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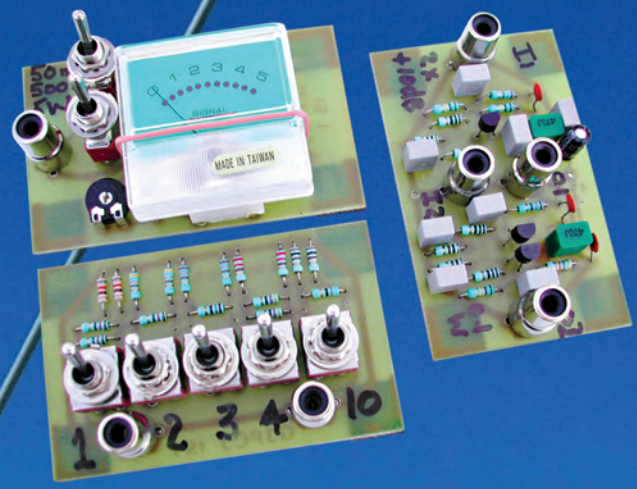

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ICOM IC-E91

Dual-band handheld transceiver.
* Tx:144 - 146MHz, 430 - 440MHz
* FM, NFM, AM & GMSK (4.8kbps voice)
* 5 / 5W, 500 / 500mW
* Wideband Rx 0.495MHz - 999.990MHz
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£249.95 C

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20 Amps 11 - 15V
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80m / 40m Receiver
SSB CW AM inc Software

NEW

Experience the thrill and amazing low cost performance of Software Defined radio. The SoftRock receiver kit builds you a dual-band 80/40m all-mode receiver with Ten IF filters, 6kHz - 25Hz, programmable AGC, Full DSP, Digital display down to 1Hz, Peak/RMS S-meter, IF Shift, Live Panoramic Display, Spectrum Scope, Memory Data Base etc. It takes about an evening to build and comes with all components, circuit board and CD disc with programmes and construction guide. Just take the output into your sound card, load the software and experience performance that would cost you £600 plus for a normal radio!! Don't underestimate it!

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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.

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IC-7800 £6400 D
Icom Flagship HF 200W transceiver. 200W max.

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As above plus 17" flat screen, keyboard & SM-20 mic

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HF/VHF 160m-2m 5-100W. SSB CW FM AM. 12V DC.

IC-706 MkIIGDSP £769 D
160m - 70cm (up to 100W HF) Detachable head.

IC-718 £449 D
Quality budget class radio HF 160 - 10m

IC-703 *Lower Price* £449 D
160 - 6m of pure QRP joy!! 10W Max

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. 160m-70cm with every feature imaginable inc. DX Cluster. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

New Lower Price **£1295 D**

TS-2000X *Lower Price* £1779 D
Take the TS-2000 and add a superb 23cm module.

TS-B2000 £1469 D
HF - 70cm with PC software for direct PC control.

TS-570DG £799 E
Superb Budget Radio 100W from 160m to 10m.

TS-480SAT £699 D
HF 160m - 6m with remote front panel. Auto ATU

PW Reader Offer

TS-480HX £799 D

200 Watts 160m - 6m

Get this 45 Amp Supply for £99, when purchased at same time as TS-480HX.

Yaesu HF Transceivers

YAESU FT-857

SPECIAL OFFER!

160m-70cm with up to 100W output, Multi-Mode HF/VHF/UHF Transceiver. With built-in electronic keyer and detachable front.

FREE YSK-857 Seperation Kit AND/OR ATAS-120 Active Tuning Antenna for £189

£579 D

FTV-1000 *Lower Price* £599 C
6m transverter for FT-1000 Mk-V and Field.

FT-897D *See Offer* £649 D
160m-70cm 100W, up to 20W from optional internal batts.

FT-840 £399 D
One of our all-time best sellers. 100W 160m - 10m

SPECIAL OFFER!

FT-817ND £429 D
Up to 5W output 160m - 70cm. UK warranty.

FT-817bhiDSP £539 D
FT-817ND with fitted bhi DSP module.

Free YF-122C CW Filter with FT-817 while stocks last

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

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Icom VHF/UHF Mobile/Base

ICOM IC-E208
LIMITED OFFER

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
£215 D

IC-910H *Lower Price* **£1085 D**
2m / 70cm 100W Base station all - modes with option for 23cm module (**UX-910 £359**)

IC-910HX *Lower Price* **£1229 D**
As above but with 23cm module ready fitted and a big saving as well.

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

Kenwood VHF/UHF Mobile/Base

KENWOOD TMD-700E
2m/70cm dual band mobile transceiver with APRS. Doesn't need extra high cost boards to function. Only extra if required is a compatible GPS receiver.

£418 C

TM-G707E **£265 D**
Dual Band 2m & 70cm with detachable front

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

TM-271E **£187 D**
Single Band 2m FM 60W mobile transceiver

Yaesu VHF/UHF Mobile/Base

YAESU FT-7800E *SPECIAL OFFER*

*2m/70cms Dual Band Mobile *High power 50W 2m /40W 70cms *Wide receive inc. civil & military airband *CTCSS & DCS with direct keypad mic. *Detachable front panel *1000 memories plus five one-touch
FREE YSK-7800 SEPERATION KIT
£229 C

FT-2800M *LOW PRICE* **£129 D**
*2m FM Mobile transceiver *High power 65W *Capable of VHF wideband receiver

FT-8800E *LOW PRICE* **£265 D**
*2m/70cm Dualband FM Mobile transceiver *50W 2m, 35W 70cm *Wideband receiver

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

FT-1802E **£129 C**
*2m FM Mobile with up to 50W RF Output

Icom VHF/UHF Handhelds

IC-V82 *NEW* **£159 C**
2m FM Digital Handheld 7W

IC-U82 *NEW* **£159 C**
70cm FM Digital Handheld 5W

IC-E90 *Limited Offer* **£194 C**
6m / 2m / 70cm handheld transceiver

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

IC-E7 *NEW* **£169 C**
New 2m / 70cm handy wide RX

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.
£189 C

TH-D7E *Low Price* **£249 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
LIMITED 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.
£209 C

VX-6E 2m/70cm 5W. **£189 C**

FT-60E *LIMITED OFFER* **£159 C**
2m/70cm 5W Handheld

VX-2E 2m/70cms min **£115 C**

VX-110 2m handheld **£94 C**

Alinco VHF/UHF Handhelds

DJ-C6E *NEW* **£119 C**
2m/70cm FM 300mW handheld transceiver

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

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

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

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

W3FF NEW Mini Buddipole

Portable 40 - 2m Ant Just 14" long packed!

£189 D
Order as W3-MBP

Comes in a case **just 14" long** yet extends to a **highly efficient 4.6m long rigid rotatable dipole.** Great for camping and back-packing. Handles 200W and band changing is just a coil tap away. Supplied with 25' of coax and balun. Centre has standard 1/2" plumbers pipe thread. Optional telescopic mast and tripod available.

SGC HF Linear Amplifiers

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

Yaesu HF Linear Amplifiers

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

Watson Mobile Antennas

ANTENNAS

W-2LE	1/4 wave 2m 0.48m 200W	£9.95	C
W-285	5/8th 2m 1.33m long 200W	£14.95	A
W-77LS	2m/70cm 0.42m 50W	£14.95	C
W-770HB	2m/70cm 1.1m 200W	£24.95	C
W-7900	2m/70cm 2m/70cm 1.58m	£32.95	C
WSM-270	Dual band mini mag BNC	£19.95	A
WSMA-270	Dual band mini mag SMA *New*	£19.95	A

BASES

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

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

WATSON Low Noise PSUs

WATSON W-25SM
Competitors models get bad press (see Radcom Dec. P66) But "Watson W-25SM stood out from the others."

£79.95 C

NEW STOCK & OFFERS

YAESU VX-120 & VX-170 *NEW*

< VX-120
A 2m 5W handheld with an 8-key pad, Ni-MH batt & charger

VX-170 >
A 2m 5W handheld with a 16-key pad, Ni-MH batt & charger

£99.95 C **£109.95 C**

YAESU FT-DX9000D *NEW*

Top-of-the-range 200W HF + 6m Deluxe Base Station. Auto ATU, 220V AC PSU, Class 'A' operation for AM & SSB, large TFT data management unit and dual analogue meters, Main/Sub receivers, 32-bit IF DSP. Return of the FT-DX series represents the very best in high power DX-ready base stations.
£7299 D

bhi DSP Equipment

SPECIAL OFFER
10% Off all these bhi prices in August

NES10-2 MkII **£99.95 C**
Combined speaker and DSP unit.

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

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

ANEM *NEW* **£119.95 C**
"NOISE AWAY" Amplified LS DSP module

NEHM *NEW* **£99.95 C**
"NOISE AWAY" Headphone DSP module

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

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

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

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

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

WATSON WM-S Hands Free

WATSON WM-S

Stay legal. Flexible boom microphone mounts under sun visor. PTT box mounts on gear changer. All powered from rig mic socket! **Includes detachable lead to match your radio.**

£39.95 C

To check compatibility, download PDF "WM-S Compatibility" in leaflets section of www.wsplc.com

ICOM IC-7000 *NEW*

160m - 70cm
Up to 100W
(HF-6m) Digital Filtering
£999 D

6" External TFT Screen
***£49.95** with built-in TV -*
when purchased at same time as IC-7000 radio.

Check out *www.wsplc.com*
Code: TFT-7000
Normally £99.95

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Software Defined Transceivers

Flex Radio USA

This transceiver outperforms hardware designs that cost three times the price!

Software Defined Radio is the future. I am sold on it and so will you be. No, it is not like controlling your XYZ radio by computer. SDR transfers most of your radios circuitry into the PC - even SSB generation - offering ultra linear processing and unprecidented circuit stability. A £1000 SDR radio would cost you at least £5000 in hardware form. And it is more reliable with FREE updates via the Internet! No more cash outlays to get the latest version! I have never experienced the performance I am getting from the SDR-1000. It is awesome with its extremely low noise receiver, IF filter shape factors never before achieved, 99dB dynamic range, and transmit and receive audio quality impossible to obtain from analogue designs. I can even record 96kHz chunks of RF spectrum for later analysis and tuning - great for weak signal tests etc. You also get so many extras including live spectrum display, wave display and other tests equipment. **Peter Waters. G3OJV.**

Try it for FREE! Send us two first class stamps and we will send you a full software kit with manuals and an 80m wave file so you can actually run the receiver section live. You will be able to tune around the 80m band, receive signals, try different filters, IF shift, AGC settings, noise reduction, different tuning steps etc. Yes REALLY!

What the Reviewers say:

Practical Wireless
"I've not heard filter performance like this on any rig"

Monitoring Monthly:
"will extract weak and difficult signals where others fail"

ARRL QST:
"third order IMD is up there with the best radio we have ever measured."

RSGB Radcom:
"selectivity - I have never achieved this on any other radio except perhaps the TenTec Orion. - the receiver performance rates with the very best - more and more radios will engineered in this way in the future - the available features and functions is awsome and comparable to top end radios and more"

For more quotes and full reviews, please check out
www.flex-radio.com

Key Specifications

Rx - 12kHz to 65MHz
Tx - 1.8MHz to 52MHz (Ham)
Power - 1W - 100W (500mW 6m)
IMD - 99dB
MDS - 130dBm (14MHz 500Hz)
Modes - SSB CW AM FM

*Realtime Panadapter
*Click on Spectrum Display Tune
*Filter shape factors 1.05:1
*No ring filters down to 25Hz
*AGC after brick wall filter
*Graphic Equaliser & Compander
*Variable bandwidth Tx filter
*Iambic Memory Keyer

Prices

SDR-1000 100 Watts	**£995.00**
SDR-1000 1 Watt	**£649.00**
SDR-1000 Receiver	**£649.00**
Auto ATU	**£199.00**
Delta-44 Soundcard	**£99.00**
VFO Knob	**£59.00**
Shuttle Knob	**£99.00**
Soundcard leads	**£24.95**
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The Soft Option!

Win Radio

Unmatched in value and performance

Choose either PCI version or external cased model

Software included

Welcome to the exciting world of SDR where the power of your PC outperforms anything a hardware design could achieve!

Software is included and requires Windows 98 or later with PC speed 500MHz or above.

Choose from internal PCI slot module or external module.

"i" = internal model
"e" = external model

WR-G303 Features

Real-time spectrum analyser; Plug and Play installation, 2nd IF totally SDR; Easily updated, Simple USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Triple AGC speeds or manual; Extensive memory feature; Dual real-time spectrum scopes; Bandwidths of: 0.5, 2.5, 3, 4, 6, and 12kHz; SSB sens. typically: 0.3uV; AM Sens: 0.9uV.

Specification

Mode: AM AMN AMS SSB CW NFM
Tuning steps: 1Hz **Image reject**: 60dB
IP3: +5dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 5dB **RSSI Sensitivity:** 1uV
Scan Speed: 40chs per sec
IFs: 45MHz; 12kHz **Stability:** 10 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12VDC Unit or PCI

WR-G305 Features

Real-time spectrum analyser; Plug and Play installation, 2nd IF totally SDR; Easily updated, Simple USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Dual Loop variable speed AGC; Manual IF gain; Unlimited memory; Audio filter: Dual real-time spectrum scopes; Multifunction squelch; Graphi hit count; Bandwidths of: 0.5, 2.5, 3, 4, 6, 12 and 220kHz; SSB sens. typically: 0.3uV; FM Sens: 0.7uV.

Specification

Mode: AM AMN AMS SSB CW NFM
Tuning steps: 1Hz **Image reject**: 60dB
IP3: 0dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 5dB **RSSI Sensitivity:** 1uV
Squelch: Level, noise, voice, CTCSS, DCS
Scan Speed: 60chs per sec max
IFs: 109.65 MHz;12kHz **Stability:** 10 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12VDC Unit or PCI

WR-G313 Features

Real-time spectrum analyser; IF Shift & Notch Filter; 2nd IF totally SDR; IF spectrum record, USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Triple AGC speeds or manual; Extensive memory feature; Dual real-time spectrum scopes; Noise Blanker; Test & Measure features; Bandwidths variable 1Hz - 15kHz; 600 Ohms line output; SSB sens. typically: 0.25uV; AM Sens: 0.9uV.

Specification

Mode: AM AMS SSB DSB ISB CW NFM
Tuning steps: 1Hz **Image reject**: >70dB
IP3: +8.5dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 2dB **RSSI Sensitivity:** 1uV
Dynamic Range: 95dB
Scan Speed: 40chs per sec
IFs: 45MHz; 16kHz **Stability:** 0.5 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12VDC Unit or PCI

WR-G315 Features

Real-time spectrum analyser; IF Shift & Notch Filter, 2nd IF totally SDR; IF spectrum record, USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Dual Loop variable speed AGC; Manual IF gain; Unlimited memory; Audio filter: Dual real-time spectrum scopes; Multifunction squelch; Nise Blanker; Bandwidths of: variable 1Hz - 15kHz; SSB sens. typically: 0.25uV; FM Sens: 0.5uV.

Specification

Mode: AM AMS SSB DSB ISB CW NFM
Tuning steps: 1Hz **Image reject**: 60dB typical
IP3: 0dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 5dB **RSSI Sensitivity:** 1uV
Dynamic Range: 90dB
Squelch: Level, noise, voice, CTCSS, DCS
Scan Speed: 500chs per sec @1kHz steps
IFs: 109.65 MHz;12kHz **Stability:** 0.5 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12V DC or PCI

Prices

WR-G303i	HF PCI module	£385.95
WR-G303e	HF External USB	£454.95
WR-G305i WFM	HF-UHF PCI module	£469.95
WR-G305e WFM	HF-UHF External USB	£539.95
WR-G313i	HF PCI module	£699.95
WE-G313i 180	HF PCI module	£869.95
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WR-G3133e180	HF External USB	£999.95
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WR-DNC3300	3300MHz down converter	£174.95

september 2006 contents

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Cover subject

The Comet antenna is shown in use at **GB0SH** at Strumble Head Lighthouse on the Pembrokeshire Coast in Wales. As far as Nevada (Comet distributors in the UK) are aware this was the first time that the Strumble Head Lighthouse has had an Amateur station transmitting from inside the building. Enjoy this issue, see you next time.

Design: Steve Hunt
Main Photograph: Courtesy of Tim Beaumont M3SDE/ZK1SDE (supplied by Nevada)
Inset Photograph: Tim Walford G3PCJ

features

15 Friedrichshafen 2006
A round-up of the news and sights from the second biggest Amateur Radio show in the world.

16 Doing it By Design
Try your hand at building **Tony Nailer G4CFY's** basic double sideband generator for 7MHz.

18 Comet H-422 Four-Band Rotary Dipole Review
Carl Mason GW0VSW, has been testing, what turned out to be a versatile antenna from the Comet range. If you're looking for a rotary dipole he says it has to be worth a look!

22 Simple RF Test Equipment
Stocking your radio shack with the basic necessities is a must for every budding home-brew enthusiast, so what better place to start than by building your own test gear? **Tim Walford G3PCJ** gets you started.

25 Ladders Of Attenuation
Stefan Niewiadomski urges you to climb the 'rungs' of ladder attenuators. They may prove to be easier to use than you think.

32 T4-2 The Station Aid
Get busy and have a go at 'brewing-up' **Rob Hannan G4RQJ**'s adapter for remote radio-monitoring.

36 Leicester Amateur Radio Show
It's show time again! Whet your appetite and get the low-down on what will be on offer at Castle Donington this year with our insight to one of the UK's best loved Amateur Radio shows.

41 Antenna Workshop
Bert Roberts G4XBZ looks into the process of designing and erecting a flexible all-band h.f. vertical antenna. You'll only need a few materials and plenty of enthusiasm.

45 A Super-regenerative Receiver for 144MHz
A classic v.h.f. project is re-visited here. It's still a viable project and could still be built today.

48 Carrying on the Practical Way
George Dobbs G3RJV shares his ideas for a glowing voltage indicator unit this month.

50 Valve & Vintage
Join **Phil Cadman G4JCP** in the vintage wireless shop as he prepares for Russian visitors as he commemorates an interesting 40th anniversary.

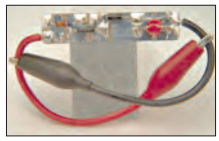

18


22


32

36


41


48

regulars

6 Keylines Topical chat and comments from our Editor, **Rob Mannion G3XFD**. This month, he discusses raising the hobby's profile among non-hobbyists.

7 Amateur Radio Waves You have your say! Keep those letters coming in and making 'waves' with your comments, ideas and opinions.

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

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

54 VHF DXer David Butler G4ASR has reports of tremendous Sporadic-E openings on the v.h.f. bands.

56 HF Highlights The latest news from the h.f. bands is presented by **Carl Mason GW0VSW**.

60 Book Store Check out the biggest and best selection of radio related books anywhere, in our bright and comprehensive Book Store pages.

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

64 Subscriptions Want to make sure you don't miss a single issue of your favourite radio read, then why not subscribe to *PW* in one easy step?

65 Topical Talk Rob G3XFD discusses **Brian Catchpole M0TAD**'s points of view on the possibilities of recycling Radio and electronic equipment.

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rob mannion's keylines

Rob Mannion G3XFD

Over the two days , Thursday and Friday 6 and 7th July I travelled to East Anglia and the East Midlands. The 551 mile (886km) round-trip from Dorset was for a club visit and a meeting with Norfolk based *PW* authors.

King's Lynn Amateur Radio Club (KLARC) in Norfolk welcomed me. Despite the heat, everyone thoroughly enjoyed the evening and we didn't leave the beautifully situated clubroom until after 11pm! I shall be looking forward to another visit to KLARC in the future.

My long journey was notable for a number of reasons - not the least being that the air-conditioning in my car was really earning its keep! However, another reason - a recurring question - (from people I met during the journey) made me realise something must be done to publicise Amateur Radio to the general public!

Amateur Radio?

While parking my car at the Tesco in store in Market Deeping, Lincolnshire for my lunch, I was approached by one of the trolley attendants. The man was over retirement age but very alert in his part time job. Interested, he asked about the EI5IW/G3XFD callsign lettering in the rear window of my car. When I gave him brief details, he asked, "What's Amateur Radio"?

He knew about CB radio but despite having been a skilled engineering machinist on specialised lathe work for many years, this intelligent, inquisitive man knew nothing of our hobby. So, I was pleased to present him with a back issue of *PW* from the box I carry in the car!

Later, near Wisbech in Cambridgeshire, I stopped at a roadside fruit & veg stall to stock up on fresh local produce to take home. While I was waiting to be served, other motorists stopped to do the same. Within moments, I was again explaining what my callsign lettering meant and what the large 144MHz mobile antenna was for.

Once again the, the Amateur Radio Public Relations (PR) script was turned on! But this time the interest only extended as far as my answer. However, I was left with the realisation that very few people know anything of our hobby!

We must promote Amateur Radio more effectively in these Islands! In the USA our pastime is well known and respected, so we must try to 'come out of the closet' ourselves. So, why not start something yourself and hold an 'open' day at your club?

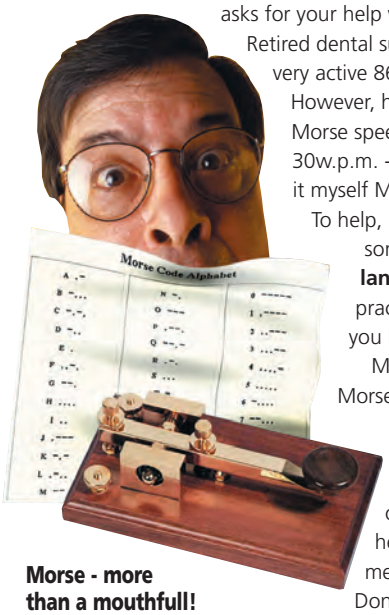
When I was a schoolboy, my first real meeting with Amateur Radio was at the Southampton Show, held on the large common in the city. The old **Southampton RSGB Group** had a regular stand there and even though the operators often had their backs to visitors, Amateurs such as **Maurice G3IXN** were on hand to explain what was going on. The very effective PR led to me becoming a member of the Southampton group for many years.

My plan is to make 2007 the year when we'll make people fully aware of the hobby. We need to support all initiatives, including the **GB4FUN** vehicle of course. But even though you may not have a specialised demo vehicle available - you do have your enthusiasm.

I'd like to hear more of your own club's local PR initiatives. So, watch this space please!

Morse Help

Miles Hely G2CYN has been a life long reader and supporter of *PW* and now asks for your help with his Morse! Retired dental surgeon Miles is a very active 86 year-old. However, he finds that his Morse speed - once up at 30w.p.m. - (Never managed it myself Miles!) is slowing. To help, he'd like to obtain some **plain language** Morse practice tapes. Can you help?



Morse - more than a mouthfull!

Miles has a Datong Morse Tutor, which produces random number and letter groups only. But if you can help, please contact me at the office.

Don't forget - learning a language (Morse, in effect, is a 'language') stimulates the brain! Along with my Linguaphone language learning my own 'little grey cells' are helped with a regular dose of Morse.

Rob G3XFD

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.

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.

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 **bookstore@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.

A new initiative has been launched which is designed to help you obtain your favourite magazines from newsagents. Called **Just Ask!** its aim is to raise awareness that newsagents can stock, order and in some cases even home deliver magazines.

We will be including the **Just Ask!** logo in the pages of this and future issues and have included a newsagent order form to help you to obtain copies.

So keep a look out for the logo and next time you visit your newsagent remember to **Just Ask!** about obtaining copies of your favourite magazines.

amateur radio waves

Surplus Equipment

● **Dear Rob**

I am old enough to remember the halcyon days of the early 1960s when government surplus equipment was the foundation, on which our hobby rested. As a school boy living just outside London, it was a real treat to get a Red Rover bus pass (remember them?) and window shop in the then Mecca of the electronics industry. I refer, of course, to Tottenham Court Road, Edgware Road and Lyle Street. The pages of *PW* at the time were full of adverts for this ex-services equipment.

Indeed, if you visited a shack at this time, you would be likely to see an HRO receiver and a modified radar display unit monitoring the transmitter exciter. Oh the joy of bringing home a lump of equipment with no idea what it was! You bought it, not because you needed it, but because it was all you could afford. If value is expressed as money spent for weight purchased, then every visit produced a bargain.

Great days indeed, but are things so different today? Granted, government surplus supplies have all but dried up, but in its place we have the amazing opportunity of the disposable society. Many mobile phones have a life of no more than 12 months; analogue Sky satellite receivers are to be seen piling high at the local tip (sorry, I should have said recycling plant); old hi-fi units have zero value and last year's computer is only good for hardcore when you build a garage. So, clearly there's no shortage of raw material, it's just of a different kind.

It seems to me that *PW* is missing a trick here. In this day and age, when we are all being urged to recycle, what could be more environmentally friendly than using this redundant equipment again?

All we need is guidance and much of this equipment, or at least many of the components, could be used again. There used to be a thriving community of private mobile radio (p.m.r.) equipment modifiers; indeed much of the potential skip fodder they rescued is still doing sterling service with Amateurs today.

Please, let's have more articles on modifying this gear and why stop there? Surely, we can broaden the approach: 'Ten ways to use an old computer power supply in the shack' or 'Using Sky receivers for DXTV' might both be suitable future articles. The list of potential projects is endless. No doubt other readers could suggest more.

While we are on this modification theme, to my knowledge *PW* have never undertaken a technical article on modifying receivers to enable Digital Radio Mondiale (DRM). An important development, which many would like to be involved with. Come on *PW*! In the past you have led the charge when it comes to technical information, you can do it again!

Now, before anyone says it, I know much of this information may be available on the Internet; but I for one would be reluctant to use it. It seems to me that what *PW* is good at, is a certain amount of 'hand-holding'. The technical water might be deep, but we trust *PW* to guide us safely to the bank where with increased knowledge and experience we continue our journey within our Amateur Radio hobby.

However, I have to say that I applaud the recent increase in construction projects in the magazine, long may it continue. I have been buying *PW* for in excess of 40 years and no doubt will continue to do so for many more. But I do believe 'our' magazine could be in the vanguard of a new 'green' movement within our hobby. A little difficult, perhaps even risky, but this could be *PW* with the edge it used to have when it was known as just *Practical Wireless*. I for one will still spend my £3 or so on a copy.

Brian Catchpole M0TAD
Milton Keynes
Buckinghamshire

Brian has made some important and interesting suggestions. I ask readers to join me on the Topical Talk page (page 65) where I can reply in detail. **Editor**

Encouraging M3s On The Air

● **Dear Rob**

Concerning the discussion on M3s and low power working, a few years ago I had a splurge of working QRP on s.s.b., when the conditions were better, of course. I worked many stations into Europe on 2 or 3W, – W4, Florida 4W, K1 Maine 2W and Australia 8W, with confirmation and mainly on 7 and 14MHz using a vertical antenna. I say "Don't despair M3s", when conditions are good you can indeed work the world on 10W and under.

Finally, I like the format for the magazine, keep up the good work. All the best.

Elgin M0ELG
Kidderminster
Worcestershire

King's Lynn Welcome

● **Dear Rob**

I was on holiday in Norfolk 1st - 8th July and I would like to express my sincere thanks to the **Kings Lynn Amateur Radio Club**, for making me most welcome at their meeting when you were their guest speaker. **Dave G6JKT** was most helpful with on-air instructions in the area. Anybody visiting the locality may find activity on the 144MHz repeater 145.712MHz and the 70cm repeater on 433.100MHz CTCSS tone 94.8.

Phil Manning G1LKJ
Guildford
Surrey

A great club, with an even greater welcome Phil! I look forward to visiting again in the future. **Editor**

Grateful Thanks From Russell Bradley

● **Dear Editor**

My wife Pam and I would like to express our thanks to all the many Amateurs locally and Nationwide who sent so many messages of support and cards directly, or via Pam, following my heart attack on the 11 June. We were overwhelmed with the support given by so many members of the Amateur Radio fraternity locally and nationally.

It turns out I had a faulty heart valve and a blocked artery, which was corrected by an angioplasty procedure and I'm pleased to say I was discharged from hospital on Tuesday 27 in time for my 60th birthday on the 28 June!

I'm feeling much better despite being a little tired and it is a pleasure to be able to walk without discomfort. I have to have a couple of weeks convalescence and then to attend a rehab course to build up my strength again at the local hospital. This will give my a chance to get on the air in the near future when I get my h.f. antenna reinstalled, to this end a few local Amateurs are coming round to get me on the air again.

I look forward to meeting *PW* readers on the air or at a rally in the near future. Once again many thanks from Pam and myself.

Russell Bradley G0OAKD
Chairman
South Normanton,
Alfreton & District Amateur Radio Club
North Derbyshire

Everyone at PW wishes you a speedy recovery Russell! **Editor**

Arabacle's Anniversary

● **Dear Rob**
With the rapid approach of his anniversary, perhaps you could consider publishing again the story of that eminent Radio Amateur, **Arabacle Oblifork**, whose diligence and zeal wreaked such a devastating effect on the radio communications of the Wehrmacht, to the extent that, arguably, the hostilities were shortened by several months, if not years.

As you are aware, it fell to *PW* to draw back the veil of secrecy, which had been drawn around Arabacle's operations. I believe a repeat of your article would be well received.

Dave Oswald GM3COQ
Montrose
Scotland

I have the enviable position of honorary archivist, with unlimited access to the complete reference library for PW and sister magazines covering more than 70 years. However, as I wasn't resident in this country at the time, I missed the original publication of the fantastic achievement of Arabackle Oblifork. I knew nothing of the story of this Albanian amateur until I read, and re-read ***John Heys G3BDQ****'s account of his remarkable life and achievement in the May 1983 issue of PW. I was astounded, perhaps, as Dave suggests it's time we republished story of the 'saviour' of the 20m Amateur band. The Editor is planning to republish the story during 2007, the 75th year of PW. Reader's suggestions regarding other 'special' articles are welcome.* **Tex Swann G1TEX**

Applause For W&S

● **Dear Sir**
This is a loud plaudit for one of your regular advertisers, namely **Waters & Stanton** of Hockley in Essex. They deserve a mention in despatches because they repaired an MFJ unit that I had stupidly wired up the wrong way round! But not only that, both the repair and the postage costs were free too.

Waters and Stanton employee 'Zippy' was the man who put it all back together again in record time. No sooner had I sent it away, it was back on the bench again doing what is does best – banging out the c.w.

Thank you Waters & Stanton and its service department who provided such an excellent after-sales service. Long may they prosper. Wouldn't it be heart warming if all service repairs went so smoothly as this did, be they free or not?

I'm also writing about two articles in the same issue (July 2006) about what is probably my favourite antenna – the dipole. But, which one of them did I personally prefer? Well, with no hesitation at all, it has to be the one penned by *PW* cartoonist and author **John Worthington G3COI**. And of course, the magic ingredient is humour, which is missing in the **Steve Telinuis-Lowe 9M6DXX's** variant on the theme, but not unsurprisingly included in G3COI's version of the same subject.

On the other hand, I'm glad the Steve 9M6DXX didn't attempt humour. His exploration on the same theme was as I expected before I read it, purely functional and with respect to his pervious job as Editor of *Radio Communications*, eminently practical and to the point.

The alternative 'spin', courtesy of G3COI was more enjoyable to read. If I were a new boy or girl to the hobby of Amateur Radio (or even if I wasn't), I'm sure John G3COI's amusing article would get me wanting to build a dipole almost immediately! Unfortunately, 9M6DXX's wouldn't. It might be helpful later, but not straight away. The magic of humour is a marvellous device to whet the appetite of motivation.

Ray Howes G4OWY
Weymouth
Dorset

Letters Recieved by 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.

Look out for representatives from *Practical Wireless* and *RadioUser* at rallies printed in bold.

August 13
Flight Refuelling ARS Rally
Contact: Mike M0MJS
Tel: (01202) 883479.
The annual Flight Refuelling Amateur Radio Society Rally will be held at Flight Refuelling Sports and Social Club, Merley, Wimborne BH15 4JU. All the usual traders, stalls, car boot and refreshments will be on-site.

August 27
Milton Keynes ARS Annual Rally
Contact: Mike G3LFR
Tel: (07973) 264473
E-mail: rally@bletchley.net
Website: www.mkars.org.uk
The Milton Keynes Amateur Radio Society Annual Rally will take place at a **new** venue for 2006 - Holne Chase Primary School, Buckingham Road, Bletchley, Milton Keynes MK3 5HP. The rally opens at 1000, with trading closing at 1600. Talk-in will be on 145.550MHz. The rally location is a five minute walk from Bletchley Park (well worth a visit).

August 28
Huntingdonshire ARS Rally
Contact: Peter Herbert M5ABN
Tel: (01480) 457347 between 1800 - 2200
E-mail: peter.m5abn@btinternet.com
Website: http://www.hunts-hams.co.uk/
The Huntingdonshire Amateur Radio Society will be holding their annual bank holiday Monday rally at Ernulf Community School, Barford Road, Eynesbury, St. Neots PE19 2SH (near Tesco Superstore on A428). Doors open at 1000, admission £1.50. Hall and boot sale on hard standing, Talk-in on S22. Hot and cold refreshments will be available.

September 3
West Somerset ARC Car Boot sale
Contact: Bob
Tel: (01643) 863462
E-mail: info@westsomerset-arc.co.uk
West Somerset Amateur Radio Club are holding their car boot sale at the Selworthy Parish Hall and Recreation Ground in Allerford Village, Minehead, Somerset TA24 8HL. Doors open from 1000 until 1600, admission, £5 for sellers, .£1 for buyers, children under 16 free. All the usual traders (no Household goods). Tea and coffee will be available at the venue and food will be available in the village.

September 8/9
Leicester Amateur Radio Show
Contact: Geoff Dover G4AFJ
Tel: (01455) 823344
E-mail: Geoffg4afj@aol.com
Website: www.lars.org.uk
The 36th Leicester Amateur Radio Show takes place at Donington Park, Castle Donington, North West Leicestershire, Derby DE74 2RP There will be over 100 stands selling radio and radio related equipment, computers and electronics, as well as the major manufacturers and dealers displaying the latest products. There promises to be a comprehensive lecture programme as well as the chance to try your hand at DFing and to win an ARDF Receiver! Other features include flea market, Bring and Buy, local and national clubs and societies together with all your favourite radio magazines. The show opens at 0930 on both days and closes at 1730 on the Friday (8th) and 1630 on the Saturday. Admission: One day ticket £3.50, concessions (OAPs & under 16) £3; two day ticket: £6, concession £5. Under 12 free when accompanied by an adult.

September 24
Plymouth Radio Rally
Contact: Frank Russell
Tel: (01752) 563222
E-mail: frank@foxonezero.fsnet.co.uk
The Plymouth Radio Club will be holding their next Radio Rally at the Stoke Damerel Community College, Plymouth PL3 4BB. There will be over 300 car parking spaces with lots of indoor stalls selling everything you might want that is even slightly radio related! Refreshments vans, indoor rest and natter areas, disabled toilets, Bring & Buy and demonstrations. Doors open at 1000. Talk-in on S22.

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. Look out for representatives from *Practical Wireless* and *RadioUser* at rallies printed in bold.

amateur radio news & products

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

Special Event GB2PF

A special event station is being run by **Bolsover Amateur Radio Society** to mark the birthday of **Peter Fidler**, a Bolsover man who mapped large areas of Canada in the 18th Century. The event will be held at the Coalite Sports and Social Club, Moor Lane, Bolsover S44 6EP (please note that the Bolsover Amateur Radio Society are moving permanently to this venue with effect from 26 September and look forward to welcoming old and new members) over the weekend of the 12/13th August 2006 and the callsign **GB2PF** will be used. Activity will be on h.f.. and v.h.f. bands.

For more details about the society and their activities take a look at: **http://www.g4rsb.org.uk/**

Accreditation Awarded

Martin Lynch & Sons have recently been certified as an ISO 9001:2000 accredited organisation. On receiving this accreditation, Martin commented: "I am delighted that our systems and services we have worked to for many years have been accepted by the 9001 assessment auditors and this once again proves how seriously we take our business. Our customers have always been our guide as to 'how right we do things'; and all the staff at ML&S worked hard to ensure the June assessment ran as smoothly as it did".

In particular, Martin would like to thank his own on-site quality management representative, **Martyn Spence G4SOH** for his time and commitment to the accreditation.

ML&S Martin Lynch & Sons Ltd., Outline House, 73 Guildford Street
Chertsey, Surrey KT16 9AS UK
Tel: (01932) 567333. FAX: (01932) 567222
E-mail: Martin@MLandS.co.uk
Website: www.MLandS.co.uk

Walter G3ESP and Joyce Score 60!

Well known *PW* author **Walter Farrar G3ESP** and his wife, Joyce, celebrate 60 years of marriage in 2006. And it turns out that the story began in Christchurch, very close to the *PW* offices!

At home in Pontefract 2006.

Walter G3ESP writes: "I first met Joyce in 1944 when we were both working at the Signals Research and Development Establishment (SRDE) in Christchurch (then in Hampshire, but now in Dorset). Our wedding took place on 23 April 1946 and 60 years later in April 2006 a white flag with a red cross of St. George was run up on my nine metre high mast for the whole day. After all, St. George is the patron saint of England and it would have been Shakespeare's birthday too, if he was still alive"!

A regular author for *PW*, Walter, 86 and Joyce, 82 have lived in Pontefract, Yorkshire for many years. They have two children, Marilyn who is 52 and son Paul, now 51 years old.

After leaving government service at the SRDE in Christchurch Walter worked as a school teacher and college lecturer until retirement. Languages have been a lifelong interest for Walter and his interest in the international language Esperanto partly explains his callsign G3ESP!

Congratulations to Walter and Joyce from everyone on *PW*!

Rob Mannion G3XFD

Wedding Day in April 1946.

Ofcom Publish Lifetime Amateur Radio Licensing Document

Rob Mannion G3XFD, takes a look at the latest load of paperwork from Ofcom. This time it's the document detailing the format of the new 'Licence for Life' legislation.

The draft 'Licence for life' proposals were published on the Office website on July 4 2006 using the URL: **www.ofcom.org.uk/consult/condocs/aradio/lifetimelicence/licenceformat.pdf**

The *Licence for Life* document is a 27-page download and takes some reading! There's an introduction, followed by the background of the new legislation, followed by a draft of the proposed Amateur Radio Licence itself.

This brief news report highlights several changes/concessions, which are sure to interest readers. First, the draft section on station logging requirements seems to confirm that there will in future not be a firm requirement for keeping a 'paper' logbook. There's no mention of a paper logbook and the document states that, a log should be kept at the request of an "authorised person when required". Note the 'when required bit! This obviously would be the case when TVI or BCI was under investigation.

Second, there also seems to be a relaxation of the regulations regarding operation of a (full licence) station by Radio Amateurs from abroad (no mention of CEPT). So, there are some interesting changes on the way!

Note: For those readers without access to the website, paper copies are available from Ofcom at the **Licensing Centre, Ofcom, Riverside House, 2a Southwark Bridge Road, London SE1 9HA.**

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

IC-7000, Now E-Marked!

Icom UK are pleased to announce that the IC-7000 h.f./50MHz/v.h.f./u.h.f. mobile transceiver now complies with the European Commission Directive 95/54/EC and is E-marked. This means, that as well as the IC-7000 being great in the shack, you can now install and enjoy using this transceiver in your vehicle.

To ensure convenient installation in your vehicle, Icom UK has created a new mobile mounting kit, RMK-7000, which features a mobile mounting bracket for the main unit, a mounting bracket for the transceiver's head and a 3.5m separation cable. The IC-7000, RMK-7000 and all associated accessories are available from all authorised Icom Amateur Radio Dealers.

For a full review of the IC-7000 take a look at the August 2006 issue of *Practical Wireless* and for more details point your web browser at: **www.icomuk.co.uk/amateur**

Hillcrest On The Move!

The **Hillcrest Amateur Radio Society** has moved its venue due to severe parking and access problems at the original site. With effect from the 15 June the club have been meeting at **The Summerhill School Lodge Lane, Kingswinford, West Midlands DY6 9XE.**

The Society was founded in the early 1990s with the aim of furthering Amateur Radio in the Dudley area of theWest Midlands. Meetings are held at 1945 on the first, third and fifth Thursday of the month. Full details on events planned in the coming months can be found at **www.hillcrestars.co.uk** or by contacting the secretary, **Stuart M0SJV** on **(01384) 232457.**

Advanced Radio Amateur Course

An advanced Radio Amateur course will commence on Monday 2 October 2006 at **Newstead Wood Girls School, Avebury Road, Orpington, BR6 9SA** To enrol for on the course you should contact the Bromley Adult Education College, Widmore Centre, Nightingale Lane, Bromley BR1 2SQ. Tel: 020-8460 0020. Further information can be found at **www.baec.ac.uk**

Scarborough Shines a Light

The Scarborough Special Events Group will again be taking part in the annual International Lighthouse Weekend on the 19/20th August. The group will be operating from the lamp room at the top of Scarborough Lighthouse ENG-121, as **GB1SCA**.

Every alternate year the group invite local artists to submit a painting of Scarborough lighthouse to provide a unique souvenir QSL. This year's painting, by Robert (Bob) Sheader, shows a sailing vessel running for the shelter of Scarborough harbour during the great storm of 1880, when nine ships were wrecked on Scarborough's south sands.

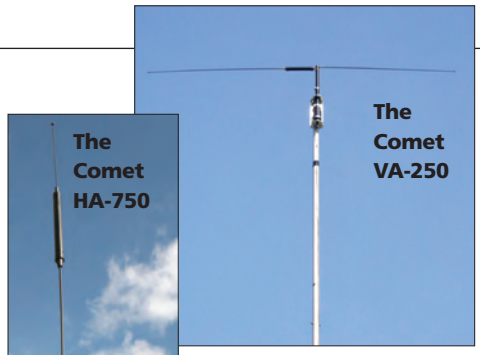
For more information on the Scarborough Special Events Group contact:
Roy Clayton G4SSH, 9 Green Island, Irton, Scarborough YO12 4RN.
Tel: (01723) 862924

Lighthouse on the Air

Over the weekend of the 19/20th of August, members of the **Norfolk Amateur Radio Club** will be operating **GB0HL** from Happisburgh Lighthouse as part of International Lighthouse/Lightship Weekend. The distinctive red and white lighthouse is the oldest working light in East Anglia and is unique as it's the only independently run lighthouse in Great Britain. Built in 1790, originally one of a pair - the tower is 26m (85ft) tall and the lantern is 40m (134ft) above sea level. The 'low light', which was discontinued in 1883 was 6m (20ft) lower and the pair formed leading lights marking safe passage around the southern end of the treacherous Haisborogh Sands.

Throughout the weekend, **GB0HL** will be active on the h.f. and v.h.f. bands with stations operating s.s.b., c.w., SSTV and ATV. All stations contacting GB0HL will receive a colour QSL card and s.w.l. reports are welcomed. Members of the public are encouraged to visit GB0HL during the weekend as members of the Happisburgh Lighthouse Trust will be on hand to provide guided tours of the Lighthouse to those wishing to climb the 112 steps to the lantern (please note that children under eight years of age are not allowed to climb the tower). For more details on the activities of the Norfolk Amateur Radio Club take a look at:
http://www.norfolkamateurradio.org/

New Comets


The Comet VA-250


The Comet HA-750

Nevada have recently added two new Comet antennas to their vast product range. The first of these is the **Comet VA-250** ultra compact three-mode antenna for use on the 7 to 70MHz bands. It's billed as being an ideal antenna for flat-dwellers, caravanners, holiday operations or anywhere that there's not a lot of space.

The VA-250 is actually three antennas in one. It can be configured as an ultra-compact rotary Tee, with the supplied 10m wire as an end-loaded long wire or with the wire suspended for a broad-band vertical. No radials are required – it's an incredibly easy antenna to use. The VA-250 retails for £169.00 plus postage and is available now.

The second new antenna is the **Comet HA-750B** wide-band mobile antenna. This is said to offer excellent s.w.r. on 7MHz and from 18 - 80MHz with no gaps. The HA-750 can also be used on all bands from 3.5MHz upwards with an antenna tuning unit.

Based on the highly successful CHA-250B wide-band base vertical, the HA-750B is only 1.23m overall and weighs just 730g, yet it is rated at 120W s.s.b. (intermittent). It's built on a heavy-duty PL259 mount and fitted with a tilt-over hinge, which reduces its height to just 9in. The HA-750B costs £139.00 plus postage.

Both of the new Comet antennas are available direct from:

Nevada Radio
Unit 1 Fitzherbert Spur
Farlington
Portsmouth
PO6 1TT
Tel: 023-9231 3090

Michael Wright G8SRL/G0GCI 1940-2006

It's with much sadness that **Les Featherstone G6UBM** reports of the sudden tragic and premature death of **Michael Wright G8SRL** on the evening of 6 July in a road accident.


Photo courtesy of Ken G3KIP.

Mike originally took his RAE while still at school but did not obtain his callsign until 1979 when he found that a v.h.f. licence could be obtained without the need of a Morse qualification. By 1986 he had passed the Morse test and obtained the full licence. He continued to use this until late 2003, when he reverted to his original callsign, the Morse requirement having been removed at that time.

While he lived at Farnborough in Kent, Michael was active with local clubs and his interest in contesting was fuelled by participating in the field-day sites on the Ridgeway. Thirteen years ago, relocation of his work prompted a move to Matfield and a transfer of allegiance to the West Kent ARS where in the fullness of time he became Chairman and Treasurer of the Society.

Mike was active on v.h.f. bands both contesting and DX chasing, especially on the 50, 70, 144 and 430MHz bands. The Backpackers contests were a particular favourite of his and were normally entered under the WKARS call of G1WKS. His endeavours resulted in a fair level of success both for WKARS and his own tally of squares worked and confirmed. Although not a great constructor, he did manufacture a number accessories for his stations including antennas. Probably his greatest legacy to Amateur Radio, will be the encouragement and enthusiasm he gave to others.

Coming from a large family, of five sisters and three brothers, in the Farnham area, Mike, although he never married was a fond and notably generous uncle to his nephews and nieces. Away from Amateur Radio his main interest was the social scene at the Hop Bine, his local pub. Here he was affectionately known as 'Radio Mike' by his friends and where he was a popular and active participant in many activities and a regular member of the darts team. It was while returning from the Hop Bine that he was knocked off his bicycle and we lost a good friend and genuinely nice guy.

Our sympathies and thoughts are with Mike's family and friends following this sad loss.
Editor

amateur radio clubs

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

Club Organisers: please include your event's full address, including its postcode, with any news item sent to us for publication.

EAST LOTHIAN
Cockenzie & Port Seton ARC
Contact: **Bob Glasgow GM4UYZ**
E-mail: **gm4uyz@cpsarc.com**
Website: **www.cpsarc.com**
The Cockenzie & Port Seton Amateur Radio Club meets on the first Friday of every month (except January where it is the second Friday) in the Lounge Bar of The Thorntree Inn, High Street, Cockenzie, Prestonpans, East Lothian EH32 0DQ from 1900 Club meetings are very informal events and are really an excuse to have a rag chew and a few beers of course! In addition to regular club nights the members aim to organise at least one other event each month. These include technical talks, equipment test nights, and direction finding hunts, visits, social nights, special event stations, contests and an annual junk sale.

KENT
Bromley & District ARS
E-mail: bdars-news@hotmail.co.uk
Website: www.bdars.org
The Bromley and District Amateur Radio Society offer technical and general interest talks, contest group, special event and demonstrations group, direction finding hunts, construction competitions, mutual help, Junk sales, newsletter, Foundation Licence Course tuition and much more. Meetings take place every third Tuesday of the month at 1930 for 2000. The society meets at the Victory Social Club, Kechill Gardens, Hayes, Kent BR2 7NG (off B265, Hayes Lane, Bromley).

STAFFORD
Stafford & Districts ARS
Contact: **Graeme Boull G4NVH**
Tel: **(01785) 604534.**
E-mail: **graeme.boull@ntlworld.com**
Website: **www.g3sbl.org.uk/**
The Stafford & Districts Amateur Radio Society meet on Thursday at 2000, The shack is located in the AREVA T&D UK Ltd. Factory, St Leonards Works, St. Leonards Avenue, Stafford ST17 4LX. Their next meeting takes place on **Aug 31** and is a Presentation and Demonstration by the 58th Signal Squadron TA - G4NJR. Why not go along and join in?

WEST SUSSEX
Horsham ARC
Contact: **Adrian Boyd G4LRP**
E-mail: **adrianboyd@avaya.com**
Website: **www.harc.org.uk**
Members of the Horsham Amateur Radio Club meet the first Thursday for each month at the Guide Hall, Denne Road, Horsham, West Sussex. NRQ TQ17 at 2000 local time. Their club programme offers a variety of lectures covering a wide range of subjects. The club has two nets; the first one is on Sunday mornings at 1000 local time with a frequency of 3.722MHz and the second is on a Saturday evening at 2130 local time with a frequency of 144.725MHZ, all are welcome to join in. At the March and October meetings they have a surplus equipment sale at which anybody can bring along items to be auctioned off. The club takes a small commission for this service. Bi-monthly social evenings are held at local Public Houses, at which all members, potential members and any partners are welcome. Forthcoming meetings include: **Aug 17:** Social Evening at the George & Dragon, Dragon's Green; **Sept 7:** Club Night - 'Efficient Loops - the latest' with **G3LHZ**; and **14th**: Committee Meeting at the QTH of **G3ZBU**.

Keep your club news coming to **pwnews@pwpublishing.ltd.uk** and **please remember** to include the **postcode** of your meeting venue - it helps potential visitors to find you!

European Radio Show

Friedrichshafen 2006

Roger Hall G4TNT

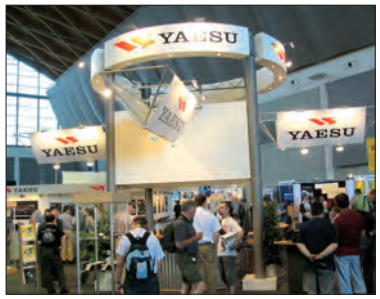
The second biggest Amateur Radio show in the world took place in June in Friedrichshafen, southern Germany. For the last 31 years this small town on the shore of Lake Constance has hosted Ham Radio, the European equivalent of the Dayton Hamvention.

Although not as big as the Dayton show, Friedrichshafen still had 221 exhibitors attending from 35 countries and it attracted almost as many visitors with just over 18,000 turning up this year as opposed to the 20,000 who went to the Hamvention. Vistitors to the show came from more than 30 different countries, about half of them travelled more than 200 miles to get there and, encouragingly, about 15% were under 30.

The main show was held in the main Hall, A1, which is a bit bigger than the hall at the Donington show (Leicester). It's big but it was easily overshadowed by the huge indoor flea market. This occupied three halls and it was hard to cover it all in the three days that the show was on. There was a wonderful selection of vintage radios for sale, along with a range of quality test equipment. Of course, there was a lot of other radio related stuff on sale as well as everything else from fresh fruit to watches.

If you've ever wanted to visit a massive international radio show, Friedrichshafen is a good one to go to. Cheap direct flights are available from Stansted Airport. You should expect to pay between £75 and £100 for a return flight. The flights leave early in the morning and return late at night. As Friedrichshafen is a popular holiday resort in its own right, a long weekend with the family and a side trip into the Black Forest is a good option. That way they can look around the town or sunbathe by the lake while you enjoy the show. If you hire a car, there's plenty of parking at the show or you can take the special bus from the town centre. If you're tempted, next year the show will be on June 22, 23 and 24.

Meanwhile, here are some of the sights from this year's show. **PW**



The main show was held in the main Hall, A1, which is a bit bigger than the hall at Donington. The 'big three' radio manufacturers - Icom, Kenwood and Yaesu - were well represented with impressive stands.

A small section of the Flea market.

Just one of the many companies selling loop antennas, which seem to be very popular in Europe.

This show has always been known as a good place to find vintage radios and this year there was an exceptionally good selection.

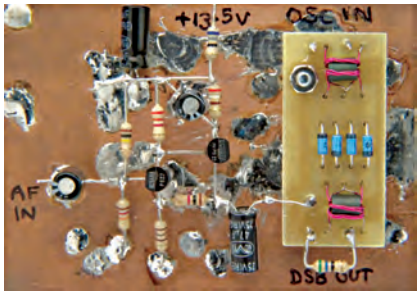
If you've ever hankered after a genuine Enigma machine, Tom Perera W1TP would sell you one but you'd need at least $25,000!

The flea market at this show has always been a good place to buy good quality test equipment.

The QSL Wall was a popular way of letting your friends know you were there.

doing it by design

This month, Tony Nailer G4CFY has decided to design and then describe a basic double sideband generator for 7MHz.



The prototype board for the double sideband suppressed carrier generator project (see text).

This month, I've decided to describe the generation of double sideband suppressed carrier (d.s.b.s.c.) signals and I'm doing this because I think there's a generation of Radio Amateurs and experimenters who have yet to tread this path. Regardless of the numbers of projects for direct conversion transmitters and receivers, which have been published over the years, I think it's likely that many readers have probably not 'had a go' themselves - unless there were printed circuit boards (p.c.b.s) available for an s.s.b. project.

So, let's start from the very basics of generating a suppressed carrier signal by remembering there are two very important requirements for a double balanced mixer. One is that the balance should be good, that refers to the attenuation of either of the input signals when measured at the output. I consider 40dB to be a minimum. The other requirement is that the output level should be proportional to the input level over a very wide range without undue distortion products.

Doubly Balanced Diode Mixers

Doubly balanced diode ring mixers are relatively simple and can achieve both requirements easily. Their disadvantage is they need to be driven from low impedance sources, for both signal input ports.

The double balanced mixer featured in DiBD, September 2005 *PW*, used four BAT42 diodes and a pair of small ferrite beads, **Fig. 1**. It achieved the 40dB isolation and was found to be usable over the range d.c. to 100MHz. This means the mixer will be ideal for our needs.

A suitable variable frequency oscillator (v.f.o.) source would be the Portland VFO with Buffer 2. This v.f.o. was designed exactly for the purpose, it's ideal for use with this project.

Editorial note: The projects mentioned are available as DiBD Mixer WT2858 and Portland VFO from the *PW* PCB Service.

Microphone Amplifier

Now let's consider an audio amplifier, to work with a dynamic microphone and to feed the diode ring. The audio voltage produced by a typical 600Ω dynamic microphone is 50mV peak-to-peak (p-p). If the oscillator port of the mixer is driven with 1V p-p then we could need 0.5V p-p audio drive. So, we need a gain of around 10.

I have decided against using an Op Amp because of their tendency to get 'upset' with radio frequencies (r.f.) getting into them. The alternative is to design a discrete amplifier, which functions a bit like an Op Amp. This will consist of an *npn* and a *pnp* transistor, each operating in common emitter and directly coupled together **Fig. 2**.

These two devices have both alternating current (a.c.) and direct current (d.c.) feedback from resistors R5 and 6, which must have a ratio of 10:1. This fixes the total gain at a theoretical maximum of 11. Individually the two devices must have as much voltage gain as possible. Then in effect it's like an Op Amp with a high open loop gain but a closed loop gain of 11.

Initially, I chose to run Tr1 at a collector and emitter current of nominally 1mA and I decided that Tr2 should to have a collector and emitter current of 6mA. The supply rail was arranged to be 13.5V and the decoupled point Vd below R7 should be around 13V.

I decided to let the collector of Tr2 be at about half rail, that is 6.5V. To drop say 6V across R5 with 6mA flowing through it would put its value at 1kΩ. This arrangement would make R6 100Ω.

The resistor R6 will carry 1mA for Tr1 and 6mA for Tr2, so it will drop 0.7V. The emitter of Tr1 will be 0.7V and the collector of Tr2 will be 6.7V.

The base voltage of Tr1 will be about 0.7V above the emitter voltage, so it will be 1.4V. If the voltage across R2 is 1.4V, then there will be 13V - 1.4V = 11.6V across R1. The ratio of R2 to R1 is then 11.6/1.4. Choosing high values this could be 116kΩ and 1.4kΩ. The nearest preferred values being 120kΩ and 15kΩ.

Now Vb = Vd*R2/(R1 + R2),
Vb = 13*15kΩ/(120kΩ+15kΩ),
Vb = 195kΩ/135kΩ = 1.444V.

Not bad but a little high! I tried again using 100kΩ and 12kΩ a pair with a slightly higher ratio.

Vb = 13*12Ω/(100kΩ + 12kΩ)
= 156kΩ/112kΩ = 1.39V. Close enough!

The collector of Tr1 must be at least 3V above the voltage at the collector of Tr2 or that device will have insufficient voltage across it. If the collector of Tr1 is set at 10V, and has a collector current of 1mA, then R3 = 3kΩ. Either 2.7kΩ or 3.3kΩ can be used.

The emitter of Tr2 will be 0.7V above the base voltage, so will be 10.7V. This means R4 has 13- 10.7 = 2.3V with 6mA flowing through it, R4 = 2.3V/6mA = 383Ω. (Use 390Ω).

The supply resistor R7 will have 0.5V across and 7mA flowing through it, so it will be 0.5V/7mA = 71.4Ω, (use 68Ω).

Data Book

The *Mullard Data Book* gives the gain

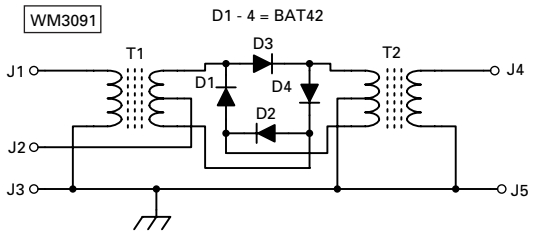


Fig. 1: The double balanced mixer featured in DiBD, September 2005 *PW*, used four BAT42 diodes and a pair of small ferrite beads. It achieved the required 40dB isolation and was found to be usable over the range d.c. to 100MHz (see text).

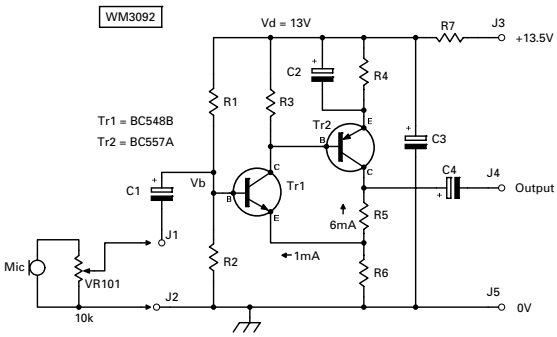


Fig. 2: Tony G4CFY decided against using an Op Amp because of their tendency to get 'upset' with radio frequencies (r.f.) getting into them. A discrete component amplifier, as illustrated here, which functions a bit like an Op Amp is used instead (see text).

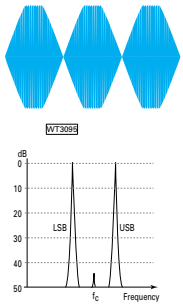


Fig. 3: During the design stages, Tony discovered that the mixer output was distorted. The audio was then reduced until the distortion was gone. The output signal amplitude was then 700mV p-p and shape as shown here. Note: The equivalent r.f. spectrum would look as shown below the waveform envelope (see text).

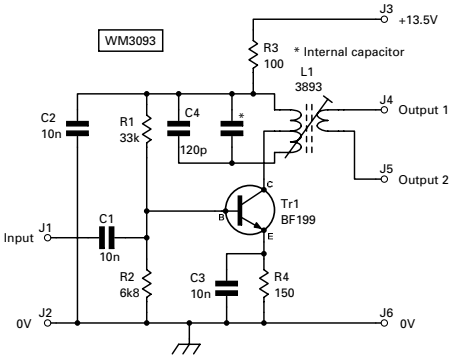
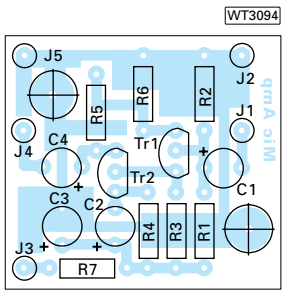


Fig. 4: A suitable i.f. amplifier circuit. The project is available as IF Tuned Amp WT2417 from the PW PCB Service. This circuit with a 10.7MHz i.f. coil TOKO 3892 or 3893 together with a 120pF capacitor in parallel would resonate nicely at 7MHz.



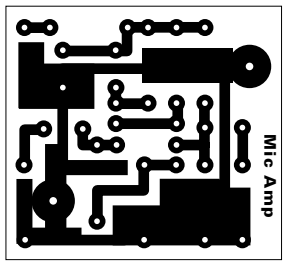


Fig. 5: The microphone amplifier board p.c.b., with associated component overlay (see text).

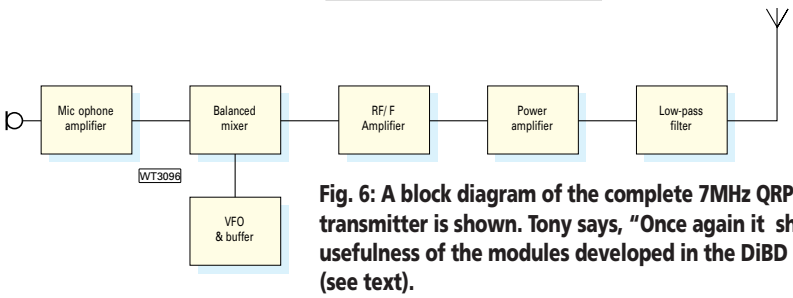


Fig. 6: A block diagram of the complete 7MHz QRP d.s.b. transmitter is shown. Tony says, "Once again it shows the usefulness of the modules developed in the DiBD series". (see text).

Kits & Bits

Parts availability: DiBD Mixer, p.c.b. £1.50. Parts and wound toroids £3. P&P 75p.
Microphone amplifier, p.c.b. £4, components £1. P&P 75p.
7MHz 20mW amplifier, p.c.b. £2,. components £2. P&P 75p.
Portland VFO and Buffer 2, p.c.b. and parts kit, with drilled box £23.50. P&P included.
Cheques payable to **A.J. & J.R. Nailer, Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset DT1 2EF.**

(h_{fe}) of the BC548B as typically 300 and base input impedance (h_{ie}) as typically 4.5kΩ. The input impedance at the base of Tr1 will be that of the transistor Rt = (h_{fe}*R6 + h_{ie}) in parallel with R1 and R2.

Let the parallel combination of R1 and R2 be Rp. Then Rp = R1*R2/(R1 + R2).

Rp = 100kΩ * 12kΩ/(100kΩ + 12kΩ)
= 1200*k^2/112kΩ = 10.7kΩ.
Rt = h^{fe}*R6 + h^{ie} = 300*100 + 4500
= 34500, or 34.5kΩ.
Rp//Rt = Rp*Rt/(Rp + Rt)
= 10.7kΩ*34.5kΩ/(10.7kΩ + 34.5kΩ)
= 369.15k^2 / 45.2kΩ = 8167Ω. This is quite high enough, though not as high as I expected. The lowest factor is the value of R2, if necessary this could be increased in proportion with R1.

Now, we will determine the coupling and decoupling capacitors. The lowest operating frequency of audio will be 300Hz. The capacitor C1 could have a reactance XC1 of 100Ω which is insignificant compared to the input impedance.

If XC1 = 1 / (2*π*f*C1), then C1 = 1 / (2*π*f*XC1)

C1 = 1 / (2*π*300*100), C1 = 1/188495 = 0.0000053F, or 5.3µF. Use 4.7µF.

Now, both C2 and 4 need to have a reactance of 10Ω or less, so we could use 47µF. The capacitor, C3, should be less than a tenth of the value of R7, let's say 5Ω, which will require 100µF.

Double Sideband Generator

Let's now look closely at the techniques and circuitry required for the double sideband (d.s.b.) generator. The amplifier was built up 'dead bug' style and coupled to the diode ring mixer board (DiBD Sept 2005 *PW*) and to a Portland VFO with Buffer 2 running on 7MHz (March 2006 *PW*).

A supply of 13.5V was connected to the set up. A Wien Bridge Oscillator unit was used to apply a signal of 50mV at 3kHz to the amplifier input. I used a Telequipment D54 Oscilloscope (with a

10MHz bandwidth) for measurements. The probe was a simple coaxial cable with BNC one end and split tails with prod clips.

The output from the amplifier to the mixer was exactly 500mV, undistorted. Increasing the input audio and the output started to clip at the bottom at 600mV p-p.

Unterminated Mixer Output

I then looked at the signal at the mixer output, which was seen to be distorted. The audio was then reduced until the distortion was gone. The output signal amplitude was then 700mV p-p and shape as shown in **Fig. 3**. **Note:** The equivalent r.f. spectrum would look as shown below the waveform envelope.

Input from the Portland VFO to the mixer was measured at 1.225V p-p. Audio input level was 36mV and audio at the mixer input was 360mV.

The audio signal was removed and the scope sensitivity increased to a maximum of 10mV per division. The waveform on the display was about 2.5mV p-p. This is one 280th of the peak output envelope and represents 49dB carrier suppression.

Terminated mixer output

Next, a 56Ω resistor was connected to the mixer output port and the measurements repeated. The observed r.f. output envelope was 350mV p-p. (The a.f. input was 35mV p-p and the a.f. at the mixer input 310mV p-p). Oscillator input at mixer 1.2V p-p. Unmodulated carrier 2mV. Carrier suppression 350mv/2mV = 175. This represents 45dB.

Output from the mixer of 350mV p-p into 56Ω comprises two signals, one at the oscillator frequency plus 3kHz, the upper sideband, and one at oscillator minus 3kHz, the lower sideband. This is the double sideband suppressed carrier we require.

Each signal has a power level of 175mV peak, which is an r.m.s. value of 0.7*175mV = 123mV. With a 56Ω load the power $P = V^2/R = 0.123^2/56 = 0.27$mW r.m.s. Total output 0.54mW.

A single stage using a BF199 with 16dB power gain can raise this to over 20mW. A suitable circuit would be the IF Amp described in DiBD, July 2004 issue *PW*. In this application we would be dealing with large signals and it will be necessary for the device to run at a higher collector current. The emitter resistor will need to be reduced from 820Ω to 150Ω.

Editorial note: The board is available as IF Tuned Amp WT2417 from the PW PCB Service. This circuit with a 10.7MHz i.f. coil TOKO 3892 or 3893 together with a 120pF capacitor in parallel would resonate nicely at 7MHz. The circuit is shown in **Fig. 4**.

Power Amplification

At 7MHz, a power MOS device such as the IRF610 could further amplify this to about 2W. That's quite a nice level for a bit of QRP work. Unfortunately, I didn't have the time during the creation of this article to pursue the development of a power amplifier (p.a.) stage.

The microphone amplifier I've described was laid out as a p.c.b. and is shown together with the component identification in **Fig. 5.**

A block diagram of the complete 7MHz QRP DSB transmitter is shown in **Fig. 6** and once again shows the usefulness of the modules developed in the DiBD series. I hope you will have a go at building it and learning about d.s.b. yourself!

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

PW

The Comet H-422

Taking a break from his normal PW duties, Carl Mason GW0VSW tried out an interesting antenna from the Comet stables. Carl then found some interesting differences between the Comet and his usual G5RV antenna.

Apart from using a vertical, I've always been restricted in the type of antenna I can use at home. Wire dipoles have been my favourite for sometime now because they are very simple and cheap to construct. They are also very easy to replace should they get damaged, which is something that seems to happen more frequently these days with our British, and particularly the Welsh weather!

Although I'm happy with my G5RV, I have always wanted to be able to rotate the antenna. This would be helpful to pick up those stations that are normally weak, or lost in the 'nulls', and perhaps favour some of the DX I wouldn't normally be able to hear.

The Comet H-422 four-band Rotary V Dipole had caught my eye several times while I was looking at alternatives. I wanted something that could rotate but not take up too much space and also be suitable for some portable operating. Its price, size and simple construction seemed ideal to me and when the *PW* Editor asked me if I would like to review the antenna I jumped at the chance!

The Comet rotary dipole, assembled as a horizontal array, helped by friend Denzil Evans GW3CDP, ready to be installed on the GW0VSW mast (see text).

Four-Band Rotary V Dipole

Fig 1: The Comet antenna ready for assembly. Carl Mason GW0VSW, found it took him 45 minutes to prepare (see text).

Four Trap Dipole

The Comet H-422 is a fairly new four-trap design dipole that covers the 7, 14, 21 and 28MHz bands with a claimed v.s.w.r. of less than 1:1.5, at a centre frequency depending on how you set up the elements. This means that it should be possible to operate on all four bands, depending whether you favour s.s.b. or c.w, without the use of an antenna tuning unit (a.t.u.).

The antenna can be assembled as either a horizontal or a V configuration dipole with a total length of 10.3 or 7.4m respectively. The turning radius of the antenna is reasonable at 5.3m (Horizontal) or 3.8m (V) and is capable of withstanding wind speeds of around 126km an hour (approx 78 miles per hour).

The manual states that the antenna is rated up to 1kW. Comet also provide a 'high power' CBL-200 balun, which should help prevent TVI and other associated problems when transmitting. The whole installation weighs just 5.4kg (11.9lbs) which means the antenna can be mounted on any suitable mast with a diameter of between 38 to 62mm (1.5 to 2.5 inches).

Opening The Box

On opening the box, I found that the 2.1m long (7ft) long cardboard container had everything required to complete the antenna, **Fig. 1.** This included various pre-cut elements of lightweight aluminium tubing, the six traps, a strong centre mounting plate, with the various nuts, bolts and clamps sealed in plastic bags.

Finally, there was a set of photocopied instructions that I found to be very simple and self-explanatory. Exploded diagrams helped me decide what bolt or bracket went were and they showed the suggested positions for the trapped elements (depending on where you want the centre frequencies to be for each band), **Fig. 2**.

I decided to opt for a centre frequency that favoured the top end of the c.w. and bottom end of the s.s.b. allocations for each of the four bands. I also decided to erect the H-422 in the V configuration first and compare it to my inverted G5RV before changing the configuration to a horizontal dipole.

I thought it would be interesting to see how the antenna performed in each configuration. I also wanted to discover just how much of a particular band I could operate on without the aid of a tuner.

Identification & Assembly

The separate aluminium tubes and traps were easily identifiable and slotted together easily. However, I found that care needs to be taken when selecting, which pre-drilled hole to use on each length, as these govern the appropriate bandwidth and each element must match precisely.

The supplied M4 bolts and spring washers were more than adequate, although the pre-drilled holes were slightly larger than I would have liked. Once the bolts were tightened, however, there was no movement in the tubing and to be fair, after three months in the air they had survived some 96km/h (60mph) winds and were still holding up well.

As I assembled the antenna, each joint in the tubing was taped up to prevent water entering, although this was personal preference and not mentioned in the instructions. If I were to own the antenna myself, I would have used some silicone sealant here for a more permanent job, as I would not rely on the small drain holes to clear any water that did manage to creep in over time. Incidentally, it's important that when the elements are eventually bolted to the centre plate, that the drain holes actually face downward for obvious reasons!

Fig. 2: The traps on the antenna need to be carefully located on the assembly (see text).

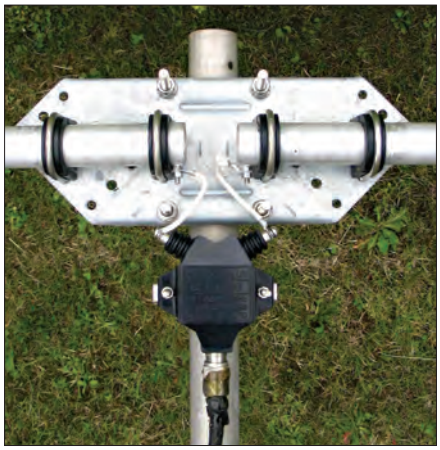


Fig. 3: The centre plate of the dipole assembly is robust and easy to assemble (see text).

Fig. 4: The Comet H422 rotary dipole - assembled in the V configuration - ready for use (see text).

Once the elements were bolted together they were attached to a very strong centre plate, **Fig. 3**, which eventually clamps to a mast. This is achieved by using the supplied M8 U bolts and strong moulded plastic separators, which are slid on the element ends before tightening the U bolts around them. (This is a very secure way of holding each element to the plate as they have a very positive grip).

At the end of each element is a small hole, into which a length of feed wire is bolted (Fig. 3), one for each side, which will eventually be connected to the balun. These wires have 'eyes' that are of different sizes pre-soldered at each end so, I needed to ensure the correct end was secured to the element. (It's obvious which end is which, as the retaining bolts are either M4 or M5).

With each element secured to the plate it only remained for me to fix the rather cumbersome structure (because of the length) to the supporting mast and mount the supplied balun below it.

The TV antenna type clamp is screwed to the balun using M5 bolts and washers. This in turn is secured too the mast with a M5 U bolt (just below the plate).

The lengths of the feed wires determines the final position of the balun and once each feed wire is secured, I only needed to slide the bracket/balun up to take the strain off the feed wires and tighten the bolts.

It only remained for me to connect the coaxial cable to the bottom of the balun with a PL-259. After just 45 minutes of assembly work I was ready to raise the antenna!

The completed antenna was lifted up on a support mast to a bracket on the rear of my garage, at approximately 6m (20ft) above ground, **Fig. 4**. As I have no rotator (yet!) I lined the antenna up in a North/South direction in line with my inverted G5RV at a similar height.

I had an antenna switch already in my shack so I would be able to operate with both the dipole and G5RV to compare the performance. The rig used was my Icom IC-737a running 60W without the auto tuner at first, to see what bandwidth I had available for each band. However, I did use a separate meter to monitor the s.w.r.

On The Air

My first contact was on 7MHz with **Lionel 2U0GSY**, on Guernsey, Channel Islands with 5 and 6 reports each way. Received signal strength on the G5RV was similar, although background noise was much higher. Next in the log book was a more 'local DX' contact with **Andy** operating **GB6SWL** from Dundee in Scotland, with 5 and 9 reports being exchanged. However, on the G5RV his received signal strength was about two S-points down at 5 and 7.

The 14MHz band was quiet, but **CN8SG** (Morocco) made the log with 5&8 sent each way and 5&6/5&7 on the G5RV. A change to 21MHz and c.w. found **Nick RA6DRV/1** near Pskov (Russia) and on c.w. reports of RST569/559 were exchanged on the H-422 and 559/549 on the G5RV.

Unfortunately, 28MHz was 'dead' and I was unable to copy any signals during the review period and the operating times I had available to me.

I tried PSK31 on some occasions and must say I was picking up signals on the lower two bands that the G5RV did not appear to receive! This included **Leon 4K8F** in Baku, Azerbaijan and **Jonathan KF4HOU** in Church Hill, Tennessee and a new one for me, **YU5LIX in** Venezuela on 7MHz. I also worked **Luis KP4ED**, in Bayamon, Puerto Rico with 20W on 14MHz.

Perhaps the successful QSOs were because of reduced background noise/interference unfortunately, I do pick up a good deal of background noise and local interference on the G5RV. However, it's something I've got used to and work around.

In general the H-422 was the same, or half an S-point down on the G5RV on 7MHz. It was two S-points better on 14MHz, one S-point better on 21MHz and I have no reason to believe it would not compare similarly on 28MHz.

Enjoyable Trial

I really enjoyed the trials using the Comet H-422 rotary V dipole antenna as it provided me with the opportunity to operate on four of the most popular h.f. bands. The assembly instructions are adequate and I think it would be difficult to make any mistakes when it's assembled, providing the diagrams are studied and followed correctly.

While the H-422 may not be suitable for everyone, because of its overall length, I certainly found it an improvement over the G5RV on some bands. Even with its fixed position the antenna allowed me to make a few contacts that I would not normally have achieved on the G5RV.

With a suitable rotator it would be a very useful antenna especially for those readers wishing to upgrade from a simple wire or vertical.

The Comet H-422 also seems less prone to noise compared to a wire dipole. It will open up a whole new h.f. world and provide many hours of DX fun providing it's sited well!

I found no obvious difference in performance, whether the H-422 was mounted as a V, or horizontally, and I tried both. I guess the choice would be yours depending on your location.

The 14MHz bandwidth is rather narrow, which is a problem if both c.w. and s.s.b. is needed, but with the aid of an a.t.u. it will be able to operate across each band.

Construction is straightforward and the supplied hardware more than adequate for the job. If properly maintained I am sure the antenna will give you many years of service. It's one of several rotary dipoles on the market at the moment and with a list price of £169, it has to be worth a look! **PW**

Manufacturer's Specifications

Frequency coverage:	7, 14, 21 and 28MHz
Impedance:	50Ω
VSWR:	<1:1.5 at centre frequency
Maximum input Power:	1kW s.s.b.
Connector:	M Type (SO239)
Maximum Wind Velocity:	125kph (78m.p.h.)
Length:	10.3m (Straight construction) or 7.4m (V
type	construction)
Weight:	5.4kg
Rotation Radius:	5.3m (Straight Construction), 3.8m V type Construction)
Suitable mast diameter:	38 - 62mm

Product
The Comet H-422 Four- Band Rotary V Dipole

Company
Nevada (UK Agent)

Contact
Sales on 023 9231 3090

Pros & Cons

Pros
I certainly found it an improvement over the G5RV on some bands. Even with its fixed position the antenna allowed me to make a few contacts that I would not normally have achieved on the G5RV.....with a list price of £169, it has to be worth a look!

Cons
May not be suitable for everyone, because of its overall length.

Price: £169 (P&P £10)

Supplier
My thanks for the loan of the review item goes to; **Nevada, Unit 1, Fitzherbet Spur, Farlington, Portsmouth, Hampshire PO6 1TT. Tel: 023-9231 3090, FAX: 023-9231 3091. E-mail: sales@nevada.co.uk Website: http://www.nevadaradio.co.uk**

Comments from Nevada

Mike Devereux G3SED, Managing Director of Nevada writes: Thanks for letting me see the review - I must say it is a good practical write up - well done for Carl. A couple of points:
1: A word of warning about his comparisons with the G5RV - the Comet antenna as a dipole will have large nulls of the ends and so by rotating it could have given even more advantage over the G5RV on higher bands, depending on the direction of the station being worked. Indeed, it is these nulls that probably gave Carl the advantage on the Comet in signal to noise over his G5RV. Ideally, the antenna needs to be rotatable to get the full benefits from it **Mike**

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Simple RF Test Equipment

Tim Walford G3PCJ shares his well known simple and straightforward approach on the test bench. And as you would expect, there's some practical projects - with kit options - to get you busy in the shack!

With all the encouragement to experiment that you get from reading *Practical Wireless* regularly, you are soon likely to need some test equipment! This article has some suggestions for simple items that I find invaluable when experimenting at my electronics bench.

I'll describe the circuits and outline some of their common uses. The first circuit, for a radio frequency (r.f.) meter voltmeter, is so simple that I'm not even offering a kit!

The other three projects are a 50Ω attenuator, a power meter and a pair of twin r.f. amplifiers. Kits are available for all three of these projects (see the panel on page 25).

Basic RF Voltmeter

The circuit of the basic r.f. voltmeter is shown in **Fig. 1**. The meter uses a voltage doubler circuit for better sensitivity, so it will show the peak-to-peak (p-p) r.f. voltage; this can be converted to root mean square (r.m.s.) volts by dividing by 2.8.

As I've mentioned, the meter is very simple. It only has four components and needs the normal digital multimeter that keen constructors should already have!

The two capacitors should be of the same type (**not electrolytic**) and the same value. The value is quite uncritical between 1 nF and 1µF.

The diodes should be of the same type and ideally germanium, because their forward voltage drop is least at about 0.1V (OA90, OA91, OA10, OA47, etc.) but they are getting a bit rare nowadays! This rarity leads to a more sensitive device. The next best are Schottky types (BAT81, BAT83, BAT85, BAT86) with a nominal forward drop of about 0.4V.

However, ordinary silicon diodes (1N4148, 1N914 etc.) with a nominal drop of 0.6V are entirely suitable for measuring larger signals, such as the output of QRP transmitters. For high frequency work, the input leads should be short and the components close together. **Note:** The length of the meter leads is not important as they carry only the rectified direct current (d.c.) output. There have been many physical designs utilising plastic pen bodies and similar!

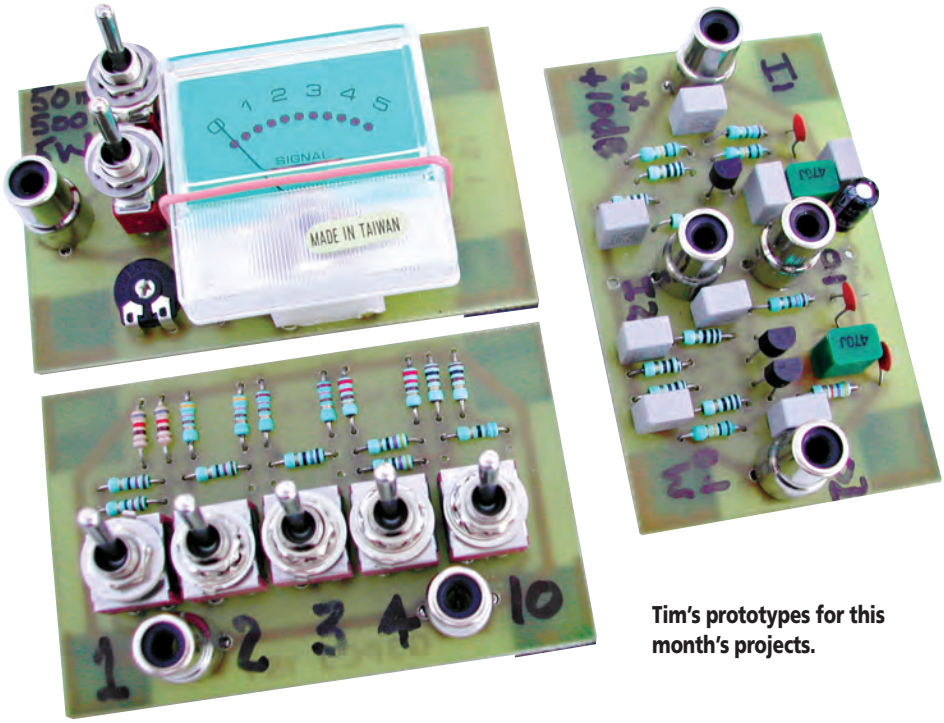
Using the meter is simplicity itself, especially if the digital multimeter you have is auto-ranging! Otherwise, set it for a full scale deflection (f.s.d.) of about twice what you expect.

To start, set the meter to read d.c. voltage and connect the probes to circuit ground and the point under test. **Note:** All the diodes I've already listed are suitable for assessing oscillators and other low power sources up to about 30V p-p. If you are investigating a QRP transmitter, you can measure the r.f. voltages in the low power stages right through to the output, checking that they get larger (generally!) as you get nearer the output.

All the diodes should give a useful, but progressively inaccurate indication, as the input signal gets smaller they should remain 'useful' down to below a quarter of their nominal forward voltage-drop figure. Even if the reading is very low, the mere fact that it changes (and remains steady) when connected to the circuit under test will indicate the presence of r.f. ,which is often the matter being questioned!

The reading does need to remain steady and not return to zero (assuming the r.f. signal is actually steady, as is obtained from a test oscillator). This is because there will be a transient due to the input capacitor charging up when you connect the probe to any point that has a d.c. voltage on it, as well as any r.f.

However, if the signal is expected to fluctuate (with audio modulation for example) the reading will 'kick-up' on speech peaks but be rather slow to die back during periods of silence! The circuit will work from audio frequencies and right up to v.h.f.



Tim's prototypes for this month's projects.

A 50Ω Attenuator

The circuit of the 50Ω attenuator is shown in **Fig 2**. It's a very common design for which the maths can be found in any **American Radio Relay League** (ARRL) or **Radio Society of Great Britain** (RSGB) handbook. It has switches for 1, 2, 3, 4 and 10dB and so allows steps of 1dB of power attenuation from zero (straight through) up to a maximum of 20dB if all switches are selected.

The actual attenuation, in dBs, is just the sum of the switches that are actually selected. Each stage is designed to work in a 50Ω system where both the in and out impedance is 50Ω, which allows them to be cascaded.

This version uses the Pi attenuator

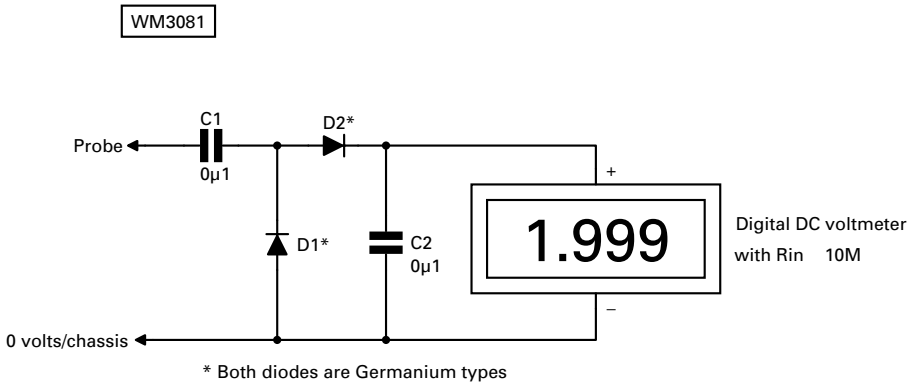


Fig. 1: The circuit of the basic r.f. voltmeter. The meter uses a voltage doubler circuit for better sensitivity, so it will show the peak-to-peak (p-p) r.f. voltage; this can be converted to root mean square (r.m.s.) volts by dividing by 2.8 (see text).

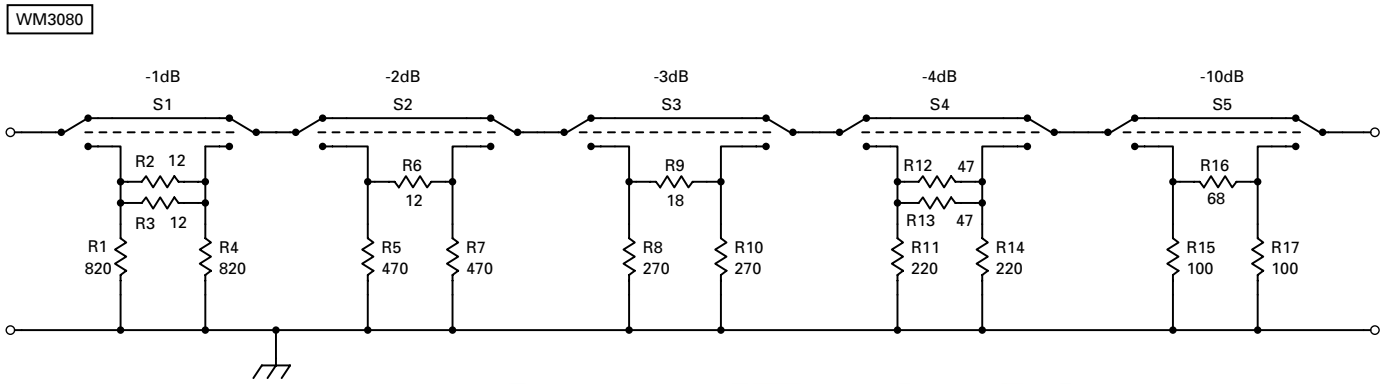


Fig. 2: Circuit of the 50Ω attenuator (see text).

circuit with five double-pole changeover toggle switches - one for each section. The switch tags, which pass right through the printed circuit board (p.c.b.), and are soldered direct to the copper tracks leading to the resistors, see **Fig. 3**.

Each section comprises three resistors but the low values required for the top of the Pi section are sometimes a bit difficult to obtain. Because of this, the p.c.b. has provision for two resistors in parallel here to obtain the low value.

The maximum continuous power that the attenuator can handle is about the same as the power rating of the resistors - 0.5W types are supplied in the kit, but you could use bigger ones with care. The p.c.b. is drilled for either screw terminal in/out connection blocks, or p.c.b. mounted phono sockets, which use 5mm spaced tags.

Experienced constructors might argue that phono plugs and sockets aren't ideal for r.f. work. However, I think they're fine for h.f. and aren't costly, so I also include matching plugs!

Traditionally, the in and out parts of each section would be enclosed in an r.f. tight enclosure to provide better isolation,

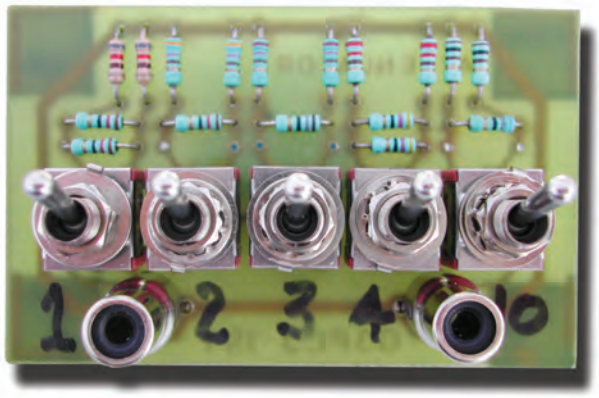


Fig. 3: The switch tags on the 50Ω attenuator pass right through the printed circuit board (p.c.b.), and are soldered direct to the copper tracks leading to the resistors (see text).

Fig. 4: The power meter project combines a 50Ω dummy load and r.f. voltmeter. It is normally calibrated directly in terms of power, with a square law scale. The photograph shows a version with the meter mounted horizontally for the most compact shape.

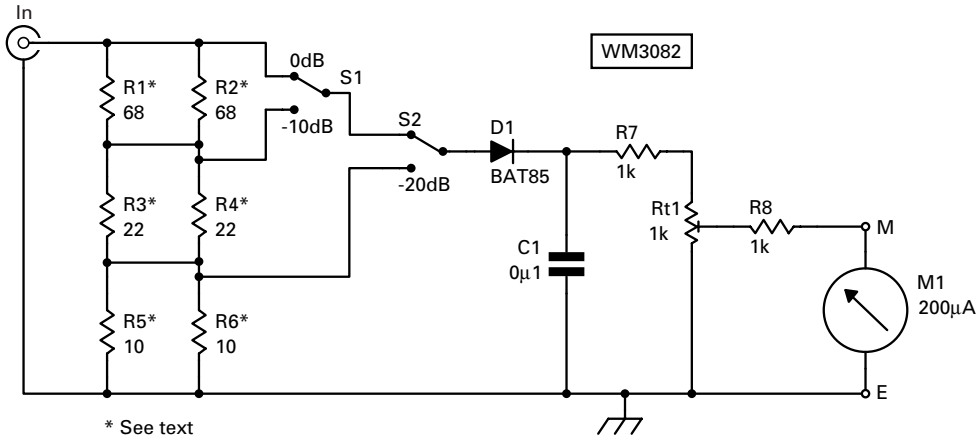


Fig: 5: The range switch would ideally be a three-way slide switch. Unable to locate a suitable version for this kit, Tim G3PCJ opted to use two standard single-pole toggle switches in 'series' (see text).

but this is only necessary for 20dB or more. If you wish, you can easily mount the whole kit by the switches in a small die-cast box with whatever type of r.f. connector that you have standardised on, 50Ω BNC and so on. Incidentally, I don't use PL259s, etc., because of their size and lack of p.c.b. types!

These attenuators, with a known output from a signal generator, can be used to accurately measure the minimum signal a receiver will copy, or to see what happens with very strong interfering signals! This is the lab version of using a receiver on 7MHz at night!

Under the 7MHz conditions, if the audio turns to 'mushy' untunable music, it's probably because some early receiver stage is overloading and you need to reduce the very strong broadcast station signals from the antenna! To reduce the problem, place the attenuator in the 50Ω antenna lead and gradually increase the amount of attenuation. At some point you'll probably find that a small amount of extra attenuation suddenly removes the mushy noises, leaving only a slightly weaker wanted signal that is now easily read, because it's 'in the clear'.

Power Meter

The power meter project combines a 50Ω dummy load and an r.f. voltmeter that's normally calibrated directly in terms of power, with a square law scale. The photograph, **Fig. 4**, shows a version with the meter mounted horizontally for the most compact shape.

By tapping the voltmeter down the 50Ω resistive dummy load, the basic sensitivity of the r.f. voltmeter is reduced, so allowing a higher power at f.s.d. The actual maximum f.s.d. on the highest power range is arbitrary but I've chosen 5W as a reasonable compromise for what the readily available resistors must be able to dissipate.

The range switch would ideally be a three-way slide switch. Unfortunately, I have not been able to find a suitable version for this kit, so I've opted to use two standard single-pole toggle switches in 'series', see **Fig. 5**.

When both toggles are physically away from the user, the f.s.d. is 50mW, and when 'leaning together' the f.s.d. is 500mW, and 5W when they are both towards the user. These quoted power figures are in 10dB increments corresponding to f.s.d. powers of +17, +27, and + 37dBm where 0dBm is 1mW into 50Ω. This allows a basic calibration for the 0 to +17dBm most sensitive range, and all the user has to do is add 10 or 20dB to the reading for the higher power ranges.

Theory & Calibration

Let's now look at the theory and calibration. The r.f. voltmeter part of the project is a d.c. coupled peak reading circuit, so that it can be calibrated with a d.c. source. This makes life much easier!

For alternating current (a.c.) signals the power is the peak voltage (Vp) squared, divided by twice the load resistance. (Because P = Vrms squared over R, and Vp is the squareroot of two times Vrms. **Note:** This is Vp not the Vp-p of the basic voltmeter mentioned earlier.).

Turning the formula around, and with a 50Ω load, Vp then works out to be ten times the square root of the power. So, with it set for maximum sensitivity (50mW or +17dBm f.s.d.) without any r.f. attenuation, the peak voltage of the a.c. input will be 2.24V. This means we can use an input of 2.24V d.c. from a battery or p.s.u. to make it read full scale!

It so happens that connecting 220Ω in series with the 50Ω of the power meter across an actual 13.8V supply will give almost the exact required voltage! All you do is connect them up, set it on the 50mW range and adjust the preset to make the needle show f.s.d!

The small meter supplied in the kit can be opened up and the scale carefully re-calibrated in terms of power or dBm. But it's somewhat easier to have **Table 1** (as measured on the prototypes) to hand when taking readings! It shows the indicated power in terms of the meter reading number, after f.s.d. calibration for 50mW on the most sensitive range.

The Power Meter can be used for directly measuring the output of test oscillators, signal generators, and QRP transmitters. For extra sensitivity, the following amplifiers can precede the Power Meter. (Don't forget always to leave it on the least sensitive range after use!)

Twin RF amplifiers

The twin r.f. amplifier kit, **Fig. 6**, has two separate nominal 10dB power gain broadband linear amplifiers for use in 50Ω circuits. The amplifier circuits are given in **Fig. 7** and are metal oxide silicon field effect transistor (m.o.s.f.e.t.) versions of the standard bi-polar amplifier 'circuit blocks' block popularised by the ARRL.

In practice, m.o.s.f.e.t.s are much easier to bias, cheaper and sufficiently fast for h.f. work. The use of two forms of feedback - drain to source, and small source degeneration resistors - leads to stable wideband amplifiers with reasonably well defined in/out impedances.

The two amplifiers offered this month are not identical, the first is low power, but the second has a higher d.c. bias current for a higher output up to about **250mW** maximum, but around 100 mW for good linearity.

Because dissipation is high in the second amplifier, two BS170 m.o.s.f.e.t.s are used in parallel to share the necessary standing current. **Note:** All three of these devices run warm in use!

The amplifiers can be used in cascade or separately. The boards are drilled for the same terminal blocks or phono connectors as before. They are simple to build with only d.c. checks of the bias conditions and there's nothing to adjust!

The amplifiers can be used ahead of the power meter project to increase its

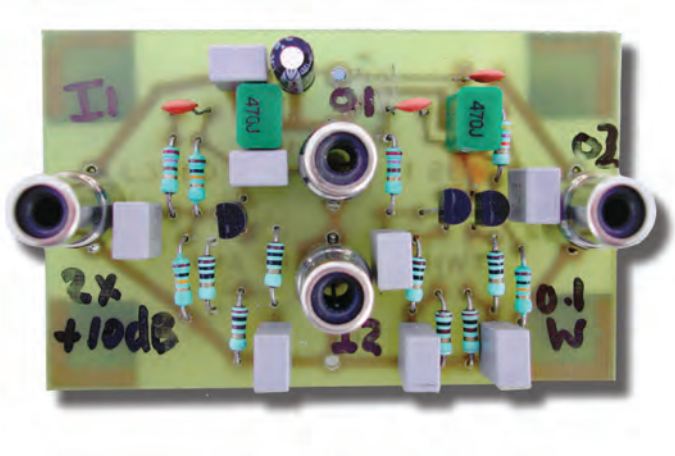


Fig. 6: The twin r.f. amplifier kit. It has two separate nominal 10dB power gain broadband linear amplifiers for use in 50Ω circuits (see text).

sensitivity by 10 or 20dB, or they can be used to boost signals to a 'deaf' receiver. In use, just put the first amplifier or possibly both, in the 50Ω coaxial cable between the antenna matching unit (a.m.u.) unit (or a.t.u.) and the receiver.

Note: Be a bit careful if there's any risk of the receiver's front-end being damaged by 250mW - a pair of back-to-back silicon diodes (1N4148, etc.) can be connected across the antenna lead for protection.

When building a new QRP transmitter, the amplifiers can be part of a temporary line-up, to compliment the other free-standing 'quarter Euro-board, p.c.b. projects, which now include the Mini-Matcher, Mini-Bridge and Kilve receiver.

The Kilve Receiver

Now a quick note anout the Kilve receiver, as published in *PW*:

Incidentally, **Robert Strong**, who had built one, got me to investigate his receiver that seemed 'deaf', but was otherwise working normally. I eventually found that different batches of the 2N3819 transistors used in the product detector had a marked effect on conversion gain and hence sensitivity.

The spread of the 2N3819 d.c. characteristics are notoriously wide, but I had not anticipated this consequence! If yours is similarly affected, please send me a couple of first class stamps for another 2N3819 from an alternative batch. Thanks for telling me all was not right, Robert! I'm always pleased to have any comments, good or bad, as long as they are intended to be helpful!

Meanwhile, I have started on the next project, which is a single band double sideband 'phone transceiver called the Brean, similar in concept to the Brent c.w. transceiver. Cheerio until then!

PW

Kits and Bits

Kits for the RF Testgear are available from Walford Electronics. They include all parts, to build them 'open' style as in the accompanying photographs. Prices are:

Attenuator, £19

Power Meter, £19

Twin RF amps, £19

P & P is £2 per order.

If all three above kits are ordered together (£57), they are P&P free!

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**

Indicated Meter reading	Actual input DC voltage	Cor esponding Power (mW)	Power in dB relative to 1mW (0dBm)
1	0.51	2.5mW	+ 4
2	0.76	5.8mW	+ 8
3	1.05	11mW	+ 11
4	1.47	21mW	+ 13
5	2.23	50mW	+ 17

Table 1.

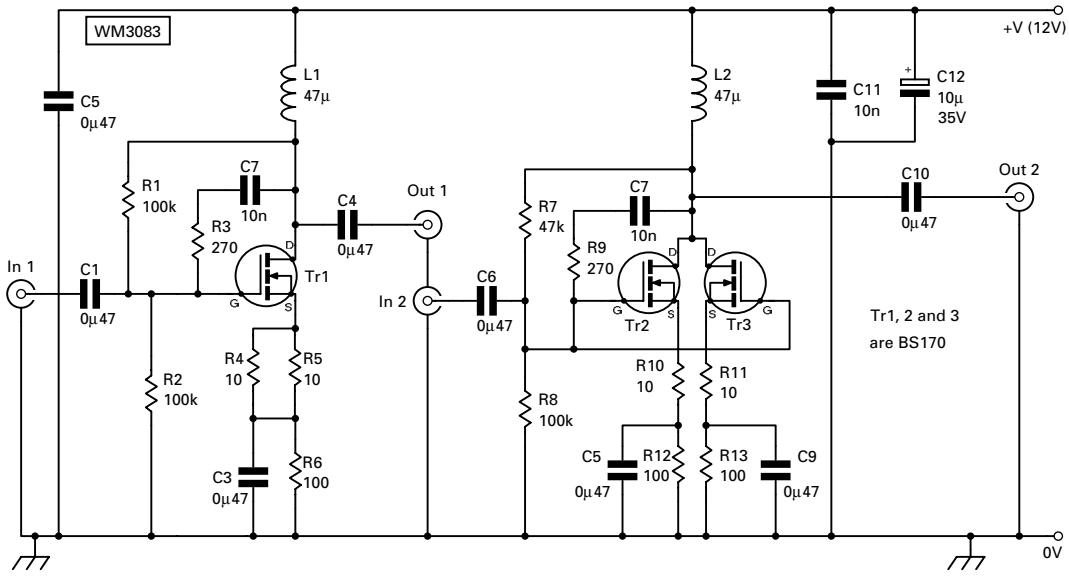


Fig. 7: The amplifier circuits use metal oxide silicon field effect transistors (m.o.s.f.e.t.s) to advantage (see text).

Ladders of Attenuation

Stefan Niewiadomski urges you to climb the rungs of ladder attenuators. It may prove to be easier than you think. So, read on and find out!

Attenuator networks are useful building blocks in radio designs, often to be found in a receiver's front-end. In this position, they can reduce the amplitude of the input signal, so that the front-end is not overloaded by high power transmissions close in frequency to the signal of interest. In simpler receivers a rotary potentiometer is often used to 'pot-down' the input signal, but this approach has disadvantages, in that it's not easily calibrated and doesn't present constant input and output impedances as it's varied.

When there's a change of impedance at the input to a receiver, it means that any antenna or filter that's connected also 'sees' a changing impedance. So, as a simple potentiometer attenuator is adjusted, it's rather difficult to predict the response of the antenna or filter.

An ideal attenuator network would have switchable, multiple, predictable steps and, would always present the same impedance at its input and output, whatever the attenuation level. This article describes a six-step, 3dB-per-step resistive network for 50Ω impedance operation, along with the simple design process.

So, using the design you'll be able to change the impedance and attenuation steps values to suit your own particular application. It also shows how the attenuator components can easily be mounted on a commonly available low-cost rotary switch.

Circuit Description

Let's first look at the description of the circuit that's to be found in **Fig. 1**. Here, you'll see the schematic of a six-step, constant-impedance ladder network, that consists of a set of series and shunting (one end connected to ground) resistors. Because the circuit looks like a ladder laid on its side, it's often called a ladder network!

A switch, S1, provides six positions, where position-1 is the minimal attenuation position. The input-to-output attenuation becomes greater as the switch is moved towards position-6. The rather strange way the resistors are numbered simply reflects the order in which they are calculated.

Attenuation (dB/step)	K factor
0.1	1.0116
0.5	1.0593
1	1.1220
2	1.2589
3	1.4125
4	1.5849
5	1.7783
6	1.9953
10	3.1623
20	10.0000
30	31.6228
40	100.0000

Table 1: The k-factor for attenuation step-levels of 0.1 to 40dB per step. See text for how to calculate the k-factor for other attenuation values.

Design Process

The first step in the design process is to work out the *k*-factor that's needed, from the attenuation per step. The table shown in **Table 1** shows the value of the *k*-factor for some useful attenuation-per-step values from 0.1 to 40dB. More mathematically-minded readers will spot that *k* is simply the voltage attenuation ratio corresponding to the dB value. Therefore an attenuation of 6dB gives a *k*-factor of 1.9963.

Eagle-eyed readers may ask "why isn't *k* equal to exactly 2 for 6dB of attenuation? Since we all know that 6dB is half voltage". The answer is, that half voltage attenuation, or the quarter power point, is actually equal to 6.02dB. But in normal every day use, it's usually abbreviated to plain 6dB.

If you have a need for a value of *k* that's not shown in Table 1, then it can be easily looked up in standard tables, or calculated on a scientific calculator from the equation:

$k = \text{antilog}_{10}(A/20)$

Or:

$$k = 10^{(A/20)}$$

Where A is the voltage attenuation in dB.

Now we can calculate the resistor values. They are given by:

$$R1 = \frac{k^2 - 1}{2k} * Z \qquad R2 = \frac{k + 1}{k - 1} * Z$$

$$R3 = \frac{R2 * Z}{R2 + Z} \qquad R4 = \frac{Z}{2}$$

Where Z is the input and output impedances (both the same value) in ohms.

Real-World Example

So now let's use the above formulae to work out a real-world example. We want a six-step, 3dB-per-step resistive network for 50Ω input and output impedance. Firstly, we look up 3dB in Table 1 and get a *k*-factor of 1.4125. Then we plug this value, along with the 50Ω input/output impedance, into the resistor equations shown above.

The resulting calculations are as follows:

$$R1 = \frac{k^2 - 1}{2k} * Z = \frac{1.4125^2 - 1}{2*1.4125} * 50 = 17.61\Omega$$

$$R2 = \frac{k + 1}{k - 1} * Z = \frac{1.4125 + 1}{1.4125 - 1} * 50 = 292.4\Omega$$

$$R3 = \frac{R2 * Z}{R2 + Z} = \frac{292.4 * 50}{292.4 + 50} = 42.7\Omega$$

$$R4 = \frac{Z}{2} = \frac{50}{2} = 25\Omega$$

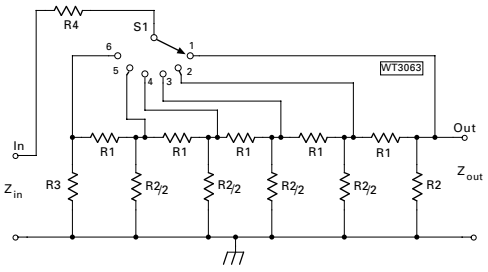


Fig. 1: The general form of a ladder attenuator needs only four values of resistor that depend on the attenuation step-value and the input/output impedance (see text).

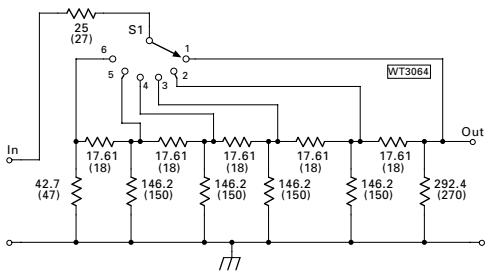


Fig. 2: Translating the theoretical circuit of Fig. 1 into a practical 3dB per step and 50Ω impedance attenuator. The theoretical value of the resistors have suitable practical values in brackets, which results in a difference of less than 0.2dB per step.

Of course, we're very unlikely to have any 17.61Ω or 292.4Ω resistors to hand. But, as with most circuits, the values can be rounded to the nearest standard value without much noticeable change in performance. So, 17.61Ω becomes 18Ω, and 292.4Ω becomes 270Ω, or the much closer value of 300Ω if you have resistors in the E24 range.

Note: that the set of resistors connected to ground in the middle of the network have a value of R2/2. In this example this value is 146.2Ω, which itself will need to be rounded to the nearest real-world value of 150Ω. The exact resistor values for this attenuator design, and their rounded real-world values are shown in **Fig. 2**.

Does It Work?

"Well", you may ask - "does it work"? To answer that, I've found a neat way of checking such calculations, without building a prototype, is to simulate the network on an analogue circuit simulator. I use the computer program *SPICE* for this function and carried out a simulation for the attenuator, designed just above, using the exact calculated values for the resistors.

The attenuation steps 1-6, were as expected and the real-world values ended up close enough for amateur work. Of course, such a computer-based analysis uses perfect models for the resistors, and so each step (calculated or real values) gave absolutely flat frequency responses.

However, the flat frequency response wouldn't be seen in the real-world. The analysis does though, give confidence that the formulae work and that we've worked through the calculations correctly.

When I 'plugged' the real-world values into the simulated version of the attenuator, the worst case deviation from the exact attenuation value was 0.2dB. Though it wouldn't do for accurate scientific work, you can appreciate the usefulness of our attenuator for practical use.

No 0dB Position

As shown in Fig. 1, the ladder network does not have a 0dB attenuation position, so there's always some attenuation in-line. In our design, the lowest attenuation value attained, is obtained when S1 is in the step-1 position and that gives an attenuation of 3dB.

There will be times, when an attenuation of 3dB in a receiver front-end could definitely be a disadvantage. This attenuation would be half an S-point drop in signal level, and there will be occasions when we want to have the absolute maximum signal input. (An attenuation of 0dB would only occur with the ladder attenuator completely out of circuit).

Removing the ladder attenuator from the circuit can be achieved simply, as shown in **Fig. 3**, where the attenuator is bypassed by a 2-pole toggle switch S2. This method needs an extra control on what might already be an over-crowded front panel so, an alternative way of achieving this 0dB position is described below.

Construction

One of the nice features of these ladder networks is that they fit neatly onto a rotary switch, whereas T and p-networks tend not to fit so conveniently onto a rotary switch. In fact, T and p-networks fit better onto toggle or slide switches, though these can take up more front panel space than a single rotary switch.

The illustration, **Fig. 4,** shows a circuit diagram of how the ladder network fits onto a 2-pole 6-position rotary switch, as commonly used by amateurs. The use of a 2-pole switch solves the 0dB attenuation issue.

In the switch positions shown in Fig. 4, The attenuator part is effectively taken out of circuit and by-passed. So, the 'In' terminal is fed to contact 7 of S1b, which is connected via the C terminal directly to the Out line, giving 0dB attenuation. None of the resistors, making up the ladder network are in-circuit.

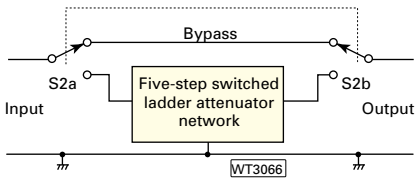


Fig. 3: A simple two switch solution to overcome the lack of a 0dB attenuation position of the circuit in Fig. 1 (see text).

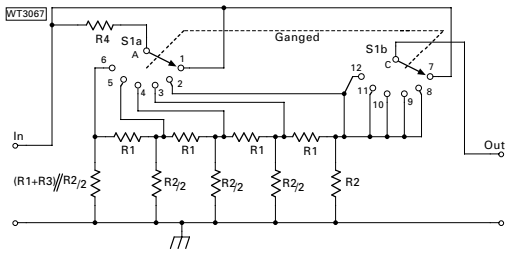


Fig. 4: Reducing the six-step circuit of Fig. 1, to five-steps allows us to use a two-pole six-way switch to give a 0dB (or through) position to the attenuator network. In effect we still have six-steps but they now include a 0dB position.

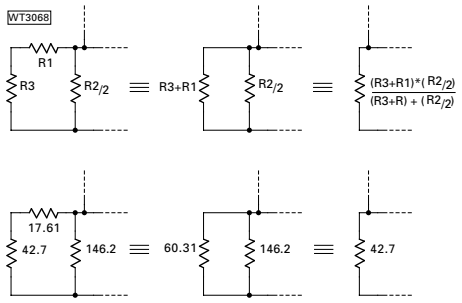


Fig. 5: Resolving the three unswitched resistor network, on the left hand side of Fig. 1, into a single equivalent resistor. It will probably come as no surprise to see that it has the same value as the original R3 in Fig. 1 (see text).

In the positions, two to six, the ladder network is engaged and progressively more attenuation is obtained. Of course, as we now have only five steps of attenuation, rather than the six steps shown in Fig. 1. The step of greatest attenuation value has been lost. But in most applications, the difference between having five rather than six attenuation positions is fairly academic.

The sixth attenuation value can be accommodated if a two-pole switch with more than six positions is available. It can be seen from Fig. 4 that the three resistors that are to be found at the left-hand side of Fig. 1 are now unswitched. As that part of the network is unswitched, it plays a passive role in the network, and so it can be merged into a single resistor as shown in **Fig. 5**.

In Fig. 5, you'll see the various steps taken in resolving the three resistors into one. The use of a few simple calculations of series and parallel connected resistors shows the calculation for the resistor in the network position as already described. And I'm sure it will come as no surprise that this new resistor has the same value as the original one shown as R3 in Fig. 1.

In r.f. applications the input and output connections to the attenuator switch will usually use coaxial cable or fittings. I often use miniature RG-174 coaxial cable for this job, as it's only about 3mm in diameter and is very flexible. **Note:** The outer braid of the cable can be used to pick up the ground connections on the bottom end of the shunt resistors.

Well that's it! It's quite easy, so now I've shown you how to create one, you can go and make your own rotary stepped-attenuator yourself. **PW**

References

Most of the data for this article has come from: *Handbook of Electronic Tables and Formulas*, 5th edition, published 1979. Compiled and edited by Howard W Sams. This book contains a great deal of useful information on many attenuator network configurations.

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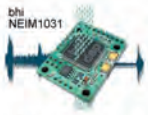

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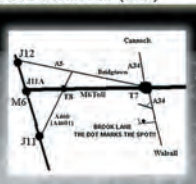

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T4-2 The Station Aid

Rob Hannan G4RQJ, peers into the tea-leaves and sees a remote radio-monitoring opportunity emerging from the mixture. Try brewing it yourself!

Look no wires! You can monitor two radios in the shack while you're elsewhere in the house (see text).

How many times have you heard "this station is now QRT..." just as you come into the shack from a spell of gardening/domestic QRM? The station you really wanted to hear has finished and you've missed him. My solution to this problem is a pair of wireless headphones (u.h.f. radio-linked).

My wireless headphones are a relatively cheap pair, from Goodmans, but almost any r.f. type will work, providing they can achieve a signal to the furthest reaches of your property. Plug the base unit into the rig, set the frequency you want to monitor and with the 'phones round your neck, you should be able to hear, what your rig is receiving, all over the house.

Now, you can be working in the garage or even the far corners of the garden, unless you live on a farm! You can move around but you can still hear what's going on. The headphones may also keep you fit, as you'll often need to sprint to the shack at the right moment!

I've used this system very successfully for some time, but there is a flaw to this basic setup. It would be great to be able to monitor more than one frequency at the same time. But in this basic set-up it isn't possible.

It would be an advantage to listen to a combination of an h.f. band and a v.h.f. calling channel, which would require some sort of audio mixer. I was discussing this with an old friend, **G3ZVQ**, who asked: "aren't those things stereo"? Then the penny dropped. So, after half an hour with the soldering iron, the T4-2 project was born.

Why T4-2?

You may ask, why have I called it the T4-2? Well it's T-shaped and it's for putting two signals into the headset. The headset base unit uses a standard miniature jack plug, wired with the sleeve as common and the tip as one channel input, and the ring as the other. You will need a stereo jack socket to suit the plug on your unit.

The type of socket you have to hand will decide your method of construction. Mine is a board-mounted type, recovered from an old cassette recorder. I used a small piece of perforated board to mount the adapter on.

The input leads will depend on the output sockets of the radios you want to use. In my case, I needed one standard and one miniature mono jack plug.

If you are really up-market then you could use three panel-mounting jack sockets, one stereo and two mono. Put the whole thing in a small box and use mono patch cords to get from the T4-2 to the rigs.

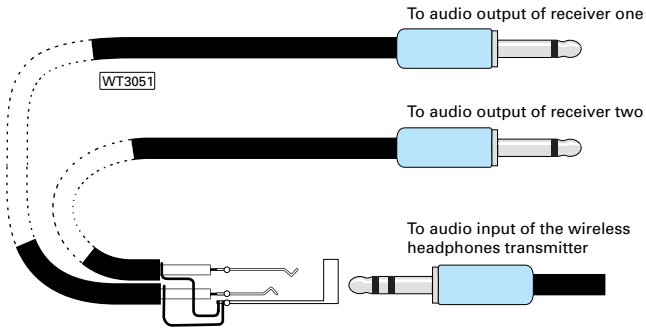

Fig. 1: A schematic layout of the T4-2 adapter (see text for more details).

In use, simply plug T4-2 into the headphone sockets of the radios and adjust each volume control for a comfortable level in the headphones. Try not to overdrive either channel, as this will cause 'bleed over' into the opposite side. You can, of course, use squelch on the radios if they have it.

You could put your v.h.f./u.h.f. scanner on one port and an h.f. set onto the other. That's a handy combination, particularly if you are into chasing awards like SOTA where activity may be on either. I'm sure you can think up your own combinations!

Since making mine, I have found it handy for copying weak h.f. stations that require headphones, while monitoring the v.h.f. calling channel, which under normal circumstances you would not hear because of the headphones. All I have to do now is work out how to get that third channel in!

PW

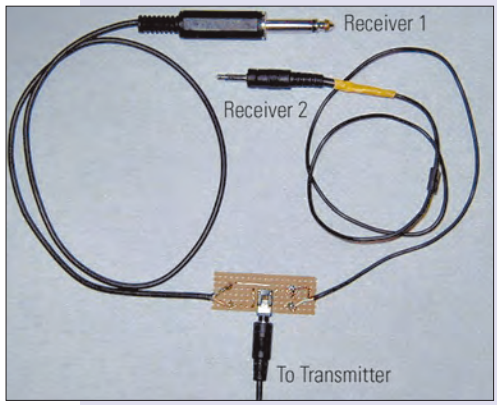

Fig. 2: Rob G4RQJ's prototype T4-2 adapter, your adapter may differ, depending on the stereo socket you have to hand.

On an historic note, an old instructor back in the 1950s reckoned that in the beginning the connectors were referred to as Jacks (plugs) and Jills (sockets) but this was changed so as not to offend sensibilities when female telephonists came on the scene!

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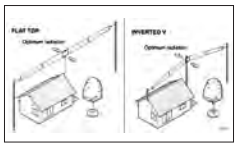

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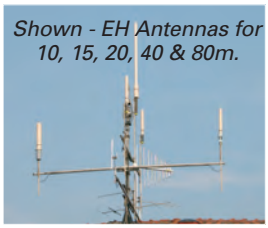

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MyDEL Power Supplies with 2-Year Warranty

A new rage of PSU's from MyDEL. The neatest smartest looking desk top power supplies that money can buy. Ideal for powering any main rig or accessory requiring 13.8V DC at up to 25 Amps.

MyDEL MP-250A Only £89.99

25 Amps maximum, 22Amps constant, ideal for most modern HF Transceivers

MyDEL MP-4128 Only £69.99

Another new switch mode PSU from MyDEL. Similar in spec to the MP-250A but without meters or cigar lighter o/p. 22-25 AMP output with heavy duty binding posts on the front panel and push on terminals for lower current output on rear. Fully protected.

Why pay more for the same unit?

MyDEL MP-925 £99.95

Linear 25-30A 13.8VDC PSU, using a large transformer, twin meters to monitor Volts & Amps. Been on the market for over 20 years in various different brand names and model numbers.

MyDEL MP-9600 £179.94

The latest in a line of switch mode power supplies from MyDEL . This high current (60 AMPS) switching mode DC regulated output power supply is designed with a highly efficient active power factor corrector. The constant current limiting protection allows the output current to remain stable but the output voltage decreases to a level that permits safe operation of the power supply. Remember ALL MyDEL PSU's come with 2 years warranty. Unlike other high current switch mode supplies on offer, the MyDEL MP-9600 is OVER VOLTS PROTECTED direct from the factory.

Yaesu FP-1030A £179.00

A power supply for Life? Probably. 25-30 Amp.

MFJ PRODUCTS AT LOWER PRICES

MFJ-461 Pocket size Morse Code Reader with built in display. Just place in front of your speaker to copy CW - instantly! Fully self contained, battery powered. **£69.95**

MFJ-418 Pocket size Morse Tutor with built in display. Random sending of Morse characters with confirmation on screen of what has been sent. Fully self contained, battery powered. **£69.95**

MFJ-1704 Probably the best 4 way antenna switch available. Cast Alloy construction, Power 2.5kW ● Isolation 60dB at 30MHz, 50dB at 500MHz ● Range DC ->500MHz. **£59.95**

MFJ-971 An ideal QRP ATU. Easy to use and very compact. QRP Portable ATU ● 1.8 - 30MHz ● 300W/30W 6W selectable ● Cross needle meter ● 12V DC Ext ● SO-239 sockets
● Tunes wire, coax, balanced lines
● Terminals & earth post
● Size 160 x 150 x 60mm
● Weight 870g. **£89.95**

MFJ-902 Tiny Travel Tuner. Tiny 4½ x 2¼ x 3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything! **£65.95**

MFJ-904H Tiny Travel Tuner/ SWR/Wattmeter & Balun. Tiny 7½ x 2¼ x 3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything! **£109.95**

MFJ-949E 300 Watt Antenna Tuner. More Hams use MFJ-949's than any other antenna tuner in the world! Why? Because the world's leading antenna tuner has earned a worldwide reputation for being able to match just about anything. **£124.99**

MFJ-974H 160 Thru 6 Meters Balanced Line Antenna Tuner. The MFJ-974H is a fully balanced true balanced line antenna tuner. It gives you superb current balance throughout its very wide matching and frequency range. **£159.95**

MFJ-993B 300 Watt IntelliTuner Automatic Antenna Tuner. The MFJ-993 IntelliTuner lets you tune any antenna automatically balanced or unbalanced - ultra fast. It's a comprehensive automatic antenna tuning center complete with SWR/Watt-meter, antenna switch for two antennas and 4:1 current balun for balanced lines. **£199.95**

MFJ-994 Similar to 993 above but 600 Watts. 1.8-30MHz, Auto ATU **£269.95**

MFJ-259B/L Special With FREE Loop Antenna Range: 1.8-170MHz. MFJ's favourite Antenna Analyser with HF frequency coverage. It's simple to operate and keeps your antennas in check. MFJ-259B gives you a complete pictures of your antenna's performance. You can read antenna SWR and Complex Impedance 1.8 to 170MHz. **£189.95**

MFJ-269 Range: 1.8-450MHz. MFJ's latest Antenna Analyser with UHF frequency coverage. Based on the successful MFJ-259B it combines all of the features plus more. **£269.95**

Don't forget! ML&S now stock one of the largest displays of MFJ in the country!

E&OE.

Icom

Icom IC-PCR1500
ML&S Price: £369.95

The latest version of the famous PCR-1000. The Icom PCR1500 wideband computer receiver connects externally to your PC via a USB cable. This provides compatibility with many computer models, even laptops. Incredible coverage is yours with eception f om 10kHz to 3300MHz . Modes of reception include AM, FM-Wide, FM-Narrow, SSB and CW. (CW and SSB up to 1300 MHz only).

Icom IC-R1500 ML&S Price: £419.95

Another new model from Icom Japan. Identical to the NEW PCR-1500, the R1500 has the addition of a remote head f ont panel for vehicle mount. The Icom R1500 wideband computer receiver connects exte nally to your PC via a USB cable. The adio can also be controlled via the supplied control head (with not all functions supported).

In addition to the newly introduced PCR-1500 & R1500, Icom engineers have been working overtime and produced Dual-receive versions, PCR-2500 & R2500.

Icom IC-PCR2500

Additional features over PCR-1500/R1500

Diversity Reception: When two antennas are connected, the receiver picks the antenna with the best signal strength for stable signal eception.
Simultaneous Dual Receive: IC-PCR2500/R2500 has two independent receiver ci cuits inside. Both eceivers cover 0.01-3299.999 MHz in AM, FM, WFM, SSB, CW and DV modes on the main band, while the sub-band covers 50-1300MHz in AM, FM and WFM modes simultaneously.
Remote controller head: The IC-R2500 is supplied with a emote cont ol head similar to an IC-2725 head for mobile or base station use. This allows you to monitor both receive s at the same time.
Optional accessories for IC-PCR2500/PCR2500: In addition to IC-PCR1500/R1500 accessories, the IC-PCR2500/R2500 can use the following additional optional internal units for extra receiving functions.
• UT-106 AF DSP unit (same as IC-PCR1500/R1500) • UT-108 DTMF Decoder • UT-118 D-Star Digital Voice Unit (Please note that only one unit can be fitted at a time).

IC-PCR2500: £474.95 IC-R2500: £529.94 See web for further details.

Icom IC-7000 see www.ic-7000.com

A full blown mini-IC-756pro111 that you can use in the ca or a home. We've all been waiting for this World Class Transceiver from Icom for over a year. In a package no bigger than he original IC-706, Icom have p oduced a FULL DSP HF/6m/2m & 70cm rig wi h many many featu es including a first - TFT Colour Display built into a mobile size radio.

Only £999.95 If you see it cheaper then call!

Icom IC-7000 Bundle

The New IC-7000 bundled with the IC-5LD TFT 5" Display & a MyDEL MP-4128 compact PSU. (As shown)

Only £1069

Icom IC-7800mkII NOW IN STOCK

RRP: £6400.00 Defer payment for 12 months - Interest FREE!*
The Icom Flagship Base Transceiver just keeps getting better & better.
Now fitted with 3 Roofing Filters for even more receiver performance.
On permanent display next to the FTdx9000.

NEW Icom IC-756Pro mkIII

RRP £2495, ML&S £1999 - Buy now, pay later*
Package deal: IC-756ProIII, SM20 Microphone, SP-23 New Base Speaker with filters. **RRP £2768, ML&S £2199**

Icom IC-7400 Only £1349 (Rig only: £Call) + SM-20 + SP-21 + MP-250A

100W HF, 6m and 2m complete with internal ATU -
What a package! New IC-7400 with Matching Desk Mic, Speaker & MyDEL Metered Base PSU.

*Subject to status

Icom IC-718 Basic ready to go 100W HF Transceiver supplied with Microphone & DC Lead.
RRP: £649, ML&S: £449 or 48 x £13.29 p/m

Icom IC-910X The best 2/70 & 23cm dedicated all mode base. 23cm included.
RRP: £1675, ML&S: £1239 or 48 x £36.66 p/m
Basic Version (without 23cm) also available:
£1089 or 48 x £31.93 p/m

Icom IC-703 IDEAL FOR M3 USERS
10W Portable/Base HF Transceiver with built-in ATU.
RRP: £703, ML&S: £449

Icom IC-E208 2/70 mobile 50/55W Transceiver with host of additional features. Remote head leads included.
RRP: £365, ML&S: £215

Brand New IC-E90 Triple Band Handie.
Only £199.95!
Or available with 4m and extra antenna for
Only £239.95

NEW Icom IC-E7E The latest micro Twin Band Handie from Icom! 2m/70cms.
ONLY £169 -
or add a LC-161 for only £16.99 in stock now!

kenwood

Kenwood TS-2000E
Just superb on all bands 160m-2m with optional 23cm (X-Version)**RRP: £1699, ML&S: £1299**

Kenwood TS-2000X As above but with 23cm fitted.
RRP: £1999, ML&S: £1699

Kenwood TS-2000LD
Special Edition Black version.
ML&S: Call

TS-570DGE From M3 to G3 the TS-570 still sets the standards in easy to use HF operating.
Whilst most transceivers on the market cover everything including 6/2/70, Kenwood continue to make this excellent HF-Only Transceiver for the serious DX operator.
It offers 100 Watts out (variable) and comes complete with a microphone and DC lead. As the TS-570 has a high speed Auto Tuner already fitted, all that is required is a power supply, (See the new MyDEL MP-4128) and a simple antenna and you're away!

TS-570DGE Bundles

1. TS-570DGE 100W, with Auto ATU & DSP 'Vanilla' £739.95
2. TS-570DGE + MP-4218 23A PSU £799.95
3. TS-570DGE + MP4128 PSU & MC-60A Desk Mic £909.95
4. TS-570DGE + MP4128 PSU, MC-60A Desk Mic & SP-23 Desk Speaker.....£969.95

Kenwood TS-480SAT
The best selling Kenwood H.F. Can be used mobile or base. Includes ATU. **ML&S: £699.95**

Kenwood TS-480HX
As TS-480SAT but 200 Watts, no ATU. **ML&S: £799.95**

Kenwood TH-F7E
2/70 Handie with Gen Cov RX. If you must have SSB RX on your dual-bander then buy one!
RRP: £289.95, **ML&S SUPER LOW PRICE: £199.95**

yaesu

The Rig of the Year is Arriving

Yaesu FT-2000MP: £2,399.95. Yaesu FT-2000D: £2,899.95. Prices to be confirmed.

- ★ First Batch September 2006
- ★ Two Versions, MP & D Specification
- ★ FT-2000MP 100 Watts, 160-6m, Internal PSU
- ★ FT-2000D 200 Watts, 160-6m, External PSU
- ★ Variable RF Tuning & Roofing Filters as standard
- ★ Orders being taken today, trade-ins welcome

FT-857D + ATAS-120 Auto Antenna Bundle
Still only £759 for both (Rig only £559)
The Ultimate HF Mobile Installation!

Yaesu FT-897D Bundles

5-Ways to buy your FT-897! High Power version of the FT-817. Use as a transportable, (20W) or as a base/mobile (100W)

Bundle 1. FT-897D 'Vanilla' Basic FT-897 HF-70cm Transportable.....Only £649
Bundle 2. FT-897D + LDG AT-897 & MP-4128 22Amp PSU.....Only £849
Bundle 3. FT-897D, FP-30 7 FC-30
The most compact HF base with built-in mains PSU & Bolt-On Auto ATU.....Only £849
Bundle 4. FT-897D, 2 x FNB-72, CD-24 & PA-26
The ultimate HF/V/U system with both batteries, charger & adapter.....Only £849
Bundle 5. Ultimate FT-897D System!
As above but with MP-4128 23 Amp PSU & LDG AT-897 Auto-Tuner.....Only £1079

Yaesu FT-817ND Bundles

FT-817ND 'Vanilla' - Basic FT-817.....Only £399.95
FT-817ND + YF-122C 500Hz CW Filter.....Only £429.95
FT-817ND + YF-122S COLLINS SSB Filter.....Only £429.95
FT-817ND + SLA-817 100W Amplifier.....Only £619.95

All ML&S FT-817ND's include 2 Years Warranty, Metal Hydride batteries, charger, mic, etc. Why not add a CSC-83 Carry Case for only £19.95?

Yaesu FTdx9000D 200 Watts or 400 Watts, TFT Screen or not. You choose. Call for more info or see www.FTdx9000.com **'D' spec now shipping at £7299**

Yaesu FT-7800 Bar make the tea it'll give you 2m/70cm @ 50W/40W. **ML&S: £239**

Yaesu FT-8800 Similar to the FT-7800 but can receive on 2 & 70 simultaneously. **ML&S: £269**

Yaesu FT-8900 One-stop solution to high-power FM on 10m, 6m, 2m & 70cm. When your local repeater is busy, slip onto 10m & work DX! **Only £339**

FREE MyDEL HANDS FREE OR YSK-8900 YOU CHOOSE OFFER SUBJECT TO AVAILABILITY

Yaesu FT-1802E
2m FM Mobile.
5-50W out. Very similar to the FT-2800.
ML&S: £139

Yaesu VX-2E Micro Handie 2/70 with scanner. Complete with Li-ion battery, charger & antenna.
Now only £119.95

Yaesu VX-6E Latest twin band handie with built-in morse tutor. **£189.95**

Yaesu VX-7R The UKs best selling Triple Band Handie.
ML&S: £219
or with lapel microphone: Only £229

Quadra VL-1000 The easiest way to get 1kW output from any Yaesu HF Transceiver. Plug in 240V, attach rig & antenna and you have a fully automated amplifier with auto tuner. **£Call (always in stock)**

Don't forget! ML&S are approved stockists for the following: AOR, bhi Ltd., Icom, Kenwood, Maldol, MFJ

Leicester Show. 8th & 9th September

Come and meet the ML&S team at Donington and see our massive array of products.

ML&S martin lynch & sons

Suppliers of Communications Equipment

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Open 6 days a week
Mon - Fri 9.30am - 5.30pm Sat 9.00am - 5.00pm

Tel: 0845 2300 599

local call number

Web: www.hamradio.co.uk
E-mail: sales@hamradio.co.uk

Ten Tec Orion 2

Visit our showroom and compare the Orion 2, IC-7800 & FTdx9000D side by side!

At last! The new Orion 2 has arrived. Using mode appropriate crystal roofing filters & IF-DSP as part of the main receiver, the new Orion 2 is still in a league of its own. For full details see: **www.hamradio.co.uk/orion2.shtml**

NEW!

TenTec 566AT Orion 2 with internal ATU **£3599.00**
TenTec 566 Orion 2 without ATU **£3349.00**

NEW MyDEL CG-3000. Only £199.95

High power version. With 200W and 200 memory channels.

- Tunable frequency: 1.8 - 30 Mhz with long wire antenna from 8 meters
- Input impendence: 50 ohms
- Input power: 10 - 200W PEP
- SWR: <2:1
- Power supply voltage: 12V +/- 10%
- Current consumption: <0.8A
- Auto tuning time: Approx. 2 seconds (first time tuning)Less than 1 second (return to memory frequency)
- Memory channels: 200
- Weight: 1.8 KG
- Size: 310 x 240 x 72mm (L - W - H)

MyDEL CG-2000 Remote ATU.
A simple to use remote end-fed wire ATU for 160m - 10m. 100W, 150 memories.
Only £149.95

LDG Tuners & Accessories

If you see LDG advertised cheaper in this magazine (or on the web) from a UK stockist we will try and BEAT it! Please call.

ML&S have been appointed Main Distributor for the US built LDG Product range.

LDG Z-100 100W Auto ATU 160M-6M .....**Only £119.95**

LDG AT-100Pro & AT-200Pro 100W or 200W Auto Tuner, 160M-6M with 2 Antenna outputs **AT-100Pro £169.95**
.....**AT-200Pro £179.95**

LDG AT-1000 1kW Auto Tuner, wide tuning range (10:1 SWR) 160M-6M .....**Only £499.95**

AT-897 Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too! .....**Only £179.95 Special 'Intro' price**

LDG Z-11Pro Portable compact & tunes 100mW to 125W.....**£139.95**

LDG RT-11 Waterproof remote ATU 1.8-54MHz **£149.95**

LDG RBA-1:1 & RBA 4:1 Probably the best 1:1 & 4:1 baluns out there. .....**£29.95 each**

LDG TW-1 & TW-2 Talking Wattmeters! TW-1 HF 0-2kW TW-2 6/2/70 250W. .....**£109.95 each**

LDG DTS-4+4R & DTS-6+6R Remote Antenna Switchers. 1.5kW 1-54MHz. Either 4 or 6 way,.....**£89.90 & £119.90**

FT Meter - External meter
Add-on analogue meter for the FT-857 and FT-897. Just plug & go! Enables you to read signal strength. Discriminator, power output, s.w.r., ALC etc. **£39.95**

NEW PRODUCT! LDG AT-7000

£139.94

Specifically designed for the IC-7000! The AT-7000 is the ideal tuner for your shiny new IC-7000. First, it matches up to 10:1 SWR (3:1 on 6 meters), so just about anything you can feed with coax is good to go. And, it has 2,000 (not a typo; that's 2,000!) memories.

Take Away Now and Pay NOTHING Until This Time Next Year!!

Having many years of experience offering specific finance packages for our customers, we can now offer various options on payment. We have added "Take-Away Now & Pay Later" to all our products over £199. It works like this: 0% APR An example of our Take-Away Now: Discounted price of £300. Pay no interest provided you pay by the date the amount is due, in full. After the 12 months period has expired pay £15.76 for 36 months. TAP £567.43 Please note that interest is calculated from the date of the original agreement. 29.8% APR.

NEW PRODUCT!!! Icom IC-E91

VHF/UHF DUAL-BAND FM TRANSCEIVER

This model covers 0.495-999.990MHz with V/V, U/U receive capability. The supplied Li-Ion battery pack provides high power 5W (typ.) output in both bands for stable operation. The large dot-matrix LCD and 4-direction navigation system is perfect for easy to see, user friendly operation. Furthermore, by installing the digital unit, UT-121, you have D-STAR DV mode operation.

A truly versatile multi-featured radio that further advances Icom's lead in digital amateur communications!

MAJOR FEATURES

- Wide band receiver with dual watch receiver capability
- Large dot-matrix display
- Total 1304 memory channels
- Simple bandscope
- Keypad navigation
- 5 Watts (typical) output in V/U bands
- Water resistant construction equivalent to IPX4
- Modern design trend follows on from the IC-E7
- D-STAR DV mode ready (Digital Voice + data) with UT-121
- One touch reply button (DV mode)
- Built-in voice recorder and auto reply voice message (DV mode)
- Optional PC remote control capability

Call for special intro price!

REVIEWED IN PW AUG ISSUE!

Full range of Palstar now in stock

AT-AUTO

AT1KM Meter 1200 Watt Antenna Tuner..**£289**
AT1500CV 1500 Watt Antenna Tuner **£369**
BT1500A 1500 Watt Double L Balanced Antenna Tuner **£439**
AT-AUTO 1500 Watt Automatic Antenna Tuner **£829.95**
AT4K 2500 Watt Antenna Tuner **£629.95**
AT5K 3500 Watt Antenna Tuner **£829.95**
DL2K 2000 Watt Dummy Load **£139.95**
DL5K 5000 Watt Dummy Load **£279.95**

EMTRON HF Linear Amplifiers

"The Best Built Amplifiers in the World"

DX-1D Cool 1kW, small foot print. **£1699.95**

DX-2 Slightly larger than the DX-1 but offering 1500W key down.....**£2799.95**

DX-2SP Already the most popular of the range, same as DX-1 but a minimum of 2kW output (2500W PEP) **£3199.95**

DX-3 Emtron's "Big Gun" using a GU-78B and producing in excess of 3kW key down. **£4599.95**

DX-4 If you thought the DX-3 is over the top how about the DX-4 producing over 4kW, or run on 3-phase for 5kW! **£6399.95**

New! Sommerkamp Linear Amplifiers

New to ML&S, for the full range see our web site under "Amplifiers".

SLA-300 1-8-30MHz Linear Amp, up to 300W output 2-15W drive. Band-Pass filters for each band. **Only £299.95**

SLA-817 Designed for the FT-817/IC-703 offering100W output.**Only £229.95**

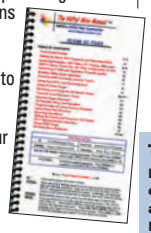
SLA-50V/U Ideal for any dual band Handie/mobile or base, DUALBAND (2/70) .5-20W I/P 50-100W PEP LINEAR AMPLIFIER. **£229.95**

SLA-200 Increase your 2m output! 1-50W I/P 60-250W-PEP 2M LINEAR AMPLIFIER. **£229.95**

SLA-517 More power on 6M. 6M 1-10W I/P 50-100W PEP LINEAR AMPLIFIER. **£199.95**

Nifty Equipment Manuals

Nifty Equipment Manuals and Quick Reference Cards for Yaesu, Icom, Kenwood, Elecraft & Ten-Tec radios



Mini-Manuals are fully laminated and spiral bound booklets, 4.25 x 8 inches, providing simplified step-by-step instructions for all your radio's features.

These short-form manuals are smaller, more durable and easier to use than manuals normally supplied with a radio. Compact - small enough to be kept with your transceiver. Very rugged.

Quick Reference Cards are designed as a three-page foldout the size of a credit card for easy carrying in a wallet or purse.

See our web site under "Books"

, Miracle Antenna, Hustler, Tokyo-Hypower, Tom Tom, Diamond, Yaesu, Palstar & Comet and many more

The 35th Leicester Amate

It's...

Show Time!

The Leicester Amateur Radio Show (LARS) is now in its 35th year and, although, over the years traders have come and gone, technology has moved on and things have changed, one thing remains the same and that's the spirit of the radio enthusiasts, dealers and manufacturers coming together to enjoy the show. The Donington Park venue has been home to the LARS since 1998 and the present committee of show organisers took over the job in 1983 from the Amateur Radio Retailers Association.

Although the show is, of course, primarily dedicated to Amateur Radio, you'll also find an array of computer orientated traders, component, electronic and flea market traders there too. From the Big Three - Icom, Kenwood and Yaesu to the high street retailers like Nevada, Martin Lynch and Waters & Stanton through to the smaller specialist component sellers like Strikalite and Westlake, there really is something for everyone. The show offers the ideal opportunity to see many radios being demonstrated in one place, allowing you to 'try before you buy' from the retailer of your choice.

You'll also find many local and national radio clubs represented, a Bring & Buy stall and flea market to enjoy. There'll also be the chance to try your hand at DFing and win an ARDF receiver!

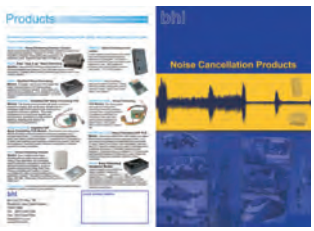
So, what are you waiting for? Make a date in your diary and head for Donington, you won't be disappointed and you can be sure of a warm, friendly welcome from everyone there! For the most up-to-date information, details of local accommodation, attractions, travel and facilities as the show approaches keep an eye on www.lars.org.uk

bhi - Stand W5A

Graham Somerville of **bhi** will be busy demonstrating and selling the full range of DSP noise cancelling products that his company produces. Among the products on show will be the NES10-2 DSP noise cancelling speaker, which requires 12-24V d.c. and simply plugs into the extension speaker socket or headphone socket of your transceiver or receiver. You'll also be able to see the NEIM1031 in-line module, which requires the same d.c. input and fits inbetween the radio and its extension speaker. Alternatively you can just use it with headphones.

The NEDSP1061-KBD can now be fitted in a wide variety of radios including the Icom IC-706MKIIG, IC-736/738 Yaesu FT-817, FRG-100, Kenwood TS-50, TS-440, Alinco DX-77 and Realistic DX394. Fitting instructions for these radios can be found on the bhi website. There may also be a new product launched at the show for those Yaesu users with big fingers and bad eyes - so pop along and take a look!

www.bhi-ltd.co.uk



Nevada*

The Nevada team will be showing a range of new Military specification guying ropes suitable for the smallest mast to the largest tower. They are pre-stretched and UV resistant with the higher load ropes featuring Kevlar for lightweight and very high strength. Prices start at just £45 per 100m drum.

Also on show will be the new Alinco DJ-V17E, a 5W 144MHz hand-held that features a rugged water resistant case for use in all kinds of weather and environments. It features two-touch instant repeater access and coverage from 137-174MHz (optional). The price will be in the region of £109.

That's not all - a new high quality Japanese meter from Daiwa for the u.h.f. and Amateur TV enthusiast will be on display. The CN-801S11 covers 0.9 to 2.5GHz. It measures power from just 200mW up to 20W in three ranges with p.e.p. readings for s.s.b. operation. The price is £169.95.

www.nevada.co.uk

Radixon/ WiNRADiO - Stand 1A

Radixon and WiNRADiO will be present at this year's show where they will be displaying and demonstrating all of the G3 receiver range, including the new G305 h.f./v.h.f./u.h.f. receiver. They will be offering discount vouchers to visitors, which may be redeemed against any WiNRADiO product available for purchase at the Waters & Stanton stand.

www.winradio.co.uk

AOR TenTec - Stand 4B

The new TenTec Orion-II 566 transceiver was recently launched in the UK and will be on display. It's considered by many reviewers to provide the best close-in receive performance of any Amateur Radio product on the market regardless of price.

A cross section of both AOR and TenTec product ranges will also be on display. Richard Hillier and the AOR TenTec team look forward to meeting customers, old and new to discuss technical and sales matters.

www.aoruk.com

eur Radio Show Don't miss it!

Waters & Stanton - Stand W5

The W & S stand will once again welcome **Bob** and **Sarah Heil**, as they represent their famous range of microphones from the USA. Bob **K9EID** will be lecturing both days on 'Increasing the power from your transmitter'. **Peter Waters G3OJV** will be lecturing on 'Software defined radio - the future today' on both days and there will be a special promotion on behalf of FlexRadio, the software defined radio manufacturer from the USA.

You can also expect to find all the latest products from bhi, Diamond, Heilsound, High Sierra, MFJ Enterprises, Optoelectronics, Primetec, Wonderwand, Watson and WiNRADiO on show. Don't miss it!

www.wsplc.com

Yaesu UK - Stand 15

The new FT-2000 h.f./50MHz transceiver will be on show following its launch at the Dayton Hamvention. This 'milestone' radio has some of the same features and facilities already in use in the FT-9000, so that should give you an idea of the standard of quality you can expect to find in the FT-2000!

Alongside the FT-2000, Yaesu will have a variety of other equipment from their range and representatives will be available to answer your questions and demonstrate the radios.

www.yaesu.co.uk

Kenwood Electronics UK Stand 14

Representatives from Kenwood Electronics UK will be on hand to demonstrate their comprehensive range of products, which range from hand-helds through mobiles to base stations. On show will be the Anniversary Edition TS-2000E, which is a limited edition version of the TS-2000E in a special black finish to commemorate Kenwood's 60th Anniversary. You'll be able to chat to the team, ask questions, find out about the range of Kenwood radios and get the opportunity to check them out first hand.

www.kenwood-electronics.co.uk

Martin Lynch & Sons Stand W12

The 'Lynch Mob' will not only be exhibiting the usual range of goods from Icom, Kenwood and Yaesu (including hopefully the new FT-2000!), but their increasing range of own direct imports. These will include the MyDEL range of power supplies, which now include the MP-4128 compact, 23-25Amp, MP-250A 25Amp (metered), MP-925 25-30Amp (metered, linear) and the new MP-9600, featuring a massive 60A, variable voltage unit (with full over-voltage protection) twin digital read-out showing Volts amd Amps. All these MyDEL p.s.u.s. will be demonstrated and are offered with a unique two-year warranty.

As ML&S are now the UK's largest LDG re-seller, they will be displaying the entire range of LDG automatic antenna tuners. These will include the new AT-7000, an auto antenna unit designed exclusively for the IC-7000.

If you're looking for a communications receiver then the Palstar R30CC could be just the thing for you. Martin will have the full range of Palstar products on show and says how many people know that all the chassis work for Palstar is fabricated in the original RL Drake factory?

That's not all - Martin will be featuring new company, CG Antenna's, tuning units and in particular the new CG-3000 weather-proof random wire tuner. This offers 200W, 200 memories and retails at only £199.95.

www.hamradio.co.uk

PW Publishing Ltd Stand W3

Practical Wireless & RadioUser

Practical Wireless & *RadioUser* Magazine staff will be on hand to welcome readers, discuss article ideas and receive feedback. **Rob Mannion G3XFD**, *PW's* Editor will be there, happy to discuss plans for the magazine's 75th year (2007) and to chat to friends old and new. *RadioUser's* (the new *Short Wave Magazine*) Editor, **Elaine Richards G4LFM** will also be there to receive your feedback on the magazine, that is fast becoming everything the radio listener could possibly want and has earned the status of best seller!

Look out for special subscription deals, a good selection of radio related books, back issues and a clearance table, where you'll find plenty of bargains. So, make sure you come along, have a chat and meet the team behind the UK's best selling hobby radio magazines!

www.pwpublishing.ltd.uk

Icom UK Ltd.*

Icom UK Ltd., will be showing off their latest range of rigs, including the IC-7800, IC-7000, IC-E7 and E-91. Visitors to the stand will be able to admire the radios, ask questions and learn about the technology behind them. The Icom team will be pleased to welcome you to their stand. **www.icomuk.co.uk**

Convention & Meeting Programme

Throughout the duration of the show there will be a series of lectures taking place. Here's what's on offer:

Friday 8 September

1200-1300 Meet the RSGB *RadCom* Team
1300-1400 Increase Your Talk Power by **Bob Heil K9EID**
1400-1500 Software Defined Radios by **Peter Waters G3OJV**
1500-1600 Enigma and Friends: Building a collection of code and cypher systems **by John Alexander G7GCK** and **David White**

Saturday 9 September

1100-1200 Simple Amateur Radio Astronomy by **Jeff Lashley M3KJU** of the National Space Centre
1200-1300 Enigma and Friends: Building a collection of code and cypher systems by **John Alexander G7GCK** and **David White**
1300-1400 Increase Your Talk Power by **Bob Heil K9EID**
14000-1500 Software Defined Radios by **Peter Waters G3OJV**
1500 RAIBC AGM

All details correct at the time of going to press (27 July 2006)
*** Stand number awaiting confirmation at time of going to press**

The 35th Leicester Amat

Show Info

When

Friday 8 and Saturday 9 September 2006

Where

Castle Donington
Intenational Exhibition Centre,
Donington Park,
Castle Donington,
North West Leicestershire,
Derby DE74 2RP

Opening Times

0930 to 1730 on Friday (1630 on Saturday)

Admission

One-day ticket - £3.50
concessions (OAPs & under 16) - £3

Two-day ticket - £6
concessions (OAPs & under 16) - £5

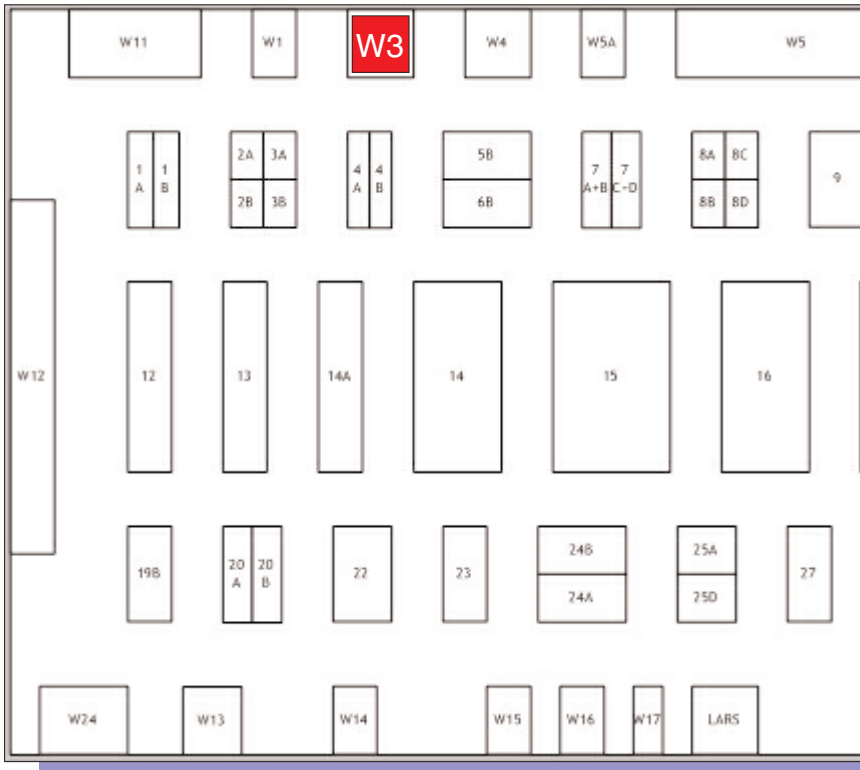
Under 12s free when accompanied by an adult.

More Information

For more info check out: **www.lars.org.uk**

Traders Attending*

A. Jackson	29B
AOR (UK) Ltd	**4B**
Barenco	**22**
BHI	**W5A**
Bowood	7A+B
Bring & Buy	**W18**
Communications PMR	**24A**
Compelec	29A
Component Reclaim	8C
Computer recycling centre	28
Dave Wood	29C
Diode Communications	10
Downtown Computers Ltd	**W10A**
Dragon Offiice Products Selection	1B
Eric Blake	**3B**
G H Engineering	**4A**
GCS Office Seating	7C+D
Global Audio Visual	W14



*** All exhibitors marked in bold had confirmed their book going to press (27 July 2006).**

eur Radio Show Floor Plan

HaRP Shareware	W16
Icom UK Ltd	**16**
Indigoquest	W1
InkTec Midlands	**6B**
JAB Electronic Comps	**12**
John Dilkes	**8B**
Keith Orchard	2A
Kenwood Electronics UK Ltd	**14**
Martin Lynch & Sons	**W12**
Mary Molyneux	**8D**
Mikay Distributors	**30**
Moonraker (UK)	**W9**
Nice One Publishing	**W24**
Ofcom	23
PW Publishing Ltd	
Practical Wireless & RadioUser	**W3**
Platinum Satellite	**19A**
Poole Logic	W15
PWPC	W13
RSGB	**17**
RSGB (2)	**25A**

kings and the details were correct at the time of

Radioswap.co.uk	**27**
Radioworld	**W11**
Radixon	**1A**
Rich Electronics	**18**
Sabaki Ltd	2B
Sandpiper Aerial Technology Ltd	**13**
SGS Electronics	**29**
Sinequanon Group	14A
SOTA Beams	25d
Strikalite	W4
Stuff	**24B**
TAMS 2000 Ltd	**9**
Terry Milman	3A
TETRA	**W10B**
Timestep Electronics	**W17**
TLX Electrical Ltd	20A
Trade	8A
Vann Draper Electronics Ltd	**20B**
Waters & Stanton	**W5**
Westlake Electronics	5B
Yaesu UK Ltd	**15**

Specialist Interest Groups

BATC	T6
BORG	T2
BR ARS§	**T8**
Bromsgrove	**T22**
CDXC	T6
Derby &DARC	T3
Huntingdon ARC	T4
Leicester Raynet Group & Raynet Supplies	**T19**
Leicestershire Repeater Group	**T11**
Loughborough & Shepshed	
Vintage Wireless Group	**T5**
Malvern Hills Repeater Group	T14
March and District Radio Amateur Society	T21
NH Watch	T15
Nottingham ARC	T16A
Nottingham QRP Club	T1
Nottingham Repeater Group	**T10**
RAFARS	T7
RAOTA	**T18**
RNARS	T9
RSARS	T20
RSGB ARDF Committee	T17
Shipley Vintage Wireless Club	T12
Spalding and District Radio Club	T15A
Stourbridge	T23
Trent Vale RC	T12
Vintage and Military	T24
G QRP Club	**T?**

Antenna Workshop

Bert Roberts G4XBZ, looks into the process of designing and erecting a flexible all-band h.f. vertical antenna. All you need is an automatic antenna tuner, a fibreglass pole, a steel tape measure and enthusiasm for the project!

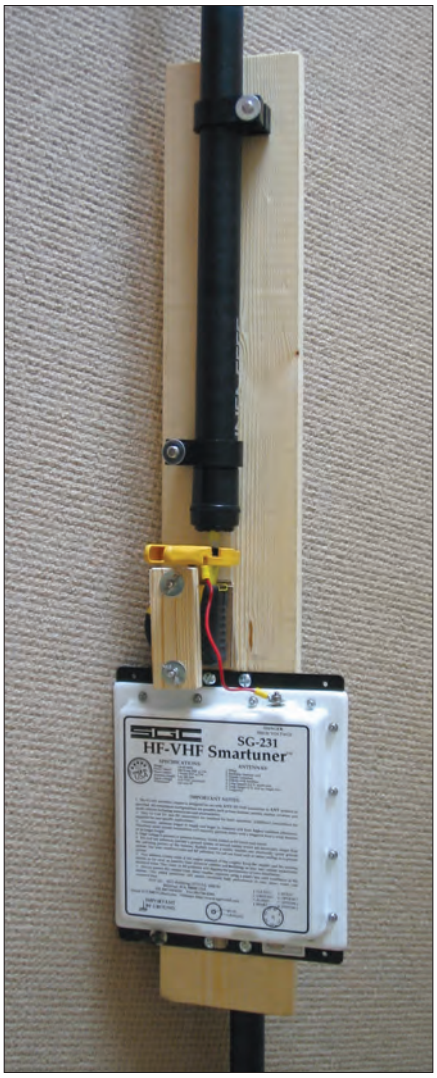


Fig. 1: A general impression of the assembly of components. As supplied, the fibreglass 'fishing pole' antenna is 1.14m long and 40mm in diameter and consists of nine telescoping sections (see text).

This article presents my summary of the thought processes that have gone into selecting and building an all-band h.f. vertical antenna. It also contains construction details of a simple but effective prototype antenna that can be used on all the h.f. bands for static mobile, or from a patio/temporary location.

The antenna consists of an eight metre long steel measuring tape contained within a telescopic fibreglass fishing pole, which extends from approximately one metre to eight metres in eight sections. Power is then fed to the system from the transceiver via a suitable automatic antenna tuning unit (a.a.t.u.).

When used for static mobile the tip of the antenna is approximately nine metres above the ground with the ground plane itself being provided by the bodywork of the vehicle, whilst for static operation a fan of wires is used as a ground plane.

The antenna is effective in use, with 'band hopping' being almost instantaneous. It's also very easy to erect and dismantle.

Downsizing Requirements

The need to build the antenna came about because of 'downsizing' requirements when I moved from a house to a flat. It became necessary for me to change to almost entirely mobile operation and therefore to replace my previous tree mounted wire trapped dipole, using some form of multiband h.f. antenna that could be used for static mobile and possibly on a patio, or suitably mounted on a caravan.

I decided that the chosen antenna should be easy to erect and dismantle and preferably would not need manual re-tuning between bands. Initially, I used helically wound whips, magnetically-mounted on the vehicle roof. These worked, but were not very efficient and each band required a separate antenna.

So, in an attempt to improve the signals and also become independent of using the vehicle as the 'ground', two 3.5MHz helically-wound whips were mounted 'back-to-back' so as to constitute a dipole. These were fed via 50Ω impedance coaxial cable, a 1:1 balun and the assemby successfully tuned up on both 3.5 and 14MHz.

A further modification was to mount two 7MHz whips at right angles to the 3.5MHz whips, so that 80, 40 and 20 metres could be worked without having to change the antenna. The set-up worked, but the four whips plus their mount and balun were rather heavy, especially when mounted at the top of a portable, four metre caravan television mast.

The signal reception was very good and quiet but the signal reports that were received were never very good. So, it was back to the drawing board!

All the generally used antenna designs were considered. Eventually, based upon my criteria, I decided that probably the antenna that would most satisfactorily meet my requirements would be some form of wire vertical.

Verticals & Design Issues

It was then time to look closely at vertical antennas and their design issues, bearing in mind that the best performance of a vertical antenna is achieved when it's a quarter wavelength long. However, many verticals are considerably shorter than this, needing loading and matching to be effective.

Next to be considered was the radiation pattern of a vertical antenna. This is omni-directional and has a low angle of radiation, emitting uniformly in all compass direction and also exhibits similar reception characteristics (Often referred to as 'reciprocity').

I also had to bear in mind that the operational efficiency of a vertical is dependent on a number of key factors:

A: The overall height of the antenna.

B: The nature of the ground over which the antenna is placed.

C: the efficiency of the ground/counterpoise system used.

D: The efficiency of the matching and loading elements.

E: The surroundings.

So, let's now look at the key factors individually.

Overall Height

Overall height: Generally the higher the better, as the efficiency of a vertical antenna increases with height. Additionally, the elevation angle of maximum radiation decreases with height - better for long distance (DX) working.

It must be borne in mind, however, that an half-wave vertical antenna presents a very high feed-point impedance, which according to manufacturers, is often outside the matching range of most a.a.t.u.s/automatic matching units. So, it's very important to avoid antenna lengths that are at, or near, a half-wave length (or

Fig. 2: The measuring tape's casing should be held in place via a pair of long screws terminated with wing nuts. This is so that the position of the tape can be fine tuned. The tape casing is finally clamped in place between the coupler and the base of the fishing rod, as shown in this diagram.

Fig. 3: The coating on the tape measure is removed at the area where the copper strips are clamped on to provide electrical contact (see text).

multiples of half-wavelengths) long at any of the frequencies that are to be used.

In order to avoid half-wavelengths and their multiples for the h.f. bands, antennas having heights of approximately 7.2, 8.8 and 11.8m should be considered.

Nature Of The Ground

Nature of the ground: The nature of the ground where the antenna is located is important. The ground effectively reflects the other 'half' (often referred to as the 'mirror image') of the antenna and collects the return currents to the feed-point.

In practice, most ground (other than a sea marsh) provides a very poor reflector/collector system. In order to operate reasonably efficiently it's necessary to provide an 'artificial ground' by using a series of radials.

Note: In the case of mobile operation, the body of the vehicle acts as the ground and also provides a capacitive link to earth.

Ground Or Counterpoise

The ground or counterpoise system used: Radials reduce ground losses and increase antenna efficiency. However, the information available on radials is confusing and conflicting, with regard to their number, length, diameter, insulation and as to whether they should be laid on the ground or buried!

Of necessity, when operating from a temporary location the wires have to be laid on the ground and can either be bare or insulated. In general, a large number of short radials are preferable to a few long ones.

Matching & Loading Elements

Let's now look at the efficiency of the matching and loading elements. Most verticals will be less than a quarter-wavelength long and to be effective will need to be loaded in some way. The antenna can be loaded inductively or capacitively, or with a combination of both.

Inductive loading can be at the base, middle or continuous (wire coiled around the antenna). Capacitive loading is generally provided at the tip of the antenna.

Multi-band operation requires the antenna to be matched to the transmission line and the transceiver. The matching can either take place adjacent to the transceiver by means of an a.t.u. to match the transceiver to the transmission line. Alternatively, the matching can take place adjacent to the antenna - by means of a coupling system that will match the antenna to the transmission line and thereby eliminate feed-line losses.

The Surroundings

The surroundings are important, and ideally a vertical should be mounted clear of any obstruction that could distort or absorb its radiation - especially metal structures.

My advice is that you should (wherever possible) mount your own antenna well clear of buildings and trees.

Telescopic Mast

For my purposes, the idea of a wire vertical mounted on/or wound onto a telescopic fibreglass mast seemed the ideal solution. I then purchased a telescopic fishing rod from *PW* advertiser, **Sandpiper Aerial Technology Ltd.** (See advert on page **66**).

Note: *Sandpiper confirm these are in stock, and readers should order the 9m fibreglass telescopic mast, which folds down to 1.14 metres in length.* ***Editor.***

As I had the intention of making a wire vertical, the fibreglass telescopic rod was supplied with an earth spike, two brackets to attach the rod to the spike, coil formers and sufficient wire. However, the main snag appeared to be the problem of how to wind up the wire when the antenna was being dismantled as six to nine metres of wire was bound to become tangled!

After trying various ideas, including a fishing-line reel, I decided that a more convenient arrangement would be to use a spring loaded steel measuring tape. This innovation would result in a self-winding antenna element. Of course, such an arrangement does not provide a loaded antenna but it does have a most definite advantage in convenience of use when erecting and dismantling the antenna.

Antenna Tuning Unit

Due to the wide range of wavelengths and impedances that could be presented by the antenna over the range of frequencies used, it was apparent that a wide-range a.t.u. of some form would be required. Such a device would also need to be automatic and be capable of quickly switching between bands without manual re-tuning.

The ideal solution appeared to be to mount an automatic a.t.u. (a.a.t.u) at the base of the antenna rather than mounting a tuner adjacent to the transceiver. Based upon their characteristics, I chose an SGC-231 a.a.t.u./matching unit (available from Waters & Stanton PLC).

Note: *I checked the availability of the SGC-231 with W&S, who confirm they have a few in stock. The '231 has actually been replaced by the SGC-237, which has all the same features, frequency coverage and capabilities but is much smaller then the older '231. The new model has the advantage for readers in that it's also much cheaper!* ***Editor***

Details Of Prototype

A general impression of the assembly of components is shown in **Fig. 1**. As supplied, the fibreglass 'fishing pole' antenna is 1.14m long and 40mm in diameter and consists of nine telescoping sections.

The mast has a push-in rubber cap at the top end and a screw plug at the bottom. For the suggested project it's necessary to cut a crescent shaped slot in the bottom cap - approximately 5 x 30mm - sufficiently large and curved enough in shape to allow the steel tape to pass freely through the cap, but small enough to stop the fibreglass sections falling out of the base. The fishing pole is bolted to a length of wood approximately 140mm x 1m, to which the a.a.t.u. is also bolted.

Note: The measuring tape casing should preferably be plastic rather than metal and it should also have rubber mouldings on the outside as this makes it easier to clamp and fix in position. The tape needs to be mounted in such a way that the centre line of the tape itself and the fishing rod can be aligned. This can be arranged by using thin pieces of wood (such as plywood or hardboard) between the casing and the main support.

The measuring tape's casing should be held in place via a pair of long screws terminated with wing nuts. This is so that the position of the tape can be fine tuned. The tape casing is finally clamped in place between the coupler and the base of the fishing rod, as shown in **Fig. 2**.

Most eight metre measuring tapes sold nowadays are 25mm in width. Unfortunately, this is too wide for the thin top sections of the fishing pole. So, to enable the tape to fit into the topmost sections it's necessary to trim the measuring tape down to approximately one third its width for two metres from the tip.

I found that the diameter of the top section of the pole is too narrow to accommodate anything other than a thin wire, so it wasn't used. However, in order to use the next-to-the-top section, approximately 1.1m was cut off the end of the tape and replaced with the same length of copper wire. This was then soldered on to the tape and terminated with a key-ring. (The key ring is used to pull out the first section of the fishing pole when the antenna is being erected).

Connecting The Antenna

The feed from the SGC-231 a.a.t.u to the antenna itself is via a short (200mm) length of copper wire. This is terminated with two copper strips, which fit on each side of the measuring tape and are clamped in place with a small plastic clamp. **Note:** the coating on the tape measure is removed at the area where the copper strips are clamped on (see **Fig. 3**).

Editorial suggestion: *The coatings on some tape measures can be extremely tough indeed and I have an example that's coated in Teflon. Personal experience has proved that it's best to check (using a test meter) that electrical contact has been made on to the metal tape. Also, please be aware that some long tape measures can use fibreglass tape. So, unless you wish to thread a wire through the length of the fabric - don't be caught out!* ***G3XFD***

Weatherproofing & Protection

Realising that I needed to provide protection and weatherproofing from the elements, I enclosed the SGC-231 and its connections, together with the steel tape, in a plastic wheelie-bin liner. This was fixed around the fibreglass pole by means of a bicycle tyre inner tube rolled back upon itself, **Fig. 4**.

A short length of the bicycle inner tube is first rolled on to the fibreglass tube and then left in position until it becomes necessary to protect the a.a.t.u., etc. from rain. In which case, the plastic is fitted over the assembly and the top section of the inner tube is rolled over the plastic thus making a completely waterproof rubber skirt.

Power Supplies

Power from the transceiver is fed to the base of the coupler via a length of coaxial cable. The 12V d.c. supply for the SGC-231 is supplied via a twin core cable.

The antenna is mounted, in my case, on to the back of a Land Rover (but you may not need such a vehicle!) via a length of 38mm outside diameter (o.d.) aluminium tubing, salvaged from a lighting stand. This is fixed on to a length of slotted strip bolted to the back of the length of wood, **Fig. 5**.

The arrangement also provides a suitable support for fixing the antenna to the base of a patio umbrella stand for use on the patio, **Fig. 6**.

Static Mobile Operation

When I'm operating static mobile, the SGC-231 a.a.t.u is connected to the vehicle chassis with an earthing strip. However, when I'm operating on the patio a fan of wires is used as the ground plane.

A close-up of the connections to the coupler is shown in **Fig. 7**. Looking at the diagram, and reading from left to right, the connections are: ground, r.f. input and 12V d.c. power input.

Fig. 4: A short length of the bicycle inner tube is first rolled on to the fibreglass tube and then left in position until it becomes necessary to protect the coupler etc. from rain (see text).

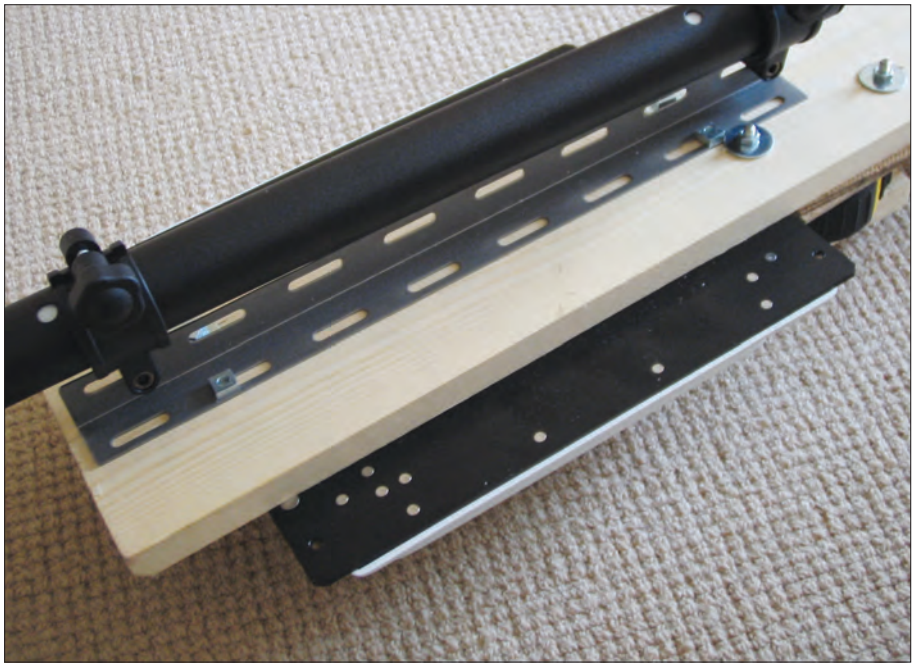


Fig. 5: The author's antenna is mounted on to the back of a Land Rover via a length of 38mm outside diameter (o.d.) aluminium tubing, salvaged from a lighting stand. This is fixed on to a length of slotted strip bolted to the back of the length of wood.

Fig. 6: The arrangement described in Fig. 5 also provides a suitable support for fixing the antenna to the base of a patio umbrella stand for use on the patio.

transmission line at the frequency in use. As the unit has a non-volatile memory, the next time that frequency is used the tuning is almost instantaneous and a contact can be made without waiting to tune up. This results in very quick and effortless 'band hopping'.

Note: When first used the SGC-231 (or newer models) will make a noticeable mechanical 'clattering' sound as the system (using relays) matches the system to the antenna. The noise will continue until the a.a.t.u is 'satisfied' it has a good match. However, because of the built-in frequency 'memory', when you return to that frequency, the a.a.t.u will almost instantly provide the correct settings and you can immediately transmit. It's extremely convenient!

Packing Up

The fishing pole is collapsed in reverse order - starting with the largest diameter section, each section being separated from its adjoining section with a slight twisting motion to break the friction.

It should be appreciated that the antenna as presented is only the prototype and as such can obviously be improved and tidied up. Ideally the ohmic resistance of the antenna itself should be as low as possible, hence the existing steel tape could be replaced with a length of copper strip; but the gain in efficiency would need to be established by experiment.

Also, the overall length of the prototype could be halved by introducing a hinge arrangement between the a.a.t.u./matching unit and the fishing pole.

A simpler - and less expensive a.a.t.u. - preferably with a built in 12V d.c. supply could have been used, but it wasn't possible for me to anticipate the possible range of impedances that would have been encountered. So, the SGC-231 unit, capable of matching a wide range of impedances was chosen in the first place rather than having to upgrade later!

The prototype works well and I'm enjoying using it in its original form for the time being. I hope to work you on the air! **PW**

During temporary operation a balance has to be found between radiating efficiency and the practicality of handling a fan of long radials! The radials consist of eight wires each four metres long, soldered together at one end. Incidentally, to avoid the wires becoming entangled when they are coiled up, I feed them through six or seven grommets each 6mm in diameter.

Prior to laying out the radials the bundle of wires is first laid out in a straight line, and the grommets are pulled back to the earth terminal. The fan of wires is then laid out on the ground (preferably in a symmetrical pattern) around the base of the antenna. At the dismantling stage the process is simply reversed.

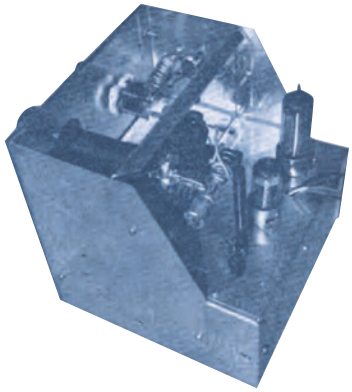
On The Air

When I'm ready to go on the air the fishing pole is extended - starting with the smallest section and each section being friction locked to the next via a slight twisting movement. Next, the 12V d.c. supply and the output from the transceiver and the ground are all connected. The antenna is ready for use.

When connected for the first time, and when r.f. is presented at the input, the SGC-231 matches the antenna to the

Fig. 7: A close-up of the connections to the author's SG-231. Looking at the diagram, and reading from left to right, the connections are: ground, r.f. input and 12V d.c. power input.

A Super-regenerative Receiver For 144MHz



This super-regenerative receiver project (left), originally published in the February 1967 issue of the magazine, was one of the late F. (Frank) G. Rayer G3OGR's few forays on to v.h.f. published in PW. It's still a viable project for anyone willing to try valved receivers above 30MHz!

Important Editorial note: This project provided me with a great deal of enjoyment in the late 1960s and also got me into trouble with the local police! (see later). The project worked extremely well indeed and I provided my version with tuning coils covering both the 70 and 144MHz bands. The majority of the operating on the v.h.f. Amateur Radio Bands in those days employed amplitude modulation (a.m.) and the 'super-regen' is ideal for this mode. Reception of Band II broadcast f.m. is possible, although the recovered audio level will be low. Unfortunately, the narrow band f.m. (n.b.f.m.) we use on 70 and 144MHz nowadays will produce even less audio. However, you can add further audio stages to overcome the problem.

I think it's worth mentioning how I got myself into trouble with the police because, if you build the project, it may help you avoid problems with other users on the bands! The problem developed because I - not having a 954 acorn valve to hand at the time - built the receiver without the radio frequency (r.f.) stage. This meant that the super-regenerative detector (V2) was connected directly to the 144MHz antenna on the roof of my Morris Minor. So, as this type of oscillating detector can also be an effective transmitter - whenever I passed police vehicles, or officers with hand-held radios, their receivers (using a.m. in those days) picked up a 'swooshing' sound as I passed. It took some convincing before police officers understood I wasn't listening to their frequencies (just outside the 144MHz band at that time).

The problem was caused by the relatively powerful oscillator in my receiver and the lack of selectivity in the relatively unselective police radios used in the 1960s. The problem was quickly solved by building a suitable r.f. amplifier to isolate the detector stage from the antenna (for obvious reasons, this approach is essential when a beam antenna is used!).

I used an EF50 valve for the r.f. stage, but the EF91 will work well on 70MHz and adequately on the 144MHz band. One half of a 12AT7 double triode can be used for the detector, with the second triode being used for audio. Nowadays, of course, the audio stages could be replaced by integrated circuit (i.c.) amplifiers, which will require careful input filtering due to the possibility of supersonic frequencies (from the detector) entering the chip. Good decoupling is essential!

Incidentally, the h.t. for the mobile receiver was provided by a wartime surplus (American) Hoover 12V d.c. to 230V d.c., 150m.a. output rotary converter. A very rugged, reliable but noisy h.t. source! **Rob G3XFD**

The Original 1967 Article

In a super-regenerative receiver, regeneration is advanced far beyond the point where oscillation commences, but is interrupted at a frequency above audibility (supersonic frequencies). This provides very high sensitivity.

The super-regenerative receiver described here uses easily obtainable valves and tunes approximately 142-150MHz with the coils employed. Coverage can readily be modified by altering the coils.

A 954 acorn valve is used for r.f. amplification and to help isolate the oscillating stage from the antenna. Output is coupled to L4 by L3.

The valve V2 is the detector. Grid rectification causes a negative grid potential which stops oscillation until the charge has leaked away through R3, when oscillation recommences. The values of R3 and C4 allow this to happen at above audible frequency (supersonic, hence 'super-regeneration').

The 50kΩ variable resistor, VR1 adjusts regeneration by varying the high tension (h.t.) voltage applied to V2. In a super-regenerative detector a loud hiss is heard when no signal is present, but this almost ceases when a signal is tuned in. The valve, V3, is an audio amplifier, and V4 the output stage.

For smooth regeneration and lack of various feedback effects, a separately decoupled h.t. supply was found necessary for V1 and V2. This is preferably obtained from a voltage regulator, but satisfactory results are possible by voltage dropping from the 250V line as shown in **Fig. 6**.

Prototype Chassis

The prototype chassis (heading photo) was 6 x 6 x 3in deep (152 x 152 x 76mm). The panel is supported by large brackets and these also brace the vertical screen carrying V1, V2 and the variable capacitor VC2 (see **Fig. 2**). This provides a front section with V1 grid and other circuits, while V1 anode and V2 holder tags are behind. The audio stages V3 and V4 are on the chassis.

The vertical screen can be largely wired in advance. Punch holes for VC2, V2 holder, and a clearance hole for V1 (**Figs. 3** and **4**). The connections in Fig. 3 are when viewing the acorn valve from its shorter or grid end (also see Fig. 2).

Care must be taken when soldering, or the acorn valve seal will be broken by heat. Leads are shaped and cut so that there will be no strain on the valve pins and they are also lightly tinned with solder.

The capacitors, C1 and 2, should have the shortest possible wires. Clean the valve pins, if necessary, and tin the extreme ends with cored solder and a hot iron, which is removed immediately the solder flows. The valve is then soldered in as in Fig. 3, with equal care.

The diagram, **Fig. 4**, shows the rear of the screen, leads to V2 and the items in the tuned circuit are kept as short as possible. Fit soldering tags so that tags 4 and 7 of V2 holder may be soldered to them without wire (Fig. 2). Tag 1 goes to VC2 at its nearest point (Fig. 2).

Variable Capacitor Modification

The variable capacitor, VC2, has four moving plates, and two fixed plates, isolated from each other. It was made from a 75pF short wave variable capacitor. The spindle retaining clip was pulled out with a pointed tool, and the spindle and moving plates withdrawn. Unwanted plates were removed from the spindle by bending them from side to side with small flat nosed pliers.

If the capacitor you have available* has plates assembled on threaded rods, with spacers, it should be taken apart to remove the plates. The rotor had nine moving plates. Counting from the back, leave plates 1, 3, 6 and 8, and remove the others. Remove

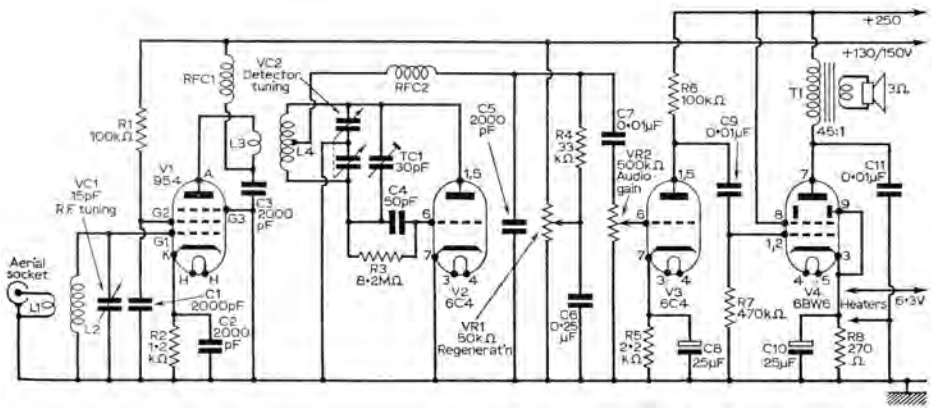


Fig. 1: Circuit diagram of the receiver section.

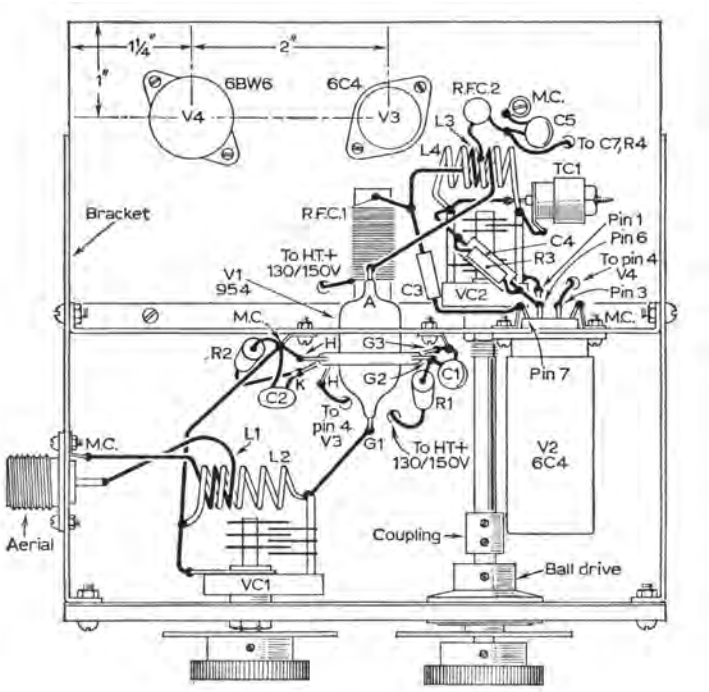


Fig. 2: Top view of chassis layout. Note the position of the components. At these high frequencies the shortest possible leads should be used.

all the fixed plates one at a time, and check that the capacitor is not the type with the two fixed plates supports joined by a metal strip in front.

Replace the spindle. Prepare two fixed plates by cutting off one lug of each and then put one such plate between the front pair of moving plates and solder it to one support. Put the other plate between the rear moving plates, and solder it to the other support. Each section of VC2 is thus a single fixed plate between two moving plates, double spaced. The capacity is approximately 5pF each section.

**** Note:** It's possible to use Philips 'Beehive' type concentric trimmer capacitors (available with values between 5 and 30pF) to provide tuning for this project. Suitable diameter nylon or ptfe tubing is slid over the moving part of the Beehive, and this can be fed through a control panel. A tuning knob or slow motion drive can be attached. This method also reduces tuning problems associated with 'hand capacity' (changes in frequency caused by the presence of a human hand near the tuning circuits).* **Editor**

The Screen

The screen is bolted as in Fig. 2. A coupling and piece of 0.25 inch rod couples VC2 to the slow motion tuning system, which occupies a hole in the panel. The latter was varnished hardboard backed by aluminium sheet. (The capacitor VC1 has no reduction drive).

Tuning Coils

Details of winding the tuning coils are as follows: L1; 2 turns of 18 or 20 s.w.g. insulated wire, and placed between the turns of L2. L2; 4.5 turns of 16 s.w.g. enamelled or bare wire, spaced to 075in (19mm) long. L3; 2 turns of insulated wire at the centre of L4. L4; 5 turns of 16 s.w.g. wire spaced 0.875in (22mm) long. All coils are 0.375in (9.5mm) outside diameter.

To make L2 and L4, straighten the wire and wind turns side by side on a suitable object. Run a small tool (blunt probe will do) round and round between turns, or stretch the coil to the required length. Shape and cut the ends and solder them to the appropriate points. The coils L1 and L3 are made in the same way and fitted as in Fig. 2.

Radio Frequency Chokes

The radio frequency choke, RFC1, is made using 70 turns of 34s.w.g. enamelled wire, close wound on a 0.3125in (8mm) diameter former. Mine was a push fit on a bolt attached to the vertical screen. (Adhesive is applied to the ends of the winding only).

The second RFC2 choke is wound on a 2.5in (65mm) piece of 0.25in (6.5mm) diameter insulated rod. Secure 34 s.w.g. enamelled wire near the top and wind 70 turns side-by-side and again secure with adhesive or tape. Bind the extreme bottom of the rod with a few turns of bare wire, and solder on a tag bent at right angles. This tag is bolted to the chassis, and is an earthing point for C5 (Fig. 2).

Solder the top choke lead to the centre of L4. **Note:** Other, ready made, v.h.f. type chokes should be satisfactory.

Audio & Output Stages

The audio and output stages are wired as in Fig. 5. Any slight leakage in C7 or C9 will upset the audio stage grid voltages, so these capacitors should be tested if they're not new.

A tag strip anchors the two h.t. positive supply leads. Insulated leads for power supplies and speaker pass through a hole in the chassis. If the speaker transformer is separate, and not attached to the speaker, the transformer could be bolted to the chassis underneath, near V4. When using a speaker with transformer attached, remember that the h.t. voltage is present on connections from receiver to transformer primary!

Current can probably be taken from an existing power pack. The heaters require 900mA at 6.3V. The audio stages draw approximately 60mA at 250V. Current required at the 130-150V point is small, depending on the setting of VR1, and averages about 4-6mA.

Power Supply

A suitable power supply circuit is shown in **Fig. 6**, and can be modified in some cases to suit items to hand. The 6.3V winding may be rated at more than 1A. If this winding can supply 2A or more, and there is no 5V winding, a 6.3V rectifier such as the EZ81 can be used, in which case the rectifier cathode is taken to the h.t. smoothing choke only, and all heaters are then in parallel.

The h.t. current drain can be kept down to a suitable level for a 60mA transformer by using 12kΩ and 20kΩ resistors instead of 6.2kΩ and 10kΩ, and by increasing R8 to 330Ω. Smoothing capacitors need not be the values shown, and can be 350V or 450V.

The choke is any small 60 or 80mA smoothing type. The power supply itself is built on a separate chassis, size to suit individual components.

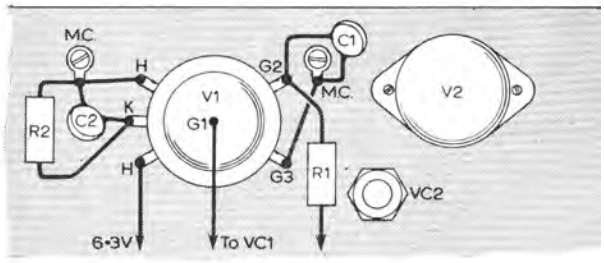
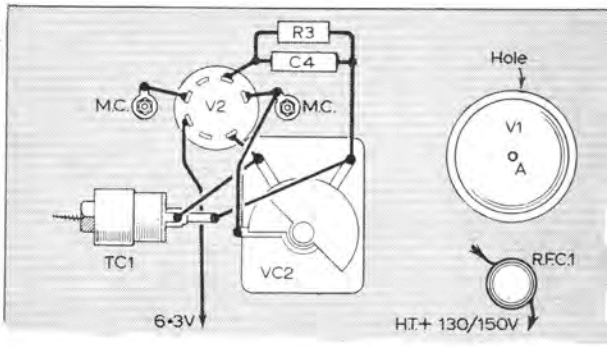


Fig. 3 (above): Top chassis screen viewed from the front.
Fig. 4 (below): Top chassis screen viewed from the rear.



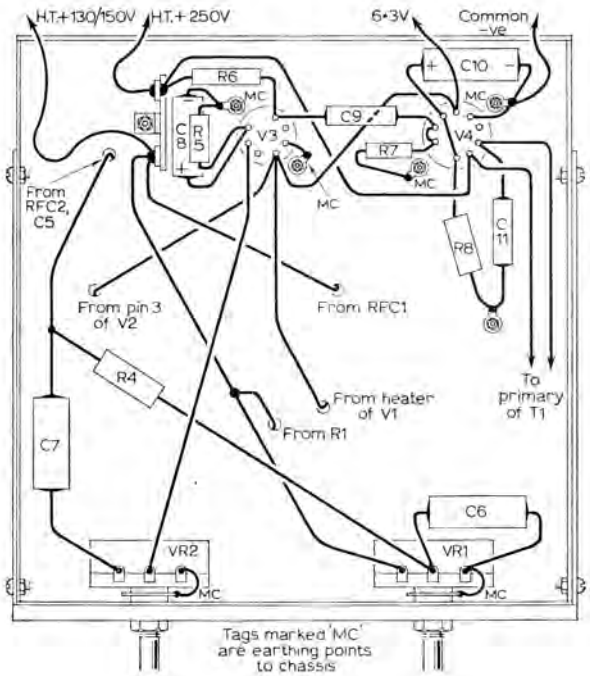
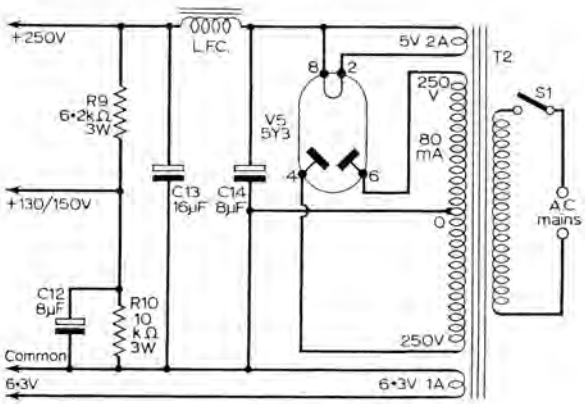


Fig. 5 (above): Under chassis wiring of the receiver.
Fig. 6 (below): Circuit of a suitable power supply.



Using The Receiver

With L4 wound as described, TC1 is almost completely open for the 144MHz band. A very small adjustment of TC1 has considerable influence on band coverage. Later, it can be rotated slowly with an insulated tool, while checking coverage.

Operating the receiver: With VR2 near maximum, slowly turn up VR1 from its minimum position. When super-regeneration commences, a loud hiss will be produced. Turning back VR1 a little reduces this hiss, but if VR1 is rotated too far, super-regeneration will cease.

With VR1 in the best position (found by experience!), VC1 can be peaked for maximum noise even with no antenna connected. However, with the antenna connected, tuning VC1 should give quite a high noise level. With TC1 nearly open, resonance with VC1 can be expected around minimum capacity, increasing slightly as VC2 is closed.

When a usable signal is tuned in, the hiss should almost completely cease. In these circumstances, peaking VC1 for maximum signal strength corresponds to minimum noise. With careful adjustment, very weak signals can be resolved.

If super-regeneration is not satisfactory, it may be worth changing R4 since surplus 6C4 valves seem to vary somewhat. If super-regeneration is absent, reduce R4 slightly in value. Alternatively, slightly increase the h.t. voltage by increasing the value of R10, or reduce the value of R9. On the other hand, should super-regeneration be difficult to control, slightly increase R4 in value, or reduce the h.t. voltage.

Suitable Antennas

For a working range of some miles, a vertical 0.25l wave antenna will do. This is about 19in (482.5mm) long.

Component List

Capacitors:

C1	2000pF 150V disc ceramic
C2	2000pF 150V disc ceramic
C3	2000pF 250V disc ceramic
C4	50pF mica
C5	2000pF 250V disc ceramic
C6	0.25μF 250V paper tubular
C7	0.01μF ceramic or mica
C8	25μF 12V or similar electrolytic
C9	0.01μF ceramic or mica
C10	25μF 25V or similar electrolytic
C11	0.01μF 350V
C12	8μF 350V electrolytic
C13	16μF 350V electrolytic
C14	8μF 350V electrolytic
VC1	15pF variable
VC2	5+5pF variable (see text)
TC1	30pF air spaced concentric trimmer (Beehive type)
VR1	50kΩ linear pot
VR2	500kΩ log pot

Resistors:

R1	100kΩ 0.5W
R6	100kΩ 0.5W
R2	1.2kΩ 0.5W
R7	470kΩ 0.5W
R3	8.2MΩ 0.5W
R8	270Ω 1W
R4	33kΩ 0.5W
R9	6.2kΩ 3W
R5	2.2kΩ 0.5W
R10	10kΩ 3W

Valves

V1	954 acorn
V4	6BW6
V2	6C4
V5	5Y3
V3	6C4

Miscellaneous:
Two B7G holders, one B7G screen, B9A holder, L1, L2, L3 and L4, RFC1 and RFC2, see text, Ball drive, coaxial socket, 10H 80mA choke, mains transformer 250-0-250 at 80mA, 5V at 2A, 6.3V at 1A, switch 1 pole 2-way, 4-sided chassis 6 x 6 x 3in., 6 x 3in. flanged runner, 6 x 6in. panel, two panel brackets about 5 x 5in., knobs, tag strip, etc.

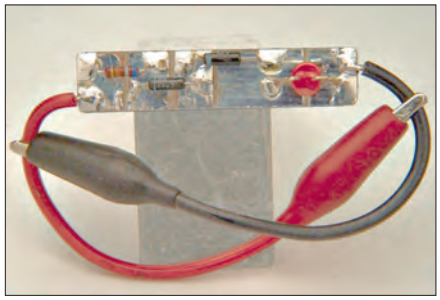
Signal strength at greater ranges will be much improved by using a dipole. It may be wire supported from convenient points, or attached to insulators on a strip of wood, or self-supporting rods. The overall length is about 38in (965mm, or 0.965m).

In view of the very small size, a simple beam is also easily constructed, but some means of rotating it will then be needed. The 'armstrong' method is cheap and 'handy'!

Various ready-made or adjustable aerials and multi-element antennas giving increased signal strength can be obtained. At first, a dipole may be preferred. But the chance of receiving some DX may well tempt you to buy or build a beam antenna. **PW**

Carrying On The Practical Way

The Rev. George Dobbs G3RJV aims to light up your shack this month, after you've built the glowing voltage indicator unit!



This month's projects may also you to encourage you to try some portable operating in the Welsh hills. The ideas G3RJV suggests will help operating during the refreshing Welsh rain!

"There are two kinds of light - the glow that illuminates, and the glare that obscures".
James Thurber (1894 - 1961)

Welcome to Carrying on the Practical Way (COTPW) for September! It's worth mentioning here, that when I'm not working on the column (from time to time) I do a little portable operating, usually on 14MHz and from Wales. It's one of those things I like to do but rarely find enough **time to put into practice**!

So, in an attempt to do more portable operating, I decided to set up a dedicated portable station. My usual portable transceiver is a NorCal 20; a single band QRP rig once sold in kit form by the Northern California QRP Club. With a built-in electronic keyer, an audio frequency 'readout' (it sends the frequency in Morse code!) and small in physical size, it's ideal for the job.

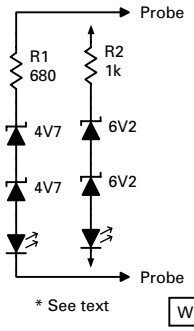


Fig. 1: Not wishing to carry a test meter into the wet Welsh hills, G3RJV made a very simple battery condition tester. The circuit is shown here (see text).

Fig. 2: The indicator was assembled quickly onto a small piece of printed circuit board (p.c.b.) material as shown. The board measures roughly 50mm by 10mm and has three channels cut through the copper surface (see text).

Kits To The Needy

For some years now, I've been responsible for distributing NorCal 20 kits to needy Radio Amateurs around the world. I still have some of these kits, which are available for Amateurs who otherwise would not be able to have their own station.

Through the G QRP Club, I've been able to send many of the kits to individuals and groups in poorer parts of the world. Incidentally, if any *PW* readers know of worthy recipients for these kits please let me know via **g3rjv@gqrp.co.uk** We prefer to deal with groups who can accept small numbers of kits, although single kits have been sent to individuals. Perhaps you may like to suggest a recipient and pay the postage costs? The G QRP Club will then supply the kit free of charge.

Editorial note: *I have already pledged my help to George and I'm sure readers will also support the G QRP Club, in what I regard as being the true spirit of Amateur Radio.* ***G3XFD***

Portable Station

Now, it's back to the portable station! With the NorCal 20, I have a telescopic fibreglass pole and use this to support a lightweight 14MHz dipole, or a base tuned vertical antenna.

To keep the weight down, for my power supply I use a 12V lead-acid gel battery. The NorCal 20 draws over 200mA of current on receive but the battery gives me several hours of operating.

Not wishing to carry a test meter into the wet Welsh hills, I decided to make a very simple battery condition tester. The circuit is shown in **Fig. 1**.

In the circuit, the resistor R1 is the series resistor for a pair of 4.7V zener diodes. These are used in series so that the combined voltage regulation (2 x 4.7V) is somewhere near the voltage at which the battery ceases to be useful.

Using this circuit, the l.e.d. glows brightly at the full 12V and ceases to glow at about 10V. Left connected across the battery, it uses up very little current and provides a warning when the battery may fail to supply the required voltage to operate the transceiver.

Sometimes, I've seen this circuit used for over-voltage as well as under-voltage indication. This feature can be added by including the circuit around R2 and its diodes and l.e.d., although for my purposes, it wasn't required.

Assembled Quickly

The indicator was assembled quickly onto a small piece of printed circuit board (p.c.b.) material as shown in **Fig. 2**. The board measures roughly 50 by 10mm and has four channels cut through the copper surface.

These channels, or gaps in the copper-plated surface are made by carefully drawing a sharp hacksaw across the plated surface. Make the cuts with care, too much pressure may cut all the way through the board.

Cutting as I've described produces five large copper pads, which are used as solder connection points for the components. The l.e.d. protrudes through a hole drilled in the board. Incidentally, for those who like to keep up with the times, you're now using surface-mount technology!

Bar-to-Band

I have a very simple method of remembering which way round l.e.d.s are connected. In the circuit symbol for a diode, the cathode is denoted by the flat bar. Diodes, including zener diodes, usually have a band marking the cathode end. So just remember "bar-to-band" for a diode. Some l.e.d.s have a shorter lead for the cathode, but they all have a flat area on the circumference of the plastic case next to the cathode lead. So, remember "bar-to-flat" is the rule for the l.e.d.

Note that the polarity of the zener diode and the l.e.d. are the opposite way around. The l.e.d. is forward-biased so it will glow, but the zener diode is reverse biased. For an explanation, please look at **Fig. 3**.

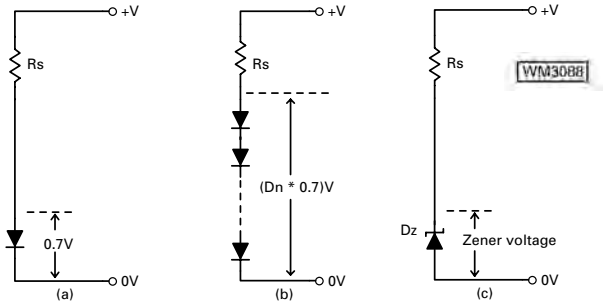


Fig. 3: Differing ways to use diodes as regulators in the circuit (see text for detailed explanation).

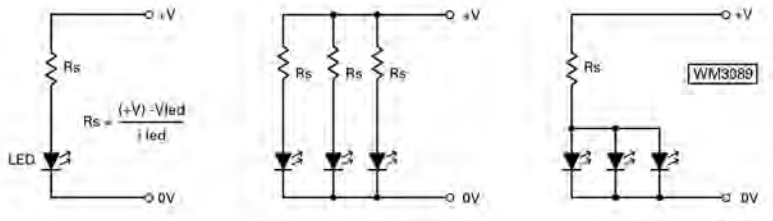


Fig. 4: How differing value series resistors maybe used and how more than one diode can be powered from a single supply.

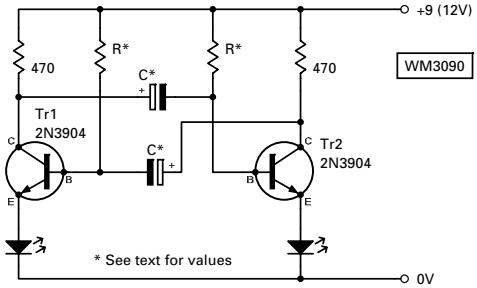


Fig. 5: The flashes that could deter thieves! This popular multivibrator circuit can be arranged to flash each diode approximately once a second (see text).

The diagram, **Fig. 3a**, shows a silicon diode forward biased through a series resistor. A diode has a forward voltage drop; the voltage at the anode is higher than the voltage at the cathode. This varies according to the type of diode. For a silicon diode, it's in the order of 0.7V. So Fig. 3(a) is a voltage regulator circuit; as the supply voltage varies, the voltage across the diode remains at 0.7V.

However, there are some problems! As the current increases, the voltage drop will increase slightly, and if the reversed supply voltage is too high, the diode will break down.

In spite of the difficulties, silicon diodes can be used for voltage regulation as shown in **Fig. 3b**. Here, the drawing shows a number of silicon diodes connected in series, replacing the single diode of Fig. 3a.

If the number of diodes is 'Dn', then the regulated voltage will be 'Dn' * 0.7V'. Higher current silicon diodes, like the 1N400x series, would function well in this circuit. The value for Rs would be worked out using the same formula as for a zener diode.

Zener Diode Regulation

The diagram, **Fig. 3c**, shows the circuit for zener diode regulation. A zener diode allows current to flow in both directions. In the forward direction, as usual no current flows until the voltage across the diode is 0.7V.

But in the reverse direction, as shown in Fig. 3c, no current will flow until the voltage reaches the 'zener voltage'. Above this voltage, current flows freely and it's the series resistor that prevents the diode being destroyed.

The formula for working out the series resistor is

Rs = [Vin - Vz] / I

Where Vin = input voltage, Vz = zener voltage, I = current through Rs (use the maximum expected current).

For example, with a 12V supply, 9V regulated at 50mA can be produced by a 9V zener diode and an Rs of about 60Ω.

Series Resistor?

Now we've discussed what's required for the series resistor in a zener diode regulation circuit, what about the series resistor for an l.e.d? The diagram, **Fig 4a**, shows how this is done with an equally simple formula. The series resistor is found from the formula

Rs = [V_S-V (l.e.d.)]/I (l.e.d)

Where Rs = series resistor, V_S = supply voltage, V(l.e.d.) = operating voltage of the l.e.d. and I(l.e.d.) = operating current of the l.e.d.

Note: Most common l.e.d.s operate at about 1.8V and about 20mA.

In practice, I use a simpler rule of thumb equation for supply voltages above 5V. This is:

Rs=Vs/20mA

(Use the nearest preferred value of resistor).

Using the formula suggested, common supply voltages work out as: for 6V, Rs is 330Ω, and for 9V, Rs is 470Ω and for 12V, Rs is 680Ω. **Note:** If you require a brighter glow, use a smaller value. Don't forget that in practice, an l.e.d. is really quite a rugged device

Two Approaches

When using more than one l.e.d. with the same supply, there are two approaches. The diagram, **Fig. 4b**, shows three l.e.d.s in parallel with a series resistor for each diode.

In this case, the value for Rs for one of the l.e.d.s is worked out and the same value used for each l.e.d. (This is a current sharing arrangement.)

The parallel l.e.d.s can also be fed through one series resistor. In this case the value can be worked out from the first formula, but inserting the value of the total current for all the l.e.d.s as I(l.e.d.).

Mock Alarm

This month, one very simple circuit has produced a lot of information. So, not wanting to cheat readers of something to build, I've added a small circuit, **Fig. 5**, I call it a 'Mock Alarm' because it makes two l.e.d.s flash and could be mounted in a plastic case to simulate an alarm that's been 'set'.

Many readers will recognise Fig. 5 as a flop-flop circuit using two transistors each with an l.e.d. in the emitter lead. The rate of the flash is controlled by the values of R and C. Good values to begin with are 47kΩ for R and 22µF for C. This gives a flash rate of about one per second.

I used 2N3904 transistors, although any similar device would work. You could even try *pnp* transistors and reverse the power supply! I built mine 'ugly' style on a piece of p.c.b. material, with the l.e.d.s protruding through the board.

The diagram in Fig. 5 could even link with Fig. 1. As you leave your car at the bottom of the hill before embarking on the hike to the radio portable site, you would then switch on the mock alarm to suggest that it's alarm protected!

PW

Valve & Vintage

Phil Cadman G4JCP, who is a very sober gentleman, has a bottle of Vodka on the shop counter. Is he expecting Russian visitors? Let's join him and find out!

Greetings comrades! Despite the warm summer weather, you find me sitting in the Valve and Vintage 'shop', wearing my Russian hat, and carefully polishing my samovar. No, I haven't finally lost my grid bias! Instead it's just my way of commemorating the 40th anniversary of a rather interesting amateur discovery.

Towards the end of 1966, at the height of the Cold War, the late **Geoffrey Perry**, then a physics teacher at **Kettering Grammar School** in Northamptonshire, had a letter published in *Flight International* magazine. The letter stated that Perry, aided by **Derek Slater G3FOZ**, and a number of school pupils, had deduced from freely available data and from analysing radio signals from Soviet satellites, that the Russians must have a new (and as yet undisclosed) launch site approximately 322km (200 miles) south of Archangelsk.

Although the letter initially produced little reaction, it was read with interest by the late **Dr Charles S. Sheldon II**, of the Congressional Research Service in the USA. Just before Christmas 1966, he alerted the press of the letter's importance, and as a result, Kettering Grammar School became famous the world over. Yet despite all the publicity, neither the Russians nor the Americans admitted the existence of the new launch site - Plesetsk - for some years.

I think the 40th anniversary of the Kettering group's discovery of Plesetsk should be acknowledged. After all, the group's achievement showed that with simple equipment - their receiver was a Marconi CR100 (B28) - plus careful observations, hard work and some logical thought, real discoveries could be made by amateur enthusiasts. I wonder, have any of *PW*'s readers been members of the Kettering group at some time?

Editor: *We would very much like to hear from anyone who was involved in this remarkable work. I seem to remember seeing the school featured on the early evening* Tonight *programme with* ***Cliff Michelmore****. G3XFD*

Incidentally, Geoffrey Perry had a very interesting article published in *Physics Education* in 1968. Entitled 'A school satellite tracking station as an aid to the teaching of physics', it explained how radio and satellite technology could enhance the teaching of not only physics but also mathematics and chemistry as well.

Given the state of science education in the UK at the moment, I suggest it ought to be required reading for every science educator!

So, you might ask, "What has this to do with radio"? Well, in answering, last time I featured the 'Hiker's One', a set from the late 1930s, which used a double grid (bi-grid) valve connected as a space charge valve. Applying a small positive voltage to the first grid and feeding the signal to the second grid, results in a useful anode current flow even at very low anode voltages.

Published Curves

The useful anode current flow at low voltages effect can be seen in the published curves for some valves. The diagram, **Fig. 1**, shows a selection of anode current curves for an L77 triode, better known as a 6C4 or half an ECC82. You'll see that when the control grid is negative, anode current is initially very low, while the steepness of each curve increases with increasing anode voltage.

However, when the control grid is positive, the curves are initially very steep, indicating that there will be a relatively large anode current flow even at low anode voltages. The curves then reduce in steepness as the anode voltage is increased. I think it's now worth giving a brief explanation of this effect.

Let's consider a thermionic (valve) diode. When the cathode is heated to operating temperature, some electrons attain enough energy to break free from the surface. These electrons form a negatively charged 'cloud' around the cathode, which repels further emitted electrons back to the cathode. This is the space charge.

If the anode has a positive potential, some of these electrons will be attracted to the anode and a current will flow. This current - called the space current - is limited by the presence of the space charge, and its magnitude is governed by the Child-Langmuir space charge law, also known as the 'three halves' power law.

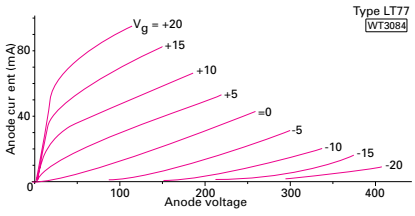


Fig. 1: A selection of anode current curves for an L77 triode, better known as a 6C4 or as half an ECC82 (see text).

Triode Valve

In a triode, the electric field at the surface of the cathode is the sum of the fields produced by both the anode and the grid. The grid has more influence simply because it's so much closer than the anode. Even a small positive voltage on the grid will produce a respectable space current, all of which will head for the grid (and finally land on it), providing the anode voltage is zero.

As the anode becomes positive, it attracts some of the electrons that were initially attracted by the grid but missed the grid wires. When the anode voltage is increased, an increasing proportion of this space current (created by the positive grid) is captured by the anode. But once most of it is captured by the anode, the slope of the curves decrease, and they begin to resemble 'three halves' power law curves.

Note: It should be remembered that although the anode current does not follow the Child-Langmuir law, the total space current leaving the cathode does. (I admit that this is an over simplistic explanation, but I'm sure you get the idea!).

Necessary Detail

Actually, I've found that most books about valves don't go into the detail necessary to fully appreciate what happens when valves are used both within, and outside their normal operating conditions. Fortunately, two excellent books on valve theory are currently available on the Internet.

The first book is *Vacuum Tubes* by **Karl R. Spangenberg**, published in 1948. It can be found at: **http://www.ken-gilbert.com/techstuff/spang/Spangenberg.html** (Look for the

Fig. 2: Reader Ron Pearce has built a Hiker's One. The set covers 1.8 to 28MHz using three plug-in home brewed coils and uses a genuine type 49 valve (see text).

'ZIP' file.) Unfortunately, the book is not complete, but all the basic theory is there.

The other text is entitled *Theory of Thermionic Vacuum Tubes* by **E. Leon Chaffee**, published in 1933. That's available in full from: **http://www.pmillett.com/tecnical books online.htm** (There are several other very useful valve books there too). However, be warned, both Spangenberg and Chaffee are highly mathematical but please don't be put off! Even if you only read between the equations, you'll still get a good understanding of valve operation. My thanks certainly go to the people who scanned the books and made them available.

Never Common

Space charge valves were never common, so published data is necessarily limited. As far as I know, no valve manufacturer ever produced characteristic curves for space charge operation of 'normal' valves.

Some types have been found, by experiment, to be useful as space charge valves but measured data is all but absent. This is a pity, as comprehensive, quantitative data on the operation of normal valves, working at low voltages (space charge mode or otherwise) would be extremely useful, and might give further insight into how valves work under these unusual conditions.

Additionally, things like contact potential, initial electron velocity, the potential drop along a filamentary cathode and such like, all of which are normally of little or no concern, do become significant at low voltages. Again, it would be nice to know how these factors affect valve operation.

So here's where we amateur enthusiasts come in! Obtaining characteristic curves, particularly when only low voltages are involved, is not difficult. Just very time consuming.

Modern digital multimeters are cheap and perfectly accurate enough for this application. Results can be plotted on computer, in 3D if required. Actually, 3D plots are very useful when displaying graphs where there are a number of variables and they often allow hidden subtleties in the data to become visible.

Influencing Space Charge

Positive g1 operation isn't the only way to influence the space charge. For example, running the cathode at lower than specified temperature reduces the space charge.

You may recall that most valves used in low-voltage valved receivers have under-run heaters (filaments). This helps with battery economy, but also may be beneficial to the working of such sets.

Again, some quantitative data would be very useful. With electrode voltages held constant, does the anode current increase or decrease if the temperature of the cathode is reduced a little?

Manufacturers issue dire warnings about both over-running and under-running heaters/filaments, and overrunning is indeed detrimental to valve life. However, operating the cathode **below normal** operating temperature is certainly not as serious and may not be destructive even in the long term. Anyone like to comment?

Steve Bench Experiments

One valve enthusiast who has published some of his work on the Internet is **Steve Bench**. He's been experimenting with directly heated triodes operated with lower than specified voltage on their filaments see **http://members.aol.com/sbench102/dht.html**

Plotting one particular valve's characteristic curves, Steve discovered that over a wide range, the valve's amplification factor, mutual conductance and anode resistance, were all appreciably constant. Operating as a voltage amplifier, the valve produced significantly lower distortion than normal.

Closer to home, **Derek Cooknell** (we first met at Aston University in Birmingham) wrote to say that he too has been investigating the effect of reduced heater voltages. Derek took a 6SJ7 and connected both g1 to g2 to +3V, tied g3 to the cathode, and then obtained plots of anode current against anode voltage for different heater voltages.

The curves Derek obtained look like ordinary triode curves. Tying g3 to the anode and using g2 as the control grid may produce something different. Derek will hopefully let us know!

Feedback From Readers

Now, a couple of bits of feedback from readers before I nip off for a brew. First, I must thank **Ken Young G3ZCG**, for the information he sent me about the curious CV359 neon indicator.

I'm also most grateful for the E-mails **Don Holker** sent describing the Modulator Type 64. I was amazed to learn how this equipment produced a 3.5kV/50A pulse, 1µS long, which was then stepped up to around 14kV and fed to an X-band magnetron. Quite a piece of kit!

Ron Pearce also wrote to tell me about the short wave version of the Hiker's One he's built. The set covers 1.8 to 28MHz using three plug-in home-brewed coils and uses a genuine type 49 valve. Ron included a picture, **Fig. 2**, and a short but impressive list of some of the DX stations he's heard using the set.

Right, it's time for a cuppa! But do 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.** 73 and goodbye comrades!

PW

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VHF DXer

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

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

It's no exaggeration to report that Sporadic-E (Sp-E) openings on the v.h.f. bands during June were the best that I can ever remember and my memories go back a very long time! The 50MHz band was open every day throughout the month with numerous single-hop and double-hop contacts being made with stations throughout Europe and the nearer reaches of Africa and Asia. This was nothing compared to the real DX that could be found during 21 days of transatlantic openings to North and South America and three extremely unusual openings over the North Pole to Japan!

Propagation on the 70MHz band was equally good, with only five days during June when there was no reported Sp-E propagation. Most of the new DXCC countries were worked from the UK and a number of 'firsts' were reported. Opertators in the UK reported making two-way contacts with stations in Azores (CU), Croatia (9A), Denmark (OZ), Dodecanese (SV5), Greece (SV), Portugal (CT), Romania (YO) and Serbia & Montenegro (YU).

Conditions on the 144MHz band were fantastic, with 19 days of long-distance openings being reported by UK stations. Indeed, during the first two weeks of June it seemed as if there were Sp-E openings every single day. Around 35 countries at Sp-E distance (not less than 1000km) were worked from the UK but not all of these were in the 'traditional' southeasterly direction. During June, there were a number of 144MHz Sp-E openings to northeast Europe with contacts being made into northern Scandinavia, the Baltic area and Russia. This is most unusual!

The only problem with all the openings is that I have so much information I don't know where to start!

So, this month I'll just take a look at the 50MHz band and next time around I'll catch up on the 70 and 144MHz openings. Assuming, of course, that nothing happened in July, which would be extremely unlikely!

THE 50MHz BAND

It's probably true to record that virtually every European country was worked from the UK during June. By analysing the DX Cluster records I noted that a total of 57 European countries were contacted on the 50MHz band. Some of the more interesting stations included those of CU3EQ (Azores), C31BO and C31JM (Andorra), HV0A and HV5PUL (Vatican City), JW0HZ and JW4GHA (Svalbard), LX1NO (Luxembourg), OH0RJ (Aland Islands), OY1CT (Faroe Islands), SV9CVY (Crete), T77GO (San Marino), TF8GX (Iceland), ZA/UT7DW (Albania), ZB2FK (Gibraltar) and 3A2LF (Monaco).

Frequently, the Sp-E propagation would consist of many hops, therefore extending the range into the nearer parts of Asia and Africa. A total of 13 countries were worked in these continents, the Asian stations being EY8MM (Tajikistan), JY4NE (Jordan), TA7OM (Turkey), ZC4LI (Sovereign Bases, Cyprus), 4L3Y (Georgia), 4X4DK (Israel) and 5B8AV (Cyprus).

The African stations were CN8SI (Morocco), CT3FT (Madeira Islands), EH8BPX (Canary Islands), EA9HA (Ceuta & Melilla), 5T5SN (Mauritania) and 7X0AD (Algeria). That brings the number of countries worked from the UK during June to a total of 70. Pretty amazing but this was only the beginning, as I haven't mentioned the North Pole path or transatlantic paths yet!

Andy M1IFT (Yorkshire IO93) reports that the 50MHz band was open at his QTH on most days during June. He uses an Icom IC-756 transceiver running 100W into a 5-element Yagi but often reduces the power to less than 1W. Recent s.s.b. contacts in June have included stations in Austria (OE), Croatia (9A), Cyprus (5B), Czech Republic (OK), Hungary (HA), Iceland (TF3ZA), Italy (I), Poland (SP), Slovakia (OM), Slovenia (S5), Spain (EA), Sweden (SM) and Serbia & Montenegro (4N500CC).

On June 3, Andy heard a huge pile-up on the station of HV0A (JN61) operating from the rare DXCC country of Vatican City. Andy also mentioned that on several mornings in June whilst driving in his car he received Scandinavian stations in the Band II v.h.f. f.m. broadcast band. Stations in Finland and Sweden were received with full radio data system (r.d.s.) decoding. This is most interesting and confirms the increase in Sp-E propagation to the northeast of the UK.

OPENINGS TO JAPAN

On June 14, 19 and 21, three extremely rare openings to Japan occurred on the 50MHz band. They are so rare that this is the first time that I've recorded the polar path being open other than during the winter peak of the 11-year Sunspot cycle via F2-layer propagation. But this is Sunspot minimum in the summer that (in my opinion) rules out F2 propagation, although may strengthen the case for some form of E-layer propagation. That is because there is a popular theory that Sp-E propagation can be more prevalent at Sunspot minimum.

The first opening on June 14, occurred between 0700-0830UTC with the c.w. stations of JE1BMJ (QM05) and JA7QVI (QM08) being heard by stations in southern England. **Ken Osborne G4IGO** reports that it was a nice surprise to work JA7QVI (9535km) at 0706UTC and JE1BMJ (9746km) at 0732UTC, as this was the first time he had ever identified JA stations in the Summer. The opening started at his QTH (Somerset IO80) at 0702UTC and ended sometime after 0830UTC.

The station of JE1BMJ was in for about an hour peaking 599 at times but with no other UK stations hearing him. The beam heading was on the direct path (around 30° from England) and not skewed as so often happens during F2 propagation. Ken believes that the 9746km contact could well be a distance record for E-layer propagation from England. He is of the opinion though, that these rare openings are not multi-hop Sp-E but could be Chordal-E or some form of high-level E-layer propagation. Whatever the propagation mode Ken mentions that the most important thing is to be in the right place at the right time.

Interestingly, **Han JE1BMJ** notes that the openings occurred during the Summer Solstice period when the Sun was at mid-path. Han reports that at 0710UTC he was heard by the station of 5T5SN (Mauritania IK28) peaking 519 over the 13548km path.

At 0732UTC, he was called by G4IGO exchanging 559/539 reports that rapidly increased to 579/599. Contacts then followed at 0747UTC with the stations of G3WOS and G4FVP. At 0805UTC c.w. contacts were made with SV1BB and SV1SB and a few minutes later with 9A6R exchanging genuine 599 signals. His last QSO came at 0827UTC with the station of G4RGK. This c.w. signal was initially in the noise but grew rapidly, then sank below the noise shortly after exchanging reports.

The next Japanese 50MHz opening was reported on June 19 between 0735-0810UTC with several UK stations making c.w. contacts with JH1XYR (PM96), JM1DTF (PM95) and JL3IQE (PM74). Signals were not strong but were 'in and out' for about 45 minutes.

Fig. 1: The 50MHz antennas at the QTH of Kevin Forster NL7Z.

Yasu JL3IQE reports working five UK stations G3FPQ, G3WOS, G3ZSS, G4AJC, G4IFX and a few SM, OH and OZ stations. It's interesting to note that all the UK stations were located in grid IO91 relatively close to each other.

Two days later, on June 21, there were two unique polar openings. The first, between 0658-0703UTC was very brief but did allow enough time for the station of G4IFX (IO91 yet again!) to make c.w. QSOs with the stations of JH7MSB (QM08) and JL8GFB (QN03).

The second opening of the morning didn't quite make it into the UK but it was very interesting never the less. There have been many attempts at making the first terrestrial 50MHz contact between Europe and Alaska but all without success. This is a very difficult path over the polar region, where the slightest geomagnetic disturbance wrecks any chance of a v.h.f. contact. However, at 1113UTC on June 21 the station of **Kevin Forster NL7Z** (Alaska BP51) heard strong European video signals on 49.750MHz. He immediately started putting out CQ calls on 50.115MHz and after 15 minutes was rewarded by a c.w. contact with the station of PA4PA (JO22) for the very first Alaska-Europe contact.

Kevin mentions that as it was 0330 local time it took him a few minutes to wake up and make the most of the short opening. He then went on to make nine c.w. contacts in four DXCC countries that included the stations of DL9USA, OZ1DJJ and SM6CMU. The 50MHz antennas at the QTH of NL7Z can be seen in the photographs in **Fig. 1.**

Adding Japan to the list of 50MHz countries brings the total to 71 worked from the UK during June. But I still haven't mentioned the 21 days of transatlantic propagation to North and South America yet!

TRANSATLANTIC OPENINGS

It might be easier to report when the 50MHz band was **not** open over the transatlantic path rather than specify when it was open. Suffice to say that in the 26-day period between June 3 and June 28 there were openings on 21 days! Rather than list all the openings (on some days there were two or three separate events) I'll just mention one of the larger ones.

First, just to whet your appetite, here's a list of the ten South American and North American countries worked from the UK during June on the 50MHz band. They were the British Virgin Islands (VP2V), Canada (VE1, VE8, VO1 call areas), Dominican Republic (HI), Martinique (FM), Netherland Antilles (PJ), Puerto Rico (KP4, WP3), St.Kitts (V4), Trinidad & Tobago (9Y, 9Z), USA (W0, W1, W2, W3, W4, W5, W8 call areas) and Venezuela (YV). That brings the total up to at least 81 countries (but probably more) worked from the UK during June.

An opening on June 9 was typical of the more lengthy events recorded during the month. The 50MHz band had been open before 0600UTC from all parts of the UK to stations such as HA5MA, OM3OM, SP9CCD, UT3BW and 4N1GZ. At 0925UTC the first signs of a transatlantic opening were reported by GW3MFY (IO81), who heard the c.w. station of K1TOL peaking 559 on 50.103MHz. However, transatlantic signals faded out shortly afterwards and the European opening took precedence with interesting stations such as SV1LK (Greece), T77GO (San Marino) and 5B4AGM (Cyprus) being contacted.

At 1000UTC, UK stations heard the Azores beacon CU3URA (HM68) on 50.013MHz. The reception of this beacon is often a precursor to a multi-hop Sp-E transatlantic opening and sure enough at 1030UTC it all kicked off! It started in the W1 call area with K1CP, N1DG K1SG, K1SIX, K1TOL, W1VHF, and W1ZC being worked by G and GW stations.

After an hour of intense activity, the propagation spread to the W2 and W3 call areas with many c.w. and s.s.b. contacts being made with 59 signals. Simultaneously a path opened up into the VE1 (Canada) and VO1 (Newfoundland) call areas with VE1WT, VE1YX, VE1ZZ, VO1AU and VO1HE being worked by stations as far apart as Jersey (GJ) and Scotland (GM). By 1230UTC the main path extended into the W4 call area with stations such as N4AVV, NG4C, K4CIA, K4DY, K4QI and K4RV being worked by stations over much of the UK. This opening continued through to around 1530UTC finishing up with even longer distances being worked in the W5, W8 and W0 call areas. But it wasn't quite over just yet!

The European opening was still going full bore with local DX stations such as EA6BB (Balearic Islands), EB8CME (Canary Islands), CN8SG (Morocco), IS0/I1NAI (Sardinia) and ZB3B (Gibraltar) being contacted by many stations. Between 1700-1730UTC the transatlantic path opened up yet again, albeit briefly to the VE1 call area. Then it was back to the European E-layer activity to stations in CT, DL, EA, F, HA, SV, S5, UT, YO and YU. This frenetic activity continued through to 2300UTC, finally ending with reception of the Jan Mayen JX7SIX beacon. Quite an amazing day, with over 17 hours of Sp-E activity. But don't forget that this was just one day in June and there were many more like it throughout the month.

DEADLINES

Wow - what a fantastic month! I hope you managed to catch some of the v.h.f. DX. If you did, then please send me your reports to the address given below by the last Saturday of each month. Good luck and see you again next month.

73, David G4ASR

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HF Highlights

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

Elgin Mackinlay M0ELG in his shack.

I mentioned a possible new entity last month and, as expected, the **UN General Assembly**, after a recommendation by the Security Council, has decided to admit The Republic of Montenegro to the United Nations adding it to the UN list of Member States. According to the ARRL, DXCC 'criteria' members listed by the UN qualify as Political Entities and therefore effective as of the 28 June, the ARRL has added The Republic of Montenegro to the DXCC List. Any QSOs made on, or after, this date will count for DXCC credit and claims will be accepted immediately. Further details and information can be found at **http://www.arrl.org**

Leighton Smart GW0LBI heard 4O3F (Montenegro) calling "CQ" on 14MHz on 28 June and tuned up his long wire to work him and congratulate him on independence. The pile-up that followed was unbelievable!

DX NEWS

On to this month's DX news now and special event station **9A06P** (Nine Alpha ZERO SIX Papa), will be active from now until 31 December. The call is to celebrate the city of Djurdjevac and operations will be on all bands using all modes. Full details with be printed on a special QSL card and all QSOs will be confirmed automatically via the bureau.

Another special event station from Japan, **8J5TOSA**, will be active until 31 August to celebrate the Tosa (240,000-koku) Expo. Tosa is an old name of Kochi Prefecture, which faces the Pacific Ocean and covers half of southern part of Shikoku Island. A koku is the unit for measuring rice, which is about 180 litres, 150 kilograms or five bushels! This is enough to feed one person for one year! Activity will be on all bands and modes, and QSLs can go via the JARL Bureau.

A SP15BSP QSL received by Martin Addison 2E0MCA.

In Canada, two islands in the part of the St. Lawrence Gulf Group in Quebec Province will be activated by **Dave Allard** until 11th August. He will operate holiday style as **VA2DV/P** from Gande Ile (CISA QC-019 for the Canadian Islands Award) and Ile Nue de Mingan (CISA New). Power output will be 100W and activity is expected to be on mainly 14 and 18MHz, possibly with some activity on 3.5MHz, depending on conditions at night. All QSL cards will be via his home callsign, direct to **1910 Rand Saint-Edouard, Saint-Liboire, QC JOH 1RO**, Canada or through the bureau.

Further details on **The Canadian Islands Award Program** can be found at **www.qsl.net/ve3tpz/cisa/**

Don't forget the **International Lighthouse/Lightship Weekend**, which will be held on the third weekend of August. Look for lighthouses to be active on all bands and modes, including the digimodes, from all parts of the globe and on most bands.

The lighthouse event is **not** a contest and each station's operators decide how they will operate regarding bands and modes and, of course, any restrictions at their relative locations. Participants are not committed to being on the air during the entire period, only as much and as often as they can. As available space in many lighthouses is filled to capacity, the activity does not have to take place inside the tower itself and 'Field Day' type set-ups are common at the lighthouse or other buildings nearby. Further details are at **http://illw.net/**

YOUR REPORTS

On to your reports now and first off is Leighton Smart GW0LBI in Trelewis, Mid-Glamorgan who seems to be the only reporter working on Top Band at the moment. Using his Yaesu FT-100 with 50W c.w. to a 67m (220ft) long wire antenna tuned against earth with a quarter-wave counterpoise cut for the band, Leighton worked IV3RLB (Italy), EU3AR (Belarus), HG6N (Hungary), YR7M (Romania), SN2B (Poland), S57M (Slovenia) and OM4F (Slovak Republic) between 2017 and 2044UTC. Later, he worked UX5NQ (Ukraine), LY7M (Lithuania), OH2BCI (Finland), TK/DL4FF (Corsica) EU-014 and DF2UU made the log between 2312 and 2346UTC.

THE 7 & 10MHz BANDS

On to 7MHz and the log of all-c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy, Kent who, using his usual station, a Ten Tec Omni 5 at 70W to a G5RV, found 9K2HN (Kuwait) and ZC4LI (UK Sovereign Bases on Cyprus) around 2100UTC on what seemed a very quiet band for a change!

CARL GW0VSW HAS LOTS OF NEWS TO PASS ON THIS MONTH, SO TAKE IT AWAY CARL...

There were quite a number of German special event stations worked this month by **Martin Addison 2E0MCA** in East Finchley, North London who spent a good deal of time on the band using s.s.b. Many of these calls were for the World Cup and included DQ2006L and DR2006P. Other stations worked were F2YT/P (France) 0647, MI0JPJ (Northern Ireland) EU-115 Joe in Dungiven at 0806 followed by SO1CC (Poland) at 0919UTC using a Yaesu FT-840 and 10W to a folded half-size G5RV.

In Cumbria, **Roy Walker 2E1RAF** was on 10MHz using his Kenwood TS-570DG and 5W into an 80m wire loop. With 50W c.w. Roy added 8S6KOS (Sweden) 0855, DL1GBZ (Germany) 1024, OH2EI (Finland) 1300, SN0DK (Poland) 1925, UA3AY (European Russia) 1950 and S57J (Slovenia) 1956 to his huge log.

The 7MHz band also had a few openings for Ted G2HKU who managed to get 9H1SP (Malta) EU-023, 9K2UN (Kuwait), VE1POI/1 (Canada) and EA8PP (Canary Islands) AF-004 in his log despite "a very noisy" band around 2000UTC.

THE 14MHz BAND

On to 14MHz now and a report from **Elgin Mackinlay M0ELG**, Kidderminster who worked all hours on the band using s.s.b. logging HK3AK (Colombia) in Bogota at 0042, Ken VK3ALA (Australia) OC-001 in Jindivik, Victoria at 0210, VE3CNF (Canada) John in St. Catharines, Ontario 0240, KP2AGC/P (US Virgin Islands) NA-106 at 0352. Elgin also

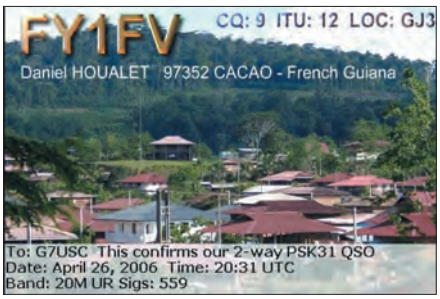
A 9M2CNC QSL received by Martin Addison 2E0MCA.

worked more Australians between 0658 and 0750 including VK7KDO, VK2HBG, VK7AR and VK2ZOM, 4J/P/UR7IJQ (Azerbaijan) 0728, EW8AM (Belarus) 1530, UA9SBQ (Asiatic Russia) 1603 and SV9CVT (Crete) EU-015 at 2158UTC.

Also on the band, was new reporter **David Bambrook 2E0DAB** in Little Milton near Oxford whose family has been taking priority of late. But he still managed to work WX3B (USA) Jim in Taneytown, Maryland at 0433, LZ1JZ (Bulgaria) 1453 and EO61IS (Ukraine) at 1943UTC using a Yaesu FT-747GX, feeding his home-made antenna tuning unit to a dipole installed in his loft as he has no garden!

Another new reporter is **Ian Porter G0OSY** who wrote in to say, "Living in a flat I usually operate exclusively on 144MHz, as there is just enough room on my balcony for a 4-element Cubex Quad for that band. However, I had the opportunity to operate h.f. for a week while house sitting for my parents while they took a well deserved holiday in Rhodes! The shack there belongs to my Father M3LRL who finally had time to take the Foundation Licence last November". Ian's 100W s.s.b. logbook included 'best DX' AB1AI (USA) Brian in Wallingford, Connecticut at 1356, IQ3DD (Italy) 1911, SP0TPFK (Poland) 1908 and RK6CM (European Russia) at 1917UTC. The equipment used included a Yaesu FT-847, MFJ-993B Versatuner and an half-size G5RV up around 6m (20ft).

Now to the log of **Owen Williams G0PHY**



Gary Mckelvie G7USC received this QSL card.

in Biggleswade, Bedfordshire, who used s.s.b. from his Yaesu FT-757 and 100W into his dipole, finding C56W (The Gambia) at 1648 and JX9NOA (Jan Mayen) EU-022 at 2131UTC. Owen said, "There was still some DX around despite all the enormous pile-ups for the DQ and DR World Cup special event stations in Germany".

Martyn Medcalf M3VAM in Chelmsford, Essex used s.s.b. once again, finding CN2BC (Morocco) 0922, J43P (Greece) 1159, ER4DX (Moldova) 1411, UT7I (Ukraine) 1420, YR9P (Romania) 1513, RK3DZB (European Russia), Z37M (Macedonia) 1632, CT3MD (Madeira Island) AF-014 at 1847 and TF3ART (Iceland) EU-021 at 1910UTC using an Icom IC-746 and a 'new' half-size G5RV antenna with his SGC-237 auto tuner.

In Middlesborough, **Keith Winward 2E0JKD** continues to do well with his Yaesu FT-1000MP Mark V Field and 'Cobweb' antenna at 7m (25ft). Voice contacts included, SV9GPV (Crete) 1937, K1QS (USA) Walter in Naples, Maine at 2314 and 9K2MU (Kuwait) at 2320UTC.

Also active on the band was **Panos Dadis SV1GRN** in Athens who uses a variety of antennas in his backyard. A home-brew inverted-L with a antenna coupler made by a friend was used to work 3DA0TM (Swaziland) 0601, TF3ZA (Iceland) 1754, TR8CA (Gabon) 1809, C56W (Gambia) 2141, 7X5RS (Algeria) 2143 and ZB2FX (Gibraltar) 2058UTC.

THE 18 & 21MHz BANDS

In Nuneaton, **Chris Colclough G1VDP** enjoyed the 18MHz band, listing contacts with s.s.b. stations VR2XMT (Hong Kong) AS-006 at 1520, S9SS (Sao Tome) AF-023 at 2030, C56W (Gambia) 2101 and HK3AK (Columbia) at 2155 using a Yaesu FT-1000 Mark V Field and 400W via a UK Ranger amplifier to a rotary dipole for the band.

The s.s.b. log of **Jim Pedley GM7TUD** in Dumfries lists contacts with ES0QD (Estonia) on EU-034 at 0858 and PY1/IV3GKE (Brazil) at 2030UTC, while the 21MHz band gave just one call, YE6P (Indonesia) oc-270 at 1304UTC. Jim's equipment was a Kenwood TS-450S transceiver into a Cushcraft MA5B antenna.

On 21MHz was Roy 2E1RAF and it provided him with a few more stations including DK0SP/SUB (Germany) operating from the preserved Submarine U9 in the museum at Speyer at 0827 and SJ4C (Sweden) at 1324. Later, 9M6XRO (East Malaysia) was copied at 1900UTC with a very strong signal but was not worked despite several calls and Chris G1VDP managed SP9EKL (Poland) 0926, YE6P (Indonesia) OC-270 at 1424, CE3PG (Chile) 2118, ZP8AE (Paraguay) 2132 and JX9NOA (Jan Mayen) EU-022 at 2231UTC this time with a Cushcraft MA5B mini beam.

THE 24 & 28MHz BANDS

On 24MHz, s.s.b. calls TZ9A (Mali) 1637, TK/DL4FF (Corsica) 1850, JW4GHA (Svalbard) on Bear Island EU-026 at 1958 and ZD8I (Ascension Island) AF-003 at 2000 were all logged by Jim GM7TUD.

In Worcester Park, Surrey, **Eric Masters G0KRT** found 28MHz open at various times during the day, working EA4CJI (Spain) 0815, DJ3HJ (Germany) 1456, SM3NXS (Sweden) 1607, IK1SOW (Italy) 1614, OH6A (Finland) 1802, OE9PJT (Austria) at 1920 using s.s.b. and c.w. stations TK/F5TIF (Corsica) 0910, OH1TN (Finland) 1750, F5RRS/P (France) 1759, 9A1UN (Croatia) 1810, IJ5JT (Italy) 1830 and HA5LZ (Hungary) at 1834UTC. Eric uses a Kenwood TS-570DG running 100W into a modified W3EDP antenna, which is 25m (84ft) long and has a loading coil attached, which is tuned by an SGC230 auto tuner.

In Germany, DL5SAF was worked using f.m. at 1550 by Keith 2E0JKD who then proceeded to work him on 7, 10 (c.w.), 14, 18, 21 and 24MHz s.s.b. ending this chase at 1646UTC, while JW4GHA made the log of Jim GM7TUD once again at 1057UTC. Finally, Chris G1VDP used the MA5B again to work a vast number of calls that included YO5CPY (Romania) 0923, EA9PY (Ceuta & Melilla) 1015, 7Z1SJ (Saudi Arabia) 1025, FR1AN (Reunion Island) AF-016 at 1037 and a change to PSK31 found S56EPX (Slovenia) 1512, HG1RM (Hungary) 1522, SP3SXX (Poland) 1528 and OE3AVA (Austria) at 1557UTC while Panos SV1GRN worked EE7WFC (Spain) with s.s.b. at 1107UTC.

SIGNING OFF

Well that's about it for another month but before I close I must mention **Mike Gloistein GM0HCQ** who is the Radio Officer on the RRS *James Clark Ross*. In the June issue I incorrectly headed the photograph of the ship he works aboard as the Royal Survey Vessel, which does not exist. The correct name should have read Royal Research Ship, so apologies for any confusion caused!

Thanks to all our reporters again this month for their logs. It's good to see the higher bands opening up for a while, all be it briefly. Thanks also to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* and **Mauro Pregliasco I1JQJ/KB2TJM** editor of the *425 DX Newsletter* for the DX information. Until next time, have a good DX filled month.

73, Carl GW0VSW

The Cobweb antenna used by Keith Winward 2E0JKD

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You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

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rob mannion's topical talk

This month's topical talk has been inspired by a letter from Brian Catchpole M0TAD regarding surplus equipment and 'green' Amateur Radio. Rob Mannion G3XFD replies and offers Brian - and other readers - a challenge!

I always enjoy facing a challenge myself - especially if I think there's a chance of success! The letter from **Brian Catchpole M0TAD** (letters this month) from the 'city of roundabouts' - Milton Keynes in Buckinghamshire – is in reality a challenge itself.

Brian recalls the old days when we could enter Tottenham Court Road in London's West End at 9am, to explore the surplus equipment to be found in radio shops and only get half way towards Goodge Street underground station by 5pm! Unfortunately, those days have gone forever and we must look into the future!

Brian himself is mounted firmly in the present time because he challenges me with the suggestion that *PW* is actually 'missing a trick' here by not publishing articles using modern surplus equipment, ranging from scrap mobile telephones to computers, etc. He also mentioned surplus p.m.r. equipment, which was extremely popular a few years ago. Indeed, my own first mobile rig was a Pye Reporter valved v.h.f. transceiver, converted for 144MHz by my kind friend **Alan Partner G3HKT**.

Despite the success of converted p.m.r. gear in the past, there's a big problem now and it can be summed up as 'availability'!

Component Availability Nightmare!

Availability of surplus equipment (and also specialised components for projects) for conversion and possibly an article, is a nightmare for the *PW* crew! Specifically, I can remember a conversion article featuring the Pye Olympic for 50MHz by **Ken Ginn G8NDL** (September 1995).

As soon as we published the article the transceivers literally disappeared from the market, despite Ken G8NDL's efforts to trace more. The project was too popular and I had to face many unhappy, disappointed readers as a result.

So, here comes the challenge for Brian M0TAD and other potential authors considering basing articles on surplus material: Produce a constructional project using recycled radio telephone/computer or other equipment using readily available (as far as possible using a guaranteed source of the equipment) and the *PW* staff will be pleased to consider it for publication.

However, before you submit your article/idea to us - please remember what I refer to as the '*PW* specialised component jinx'! This comes into play just as we are going to press. We would have already checked on specialised components with the author, the supplier and very often the manufacturer too. But when we've published the project we find that the manufacturers (keen to empty their shelves of otherwise unwanted stock) made the component/chip obsolete or unavailable just as *PW* appears on the shelves.

Tex Swann G1TEX and I have had the unenviable job of scrapping some good projects due to this jinx. However, you may be immune or be able to overcome its malevolent presence!

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Index to Advertisers

bhi 40	*RadioUser* 59
Birkett, J 53	Radioworld 28, 29, 30, 31
Bowood Electronics 53	Spectrum Communications 58
Castle Electronics 59	Sycom 58
Hartleys Auctions 53	Telford Rally 58
Kenwood Electronics 67	Tetra Communications 21
Kit Radio Company 58	The Shortwave Shop 58
Leicester Amateur Radio Society 40	Waters & Stanton 2, 3, 4
Martin Lynch & Sons 33, 34, 35	Worsley Communications 59
Moonraker 12, 13, 14	Yaesu UK Ltd 68
Practical Wireless 65	

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60th Anniversary: Introducing the TS-2000 Limited Edition — Special Black Version

Black Version

TS-2000 All-mode Multibander HF/50/144/430MHz

Kenwood is celebrating its 60th anniversary with a Limited Edition model (black version) of the renowned TS-2000. Functionally identical but visibly different, this Limited Edition offers the same advanced features as the original model, but with a front panel, main tuning knob and carrying handle all finished in exclusive black — a feast for the eyes.

Engineered for long years of enjoyment, this special TS-2000 is further distinguished by a unique serial number on the back, starting with No.1. Only 570 are to be produced, and of those just 210 will be sold in Europe.

Unique serial number


Carrying handle

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The Powerful New FT-2000

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- Strong receiver design provides wide dynamic range and high 3rd order intercept point
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- External display port for viewing a wide range of information including RF and Audio Scopes (Optional DMU-2000 Data Management Unit and monitor are required)

HF/50 MHz Transceiver

FT-2000

- FT-2000D 200 W with External Power Supply
- FT-2000 100 W with Internal Power Supply

Shown with after-market keyer paddle, keyboard, and monitor (not supplied). Optional Data Management Unit (DMU-2000) and monitor are required for viewing of Aud o Scope and other display features.

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may d ffer n some countries. Check with your local Yaesu Dealer for specific details.

FT-2000 Available in Europe - October 2006
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