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Radio Communications Equipment Guide 2007

368 Full colour pages, crammed full of the latest products, photos & technical spec. Carriage Discount Vouchers included

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(+ £1.75 UK P&P)

AFT (Tonna) Antenna's

Model	Freq.	El.	L. (m)	dBi	Price +P
20505	6m	5	3.45	10	£89.95 D
20804	2m	4	0.93	8.9	£47.95 C
20808	2m	2x4	1.03	8.9	£69.95 D
20809	2m	9	3.47	13.1	£57.95 D
20089	2m	9/P	3.47	13.1	£59.95 D
20818	2m	2x9	3.57	13.1	£87.95 D
20822	2m	2x11	4.62	14	£119.95 D
20811	2m	11	4.56	14.2	£84.95 D
20817	2m	17	6.57	15.3	£99.95 D
20317	2m	17	10.45	17	£199.95 D
20899	2m/70cm	9/19	3.70	13/16	£89.95 D
20909	70cm	9	1.24	12.9	£45.95 D
20919	70cm	19	2.82	16.2	£59.95 D
20938	70cm	2x19	2.82	16.2	£65.95 D
20921	70cm	21	4.6	18.2	£74.95 D
20922	70cm	21	4.6	18.2	£117.95 D
20635	1296MHz	35	3.07	20.8	£64.95 D

CREATE RC5-1

*Rotation Torque: 6kg/m *Brake Torque: 80kg/m *Max. vert load: 400kg *Max. horz load: 800kg *Mast size: 48-63mm *Weight: 5kg

£339.95 D

CREATE RC5-1

*Rotation Torque: 6kg/m *Brake Torque: 90kg/m *Max. vert load: 400kg *Max. horz load: 800kg *Mast size: 48-63mm *Weight: 5kg

£419.95 D

KENWOOD TS-2000 Package Deal

All-Mode Multi-Bander

Package: TS-2000uk
25 Amp AC PSU
1.8 - 430MHz Pwr Meter
RG-213 patch lead

*1.8MHz - 440MHz *1200 MHz Option
*100W 1.8 - 146MHz *50W 70cms 10W 23cms
*Dual Watch HF/VHF *Comprehensive DSP
*DX Cluster Auto Tune *Built-In TNC
*Auto ATU 1.8MHz - 52MHz
*Transverter Display

Radio alone £1295 D
TS-2000X - As Above but fitted 23cms £1739 D

Package Price £1379 D

YAESU

FT-2000 Buy Now Pay Later! 0% Interest!*

1.8-30MHz +6m 100W

Great Part Exchange Deals!

*100W RF Output Power built-in mains power supply
*IF DSP with WIDTH/SHIFT and Contour Tuning
*First IF Roofing Filters *Dual In-band Receive
*Robust Receiver Front End with optional High-Q μ-Tune Preselector

£1999 D

FT-897D Buy Now Pay Later! 0% Interest!*

* HF + 6m, 2m, 70cm
* CW, SSB, AM, FMN, FMW, PACKET, DIGITAL
* HF/6m 100W, 2m 50W, 70cm 20W

£599 D

FT-857D Buy Now Pay Later! 0% Interest!*

* Tx: 160-6m(100W), 2m(50W), 70cm(20W)
* USB, LSB, CW, AM, FM. (WFM Receive)

NEW LOW PRICE!

£499 D

FT-817ND Buy Now Pay Later! 0% Interest!*

LOW PRICE!

* TX: 160-10m, 6m, 2m, 70cm
* USB, LSB, CW, AM, FM, WFM, Digital (AFSK), Packet (1200/9600 FM)

£349 D

FT-DX9000D Buy Now Pay Later! 0% Interest!*

Deluxe Base Station HF Transceiver. 1.8 -30MHz, 50-54MHz (160m-10m + 6m Amateur Bands) Tx

FT DX-9000D 200W internal PSU **£7,299 D**
FT DX 9000MP 400W ext. PSU **£8,299 D**
FT DX-9000 Contest 200W no TFT **£3,799 D**

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BUY NOW TO BEAT THE PRICE INCREASES!

MFJ SGC HEIL SOUND

MFJ

MFJ-929 £199.95 D
Compact IntelliTuner
Compact 200W 1.8-30MHz Coax or Random Wire Auto ATU

MFJ-927 £229.95 D
Remote IntelliTuner
Compact 200W 1.8-30MHz Auto ATU with Power Injector

MFJ-976 £429.95 D
Balanced Line ATU
1.8-30MHz 1500W Balanced Line Antenna Tuner

SGC

SG-231 £349.95 D
SmarTuner
1.8 to 60MHz, 3 - 100W (PEP)
VSWR: <1.4:1 typical

SG-237 £269.95 D
Compact ATU
1.8 to 60MHz, 3 - 100W (PEP)
40W max CW, VSWR: <1.4:1

SG-239 £189.95 D
Mini SmarTuner
1.8 - 30MHz, 1.5 - 200W (PEP)
VSWR: Typically less than 2:1

SG-230 £339.95 D
The Original Long Wire SmarTuner - 1.6 - 30MHz, Power Input 3 - 200W

HEIL

PR-780-PTT £159.95 C
Deluxe Base Microphone
Dynamic cardioid studio mic w/ CB-1PTT base (needs CC-1-XLR) lead.

HC-4 £29.95 A
Dx Quality Mic Insert
Response from 500Hz to 3.5kHz with a 10dB mid-range peak.

HC-5 £29.95 A
Normal Quality Mic Insert
Response from 350Hz to 4kHz with a 6dB mid-range peak.

HTSS £49.95 C
Traveler Single Side Headset & Boom Mic
Requires HSTA patch lead

HTDS £59.95 C
Traveler Double Sided Headset & Boom Mic
Requires HSTA patch lead

HSTA £17.95 A
HSTA-YM for Yaesu modular
HSTA-706 for Icom modular
HSTA-KM for Kenwood modular
HSTA-K8 for Kenwood 8-pin
HSTA-IC8 for Icom 8-pin
HSTA-KHT for Kenwood
HSTA-IHT for Icom handhelds
HSTA-VX for Yaesu handhelds

Handheld Scanners

YUPITERU MVT-7300

*Frequency 531-1320MHz
*NFM/WFM/NAM/WAM/USB/LSB/CW
*1000 memories
*8.33kHz airband spacing

£199 C

YUPITERU MVT-3300

*66-88 / 108-170 / 300-470 / 806-1000MHz
*NFM / AM
*5 Steps
*200 Memories

£99 C

ICOM IC-R5

*150kHz-1310MHz
*AM, FM, WFM
*1250 Memories
*Name Tagging
*AM Ferrite antenna
*Civil & Military
*Emergency Services
*2xAA cells (extra)

£159 C

ICOM IC-R20

150KHz-3304.999MHz, 1,250 memories

£289 C

ICOM IC-R3

0.495-2450.095MHz, 450 mems, TFT colour display.

£339 C

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

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FREE SP-20 Base Station Speaker with Filters worth £164.95

200W HF Built-in AC PSU

£6,395 D

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0% Interest!*

HF + 6m 100W All-Mode

£1989 D

IC-7000 — Buy Now Pay Later!

0% Interest!*

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Rig Only £895

TFT-7000 5.6in Monitor/TV for IC-7000 **Exclusive to W&S**

Deal1 - IC-7000 with Watson Power-Mite portable psu. **£929.95 D**

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IC-7400 — Buy Now Pay Later!

0% Interest!*

100W HF-VHF

Rig Only £1,199 D

Deal1 - IC-7400 with SM-20 Desk Mic & SP-21 Speaker **£1,269 D**

IC-718 — Buy Now Pay Later!

0% Interest!*

100W HF Transceiver

£439 D

IC-706 — Buy Now Pay Later!

0% Interest!*

HF/VHF/UHF All-Mode Transceiver

SPECIAL OFFER! **£599 D**

IC-703 — Buy Now Pay Later!

0% Interest!*

The lovely 10W QRP HF-6m radio with built-in Auto ATU **£449 D**

KENWOOD

Exclusive to Waters & Stanton!

NEW RADIOMATE

Keyboard For FT-817, FT-857 & FT-897

Rig not included

- *Direct frequency entry*
- *Mode change*
- *Carrier tune mode*
- *VFO A/B*
- *10 Memories*
- *Self-Powered*

RadCom Review (Feb 2007) "A pleasure to use - - has transformed my FT-817"

£99.95 C

TS-480SAT — Buy Now Pay Later!

0% Interest!*

100W HF+6m

£679 D

*1.8MHz - 52MHz 100W *Built-In Auto ATU *Removeable Front Panel *Comprehensive DSP *Speech Processor *Quad RF Mixer *CW Message Recorder *PSK31 Compatible

TS-480HX - As Above but 200W and no ATU **£765 D**

bhi DSP Noise Cancelling

bhi NES10-2 MkII SPECIAL OFFER!

Speaker and programmable DSP unit. Offers dramatic noise reduction.

Was **£99.95** Now **£89.95 C**

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"Noise Away" Amplified Noise Elimination Module. Fits in-line between the equipment & speaker.

£119.95 C

bhi NEIM-1031

Noise Eliminating In-Line Module.

£129.95 C

bhi NEDSP-1061-KBD

Noise Eliminating DSP module designed for retro-fit in a number of transceivers, FT-817, TS-50, IC-706MkIIG, FRG-100, DX-77. With Keyboard.

£89.95 C

bhi NEDSP-1062-KBD

Noise Eliminating DSP module simply fits into Loudspeaker path, features a small keyboard to control functions.

£99.95 C

Icom VHF/UHF Mobile/Base

ICOM IC-E208

VHF/UHF FM Dual Band Mobile Transceiver

*Freq range 144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz

£215 D

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

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

IC-2200H **£179 D**
2m 55W FM mobile with rugged construction and with digital option.

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

Kenwood VHF/UHF Mobile/Base

KENWOOD TM-271E

2m FM 60W Mobile Transceiver. MIL-SPEC DTMF Mic.

Built-in CTCSS & DCS encoder / decoder.

New Low Price! **£149 D**

TM-G707E **£199 D**
Dual Band 2m & 70cm with detachable front

Yaesu VHF/UHF Mobile/Base

YAESU FT-7800E

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

YSK-7800 Remote Cable Only £24.95 **£169 D**

FT-1802E *Low Price!* **£99 D**
*2m FM Mobile transceiver *5, 10, 25 50W *DTMF Mic Supplied as standard

FT-8800E *Low Price!* **£219 D**
*2m/70cmDualband FM Mobile transceiver *50W 2m, 35W 70cm *Wideband receiver

FT-8900R *Low Price!* **£249 D**
*2m, 70cm, 6m & 10m Quadband FM Mobile transceiver *Independent dial for each band

Yaesu ADMS Software

Programming Software For Your Radio

Programme Memories and all your radio's functions from your PC. Includes Windows software and serial lead with adaptor for your Radio.

ADMS-1F for VX-110/1 / **ADMS-1G** for VX-7 **ADMS-1H** for VX-2E / **ADMS-1J** for FT-60E **ADMS-2H** for FT-8900 / **ADMS-2I** for FT-8800 / **ADMS-2J** for FT-2800 / **ADMS-2K** for FT-7800 / **ADMS-3** Programming Kit for VR-500, all **£39.95** with FREE PC Radio Data Lead.

ADMS-4A for FT-817 and **ADMS-4B** for FT-857/8 both **£29.95**, both these items require a seperate CT-62 lead at **£29.95**

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Icom VHF/UHF Handhelds

ICOM IC-E91

The IC-E91 is Icom's new stylish true dual-band handheld transceiver. It covers 2m and 70cm transmit and a wideband receiver that covers 0.495 to 999MHz.

SPECIAL OFFER! **£199.95 C**

IC-V82 7W 2m Digital **£159 C**
IC-U82 70cms Digital **£159 C**
IC-E90 6/2/70cm **£189 C**
IC-T3H 2m 5W **£129 C**
IC-E7 2m/70cm Wide Rx **£139 C**

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!

£199.95 C

TH-K2E 2m 5W **£99 C**
TH-K2ET 2m 5W FM **£145 C**
TH-K4E 79cm 5W FM **£139 C**

Yaesu VHF/UHF Handhelds

YAESU VX-7R

LIMITED SPECIAL OFFER

Totally waterproof, Wide frequency coverage 500kHz-900MHz AM/FM.

£209 C

VX-6E 2m/70cm wide rx 5W **£169 C**
FT-60E 2m/70cm wide rx 5W **£129 C**
VX-2E 2m/70cms miniature **£99 C**
VX-150 2m w/ 16-key pad **£99 C**
VX-120 2m 5W w/ 8-key pad **£99 C**
VX-170 2m 5W w/ 16-key pad **£109 C**

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

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Software Defined Transceiver

Nothing Else Comes Close!

FlexRadio SDR-1000

£6,000 in hardware form - £995 as above! What a choice!

If you have heard my recent talks you will understand how exciting this SDR-1000 software defined transceiver is. Just load the FREE software, connect up the SDR-1000 transceiver to a suitable soundcard and you are ready to go. It will transform your enjoyment. There are regular FREE updates for customers to download. Call our sales desk for a FREE demonstration CD and operate the radio on your PC using a supplied 80m RF sound file. The FlexRadio SDR-1000 would cost you around £6,000 in hardware form! Part Exchange welcome. Peter Waters G3OJV

The Concept:

All modulation and demodulation takes place in your PC. IF filtering and other DSP processes also take place in the PC. Ancillary controls such as AGC, ALC, audio processing, control functions, metering and displays are likewise done within your PC. And everything can be updated FREE as new software versions appear.

SDR-1000 comprises transceiver (100W or 1W) software and PC control cable connector. You need to add a suitable PC professional soundcard like the Delta-44 and 3.5mm stereo connecting leads (soundcard leads and PC speaker adaptor lead kits recommended) plus any Yaesu 8-pin microphone.

Check These Features!

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
Yaesu MH-31B8 mic.	£39.95
Shuttle VFO Knob	£99.00
Soundcard leads	£24.95
PC speaker adaptor lead	£4.95

HF Antenna's

We Are Now The Sole UK Distributors For Gap Antennas!

CHALLENGER
8-BANDS HF-VHF

- Bands: 80, 40, 20, 15, 12, 10, 6, 2m.
- 2kW PEP SSB • VSWR: Better than 2:1
- Full band 40m upwards 130kHz + on 80m
- 3/8 wave basic concept
- Height 9.6m (31.5ft)
- Radials 3 x 7.6m (25ft).
- 3ft ground socket supplied
- Can be mast mounted
- Weight 8kg

£229.95 D

EAGLE
6 BANDER

- Bands: 40, 20, 17, 15, 12, 10m
- 2kW PEP SSB
- VSWR: Better than 2:1
- Full band 40 - 12m - 40, 20, 17, 15, 12m, 500kHz + on 10m
- Height 6.4m (21t)
- 2m (80") 3 x counterpoises inc.
- Support pipe reqd. (1.25" max)
- Weight: 4.9kg.

£249.95 D

VOYAGER DX IV
4-BAND LF

- Bands: 160, 80, 40, 20m .
- 2kW PEP SSB
- VSWR: Better than 2:1
- 80m up full coverage, 90kHz + on 160m
- Height 13.72m (45ft)
- Radials 3 x 17.4m (57ft)
- Requires guys - brackets inc.
- 2ft groun pivot included
- Weight 13.6kg

£329.95 D

TITAN DX
8 BANDS

- Bands: 80, 40, 30, 20, 17, 15, 12, 10m
- 2kW PEP SSB
- VSWR: Better than 2:1
- Full band 40 - 10m (40, 30, 20, 17, 15, 12, 10m), 100kHz + on 80m
- Height 7.6m (25t)
- 2m (80") 4 x counterpoise inc.
- Support pipe reqd. (1.25" max)
- Weight: 11.3kg.

£279.95 D

CUSHCRAFT
COMMUNICATIONS ANTENNAS

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

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

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

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

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

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

MA5B £399.95 D
5-band 2 El mini beam. 20m - 10m 2kW. Elements 5.2m Turn radius 2.7m. (Dipole on 17/12m) 5dB gain

HUSTLER

6-BTV

6-BTV £229.95 D
*6-band vertical, 7.3m tall, 1kW.
*Coverage: 80, 40, 30, 20, 15, 10m
Can be used at ground level with earth stake. Ideal for small gardens

5-BTV £199.95 D
*5-band vertical, 7.64m tall, 1kW.
*Coverage: 80, 40, 20, 15, 10m
Can be used at ground level with earth stake. Ideal small gardens

4-BTV £169.95 D
*4-band vertical, 6.52m tall, 1kW.
*Coverage: 40, 20, 15, 10m
Can be used at ground level with earth stake. Ideal small gardens

Watson Power Supplies

The UK's Power Supply Specialist.

WATSON POWER-MITE

*11-15V Variable.
*20A continuous
*23A peak, 100 - 260V
*AC in. 2 x Meters
*150 x 55 x 165 mm

£49.95 C

WATSON W-25SM

*13.8V Fixed.
*23A continuous
*25A peak
*115 / 230v AC in.
*229 x 180 x 73 mm

£67.95 C

Software Defined Receiver £19.95!

NEW SoftRock-Lite v6.2

These are single band designs in kit form
They will outperform many current transceivers and receivers
This is the future of Ham Radio - Experience it NOW!

Here is your chance to experience the power and performance of Software Defined Radio at a crazy price. These designs work with the receiver section of the Power SDR software used by the FlexRadio SDR-1000. You get:
*** Digital readout * Full DSP * Variable IF filtering 20kHz - 25Hz * SSB CW AM FM * Comprehensive metering and AGC etc. Uses your regular PC soundcard.**

*Software CD provided
*Requires PC - with SoundCard
*PCB size 38.1 x 38.1mm
*Supply 9-12V
*Build Time - approx 3 hours

Prices

SOFTROCK-Lite-160m	160m Kit	£19.95
SOFTROCK-Lite 80m	80m Kit	£19.95
SOFTROCK-Lite-40m	20m Kit	£19.95
SOFTROCK-Lite-30m	30m Kit	£19.95

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

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May 2007
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(June 2007 Issue on sale 10 May)

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This month, why not try your hand at building the PIC beacon clock designed by Phil Cadman G4JCP or the variable h.t. power supply as presented by Stef Niewiadomski? Also, don't miss Practically Yours – 75 years of Heritage & History, covering 1960-1969.

Design: Steve Hunt
Photographs: Phil Cadman G4JCP (background photo) and Stefan Niewiadomski

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Welcome! Each month Rob introduces topics of interest and comments on current news

Keylines

Rob G3XFD discusses operating mobile and the connection with the hand-held mobile phone law.

The recent introduction of the (much needed) harsher laws to help stop the use of hand-held mobile 'phones in vehicles is of special interest to the Amateur Radio hobby. However, before I mention my concerns for Amateur Radio mobile operating I should mention that the new laws, carrying the potential of penalty points on a driving licence together with much larger fines, does not seem to have much effect! I can demonstrate this by sharing a recent experience!

On Friday 9 March I drove the 322km (200 miles) from Dorset to South Normanton, north Derbyshire, for the Junction 28 rally on the Saturday. On that long journey, I was truly surprised at the large number of drivers totally ignoring the 'no mobile 'phone calls' regulations. Although I witnessed large numbers of drivers ignoring the regulation, by far the worst case was a motorist who passed me (I was in the middle lane) travelling faster than the 113kph (70mph) limit speaking on a hand-held 'phone while reading a map book spread out over the steering wheel!

However, you may ask me, "What's the relevance of this with our hobby Rob?" In answering the obvious question I have to reply with, "A very great deal!" This is because many of us use hand-held microphones for mobile operations and know of the exemption that applies to their use in our vehicles. Because of the law's increased severity, I feel we have a much greater risk of attracting attention, even if we aren't doing something stupid.

The legal exemption remains and if stopped by the police for operating mobile Amateur Radio, the reference to quote is: **The Road Vehicles (Construction and Use) (Amendment) (No.4) Regulations 2003 Statutory Instrument 2003 No 2695**. This sets out the exemptions under the new law. Statutory Instrument No. 2695 can be found at **http://www.opsi.gov.uk/si/si2003/20032695.htm**

Unfortunately, I feel that few Amateurs who know of the regulations are aware of the problems that remain and the difficulties that could arise. Especially if an incident occurred when someone using their rig when mobile attracted the attention of a police officer, perhaps when another violation or perhaps an accident took place and where the Amateur was seen using a microphone. Anyone involved in such an incident, and seen to be operating an Amateur mobile station, could find it very difficult to prove that operating the Amateur equipment played no part in the violation or accident.

I have discussed the possible problems with several friends who are Amateurs and serving police officers. Their advice is the same as mine, in that "whenever possible when operating mobile you should ensure that you are using a microphone and transmit/receiving controls that leave your hands free and that the control of your vehicle is in no way impeded." Safety first!

Scratchers & Whistlers

In the past few months, I have been able once again to enjoy more time in my shack. During much of the time I spend in the shack working, I listen to the bands. Often I'll tune into the various nets, listening to many old friends chatting about our hobby. Unfortunately, however, sometimes those conversations attract the attentions of very unpleasant people – the microphone scratchers and whistlers.

Recently, one totally harmless and friendly Sunday afternoon QSO between Amateurs in the West Country, the London area and the Midlands was disrupted by an offender. Unfortunately, one of the stations rose to the bait and complained about the interference. A big mistake! That's the very worst reaction you can offer because until then the nuisance transmitter does not know they are having any effect! **Please remember; you should never let the offender know their signals are causing problems**.

Because of modern equipment DSP facilities the whistlers and scratchers have never disrupted or affected a QSO I've been involved with. Despite this, I feel it's time for the Amateur Radio hobby to act together to locate the nuisance transmitters, alert the authorities and have them shut down. To this end I ask you to join me on the Topical Talk pages for further discussion. Readers may remember that – by working with the old Radiocommunications Agency the deliberate interference source on the IBP frequency of 14.1MHz was traced and shut down. We can do the same with the whistlers and scratchers.

April Fooled!

A large number of readers have apparently enjoyed the Mobile Planning Permission April spoof and have written in to say so! The *PW* Editorial team were pleased that so many of you enjoyed the joke. However, one clever reader friend (in the motor trade himself) telephoned posing as a very concerned main dealer. It was a case of the spoofer being spoofed and I enjoyed having leg my pulled once I realised it was a spoof!

The late **Dr Colin Sumner G0POS** would have enjoyed the April spoof himself – especially if I was able to tell him that several readers thought we had two spoofs in one issue! One reader took some persuading that he was a magnetic man as suggested in Colin's article 'Magnetic Man'. I'm very sure my friend would have enjoyed that joke!

Rob Mannion G3XFD/EI5IW

Send in your thoughts and win a voucher!

letters

Send your moans, groans and even praise when it's due to the editorial address or E-mail: pwletters@pwpublishing.ltd.uk

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**

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

Star Letter

● **Dear Rob**

I refer to very instructive article in March *PW* by **Len Paget GM0ONX**, on Planning Permission. As a long retired Solicitor, who in far off days in Private Practice quite often had to present planning applications, I would like to stress the desirability of having an informal chat with the planners before lodging the formal application. You never know, you might find that you do not need one, as I did when I was contemplating erecting a Tennamast. The Chief Planner took the view that it was part of a hobby activity, and accordingly part of the peaceable enjoyment of my curtilage *(legal term referring to the area of land attached to and containing a dwelling house*). Further as it was mounted on a ground post that fitted into a socket in the ground it was not permanent, so no planning approval was needed. That was many years ago and cannot be founded on as a precedent.

Planners are human and do not like being taken for granted or by surprise. By having an informal chat before the application is lodged you can brief them on what you are trying to achieve and why you want it and they will undoubtedly indicate what is possible, or acceptable to their authority and within any laid down guide lines. Treat them with respect, do not try and tell them their job or insist on your rights (whatever they may be). Ideally, try and make an appointment with the Principal Planning Officer. This Officer will have a wider experience and more departmental clout than a minion who answers the enquiry counter. The whole object is to get the planners 'on side'.

Once you get the permission, I would venture to suggest that the next job is to get, and keep, the neighbours 'on side'. That might not be achieved by putting up the 60-foot mast with the Thunderbird on top straight away! Start with a smaller antenna and with the mast at half height or less. Once the neighbours have got used to that and realised that it is not a threat to them, you can expand gradually. The odds are that many will not notice the gradual changes and those who do might comment that they see that you have changed your aerial. In that event, try and explain in layman's language the reason for the change, for example, "trying to improve the strength of my signal to my pal in Waga Waga." Remember courtesy costs nothing and recipients usually will respond in kind.

Bill Wright GM3IBU
Kirkwall
Orkney

Sound advice from another professional! Thank you for the most sensible suggestion Bill and it's good to hear from one of our friends from the Orkney Islands who is enjoying our wonderful hobby in retirement. ***Rob G3XFD.***

Planning Permission For Mobile Operations

● **Dear Rob**

Regarding the item on planning permission for mobile operations, do you know if this will be extended to cover private yachts and other craft carrying maritime mobile amateur radio stations in UK and or EU waters? There may also be implications for international waters as well.

I'm gravely concerned about this, as the EU has recently prohibited the use of red diesel as a fuel for diesel engine boats/yachts, thereby increasing the cost of yachting by forcing owners to pay duty on their fuel. Although I only use my engine sparingly to get on and off my moorings and in emergencies, any increased bureaucracy or cost might well prohibit my future ownership and use of my yacht.

Na, you didny tak me in with your April Fool, no bad tho'. You could have printed a slip for readers to cut out and lobby their 'Euro' MP in the Politburo, give them something to do, replying to all the spoof forms, etc. Now that would have been funny. If you are going to wind them up, do it properly! Maybe I should sit down and compose next year's wind up?

Returning to the theme of /MM operations, I wonder if you might publish the following ideas. I write to seek the views of others who operate Amateur Radio from a sea going or inland vessel, be it a yacht, motor craft or commercial vessel to see if it might be worth pursuing the founding of a society for the exchange of ideas related to maritime mobile operation? **Summits On The Air** (SOTA) is very successful in promoting interest in hill walking coupled with Amateur Radio and the exchange of ideas relating to equipment, aerials and so on. Perhaps a similar loosely coupled club could offer similar benefits and exchange ideas to those of us Amateurs who sail or power boat? Anyone with views on the matter can contact me as follows: E-mail **radio@stasail.com** or Mobile: **(07871) 959654.**
Colin Topping GM6HGW
Fife
Scotland

The Editorial team have been delighted with the feedback from the 2007 April spoof Colin and are pleased you enjoyed it along with many other readers! However, the computer spell checker had problems in passing the Scots Doric vernacular and I hope it looks 'braw & bricht' in print to an expert speaker such as yourself. Please keep us updated on the progress of your idea for a maritime grouping so that we can publicise it further for you. Good luck with your ideas. **Rob**

High Power Petition?

● **Dear Rob**

As I'm a regular reader of *PW*- although still working towards my M3 licence - I was interested to hear about the petition under way to try to persuade the UK authorities to allow all transmitting Amateurs to have a much higher legal transmitting power output. Although I spoke to you briefly at the South Normanton Rally on Saturday 10 March, I didn't get a good chat to discuss it at length and have kept my promise to

letters

write in on the subject.

As I have yet to get my licence the topic of higher powers interests me. I know the 10W is the limit for an M3 and I am sure that I would be a little hesitant with a higher power level until I had got used to things.

The main reason for dropping you this E-mail is to ask you what you think of the idea of higher power operations for Amateurs who have a full licence? From what you have written in *PW* over the years, I think it's obvious that you tend to use lower power yourself Rob, so how much do you know of the petition and what do you think will happen? I live in an old house that's been turned into four flats and even though I can put a small aerial up outside in the shared garden when I do get on the air, I will be treading on unknown territory regarding TVI and BCI, etc. I will be on a steep learning curve.

I enjoyed the Junction 28 rally because it has got much larger you and **Ian G4EAN** seemed that much busier. Hope you enjoyed the event, I certainly did! Best wishes.

John Crondall
Belper
Derbyshire

Yes, we were extremely busy at the rally this year John and I missed chatting at length to many friends we'd met in previous years. However, as you've raised an important topic I invite everyone to join me on the Topical Talk page where I plan to discuss it at greater length. I also hope that John and I will work on the bands as soon as he gets his M3 licence. **Rob**

Operating GB75PW At Junction 28

● **Dear Rob**

The Junction 28 Radio Rally organised by the **South Normanton & District Amateur Radio Club** has now become a regular on my calendar and judging by the number of readers waiting to chat to you at the *PW* stand it has become a busy event for you too! Both **Ian Brothwell G4EAN** and yourself seemed to be very busy, with Ian manning the *PW* stand for much of the time while you were extremely busy operating **GB75PW**, mostly it seems on 7MHz.

As a listener myself I found it most interesting to watch a Special Event callsign station being operated. At times it seems as if you were barely able to cope writing and talking at the same time! Fortunately, you were able to use the loudspeaker on the Icom transceiver and the audience was able to listen in and be 'part of it'. Unfortunately though, there was a downside to it all – you were so busy on the air you weren't available to chat to us as you do usually at this very friendly and informal rally.

You did get some help from a local club member for a while – perhaps back up operators would be the idea in future? In this way readers who have come to meet the *PW* staff at the rally would get a much better chance to meet and talk things over and stations trying to get GB75PW in the log book and would still get an opportunity to work it when the Editor was taking his 'turn on the microphone'.

I did get a chance to chat to Ian and yourself in the end Rob but I think a few more operators would be a good idea!

Peter Williams
Matlock Bath
Derbyshire

You have made a very good point Peter and I thank you for raising it. I'm pleased we were able to have a few minutes together but you have highlighted a significant failing in our first rally operation of GB75PW. Unfortunately, Ian Brothwell G4EAN was suffering from a heavy cold and sore throat and he was too croaky to operate. Instead Ian was kept busy on the stand while I was on the air. Eventually another operator – ***Dennis Miller M0DEN*** *– kindly volunteered his services and it eased the problems. Ian G4EAN, along with licenced PW colleagues, is one of the 'notified; licensees for GB75PW and provided he and I are present other licensed Amateurs can operate. The South Normanton event was the first rally 'outing' for us with the callsign. We hope that many more Amateurs will come forward to get behind the microphone/keyboard or the Morse key during the period (1 March to 31st December) that GB75PW is on the air, because it's one of the main reasons why we have taken our 75th anniversary year station 'on the road'. After all PW readers are part of the celebrations*! **Rob**

rallies

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

April 15
The 23rd Yeovil QRP Convention
Contact: George Davis
Tel: (01935) 425669
Website: www.yeovil-arc.com
The 23rd Yeovil QRP Convention will take place in Digby Hall, Hound Street, Sherborne, Dorset DT9 3NL. Follow the black on white lettering road signs to Town Centre. The Digby Hall adjoins the central shopping car parking. Doors open at 1000 and there will be trade stands, a Bring & Buy as well as refreshments available.

April 15
The West London Radio & Electronics Show
Contact: Paul M0CJX
Tel: (01737) 279108
E-mail: info@radiofairs.co.uk
Website: www.radiofairs.co.uk.
The West London Radio & Electronics Show will be held at Kempton Park racecourse, Sunbury-on-Thames, Middlesex TW16 5AQ. Doors open at 1000. There will be trade stands, a flea market and car parking is free.

April 22
Lough Erne ARC 26th Annual Radio Show
Contact: Alan Gault
Tel: (07771) 811484
E-mail: alan.r.gault@homecall.co.uk
Website: www.lougherneradioclub.co.uk
The Lough Erne Amateur Radio Club 26th Annual Radio Show will take place in the Share Centre, Smiths Strand, Shanaghy, **Lisnaskea**, County Fermanagh BT92 0EQ. There will be plenty of car parking and refreshments on site, a Bring & Buy stand with no fees and traders big and small selling radio gear, components, electronics, computer components and various new, surplus and second-hand equipment.

April 29
RadioActive Show
Contact: Roger Reeves
Tel: (07747)618131
E-mail: roger.reeves@radioactiveshow.co.uk
The Mid-Cheshire Amateur Radio Society will be holding the RadioActive Show at the Civic Hall located in the historic market town centre of Nantwich in Cheshire. There will be over 80 stands of top traders and exhibitors and they are also planning to hold a series of seminars and demonstrations to suit all levels of interest, as well as presentations being made by specialist groups and clubs for the more experienced visitor. There will also be the popular Bring & Buy.

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.

KENWOOD

Listen to the Future

Nestled in the palm of your hand, Kenwood's TH-F7E is incredibly small — just 58 x 88 x 29 mm (WxHxD). How could so much be packed into such a super-compact design? Impossible! But it's true. This little wonder is an FM dual bander (144/430MHz) with dual-channel RX capability, 16-key pad, multi-scroll key, and no fewer than 434 memory channels. Other attractive features include a built-in ferrite bar antenna for AM broadcasts, LCD with backlight, and a lithium-ion battery. Small enough to slip into a pocket, the TH-F7E allows you to roam freely while enjoying the clear, reliable communications for which Kenwood is renowned. And despite its smart looks, it's tough enough to meet MIL-STD criteria for withstanding the rigors of outdoor use, while delivering superb performance.

● Receives 2 frequencies simultaneously, even on the same band ● 0.1~1300MHz(B band) ● FM/FM-W/FM-N/AM plus SSB/CW receive ● Bar antenna for receiving AM broadcasts ● Special memory channel RX mode (10 channels) ● 1200/9600bps packet compatible (ext.TNC) ● 434 memory channels, multiple scan functions ● 16-key pad plus multi-scroll key for easy operation ● 7.4V 1550mAh lithium-ion battery (std.) for 5W output and extended operation ● Built-in charging circuitry for battery recharge while the unit operates from a DC supply ● Tough construction: meets MIL-STD 810 C/D/E standards for resistance to vibration, shock, humidity and light rain ● Larger frequency display for single-band use ● Automatic simplex checker ● Battery indicator ● Internal VOX ● MCP software (Free download from Kenwood website)

144/430MHz FM DUAL BANDER

TH-F7E

5W Model

- **5W output (144/430MHz:) DC 7.4V operation**
- **FM/FM-W/FM-N/AM plus SSB/CW receive**
- **Continuous RX: 100kHz to 1300MHz (B band)**
- **Simultaneous reception of 2 frequencies**
- **Tough construction: MIL-STD 810 C/D/E**
- **1200/9600bps packet Compatible**

Available from all official Kenwood amateur radio dealers. For full details of our dealer network and all Kenwood amateur products contact your local dealer or Kenwood Electronics UK Limited. 01923 655284
e-mail comms@kenwood-electronics.co.uk

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news & products

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

Lighthouse/Lightship Weekend

The International Lighthouse/Lightship weekend has become one of the highlights of the year for Amateur Radio operators around the world. The event helps promote public awareness of lighthouses and lightships and highlights the need for their preservation whilst raising the profile of Amateur Radio.

This year's activity starts at 0001UTC on Saturday 18 and finishes at 2359UTC Sunday 19th August. Space is, of course, limited in a lighthouse, therefore activity does not have to take place within the lighthouse itself. However, the guidelines dictate that the Amateur station should be set up at or adjacent to the chosen lighthouse, for example, in an adjoining field, in which case permission should be sought from the relevant landowners.

The event is **not** a contest and the emphasis for the participants has always been to have fun, without the pressure to make a large numbers of contacts. For further details and to register for the event, visit **http://illw.net/**

Flight Refuelling ARS 25th Anniversary

The **Flight Refuelling Amateur Radio Society** was formed in 1982 by Amateurs who were keen to take part in v.h.f/u.h.f. contests. One of the main aims of the society was to promote friendship among Amateurs and this is still very important today.

The FRARS has always been active in training people wishing to gain a transmitting licence and at present they are actively engaged in tuition for Foundation, Intermediate and Advanced examinations. They also believe it is important to demonstrate the hobby to young people and to this end they have made visits to a number of local schools.

As part of their 25th anniversary celebrations in April and May, FRARS will be operating a Special Event station, **GB2FRA**, on h.f., v.h.f. and u.h.f. Anyone contacting the station will receive a special anniversary QSL card. Further information about FRARS can be found at **www.frars.org.uk**

Thornton Cleveleys SSTV Activities

John Earnshaw M0JFE would like to share with fellow readers that the **Thornton Cleveleys Amateur Radio Society** (TCARS) hold a SSTV net every Thursday on 145.575MHz about 2000 hours. Recently, John and fellow club members, **Brian M3OYG** and **Nathan M3PVD** went SSTV mobile and had great fun and success. They managed to send six pictures from different locations and two were sent whilst moving in the vehicle.

As far as John is aware, this was an innovative first, as he has not heard of anyone else going mobile SSTV in the UK. The equipment used was a FT-1500M, HP NC4000 laptop and ZLP Electronics Digimaster USB Audio-data interface through a Watson mini mag mount antenna working 5W.

For more information about TCARS and their activities contact: **John Earnshaw, 63 Manor Road, Fleetwood FY7 7LJ. Tel: (01253) 776041** or **(07981) 308844**

news snippets

Up & Running

The **Huddersfield Technical College Radio Society** is now up and fully running. The club is on the air, with the callsign **G3KJO** and is operational on all h.f. bands, 144 and 430MHz. The club also intends to enter contests in the near future.

Visitors are welcome and courses are run every Monday evening from 1800-2100 hours at the Technical College, New North Road, Huddersfield HD1 5NN.

For more details contact **Roger Higton G3XXR** on **(01484) 536975**, E-mail: **rogerg3xxr@aol.com** or check out **www.huddcoll.ac.uk/g3kjo**

Welwyn Hatfield ARC

"CQ, CQ we are now calling all former members of the **Welwyn Hatfield Amateur Radio Club**." This year, 2007 is the 25th anniversary of the conception of Welwyn Hatfield ARC and the Committee would like to invite all former members to get in touch, so they can personally invite you to a hog roast to be held on 4 August.

As part of the celebrations the club will be putting the club callsign **GX3WGC**, on air every third Monday of the month. The following E-mail certificates will be issued: Bronze for 3 QSOs, Silver for 6 QSOs, Gold for 9 QSOs (1 QSO per 24 hour period counts) The club call will also be on air each day the week preceding 4 August. Applications for the certificate should be made by E-mail to **gx3wgc@wharc.org.uk**

For further details of the 25th Anniversary celebrations or the club in general contact the club Secretary **Kevin Howard GX3WGC**, Tel: **(01920) 830617**, E-mail: **g3wgc@wharc.org.uk** or visit the club website at: **www.wharc.org.uk**

International Space Colloquium

The 22nd AMSAT-UK International Space Colloquium will be held at Surrey University, Guildford, Surrey, from Friday 20 July to Sunday 22nd July 2007. AMSAT-UK invites speakers, about Amateur Radio space and associated activities, for this event. They are also invited to submit papers for the 'Proceedings' document, which will be published at the same time but printed papers are not mandatory. They normally prefer authors to present talks themselves rather than having someone else give them in the authors' absence. 'Unpresented' papers for the Proceedings document are also welcome.

Offers of talks should be submitted as soon as possible; the final date for full documents to be received is mid-June 2007 in order that the Proceedings document will be available to participants. For more details E-mail: Dave at **g4dpz.me.uk**

Southern Pennines Fun Day

The second Southern Pennines Fun Day will take place on Sunday 22 April 2007. The object of the exercise is to activate all 17 SOTA summits in the Southern Pennines area simultaneously. There is also a secondary objective to make Summit-to-Summit contacts from each hill to every other. In 2006, this objective was missed by just two QSOs and it's hoped that 2007 will see will see 100% success.

This event was a great success last year and all summits were activated. The event attracted many well-known SOTA activators and a few new ones. All QSOs will take place on 144MHz and a schedule will be sent out to participants before the event. Anyone wising to take part should E-mail: **summits@m0zzo.com**. A spreadsheet showing the summits still available for activation can be downloaded from **www.m0zzo.com**

Quartslab on the Move

Major changes are taking place at Quartslab Marketing Ltd., (QSL). From April 2007, QuartSLab.Com will become one of the Connogue Group of companies and will trade from Dublin in Ireland. **Dave Collings G4YIB**, the Managing Director of Quartslab Marketing Ltd., says that imminent retirement has triggered the change.

Dave Court EI3IO/G3SDL, who was one of the original Directors of Quartslab 25 years ago, is again picking up the reins and integrating the company into Connogue Limited, his professional telecommunications consultancy. Full details can be found at **http://quartslab.com** from 1 April.

The QuartSLab adventure started back in the early 1970s when two radio enthusiasts were seeking to purchase some crystals and finding a supplier of the necessary crystals at a reasonable price then proved rather difficult. This was in the pre-Internet age but nevertheless a new quartz crystal factory in Singapore with good prices and a reasonable delivery time was identified and the crystals duly arrived. This led to the idea of importing crystals for commercial mobile radio equipment on popular Amateur Radio channels and C&C Electronics was born.

The enterprise was started with £200 and operated from rental accommodation in south east London. The business expanded rapidly and C&C moved into the supply of crystals for professional as well as hobby radio applications and imported quartz crystal from suppliers in Canada, Denmark, India and Japan as well as Singapore.

In 1978, QSL or Quartslab Marketing Limited was established. In 1979, the first change of address within the London area occurred; the move to Erith in Kent took place in the early 1980s. Quartslab went from strength-to-strength and started to manufacture small quantities of crystals itself to meet the demand for very fast delivery times. The situation carried on in much the same way for two decades and into the 21st century. Earlier this year it was agreed that Quartslab should move to the Emerald Isle and become part of the Connogue group of companies, trading as QuartSLab.com.

The 'two Daves' would like to thank all past customers of and suppliers to C&C Electronics and QuartSLab Marketing Ltd. for their support and custom over the last 30 years. QuartSLab.com looks forward to continue providing quality frequency control products to the professional and Amateur Radio communications communities in the coming years.

Thinking Day on the Air

On Saturday 17 February the STAR Centre based at Keighley College, West Yorkshire held a special event for Girl Guiding UK and their annual Thinking Day on the Air event. Guides from the West Yorkshire North district attended a special event at the STAR Centre where they got to speak to Amateur Radio operators around the world using the STAR Centre's Club callsign, **MX0KSC**.

Guides from West Yorkshire North District using the radio equipment at the STAR Centre.

The event enabled the Guides to speak to stations in many countries including HA3TJA, RA3DJH, DF0UK, US4AS, OH3GZ, R1KSU, RW3DO, UX0FY, YO8BPK, IZ8FTP and HA5TJA. The event included demonstrations on 14 and 144MHz, s.s.b., PSK and MMSSTV.

Amateur Radio instructor **Simon Davison 2E0HTS** said "I was surprised how keen the Guides were to speak to people all around the world. Once they started it was difficult to stop them! The groups competed with each other to speak to as many stations as they could, in total they spoke to over 30 stations all across Europe."

In addition to using the radio, students attended workshops on Communication Codes, which included learning about Morse Code, the Phonetic Alphabet and making Morse Code Phone Charms and workshops on the Internet ready for the Thinking Day on the Internet event.

Adur Communications Goes Outback!

West Sussex Amateur Radio specialist **Phil Godbold G4UDU** from **Adur Communications** has let the *PW* Newsdesk into a secret - he's going to the Australian 'outback'! Well no, not quite! But Phil is importing the famous Australian made Outbacker h.f. mobile antenna systems and if you can't go 'down under' the products from VK land can now be found in West Sussex!

The Perth Outbacker covers from 3.5 to 28MHz and has an overall length of 1.8 metres. The Perth also covers the WARC bands, matches directly into 50Ω (no a.t.u. needed) and will accept up to 300W p.e.p. Phil also announced the following details: "When combined with the Outbacker's heavy duty spring base, the antenna provides a rugged and professional installation, which will last for years."

Adur will be importing a range of other antennas including the Outbacker Joey, Classic and Outreach, together with accessories and will be providing UK produced tow bar mounts and the like. The company state that they consider that, "All Outbacker h.f. antennas are coated with the latest, strongest and most technologically advanced thermal setting plastics. Our antenna coating have been well proven over 30 years from the extreme cold winters in Alaska to the harsh and very hot temperatures of the Australian deserts."

For full details of the Outbacker range, with models available at prices between £189.95 and £229.95, together with an extensive accessories for the h.f. mobile enthusiast contact **Adur Communications, PO Box 2047, Steyning, West Sussex BN44 3XJ. Tel: (01903) 879526, E-Mail: sales@adurcomms.com Website: www.adurcomms.co.uk/**

Hoswick Visitor Centre

Cecil Duncan GM0EKM has written to the Newsdesk to tell us about his collection of wireless equipment on display in the Hoswick Visitor Centre in the Shetland Islands. The centre is open seven days a week from the 1 May until the end of September and there is no admission charge and holiday visitors will be very welcome.

Cecil's collection of vintage radios dates back to the early 1900s and features items through the decades to the mobile phone era. For more information about visiting the collection you can contact Cecil at **Roadside Cottage, Hoswick, Sandwick, Shetland ZE2 9HL**.

Birthday Celebrations at Torbay ARS

Months of careful planning came to fruition for the **Torbay Amateur Radio Society's** 60th Birthday Celebrations on Saturday 24 February. While club member **Peter G4VTO** was travelling to Palm FM, the local Torquay radio station, to record a promotion for the Torbay ARS 60th birthday open day. Other club members were busy setting up for the day.

The Mayor of Torbay, Daphne Watts was invited to send a greetings message.

The open day was held at the Scout Headquarters, Newton Abbot and thanks to the publicity from the local press, radio stations and television there was a lot of interest from the public. The Town Crier, **Ken Purchase**, was kept busy hailing passing shoppers to come and look around and the Mayor, **Daphne Watts** and her escort, ably assisted by the local ATC Cadet **Sergeant Richard Nott** of **1322 Squadron**, Newton Abbot, welcomed what was now a packed Headquarters, with a well researched, interesting and enlightening speech. During her visit, while being shown the various types and styles of radio stations and exhibits from new to second-hand equipment and various plugs and cables from local traders in the South West, the Mayor was also invited to send a greetings message and showed interest in some of the home-made equipment.

The contacts made during the event included one between the Torbay ARS club station, **GB6OTR** and the **Yaroslavl Radio Club** in Russia who the club are twinned with. Other stations from Yaroslavl also called in to pass on greetings and the contact was held for nearly 45 minutes before radio conditions deteriorated.

All-in-all, the day was very well supported with many Amateurs travelling quite a distance to take part. **Peter N5KD** (G4DVP) who now lives in Dallas, Texas was on a visit to see his family in Somerset, found time to call in and wish the club well.

The day was enjoyed by all who took part. Some new members were even signed up to join the club plus new students for the club's next Foundation course taking place in April.

Introducing The Navigator

The Navigator, manufactured by US Interface, is a multi-functional, software driven USB Radio/PC Interface, which has been designed and manufactured in the USA. The Navigator is aimed at the Radio Amateur who operates data modes such as PSK31, MFSK, RTTY, c.w., Hellschrieber, Packet and SSTV. There are no links to be made when changing equipment, as everything is configurable within its own software. The manufacturers say the Navigator has been tried and tested with a number of software programs including *MixW* and with Alinco, Icom, Yaesu, Kenwood and Ten-Tec equipment to name just a few.

The unit is housed in a custom extruded aluminum case and carries FCC, CE, and Canadian approvals. US Interface claim you will not find anything else like it on the market with the same facilities, which allow the user to set up and program a unit using its own software. They say it's much more than a high performance low noise duplex, dual channel USB soundcard in its own right, with a true FSK port for RTTY, together with the K1EL WinKey, CAT radio control and a spare serial com port if you need it.

The Navigator is being released into the UK and Europe by **G3VFP** of **EZE(UK)** and costs £197.00 (288.60 Euros). The package includes an install CD, manual and a USB cable. For more information take a look at **http://www.usinterface.co.uk**

club news

Keep your club news coming to pwnews@pwpublishing.ltd.uk and please remember to include full details of your club, E-mail and telephone contact details and the postcode of your meeting venue - it helps potential visitors to find you!

BERKSHIRE

Newbury and District ARS
Contact: Richard Jolliffe G3ZGC
Tel: (01635) 46241
E-mail richard.jolliffe@vodafone.com
Website http://www.nadars.org.uk/

The Newbury and District Amateur Radio Society meet on the 4th Wednesday of each month from 1930hours at the Travellers Friend, Public House, Crookham Common, near Thatcham, Berkshire RG19 8EA. Visitors and new members are always welcome so if you're in the area why not go along?

COUNTY DURHAM

Great Lumley AR & ES
Contact: Nancy Bone G7UUR
Tel: 0191-477 0036/(07990) 760920
E-mail: nancybone2001@yahoo.co.uk
Website: www.glares.org.uk

The Great Lumley Amateur Radio And Electronics Society meet every Wednesday from 1930-2130 at the Community Centre, Front Street, Great Lumley, Chester le Street, County Durham DH3 4JD. Every second Wednesday the club invite a guest speaker to attend and every fourth Wednesday there is a Committee meeting. For the latest club events check out the website.

SHROPSHIRE

Telford & District ARS
Contact: Mike Street G3JKX
Tel: (01952) 299677
E-mail : mjstreetg3jkx@blueyonder.co.uk
Website: www.tdars.org

The Telford & District Amateur Radio Society meet at the Community Centre, Bank Road, Dawley Bank, Telford, Shropshire TF4 2AZ every Wednesday at 2000hours. Their forthcoming activities programme includes: **April 18**: Operating Abroad - Members experiences and advice; **25th**: Social Evening. Curry, Rice and stuff; **May 2**: Open evening/h.f. OTA/Committee meeting; **9th**: 'Transiting the Panama Canal' an illustrated talk by G0EYX and **16th**: Surplus equipment sale.

WEST YORKSHIRE

The Huddersfield Technical College Radio Club
Contact: Roger Higton G3XXR
Tel: (01484) 536975

The Huddersfield Technical College Radio Club has been resurrected, after many years, and was due to begin meetings again at the end of February. The original callsign, **G3KJO,** has been re-applied for and will be back on the air in due course. The club will be running courses for all licence levels and will take place on Monday evenings from 1830 to 2100hours. The club has been meeting every Monday from the end of February at Huddersfield Technical college, New North Road, Huddersfield, West Yorkshire HD1 5NN. All who are interested will be very welcome.

Doing it by Design

For the 20th article in his popular series, Tony Nailer G4CFY says, "In previous articles, I have dealt with tuned radio frequency (t.r.f.) receivers, direct conversion (DC) receivers and with superhets. Similarly transmitters can be configured as t.r.f., multiplier, DC, or superhet types and these form this month's discussion.

First, in the discussion line is the t.r.f. transmitter, the popular one or two valved Morse transmitter of the 1940s, 1950s, and 1960s, which often consisted of a crystal oscillator (XO) or a variable frequency oscillator (v.f.o.), followed by a power amplifier (p.a.) stage.

The final frequency was the same as that of the oscillator and the power amplifier stage was keyed on and off to produce the continuous wave (c.w.) Morse signal, **Fig. 1**.

Multiplier Transmitter

Next, comes the multiplier transmitter. This is a derivation of the t.r.f. transmitter with the addition of a class C driver stage. This stage could include a tuned circuit at its output set at one, two or three times the input frequency. The p.a. stage would also need to have a tuned output corresponding to that of the driver.

With the added complication of switching, it then became possible to build a two or three band transmitter only using three stages. A diagram of a 1.8, 3.5 and 7MHz (160, 80, and 40 metres) Morse transmitter is shown in **Fig. 2**.

Direct Conversion Transmitter

Now, we come to the direction conversion (DC) transmitter. Strangely enough, this is what the traditional amplitude modulated transmitter really was. An audio transformer was introduced into the anode circuit of the p.a. valve and a high voltage audio signal applied. To achieve 100% modulation of the transmitted signal the peak-to-peak (p-p) voltage swing of the audio needed to be twice the direct current (d.c.) supply voltage of the p.a. stage.

When the half-wave of audio was positive, the peak voltage became twice the d.c. supply, when the audio half-wave was negative going, the peak voltage became zero. In this way the envelope of the radio frequency (r.f.) signal followed the sinewave of the audio frequency (a.f.) signal. The peak power in the envelope would peak at four times the un-modulated level (This is because Power $P = V^2/R$).

In effect, the p.a. stage is now also the modulator or high-level mixer and the frequencies output signal will comprise the sum and difference (RF±AF), as well as the original carrier. The sum signal is the upper sideband, and the difference is the lower sideband. This is described as double sideband and full carrier, otherwise amplitude modulation (a.m.).

The modulation of the p.a. stage can be added to either the t.r.f. or multiplier transmitters, thereby creating a Morse and a.m. transmitter, see **Fig. 3**. Note that the modulation cannot be added to the driver stage unless the p.a. stage is linear in operation. This is essential because if the stage wasn't linear there would be great distortion of the signal, including multiple mixing of harmonics of the sidebands and carrier.
This effect is described as intermodulation distortion (i.m.d.).

The VHF Multiplier Transmitter

Now, we go up in frequency to look at the very high frequency (v.h.f.) multiplier transmitter.

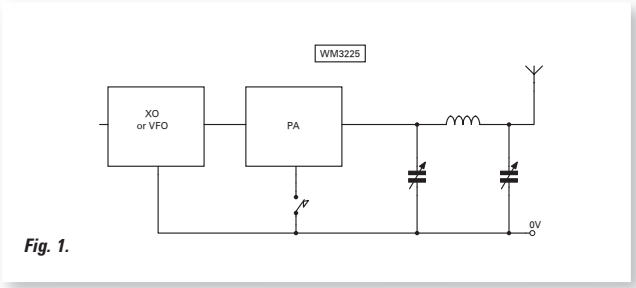


Fig. 1.

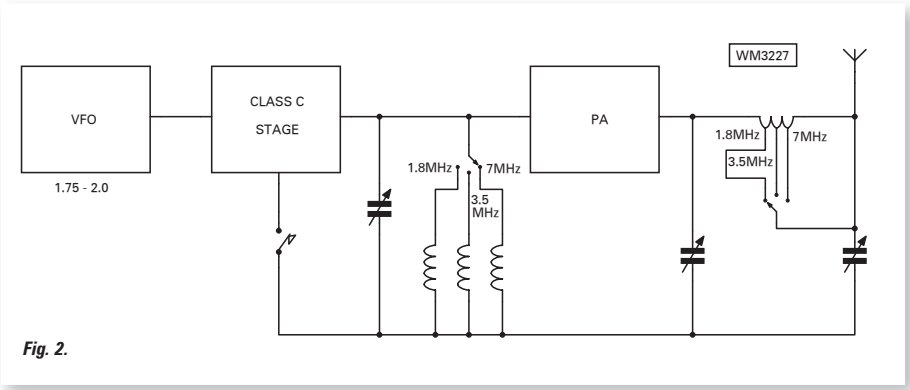


Fig. 2.

The Colpitts crystal oscillator would be the same as I detailed in DiBD for September 2004 *PW* together with the addition shown in **Fig. 5**. The multiplier stages were dealt with in DiBD 15 July 2006 *PW*. The final frequency deviation will be 18 times 280Hz or 5.04kHz.

Superhet Transmitter

Next, we will look at the superhet transmitter. This introduces an intermediate frequency (i.f.), which is not usually a multiple of the carrier. The i.f. signal may be derived from more than one source and

This type of transmitter is particularly useful for narrow band frequency modulation (n.b.f.m.), whereby a Colpitts crystal oscillator can be run at - let's say 8.1MHz - and be modulated using a varicap diode, ±280Hz. The signal is then trebled to 24.3MHz, trebled again to 72.9MHz, and doubled to 145.8MHz for use on the 2m band. Such a scheme is shown in **Fig. 4**.

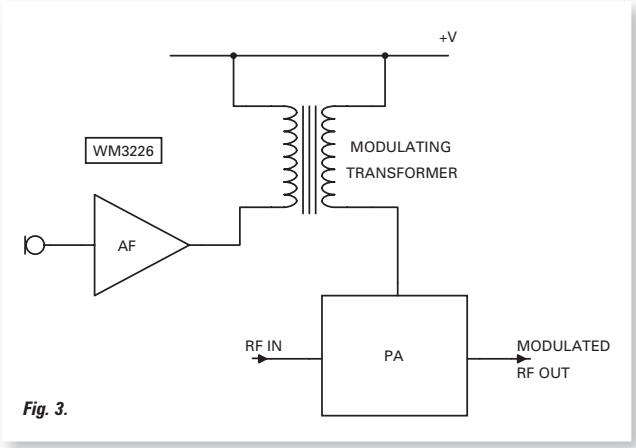


Fig. 3.

Fig. 4.

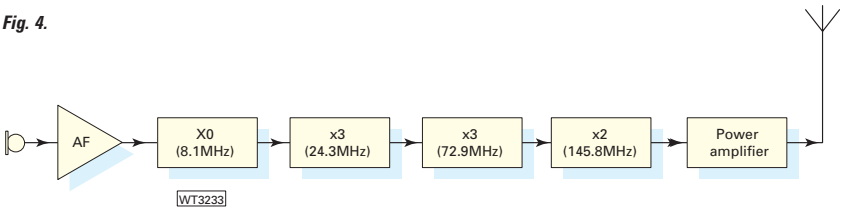


Fig. 5.

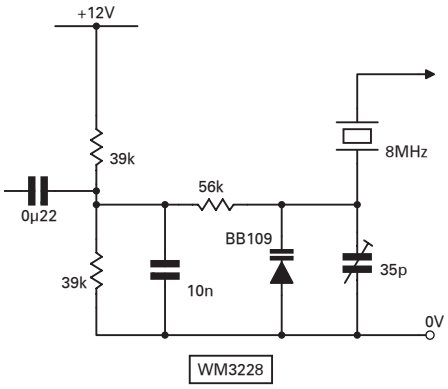


Fig. 6.

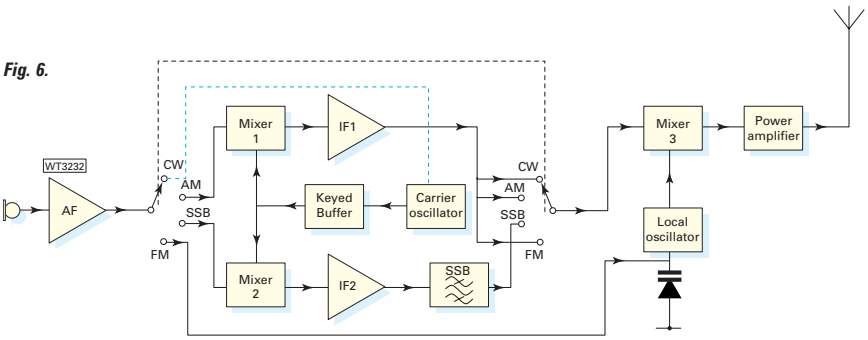
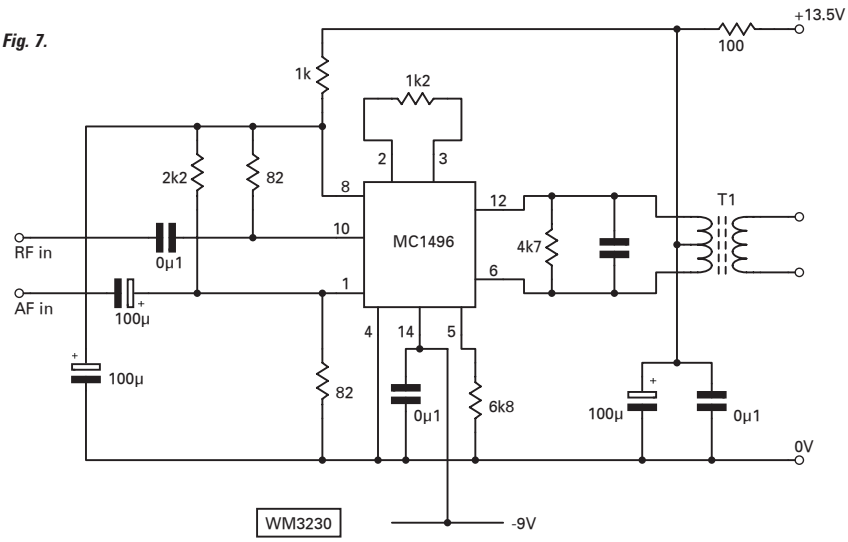


Fig. 7.



will already carry the required modulation or data. This is then fed to a mixer, together with a local oscillator signal and the sum or the difference (as required) will be selected as the final transmit frequency.

Amplification to the required power level then must be done in Class A or Class AB stages, to preserve signal purity and avoid intermodulation distortion. The configuration is shown in **Fig. 6** and includes the switching, and the other stages required for a multimode transmitter.

If the transmitter is a stand-alone unit, the i.f. can be any value, dictated by the frequency of the single sideband suppressed carrier (usually referred to as s.s.b.) filter. A really clever system would include a d.c. output from the microphone amplifier to the crystal carrier oscillator, to offset it 700Hz when in the Morse position.

The circuit is clearly quite complex and similar stages will be required in a receiver, to ease transmit receive synchronisation. It's therefore normal to use the same SSB filter, and carrier oscillator, and local oscillator for both transmit and receive.

Transmit Mixers & Modulators

In Fig. 6 there are three mixers specifically referenced. **Mixer 1** is required to pass the carrier straight through but ideally to stop the audio from passing through. This is not vital because subsequent r.f. filtering can easily remove the unwanted a.f. signal. So, Mixer 1 can be either unbalanced or singly balanced. The absolute winner here is the MC1496 but this needs a large number of external components and a negative supply rail supply of at least 8V.

Mixer 2 must balance out the carrier but doesn't have to balance out the audio, as this can easily be removed by r.f. tuned circuits. So, Mixer 2 can be either singly balanced or doubly balanced. A two diode bridge, a diode ring or the MC1496 are all good choices. However, note the choice requires the carrier to be suppressed by at least 50dB.

Mixer 3 has to deal with an i.f. and an r.f. signal, both of which should be attenuated by 30dB or more, so ideally it should be doubly balanced. A diode ring, or a doubly balanced integrated circuit (i.c.) active mixer would be natural choices.

One thing that has become apparent to me over the years and recently with the Poundbury project, is that diode ring mixers can be used for Mixer 1 and 2, as they can be followed by an i.f. amplifier to recover the voltage amplitude. However, it's not a good idea to use them as Mixer 3, where the conversion loss and the step down to 50Ω results in a very low level output signal. In this instance it's advisable to use the doubly balanced active mixer or four-quadrant multiplier.

I would actually recommend the S042P, which has good signal handling capability and low external component count. The NE/SE602 is similar but has a lower signal handling level. (The MC1496 is by far the best doubly balanced mixer but uses up to 18 external components).

Impedance Matching

When impedance matching is required there are many different types of circuit blocks for the various functions, most of which have specific input and output impedances. The S042P has a single ended input resistance of 2kΩ to each port. The output resistance is a pair of open collector transistors, and can be several thousand ohms.

The MC1496 is best fed at low

resistance, less than 200Ω. The output resistance is again two open collectors. The diode ring mixer is low resistance, though it's difficult to define exactly what it is! (50Ω is usually assumed for convenience).

The s.s.b. filter as a purchased item will probably be a 500 or 510Ω unit. A home-built s.s.b. ladder filter will probably have a characteristic impedance of about 135Ω plus a capacitance of a few picofarads.

Oscillators usually have outputs taken from the emitter of the oscillator transistor. This is likely to be in the region of 50Ω **but must not be coupled into a load of 50**Ω. (The rule to obtain good maintenance of voltage is to have the load resistance at least 10 times the source resistance).

Practical Circuits

In DiBD 16, published in September 2006 *PW,* I introduced a microphone preamplifier and diode ring mixer. This would be perfect for configuration in Fig. 4 as the microphone amplifier and Mixer 2. The best low level amplitude modulator, in my opinion, is the MC1496 circuit as shown in **Fig. 7**. Unfortunately, it needs a negative supply rail. This can be generated using a 555 timer to produce a square wave, followed by a rectifier and low pass filter, see **Fig. 8**.

Output from mixer 1 will be of the order of 100mV p-p and will need a small amount of amplification and impedance matching to drive Mixer 3. Mixer 3 would need an input resistance of 500Ω to match to the s.s.b. filter.

The i.f. amplifier, IF1, will need to produce a voltage gain of two overall feeding a load of 500Ω. Probably the first choice would be the IF Amplifier detailed in DiBD 3 July 2004 *PW*. (This has an untuned input and should use the TOKO coil 3892 in the output).

Mixer 2 (if using the diode ring) will have an output of 20mV p-p at about 50Ω. This again will need to be amplified to about 400mV and impedance matched to the filter input of 500Ω. A voltage gain of 26dB is required, which would be best achieved using a dual gate m.o.s.f.e.t. (The circuit of the Mosfet HF Amplifier DiBD March 2005 PW with a TOKO 3893 at input and output would be ideal).

The Carrier oscillator (XO) can be the parallel mode Colpitts oscillator detailed in DIBD 4 September 2004 *PW*. This will need to have a buffer to enable it to drive Mixer 2. The Buffer 1 or 2 as used in the Portland VFO of March 2006 *PW* would be ideal.

I recommend the S042P as Mixer 3. The circuit is shown in **Fig. 9**. Finally, a Portland VFO and Buffer 1 on its own or in conjunction with the Mixer-VFO board can be used as the local oscillator.

Fig. 8.

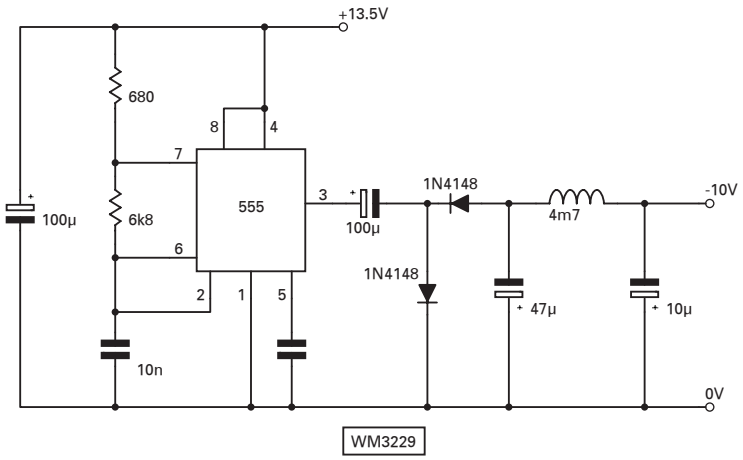
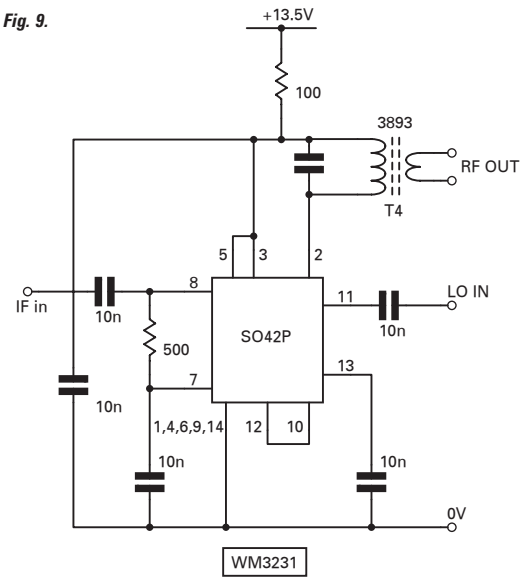


Fig. 9.



The DiBD Reference Policy

The description of the Multimode Superhet Transmitter, and suitable circuit modules included many references to previous articles in *PW*. I make no apology for this; it was intended to refer you to these, where the *PW* staff and I undertook fuller explanations and necessary calculations.

This article deliberately differs from many in this series, to demonstrate that the designers' role is as much about making the right choices of circuit module, in addition to the ability to calculate suitable component values. It also (hopefully) satisfies a very long series of questions about choices of modules and impedance matching in transmitters, received from reader **Bert Carey**. The article is fairly comprehensive, and there are lots of diagrams this time, and I didn't want to overload it further with printed circuit layouts.

I explained earlier that superhet transmitters contain many modules duplicated in a superhet receiver. Hence I feel it is unlikely that readers would build the Multimode Superhet Transmitter, though I have a high degree of confidence that it would be successful.

Having completed the article, I now realise that a simple superhet transmitter for 1.8MHz 'Top Band ' could be made using the modules outlined here. A microphone amplifier feeding the MC1496 amplitude modulator, a Colpitts carrier oscillator on say 9MHz, and i.f. amplifier feeding the S042P final mixer.

A Portland VFO and buffer 1 running on 7 to 7.2MHz would then give a difference signal 2 to 1.8MHz. Follow this with a low-pass filter (l.p.f.) to ensure attenuation of the i.f. and v.f.o. signals and linearly amplify the wanted output to the required level for transmission. Clearly this is material for a future stand-alone article to keep alive the spirit of home design and construction! ●

Chatting about DiBD: Now you may wish to correspond about this project. First send a blank E-mail with subscribe in the subject box to **pw-g4cfy-on@pwpublishing.ltd.uk** Note it is .ltd.uk and not .co.uk When the server responds, you can correspond using **pw-g4cfy@pwpublishing.ltd.uk** as the E-mail address. Your E-mail will be answered by myself or the *PW* team. You will automatically also share views of other subscribers to this list.

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AKD TV1 filter £9.95
Amalgamating tape (10mtrs) £7.50
Desoldering pump £2.99
Alignment 5pc kit £1.99

Telescopic Masts (aluminium/fibreglass opt)

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed £99.95
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed £189.95
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed £99.95
TMF-1.5 Fibreglass mast ★ 5 sections 200cm each ★ 60mm to 30mm ★ Approx 30ft erect 8ft collapsed £179.95
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ Approx 40ft erect 9ft collapsed £189.95

HF Yagi

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts £399.95

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM FREQ:10-15-20 Mtrs GAIN:8 dBd BOOM:4.42m LONGEST ELE:8.46m POWER:2000 Watts £329.95

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m POWER:2000 Watts £599.95
40 Mtr RADIAL KIT FOR ABOVE £99.00

Mini HF Dipoles (Length 11' approx)

MD020 20mt version approx only 11ft £39.95
MD040 40mt version approx only 11ft £44.95
MDO80 80mt version approx only 11ft £49.95
(slimline lightweight aluminium construction)

HF Verticals

VR3000 3 BAND VERTICAL FREQ: 10-15-20 Mtrs GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) £99.95
OPTIONAL 10-15-20mtr radial kit £39.95

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) £119.95
OPTIONAL 10-15-20mtr radial kit £39.95
OPTIONAL 40mtr radial kit £14.95

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) £169.95
OPTIONAL 10-15-20mtr radial kit £39.95
OPTIONAL 40mtr radial kit £14.95
OPTIONAL 80mtr radial kit £16.95

EVX6000 6 BAND VERTICAL FREQ: 10-15-20-30-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m(included) POWER: 800 Watts £299.95

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts £319.95
80 MTR RADIAL KIT FOR ABOVE £89.00

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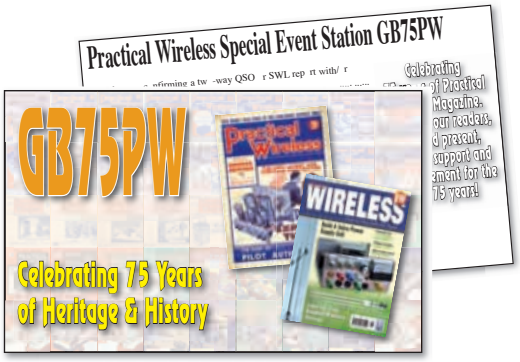
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts £49.95
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts £59.95
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts £99.95
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts £49.95
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts £89.95

(MTD-5 is a crossed di-pole with 4 legs)

ALL PICTURES ARE FOR REFERENCE ONLY

On The Road with GB75PW



The Poole Radio Society's headquarters in Creekmoor Lane in Poole.

Fig. 1: The GB75PW Special Event Station took advantage of G3XFD's car as a base mount for the antenna. Because the crew forgot to lock the sections up as they were erected they spent much time re-pumping air into the mast! (Lesson learned – lock the sections as the mast is erected!).

Plans for the first 'on air' session for the GB75PW Special Event (SE) station were well under way when the Notice of Variation (NoV) arrived from Ofcom. However, when the NoV arrived – a week before it came into effect on 1 March, we were all delighted to find that the Amateur Radio Section of Ofcom had made it to last until December 31st.This meant we could make the very most of a special year for *PW*, its staff and it readers!

Incidentally, bearing in mind that the NoV would be travelling about the UK a great deal and could become damaged and tatty, we decided to have it laminated (sealed into a transparent plastic covering) and this has proved ideal. It keeps it clean and preserved for posterity. I've also done the same with the G3XFD licence, as this too has also to be made available for inspection on request by Ofcom staff.

We had been invited to operate GB75PW from the **Poole Radio Society**. Our long-term colleague **Tex Swann G1TEX** is also a stalwart of the Poole Radio Society. Tex says that his job - that of Honorary Secretary - entitles him to make the tea and keep everyone supplied and refreshed. He was soon to prove how efficient he was at that job!

Saturday 3 March was decided on for the first on air session and what a day it turned out to be!

Launching GB75PW

To launch GB75PW the Poole Club welcomed us to their clubhouse (see heading photograph), which is less than a mile from the *PW* offices. Now based in the charming old former Methodist Chapel, the club is fortunate, after having to move from their previous headquarters, to have very homely headquarters. It has a lot of space, plenty of room for antennas and (on the day we were there) nice wet ground around the building to help with a long wire antenna together with a very useful little kitchen so Tex could keep us supplied with tea!

The day chosen turned out to be an early spring gift, dry and very pleasant. We had the choice of either using the club's indoor roof erected antennas for h.f. and v.h.f or by erecting an external system.

For h.f. I opted to use my car, **Fig. 1**, in conjunction with the modified Tenna-Tourer base as previously shown in *PW*. With the Clarke Mast Ltd. 10m pneumatic mast erected to full height we laid out a long wire antenna and ended up with a very reasonable length of approximately 35m or so. The very damp ground provided an excellent earth for the system.

The club also had other operators standing by to help (much appreciated!). and **Fig. 2** shows **Colin Redwood G6MXL** operating. **Dave Mason G3ZPR** is shown operating his favourite c.w. mode in **Fig. 3**. Colin G6MXL was a busy chap and was also taking his turn on the 144MHz station, **Fig. 4**, where a number of QSOs were made, despite the fact that we had been

Rob Mannion G3XFD provides news of the first 'on air' session with GB75PW from the Poole Radio Society headquarters in Dorset and from the Junction 28 Rally at South Normanton in North Derbyshire.

unable to give much advance warning of the operations. Incidentally, although intending to operate using PSK-31 on h.f., things were against this on the day when, (you've guessed it!) the computer crashed. Hopefully, however, the popular keyboard mode will be fully operational during future GB75PW airings from the club.

Successful Day

Everyone thoroughly enjoyed the day and it was voted an outstanding success. Many things had been learned - not the least by G3XFD that much support is needed when an Special Event station is operated! Despite the fact that this, the first GB75PW operation, had not been publicised in *PW,* there were a number of visitors, including a Polish Amateur who is living in the Poole area.

The conditions on h.f. weren't at their best but we did work many friends on the air and throughout most of Europe and beyond in Eastern Russia. However, the Icom IC-756PROIII, loaned by Icom for the period GB75PW is active, performed faultlessly despite being worked hard at the 100W level all day. The rig was a pleasure to use and its monitor scope and DSP facilities were of great help on the busy 7MHz band (we avoided 14MHz because of a contest).

We dismantled the stations just before 1700 hours and everyone left feeling very happy. The club had benefitted very much, everyone had a great day and Rob G3XFD had nearly lost his voice! We're now looking forward to further sessions from the club.

North To Derbyshire!

The next planned outing for GB75PW was due on 10 March, at the **Junction 28 Rally** held by the **South Normanton & District Amateur Radio Club** in north Derbyshire. I attend this rally each and it's one of the friendliest smaller events in my calendar. However, this year clearly proved to be a good one for the event as it had grown by at least 75% in size due to the village hall having been fully refurbished and extended. Next year, will no doubt see further growth but I'm sure the rally will not lose its special atmosphere.

I drove up on the Friday confident that the SN&DARC club members would have the promised antennas and operating position ready for use at the *PW* stand. I wasn't disappointed! The G5RV type antennas – together with a 144MHz antenna (unfortunately we weren't able to use it on this occasion) was ready and waiting. A small table, made ready was right next to the *PW* stand.

We were soon on the air – mostly on

Fig. 2: Colin G6MXL operating GB75PW on the h.f. bands, with Dave Mason G3ZPR logging. While operating on 7MHz many contacts were made, mainly on the eastern side of the British coastline with many stations from East Anglia right up to Aberdeenshire and further north in Scotland. Several Irish (EI and GI) and Channel Islands stations and one Isle of Man station were also worked. Conditions were particularly good towards Holland and a number of the new-to-h.f. Dutch PD stations entered the log.

Fig. 4: The Poole club also operated a 144MHz station for GB75PW (Colin G6MXL operating) while G3XFD is seen in the background operating the station on h.f.

7MHz and I, **Fig. 5**, was so busy trying to work a pile-up of *PW* friends on the band that it was very difficult indeed to operate and log! Fortunately, **Dennis Miller M0DEN** came to my aid later and he was kept busy for an hour or so. Taking the headphones off at the end of his stint, Dennis told me that it was quite an experience (first time he's operated such a station) and he was exhausted. I agree it was tiring and we hope to have more operators on standby during future airings of GB75PW.

Conditions on 7MHz were not as good as the week earlier but we managed to work all over the UK and into Ireland, along with a number of Dutch, Belgian and French stations.

After my break for lunch, the band became quieter for a while but suddenly, at around 1430 hours onwards it came to life again and many stations were calling us. We tried to make a proper QSO with each contact, rather than 'rubber-

Fig. 3: Poole Radio Society's President Dave Mason G3ZPR operating GB75PW on. h.f. c.w. using the club's internally roof loft mounted antennas. Contacts as far away as Russia and the former Yugoslavia were made. Dave is a very relaxed operator on the key and thoroughly enjoyed himself!

Fig. 5: The Editor G3XFD busy operating GB75PW during the busy South Normanton & DARC's Junction 28 rally. This was the first occasion the Palstar antenna tuner unit (kindly loaned by Mike Devereux G3SED of Nevada) was used and it proved to be very useful in 'fine tuning' the antenna. Rob was eventually relieved by Dennis Miller M0DEN. Dennis volunteered to operate because Ian Brothwell G4EAN had a sore throat and was concentrating on manning the PW stand! Photograph courtesy M0DZO.

stamping' each time. This meant that some stations had to wait for a while but most were very patient. Indeed, operating standards were excellent and I for one tremendously enjoyed my time on air. Reception reports and QSL cards even started to arrived at my home in Bournemouth on Monday – just two days after the event!

After the station had been dismantled I thanked the South Normanton Club members for their very helpful support. They are a great bunch; a very effective club and I could not have operated GB75PW at the rally without their help. However, the final accolade must surely go to **Ian Brothwell G4EAN** who – in reality – looked after the *PW* stand while I was busy on the air. Thanks Ian, you are as ever, a great friend and supporter of our much-loved magazine! ●

Future Planned Operations of GB75PW: The Poole Radio Society on 21 April, 23 June, 21 July, 11 August and 15 September (all saturdays). The Norfolk Club (G3LDI QTH) on Wednesday 6 June, The Worcester Club Tuesday 10 July, and the Barry Club (South Wales) on Tuesday 7 August. Updates on the schedule will be published as soon as they are confirmed.

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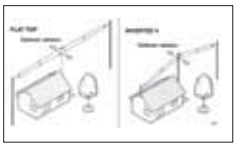

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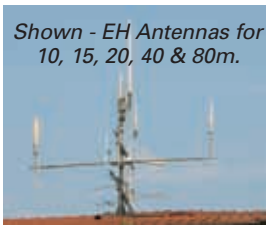

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The Practical Wireless IBP Beacon Clock (PIC Version) part 1

Phil Cadman G4JCP introduces the PW IBP Clock (PIC version): "Back in December 2001/January 2002, *PW* published a design for an International Beacon Project (IBP) Clock. It was a single band design, which used l.e.d.s to indicate, in real time, which one of the eighteen IBP beacons was due to transmit in its allocated time slot on 14.1, 18.110, 21.150, 24.930 or 28.2MHz. Despite its simple function, the design required numerous i.c.s and was laborious to wire. A multiple band version that had been developed, was deemed too complex for publication but since then a programmable integrated circuit (PIC) version has been developed and is presented here in Part 1."

Editorial note: As this major PIC project is the very first of its type in *PW*, Phil Cadman G4JCP and the Editorial team consider that the following introduction to the device is entirely appropriate. Everyone involved in preparing and producing the article on behalf of readers hope it will provide encouragement to anyone thinking of building the project! **Rob Mannion G3XFD/EI5IW**

Introducing The PIC

Just what is a PIC? Phil G4JCP provides the answers: As briefly mentioned above in the copyright notice, Microchip Technology of Chandler, Arizona, make a range of semiconductor products but the product most familiar to electronics enthusiasts is their PIC range of microcontrollers.

A microcontroller is a microprocessor, which has, on the same piece of silicon, a clock generator, program memory, data memory and various peripheral devices. Microchip manufacture a wide variety of PIC microcontrollers, from 8-bit models, through to 16-bit models to high performance 16-bit Digital Signal Controllers. The 8-bit models are by far the most popular – and a number of the Mid-Range flash versions have become highly favoured by electronics enthusiasts.

Flash Memory

Flash memory is electrically erasable and programmable non-volatile memory. Storing the microcontroller's program in flash memory means that the same PIC can be reprogrammed many times over. In addition, flash PICs have a simple, two wire serial programming interface, making them easy to physically program. The devices themselves are relatively inexpensive and Microchip provides a free development environment,which runs on the *Windows* operating system.

There's a bewildering array of PICs to choose from, mainly because commercial users of PICs always want maximum performance at minimum cost. Having a large number of different PICs available helps them achieve that objective. Electronics enthusiasts on the other hand, don't have commercial pressures and neither do they have the buying power of big companies.

So, constructional enthusiasts like us have settled on a relatively small number of PICs, which form a logical progression in terms of size and performance and are readily available. That's not to say there's no progress! Many enthusiasts are moving on to the higher performance 8-bit PICs and even on to the 16-bit ranges.

The 'original' Flash PIC was the 18-pin PIC16F84. Now available in its suffix 'A' guise, it's an ideal entry level PIC due to its simplicity. However, there are now cheaper and more powerful PICs available, so it's nowhere near as popular as it once was. The PIC used in the IBP Clock is a 16F871. This is a 40-pin device, which has 2,048 words of program memory, 128 bytes of data memory and 64 bytes of EEPROM. As it's quite typical of the devices used by enthusiasts, it's worth a closer look.

Inside The 16F871

The diagram, **Fig. 1**, shows a simplified block diagram of what's inside the 16F871. Central to its operation is an 8-bit Reduced Instruction Set (RISC) microprocessor. Most microprocessors have so called complex instruction sets (CISC processors) and make use of a large number of instructions, which can vary in length, perform simple or complex operations and take varying lengths of time to execute.

Conversely, RISC processors use a small number of simple, fixed length instructions, which execute in short, fixed lengths of time. The RISC processor cores have a definite advantage over their CISC counterparts in that they can be implemented with quite small amounts of silicon. This makes them cheap, power efficient and fast.

The RISC processors often use the Harvard architecture, in which program and data are stored in separate memories and accessed using separate buses. This improves performance over the traditional Von Neumann architecture where program and data share the same memory. Midrange PIC instructions are all single, 14-bit wide words.

The PIC fetches each instruction in a single instruction cycle, and a two-stage pipeline overlaps fetch and execution of instructions. Consequently, all instructions execute in a single instruction cycle, except for program branches, which execute in two cycles.

An instruction cycle occupies four oscillator cycles, so a PIC with a 4MHz clock can execute one million (inline) instructions each second. In practice, PICs can be quite fast, especially when

clocked at their maximum speed, which in the case of the 16F871 is 20MHz. That equates to five million instructions per second, or one instruction every 200nS.

As can be see from Fig. 1, the Flash program memory is accessed independently of the internal 8-bit data bus. However, there's a 'back way' into the program memory, which allows it to be read in a similar way to EEPROM data memory. It's also possible for the 16F871 (and some other PICs) to reprogram the Flash memory while actually running a program. By the way – don't get too concerned about the small amount of program memory, the code for the IBP l.e.d. clock, the l.c.d. clock and the l.e.d. repeater, all fits quite easily in 2K words!*

There are 128 bytes of RAM data memory. This is static memory, which retains its contents as long as there's power supplied to the PIC. Incidentally, one particularly nice thing about the PIC is the inclusion of EEPROM in many devices. The EEPROM is nonvolatile data memory and it allows the PIC to 'remember things' even in the absence of power, thereby allowing customised settings and the like to be retained through power down.

The 16F871 has three timer/counters. Timer 0 and the more versatile Timer 2 are both 8-bit timers, while Timer 1 is a 16-bit timer. Allied to the timers is the CCP Capture/Compare/PWM module, used for timing events and for generating a pulsewidth modulated output. This is very useful for engine management systems and the like. Most PICs also incorporate a 'Watchdog Timer'. This timer, which has its own oscillator, runs independently of the rest of the PIC.

If the Watchdog Timer ever times-out whilst enabled, it instructs the Reset circuitry to reset the PIC. To prevent a timeout, the PIC must periodically execute a special 'Clear Watchdog Timer' instruction. The idea being that this instruction is placed where it should get repeatedly executed, such as in the main program loop. If the PIC ever gets stuck somewhere else in its program, the Watchdog will timeout, reset the PIC and restart the program!

Note:** Readers who are not familiar with 'computer speak' may be confused with the upper case K. Many of us understand that it refers to Kelvin, a term related to temperature used in science. The term is also used to represent the nearest computer equivalent to 1,000, which is 1024 (or 2^{10}).* ***Editor

Useful USART

Another very useful peripheral is the universal synchronous/asynchronous receiver/transmitter or USART. This supports synchronous serial communications (like those used between the PC's keyboard and motherboard), and the more familiar asynchronous serial communications used by modems and v.d.u.s.

Even if an application doesn't use serial communications, the availability of a serial interface is very useful during program development and debugging. As you may appreciate, it's awkward to 'see' what's happening to the program flow within a PIC (although there are ways and means), so sending a byte out of the serial port at strategic places in your program whilst monitoring them on a v.d.u., can help keep track of what's happening.

Given the low cost of PICs, it's tempting to use them as intelligent peripherals in more powerful systems. To this end, some PICs have a Parallel Slave Port or PSP. This module allows parallel communications between the PIC and another processor to be controlled by the other processor without the need for additional logic. Finally, many PICs incorporate analogue to digital converters and in the case of the 16F871, the A/D is a 10-bit, 8-channel converter.

Most of the peripherals I've mentioned need inputs and/or outputs (I/O). Rather than dedicate pins on the i.c. package to each peripheral (which would be wasteful if a peripheral wasn't used), all input/output pins on a PIC can be used as general purpose I/O. They're arranged in groups of up to eight I/O lines, and referred to as Ports A, B, C, D and E. However, pins that are also allocated to a peripheral cannot be used as general purpose I/O if that peripheral is in use. This must be borne in mind at the hardware design stage and is the reason why the beacon l.e.d.s in Figure 3 skip certain port pins.

The diagram, **Fig 2**, shows the pin-outs of the 16F871 and I've included the peripheral function of those pins, which are of interest in the IBP Clock project. For example, pin 6 – RA4/T0CKI – is I/O line 4 on Port A or alternatively it can be the external input to Timer 0.

Smaller Sibling

As I mentioned earlier, certain PICs have become very popular with electronics enthusiasts, the 16F871 being one of them. It has a smaller sibling in the 16F870, which is the same as the 16F871, except that it has no Parallel Slave Port. It's available in a 28-pin 'Skinny DIP' (0.3 inch pin spacing) package which occupies significantly less space than the usual 0.6 inch spaced package.

Also in a 28-pin package is the 16F872, which is effectively a 16F870. However, this has an enhanced synchronous communications module instead of a USART.

If more memory is needed, then the 16F874 has twice the memory of the 16F871 and the 16F877 four times the memory. The 16F873 and 16F876 are the corresponding larger memory versions of the 16F870.

The nice thing about these PICs is that they're pin compatible – providing they have the same number of pins, of course! In fact, many PICs are pin compatible, which allows designers to change processors without necessarily having to redesign p.c.b.s.

Down In Size

Going down in size, the 16F628 is an 18-pin device with many of the peripherals of the 16F870 but with fewer I/O pins. The 16F627 is found in some PIC kits and that's just a 16F628 but has 1,024 words of program memory instead of 2,048 words.

Owing to their low cost and pin compatibility with the 16F84, the 16F627 and 16F628 have become the new entry level PIC processors. Even though the 16F628 is quite small for a microcontroller, Microchip make even smaller - and cheaper - devices. Four of these are of interest to us.

First, on the choice list the 16F676, a 14-pin device with two timers, an analogue comparator and an 8-channel A/D converter. It has 1,024 words of program memory, 64 bytes of RAM and 128 bytes of EEPROM. For applications that don't need to handle analogue inputs, the 16F630 is the same as the 16F676 but without the A/D converter.

Finally on this topic, the smallest pair of PICs I'm going to mention are the 12F675 and its A/D-less sibling, the 12F629. These devices have just eight pins and yet contain the same peripherals as their 14-pin counterparts I've already described. All necessary support circuitry is inside these little PICs - even a 1% accurate 4MHz oscillator – so all but two of their pins (remember PICs still need power) can be used as inputs or outputs.

Given their low cost, ease of programming and high integration, PICs open up the possibility of enthusiasts using microcontrollers in situations where previously they would not have been practicable. And I take the view that using PICs in Amateur Radio is little different to using a 741 op amp in place of a bunch of transistors! We're just trading hardware for software, that's all.

Now we're ready to tackle the main project! - turn the page!

The Practical Wireless IBP Beacon Clock (PIC Version) part 1

Don't start unless you've read the introduction on the previous two pages!

Back in December 2001/January 2002, *PW* published a design for an International Beacon Project Clock. It was a single-band design, which used l.e.d.s to indicate, in real time, which of the eighteen IBP beacons should be transmitting. Despite its simple function, the design required numerous i.c.s and was laborious to wire. A five-band version, designed at the same time, was deemed too complex for publication.

A microprocessor based design was also considered but using universally available CD4000 series logic chips was felt to be the better option. However, since the logic based design was published, Arizona Microchip's PIC(tm) microcontrollers have enjoyed increasing popularity and numerous variants are now both inexpensive and widely available. In addition, there are several inexpensive kits currently obtainable, which allow electronics enthusiasts to easily experiment with – and physically program – a range of popular PIC devices.

This month a PICbased l.e.d. IBP Clock is described, which uses just two i.c. packages (albeit one has 40 pins). In part 2, a version with a liquid crystal display will be featured, together with an associated l.e.d. repeater. (The latter allowing a l.e.d. display to be added to the l.c.d. unit.).

The Complete Circuit

The complete circuit of the l.e.d. clock is shown in **Fig. 3**. Both the PIC – a PIC16F871 – and the CD/HEF4060 oscillator/divider i.c. run from a +5V d.c. supply, provided by a standard 7805 three terminal regulator (IC2). The values of C5 and C6 are not critical, but C6 must be at least 330nF, while anything between 10μF and 100μF will suffice for C5. Diode D1 offers protection from a reversed supply connection.

Just as in the original wired logic based design, the timebase for the clock uses a 32KHz (See note in PIC introduction article) – actual frequency 32768Hz – miniature watch crystal and a CD/HEF4060 oscillator/divider i.c. The stability of this oscillator is critical to the long term accuracy of the clock, so I've included R32 and C7 to provide extra supply decoupling. The oscillator section of the CD/HEF4060 is connected internally to a 15-stage binary counter and an output at 2,048Hz is taken from pin 7 to drive the PIC's Timer 0.

Trimmer capacitor C9 should be adjusted so that X2 resonates at exactly 32,768Hz. This can be checked in two ways. First, there's a buffered 32,768Hz output available at pin 9, but do try to use a frequency counter with a 10 second (or longer) gate time. Alternatively, the period of the 2Hz output at pin 3 can be measured. It should, of course, be exactly 500,00μS. Please make sure your test equipment can measure to an accuracy of 1μS or better.

The buffered test points are essential because connecting anything to the oscillator circuit itself will cause a frequency shift due to the capacitance of the probe. Alternatively, simply set C9 to maximum and run the clock over a period of a few hours. See how it keeps time and adjust C9 accordingly.

The values of C8 and C9 are suitable for a crystal requiring a load capacitance of 12pF (a common value for 32KHz (see PIC intro note) watch crystals, as used in the prototype). If you use a crystal that requires a different load capacitance, then alter the values appropriately. Both C8 and C9 should be around twice the specified load capacitance of the crystal, when adjusted. If C9 can't quite pull a '12pF' crystal exactly on to frequency, then a 10pF ceramic capacitor connected in parallel with the trimmer should solve the problem.

Many PIC-based designs that maintain real time use either the PIC's own crystal (X1 in our case), or a 32KHz watch crystal connected to Timer 1's internal oscillator. While both methods are valid, I prefer a separate oscillator.

Eighteen Beacon LEDs

As you can see from the diagram, the 18 beacon l.e.d.s (catering for the three minute IBP cycle) are driven directly by the PIC and resistors R1 to R18 should be chosen to give each l.e.d. the required brightness. Having a non-multiplexed array with individual resistors allows the use of different colour l.e.d.s, even if they have widely varying efficiencies. To dim the l.e.d.s for say, night time use, all you have to do is simply switch in one or more forward-biased diodes (1N4002 or similar) in series with the l.e.d.s' +5V supply.

According to the data sheet, PIC pins configured as outputs can source or sink up to 25mA. But like virtually all logic chips, PICs are more efficient at sinking current than sourcing current. To keep the internal voltage drop to less than 0.5V (10% of supply), I only allow PIC pins to source up to 7mA and sink up to 15mA. So, it's wise to limit the l.e.d. current to 15mA.

Most of the other resistors associated with the PIC are 10kΩ, a value that's not critical; anything between 4.7 and 15kΩ is perfectly acceptable. I should mention that resistors that merely serve to pull inputs high or low (like R28 and R24 respectively) are not strictly necessary. However, all PIC I/O pins can be configured, under software control, to be either inputs or outputs.

Accidentally configuring an input that happens to be tied directly to +5V or ground, as an output, can result in a large flow of current. Using an input resistor limits any unexpected current to a safe value. Resistor R35 performs a similar function, this time protecting the output of the CD/HEF4060.

Although input resistors should not be necessary once a design has been thoroughly tested, I still like to

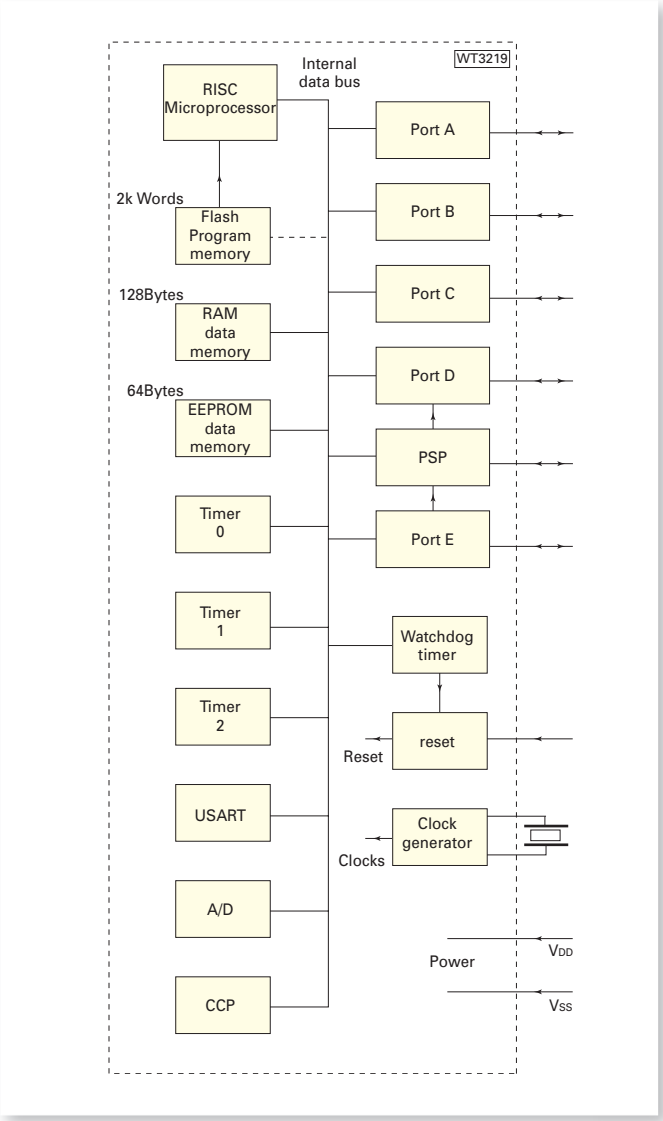

Fig. 1: The internal structure of the PIC family of microcontrollers.

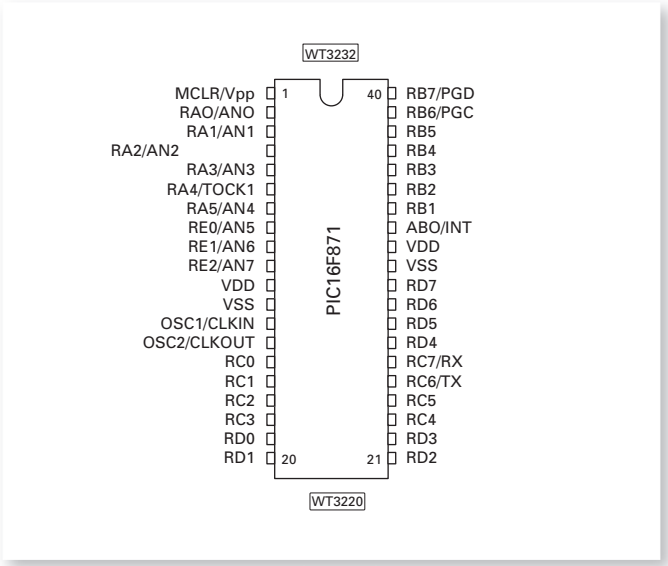

Fig. 2: The pin-out for the PIC used for this project.

keep them in circuit. Given that the IBP Clock may be used in places where there's a significant amount of r.f. energy floating around, it's not impossible for this energy to disturb a PIC. In particular, most modern v.h.f./u.h.f. hand-held transceivers can run up to 5W output and that kind of power at close range can interfere with many electronic devices, particularly if they're not adequately shielded as we know to our cost with TV and radio receivers!

Resistors R19 to R23 are, of course, necessary, as switch S1 selects the required band by connecting the appropriate band input (normally pulled high) to 0V. The sixth position is used for turning all the beacon l.e.d.s off. Incidentally, if a two-pole switch is used here, the other half of the switch can be used with more l.e.d.s to provide illuminated band indications.

Switch S2 is the reset switch, which sets the clock to the beginning of a three minute cycle. The software effectively de-bounces S2 by providing a one second hold off period during which time further resets are inhibited. Try to press SW2 as close as possible to the start of a three minute cycle or maybe a fraction of a second early, which some people prefer to do*.

Editorial comment: *Phil's advice is very sound and I have had a prototype of the original wired logic beacon clock at home for some years and follow his tip by having the clock running fractionally (half a second or so) ahead of the correct time. It works well in practice and means the l.e.d. is illuminated just before the allotted time slot for the beacon the band you are monitoring. This technique helps the user recognise the high speed (22w.p.m.) Morse and alerts you what to expect (as the beacon l.e.d. is labelled with its callsign).* ***G3XFD***

The LED Repeater

Even though the l.e.d. repeater (featured in Part 2) is primarily designed to provide l.e.d. indications for the l.c.d. clock, it can also be driven from the l.e.d. clock. To prevent ground loops, the repeater has an optocoupler at its input. Consequently, no damaging fault currents can flow thorough the 0V rails.

Twin screened cable should be used to connect the repeater to the l.e.d. or l.c.d. clock, with the screen connected to protective earth rather than 0V, if possible. Only a single 2kΩ resistor is needed to limit the current fed to the optocoupler but I've split it into two equal resistors – R30 and R31 – for safety reasons. You'll notice that a short circuit between either of the two repeater terminals to either 0V or +5V, will not cause more than 5mA to flow.

The l.e.d. and l.c.d. clocks communicate with the repeater using the PIC's USART. Now although the PIC's crystal frequency (X1) isn't critical as far as running the l.e.d. clock is concerned, it does drive the USART's baud rate generator and so directly affects the serial port's transmission (and reception) speed. With the 4MHz crystal specified, I've programmed the baud rate to be 4,808. That's as close to 4,800 as the combination of crystal frequency and baud rate generator divisors will allow. Please, do remember that for the clock to communicate with the repeater, the PICs' crystal frequencies must be the same, or at least very close. Why 4,800? The reason will be revealed next time!

The 4MHz crystal used in the prototype clock required a load capacitance of 20pF, hence the value of 22pF for C3 and C4. Actually, 22pF is on the low side as the series connection of C3 and C4 ought be close to 20pF. Many crystals specify a load capacitance of 30pF, in which case use 33pF or 47pF ceramic capacitors for C3 and C4. If in doubt, use 33pF.

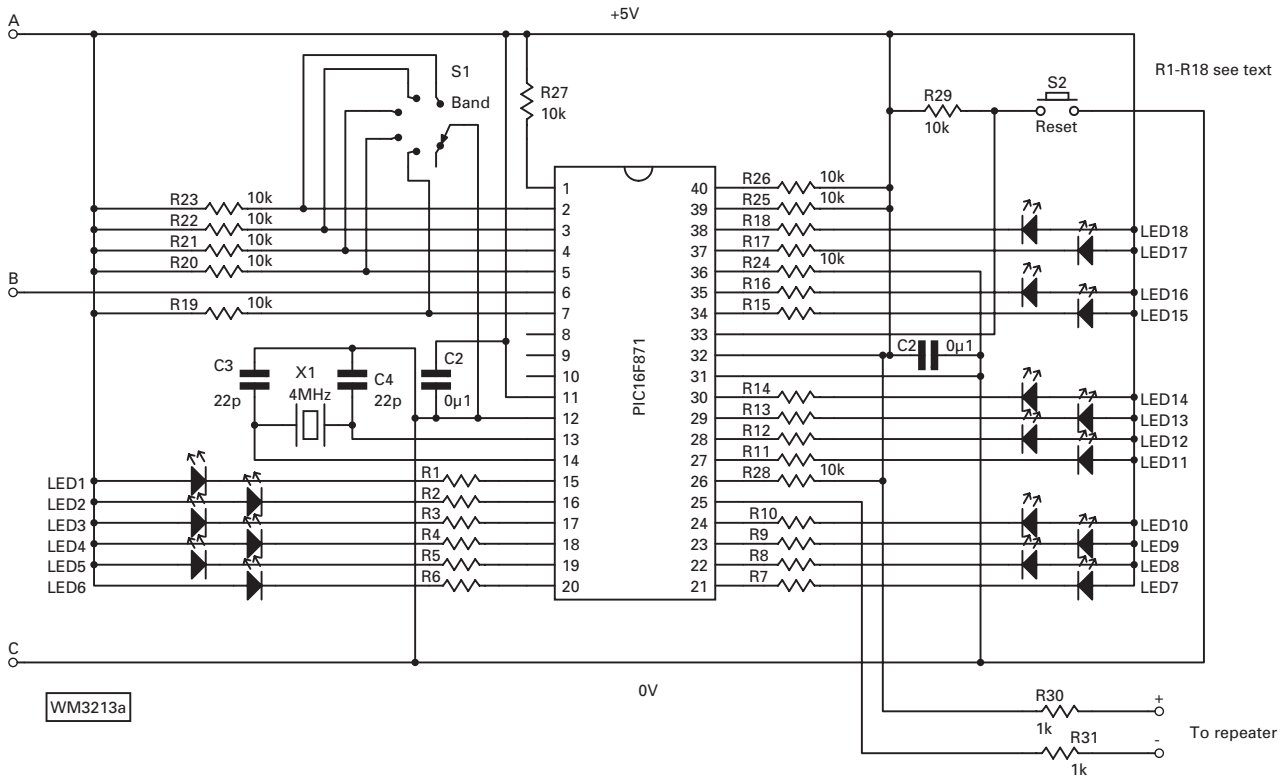

Fig. 3: The PIC clock and its external clock tick generator.

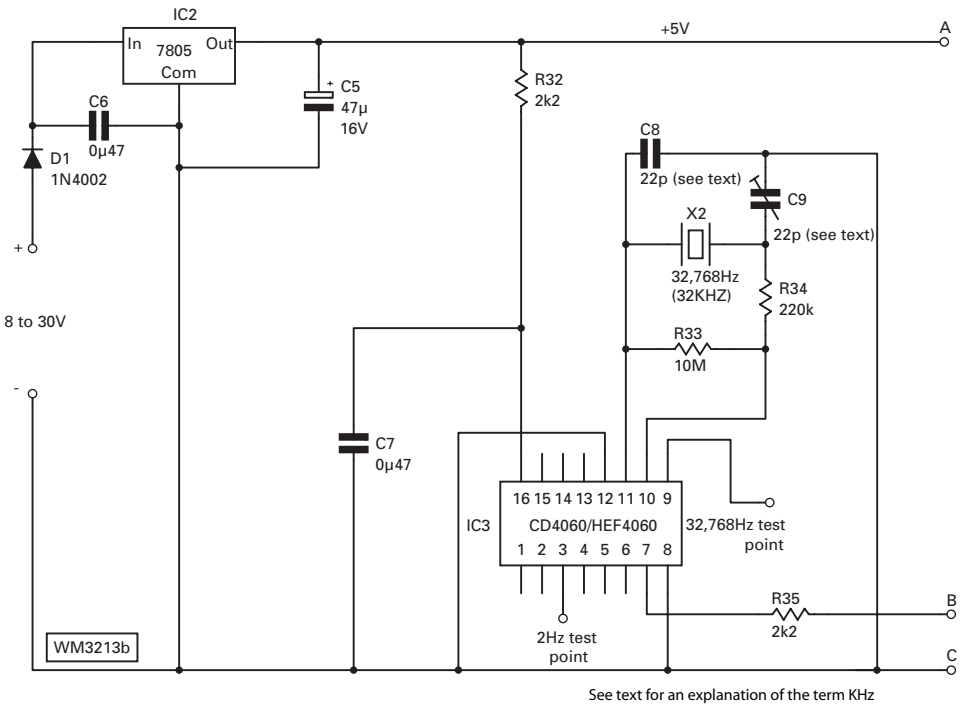

Fig. 3: The PIC clock and its external clock tick generator.

Pin Functions

The function of some of the PIC's individual pins isn't obvious, so I'll run through them now. Pin 1 on the PIC is the microcontroller's external reset input (and high voltage programming input), which is normally held at +5V. We have to momentarily short pin 1 to 0V to reset the PIC's c.p.u. and peripherals.

Pin 26 is the USART's receive input, and because it's not used in this design, it's held inactive (high) by R28. Pins 39 and 40 are used when physically programming the PIC. So, to allow in circuit programming (more about that later), it's useful to configure these pins as inputs if at all possible.

At switch on, the IBP Clock's software checks the

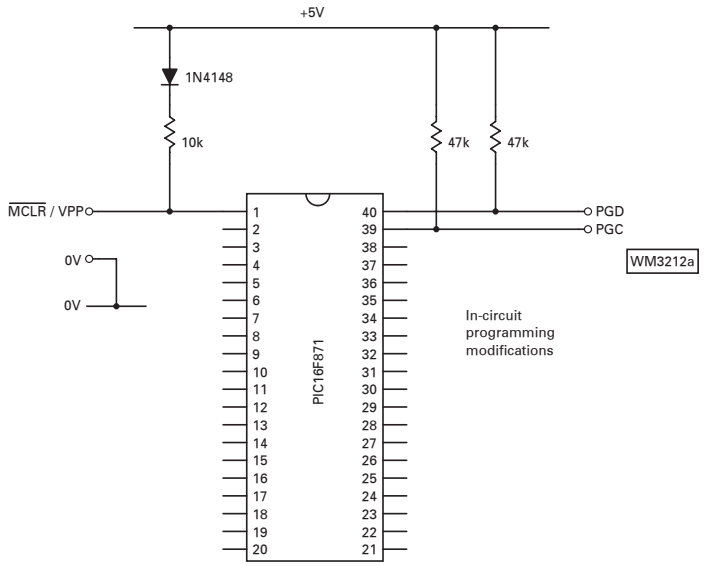

Fig. 4: The PIC can be programmed in-situ with these circuit modifications.

voltages on pins 39 and 40 and these voltages are then used to determine the function of the PIC. The following table should make things clear.

Pin 40	Pin 39	PIC Function
+5V	+5V l.e.d.	Clock
+5V	0V l.c.d.	Clock
0V	+5V l.e.d.	Repeater
0V	0V(Undefined - defaults to l.e.d. Repeater)	

Now to pin 36. This pin is pulled low by R24, and serves two purposes; one Microchip's and one mine. First, pin 36 can be used as a low voltage programming input. This function is active on brand new devices as supplied by the factory. However, most of the PIC kits on the market use the PIC's high voltage programming mode, which involves applying +12V to the reset input pin 1.

To prevent the low voltage programming mode being accidentally activated, it's essential that pin 36 be held at 0V the very first time a new PIC is programmed. Unless specifically required, it's advisable to disable the PIC's low voltage programming option. (Please see the 16F871's data sheet for more information).

In this design, pin 36 is used as a l.e.d. active high/low select pin. The circuit of Fig. 3 shows the l.e.d.s connected between the PIC pins and +5V. The l.e.d. drive is thus said to be active low, in that the PIC pin switches from +5V to 0V to illuminate the required l.e.d. However, if resistor R24 is taken to +5V instead of 0V (remember the warning above though), then the l.e.d. drive is reversed and the PIC pins will switch from 0V to +5V to illuminate the required l.e.d.

I've included this option, not to drive l.e.d.s but to directly drive ULN2804 and similar, open collector buffers. These devices (as used on the original hardware IBP Clock) can switch up to 500mA to ground from a 50V supply. So, if 15mA at 5V isn't enough, then ULN2804s should provide more than sufficient current. Of course, active high outputs can also drive discrete transistors and that's another option. Just remember to use appropriate base resistors!

Finally, the three pins which belong to Port E (Port E only has three I/O pins) are unused and are left unconnected. During initialisation, the IBP Clock software configures them as outputs and sets them low. Anyone modifying the software can use these pins for their own purposes.

Programming The 16F871

April's issue of *PW* featured a review of the **Velleman K8048 PIC Programmer and Experimentation Board** by G4JCP. This kit is eminently suitable for programming the 16F871.

If using this kit, you have two options. Either solder a 40pin d.i.l. socket (preferably turned pin) onto a piece of stripboard, and wire it as described in the kit's documentation. Or you can program the PIC while it's actually in circuit, in the IBP Clock. To do the latter, you'll need to make a few simple modifications, as shown in **Fig. 4**.

First, resistors R25 and 26 need to be increased to 47kΩ. Next, wire a 1N4148 diode in series with R27. Four connections are then required between the IBP Clock and the K8048 board. These connections don't have to be permanent, and in fact, the K8048 p.c.b. is laid out for a 5-pin connector that carries the required programming signals. Only four pins are used, the fifth is a +5V supply, which isn't needed as the IBP Clock has its own +5V supply.

The actual programming procedure is described in a 'help file' supplied with the K8048 kit. If you want to program your own PIC chip and are unfamiliar with the procedure, then I recommend you gain experience by first programming the PIC supplied with the kit. There are two example programs and if both work as they should, then you can try the 16F871. (Please note my comments concerning computers made in the K8048 review, April *PW*).

Source Code & Hex File

The source code for the IPB beacon clock PIC project and the HEX file, which is used by the programming software, is available from **http://www.g4jcp.freeserve.co.uk/** The HEX file should also be compatible with any commercial PIC programmer. Alternatively, ready programmed 16F871 PICs are available from the **Kit Radio Company** - see the components list for details. Blank PIC chips are available from a number of sources, including Maplin. A search of the Internet will reveal others.

Comprehensive data on all PIC devices, development software and debugging tools, application notes and other documentation is freely available from Microchip's website at: **http://www.microchip.com/**

Note: if you want to know more about any particular PIC device, then download its data sheet. And for additional information on mid-range PICs (like those mentioned in the introduction), get the **PICmicro(tm) Mid-Range MCU Family Reference Manual**.

Prototype LED Clock

The prototype l.e.d. clock was built on a piece of stripboard, as shown in **Fig. 5**. Please note that the physical layout of the PIC and its surrounding components closely follow the layout of the circuit diagram. Of course,

the l.e.d.s are mounted elsewhere, and pins are fixed in the stripboard at places corresponding to the cathodes of the l.e.d.s on the circuit diagram. Also notice that the l.e.d.s run in sequence, anticlockwise from pin 15 on the PIC.

When building the clock, please make sure you do double check everything! It's a relatively simple circuit, but it's also very easy to make a mistake on stripboard. When testing, make sure you have a stable +5V rail before inserting the i.c.s. Also, ensure those pins that are connected to either 0V or +5V (via resistor or not), really are connected to the proper voltage rail.

Assuming the PIC has been programmed correctly, the clock should work first time. Ruling out wiring errors and faulty components, the only thing that can stop the clock working is the failure of one or both of the crystal oscillators.

The 32KHz oscillator can be checked by wiring a l.e.d. (plus a series resistor) between IC1 pin 3 to 0V. It should flash at 2Hz. To check the 4MHz PIC oscillator, either use a logic probe or an oscilloscope. Or simply use a general coverage receiver tuned to 4MHz. You may have to put the clock quite close to the receiver's antenna to get a good signal.

As with all software projects, there may be bugs in the code. Always use the latest version, which will be made available at the web address mentioned above.

There may also be more features added to the code over time, so it's worth checking the website even if you buy a ready programmed PIC. One last point, please don't expect me to modify the code just because you want a particular feature included. The source code is on the 'Net, so have a go yourself – It's great fun! ●

Components

Resistors (All resistors 0.25W)
R1-18 300Ω minimum (see text)
R19-29 10kΩ
R30,31 1kΩ
R32,35 2.2kΩ
R33 10MΩ
R34 220kΩ
All resistors 0.25W

Capacitors

C1,2	100nF 50V ceramic
C3,4,8	22pF 50V ceramic
C5	47μF 16V electrolytic
C6,7	470nF 50V ceramic
C9	22pF film dielectric trimmer
X1	4MHz HC-49/U (or low profile) crystal
X2	32KHz miniature watch crystal
D1	1N4002
LED1-18	l.e.d.s to suit (see text)
IC1	PIC16F871-I/P [*]
IC2	7805
IC3	CD4060 or HEF4060
S1	Single-pole, 6-way rotary switch
S2	Single-pole, non-latching push-to-make switch

Stripboard, pins, wire, case to suit.

[*] Programmed PIC16F871-I/P microcontrollers for the PIC IBP Clock are available from: **KRC, Unit 11, Marlbrough Court, Westerham, Kent. TN16 1EU. Tel: (01959) 563023, E-mail: kitradioco@aol.com**. Price £7.99 all inclusive to UK addresses. (Overseas 'phone or E-mail for quote.)

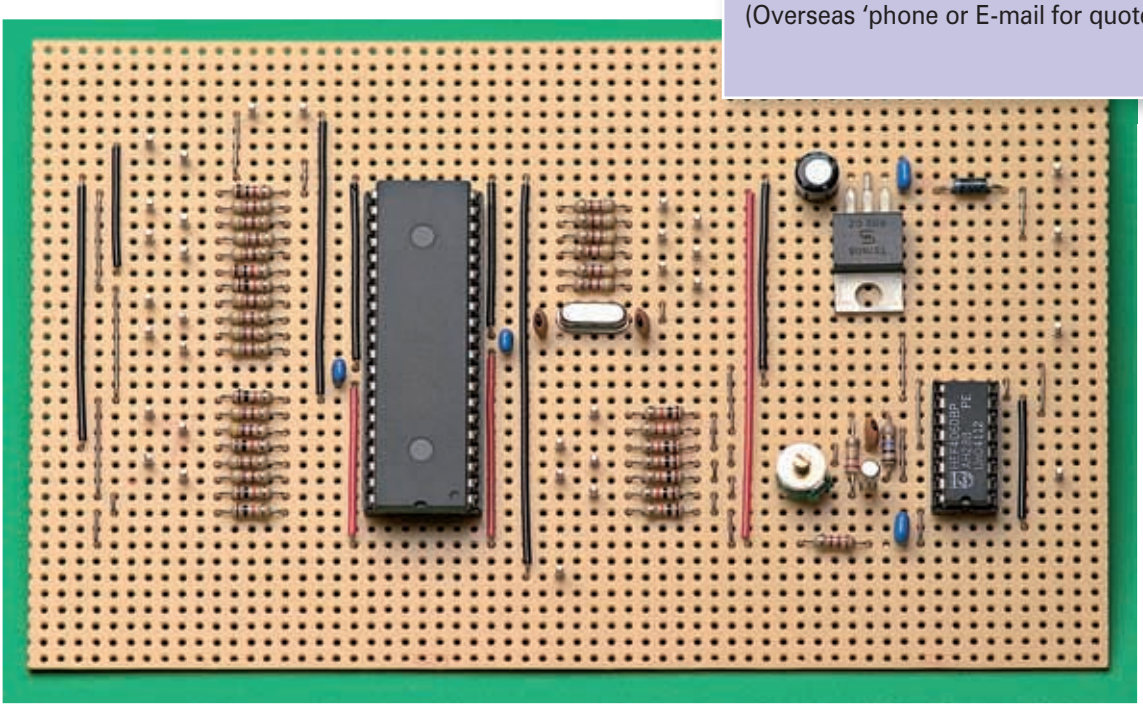

Fig.5: The prototype PIC clock controller.

In part 2, a version with a liquid crystal display will be featured, together with an associated l.e.d. repeater. (The latter allowing a l.e.d. display to be added to the l.c.d. unit.).

Phil Cadman G4JCP writes: "The *PW* team and I are planning to present Part 2 of this project in the July issue of the magazine. In the meantime, as this is our first PIC-based project, everyone involved in preparing it for you will be most interested to hear your comments and what you think of the idea. Please contact the PW offices or myself via **g4jcp@btinternet.com** or at **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**.

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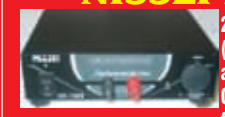

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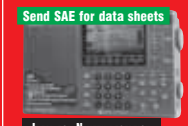

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A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc. *Simply close shut over cables and notice the difference!* Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

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A superb quality ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £12.00
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£3.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	1m	£6.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99

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DC-1 Standard 6-pin/20A fits most HF £22.00
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MH-4 4 pin fits older HF, etc. (4-pin round) £24.99

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2 way CX-201 'N' (0-1GHz) 'N' £24.95
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4 way CX-401 'N' (0-500MHz) 'N' £79.95

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(DEL Phone)

2" mast-floor base plate £13.50
6" stand off brackets (no U-bolts) £6.99
9" stand off brackets (no U-bolts) £9.99
12" T & K brackets (pair) £18.99
18" T & K brackets (pair) £22.99
24" T & K brackets (pair) £26.99
U-bolts (1.5" or 2") each £1.50
8mm screw bolt wall fixings £1.70
8-nut universal clamp (2" to 2") £6.95
2" extra long U-bolt/clamp £4.50
2" crossover plate with U-bolts £11.99
15" long (2") sleeve joiner £11.99
3-way guy ring £3.99
4-way guy ring £4.99
Heavy duty guy kit (wire clamp, etc.) £29.99
Set of 3 powder coated heavy duty fixing spikes (~0.7m long) £24.99
30m pack (4.4m) 480kg B/F nylon guy £12.50
Roll of self-amalgamating tape £6.50
Nylon dog bone insulators £1.00
Very large nylon insulators £2.00
PL-239 (small of large entry) £1.10
N-type plugs (high quality) £3.95
Copper plated earth rod (1.2m long with wire clamp) £13.99
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A simple to fit but very handy mast pulley with rope guides to awvoid tangling. (Fits up to 2" mast) ..... **£8.99** + P&P £4.50

30m pack (4.4mm) nylon guy rope £12.50
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NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

£8.99 + P&P £4.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on WALL BRACKET £2.99 P&P £1.00

30m pack (4.4mm) nylon guy (480kg) £12.50
132m (4.4mm) nylon guy (480Kg) £40.00

BARGAIN WINCH

500kg brake winch. BARGAIN PRICE

£59.95 Del £8.50

Winch wall bracket £19.99

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2½" in diameter and finishing with a top section of ¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£139.99** 12 mtrs **£169.99** Carriage £12.00.

NEW 20' SLEEVED MAST SET

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

£49.99 Del £10.00.

TWO FOR £90.00 DEL £12.50

HEAVY DUTY SWAGED MAST SET

New extra heavy duty 2" mast set. 4 sections x 5½ foot slot together.

£54.99 each.

TWO FOR £95.00 DEL £15.00

ALUMINIUM POLE CLEARANCE

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

3 SETS FOR £49.99 DEL £15.00

SET PRICE **£23.99** Del £10.00

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10 foot (collection only) 2" £29.99
2.4m (2") Ally pole 24.99
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SPEAKER MICS

M-U120
Fits most handies. Alinco, Kenwood, Yaesu.

£14.99 P&P £3.00

Ms-107K
Fits Kenwood handies.

£14.99 P&P £3.00

TH-887 HEADSET

ADAPTERS FOR MOBILE TCVRS AVAILABLE – PHONE

Superb headset for most handies.
887K (fits Kenwood) £24.95.
887 fits most twin sockets. Alinco, Icom, Yaesu, etc. **£24.95** P&P £3

LIGHTNING ARRESTOR

SP-350V

Replacement fuses £5.00

DC-1000MHz (400W through power). SO-239 fitting.

£22.95 P&P £3.00

MFJ-1118 metered

High current distribution unit £64.95

MFJ-1117

DC High current distribution unit £39.99

UNIDEN UBC-780XLT

25-512/760-1300MHz. AM, FM, WFM. Ideal seperate monitor.

£169.99

Airband ham radio & more Send SAE for review

Feature

The Postage Stamp & Amateur Radio

With the unfortunate exception of the UK, most countries throughout the world have celebrated Amateur Radio and radio operators on their respective stamps. Indeed, Some stamps have even featured old and new radio equipment. From America to New Zealand, these miniature works of postal art have advertised probable the best hobby in the world – Amateur Radio.

From the world's first postage stamp, the Penny Black, which was issued in Great Britain on the 6 May 1840, the Postal Authorities of various nations including our own, have honoured a miscellaneous selection of milestones via its philatelic distribution networks – your local Post Office. Whether it be medicine, the arts, science, history, or even more common nowadays, the stamp is commemorating important events happening today.

Not In The UK!

As I mentioned earlier, even though the UK's Postal Administration has, up to this moment in time, refused to honour Amateur Radio operators on a British stamp, don't lose heart, because other more enlightened countries have chosen to do the opposite! These include – in no particular order – with their corresponding Stanley Gibbons catalogue numbers: America (SG1242), Germany, Pitcairn Islands (SG500-503, SG479-482), French New Hebrides (SG126), Liberia (SG1650-1653), Australian Antarctic Territory (SG16), New Zealand (SG180) and so on. And – this is good news for those licensed operators or listeners amongst us who prefer Mr Morse's method of communicating – c.w. as many philatelic items also depict a Morse key as a central part of the design of the stamp!

Perhaps (to whet your appetite further) you could start your own collection of stamps featuring Amateur Radio and/or Morse keys? The Pitcairn Islands might be an ideal place to start as their stamps have featured our hobby. You'll also get some idea of prices too. Be advised though, that the prices you see in the catalogues (revised yearly) are not the prices you will pay – most stamps are sold at half-catalogue price, rarer stamps, full-catalogue and above.

Next, you may need a stamp dealer and there are literally dozens of these. However, although most dealers carry all manner of stock, a dealer who specialises in Thematic (themed stamps) for example, may have items depicting Amateur Radio or Morse keys on them. If you decide to go down this route, all dealers prefer you to list the items you need via their individual SG numbers – these will be found in the above mentioned catalogue.

Stamp Auctions

Other avenues to explore are Philatelic (stamp) Auctions, either by visiting the actual auction on the day or, sending your bid via the post. These are fairly regular events – most of which happen on a weekly basis somewhere in the UK. The addresses for auction catalogues can be found in profusion in the three main monthly stamp related magazines.

Generally speaking, stamps sold at auction are at trade prices but don't forget that the final hammer price will include a premium on top of any successful bid. You never know, you just might be lucky as I once was when

Ray Howes G4OWY, who is based in Weymouth Dorset, takes a wry look at the postage stamp and how Amateur Radio has been depicted on the World's stamps – everywhere except the United Kingdom apparently!

I purchased a Telecommunications themed lot a few years ago to find many stamps featuring Amateur Radio and Morse keys hiding amongst it! In passing, it's worth mentioning that some auction sales have the occasional QSL card lot.

As far as buying stamps are concerned, yet another avenue in the Internet, especially ebay. Just log-on and type in your area of interest and away you go. Trouble is, the choice does tend to be a bit bewildering – particularly when dozens of thematic stamp sites begin to appear on your computer screen. Then it is a case of choosing the right one!

On the Ebay auction-site, of course, you can bid for whatever stamp takes your fancy but whether you are successful in obtaining it, this is usually down to luck or dogged determination. One word of caution though, occasionally some items can be described incorrectly. Besides, it is very difficult to ascertain the actual condition of a stamp just by viewing it via a computer screen. In general, most sellers are honest but a small minority are not. So buyer beware!

Finally, perhaps I should also mention that all things being equal, stamps do rise in value – obviously some more than others. They can be an excellent investment – with the proper advice. However, many of the Amateur Radio/telegraphy themed stamps continue to be somewhat sluggish so far as the investment stakes are concerned.

On the bright side, a few have risen in price but not to the dizzying heights of some of the more esoteric philatelic gems. Stamps from the UK in particular, especially those from the Victorian era, have rocketed from the low hundreds of pounds during the 1960s to many £1000s now! In fact, you can now purchase stamps to represent part of a private pension plan.

On 5 April 2006 (Pensions Act 2006) along with residential property, works of art, wine and collectables, stamps were also allowed into pension funds. Incidentally, by way of an update, the Chancellor of the Exchequer pulled the rug on stamps and other commodities being allowed to be invested in pensions recently. But there appears to remain an opportunity to invest in units in a fund of stamps. This may not be a good idea to follow up though. So in theory, one could purchase a stamp or stamps worth from example £1000 through your pension fund, and if you were paying tax at say 40%, it would only cost you £600 plus costs to the pension administrator. But at this moment in time, there does not appear to be any pension providers offering this facility. Anyway, converting most types of collectibles into a pension fund simply to walk away with the tax-relief is not so simple as it looks!

Every Day Stamps

An easier and safer sort of investment, however, is never to forget to keep your eyes wide open for errors on the everyday stamps you purchase at your local Post Office. It does happen, sometimes. The most recent example being the slate blue £2 Machin stamp – missing the £ sign! (One of the most alarming errors found on a GB stamp for many years). A single stamp sells today for a great deal more than the original £2!

You could also buy the occasional presentation pack, some of which have risen dramatically in value. The Princess Diana Welsh presentation pack, which could be bought for several £s or so during the late 1990s, is now selling for £100 plus! So keep looking, you never know you may stumble across a small fortune just waiting to be cashed in.

Hopefully then, you'll now start your own collection of these miniature works of art show-casing probably the best hobby in the world. It's not the biggest hobby, because that is as you may have guessed, is stamp collecting. Or is it fishing perhaps?

Stamp Dealer G4OWY

Amongst other things, I (G4OWY) am a stamp-dealer. I'm a also one-time collector of prehistoric radios – particularly Heathkit and was first licensed as G6AUW in 1982. I'm also an enthusiastic planet-wanderer and reluctant insomniac who spends far too much of what should be sleeping time, talking to other like-minded souls via s.s.b. on whatever h.f. band happens to be open at 0300 and beyond.

Other interests include Cold Fusion, digital photography, Social history, QRP, astronomy, Ufology (the study of unidentifed flying objects) and writing too many letters to various magazines. If any *PW* readers would like help in obtaining any philatelic items please contact me, QTHR. ●

Antenna Workshop

John Heys G3BDQ describes the AntMatch, a versatile antenna tuner/matcher for the 144MHz band.

Antenna tuning units (a.t.u.s) or antenna matchers (a.m.u.s) for the 144MHz band are seldom described in our Amateur Radio press. To find a suitable design, I had to go back to the late 1960s to find a circuit and details of such a very useful piece of equipment.

The *ARRL Antenna Handbook* published in 1971 describes 'A Transmatch for 50 and 144MHz with SWR Bridge'. This article was, no doubt, a reprint of an article that had appeared earlier in *QST Magazine.* I have omitted the 50MHz details and the s.w.r. bridge and just re-worked the 144MHz circuitry and details.

These days we buy or construct our v.h.f. antennas, adjust them for a minimum s.w.r. while the antenna is mounted at no more than two or three metres above ground. This done we then strive to get the antenna up as high as possible.

After having erected the antenna, it's often found that the s.w.r. has mysteriously deteriorated. There are the fortunate few who can make their final s.w.r. adjustments when the antennas are positioned high up in the air but most of us with only relatively flimsy masts and not towers, cannot make that final 'tweak' to the beams in its final working space.

I have a couple of 144MHz beams and a quarter-wave vertical in my roof space. But even though they're relatively accessible, carrying out antenna tweaking in the loft, while the s.w.r. meter is in a room down below, becomes an impossible task.

A five element beam adjusted for unity s.w.r. downstairs presented a disappointing 1.4:1 s.w.r. when positioned in the roof space where it shares space with a variety of copper piping, electrical wiring, an old galvanised water tank and sundry other objects.

Modern transceivers are programmed to gradually shut down their power output when the s.w.r. of the antenna in use rises above a certain level. My rig is no exception, its nominal 100W r.f. output has dropped down to just over half of that power with the antenna's new match.

The problems that I've outlined above, stimulated my search for a simple 'sure-fire' antenna matcher for 144MHz. Having this AntMatch has other advantages beyond its matching performance. It has the ability to match antennas that have plastic or open wire antenna feeders and perfect matching when coaxial cable is used to the antenna.

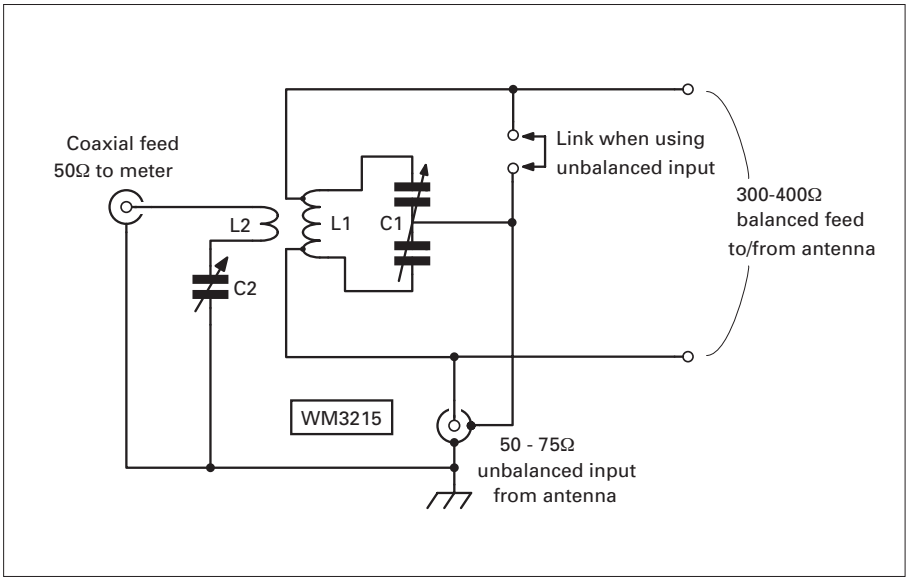


Fig. 1. The AntMatch circuit which illustrates the inherent balance of the project.

Additionally, there will be a significant reduction in the radiation of unwanted harmonics with up to 30dB of attenuation. On the receiving side the additional tuned circuit at 144MHz improves selectivity and reduces any responses to out-of-band signals, such as those from pager signals. The r.f. losses through the AntMatch are insignificant, unlike the 20% r.f. losses inherent with some of the modern auto-tune h.f. matchers.

The Circuit

The AntMatch has a balanced tuned circuit with a coil L1 (see **Fig. 1**) tuned by a 'Butterfly' type variable capacitor C1. The inductor L1 is tapped down to provide connections to a balanced feed line and also to unbalanced coaxial cable feeder. In an emergency even a short single wire can be matched but the wire must present an impedance roughly between 300 and 500Ω.

When using unbalanced feed with coaxial cable one of the balanced connections (away from the coaxial feedpoint) must be earthed by using a jumper wire to an earth connection on the box. A two turn link winding (L2) is positioned over the centre of L1, its inductive reactance being tuned out with C2.

Screened Box

The unit was built into a completely screened box. I had a box to hand, a die-cast alloy one measuring 170x120x105mm deep which may seem a little large but its size made the building stages much easier. A much smaller box might influence the inductance and *Q* (goodness factor) of L1.

The illustration, **Fig. 2**, shows the overall appearance of the controls (C1 and C2), the two insulated antenna feeder terminals, the coaxial input and output connections and an earthed wing nut for the jumper wire. All the components and the wiring can be seen in the photo (**Fig. 3**), the layout is arranged to preserve balance and to keep the connections reasonably short.

The type of variable capacitors, known as 'Butterfly' types were once easily and cheaply available on the radio surplus market, though now they may be hard to find. Capacitor C1 has a maximum capacitance of 10+10pF and as I only had a larger value capacitor, this had to be adjusted to the correct value by the careful removal of some of its plates using a fine piercing saw.

Each section was then left with just two fixed and one moving plate. The capacitor, C2, is a 35pF trimmer capacitor, which fortunately has a spindle for tuning and it is another item that came from the junk box. The coil L1 is self supporting ans has four turns of bare soft-drawn 2mm diameter

(16s.w.g.) copper wire. It is 30mm in diameter and is 20mm long.

Using bare copper wire simplified the soldering of the tap connections which are each made one turn in at each end of L1. The link coupling inductance is made with 2mm diameter (16s.w.g.) enamelled wire and has just two turns. Its diameter is 40mm and has a length of 5mm.

The 'Butterfly' capacitor is earthed through its spindle. The ends of L2 are soldered to a pair of small ceramic 'stand-off' insulators that are mounted beneath the top of the box. A small nylon cable tie holds the two turns of L2 together and stops them from springing apart.

Fig. 2. The completed AntMatch with its connectors positioned on the top of the diecast box.

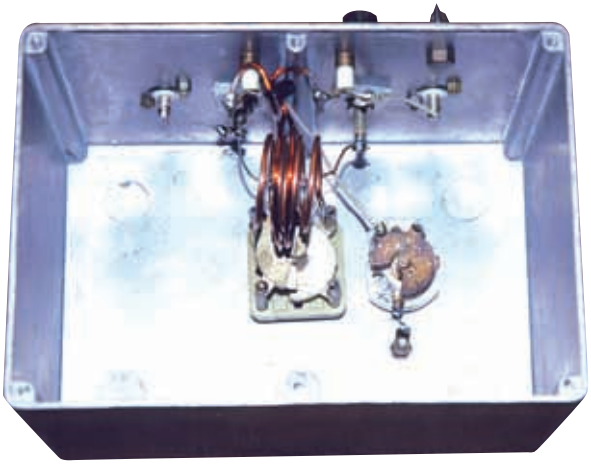


Fig. 3. Inside the box showing the layout of the components. The modified 'Butterfly capacitor' is in the centre.

Setting Up

Let's now look at how the system is set up. First, tune your transceiver to mid-band and set its power output to around 4 or 5W. Connect an s.w.r. meter between the transceiver and the AntMatch coaxial input socket but instead of an antenna, connect a non-inductive resistor of between 300 and 450Ω (using a couple of 2W 680 or 820Ω resistors in parallel or five 56Ω 1W resistors in series) to the balanced feeder terminals.

It will be possible to tune the unit using C1 and C2 to obtain either a very low or ideally unity s.w.r. indication. Then connect a 50Ω non-inductive resistor, such as a pair of 100Ω 2W components in parallel, to the unbalanced coaxial socket. The jumper wire must connect to the terminal at the end of L1 away from where the coaxial cable connects. Again, an adjustment of C1 and C2 should give a unity s.w.r. reading.

Knowing that the AntMatch works as intended, your antenna or antennas can be connected and the output power increased. As shown here, the unit handles 100W of r.f. power without flash overs. **But please note!** Never use it without an antenna or a dummy load connected.

Should your antenna already give you a 1:1 s.w.r. reading the Antmatch can still be employed, for it will reduce any harmonics that may come from the transceiver and will help to reduce any break-through of unwanted out-of-band signals.

My AntMatch is always in circuit and it lets me run my TS-2000 to its full 100W output to feed any of my three indoor 144MHz antennas. ●

SPECTRUM COMMUNICATIONS

TRANSVERTERS for 2 or 4 or 6 metres from a 10 metre rig, or 4 or 6 metre from a 2 metre rig. Includes new overtone local oscillator, and integral interface unit. 20dB receive gain, 25W transmit power. Low level drive, dual drive IF versions **TRC2-10dL, TRC4-10dL & TRC6-10dL**, high level drive, single cable IF versions **TRC2-10sL, TRC4-10sL, TRC6-10sL, TRC4-2sL, TRC6-2sL, Complete kit £163.00. Built £244.00.**

TRANSMIT AMPLIFIERS, for 2 or 4 or 6metres, single stage switched class AB linear. Diecast box with SO239 connectors. **TA2SA**, 3W in 20W out, **TA4SA, TA6SA** 2.5W in 30W out, **Complete kit £59.00; Ready Built £82.00. TA2SB**, 10W in 35W out, **TA4SB, TA6SB**, 5W in 55W out, **Complete kit £65.00; Ready built £88.00.**

TRANSMIT AMPLIFIER & RECEIVE PREAMP, for 2 or 4 or 6metres. Receive gain adjustable 0-26dB gain. Switching for either part or straight through. RF & DC switched on transmit. Diecast box with SO239 connectors. **TARP2SA** 3W in 20W out, **TARP4SA & TARP6SA**, 2.5W in 30W out, **Complete kit £72.00; Ready Built £109.00. TARP2SB**, 10W in 35W out, **TARP4SB; TARP6SB**, 5W in 55W out, **Complete kit £75.00, Ready built £112.00.**

TWO TONE OSCILLATOR As featured in *PW* March 2005. A necessary signal source used with an oscilloscope to set up AM, DSB, & SSB transmitters. **PCB & hardware kit £25. Ready Built £52.50.**

AUTO TONEBURST 1750Hz tone board for repeater access. 7-10, or 10-14V operation. **Type AT1750. PCB Kit £5. PCB Built £7.50.**

STATION PREAMPS for 2 or 4 or 6metres. RF & DC switched. Adjustable 0-26dB gain. 100W power handling.
RP2S, RP4S, RP6S, PCB & Hardware kit £29. Ready Built £47.

MASTHEAD PREAMPS, for 2 or 4 or 6meters. 20dB gain 1dB NF. 100W through handling. RF switched & DC fed via the coax. Heavy duty waterproof masthead ABS box. Includes a DC to RF station box with SO239 connectors. **RP2SM, RP4SM, RP6SM, PCB & boxes & hardware kit £38.00, Ready Built £57.00. New masthead fitting kit £6.00**

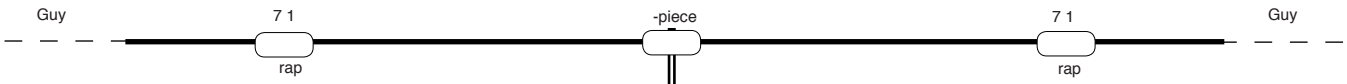
DSB 7MHz RECEIVER as featured in Doing It By Design Jan 2007 *PW*. A simple but sensitive receiver with Mosfet RF & Mixer and an IC audio amplifier. Works in conjunction with the Portland VFO detailed below. **PCB and parts with volume control and audio transformer £19.50.**

PORTLAND VFO as featured in March 2006 *PW*. 7-7.2MHz as local oscillator for a 40m direct conversion receiver or transceiver. Otherwise as 7.9-8.4MHz to use in conjunction with a mixer-vfo system as local oscillator for a 4 meter receiver/ transmitter with a 9MHz or 10.7MHz IF. Available with Buffer 2 to drive a diode ring mixer directly or with Buffer 1 suitable for IC and mosfet mixers, including the MIXER-VFO unit. **VFO PCB with Buffer 1 or Buffer 2 PCB and parts kit with potentiometer £14.50.**
PCB and parts kit with drilled box £23.50.

SPEECH PROCESSOR increases the average sideband power of SSB transmitters without driving the PA into clipping. Includes filtering to enhance the higher voice tones to increase intelligibility, and it sounds nice too. Panel control for clip and output level. Supplied with plugs & sockets to suit the rig of your choice. Type **SP1000, PCB & Hardware kit £29.00, Ready built £63.50.**

3N201 MOSFET equiv. 40673 £2.25 each, P&P 75p any quantity.

G2DYM/G4CFY Aerials



Full size Trap Dipole, 106 feet overall length, for 80-10m parallel fed, also 160m as T configuration. Comprising two inner wires, two outer wires, two 7.1MHz traps, a centre piece, two end insulators.
All version 400W continuous rated.
Carriage £15.00.
Light duty, for sheltered environment, 2.5sq.mm stranded PVC covered top wire, not including feeder **£124.00**.
Light duty, for sheltered environment, 4.1sq.mm hard drawn bare top wire, not including feeder **£132.00**.
Medium duty, for typical inland site, 6sq.mm stranded PVC covered top wire, not including feeder **£142.00**.
Heavy duty, for exposed site, 10sq.mm stranded PVC covered top wire, not including feeder **£164.00**.

BALUN 1:1 ratio 160 – 10 metres, air cored, 2kW rated. Low impedance in and out. **£40.00. P&P £3.00.**

Half size Trap Dipole, 53 feet overall length, 40-10m parallel fed, also 80m as T configuration. Comprises two inner wires, two outer wires, two 14.15MHz traps, a centre piece, two end insulators. 400W continuous rated. **Carriage Light & Medium £10.00, Heavy £15.00.**
Light duty, for sheltered environment, 2.5sq.mm stranded PVC covered top wire, not including feeder **£110.00.**
Light duty, for sheltered environment, 4.1sq.mm hard drawn bare top wire, not including feeder **£112.00.**
Medium duty, for typical inland site, 6sq.mm stranded PVC covered top wire, not including feeder **£119.00.**
Heavy duty, for exposed site, 10sq.mm stranded PVC covered top wire, not including feeder **£130.00.**

75 OHM TWIN FEEDER made off with sleeves and lugs 35ft £23.50, 70ft £38.00, 96ft £31.50, 108ft £33.00, 128ft £35.50, 140ft £37.00. Carriage £3.00.

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Amateur, CB, RSL Transmitters, Hospital Radio Links, OB Links, Aerials.

Vari-HV
a valve power supply

Since I designed and built the Valve Power Supply Unit I've adapted the basic circuit to meet additional needs. The changes, including making the h.t. output variable and current limited, adding a d.c. low voltage output and adding a digital output voltmeter, are described here.

The major change, making the h.t. output voltage variable, makes the unit very versatile and suitable for feeding the h.t. supplies for a wide range of valved circuits. Variable high voltage power supplies were fairly common projects in *PW* in the 1950s and 1960s (*PW* in both August 1961 and July 1967 provide examples) which typically used pairs of power tetrodes such as 6L6s or 807s as the series regulator elements.

No doubt the heaters of the valve rectifiers, series valves and the regulation control valve consumed more power than the unit could supply to external circuits, but such was the state of the art at the time! How far the technology of solid-state electronics has come over the years is well illustrated when you look at how simple the 21st century solution to this problem is!

New Version

The diagram of **Fig. 1** shows the circuit for the new version of the variable h.t. supply. For the sake of simplicity the mains transformer and rectifiers are not shown. It's assumed that a 250V-0-250V mains transformer secondary has been used which gives about 380V d.c. voltage (off-load) after the smoothing components C1, C2 and L1, ultimately current limited by the 100mA fuse FS1.

The wiper of R1 controls the gate voltage of *n*-channel m.o.s.f.e.t. Tr1 via R3. The IRF840 used for Tr1 has a maximum voltage rating of 500V with an on resistance of 0.85Ω and a maximum continuous current rating of 8A, though it only running up to 100mA in this application.

The source of Tr1 follows its gate voltage and produces a low resistance version of the gate voltage for its output. The output voltage of the prototype unit was variable between about 25-380V. 12V zener diode, D1, protects Tr1 against reverse source-gate voltages, and supplements the internal protection of the transistor.

Note that R1 needs to be the high resistance value of 1MΩ, though a 470kΩ can just about be used. This is to limit the power the resistor dissipates since it has almost the full 380V across it. I used a 24mm diameter

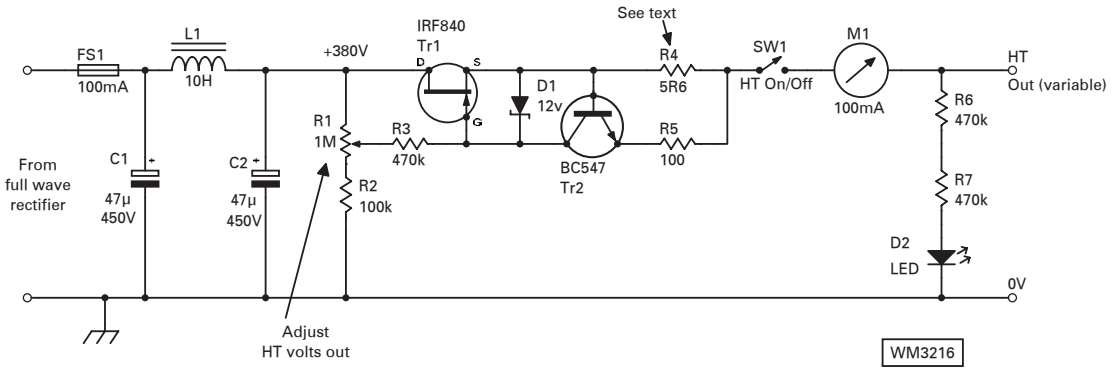


Fig. 1: The circuit of the original simply regulated supply (it has it's problems!)

Stefan Niewiadomski has modified his high voltage project from February 2007's *PW* to add some useful enhancements. Read on as he tells you what they are – it makes an excellent project even better!

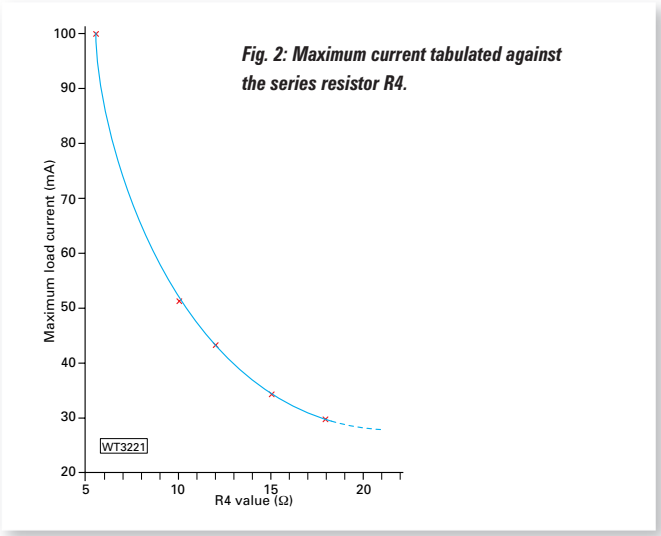


Fig. 2: Maximum current tabulated against the series resistor R4.

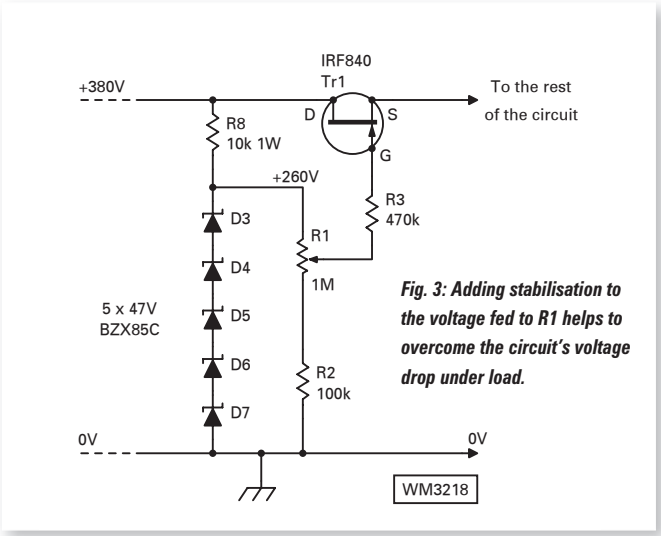
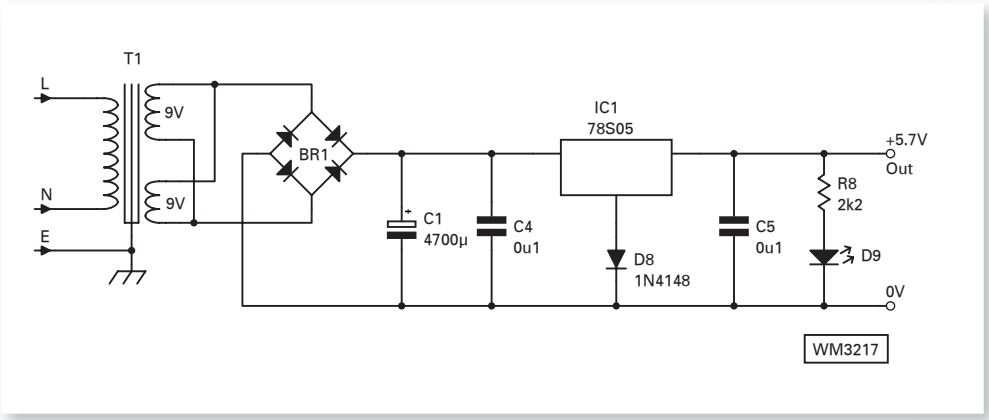


Fig. 3: Adding stabilisation to the voltage fed to R1 helps to overcome the circuit's voltage drop under load.



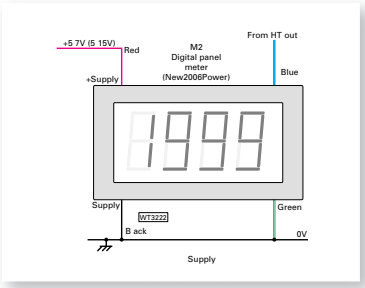


Fig. 5: Adding a digital panel meter. Depending on the full scale reading of the meter, the constructor may need to make an input limiter for the high voltage input connection.

Fig. 4: A regulator circuit that produces an output that's suitable to drive the heaters of many valves – and the additional panel meter.

potentiometer which has a 500V maximum voltage rating and 0.5W maximum power dissipation. In this application, with about 380V across its track, R1 draws about 380µA and hence dissipates a safe 0.14W. **Warning: DO NOT USE Just any old potentiometer you have in your junk box. It's going to get very hot and destroy itself very quickly.**

The variable output from the source of Tr1 is connected to the variable HT OUT terminal via R4, an HT ON/OFF switch S1 and M1 100mA d.c.meter. The ultra-bright light emitting diode (l.e.d.) D2, gives a visual indication of the variable output voltage. Its current is set at a very low level (about 400µA maximum) by series resistors R6 and R7, but even at this very low current its brightness is intense as the output voltage is varied.

The transistor, Tr2, and associated resistors form a current limiting circuit which turns Tr1 off as Tr2 is turned on by its base-emitter voltage rising as the current through R4 rises. Selection of the value of R4 allows this maximum current to be set to the value needed for your application. In **Fig. 2** I've shown how the maximum output current varies with the value of R4.

I tested values between 5.6 and 18Ω, which gave maximum currents of about 100mA to 30mA. Values of R4 outside this range can be used if needed. The value at which Tr2 limits the current is dependent not only on R4 but also on the exact d.c. characteristics of Tr2 itself, so some experimentation with R4 may be necessary.

Variable Output

Although the h.t. output of the circuit of Fig. 1 is variable, it is not necessarily well regulated, in that its output voltage will decrease (or 'droop') as the output current rises, dependent on the series resistance of the transformer secondary, diodes, etc. This may not be an issue in practice since the output voltage can simply be adjusted upwards with R1 until it achieves the desired level. An alternative approach is shown in **Fig. 3**.

In the circuit of Fig. 3, a stabilised reference voltage for R1 is generated D3-D7, a string of 47V zener diodes in series fed via R8. This circuit produce a stabilised voltage of about 260V. The current through the diodes is limited to about 10mA by R8, which is about the level needed for good regulation of the zener chain itself.

In operation, as the output current rises, causing the nominally 380V d.c. supply to drop, the feed voltage to R1 will stay constant at 260V and hence the gate voltage of Tr1 stays constant at that set by R1. Since the source of Tr1 follows its gate, the h.t. output voltage is then much more stable than previously. (Though clearly, the maximum h.t. output voltage of the unit will be 260V.)

Valve Heaters

Valve heaters are normally fed with a.c., typically at 6.3V. A suitable circuit for a d.c. heater supply is shown in **Fig. 4**. A regulated d.c. supply is useful, in the case of a very low noise valve circuit where the risk of any mains hum being induced needs to be eliminated entirely.

The a.c. voltage quoted for a valve's heater is the r.m.s. value of this voltage and hence it can be replaced by a d.c. source of the same value. An added advantage of

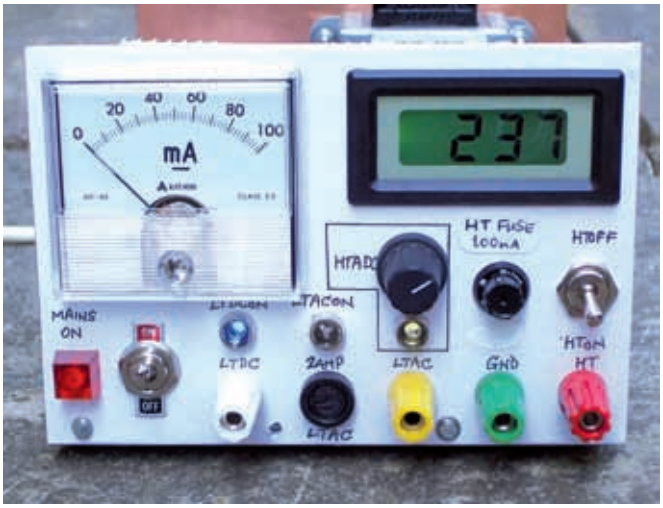


Fig 6: Accurate display of the output.

supplying a valve with d.c. is that its heater current may be measured more accurately, which is a good indication of its health.

The transformer I used for T1 had two 9V windings and these were connected in parallel so that their current ratings were added. A conventional bridge rectifier (BR1) and smoothing arrangement (C3) is used. The integrated circuit, IC1, is a 78S05 5V 2A regulator and D3 in its common lead raises its output voltage to nominally 5.7V. Another diode in this lead would give a voltage of 6.4V, but it's probably safer to under-run the heater at 5.7V rather than slightly over-run it at 6.4V. Light emitting diode D9 gives a visual indication that the supply is switched on.

Digital Panel Voltmeter

It's handy when adjusting R1 to accurately know what the output voltage is (as can be seen in the photograph above). An external digital multimeter (DMM) can be used but whenever I do this, I find I need the DMM to make another measurements somewhere else. Luckily, an internal meter can be incorporated easily and cheaply. A 500V analogue meter could be used, but this would have a fairly cramped scale and be difficult to read accurately.

I used a 0-500V digital panel meter from a company called **New2006power**, bought through eBay for about £11. As **Fig. 5** shows, this meter is very simple to use, needing an unregulated supply between 5 and 15V at about 10mA, and a connection to the voltage to be measured. Here the supply to the meter has been fed from the 5.7V output of the d.c. supply shown earlier. In fact the meter itself contains a voltage regulator, hence its tolerance to a wide range of supplies.

Construction Ideas

No detailed constructional details are given here but an idea of the front panel and chassis mounted component layout can be seen from the photographs. I used a combination of small p.c.b.s and 'ugly' construction methods and this worked well. Some heatsinking for IC1 will be needed if the full 2A is drawn from the low voltage supply.

Note that the metal tab on IC1 is connected to the common (middle) pin on the package. Normally this is very convenient, since the tab can simply be connected to a grounded metal heatsink, making good thermal contact. However, since in this circuit D8 is connected in series with the ground lead, the case of IC1 needs to be insulated from the chassis of the unit.

I made the case/chassis from double-sided p.c.b. material and 10mm x 10mm aluminium angle, simply because I couldn't find a case the exact size I wanted. Of course, any suitable case to hand can be used.

Transistor Tr1 is mounted on an aluminium bracket for heatsinking: the metal tab of the transistor is connected internally to the drain terminal and so it needs to be insulated from the chassis by an insulation washer/bush arrangement. This arrangement aids Tr1 power dissipation, especially if the output high voltage is set to a low value and the output current is relatively high.

More Flexible

I think that you'll agree that I now have a unit, which is much more flexible than the original unit. However, I wish I'd incorporated the negative bias voltage supply circuit into the variable voltage unit. I suppose, one way round this is to build the variable circuit as an outboard unit to the original fixed voltage valve p.s.u. I suppose this is part of the fascination of the hobby - there are always new circuits to be built.

●

Component Shopping List

Resistors

R1	1MΩ 500V 0.5W linear potentiometer (24mm to give adequate voltage and power rating). ESR type 951-510 or similar.
R2	100kΩ 0.25W carbon film
R3,6,7	470kΩ 0.25W carbon film
R4	5.6Ω 0.25W carbon film (see text)
R5	100Ω 0.25W carbon film
R8	2k2Ω 0.25W carbon film

Capacitors

C1,2	47μF 450V electrolytic
C3	4700μF 16V electrolytic
C4,5	0μ1 50V ceramic decoupling

Inductors

L1	10H 100mA choke
T1	0-9V, 0-9V secondary transformer (Maplin N00CF or similar)

Semiconductors

Tr1	IRF840 *n*-channel m.o.s.f.e.t. (available from ESR)
Tr2	BC547
IC1	78S05 5V 2A voltage regulator
BR1	100V 3A bridge rectifier
D1	BZX55 500mW 12V zener diode
D2,4,9	Panel-mounting ultra bright l.e.d.
D3-7	BZX85C 47V zener diode
D8	1N4148 diode

Miscellaneous

FS1	Fuse holder (20mm) plus 100mA fuse.
M1	0-100mA d.c. analogue panel meter
M2	0-500V d.c. digital panel meter (**new2006power**, bought through **eBay**, see text)
SW1	HT ON/OFF toggle switch (Maplin FH39N or similar)

Carrying on the Practical Way

Rev. George Dobbs G3RJV
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This month the Rev. George Dobbs G3RJV describes the 'T-R' box, a little design to provide simple transmit-receive switching for use on simpler rigs.

"Things do not change; we change."
Henry David Thoreau

Over the years in Carrying on the Practical Way (COTPW) I have described quite a few little QRP transmitters. They are great fun when used with a station receiver or the receiver portion of a transceiver, they can give the pleasure of contacting other stations with equipment that's the fruit of the your own labour. There's pleasure in telling the other station that the transmitter is home-made and getting extra satisfaction with every contact made.

What's more, the pleasure comes readily as simple QRP transmitters are easy to build and the achievements may not necessarily be modest. I well remember the glow of pride that that surrounded one G QRP Club member, as he told me had had contacted more than 30 countries, using only a GM3OXX 'Oner' transmitter with 1W of output to a dipole on the 14MHz band. Such things keep a hobby alive in my opinion.

Transmitter & Receiver

When I began in Amateur Radio, almost everyone I knew operated 'separates' as we called them; a separate transmitter and receiver. Fully integrated transceivers were a rarity and only for the rich or more technically minded home constructor. I had been operating for 10 years before I had a transceiver with automatic changeover in one box!

One problem was having the receiver on the same frequency as the transmitter. This was solved by 'netting' or tuning in and listening for the transmitter on the receiver. Usually the transmitter would have a netting switch to allow only the oscillator to come on and provide a signal to be found on the receiver.

In the case of QRP transmitters, the whole transmitter can be switched on or keyed. In fact my local radio club ran 'netting contests'. Contestants would net a receiver to a crystal-controlled transmitter and their accuracy would then be tested by the only club member who had a frequency meter. I recall that being a grand device with its Nixie tube read-out.

The other requirement is to have a rapid way of being able to switch from transmit to receive. Most Amateurs just used a simple manual switch and I considered myself sophisticated when I fashioned a foot-operated system from a microswitch and two hinged pieces of wood!

Likewise, many basic QRP stations these days just use a toggle switch to move from receive to transmit. Many of my little QRP transmitters have used a two-pole changeover toggle switch for the transmit/receive function.

It's obviously better to have the transmit/receive control activated by the Morse key on a simple c.w. transmitter. And in the past I have added this function to some of my projects. It occurred to me that it could be a good idea to have a key-actuated changeover system as a separate little unit that could be used for any suitable transmitter.

So, here I present the 'T-R Box', a key-actuated changeover system to be used alongside any little QRP transmitter circuit. The only pre-requirement is that the keying of the transmitter should be switched in respect to ground of the circuit.

The T-R Box

The circuit diagram for the T-R Box is shown in **Fig. 1**. The transmitter key controls two d.c. switching transistors, Tr1 and 2. A diode isolates this switching circuitry from the transmitter circuitry (Tr1 and T2 are *pnp* devices).

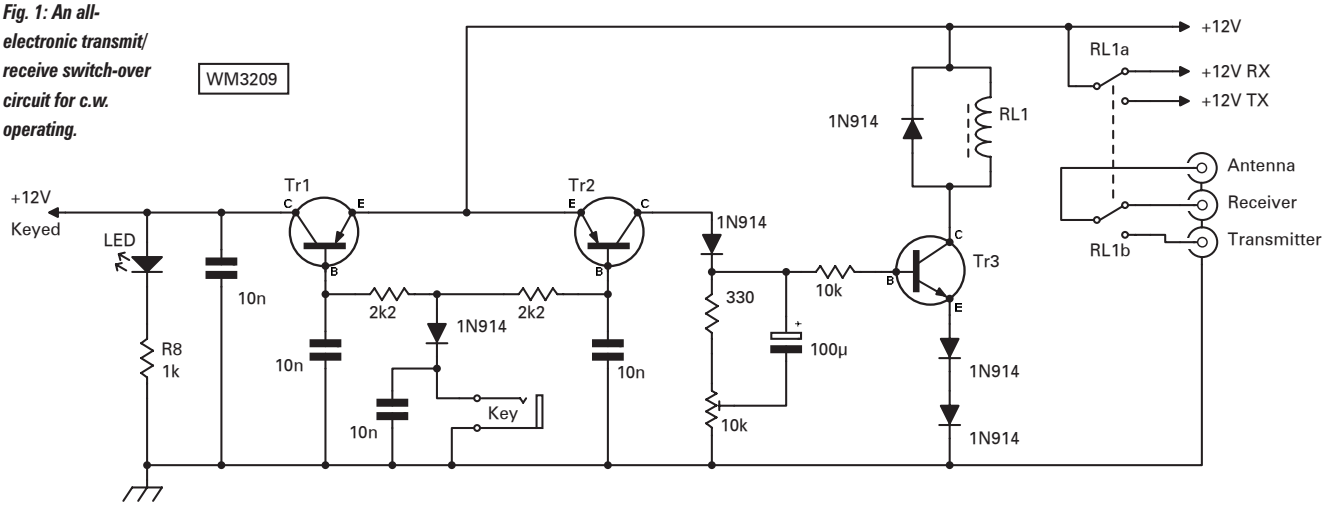
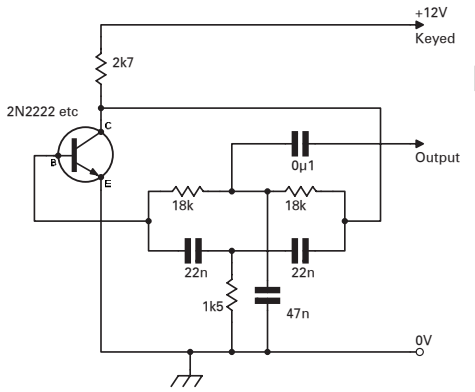
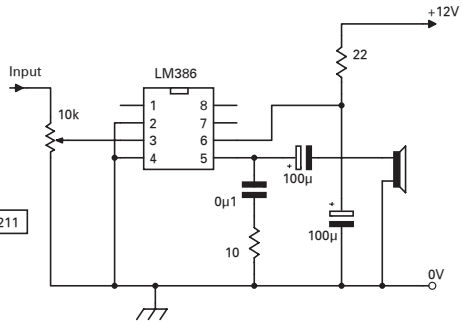


Fig. 1: An all-electronic transmit/receive switch-over circuit for c.w. operating.



WM3210

Fig. 2: A Twin-T audio oscillator circuit can produce a more pleasing side tone than a squarewave generator.



WM3211

Fig. 3: A simple sudio amplifier stage suitable for either headphones or a small loudspeaker.

Any device capable of handling the current required from the 12V keyed line would be suitable. I happened to use some 2N4036 transistors but also had some BCY71 transistors, which I have used for this application in the past. My advice is that you just look around for some fairly beefy *pnp* silicon devices.

In the circuit Tr1 operates as a d.c. switch to provide a 12V keyed supply. When the key is making contact, pulling the base 'down' to ground, via the 2.2kΩ resistor and the diode, Tr1 to conducts and 12V will appear at the collector of Tr1. This facility is an optional extra in that the change over function could be built without Tr1 and its associated circuitry.

Having a supply that's switched on and off in sympathy with the keying action can be very useful, as we shall see later. I added another optional extra to the circuit in Fig. 1, an l.e.d. complete with its limiting resistor so that it illuminates, following the keying action. Useless, perhaps but good to see!

The transistor, Tr2, (another *pnp* device) is also switched on and off by the action of the key. In it's turn, Tr2 operates an *npn* switching transistor, Tr3 to drive a relay for the change over function.

A whole variety of common *npn* silicon transistors would work for Tr3, the limitation being that Tr3 must be able to handle enough current to operate the relay. My prototype employed a bit of 'over-kill' and used a BFY51 (I have lots of them and haven't used one for ages!).

Time Delay Circuit

The transistor, Tr2 actuates transistor Tr3 via a time delay circuit controlled by the 330Ω resistor, the 10kΩ trim-pot and the 100µF electrolytic capacitor. When the key is closed Tr2 switches on Tr3 and the relay closes. On releasing the key, the relay is held in for a time governed by the decay of the voltage across the 100µF capacitor.

The decay time may be adjusted by the 10kΩ trim-pot. Having this delay ensures that the relay does not clatter in and out in sympathy with the keying action.

The trim-pot can be set so that relay only falls out when there is a significant pause in the keying action. Individual users will be able to set this according to speed of their keying. In effect, this facility provides 'semi-break-in', so that when a gap occurs in the keying, the relay returns to the receive mode.

The two diodes in the emitter of Tr3 hold the emitter voltage up to about 1.4V as a safeguard against any leakage current in the transistor holding in the relay once Tr3 is switched off.

Note: The diode in parallel with the relay coil acts as a voltage spike suppressor when the electromagnetic field in the coil collapses. You may remember this effect (the 'back e.m.f.') from school physics and induction coils.

There are quite a number of diodes in Fig.1. I have designated them all as 1N914 silicon diodes but almost any silicon diode would serve in any of the diode locations in the circuit.

The relay used in the circuit may be any small type capable of reliable hold-in at 12V d.c., having two sets of changeover contacts. For the prototype I found a small printed circuit board (p.c.b.) mounting relay with a coil resistance of just over 200Ω.

The relay contacts switch the antenna between the receiver and the transmitter. The second set of contacts are used to provide 12 V on transmit and 12V on receive. These voltages may be useful in transit and receive functions.

If these 12V supplies aren't required, a relay with a single set of changeover contacts could be used. The diagram in Fig. 1 shows the relay contacts set in the receive position, that is, with the relay de-energised.

Mint Tin Prototype

I built my prototype T-R Box in one of those little hinged mint tins and provided labelled sockets for the **Antenna**, **Receiver**, **Transmitter** and **Key**. The completed box provides a useful accessory for using any QRP transmitter with an existing station receiver.

Most c.w. operators don't enjoy 'deaf keying' and like to hear their Morse as it's being sent. The easiest way to do this is to use a sidetone oscillator, using an audio oscillator that follows the keying of the transmitter. This is where the 12V keyed line can prove its usefulness as it can power a small audio oscillator in sympathy with the keying action. Almost any simple audio generator circuit would serve the purpose.

Multivibrator circuits or the common NE555 oscillator chip are frequently used for sidetone circuits but their chopped audio signals can be unpleasant to the ear. My favourite has always been the Twin-T audio oscillator with its pleasing sine-wave output.

A suitable Twin-T oscillator circuit is shown in **Fig. 2**. A quick glance at the circuit shows the derivation of the 'Twin-T' title. The resistance-capacitance phase shift networks are two complementary Ts in the circuit. The values given in Fig. 2 will produce a note with a frequency of around 700Hz.

Usually, if the changeover circuitry is built into the receiver, the output from the oscillator would be taken directly to the receiver audio stages. That could also be done in this case. However, to make the 'T-R Box' self-contained and useable with several transmitters, adding an audio amplifier is worthwhile.

Using The LM386

For my audio amplifier I used the LM386 circuit shown in **Fig. 3**. In this configuration, with no gain setting network between pins 1 and 8, the amplifier will have a basic gain of about 20.

Note: A gain of 200 can be had by connecting a 10µF capacitor between pins 1 and 8. Connecting a resistor in series with the 100uF capacitor will provide intermediate gain values. Incidentally, I rescued one of the earpieces from a broken set of in-ear headphones and this provides just enough volume to monitor the signal when connected to the amplifier.

All the circuits I've described this time were built 'ugly' style over a copper ground-plane a squeezed into the tin box. The final result is a useful little standalone unit that could be used with a whole variety of little QRP transmitters. ●

Looking at RG-62A/U

There are probably many Radio Amateurs whose delight on finding a useful looking roll of coaxial cable in a skip has been dashed when they discovered that it was RG-62A/U. This is a cable, often used in computer networking and has a characteristic impedance of 93Ω.

However, this apparently useless cable deserves further consideration, especially by those of us of a frugal nature. First, there are certain cases where it is appropriate to use a line of 93Ω impedance. Second, its r.f. characteristics are good and this may allow it to be used, with acceptable losses, at an s.w.r. of up to 3:1.

Antennas Impedance

First, let's look at antennas whose feed impedance is close to 93Ω (resistive). The first of these is a dipole about 3λ/8 wavelengths above ground.

For example, a low-v.h.f. band dipole installed by the typical urban Amateur at 10m (30-35ft) above the ground. To feed it with RG-62A/U you just make the dipole as usual and trim it for minimum s.w.r. However, you must use an s.w.r. meter that has been designed for use with 93Ω impedance coaxial cable.

Fortunately, this is very easy. Make the well-known Stockton s.w.r. meter but use 180Ω resistors instead of the 100Ω resistors that are shown in the circuit. It's not even necessary to change the short length of screened 50Ω coaxial line in the meter.

If your rig has an auto a.t.u. there should be no further problems. However, if it was designed for a 50Ω load then you will have to make a simple matching circuit, for example the L-match, to ensure that it loads up to its full power rating.

Another antenna that's suitable for direct feed with RG-62A/U is the cubical quad or delta loop. In this case the feed impedance is about 110-120Ω and as before you trim the loop for minimum s.w.r. using the correct s.w.r. meter. Again you may have to make an a.t.u. to keep the rig happy.

Feeding the G5RV

It is quite acceptable to use RG-62A/U to feed a G5RV. In fact, on 14MHz (20m) it will give an excellent match as the bottom of the stub has a resistive impedance of about 90Ω. On the other bands the s.w.r. should be quite acceptable. Remember a correctly installed G5RV should not show unity s.w.r. when fed with 50Ω coaxial on any band. (As before an a.t.u. may be necessary to keep the rig happy.)

Input Impedance

The input impedance of an electrical λ/2 of coaxial cable is exactly the same as the impedance in which it's terminated irrespective of the characteristic impedance of the cable itself. Hence, you can feed other antennas such as dipoles, with RG-62A/U by making the feeder a whole number of half wavelengths long. (The rig 'thinks' that 50Ω coaxial is being used.) Don't forget to allow for the velocity factor of the coaxial, which in the case of RG-62A/U is 0.84.

A low 3.5MHz dipole whose feed impedance is about 50Ω can be fed as shown in **Fig. 1**. In this case the s.w.r. meter is the normal 50Ω type and as usual you just trim the dipole for minimum s.w.r. The only snag is that the antenna system will

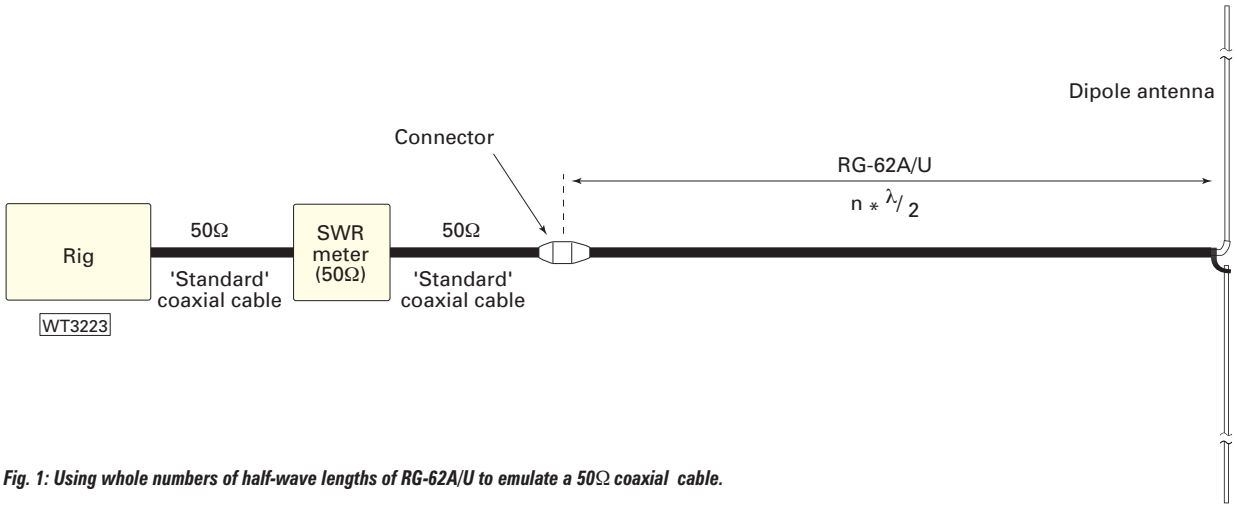


Fig. 1: Using whole numbers of half-wave lengths of RG-62A/U to emulate a 50Ω coaxial cable.

Gerald Stancey G3MCK shows that even RG-62A/U, that apparently useless coaxial cable, can have its uses.

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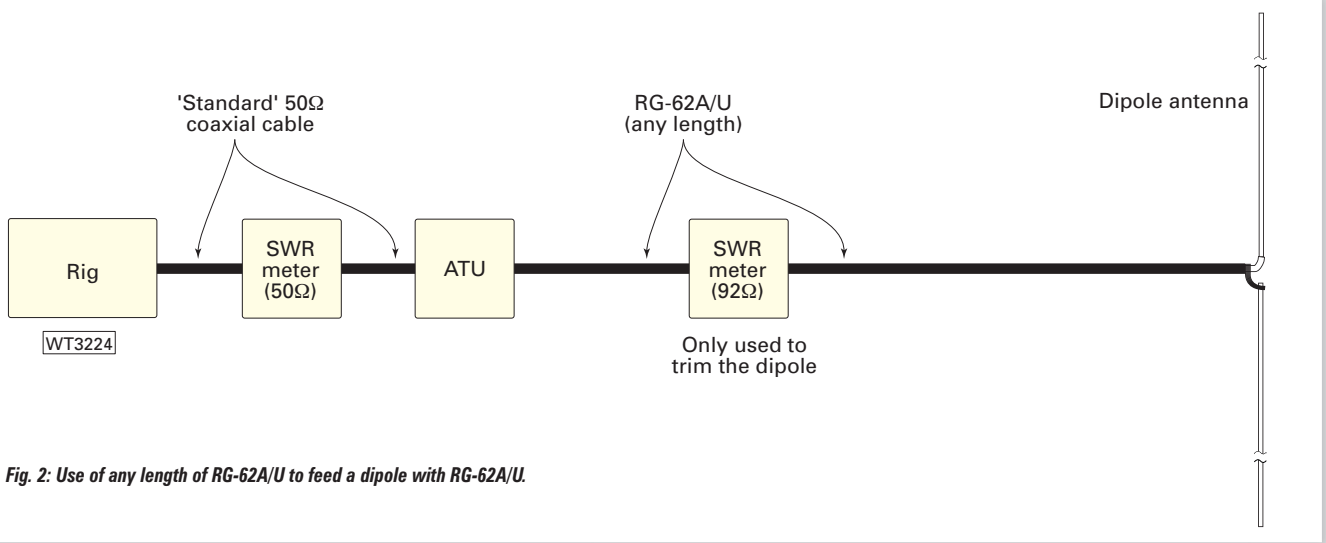

Fig. 2: Use of any length of RG-62A/U to feed a dipole with RG-62A/U.

have a narrower bandwidth than when it's fed with 50Ω feeder. This may not be a problem and it can always be overcome by using an a.t.u. at the transmitter.

If you can't be bothered to cut your RG-62A/U to an exact length then simply use an a.t.u. to keep the transmitter happy. The procedure is to trim the dipole for minimum s.w.r. using a s.w.r. meter designed for 93Ω line, then couple the rig to the line through a matching unit, as shown in **Fig. 2**. The a.t.u. must be adjusted so that there is unity s.w.r. on the 50Ω line between the rig and the a.t.u.

Those who fear that using RG-62A/U in this manner will incur horrendous losses can take comfort from the following calculation. Assume that we are feeding an 3.5MHz (80m) dipole through 30m of RG-62A/U with an s.w.r. of 2:1. Tables show that the loss of the line when matched will be about 0.6dB and that the extra loss due to the s.w.r. is 0.05dB. This gives total line loss of 0.65dB, which compares favourable with the loss of 0.85dB that would be incurred by using 30m of RG-58A.

Useful & Cost Effective

So, to summarise, RG-62A/U cable makes a useful and cost effective feeder for Amateur Radio installations. It's often available in long lengths from buildings that are being refurbished, often for the price of a pint. I hope this article has encouraged you to keep a lookout for unusual items that often have a practical use to the Radio Amateur. You just have to think sideways! ●

Valve & Vintage

Ben Nock G4BXD seems very happy as he takes over the vintage 'shop' this month. And, as usual he's been adding to the 'Kidderminster Kollection'!

Fig. 1: The Ukw E.e receiver (top) with 10WS.h below, now operating on 28MHz.

A big 'hello' to you all once again as I take my turn at manning the Valve & Vintage shop. It's been an interesting few weeks, quite a few new items have been obtained since we last met, so let's press on.

The Famous 19 Set

I would think every reader of this column knows the Wireless Set No19, it's a part of Amateur Radio history now. I think it likely that nearly everyone has seen or had one at some time or other and more of them are being revitalised to be put back on the air, both in c.w. and amplitude modulation (a.m.) 'phone working.

As famous as the '19 Set is, little is known of the German equivalent of the time. The German Tiger and Panzer tanks used low-band v.h.f. in place of the short wave frequencies used in the WS19, excluding the infamous B set of course. A main set used in the German tanks was the Ukw.E.e and 10W sender equipment, **Fig. 1**.

The receiver, Ukw.E.e, or Ultrakurzewelle Empfanger model for ultra short wave. Receiver model 'e', is a 7-valved superheterodyne set tuning 27.2 to 33.3MHz receiving a.m. only, as there's no beat frequency oscillator (b.f.o.) facility. The set was powered from a rotary generator, model E.U.a, which supplied the 130V high tension (h.t.) needed along with 12V for the heaters. High impedance headphones were used and the tank's antenna consisted of a two metre long whip.

There's also a model Ukw.E.h., which tunes from 23 to 24.95MHz but is otherwise identical to the model 'e'. Both models use seven valves of type RV12P4000. These are the types with the valve pins on the side of the base rather than the bottom and because of this they are a very snug fit when inserted in their holders.

The matching transmitter was designated 10W S.c or 10W S.h, or 10W sender model 'c' or 'h'. This is a three-valved transmitter, using two type RL12P35 as oscillator and power amplifier and a RV12P4000 as the modulator. The set can produce around 6 to 10W of either a.m. or modulated c.w. This too was powered from a rotary generator, producing 400V for the transmitter h.t. and again 12V for the heaters.

The lead tank in the group would have had two receivers fitted and a single transmitter in a small rack arrangement, (pictures can be found on the Internet). Unlike the WS19 arrangement, there is no provision for an intercom facility or indeed for anyone other than the radio operator to actually control the equipment.

However, like the WS19 there is provision for two pre-set frequencies to be selected by using click-stop screws. I have had a couple of the model 'c' receivers for some time but I recently obtained a model 'h' transmitter. Obviously, they tuned slightly different frequencies so I decided to modify the transmitter to match the receivers. This was a very simple task and involved removing three tuning coils, altering the tapping point and reinstalling them. The transmitter now covers the 28MHz Amateur band and once the band opens I shall be trying it out.

Fig. 2: The Torn E.b receiver, the charts in the two windows change as the band switch is rotated.

Fig. 3: The Russian DF receiver, the direction bearings are indicated by the large left hand dial.

Fig. 4: The SEM 35 v.h.f. man-pack set, with the mechanical digital frequency display in the centre.

More German Hardware

Another recent German addition was another receiver, the Torn. E.b., or Tornister Empfanger model 'b'. The set, **Fig. 2**, is actually a tuned radio frequency (t.r.f.) type using four valves, type RV2P800, these being a 2V heater pentodes. The set was portable being powered from batteries, a 2V cell for the heaters and a 90V h.t. battery pack supplying the 12mA of current needed. Additional power packs allowed operation from a 2V battery with h.t. via a vibrator or a similar pack running from a 12V supply.

The receiver tunes 100kHz to 6.970MHz in eight ranges using a large turret tuner. The set has two stages of radio frequency (r.f.) amplification, a regenerative detector and an audio amplifier stage capable of driving two headsets.

A tone filter is provided and this helps when receiving Morse transmissions. Despite the simplicity of the set, it performs very well indeed, even Morse and s.s.b. signals are easily resolved.

Russian Direction Finder

Another recent addition to the collection is a very heavy Russian direction finding (DF) set, called the SRP-5. This DF set tunes 186 to 750kHz in two bands. The mains powered set, **Fig. 3**, though clearly labelled as 'Made in USSR' has all the controls labelled in English.

Connections on the side, enable the loop antennas along with electrical connections to the rotating coils within the DF system, which would then connect with the large rotating dial on the set. As the operator rotated the 0 to 360° dial the phasing inside the DF loop would rotate and the received signal strength could be watched on the front panel meter.

Luckily, it's also possible to connect a standard antenna to a front panel socket allowing the set to function as a straight receiver, In this role it receives Radio 4 on 198kHz long wave and Radio 5 Live at the bottom end of the medium wave with no trouble. A suitable loop could be easily constructed, should I ever find the time to do so!

Ben Nock G4BXD
62 Cobden Street
Kidderminster
Worcestershire DY11 6RP
E-mail: military1944@aol.com

Military VHF

The next set is fairly modern, by real vintage terms and is yet another recent addition to the already groaning shelves here! It's the SEM 35, **Fig. 4**, a man-pack transceiver tuning 26 to 69.95MHz in 50kHz steps.

Made in West Germany by Standard Elektrik Lorrenz AG of Stuttgart the SEM 35 is a 1W frequency modulated (f.m.) set running off an internal 12V D-cell pack or an external 24V supply. An internal inverter produces supplies of +6V, +1.6V, -17V and -30V d.c. for various stages in the set.

Two whip antennas are provided: a 2.5m long sectional whip for the lower frequencies and a 1m tape type, similar to the metal tape measures, for the higher frequencies or rapid movement. Slightly different base arrangements even activate a small switch in the antenna base on the set, which then automatically detects which whip is fitted and tunes accordingly!

Despite the innovation mentioned the design of the set is rather poor considering it's a portable battery set. An inefficient inverter and numerous relays in the set all consume more battery power than is desirable. It's also exceedingly heavy for a 1W unit. Obviously, the set was designed to withstand battle and heavy usage by troops but it's a very heavy load – some 13kg – to carry on the back. Although the 50kHz steps are somewhat limiting I hope to use the set in portable operations during the summer months.

Well that's about it for this stint at the V&V shop. I hope you have enjoyed the selection I have shared with you and I hope it has whetted your appetite for things old and valved. As always, I can be contacted direct at **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP** or via E-mail at **military1944@aol.com or** even Skype now at **Militarywirelessmuseum**.

Cheerio for now!

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A Dream Come True

what would we do with a rich uncle?

One of my oft-practised leisure occupations is to imagine I have been given £10,000 by a rich, indulgent uncle, with strict instructions that it is only to be spent on Amateur Radio gear. Also, in order to avoid confrontation or embarrassment with my XYL the said uncle will pre-inform her that owing to sudden surge of interest on his part, he is asking his nephew to get some new gear so that he doesn't do the wrong thing himself!

I should say immediately, that this rich indulgent uncle is somewhat behind in his knowledge in current Amateur Radio prices and in future perhaps, I will index link my fantasies accordingly. So, let's say that the figure he lays on me is comparable with the prices of the day and should be enough to buy some of the best gear available but not anywhere near enough to get the most expensive.

I've gone into the price situation with some detail because I know that there are a few critical Amateur friends who, after reading this article, will tackle me rather robustly about it. And if they, for instance think I could have purchased 'so and so' if I'd have had a few extra quid they would certainly complain bitterly. Naturally, I wouldn't like to miss out on a nice rig either.

Low Profile Centenarian

Although it's many years since I met this rich uncle of mine, I know he keeps a very low profile and nowadays must be well over 100 because I'm getting on a bit! Anyway, here I am, all set up with this handsome but not over-generous cheque made out to me – what should I buy?

Well, do you know, my first reaction to having the money and the possibility of the rig is, "This is all very well but what if anything goes wrong during the guarantee term? Are you going to like motoring a few hundred miles to get the dealer to fix it?"

I should point out that I live a long way from the nearest dealer and a hell of a long way from most of the others. I don't like motoring long distances (down to the village for pipe tobacco is far enough!) as it leaves me wan in life and limb. I have tried /M but by the time you have got through the Welsh mountains and into the broad plains of England you are practically as far as you have to go and I'm, too tired to mount the microphone on the stem of my pipe anyway.

In the old days, when you bought a piece of gear from a shop, although it cost a bomb (and was probably second-hand) you seldom thought of taking it back when it went wrong. But nowadays things are very different, when modern gear goes wrong using the old troubleshooting techniques are about as effective as assaulting Caernarfon Castle with a peashooter. And that's if you can see what the miniscule components are!

So, most Amateurs get their faulty rigs back to the dealer without shame, particularly if it's still under guarantee. However, this is not very acceptable to an old codger like myself who doesn't like motoring or finding a suitable crate and then paying high prices for the gear to be transported.

But wait a minute – what am I worrying about? If I carry on moaning about possible problems, at this rate my uncle's cheque is in danger of dying on the vine!

If someone comes along and almost throws the money at me and says it **must** be spent on Amateur gear then what can I do? Of course, I realise I must stimulate employment – at least even if it is only in the distributive trades.

So, I return to the *PW* adverts and look over the current goods. Heavens above! All those little push buttons, knobs and lamps, hugely pricey 12V power supplies. Where have things gone, folks?

Mind On The Job

Eventually, I force my mind back on the job of deciding on a nice piece that will fill the bill and leave no change. But everything I choose is gradually shot full of snag holes and usually I fall asleep before I come to pass the cheque over to the dealer.

That's the situation even today – I have never yet come to making a final decision and think that (perhaps?) some grand operator out there is trying to tell me something. Maybe he's trying to say that I should not be happy with a modern button covered, tightly packed, digitally flickering, low voltage humming but can't stick 'any bit of wire into it' rig. Thinking about it I know he's right. I used to shudder when my KW Vanguard went wrong!

●

John Worthington G3COI shares an ambition many of us would like, a rich uncle, to have helped us into the radio hobby. Just imagine the possibilities if you could have asked for any rig you would have fancied! Written when he was still exiled in remote North Wales, John examines the possibilities and the problems of a dream come true.

VHF DXer

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David Butler G4ASR has reports of recent propagation openings and also takes a look back at notable achievements during the 1960s.

February was a fairly quiet month for propagation openings. Auroral backscatter events were reported on February 5, 13 and 27. All were very weak with only the reception of beacons on the 50MHz band being reported. These included GB3LER (Shetland Islands 50.064MHz), OY6BEC (Faroe Islands 50.035MHz) and TF3SIX (Iceland 50.057MHz).

The event on February 13 also made it to the 144MHz band with a contact being made from the station of GM4VVX (IO78) to LA8NK in Norway. A transitory 50MHz Sporadic-E opening was reported on February 8 to Italy around 2100UTC but very few stations appeared to be active at this time.

An excellent lift in tropospheric propagation was reported on February 4 that provided some welcome DX on the 144 and 430MHz bands. The opening started early on Sunday morning with reception of beacon stations DM0PR (Germany JO44) on 144.485MHz, OZ7IGY (Denmark JO55) 144.471MHz and SK6VHF (Sweden JO57) on 144.447MHz. By 1000UTC the propagation was centred on Denmark and northern Germany with 144MHz operators in central England contacting OZ1BNN (JO55), OZ1CLL (JO65), OZ4VW (JO44), OZ8FR (JO53) and German stations in locator squares as far to the east as JO50, JO51, JO52, JO53, JO54, JO60, JO61 and JO62. As the day continued the opening moved even further to the east and by 1400UTC a number of UK stations were reporting s.s.b. QSOs with stations in the Czech Republic (OK) and Poland (SP). Contacts up to 1300km away included the stations of OK1FD (JO60), OK1TEH (JO70), SP1O (JO73), SP2JYR (JO92) and SP6VGJ (JO81). The tropo lift stayed in for much of the day, before finally fading out early in the evening.

Station Activity

Robbie Phelan EI2IP is a new v.h.f. station who is now active from the South Coast of Ireland. Located 3km inland from Whiting Bay, the QTH (IO61) is located 90m above sea level. This is Robbie's first year of operating from there so he is looking forward to the challenge of activating such a rare square.

Using a Yaesu FT-847 transceiver, Robbie is active on the 28, 50 (3-element DK7ZB Yagi), 70 (5-element DK7ZB Yagi), 144 (10-element DK7ZB Yagi) and 430MHz (19-element Yagi) bands. He is QRV with c.w. and s.s.b. and also frequency shift keying (f.s.k.) modes JT6M and FSK441. Currently, Robbie is quite busy with getting a new house in order but he has already caused quite a stir on the v.h.f. bands.

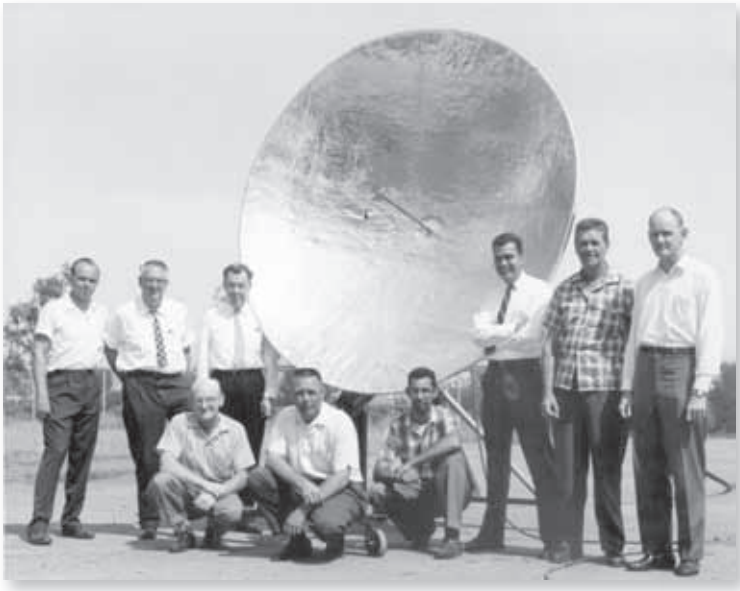

Fig. 1: Eimac Radio Club 1.3GHz Moonbounce Antenna.

Ian Hogan G6TGO (Manchester IO83) reports that he has had to relocate his 144MHz antenna due to a planning issue. The 9-element Vargarda Yagi is now mounted on a tilt-over mast at gutter height 7m above ground level.

In January, Ian conducted some tests to see how the 4.5m long Yagi would perform at such a low level. Early indications seemed to show that he had a reasonable performance 20° either side of North and South beam headings with stations being worked in Scotland and southern England.

Propagation in February started very well with the EI2WRB beacon (Waterford IO62) being heard at 569 over the 353km path. Ian found it interesting that the 50W beacon, beaming almost due East from southern Ireland, was audible at his QTH despite having to beam through the Snowdonia mountain range in Wales.

Note: I must put on record that mountains can actually aid propagation by refracting or reflecting v.h.f. signals. Even though there will be a shadow zone immediately behind the obstacle, the v.h.f. signal will diffract around or over the obstacle and start to fill the void. It is found that diffraction is more pronounced when a mountain ridge is sharp and more like a 'knife edge'. A more rounded hill will not produce such a marked effect.

Ron Price GW4EVX mentions that during a low power 430MHz contest he also experienced an interesting propagation anomaly. He was operating portable in northeast Wales (IO83) when a very weak station called him. It turned out to be GW4DGU (Carmarthenshire IO71) but when Ron turned the beam in the correct direction of 200° the signal completely disappeared. However, by moving the antenna to 290° the signal strength improved and the contest information was exchanged.

Ron can only assume that the contact was made via a reflection from one of the mountains in Snowdonia. This assumption is probably correct and it's a technique often used by v.h.f. stations with a poor take-off in a particular direction.

A variety of objects can be used for reflecting radio signals, ranging in size from buildings to mountains. Experiments have shown that signals will be better if the reflector is near one or the other station. A reflector also tends to become more effective when its surface looks large and

flat compared to the wavelength. A mountain range can often provide a suitable, although lossy, reflector for u.h.f. transmissions and can help get signals out from very difficult locations.

Signals reflected from rough objects tend to be weak because of the poor reflecting surface but are generally constant. The polarisation of the signal is likely to change on reflection from an oblique surface, although the use of circular polarisation may compensate for this.

Fig. 2: Arecibo Radio Telescope Antenna.

Microwave Reflectors

Stations active on the 10GHz band know that buildings and other large objects such as water towers or grain silos make very effective reflectors. At these frequencies heavy rain or snow showers also make a good reflectors. Interestingly, it is not essential to have a highly elevated location for working rain scatter, as is often the case with v.h.f. tropospheric contacts.

High altitude will give a very small enhancement in the achievable distance. Rain clouds exist up to a maximum height of around 10km and it is essential to have a clear view of the horizon if you want to achieve contacts of around 600-800km. Elevation can be very useful in rain scatter openings and for medium distances of around 300-500km it can mean a difference of 10-20dB in signal strength.

Due to the random orientation of wind speeds in rain clouds the reflected signals are subject to Doppler distortion that makes the signal sound like white noise. The degree of Doppler shift on the 10GHz band is very similar to that experienced during Aurora on the 144MHz band. The distortion makes it difficult to understand s.s.b. signals, especially when using side scatter and it is common to use c.w. when making rain scatter contacts on the microwave bands.

Deadlines

That's it for this month. If you have any news, reports or anything of interest regarding the 75 years anniversary of *Practical Wireless* please send me the information to the address given at the head of the page before the last Saturday of each month.

73, David G4ASR

75 Years Celebration - The 1960s

Every month during 2007 I'm celebrating the 75 years of *Practical Wireless* by looking at recollections or notable achievements and this time around I'm looking at the period between 1960-1969.

Class B Licence

On 1 June 1964 the Post Office introduced the Amateur (Sound) Licence B. It needed a Radio Amateur Examination (RAE) certificate but there was no requirement to sit the 12 w.p.m. Morse test. Class B 'codeless' licensees were restricted initially to the 430MHz band and higher frequencies.

At the same time in June 1964 new schedules were also issued for the Amateur (Sound) Licence A, the Amateur (Sound Mobile) Licence and the Amateur (Television) Licence. Yes - you needed additional licences for mobile operation or for transmitting television! Nearly 25 years later, in 1987 the Class B licence was extended to all bands above 30MHz, allowing access to the 70 and 144MHz bands.

First Moonbounce QSOs

On 17 July 1960, the Rhododendron Swamp v.h.f. Society (Massachusetts, USA) succeeded in making the first Moonbounce contact on the 1296MHz band. This record was established by a team of Amateurs from the club station W1BU, spearheaded by Sam Harris W1FZJ and the Eimac Radio Club (California) W6AY led by Hank Brown W6HB. Both stations used 1kW surplus klystrons and dish antennas (shown in **Fig. 1**), not typical Amateur Radio equipment at that time.

The first ever 144MHz Moonbounce QSO was made on 11April 1964 between the stations of W6DNG and OH1NL. The first ever 430MHz Moonbounce contact was established a few weeks later on 20 May 1964 between the stations of W1BU and KH6UK.

The Arecibo radio telescope (shown in **Fig. 2)** is currently the largest single-dish telescope in the World. First opened in 1963, this 305m (1000ft) spherical reflector antenna resides in a natural valley of Puerto Rico. The Arecibo telescope has been used for many astronomical research projects including studies of pulsars and mapping molecular gas in the Galaxy and the Universe.

As the Arecibo dish can also be used to send radio waves it has bounced and recorded radiation off planets in our Solar System and has even broadcast messages to areas of the Galaxy that might contain intelligent extra-terrestrial life. On the weekends of 3 July and 24 July 1965, the radio telescope was activated on the 430MHz band. About 500W of r.f. was fed to the 305m antenna making it one of the loudest Moonbounce stations of the decade. Both c.w. and s.s.b. operations were made from the station of KP4BPZ with many Radio Amateurs making their first e.m.e. contacts.

Orbital Satellites

On 12 December 1961, the first Orbital Satellite Carrying Amateur Radio (*OSCAR-1*) was launched into orbit, barely four years after Russia's first Sputnik. That date was very important, as it was the 60th anniversary of the first radio transmission across the Atlantic Ocean. Guglielmo Marconi had completed his famous transmission and reception of Morse code from England to Newfoundland on 12 December 1901.

OSCAR-1 used a 140mW transmitter transmitting 'Hi Hi' in Morse code, the speed of the message being proportional to the temperature inside the satellite. Operational for 22 days, the beacon on 144.983MHz was received by hundreds of Amateur Radio stations all around the Globe. Six month's later, on June 2 1962, *OSCAR-2* was launched into a 240 mile high orbit.

The transmitter power was reduced to 100mW to make the battery last longer but it only operated for 19 days before falling back into the atmosphere. The first ever active telecommunications satellite with free access to all, *OSCAR-3*, was launched to a 590 mile-high orbit on 9 March 1965. It was the first *OSCAR* to have a two-way signal-repeating transponder making it a v.h.f. radio-relay station in the sky.

To mark the 4th anniversary of *OSCAR-1* a fourth Amateur satellite was launched into orbit on 21 December 1965. *OSCAR-4* was the first satellite to be powered fully by solar cells generating electricity. It was also the first *OSCAR* to use two bands, receiving signals on the 144MHz band and re-transmitting with 3W of power on the 430MHz band.

Share your news, views and reports with fellow readers. Reports to Carl by the 15th of each month please.

HF Highlights

Carl GW0VSW has plenty to report on this month, despite band conditions not faring well.

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As usual, there's plenty to get through this month and I begin with news from the **Danish IT and Telecom Agency**, which has just opened up the possibility for Amateurs in Denmark to apply for a new block of prefixes. They should have been issued by the time you read this so do not be caught unawares if you hear on the bands the following new prefixes OU, OV, 5P and 5Q from Denmark, XP from Greenland and OW from the Faroe Islands.

DX News

On to this month's DX news, beginning with **Hrane Milosevic YT1AD** and other operators from the N8S team who will be active as **5W5AA** from Samoa OC-097 between the 20 and 24th April on most h.f. bands. The Independent State of Samoa comprises of a group of islands in the South Pacific Ocean. The entire group was known as Navigators Islands before the 20th Century because of the Samoan's excellent seafaring skills. The QSL route is via **Stevan Stepanov YZ7AA, Temerinska 22, 21000 Novi Sad, Serbia**.

In South Korea, **Rocky Han HL1VAU**, **Ryou Seung-Min DS4NYE** and **Sang-Kwen Han DS2GOO** will be active from Sonyu Island AS-148, part of the Cholla-bukto Province group made up of about 20 small islands, from the 1-4th March. They will operate on 7-28MHz using c.w., s.s.b., RTTY and PSK31 as homecall/4 and will participate in the ARRL DX SSB Contest **(www.arrl.org/contests/rules/2007/intldx.html)** over the weekend of 3rd/4th March as **D70LW/4,** possibly as a Single Operator Single Band 14MHz entry. You can QSL HL1VAU/4, DS4NYE/4 and DS2GOO/4 via their home calls and D70LW/4 via DS4NYE.

Peter Bruker HA3AUI is back in Africa and will be active as either **6W2SC** from Senegal or **J5UAP** from Guinea-Bissau until about the 30 April, possibly longer. Peter plans to operate digital modes with some s.s.b. on all h.f. bands. All QSLs via HA3AUI direct to **PO Box 15, Zamardi H-8621, Hungary** or via the bureau. Logs will be uploaded to logbook of the World (LOTW) when time allows.

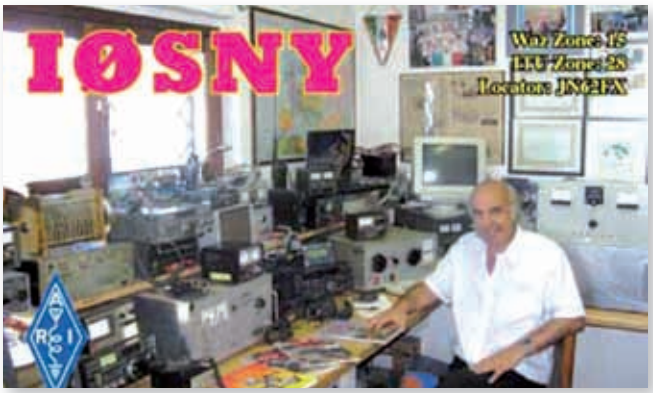
Micronesia is an island group in the North Pacific Ocean, about three-quarters of the way between Hawaii and Indonesia. From the 2 and 19th April Ferdinando Rubino IT9YRE (**V63RE**), Claudio Scaglia I1SNW (**V63WN**) and Mike McGirr K9AJ (**V63J**) will be active from Micronesia with plans to operate s.s.b. and c.w. from Ngulu Atoll OC-180 for 36 hours, from Sorol Atoll OC-277 for three days and from Woleai Atoll OC-132 for another three days. All QSLs will be via their home calls and a DXpedition website can be found at **www.mdxc.org/v63**, which has been dedicated to the memory of the late **Gianni Rizzi I7RIZ**.

In Hanoi, Vietnam **Rolf Salme SM5MX** has just revived his old callsign and will be operating as **XV9SW** until 30 April. He will operate c.w. on 14 and 21MHz depending on the 'downtown smog', which he has said is "worse than ever" so operation is just "bearable every now and then". The QSL route is via Rolf's homecall and cards will be answered on his return to Sweden in August.

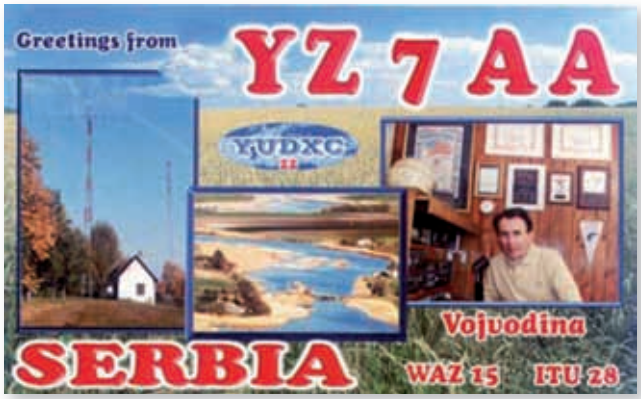
Finally, to Mongolia where operators **Nicola Sanna I0SNY**, **Giampiero Nocentini I5NOC** and **Pino Zamboli I8YGZ** will be active until the 3 May as **JT1Y** from Ulanbaatar and will also be visiting call areas 8, 9 and 0 along with members of the **JT1KAA Radio Club.** You can expect the team to be operating on all h.f. bands from 1.8 to 28MHz using c.w., s.s.b., RTTY and PSK31 so you should have a good chance to work then on at least one band! You can QSL via **I0SNY** at **Via Bartolomeo Grazioli, 26 06132 - S. Sisto (Perugia), Italy**.

Update on 3B7C

Two members of the **Five Star DXers Association** (FSDXA) recently visited Mauritius to set up the logistics for the operation from St. Brandon in September. All the necessary permits and licences are now in hand and a suitable ship has been located to take the team members and around six tons of equipment to the island. This will definitely be the DXpedition of the year!



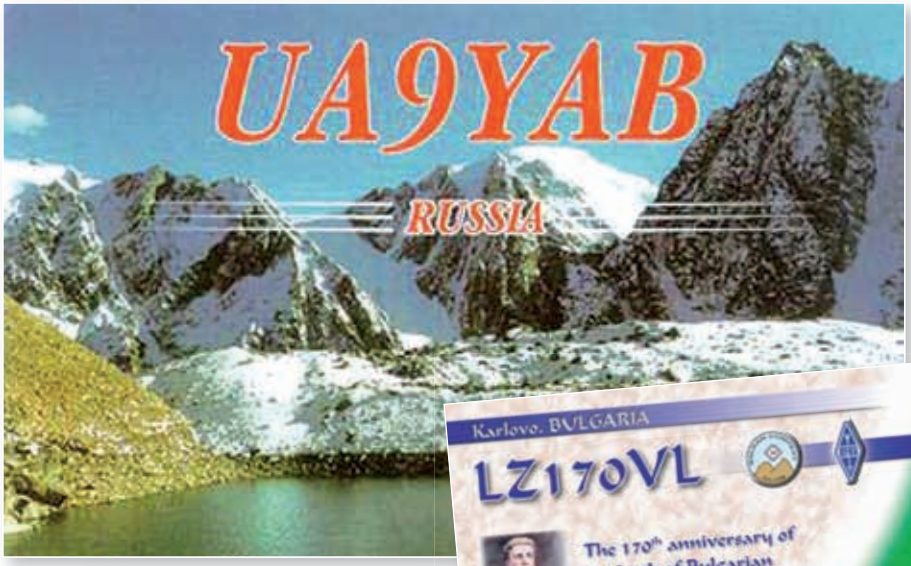
Nicola Sanna I0SNY one of the operators of JT1Y from Ulanbaatar, Mongolia.



Stephen Stepanov YZ7AA QSL manager for 5W5AA.

Information on QSLs

Those who still need a QSL card from the following stations: EN5J, EO10J, EO50JS, EO55JM, EO56JM, EO57JM, EO58JM, EO59JM, EO5JM, EO60JM, RT2J/UB4JWA, RT6J/UB3JWW, UR8J, UT1J/UB5JIM, UT2J/UB5JMR, UT7J/UB4JIW, UU100JWA, UU4JWA, UU5A, UU5J and UU5JYL can contact **Rustam UU2JQ** at **uu2jq@aport.ru** to request a card. In Namibia, **Frank Steinhauser V51AS** now has set up a more reliable QSL route. He is not a QSL manager as such and cards may take a little longer to process. Cards can be



Alex Vedernikov UA9YAB was heard by Leighton GW0LBI on 3.5MHz c.w.

sent to **Steinhauser, Schlobstrasse, 68A, 82140 Olching, Germany**.

Your Reports

I begin your reports with 1.8MHz again and the log of **Ted Trowell G2HKU** on the Isle of Sheppy in Kent who reports 'mediocre conditions' on most bands. Top Band QSOs on the key included OY3QN (Faroe Islands) EU-018 and 9H1XT (Malta) EU-023 around 2100UTC using a Ten-Tec Omni V and 100W to a Butternut vertical.

In Trelewis, Mid-Glamorgan **Leighton Smart GW0LBI** said "I had a QSO on 1.946MHz with Geoff Powell M1EDF, one of your regular reporters the other evening. He E-mailed me a while back about his dipole, which wasn't performing well on 1.8MHz (he had to use 400W just to work ON, Belgium) so, I sent him a diagram of the Inverted L that I use here and another of the earth system. I am please to say Geoff has now tried the antenna and is working all over the place with just 50W. It was nice to have a natter with a fellow contributor and, of course, it was good to help, although I'm no expert on top band antennas, believe me".

It's always nice to hear of readers helping each other and I am sure Leighton would be very please to pass on details of the antenna to anyone else who wishes to be active on Top Band. This month, he decided to listen rather than operate and his 3.5MHz log included c.w. stations 9V1YC (Singapore), EY8MM (Tajikistan), ZB2FK (Gibraltar), UA9YAB (Asiatic Russia), VE9VIC (Canada), RN6BY (European Russia), K0RK (USA) David in Bradenton, Florida and CT3AS (Madeira Island) AF-014 and on s.s.b. HL3IUA (South Korea), 8P6FU (Barbados) NA-021, EA9IE (Ceuta & Melilla) and EA8AK (Canary Islands) AF-004 between 2100 and 0030UTC using a Trio R-600 and his inverted L antenna.

The special event station, LZ170VL was worked by Martin 2E0MCA on 14MHz.

The 7 & 14MHz Bands

In East Finchley, North London **Martin Addison 2E0MCA** used a Yaesu FT-840 and 10W s.s.b. to a folded half-size G5RV antenna and lists s.s.b. QSOs on 7MHz with I2YYO (Italy) 0703, DJ3HJ (Germany) 0747 and OZ0MF (Denmark) at Tondern Naval Base (MF-960) at 0920.

Also on the band, was Ted G2HKU who worked c.w. calls VU2PHD (India), 7X4AN (Algeria) and WK2G (USA) Merrill in Dade City, Florida around 2130UTC. Moving on to 14MHz, Martin 2E0MCA logged EW1MM (Belarus) 0900, IZ4EFP/P (Italy) 1027, CN8NK (Morocco) 1033, 3V8SS (Tunisia) 1206, LZ170VL (Bulgaria) at 1310. This special callsign is dedicated to the 170th anniversary of Vasil Levski EW8MM (Belarus) 1312, SV2KGA (Greece) 1355, OK1DO (Czech Republic) 1505, T94CT (Bosnia & Herzegovina) 1612 and WB1GQR (USA), which is the callsign for **Vermont Contest Radio**, an organisation devoted to contest operating located in the Burlington area of Vermont at 1621UTC.

The log of **Owen Williams G0PHY** in Biggleswade, Bedfordshire included s.s.b. stations XT2C (Burkina Faso) at 1317 and 3DA0TM (Swaziland) at 1602UTC using his Yaesu FT-747 with 100W to a dipole.

The next report is from the log of **Martyn Medcalf M3VAM** in Chelmsford, Essex who worked s.s.b. stations YL2PQ (Latvia) 1309, TF8GX (Iceland) EU-021 at 1331, HA503FIN (Hungary) at 1418 QSL via IK3QAR and YO0QT (Romania) at 1431UTC using an Icom IC-746 at 10W to a long wire antenna with SGC-237 auto tuner.

On now to **Jim Pedley GM7TUD** in Dumfries who used a Kenwood TS-450S, TGM MQ4 beam and 100W to find DS4DRE/4 (South Korea) at 0909, J20MM (Djibouti) AF-053 at 0913, VU7MY (Lakshadweep Island) AS-011 at 1054 and 8R1AK/P (Guyana) SA-068 at 1159UTC.

The 18 & 21MHz Bands

The 18MHz band provided some activity for **Eric Masters G0KRT** in Worcester Park, Surrey. Using s.s.b., Eric worked RU9VA (Asiatic Russia) 0918, KG9G (USA) Edward in Lake Wales, Florida at 1541 and a c.w. QSO with 3B8CF (Mauritius) AF-049 at 1427UTC using a Kenwood TS-570DG with SGC-230 tuner and 100W to a W3EDP antenna.

Jim GM7TUD worked VU7RG (Lakshadweep Island) at 0917 and D60VB (Comoros) AF-007 at 1447 while on 21MHz he logged VU7MY 1244, J20MM 1458 and XR7C (Chile) 1405UTC.

Signing Off

Well that is it for another month and the bands have once again been in poor shape. There are a good number of DXpeditions and Island operations coming up over the next few months so. lets hope that all the bands improve soon. As usual, my thanks go to all our reporters and to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* for the DX information. Until next time, have a good DX-filled month.

73, Carl GW0VSW

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1960 - Amateur h.f. equipment design was rapidly changing and the introduction of 'solid state' equipment increased the choice for operators, many of whom now wanted s.s.b. instead of a.m. on their transceivers.
1961 - On 12 December the first Amateur satellite, *Oscar 1*, was launched into orbit.
1962 - Some members of the ITU decided to set up a radio club on the fifth floor of the first International Telecommunications Union building, which had been built the year before in Geneva, Switzerland. The station 4U1ITU began operating at 1200UTC on 10 June and still operates today on all Amateur bands using all modes.
1963 - In the USA CBers outnumbered the 250,000 Radio Amateurs licensed at the time!
1969 – The first two-way Amateur television contact between the US and Europe was achieved

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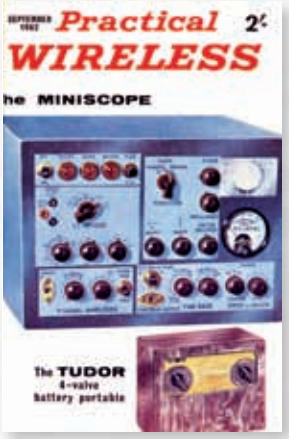
Introduction

Rob Mannion G3XFD is really enjoying his job selecting articles from *PW*'s history for this section of the magazine. This month, Rob has selected a project that was of great interest to him in 1962, together with a portable receiver design that typifies the constructional projects published in *PW* before Amateur Radio became the core subject.

During the 50 or so years I've been involved with *PW* – as a junior reader, s.w.l., licensed Amateur, author and eventually Editor – there have been occasions where I have been really keen to build a project. Indeed, some of the projects almost became obsessions. Some of the projects – including the F. G. Rayer G3OGR 'Top Band Transceiver' project from the early 1970s never got off the ground, apart from the preparatory work on a chassis.

However, the Miniscope - a project by Martin Michaelis and originally published in the September 1962 issue - came to mean a very great deal to me. Due to traumatic personal circumstance the magazine went with me from a civilian hospital to a Royal Navy hospital and back again to the Burns Units at Odstock Hospital in Salisbury, Wiltshire. Wherever I went – my September 1962 copy went with me!



Eventually, the issue became very dog-eared but I had the time to find a suitable cathode ray tube (c.r.t.) and other items. The years passed and it wasn't until 1974/75 that I actually built a Miniscope myself. It was a superb little instrument and Martin Michaelis really had to be congratulated for his project.

My chance to speak to him first came when he telephoned the *PW* offices from his home in Germany not so long after I had become Editor. Perhaps Martin had a good memory because I had sent him a letter via the *PW* offices many years before. Some years later, I had the chance of meeting Martin at the Friedrichshafen Amateur Radio 'Hamfest' alongside Lake Constance (Bodensee). I was proud at last to have met the man who had spent so much time and effort developing such a wonderfully useful instrument.

Did you ever build a Miniscope? If you did, we would very much like to hear from you. Perhaps you still use the project yourself? Or did you modify the circuitry to suit your own needs? Please write in and share your own story.

What happened to my Miniscope? Well, I'm sorry to say that I swapped it for a very basic oscilloscope with some test equipment accessories. Hopefully, someone, somewhere is still using my Miniscope and enjoying it as much as I did.

The TRF5 Portable

The TRF5 Portable receiver project by R. F. Graham (can anyone tell me anything about this author?) was quite unremarkable. Indeed, the project and the methods used in the circuitry were typical of many transistorised designs published in *PW*. At this point. however, I must admit I never even tried to build this project. Why? The answer is very simple indeed – I always had the greatest difficulty with any transistorised receiver project that used any form of reflexing!

Reflexing, the technique where a circuit re-amplified audio frequencies (a.f.) and radio frequencies (r.f.) in the same active devices requires great skill from the designer. It takes equal skill from the constructor as far as I'm concerned because I have never been able to successfully complete a reflexed receiver project!

In my early days with radio I had much success with regenerative detectors and it could be argued that 'regeneration' is a form of reflexing. But despite this and many really excellently performing tuned radio frequency (t.r.f.) receivers using regenerative detectors.) – anything using the a.f. and r.f. reflexing and anything like Mr. Graham's ideas caused many hours fault finding on my workbench!

Perhaps my circuits became unstable? This is entirely possible because of the gain that can be achieved. In the defence of the (once extremely popular) reflexed receiver I should say how embarrassed I was when I discovered that my early ZN414 'one chip' receivers didn't work at first because they 'took off' (oscillated) at r.f. due to poor construction techniques by G3XFD. I was very red in the face when I realised that by placing input and output connections too close, the huge gain (around 70dB) from the ZN414 caused the problems.

I learned much by building ZN414-based receivers and went on to use them a great deal for teaching purposes. On the other hand I was never able to make a successful reflexed receiver! Perhaps I needed the help of the late **Sir Douglas Hall** (BA, Oxon was always used in the introduction) the famous reflex receiver designer who wrote for *Short Wave Magazine* and *Radio Constructor* magazines. Perhaps readers who have been successful might like to tell me of their good results – I might learn something!

Rob Mannion G3XFD

1960 – 1969

The Miniscope
September 1962
Author M. L. Michaelis describes the construction of a compact test-set combining the functions of several separate units of conventional construction, and enabling a multitude of qualitative and quantitative measurements to be performed on wireless and amplifier circuits.

Looking Back
1970-1979
Snippets from the *Practical Wireless* archives.

The TRF5 Pocket Portable
May 1968
This project by R. F Graham was chosen for inclusion because it typifies the simple receiver projects that formed the backbone of *PW* before it concentrated on Amateur Radio. The t.r.f. type of receiver avoids the more complicated circuits and alignment difficulties of the superhet, yet will normally give good loudspeaker volume plus a reasonable selection of stations.

Round the world of Wireless
April 1965
More news memories from the 1960s.

The Practical Wireless Trimmer And Alignment Set
October 1964
Who remembers this?

Coming Next Month
Join the *PW* team as we take a trip back to the 1950s.

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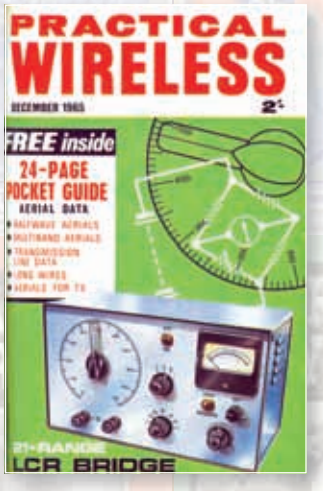

Coming up during 2007

- January Issue: 2000 - 2006
- February Issue: 1990 - 1999
- March Issue: 1980 - 1989
- April Issue: 1970 - 1979
- **May Issue: 1960 - 1969**
- June Issue: 1950 - 1959
- July Issue: 1940 - 1949
- August Issue: 1930 - 1939
- September Issue: *PW* Launch in1932
- October Issue: Pre-*PW* Radio Days
- November Issue: Pre-*PW* Radio Days
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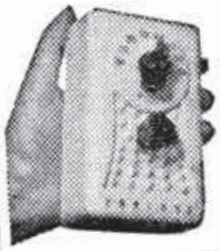

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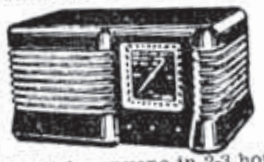

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The Miniscope

M.L. Michaelis

Sept 1962

2007 introduction, Rob Mannion G3XFD writes: *This project – written by one of the most respected German radio constructors of his time – was a dream for many of us. I wasn't able to build one for many years but my copy of PW with the juicy project waiting to be started, travelled around the world with me. Many years later, while working in Germany itself I had the great pleasure of meeting Martin and thanked him for what turned out to be an extremely useful project.*

Introduction (1962)

Many keen experimenters must confine their activities to some odd corner of a room used for other purposes too, or possess only a workshop of very limited size. Experimental work, on the other hand, is considerably hampered if essential apparatus has to be stored away in inaccessible places, requiring considerable preliminary setting-up work prior to any working session. This trouble is particularly aggravated if such apparatus is bulky or consists of many separate units. It is thus highly desirable to have the essential measuring and test equipment in as compact and multi-purpose a form as possible, so that it may be left permanently set up ready for immediate use, even under conditions of very limited space.

The Experimenter's Power Pack (already published in this magazine in the January 1962 to July 1962 issue inclusively) is aimed to meet experimental power-supply needs under the conditions just mentioned. This article describes a very compact test-set, measuring only $11^1/_2$in x 8in x $7^1/_2$in, which embodies the full functions of (a) oscilloscope (b) signal tracer (c) audio test oscillator (d) frequency-meter (e) valve-voltmeter (for a.c. ands d.c.) (f) quantitative waveform analyser, and (g) resistance-inductance measuring bridge. It uses only seven valves and a miniature cathode-ray tube, and has a built-in moving-coil meter and all power supplies also built in.

Very considerable experimental time has been devoted during design to obtaining a really stable and reliable circuit, which should function well without any difficulties if the points discussed in the course of this series of articles are carefully observed.

Equipment for the Experimental Workshop

The following question has often been raised, "What basic equipment does the keen experimenter require if he really wants to be able to observe systematically what exactly is going on in his experimental circuits, rather than rely on more hit-and-miss methods?"

The Experimenter's Power Pack and the Miniscope featured in the present article are the answer which this magazine offers, in a practical way, to this vital question. In addition to these two items (apart from the obvious need for an adequate set of the usual hand-tools such as soldering iron, screwdrivers, files, pliers, etc.) the following may also be recommended:

(a) A good multimeter, which may be home-made, according to information already published in these pages, or any good commercial model from the wide selection of advertiser's offers.

(b) A small handy grid-dip meter covering those ranges of radio frequencies with which the experimenter intends to work. For general purpose use, an instrument with a set of plug-in coils covering the range 100kHz to 100MHz would be ideal. It is of advantage to see that this instrument is usable as r.f. and a.f. signal generator and adsorption-wavemeter too (as most grid-dip meters will already be, or can be after simple modification). Capacities below 1000pF and inductances in the millihenry and microhenry ranges can then be measured with this instrument, as well as tuning-ranges of tuned circuits, etc. thus augmenting the functions of the 'Miniscope'.

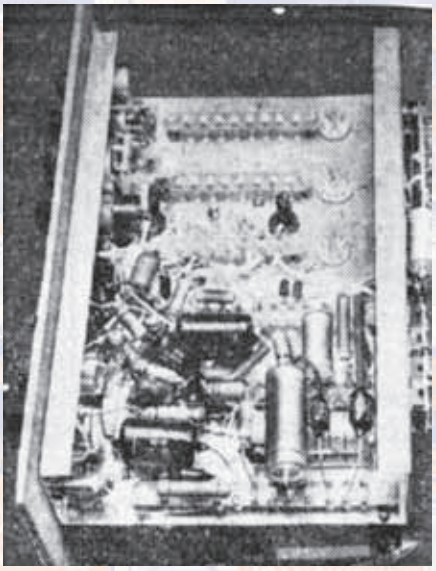
A useful third item for the workshop would be a small wobbulator for use in conjunction with the Miniscope. This can be used for aligning tuned circuits, band-pass filters, etc. Provision is made on the Miniscope for connection of such a wobbulator, in conventional fashion.

A constructor possessing this list of equipment,

This article describes the construction of a compact test-set combining the functions of several separate units of conventional construction, and enabling a multitude of qualitative and quantitative measurements to be performed on wireless and amplifier circuits.

and having acquired the necessary skill and knowledge in its practical use and possibilities, should be in a position to carry out almost any quantitative or qualitative observation on processes in normal experimental work. They will then have a very clear picture of what is going on in circuits at every stage.

Regarding the 'Miniscope' in particular in this scheme of equipment, the parts-list may appear formidable, with 73 resistors and 43 condensers and a quantity of other material! But, remembering that this one instrument combines the functions of about seven instruments, which would otherwise have to be built and bought separately, and which are all essential. In comparison the price of these components is in fact astoundingly cheap for the benefits reaped.



General Circuit Plan

The Miniscope consists basically of four circuit-portions. The first is the combined high tension (h.t.) and extra high tension (e.h.t.) power-supply. The second is the wide-band signal amplifier (Y-amplifier), including valve-voltmeter functions in the input stage and a signal-tracer output stage.

The third is the special time-base circuit, calibrated **quantitatively** for time and frequency measurements in the range from a few microseconds to about 25 milliseconds. The time-base wave is available externally at a coaxial socket for feeding a wobbulator or for general use as audio test signal. The fourth circuit portion comprises the additional elements and switching for a novel phase-bridge for L and C measurements.

A function-switch selects three operating positions. The first is entitled 'tracer'. In this position only, the signal amplifier (and associated valve-voltmeter) is operating. The amplifier signal may be heard on headphones connected to the output provided or on a miniature loudspeaker, which is connected there, or else passed into an external separate power amplifier. Of the three pilot lamps only the green one labelled 'tracer' is illuminated.

The second position of the function switch, entitled 'scope' brings the small cathode-ray tube and the sawtooth-sweep

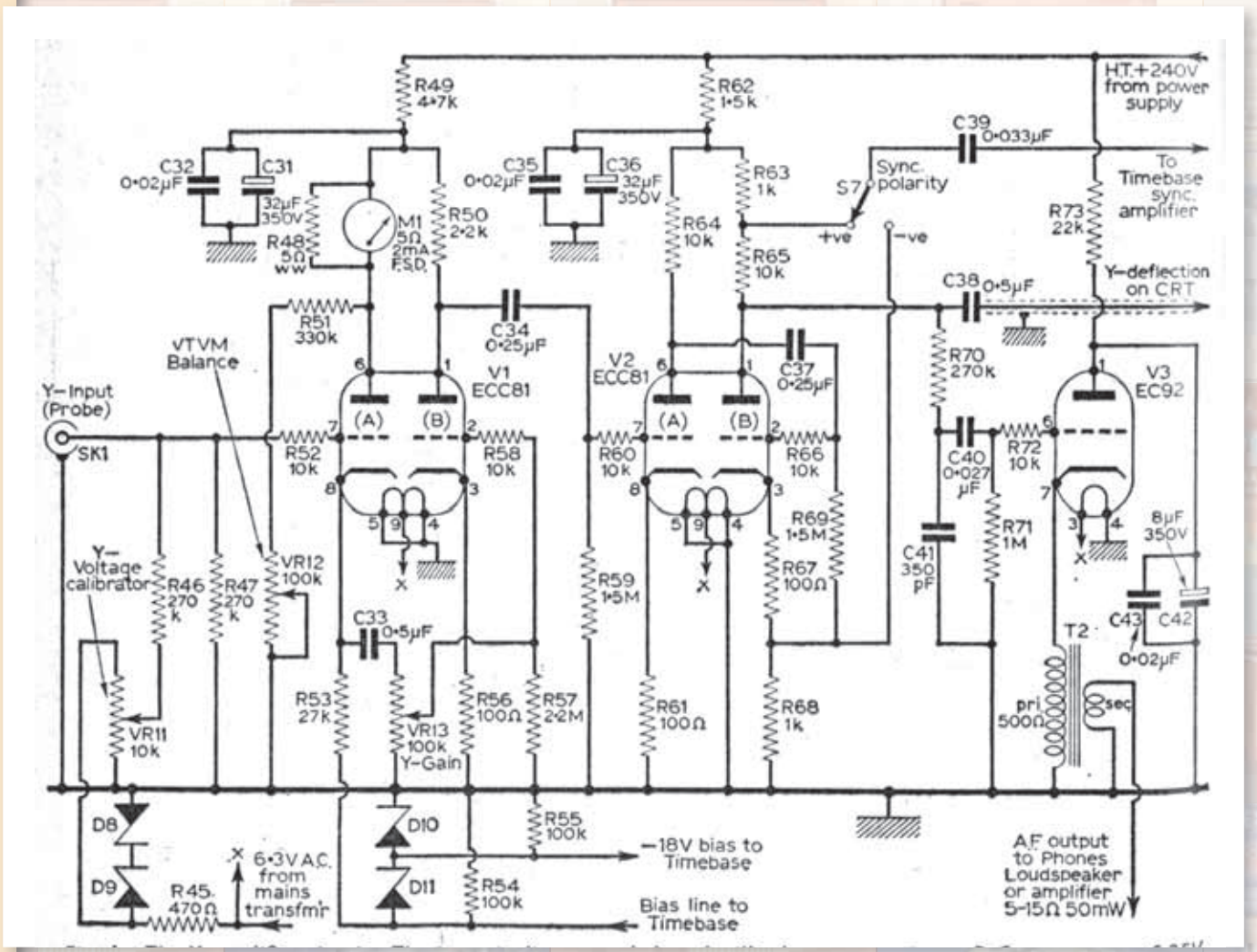


Fig. 1: The Y-amplifier circuit. The input is direct-coupled, and will tolerate a maximum d.c. component of 25V (of either polarity), of an a.c. signal of maximum amplitude 50V peak-to-peak. With the probe to be described at the end of this article, 15 times these inputs are tolerable, and the calibrations on the d.c. level meter and on the calibrator are made to apply to conditions when using the probe. It is undesirable to use the 'Miniscope' without the probe, unless the extra sensitivity is indispensable. Less waveform distortion of the h.f. components of a signal is also obtained when using the probe.

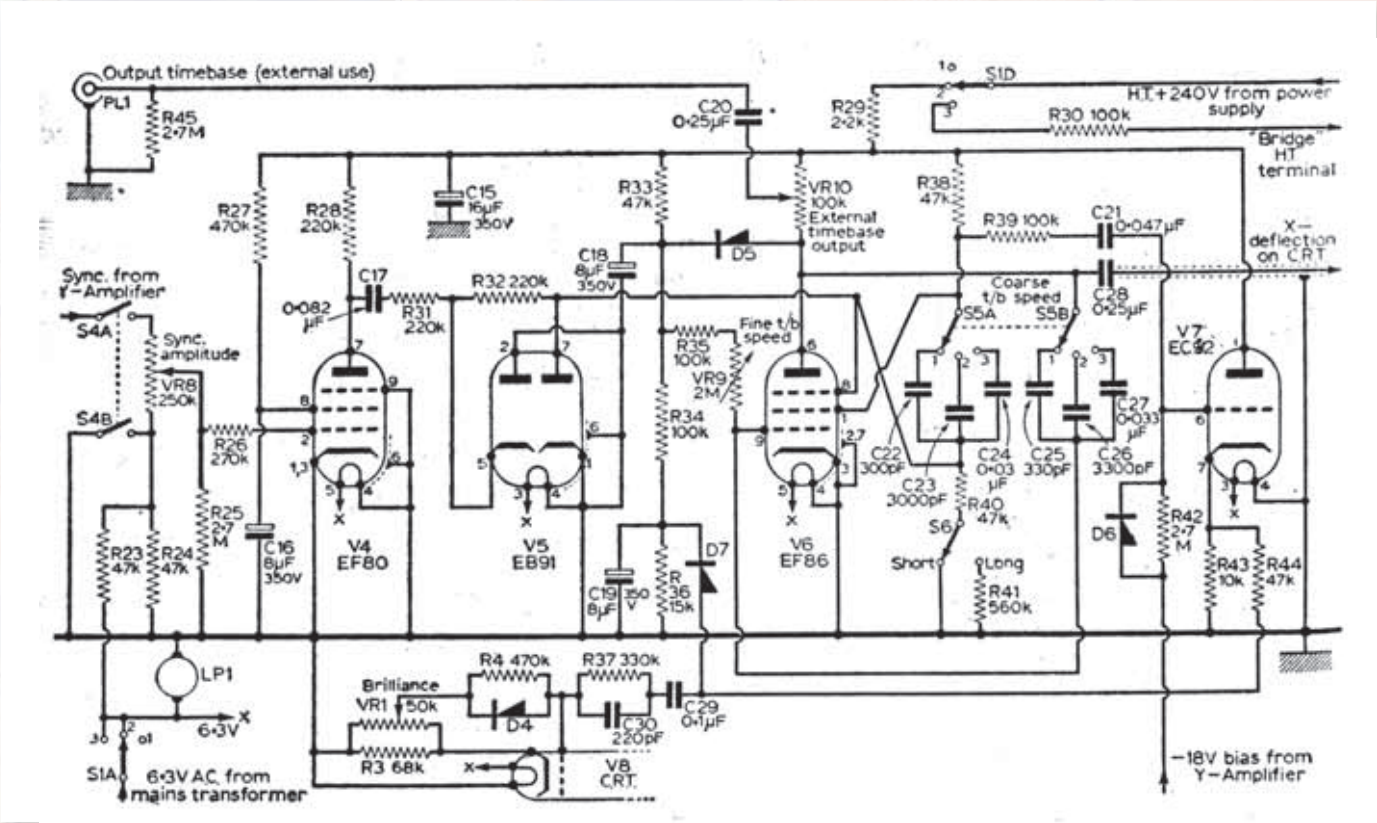


Fig. 2: The timebase circuit. This embodies an extremely linear sweep generator, with speed continuously variable from 12µsec/cm to 25msec/cm on the c..r.t. screen and also a powerful synchronising (sync) circuit, operating on the Y-signal on either polarity at will, or on the mains frequency. The sync amplifier acts as buffer, preventing timebase signals entering the Y-circuits, as well as amplifying the sync signals, so that lock is rigid even at tiny Y-amplitudes on the c.r.t. screen. Finally, the timebase-screen-grid waveform is shaped in a special circuit, giving effective flyback-blanking, avoiding confusion in displays.

timebase circuit into operation in addition to the other facilities. The signal can now be observed in form of its waveform on the cathode ray tube (c.r.t.) in addition to the continued audibility via the earphones, speaker or external amplifier.

Of the three pilot lamps the green lamp (labelled 'tracer') is still illuminated and the red one labelled 'scope' is also switched on in this setting. A zener-diode calibrator is included in the signal circuits, enabling the vertical-deflection sensitivity to be set accurately to any desired value between 1V/cm and 125V/cm. This enables the a.c. component voltage of any waveform to be read off (a.c. valve-voltmeter function), whilst the d.c. component, which the waveform may posses in addition, is simultaneously indicated (in polarity and magnitude) on the moving-coil meter situated on the panel below the c.r.t. This represents the d.c. valve-voltmeter function.

If the applied signal is pure a.c., then the waveform will appear on the c.r.t., but the meter needle does not move. If the applied signal is pure d.c., then the meter shows it, but the c.r.t. shows only the undisturbed timebase trace. The advantage of this arrangement over the otherwise more conventional signal-amplifier passing the full d.c. component (d.c. amplifier) and giving d.c. indication by a corresponding bodily shift of the trace on the c.r.t. screen is that **the relative d.c. and a.c. sensitivities may be chosen independently** to suit the relative d.c. and a.c. contents of the waveform being observed. Thus, for example accurate observation of hum-ripple percentage on a power supply is immediately possible and this normally requires two separate measurements with a conventional d.c. oscilloscope.

Furthermore, the arrangement here adopted allows the essential d.c. measurements, yet does not require a full d.c. amplifier, which would normally be tricky to construct under Amateur conditions. A straightforward, stable and reliable a.c. amplifier is thus used.

The main signal amplifier has a bandwidth, level to within the usual specifications of ±3dB, extending from 25Hz to 120kHz and will thus give accurate displays of pulsed waveforms even at the highest audio frequencies. A low-pass filter is built in between the c.r.t. feed stage and the tracer output stage to prevent frequencies higher than 15kHz reaching the earphones/speaker output . This is because these signals could otherwise be rectified at the input to a subsequent amplifier, causing grid-current blocking or distortion or creating various forms of instability).

Thus, even if applied signals are of a frequency well above the highest audible levels, they are still displayed on the c.r.t., yet give no tracer output. The amplifier still shows appreciable (though much reduced) gain at 1MHz and will just resolve individual cycles of the carrier of medium-wave stations operating around this frequency on the c.r.t. display. These will be seen by connecting a tuned circuit and good aerial to the input or the output of an r.f. signal generator if local-station signal strength is not sufficient.

The third position of the junction switch brings the L-C bridge into operation. The green pilot lamp 'tracer' is now extinguished, the red 'scope' lamp is still illuminated, and the third lamp (a green one labelled 'bridge'), is then illuminated. The signal amplifier is operating, as is the c.r.t. but the sawtooth-sweep timebase is inoperative, the X-deflection then being by the mains 50Hz sine-wave. A fixed R-C combination shifts this sine wave so that it is running 45° out of phase with the local mains.

If a sample of the in-phase mains wave is then applied to the Y-amplifier (from the 6.3V heater line) the oblique-ellipse trace characteristic of two waves of equal frequency, but a constant phase-shift relative to each other is obtained on the screen.

The in-phase wave is taken from the heater line, via an unknown capacitor (the one to be measured) on to a calibrated potentiometer, taking the Y-amplifier input from the potentiometer. This gives a phase-shift of an amount dependent upon the relative sized of the capacitor and resistance and a certain definite combination gives 45°, so that X and Y signals are then in phase again, both being 45° off the mains. This condition gives a clean **diagonal line** on the c.r.t. As the potentiometer is adjusted, the ellipse will close up to eventually become a narrow diagonal line at balance, before opening up again beyond balance. (The potentiometer may be calibrated in correspondingly capacity values). This arrangement gives very clean unambiguous balance reading.

Ranges giving continuous coverage from 1000pF to 30µF are incorporated in the 'Miniscope'. Smaller capacities are better measured with a grid-dip meter and larger ones by a method described later in this article.

Inductances give a phase-shift in the opposite direction to condensers with the arrangement here described and thus augment the phase difference between X and Y signals. A good reference condition is obtained when the phase difference has been complemented to 90°, giving a vertical or horizontal ellipse instead of an oblique one. This can be adjusted to a true circle by suitable adjustment of the Y-amplifier gain. The potentiometer is thus calibrated for coils to provide a trace in the form of a true circle on the c.r.t. screen. A range of 1 to 20H is incorporated for chokes, transformers, etc. The smaller values arising in r.f. coils, etc., are better measured with a grid-dip meter.

A number of other useful measuring operations are possible in the 'bridge' setting of the 'Miniscope' and these will be discussed below in conjunction with circuit details.

The Signal Amplifier (Y-amplifier)

The diagram, **Fig. 1**, shows the theoretical circuit of this portion of the Miniscope circuitry. It employs three valves, using high-slope triode throughout. The input stage, VI (pins 6, 7 and 8), is a Class-A cathode-follower with unity voltage gain but with impedance step-down. The purpose of this arrangement as input stage is to meet several requirements. Firstly, it accepts very high input amplitudes without overloading, so that the input can be run 'fully open' – i.e., without a gain control.

The input is at high impedance (as it must be, otherwise the signal source would be loaded and its waveform possibly changed in nature) and any volume control connected there would shunt high frequencies considerably on account of its inevitable self-capacity. The wide bandwidth achieved here would than not have been possible. The cathode-follower input stage, however, transforms the impedance at its output down to a mere one or two hundred ohms and considerable shunt capacity is tolerable there without high-frequency loss – thus the gain-control appears in this position. ●

COMPONENTS LIST

Resistors

(All carbon, ±10%, 1W unless otherwise stated – ww means wirewound)

R1	15kΩ	R26	270kΩ	R51	330kΩ
R2	100kΩ	R27	470kΩ	R52	10kΩ
R3	68kΩ	R28	220kΩ	R53	27kΩ 2W
R4	470k	R29	2.2kΩ	R54	100kΩ
R5	47k	R30	100kΩ	R55	100kΩ
R6	500Ω 2W ww	R31	220kΩ	R56	100Ω
R7	500Ω 2W ww	R32	220kΩ	R57	2.2MΩ
R8	680kΩ 2W	R33	47kΩ	R58	1.5MΩ
R9	22kΩ	R34	100kΩ	R59	1.5MΩ
R10	68kΩ	R35	100kΩ	R60	10kΩ
R11	22kΩ	R36	15kΩ	R61	100Ω
R12	330kΩ	R37	330kΩ	R62	1.5kΩ
R13	270kΩ	R38	47kΩ	R63	1kΩ
R14	270kΩ	R39	100kΩ	R64	10kΩ 2W
R15	1MΩ	R40	47kΩ	R65	10kΩ 2W
R16	1MΩ	R41	560kΩ	R66	10kΩ
R17	100kΩ	R42	2.7MΩ	R67	1kΩ
R19	270Ω	R44	47kΩ	R69	1.5MΩ
R20	3.9kΩ	R45	2.7MΩ	R70	270kΩ
R21	39kΩ	R46	270kΩ	R71	1MΩ
R22	470kΩ	R47	270kΩ	R72	10kΩ
R23	47kΩ	R48	5Ωww	R73	22kΩ 2W
R24	47kΩ	R49	4.7kΩ 2W		
R25	2.7MΩ	R50	2.2kΩ		

Capacitors

C1	8µF 450V elec (electrolytic)	C28	0.2µF 500V paper
C2	16µF 350V elec	C29	0.1µF 500V paper
C4	8µF 450V elec	C30	220pF 500V paper
C5	16µF 350V elec	C31	32µF 350V elec
C6	1µF 750V metal-paper	C32	0.02µF 500V paper
C7	8µF 350V elec	C33	0.5µF 500V paper
C8	100µF 50V elec	C34	0.25µF 500V paper
C9	8µF 350V elec	C35	0.02µF 500V paper
C10	8µF 350V elec	C36	32µF 350V elec
C11	8µF 450V elec	C37	0.25µF 500V paper
C12	50µF 50V elec	C38	0.5µF 500V paper
C13	0.01µF 1000V paper	C39	0.033µF 500V paper
C14	0.01µF 500V paper	C40	0.027µF 500V paper
C15	16µF 350V elec	C41	350pF 500V paper
C16	8µF 350V elec	C42	8µF 350V elec
C17	0.082µF 350V elec	C43	0.02µF 500V paper
C18	8µF 350V elec		
C19	8µF 350V elec		
C20	0.25µF 500V elec		
C21	0.047µF 500V paper		
C22	300pF 500V paper see text		
C23	3000pF 500V paper		
C24	0.03µF 500V paper		
C25	330pF 500V paper		
C26	3300pF 500V paper		
C27	0.033µF 500V paper		

See text

Potentiometers

VR1	50kΩ linear (lin)	VR5	5kΩ log
VR2	250kΩ lin	VR6	50kΩ log
VR3	2MΩ lin	VR7	500kΩ log
VR4	2MΩ lin		
VR8	250kΩ logarithmic (log) with DP Switch (S4)		
VR9	2MΩ log	VR12	100kΩ lin
VR10	100kΩ lin	VR13	100kΩ log
VR11	10kΩ log		

Valves

V1	ECC81	V5	EB91
V2	ECC82	V6	EF86
V3	EC92	V7	EC92
V4	EF80		

V8: DG3-12A cathode ray tube (Telefunken).

These are obtainable from Tullux Ltd., 44 Brunel Road, London, W.3. Orders will take from 2 to 3 weeks to be despatched. (Other 1.25 to 2in. Electrostatic c.r.t.s may be used if they have 6.3V heaters and require 400-500V on the final anode.) Larger surplus tubes, such as the VCR135A, may be used, but will require cabinet modifications and possibly slightly different resistor values in the e.h.t. chain.

Diodes

D1	E250C85 (250V a.c./85mA d.c.)
D2	E250C50 (250V a.c../50mA d.c.)
D3	E250C50 (250 a.c./50mA d.c.)
D4 to 7	S36 100mA/ W/150 maximum,
D5	S36 350V peak inverse voltage,
D6	S36 10pF capacity,
D7	S36 500kHz maximum.
D8	Z7.5 7.5V 25mA
D10	Z18 18V 20mA
D11	Z18 18V 20mA

Zener Diodes

(Diodes D4 to D11 are available from The Bush Crystal Co. Ltd., Hythe, Southampton.)

Switches

S1	6-pole 3-way ceramic rotary
S2	Single-pole on/off toggle
S3	2-pole 5-way ceramic rotary
S4	2-pole with VR8
S5	2-pole 3-way miniature ceramic rotary
S6	Single-pole 2-way toggle
S7	Single-pole 2-way toggle

Transformers

T1	Mains 250V 60mA/110V 10mA/6.3V 3A: primary to suit mains
T2	Output 9kΩ (R 5000Ω) – 5/15Ω)

Miscellaneous

Thermocouple R.F Meter

LP1, 2 and 3 Panel pilot lamp holders (2 green, one red); 3 12V 0.15A bulbs; 13 pointer knobs; 3 insulated wander-plug sockets; 2 coaxial sockets; F1 panel fuse holder; 4 Noval and 3 B7G ceramic valve holders with screening cans; 'phones output plug; mains cable and plug; tagstrips; wire, sleeving, etc.

April 1968

News, Views and Memories from 1960-1969

Marconi Computer for Saudi Arabia

May 1966

This photograph shows one of the new Marconi Myriad computers of the type, which will be used in the radar data handling systems for the Saudi Arabian defence system.

This computer, which has been designed by Marconi for radar data processing and other on-line applications, features the latest techniques in microelectronics. The complete machine is housed in a single deck unit, which measures 6ft x 3ft x 2ft.9in high. All controls and indicator lights are mounted in the low superstructure of the desk top, which provides the operator with full facilities for machine operation and programme checking.

New Licence for Radio Amateurs

Jun 1968

Two changes in Amateur Radio licensing arrangements were announced in Parliament by the Postmaster General, the **Rt. Hon Edward Short MP**.

A new 'Beginners' licence is to be introduced in the autumn. The details of this licence have not yet been settled but its purpose is to encourage interest in radio in people (especially young people) who have not yet reached the standards of qualification needed for a full A or B licence.

Holders of the Amateur (Sound) Licence B (for which Morse qualifications are not required) have now been authorised to operate in the frequency band 144-146Mc/s. Hitherto, Amateurs wishing to use any band below 427Mc/s have had to obtain A licences, for which a Morse test is necessary.

The 'Pirate' Danger to Shipping

June 1965

During February this year an urgent radio report from a lightship to a shore base was held up for 30 minutes because both frequencies normally available were blocked, one by a pirate broadcasting station. This was only one instance of shipping communications bands being blocked by pirate operations but it clearly illustrates the very real danger they present.

In a written answer to a Parliamentary question recently, the Postmaster General, listed 19 specific instances when transmissions from pirate radio stations had caused interference to ship-to-shore communications, seven of these instances singling out Radio Caroline as the offender.

Dec 1965

Electrically Operated Telescopic Mast

A N Clark (Engineers) Ltd., of Binstead, Isle of Wight, have recently added to their range of telescopic masts a series called Super E. The unique feature of these latest designs is that, they are arranged to be powered from a 12V supply, which most conveniently takes the form of a vehicle battery. They are thus eminently suitable for mobile applications such as, radio telephones etc. The heights available range from 16-40ft.

From operating the neat dashboard mounted switch, the time taken for the 25ft mast to extend is under 20 seconds. A similar time suffices for retraction. By means of a simple electrical connection it is arranged that the mast cannot remain extended if the ignition switch is turned on.

Transceivers for New Police Squad

August 1965

Radio communication is playing a big part in London's new 100-strong police patrol group, which began operations recently. The group has been formed to counteract sudden outbreaks of crime by saturating trouble spots with uniformed police.

Contact between the group's vehicles and Scotland Yard and the PCs on foot, is by v.h.f. radio with each constable in the group carrying a lightweight transceiver. There are just two women PCs in the group; one of them is seen here using one of the fully portable transceivers.

A selection of what was happening between 1960-1969 in the Amateur Radio hobby – how much do you remember?

Two New Models from KW Electronics

Mar 1967

KW201 Amateur Band Receiver
11 ranges 1.8-30Mc/s. Crystal mixer. Crystal BFO. Q Multipilier.
Sens: 1μV/500mW
S/N: 1μV/20dB.

KW2000CA SSB Transceiver
3-19Mc/s. 180W p.e.p. (s.s.b.) 75W (c.w), 25W(a. m.). Mains or battery.
Transceiver – 18lb
AC p.s.u. – 23lb
DC p.s.u. – 6.5lb
The KW201 incorporates a mechnical filter, which gives an i.f. selectively of 3.1kc/s at 6dB and 6kc/s

at 60dB. The *Q* multiplier (optional extra) gives a range of 3.1kc/s to 200c/s selectivity. The slide-rule vernier dial is accurate to 1kc/s.

The KW201, designed for optimum performance on single sideband, measures 13$^3/_4$ x 6 x 12$^1/_2$ and weighs 19lb. Power supply is 200-240V but a 115V version is available. The price is £105, complete with 13 crystals

The KW2000CA is a commercial long range unit with a frequency stability of 1 part in 10^6 in ambients between +70°C to –10°C. All enquiries should be made to K. W. Electronics Ltd., 1 Heath Street, Dartford, Kent.

Goonhilly Aerial No 2

June 1968

Post Office engineers report encouraging progess with the construction of Aerial No 2, which is now taking shape as a recognisable structure on the skyline near the existing aerial at the Goonhilly Earth Station in Cornwall. The 75$^1/_2$ft radius, 340ft long track, running from 66° to 326°E of N has been laid and levelled.

Some 200 tons of steel have so far been used in the construction of the aerial base structure, which is mounted on a large centre pivot and a pair of bogies, which run on the azimuth track. The 25$^1/_2$ft long screw, weighing about 30 tons, required for the elevation drive, has been landed on the base structure and the four elevation bearings positioned on the massive cross beam. Work is also proceeding on cladding the base structure to provide apparatus rooms for the sophisticated equipments required for a commercially orientated earth station.

Manufacture of most of the telecommunications equipment, including the operational control console, is nearing completion and the British manufactured equipment is now undergoing the initial phases of system testing at the contractor's works. Meanwhile, at the works of an Ipswich contractor, the fabrication of the 90ft reflector with its large backing structure and stainless steel plated petals proceeds. The weight on the elevation bearings, including that due to the counterbalance weights, is expected to be some 300 tons.

The aerial is required to work to an improved type of synchronous satellite positioned over the Atlantic Ocean later this year, thus releasing the first Goonhilly aerial from operational duty. The first aerial will then be equipped to work to an Indian Ocean satellite in 1969.

Micro Hi-Fi

Nov 1968

Sinclair Radionics have introduced the world's first monolithic integrated circuit hi-fi power and preamplifier. The complete unit, known as the IC-10, measures only 1 x 0.4 x 0.2in and the circuit, which this package contains is a chip of silicon just one-twentieth of an inch square by one-hundredth of an inch thick, which contains 13 transistors (including two power types), three diodes and 18 resistors.

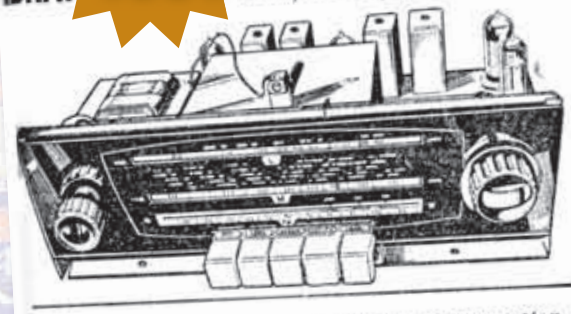
The circuit is complete in itself requiring only the addition of tone and volume controls and a power supply, which may be battery or mains. Output power is 10W peak and 5W r.m.s. continuous. Distortion is less than 1% at full output and frequency response is 5c/s to 100kc/s ±1dB.

The preamp section contains three transistors with cut-off frequencies in excess of 500Mc/s so that it may be used as an r.f. or i.f. amplifier in addition to its normal audio application. The power amplifier is a 10 transistor circuit with a class AB output stage and closely defined quiescent current, which is independent of temperature because of the extremely close thermal coupling between the output transistors and the bias diodes. The gain of the entire unit is accurately defined by built-in negative feedback loops and the circuit may be operated down to d.c. for special applications because direct coupling is employed throughout.

The amplifier will operate on any power source providing between 8 and 18V and is suitable for driving speakers of any impdedance between 3 and 15Ω. The IC-10 is guaranteed for five years and costs only 59s. 6d, complete with a comprehensive instruction manual.

April 1961

BRAN AM/FM (V.H.F.) RADIOGRAM CHASSIS AT £13.6.8 (P. & P. 10/-



Tapped input 200-225 v. and 226-250 v. A.C. ONLY.
Chassis size 15 x 6½ x 5½in. high. New manufacture. 12 mths. guarante
Dial 14½ x 4 in. in black and yellow.
Pick-up. Extension Speaker. Ae., E., hd Dipole sockets. Five "pianc
push buttons—OFF L.W., M.W., F.M. and Gram. Aligned and teste
With all valves and O.P. Transformer. Tone Control Fitted.
Covers 1,000—1,900 M.; 200-500 M.; 88-98 Mc/s.
Valves EZ80 rect., ECH81, EF89, EABC80, EL84, ECC85.
Speaker and Cabinet to fit chassis (table model). 47/6.
10 x 6in. ELLIPTICAL SPEAKER. 20/-, to purchasers of this chassi
TERMS:—(Chassis) £4.16.8 down + 10/- carr. and 6 Monthly Payment
of 30/-, or with Cabinet and Speaker £5.10.0 down and 7 Monthly Pa
ments 32/-.

BATTERY ELIMINATOR. For 4 Low Consumption Valves (6 range). 90 v. 15 mA. and 1.4 v. 125 mA. 42/6 (2/6 post). 200-250 v. A.C. Size 5½ x 3½ x 2in. Also for 250 mA. 1.4 v. and 90 v. 15 mA at same price.

THE "CABY" TEST METERS

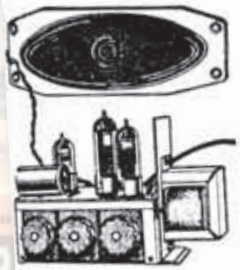
Prices include Test Prods, Batteries, Instruction Book. Also measure dB. Accuracy: A.C., 3 per cent, D.C., 2 per cent.

A-10 **£4.17.6**

B-20 **£6.10.0**

A.10—2K ohms/v. on A.C. and D.C. volts (10, 50, 250, 500 and 1000 v.); 10K and 1M ohms; ½ mA, 25 mA and 250 mA. D.C. Size: 5½ x 3½ x 1½in. Weight 17 oz.

B-20—10K ohms/v. on 0.5 v. and 2.5 v.; 4K ohms/v. on 10, 50, 250, 500 and 1000 v., A.C. and D.C. Resistance, 2K, 200K., 2 M and 20M ohms.; D.C. current, 100 microA, 2.5 mA, 25 mA, 250 mA. Size: 6½ x 3½ x 2½in. Weight, 24 oz.



3-VALVE AMPLIFIER (INC. RECT.). 4 watts. Valves ECC83, EL84, and EZ80. Controls, volume, bass and treble. On/Off switch. (Chassis size 6½ x 3 x 2½in.) 6½in. round or 7 x 4in. elliptical speaker. Not suitable for microphone input. A.C. only.

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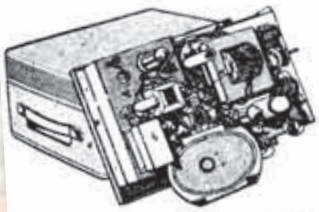

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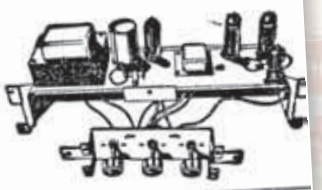

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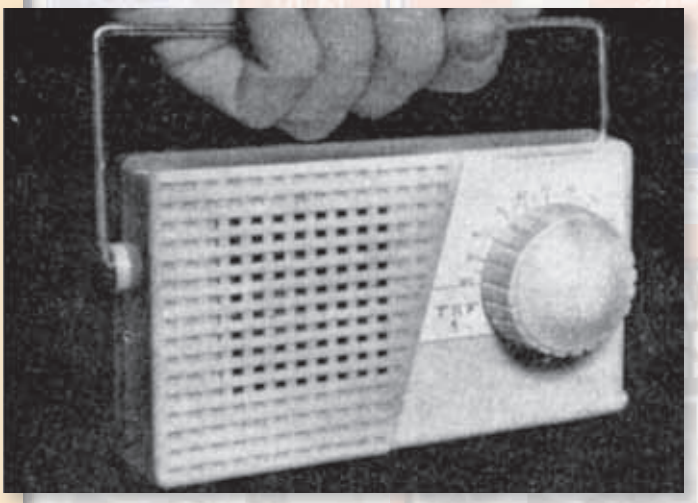
The TRF5 pocket portable

By R. F Graham

May 1968

The Editor writes: I have chosen this project not because I actually built it myself but because it typifies the simple receiver projects that formed the backbone of *PW* before it concentrated on Amateur Radio. This circuit is just one of a long line of similar projects provided by *PW* in the days when most of us had to build because there wasn't much else available that we could afford. How things have changed!



The t.r.f. type of receiver avoids the more complicated circuits and alignment difficulties of the superhet, yet will normally give good loudspeaker volume plus a reasonable selection of stations. This circuit has five transistors in a six-stage reflexed arrangement, which is sensitive, easy to build, and provides excellent volume from an economical single-ended push-pull output stage.

The diagram, **Fig. 1**, shows the circuit and a personal 'phone or headphones may be used to test it in three sections, during construction. This ensures that progressive wiring is correct. The transistor,Tr1, acts as r.f. amplifier, with regeneration through TC1 controlled by the potentiometer VR1.

In the circuit r.f. is blocked by the r.f. choke (r.f.c.) and passes to diodes D1 and D2, the demodulated signal passing through L1 to Tr1, which furnishes audio signals across R1, taken through C6 to Tr2. When the circuit is wired as far as C6, 'phones connected from C6 to battery positive give moderate phone volume from some local stations, while tuning and regeneration will be found in order if this section is working correctly.

Transistor Tr2 and 3 are audio amplifiers, connected to obtain d.c. stabilisation of their working conditions. For example, assume Tr2 collector current is too high. The voltage drop across R4 rises, moving Tr3 base positive and Tr3 emitter current falls, reducing the voltage drop across R6, and moving Tr2 base positive through R3, to restore working conditions.

Should Tr2 collector current be too low, the reverse arises. With Tr3, excess collector and emitter current increases the voltage drop across R6, shifting Tr2 base negative, increasing Tr2 collector current and the voltage drop across R4, which in turn moves Tr3 base slightly positive, to restore conditions.

With Tr2 and Tr3 added, phones from Tr3 collector to battery negative should give more than enough volume, with good quality of reproduction; thereby showing this section is in order. Transformer T1 drives Tr4 and Tr5 in a popular and economical push-pull circuit, operating directly into a 75Ω speaker.

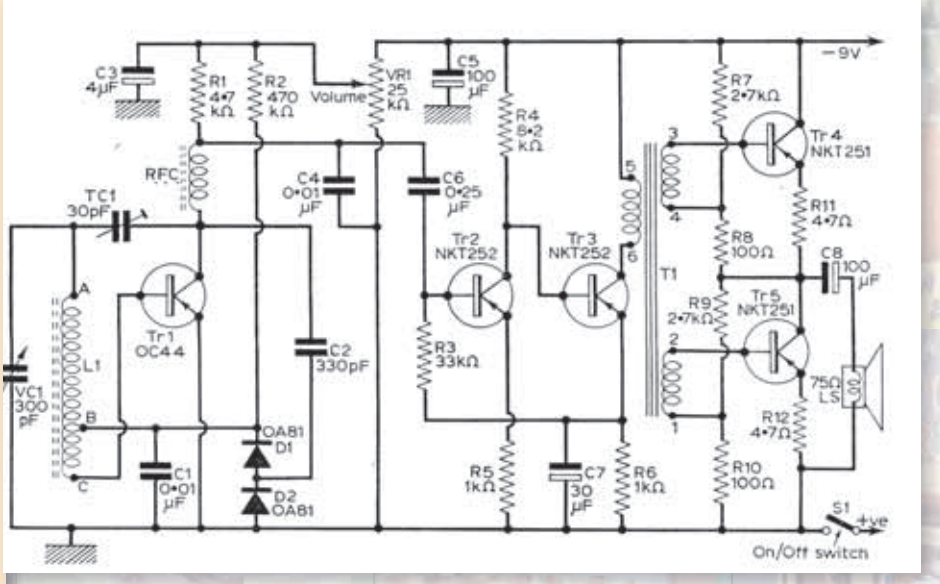


Fig. 1: Complete circuit of the TRF5 pocket portable.

Components

There is some latitude in transistors and some other items but miniature transistor receiver type components have to be used throughout. All resistors are 10% (silver band) except R7, R8, R9 and R10, which **must** be either 5% (gold band) or selected with a reliable

for accuracy. VR1 is a midget pot with switch and actual results are the same with 10k or 20kΩ. VC1 is a midget solid-dielectric (300pF) but there is space for a midget air-spaced capacitor, if to hand, and 365pF or other larger value can be fitted.

Various transformers for single-ended push-pull, for use with OC71 and 2xOC72, or OC81D and 2xOC81, or similar transistors, are satisfactory for T1. The ratio is generally about 7:1 + 1, to 3.5:1 + 1. Tags are numbered in Fig. 1 and a wiring plan shows location of tags or pins and must of course be for the actual transformer, if different from that listed.

The speaker is a 75-80Ω 2in type. Or similar unit but 35Ω units are also in order, while a 25 or 35Ω speaker is particularly suitable for 2xOC81 or similar transistors. The receiver is easily accommodated in a plastic case, which is approximately $5^1/_2$ x $3^1/_4$ x $1^3/_4$in external dimensions.

Chassis & Case

The chassis is made from 5 x 3in, 1/16in, Paxolin, with all components except VR1 and the speaker mounted on the back as in **Fig. 2**. Cases of the type mentioned have three projections inside, tapped 6BA. Bolts in holes X, Fig. 2, secure the finished receiver in its case. These three holes can be positioned by cutting thin card 5 x 3in., placing it in the case, piercing over the tapped holes, and then using the card as a template for drilling the Paxolin.

Should any holes be inaccurately placed, they can be elongated with a small round file. The two holes marked S are for bolts with extra nuts, which secure the speaker. Somewhat similar cases are made with tapped holes to fix a speaker inside, and two flexible leads can then run from speaker to receiver.

The speaker opening, Fig. 2, is about 1.75in. In diameter, to clear the speaker. As many holes as possible should be drilled before fitting any components to the panel.

Ferrite Rod Aerial

The ferrite rod aerial has 88 turns of 26s.w.g. enamelled wire, side by side on a 5 x 3/8in. ferrite rod. Glued paper is wound round the rod, and the wire fixed at A with tape, adhesive, or cotton. After winding 76 turns, the small loop B is made, and winding continued in the same direction for a further 12 turns, the wire being fixed at C.

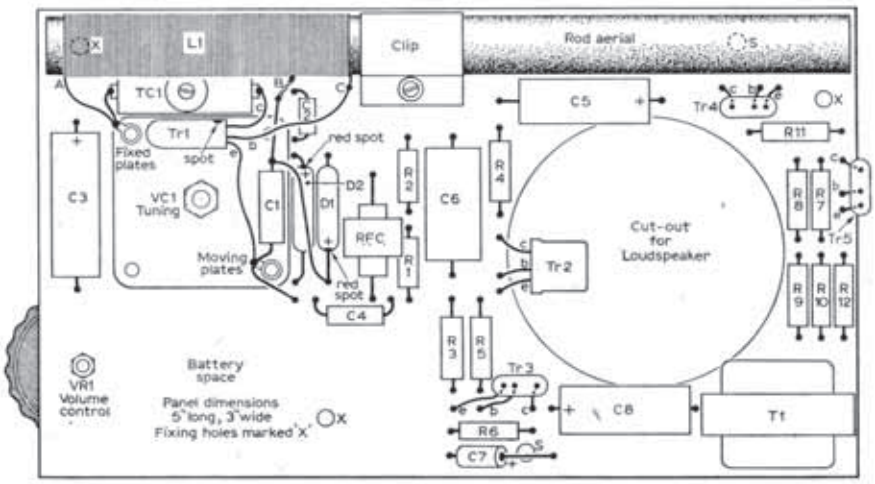
A loop of some insulating material, such as cardboard, leather or plastic is cut to go round the rod, and drawn tight with a bolt, which also goes through the panel. Extra nuts or a spacer lifts the rods so that the winding clears the trimmer TC1. Note that a wire also passes from the moving plates of VC1 through the panel to the 'earth' or battery positive circuits the other side.

If the receiver is to be tested in sections as mentioned, insert components up to C6.

The underside of the panel (or front when the receiver is in its case) is shown in Fig. 3. VR1 is fixed with a small bolt. The simplest method of wiring is to use 26s.w.g. Or similar bare tinned copper wire, with 1mm red sleeving for 'earth' and black sleeving for negative line. Joints (especially for transistors and

Fig. 2: Component layout. The volume control VR1 is mounted on the reverse side (see Fig. 3).

Fig. 3: Underside wiring of the Paxolin panel.



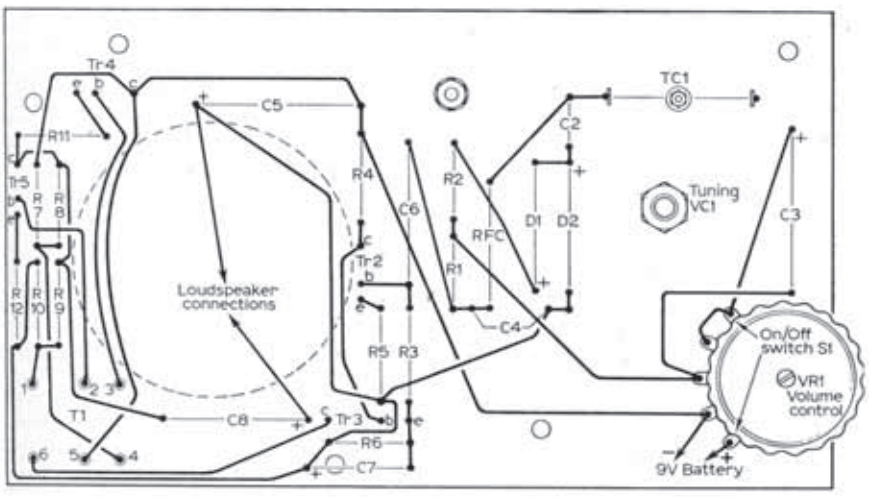


Fig. 3: Underside wiring of the Paxolin panel.

diodes) are soldered rapidly, the iron being removed immediately the joint is formed.

To test the first stage, connect phones from the free end of C6 to battery positive and unscrew TC1. Set VR1 at about half its travel. Tune in a signal with VC1 and screw down TC1 until the receiver just begins to oscillate, backing off VR1 slightly should then control regeneration.

A meter in one battery lead should show a current of about 1-1.5mA, falling by about 0.2mA on tuning in a strong signal, due to increased base bias from the diodes. Regeneration becomes less easy towards the low frequency end of the waveband, so TC1 can be readjusted slightly later, for best over-all reception.

During normal use, VR1 **must** be adjusted as a regeneration control, and **not** as a simple audio volume control. Rotating VR1 towards maximum builds up volume, until oscillation begins. Sensitivity is very high just below this oscillating point. Should no results be obtained, connections in this part of the circuit should be checked.

When Tr2, 3, and associated components have been added, it is worth checking results by connecting phones between the collector of Tr3 and the battery negative line. This corresponds to points 5 and 6, Fig. 1. Volume on local signals should be very great, and more stations may be heard. There should be no audio distortion. If results are poor or distortion has arisen since adding Tr2 and 3, check resistor values and connections here.

Current drain with Tr1, 2 and 3 in use depends somewhat on transistors, but can be expected to be around 3-4mA. Should there be any fault, correct this before wiring the output stage.

Output Stage

As mentioned, connections to T1 in **Fig. 3** are for the listed transformer, and tag 1 is red. Other transformers have tags in different positions, but are equally suitable. Resistor values R7 to 12 are suitable for OC72s, OC81s and many similar transistors, in addition to those listed.

The output transistors are best purchased as a matched pair. It should then be found that the voltage at the junction of R8 and 9 is about half the supply voltage. This will not be so with unmatched transistors in Tr4 and 5 positions or with an error in value in R7, 8, 9 or 10. In practice, it is usually found that results are satisfactory if transistor voltages lie within about 20% of each other, if the transistors are otherwise matched.

Current taken by the whole receiver should be about 8-10mA, rising to 12-20mA peaks with good volume. Should current be around 8-10mA but extreme distortion spoil results after adding the output stage, check connections to T1. In particular, leads to one half secondary may need to be reversed.

Should current be much under 8mA, with weak, distorted reception; check that a mistake is not made in reading the values of R7-11. Should current be much over 10mA, with no signals tuned in (but with reception nevertheless good) R8 or 10 may be too high in value, or R7 or 9 too low. (This is not expected with 5% resistors).

Components List

Resistors:

R1	4.7kΩ	
R2	470Ω	
R3	33kΩ	10%
R4	8.2kΩ	
R5	1kΩ	
R6	1kΩ	
R7	2.7kΩ	
R8	100Ω	5%
R9	2.7kΩ	
R10	100Ω	
R11	4.7Ω	10%
R12	4.7Ω	
VR1	25kΩ pot. With switch	

Capacitors

C1	0.01μF 150V
C2	330pF 150V
C3	4μF 25V electrolytic
C4	0.01μF 150V
C5	100μF 12V electrolytic
C6	0.25μF 150V
C7	30μF 6V electrolytic
C8	100μF 12V electrolytic
VC1	300pF miniature variable
TC1	30pF trimmer

Inductors:

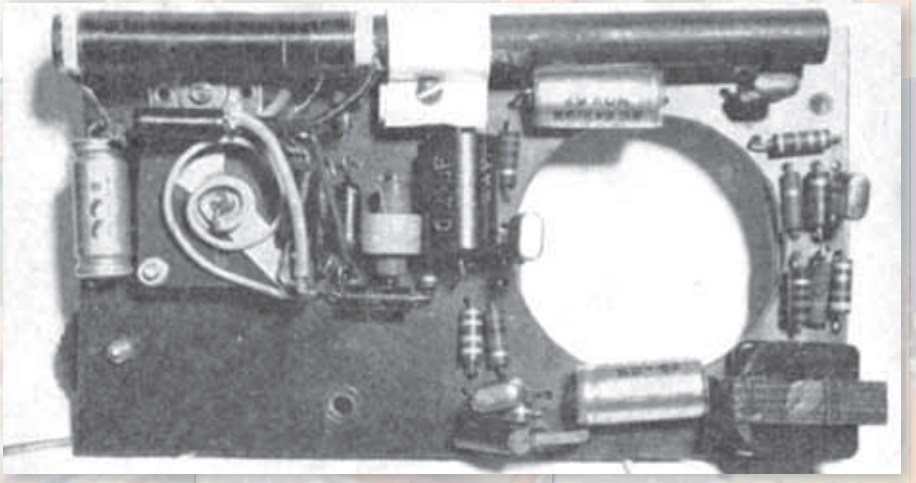
L1	see text
RFC	miniature 7.5mH r.f choke
T1	Single ended push-pull transformer 7:1 + 1 (Fotiphone L442 or similar) see text matched

Semiconductors:

Tr1	OC44
Tr2	NKT252
Tr3	NKT252
Tr4	NKT251
Tr5	NKT251
D1	OA81
D2	OA81

Miscellaneous:

Ferrite rod, wire, solder, Paxolin 5 x 3 x 1/16in., 75Ω speaker, case to suit, knob, dial, 9V battery.



Internal view of assembled receiver (less loudspeaker).

Loudspeaker Mounting

There is space for the usual 9V miniature battery, and receiver leads should have correct positive and negative clips. If the speaker is bolted to the Paxolin panel, a piece of thin felt, thick blotting paper, or similar material with a control hole can be placed between speaker and cabinet, to prevent vibration sounds.

The tuning scale is drawn on card, afterwards cemented to the case front. A knob of fairly large diameter is most suitable for tuning.

Round the world of WIRELESS


1134 PRACTICAL WIRELESS April, 1965

ROUND THE WORLD of WIRELESS

NEWS AT HOME AND ABROAD

Radio Show Successor—The '65 Show

THE National Television and Radio Show has gone for ever it seems, and in its place comes "The '65 Show", or to give it its full title, "The '65 international television radio record player disc tape recorder stereo hi-fi and musical instrument Show".

The organisers of the Show—Industrial and Trade Fairs Ltd.—plan a new "look" for the show as well as a new title. Emphasis this year will be on attracting the public, who will be admitted during all the open hours. (Last year at the National Radio Show public admittance was restricted to allow the trade time to entertain dealers in a relatively deserted Earls Court.) The one aspect of the show that has remained the same is its venue, Earls Court Exhibition Hall, London.

The dates of the show are August 25th to September 4th and the doors will be open from 10 a.m. to 10 p.m. each day except Sunday.

Perhaps the most noticeable change in the show—after the new name—will be the participation of manufacturers from abroad (see Round The World of Wireless, February issue). This innovation is expected to add fresh interest to the Show and make it one of the leading show-places for the world's radio and television industry.

The 1965 P.W. Film Show

FRIDAY, February 5th was the occasion of the 1965 PRACTICAL WIRELESS and PRACTICAL TELEVISION Film Show.

Once again this year the show was well attended by readers from all parts of the country. Many in the audience had been coming to the show for years, but there were also plenty of new readers attending for the first time.

The show is held every year at the Caxton Hall, Westminster, London, in collaboration with Mullard Ltd., and readers of PRACTICAL WIRELESS are invited to attend free.

Because of ill health, the Editor of PRACTICAL WIRELESS, Mr W. N. Stevens, was unable to take the chair at the show, and his place was taken by the Assistant Editor Mr. L. E. Howes. After his address of welcome, Mr. Howes introduced Mr. A. T. Collins, the Managing Editor, and Mr. I. Nicholson (see photograph) of Mullard, the speaker for the evening.

Mr. Nicholson then introduced the first film, which was entitled "The Electromagnet Waves". After this, a short talk with film and slide accompaniment dealt with some recent cathode ray tube developments.

An interval of 25 minutes followed when there were refreshments for the audience.

Mr. I. Nicholson of Mullard Ltd., who was the speaker at this year's Film Show.

In the second half of the programme Mr. Nicholson gave a talk on "Current Topics and Present Trends" and had on display a number of new Mullard devices which fall into the micro-miniature class.

The evening ended with a question and answer session during which Mr. Nicholson replied to questions put by the audience.

NEW SCOTTISH V.H.F. RELAY STATION

THE BBC's new television and v.h.f. sound relay station which has been built near Grantown-on-Spey, Morayshire, was recently brought into service.

This new transmitting station will transmit the BBC-1 television programme and the three v.h.f. sound programmes. On v.h.f. horizontal polarisation will be used with the following frequencies: Scottish Home Service 94.2Mc/s: Light Programme 89.8Mc/s and Third Network 92.0Mc/s.

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The 1965 PW Film Show

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The Practical Wireless Trimmer and Alignment Set


The PRACTICAL WIRELESS TRIMMER and ALIGNMENT SET

Oct 1964

Trimming tools are not only essential to anyone undertaking serious constructional work on receivers, but they are expendable. This is not to say they necessarily get broken, but like the canteen spoon they are liable to become elusive at the critical moment – usually because someone else has borrowed them.

Many reader, no doubt, already have a set of trimming tools, in particular those who obtained the set we presented with the April issue this year. Others make do with improvised trimming tools fashioned from plastic knitting needles or other suitable materials. We are certain, however, that all readers will welcome the new set of tools being presented with this issue – whether they already have trimming tools or not.

The new set is based on the first set but is designed in a diffent way. Thus the two sets may be, in some ways, complementary. One great improvement is the material from which the new tools are made; this is a new very tough plastic, admirably suited for such applications.

The photograph in the heading shows the tools assembled, and a description of their use follows:

No. 1 has a wide "screwdriver" blade (though it should not be used as such!) and is used to adjust mica and ceramic trimmers, ferrite pot cores, and slotted hex-nut compression trimmers.

No. 2 has a fine, narrow blade for the adjustment of slotted cores widely used in transistor radio receivers. The slots are often carried right through the core and the correct method of adjustment is to insert the trimming tool as far as possible before turning to reduce torsion. Since this is a very popular size, two of these are provided in this kit. No. 3 being a duplicate.

No.4 has a blade suitable for the majority of iron dust cores employed in radio and television receivers (except transistor radios).

No. 5 has a slotted end, which may be used for turning the flattened shank (usually brass), which is used to move a ferrite core in the coil of many radio sets and television turret tuners.

No. 6 is for adjusting tuning slugs with hexagonal shaped holes. This has a long shank so that it may be used with transformers fitted with two such slugs one above the other. The trimming tool is inserted through the upper slug without disturbing its setting, then inserted into the lower slug, which can than be adjusted independently, the diameter of the shank is small enough for it to rotate in the hexagon bore of the upper slug.

Nos. 7 and 8 are extension shanks. Each has a hole in the top for receiving the spigot of any of the other trimming tools. No. 7 in addition to the hole, also has a spigot, so that it may be inserted into the end of No. 8 thus extending even further the length of the composite tool. ●

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Total cost of books ordered: ..... Price (£) .....

Postage & Packing charges: Please remember to add P&P to your order. (£).....

UK: £1.75 P&P for one item, £3.00 for two or more

Overseas Europe:
£3.00 P&P for one, £5.00 for two, £2 extra per item for three or more

Overseas Rest of World:
£5.00 P&P for one, £10.00 for two, £2 extra per item for three or more

Total cost of order **including postage** .....**Price (£) .....**

Send this completed form to:

Book Store, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

Payment Details. Please note: For security purposes, you must include your house number and postcode.

Name .....

Address .....

.....

.....

Postcode .....

Telephone (Daytime) .....

I enclose my Cheque/Postal Order for £.....

Please note: Cheques MUST made payable to PW Publishing Ltd. and please write your cheque guarantee card number on the reverse.

or please debit my Access/Visa/Amex

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date ..... Security No. ☐☐☐

or please debit my Maestro/Solo

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date ..... Security No. ☐☐☐

Start date ..... Issue No (if on card).....

Signature.....

Orders are normally despatched by return of post but please allow 28 days for delivery. Prices correct at the time of going to press.
Please note: all payments must be made in Sterling, cash not accepted.

Classified Ads

To advertise on this page see the booking form below.

DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. *Practical Wireless* advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of *Practical Wireless* wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

Valves

VALVES:- OVER 50000 STOCKED Ham, Vintage, Military, Audio. SAE for FREE list to: Wilson Valves, (Jim Fish G4MH), 28 Banks Ave., Golcar, Huddersfield, West Yorks HD7 4LZ. Tel: 01484 654650/649380/650725. Mobile:- 07733 283084. E-mail: wilsonv@zoo.co.uk Visa etc. Fast & personal service.

VALVES AND ALLIED COMPONENTS IN STOCK Ring for free list. Valves/ books/ magazines wanted. Geoff Davies (Radio). Tel: 01788 574774.

TOP PRICES PAID

for all your valves, tubes, semi-conductors and ICs.

Langrex Supplies Ltd.
Unit 4, Daux Road, Billingshurst, W. Sussex RH14 9SJ
TEL: 01403 785600. FAX: 01403 785656.

Repairs

REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Medway Aerials, Rear of 14 Luton Road, Chatham, Kent ME4 5AA. Tel: 01634 845073.

Aerials

GAREX ELECTRONICS VHF/UHF accessories and aerials, PMR equipment and spares. www.garex.co.uk

Tel: 0771 4198 374 PO Box 52, Exeter EX4 5FD.

For sale

Qtz x-tals 455kHz to 150MHz Std 10.106, 10.245, 10.7, 11.155MHz £1.00/unit. Callg 3.56, 7.030, 21.06, 28.06 £1.00/unit. 1.4MHz fltrs £14.00. 10.7MHz 10kHz fltrs £3.25 P&P £1.00 + VAT. IQ Electo 0208 391 0545. vincent@jakomin.fsnet.co.uk

Wanted

OLD HALF INCH FERRITE RODS Must be half inch in diameter and be six inches long or more. Tel: Peter Tankard 0114 2316321.

BABANI BP276 SW superhet receiver construction. No reasonable price refused. Tel: 01935 432845.

QSL Cards

FULL COLOUR QSL CARDS for all your QSL needs. Shirts and caps with callsigns and also ham cartoons by GW3COI. For free samples contact Chris M0DOL. E-mail: qslers@aol.com P.O. Box 184 Northampton NN3 9JH.

Classified Advertisment Dept.
PW Publishing Ltd.,
Arrowsmith Court,
Station Approach,
Broadstone,
Dorset BH18 8PW

ORDER FORM FOR CLASSIFIED ADS

PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0870 224 7820, Fax: 0870 224 7850.

Please insert this advertisement in the ..... **issue of *Practical Wireless*** (if you do not specify an issue we will insert it in the next available issue of *PW*) for ..... insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 17.5% VAT to total).

Name: .....

Address: .....

.....

.....

.....

Telephone No.: .....

Box Number @ 70p: Tick if appropriate ☐

Category heading: .....

Please photocopy this form or write on a separate sheet if you prefer

Bargain Basement

SEND YOUR ADVERT TO:-
***PRACTICAL WIRELESS*, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW**

For your advert in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry.

Bargain Basement rules - £4 per advert

Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words f**or your contact details on the form provided and send -it together with the dated corner flash and your **payment of £4 (subscribers** can place their advert **free of charge** as long as they provide their **subs number and corner flash),** cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0870 224 7820**.

Please help us to help you by preparing your advert carefully. Any advert which contains **??** marks indicates that the advertiseing dept. could not read/interpret the wording.

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.**

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

DRAKE TR-7 PSU accessories, manuals MM 100W 2m/70cm linear amps. Icom IC-271E 2m base station. Other bits. E-mail for list, all good condition. Best offers, buyer inspects and collects. Tel: Geoff 077759 81088 (Banbury). E-mail: g4ded@ukonline.co.uk

HEATSINKS 150 x 125 x 50mm 0.5deg. R.S. Cat. No. 271-870 (8 of). New, open to offers. Tel: Andrew 0161 220 8624 (Manchester).
E-mail: andrew_knowles@vodafone.net

DJ-X3E 0.1-1300GHz FM and AM plus SMA to BNC adapter. NiCads, charger, £50. Plus 2 meter TR-7010 Trx, £20. Tel: M3EHA 01606 597342 (Cheshire).

YAESU FT-100 MkV FIELD Mint condition. Warranty to July 2007, £850 no offers. Tel: 01792 363442 (Swansea).

TRAP DIPOLE MTD-1 covers 10-15-20 metres. Fitted Balun only three months old, £30. MFJ-971 QRP ATU built-in SWR cross needle meter. Boxed, manual as new, £60. Tel: G4AQZ QTHR 01255 429117 (Clacton-on-Sea).

ELECTRONIC MORSE KEYER PIC, programmed for 5-35w.p.m. For practice or transmit. With automatic switch-off. Easy build, details provided. Needing very few extra components, £10. E-mail: chick@chickene.freeserve.co.uk

KDK-2016E 2 metre transceiver vintage 1979, with handbook and circuit details. All paperwork plus reviews, *PW* January 180 among others, needs some TLC. Was working, stored in loft. No bottom cover or microphone but almost any 4-pin would work. A bit of yesteryear, easy to get at components if needed. Also, Icom IC-B1050 CB ready for 10FM conversion, have all circuit details and reviews. Both items open to offers. E-mail: wendypm3@aol.co.uk or try wend-michael@wmevans.wanadoo.co.uk Write: M Evans, 85 Hillside Road West, Bungay, Suffolk NR35 1RH.

KENWOOD SM-230 station monitor. As new conditon, manual, £350. Buyer collects or pays postage. Tel: 01482 896471 (Hull).

MARCONI SIGNAL GENERATORS UHF/VHF FM 450-470MHz, 68-210MHz, £20. AM/FM VHF 135-220MHz, £49. MI audio distortion analyser, £40. True RMS meter, 10mV-300V, Telonic small 3.5" oscilloscope, GR generator 2GHz-32GHz, £35. MI RCL bridge, £28. Tel: 01234 354767 (Bedford).

TRIO R-2000 communications receiver complete with fitted VC-10 VHF converter. Excellent condition, boxed with manuals, £90. MFJ-462-B Morse multi-reader, as new. Boxed with manual, £60. Tel: 01825 722071 (Susssex).

FT-990 MINT CONDITION DC model, 2 extra filters 20K and 500CW, £650. Boxed with manual. TS-570DGW mint condition under 2 years old, £525. Boxed with manual. Tel: 01740 651938 (Co Durham).

KENWOOD TH-26E VHF hand-held, complete, boxed, £49 plus carriage. Wanted black plastic lid lugs for FT-221R. Tel: John G8BXO QTHR 01769 573382 (North Devon).

ROBERTS RC-828 RADIO clean, good order. Mains, battery, large screen. AM RF gain, BFO, AM narrow FM, manual, auto. SW 0-30MHz, FM/MW/LW, cassette, direct access. Ext antenna, lovely radio only £70. Tel: Frank 01608 663745 (Warwickshire).

CUSHCRAFT R-6000 vertical 20-6m, £125. Buyer collects. Tel: G4OEC 01278 741527 (Somerset).

ICOM IC-R2 hand-held scanner/receiver. Frequency covers 0.495-1309.995MHz in FM, AM and WFM with 450 memory. Mint condition, as new, boxed, manual, £75 + post. Tel: 01584 872618 (Ludlow, Shropshire).

STRUMECH VERSATOWER HD-40 surplus to requirements and selling on behalf of the North Norfolk Amateur Radio Group. Complete with ground post, rotator cage and new fittings. Ready for collection, £350. Tel: G3MJX QTHR 01263 824155 (Norfolk).

MFJ CW KEYER READER 464 plus MFJ keyboard. All V.G.V. Offers? Tel: 0777 649 5381 after 6pm please. (Dorset).

ROBERTS PORTABLE RADIO RC-828 all-mode. Includes SW 0-30MHz, light up screen and cassette. World band receiver in immaculate condition. Gift at only £65. Tel: Frank 01608 663745 (Warwickshire).

KEMPRO ROTATOR model KR-400RC microwave linear amplifier model MML-144/100-HS, £60. Microwave transverter model MMT-50-155 20 Watts, £70. Kenwood V-UHE model TS-77E. Need TLC, £90. Realistic receiver suit SWL, £40, carriage extra. Tel: Dave 01443 683912.

YAESU FT-817 mains supply. Manual Diamond high gain vertical antenna and fittings. Mobile battery and charger all in good condition. Amateur giving up, £300. Tel: 0121 743 4519, evenings. (West Midlands).

YAESU FT-857 DSP transceiver. Hardly used, mint, £375 + P&P. SG-237 SGC compact ATU. Can handle 100 Watts. Rarely used, mint, £170 + P&P. Both fully boxed with instructions. Watson W-25SM PSU, £30 + P&P. Tel: 01506 631673 evenings, or 0787 639 6882 anytime. (Lothian).

YAESU FT-990 transceiver. Dirland SS-3900F transceiver. Kenwood TS-140S. Radioshack PRO-2045 scanner. MFJ-969 deluxe. Zetag B-300P pre-amp. Everything £1000. Tel: Edward 00353 49952 1963 anytime. Mobile: 0044 779 6468536 (Co Cavan, Ireland).

YAESU FT-1000MP MkV mint condition. Buyer collects. Bargain at £1100. No offers, cash only. Tel: Mr Cochran 01373 858765 (Westbury, Wiltshire).

KENWOOD 570D, £475. MFJ-949E a.t.u., £90. MP-925 p.s.u. 25/30A, £70. All as new & boxed. RTTY modem £15. Tonituna, £20 0r £625 the lot plus carriage. Tel: 01745 570538 (North Wales).

OLD PWs from 1936. Radio constructors old radio books. aam@talktalk.net (Rainham, Essex).

Icom IC-R8500 HF/VHF/UHF receiver. Mint, unused. Silent key sale, £650. Tel: 01279 815020 (Essex).

CLANDESTINE RADIO Type GRC109. 50's station comprising TX, RX, PSU, Xtals, phones, info, spare PSU, scrap TX, £495. Buyer to inspect and collect. Tel: 01775 766398 evenings only (Spalding, Lincs).

WANTED

OLD HALF INCH FERRITE RODS must be half inch in diameter and be six inches long or more. Will pay very good money for the rods. Tel: Peter Tankard 0114 2316321 between 9am and 10pm (Sheffield).

GOOD, PREFERABLY NEW unused vibrators 12 volt if possible. Write: Mr F W Hall, 38 Elmbank Way, Hanwell, London W7 3DG.

6kHZ AM FILTER type XF30B for FR-101 receiver. Tel: Tony G3MJX 01263 824155 (Norfolk).

MFJ-TRX for 40 or 20 SSB. Will pay £60 for one in fair working order and also require a 2 meter 290Mk1 2.5W fair working order, £60. Tel: M3EHA 01606 597342.

MONITORING MONTHLY magazine September 2006. Tel: John Stacey G8BXO 01769 573382. 3 West Park, South Molton, Devon EX36 4HJ.

SONY TA SP-55 amplified control panel. Gone brainless, can't turn on or complete working amplifier for spares please. Write if you can remember how to, thank you. Paul Eeles, 9 Blackpan Close, Sandown, Isle of Wight PO36 9QH.

B40 RECEIVER must be in good working order. Wanted, can anyone help? Will pay good price for good one and will collect. Tel: Meryl 01538 385735 (Staffordshire).

BOOK TITLE *101 Ways to use your VOM and VTVM* by R.G. Middleton. Tel: Arthur 01353 723235 (Ely).

YAESU FRG-770 working. Tel: 0208 2921042. (London).

FRONT PANEL KENWOOD TS-950SD. Mint condition only asap. Tel: 01279 815020 (Essex).

bargain basement order form

Please insert this advertisement in the next available issue of *Practical Wireless*.

❑ **For Sale** ❑ **Wanted** ❑ **Exchange**

PLEASE NOTE: as a security measure, you must include your house number and postcode.

Name.....

Address .....

.....

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

Telephone Number .....

please write in block capitals

CARD NUMBER

Signature..... Security number
last three digits on the back of the card

Switch issue number (if on card) .....

Start date of card ..... Expiry date of card.....

My Subs Number is.....(or mailer label) .....

	(30)		

CONTACT DETAILS FOR ADVERT.

Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number?

Your advert, you decide! PLEASE - No FAXed Ads!

			(12)

B.B. May '07

TRADER'S TABLE

The equipment for sale on this page is secondhand or ex-demonstration

Disclaimer

Advertisements from traders for *equipment that is illegal to possess, use or which cannot be licensed in the U.K, will not be accepted. While the publishers will give whatever assistance they can to readers or buyers having complaints, under no circumstance will the magazine accept liability for non-receipt of goods ordered, late delivery or faults in manufacture.*

SHORTWAVE SHOP LTD

01202 490099

TRANCEIVERS

ICOM IC736 HF/6 ..... £550
ICOM IC703 ..... £375
ICOM IC703 ..... £350
YAESU FT2800 ..... £129
YAESU FT817 ..... £365
YAESU FT897 ..... £495
YAESU FT 990 ..... £P.O.A.
YAESU FT 100D ..... £P.O.A.
ICOM E 90 + 4M HANDY £195
YAESU 747 HF £295
NAVICO AMR1000 145MHZ £50
TRIO TW4000A DUAL BAND £85
AKD 2001 ..... £60
KENWOOD TR751E MULTIMODE £235
ICOM IC208 2/70 ..... £155
YAESU FT290R £125
YAESU FT690R £125
KENWOOD TS690S £599
KENWOOD TS120S £195
YAESU VX5R £125
ICOM IC718 ..... £350

RECEIVERS

BEARCAT 278 BASE £95
COMMTEL £60
KENWOOD R5000 ..... £395
SONY SW11 ..... £20
BEARCAT 278 BASE EX DEM £139
BEARCAT 278 BASE S/H £99
SANGEAN AT818 ..... £85
ROBERTS 9914 ..... £60
AOR 5000 ..... £890
SONY SW07 ..... £25
ICOM 8500 ..... £695
AOR EM8200 MEMORY £35
GRE PSR282 ..... £65
NRD/JRC 535 ..... £420
REALISTIC DX395 ..... £125
AOR 8600 ..... £150
YAESU VR5000 ..... £400

ACCESSORIES

NISSIE BASE MIC YAESU/KENWOOD £55
YAESU SP-6 BASE SPEAKER ..... £P.O.A.
YAESU MD-1c8 BASE MIC ..... £P.O.A.
MFJ 432 VOICE MEM KEYER ..... £P.O.A.
YAESU MMB-62 MOBILE BRACKET ..... £P.O.A.
YAESU MMB-67 QUICK RELEASE MNT ..... £P.O.A.
YEASU YSK-100 SEPARATION KIT ..... £P.O.A.
YAESU DVS-4 DIGITAL VOICE MEM ..... £P.O.A.
YAESU DSP-1 DSP UNIT ..... £P.O.A.
YAESU FVS-1A VOICE SYNTH ..... £P.O.A.
ICOM SM6 BASE MIC £49
KPC-2 NC £85
PACCOMM TINY-2 ..... £85
TOKYO HL50B AMP £180
ERA MULTIREADER £45
DIAWA 144MHZ AMP £30
DIAWA CAN 1001 HF AUTO ATU £125
MFJ 948 ATU £55
GLOBAL AT200 ATU £49
GLOBAL AT1000 ATU £60
RN ELECTRONICS TRANSVERTER £55

For latest list please see www.shortwave.co.uk

NEVADA

023-9231 3090

Icom R10 All Mode Scanning Receiver £179
Icom R2 Compact Handheld Scanner c/w case (0.5-1300Mhz) £89.95
Uniden UBC180XLT Handheld Scanning Receiver £109
Yupiteru MVT7100 All Mode Scanning Receiver £149
AOR 7030+ Receiver c/w NB, Filter Board & Remote Control £699
Grundig YB500 Receiver £89
Roberts R861 Portable All Mode Worldband Radio £129.95
Eton E1 Shortwave Receiver £325
Icom 7000 HF/VHF/UHF Mobile with DSP / new display £799
Icom 7400 100w HF/2/6m Base Transceiver with DSP/ATU £999
Icom r-8500 Communications receiver immaculate, boxed £895
Kenwood TS-690 HF + 6m Base all mode £499

Kenwood TS850S 100w HF Base Transceiver £699
Yaesu FT847 HF/VHF/UHF 100W Base Station Transceiver £799
Commtel Base 40 Channel Base CB Transceiver £89
Midland 98+ Mobile CB Transceiver £69
Zetagi M27 Antenna Matcher £20
Bencher Keyer Bencher Paddle Keyer £59.95
Adonis AM-601 Desk Microphone (Wired 8 pin Yaesu) £47
Amdat ADC60 Frequency Standard Clock £99
Dewsbury S/TUNER Super Tuner £25
Elmic CONTROLS Noise Limitor £10

Icom AT160 Coaxial Auto ATU £179
Icom AT180 Auto Tuner to suit Icom 706/7000 ..... £225
Kenwood PS30m 20amp Power Supply £110
LDG ATU Antenna Tuning Unit £139
MFJ 784 DSP Filter £129
MFJ 784B Digital Noise Filter £149.95
MFJ 9406 6m SSB Transceiver c/w microphone & manual £139
MMT144/28 10watt Transverter £89
Morse Key Morse Key £15
Pakratt 232 Data Terminal & Leads £99.95
Palstar PS04 2-4 Amp Power Supply £14
Timewave 59+ Digital Noise Filter £159.95

Check our web site for latest items available. E&OE. Prices quoted are in pounds sterling and exclude carriage

WATERS & STANTON

01702 206835

Icom IC-821H 2m, 70cm All Mode Base Transceiver 45/40W 12V £549
AOR AR-3000 100kHz-2036MHz All Mode Receiver 400ch. 12V + psu £449
Alinco DJ-190T 2m FM H/held Transceiver + CTCSS £99
ADI AT-400 70cm FM H/Held with Battery box 420-465MHz RX £89
Kantronics KAM plus Multimode Dual Port Data Controller + Pactor £149
GRE PSR-282 66-512MHz (with gaps) AM,FM Hand Held Receiver 200ch. £69
Kantronics KAM Multimode Data TNC £99
Ameritron ALS-600XCE 10-160m Solid State 600W Amplifier with 80W in £849
AKD 2001 2m FM Mobile Transceiver Channelised 25W £89
Optoelectronics Model 40 "Scout" 10MHz-1.4GHz Frequency Counter + Reactive Tune & 400ch. £199
Palstar KH-6 6m FM H/Held with CTCSS, NiCd, Charger, DC lead £75
Sharman PS-205 13.8V 20A Regulated PSU 25A Surge No Meters £59
Sony ICF-SW07 Mini Receiver + FM stereo, SSB & "One Touch" tuning £169
Icom PS-85 13.8V 20A (max) Matching PSU £179
SEC 1212 13.8V Switch Mode Regulated 12A (max) PSU £45
Alinco DJ-496E 70cm FM H/Held Transceiver with CTCSS, DTMF keypad, NiMH & charger £99
Alinco DJ-496E 70cm FM H/Held Transceiver with CTCSS, DTMF keypad, NiMH & charger £99
Mirage RC-1 Linear Remote Control Unit for Power, Mode & Preamp with 25' of cable £29
Kantronics KAM-98 Multimode Digital Data Controller with Pactor, GTOR, AMTEXT & NMEA-0183 GPS £279
Icom IC-706 HF,6m,2m All Mode Mobile/Base Transceiver with Gen.Cov.100/100/10 Watts £449
Icom IC-T3H 2m FM transceiver with CTCSS and DTMF keypad £89
Sony ICFSW07 Mini Receiver + FM stereo, SSB & "One Touch" tuning £169
Tokyo HX-240 HF Transverter 3.5-28MHz with 2m IF 40W £139
Icom IC-2100H 2m FM Mobile Transceiver 55W 113ch. + CTCSS £149
Uniden UBC-3300XLT 25-1300MHz (with gaps) AM, FM, WFM 1000Ch. Alpha-tag + TrunkTrackerIII, CTCSS £129
SGC PortaPak Portable QRP Transceiver SSB,CW 25W 10 x D cells or 12V £599
MFJ MFJ-461 Pager size Morse Code Reader + LCD Display £59
Alinco DJ-X7 100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch + 8.33kHz step £79
Alinco DJ-491T 70cm FM H/Held Transceiver 40ch. + DTMF keypad & CTCSS £115
Uniden UBC-68XLT 66-512MHz (with gaps) FM Receiver 80Ch. 4 x AA or 12V DC £59
Uniden UBC-105XLT 25-960MHz (with gaps) AM,FM Receiver + 8.33Mhz step 100Ch. 4 x AA or 9V DC £49
MFJ MFJ-484C Grandmaster CW Memory Keyer + 4 Random Access Memories £89
Yaesu VX-150 2m FM Mil. Spec. 5W Hand Held Transceiver + Full CTCSS & DTMF keypad £79
Icom IC-R2 0.495-1309MHz AM,FM & WFM Hand Held Receiver 450Ch £79
SSE PSU-101 Desk Stand with 2 x 12V DC outputs 240V AC £29
Icom IC-706 MkII HF,6m,2m All Mode Mobile/Base Transceiver with Gen.Cov. 12V £449
Icom IC-R2 0.495-1309MHz AM,FM & WFM Hand Held Receiver 450Ch £79
M. Modules MML144/30-LS 2m 1-3W in, 30W out Linear with Preamp £69
Matsui MR-4099 Portable World Band Receiver with FM stereo and SSB £59
Uniden UBC-3300XLT 25-1300MHz (with gaps) AM, FM, WFM 1000Ch. Alpha-tag + TrunkTrackerIII, CTCSS £129
Kenwood TR-751E 2m All Mode Mobile/Base Transceiver 25W £199
Midland Alan 42 Multi 40ch 4w CEPT CB Han Held Transceiver with Battery Box, AC Charger & DC Power Lead £69
Uniden UBC-278CLT 25-174,406-512,806-956MHz AM,FM,WFM + MW Desk/Mobile Receiver 100Ch. 10V + psu £99
Icom IC-R7000 25MHz-2GHz All Mode Base Communications Receiver 99Ch. mains.. £349
Radio Shack Pro-97 25-1300MHz (with gaps) AM,FM Hand Held Receiver + "SignalStalker" 1000Ch.Alpha & PC input £75
Yaesu FT-290R II 2m All Mode Portable Transceiver 2.5W 12V or 9 x C cells £199
Alinco DX-70TH HF,6m All Mode Mobile/Base Transceiver with Gen. Cov. 12V £399
Realistic Pro-43 68-999MHz (with gaps) AM,FM Hand Held Receiver 200Ch £69
Icom IC-703 HF& 6m All Mode QRP Mobile Transceiver + Auto ATU, Gen.Cov. 10W 12V £339
AOR SDU-5600 Colour Spectrum Display Unit for Receivers + PC control £649
Optoelectronics Digital Scout 60MHz-2.6GHz Digital Frequency Counter + Field Strength, Reactive Tuning & 1000 Memories £259
AOR AR-5000A +3 10kHz-3GHz All Mode Communications Receiver with TXCO, Sync AM, AFC & NB 2000Ch. 12V + psu £1,199
AOR AS-5000 3 Way Antenna selector for AR-5000 Receivers £65
Uniden UBC-3300XLT 25-1300MHz (with gaps) AM, FM, WFM 1000Ch. Alpha-tag + TrunkTrackerIII, CTCSS £129
Steepletone MBR-2000 Portable FM Stereo,MW & SW Radio 20ch £14
Yaesu FT-290R 2m All Mode Portable Transceiver 2.5W 12V or 9 x C cells £159
Icom IC-756 HF,6m All Mode Base Transceiver + ATU, DSP & Gen.Cov. 12V £749
MFJ MFJ-945E 1.8-30MHz Mobile ATU + meter 300W £65
Realistic DX-394 150kHz-30MHz AM,CW,SSB Receiver 160Ch. Mains/12V £99
Realistic Pro-43 68-999MHz (with gaps) AM,FM Hand Held Receiver 200Ch £69
Kenwood MC-60A Electret Desk Mic with Preamp, Dual Impedence £89
Yaesu VX-5R 6m,2m,70cm FM Micro Hand Held Transceiver 5W + Full CTCSS & Wide RX £129
Uniden UBC-780XLT 25-1300MHz AM, FM, WFM Desk/Mobile Receiver + Trunk Tracking 500Ch. 12V + psu £149
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Rob's chance to air his views!

Topical Talk

This month, Rob G3XFD carries on discussing the problems caused by nuisance transmitters on the Amateur bands and looks at an interesting E-mail from reader John Crondall regarding higher transmitting power levels for UK licensees.

Thank you for joining me here from the Keylines page where I first mentioned deliberate interference nuisance transmitters heard on the Amateur Bands. Often referred to as the microphone scratchers & whistlers the effectiveness of their attempts to disrupt QSOs is probably low because of the use of the notch filter provided by modern digital signal processing (DSP). However, despite DSP the rather disturbed people who try to disrupt our hobby must be either persuaded they are doing wrong and stop the abhorrent behaviour themselves, or else be identified and their details given to the authorities for action to be taken.

As I've already mentioned, I feel it's essential that we should never acknowledge the efforts of the sad individuals who try to disrupt QSOs. Instead, with the nuisance station unaware of what's happening when they transmit, we can work together, quickly get a direction finding (DF) bearing, compare notes and inform the authorities. And, of course, at this point I fully realise that now I've written this, the offenders will either be warned off or alerted as we discuss the idea!

Direction Finding Problems?

At first, the techniques and equipment required for DF work may seem overwhelming. Added to this is the fact that the scratchers only spend a short time transmitting. Fortunately, relatively recent history provides an excellent example of what can be done with co-ordination of efforts. The 'Huff Duff' DF system developed in the Second World War is an excellent example. Specifically set up to monitor the U-boat menace it was extremely effective and basically very simple.

Set frequencies were monitored by a host of DF stations. When signals were heard bearings were quickly taken and passed on immediately to a central control point. Even the shortest transmission led to the submarines being detected on the surface. Eventually, especial cathode ray tube (c.r.t.) displays were used to help plot signals and get bearings and limited automation was introduced.

Many of us already have DFing skills and others can quickly learn. We can break transmission briefly during our 'over', leaving the nuisance transmitter exposed for bearings to be taken. With teamwork I'm sure that we can pinpoint the sources very quickly indeed.

I know co-operation works because in recent years, convinced that someone was deliberately interfering with the International Beacon Project (IBP) 14.1MHz transmissions, I took bearings in various parts of the south of England and these indicated the transmitter was in Eastern Europe. Later, further bearings from East Anglia (taken during a *PW* trip) confirmed a specific area outside a town in a country newly entered in to the EU. The Radiocommunications Agency then took over and the nuisance signal soon disappeared! If you are interested in helping with this problem, please drop me a line, by working together we can help Ofcom to help us.

High Power Petition

News of the existence of a petition to encourage an increase in the legal power levels for Amateurs in the UK was given to me by a number of readers. **John Crondall** (Letters this month) also came to talk to me at the *PW* stand at the Junction 28 QRP rally and like the other readers, asked me if I thought such a petition would succeed.

In reply I've only been able to refer to my own experiences, which include living deep in the Hampshire countryside, in the remote North West Scottish Highlands and in a heavily built up but pleasant Victorian/Edwardian seaside town. In my former country QTHs most TV sets were prone to EMC problems because of fringe area reception, so there were no high power transmitters for G3XFD/GM3XFD! In the town the problems are due to high-density housing and I'm fortunate enough to operate at the 100W d.c. output level using c.w. when necessary, due to conditions.

At best I think higher power permits from Ofcom may eventually be given to individual Amateurs who can prove – perhaps having been given temporary testing permission – that they won't cause EMC problems (The onus being on the Amateur to prove it with neighbours – thus opening a possible can of worms). However, enough of my opinion – what's yours on this subject? Do you want higher power levels? Are they necessary? Are you able to operate using a linear amplifier on h.f. and v.h.f. now? If so, do any problems occur? Please write in and share your experiences because they could be helpful for those of us who tread warily when using anything above the 50W d.c. output level.

Rob Mannion G3XFD/EI5IW

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