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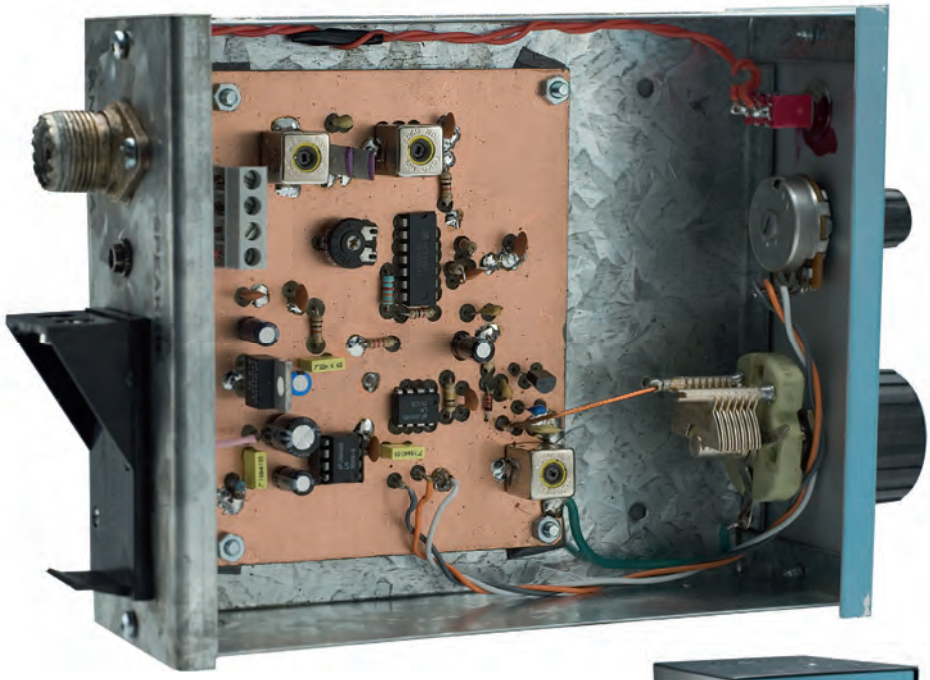
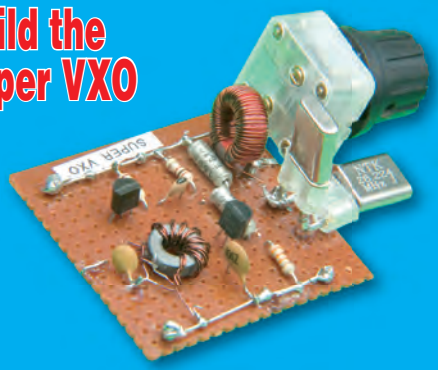
Britain's Best Selling Amateur Radio Magazine

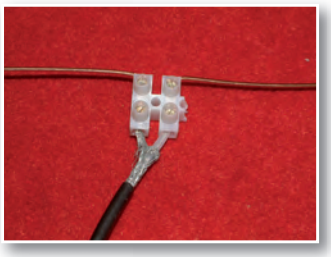


Build the Clara Direct Conversion HF Receiver

On the Air with the K3!

Build the Super VXO





What Next? Temporary Antennas

Radio Personality

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New Hockley D-Star Repeater GB7SS! Rx 439.8625 Tx 433.2625

Waters & Stanton First with VX-8

VX-8 Tri-bander

* Weather Proof
* Similar to VX 7 Spec.
* Built in TNC & APRS
* Optional GPS
* Optional Blue Tooth

Waters & Stanton were given a sneak preview of this new radio by Yaesu's top designer Mr Fujiki. We will have the first UK stocks and it should be available September. This will be the first truly portable APRS radio, and with Blue Tooth, could easily function as a mobile.

Exclusive - get FREE IC-7000kbd with matching lead for instant RTTY/PSK31

NEW Icom IC-7700 HF Transceiver

• 1.8 - 54MHz up to 200W PEP • SSB CW FM AM

Icom have produced a realistically priced transceiver based on the IC 7800 technology. Dual DSP units form the heart of the design. The rx. front end has a preselector and boasts 40dBm i.p. that equals the IC 7800 at twice" the price! The 7" colour LCD panel is truly amazing in clarity. The spectrum scope allows close signal and band monitoring. Includes built in PSK31 and RTTY and FREE IC 7000kbd keyboard no PC needed! Other features: IF notch, professional grade 6m rx, digital voice recorder, dual USB ports, auto atu etc.

£Phone!

FT-450 NEW YAESU

160m 6m 100W
SSB CW AM FM
IF DSP
Voice Memories
23 x 8.4 x 22 cm

Also get voice recorder and announcer!

W&S £529 D

Deal: *Get FREE Extra DC Lead!* Exclusive to PW Readers Request when ordering

FT-450AT with Built In ATU **£609 C**

FT-950 NEW YAESU

100W
160 - 6m

W&S £999 D

DSP filtering, incorporating features such as Variable Bandwidth, IF Shift, and Passband Contour tuning. Digital Noise Reduction and Digital Auto-Notch Filtering. On transmit you get a three-band graphic equaliser and the ability to change the transmit SSB pass-band. There are plenty of other features which you will get from the Internet. What you won't get elsewhere is our offer to PW readers!

Deal: *Get FREE W-25XM power supply worth £99 when you buy FT-950 from W&S. Offer to PW readers only at time of order.*

These Yaesu offers expire 31/5/08

PAY NOTHING FOR 12 MONTHS

BUY NOW PAY LATER AT ALL 3 STORES

AVAILABLE ON ALL SALES OVER £200

On most items over £200 in value it is now possible to buy with a finance agreement and pay nothing for 12 months without incurring ANY interest charges. If paid in full within 12 months then a £29 settlement fee is payable. **Typical example** of Buy Now Pay Later: Cash price - £600. Pay no deposit and pay the full amount in 12 months. Pay no interest – just £29 fee. **OR** - 29.8% APR - Then repay £30.85 per month for 36 months. No settlement fee. Total amount due £1110.60. Interest is calculated from date of agreement. All finance is subject to status – written quotation on request.

FT-897D+ YAESU

The FT 897D+ is exclusive to W&S and comes with dual DC leads making it the ideal base portable radio.

STOCKS LIMITED

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

W&S £514 D

Get Ready For D-Star! (first repeater at Herne Bay)

Log on to GB7SS repeater at Hockley

ICOM IC-E2820

This dual band mobile offers D Star facillities with digital speech as well as normal FM at 50W

IC-E2820 Mobile FM **£379 C**
IC-E2820 with D Star **£519 C**

PW customers can claim an extra DC lead when ordering!

IC-E91
Fitted with D Star
£349.95 C

D-Star Repeater Low cost subsidised Icom repeater available to clubs when purchasing D-Star Radios from us. Phone for details.

FT-2000 YAESU

1.8-30MHz +6m 100W
£1695 D

FT-2000D 200W
£2399 D

The FT 2000 series has become the DXpedition favourite. With front end preselector and dynamic range, it handles crowded bands with ease. You can dial in selectivity right down to 25Hz. Transmitted audio quality can be adjusted over an enormous range via the built in DSP. And if you opt for the FT 2000D, it is almost having a 2 el. Yagi for FREE.

PART EXCHANGE? We take in almost any ham gear - even old clunkers!! Give us a call TODAY

FT-857D YAESU

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

W&S £479 D

FT-DX9000D YAESU

Yaesu's top radio series of transceivers for the ultimate experience!

FT DX9000Contest £3799 D
FT DX9000MP £8299 D

W&S £7299 D

FT-817ND YAESU

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

Deal: bhi DSP fitted **£449**

W&S £349 D

TM-V71E NEW KENWOOD

EchoLink Memories & NODE Terminal
50W on 2m & 70cms!

W&S £269 D

FTM-10R/E NEW YAESU

Bluetooth

W&S £249 D

New 2m/70cm Mobile with Bluetooth option
*50W 2m 40W 70cms
*Removeable front
*Built in PTT & Microphone!
*Size: 11 x 3.7 x 17 cm

Deal: FTM 10E with Bluetooth Adaptor (BU 1), Headset (BH 1) & Charger (CAB 1) **Total List Price £382**
Offer Price £279.95 D

IC-7700 NEW ICOM

*160m 6m *200W *SSB CW AM FM *+40dBm Intercept *7" Colour TFT Spectrum Scope

Billed as a Contest Radio, the design takes features from the IC 758 & IC 7800 to give you a transceiver packed with features. Available February.

W&S £3995

Deal: NC-4 Headphones **FREE**

IC-7800 ICOM

Icom's greatest HF transceiver ever. Invest in the best! 200W HF Built in PSU

Deal: SP-120 Filter Spkr **FREE**

W&S £6400 D

Orderline

01702 206835

Online Catalogue

www.wsplc.com

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Zero Deposit
Zero Interest

D-Star Dongle NEW

Join the D-Star fun from your laptop PC!

The D-Star Dongle gives you access to D-Star repeaters around the world. It contains the special DVSI AMBE codec chip that allows for encoding and decoding of the audio used with D-Star. Just plug it into your PC port (Windows XP/VISTA or Mac Inte) and transmit and receive. Those without a licence can listen only.

£124.95 C

TS-2000

KENWOOD

*100W All-mode
*160m - 70cms
*Duplex operation
*Satellite ready
*DX cluster QSY

The TS-2000 offers all-band coverage in one very neat & effective high performance system. This is one of the best buys in ham radio. Add our W-25AM 13.8v supply (£89.95) and you are ready to go.

Deal: FREE Extra DC Lead (Quote advert when ordering)

W&S £1295 D

TS-2000X with 23cms **£1599 C**

TS-480SAT

100W HF+6m **£679 D**

IC-756PROIII

ICOM

HF + 6m
100W
All-Mode

W&S £1749 D

IC-756PROIII Special Deal

IC-756 Pro III
+ SM-20 Desk Mic
+ NC-2 Noise cancelling 'phones
+ W-25AM power supply
+ Spare DC lead

Only £1829 D

IC-7000

ICOM

HF/VHF/UHF
All-Mode
Transceiver

W&S £899 D

Deal2: With TFT PAL TV Screen £999
Deal3: With TFT + Power-Mite PSU £1049

IC-7400 OFFER

ICOM

HF - 70cms 100W transceiver plus SP-21 spkr and SM-20 mic **£979 D**

IC-718 HF 100W transceiver **£439**

IC-706IIGDSP

ICOM

HF/VHF/UHF
100W
Transceiver

Deal: IC-706 + New Power-Mite-NF FREE

W&S £649 D

IC-703DSP

ICOM

10W QRP
HF-6m built-in
Auto ATU + DSP

W&S £449.95 D

Visit our eBay shop for more bargains!

eBay

Go to www.wsplc.com & click on the link to our eBay shop

Exclusive to Waters & Stanton!

Radiomate NEW

For YAESU

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

Rig not included!

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

£99.95 C

bhi DSP Noise Cancelling

NES10-2 MkII

Speaker and programmable DSP unit. Offers dramatic noise reduction.

£89.95 C

ANEM

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

£112.95 C

NEIM-1031

Noise Eliminating In-Line Module.

£125.95 C

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. WithKeyboard.

£89.95 C

NEDSP-1062-KBD

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

£94.95 C

Icom VHF/UHF Mobile/Base

IC-E208

Dual Band FM Mobile *144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz **£219.95 D**

IC-910H **£1089 D**
2m/70cm 100W Base station all-modes Option for 23cm module (UX-910 £359)

IC-910HX **£1239 D**
As Above but with 23cm Module ready fitted and a big saving as well.

IC-2200H **£179.95 D**
2m 55W FM mobile with rugged construction and with digital option.

IC-2725E **£279.95 D**
2m/70cm radio. Easy to operate and install and a lovely detachable head.

Kenwood VHF/UHF Mobiles/Base

TM-271E

2m FM 60W Mobile Transceiver. MIL-SPEC DTMF Mic. Built-in CTCSS & DCS encoder / decoder.

£149 D

TM-D710E *Low Price* **£399 C**
Dual band APRS 50W FM

Yaesu VHF/UHF Mobiles/Base

FT-7800E

*2m/70cm Dual Band Mobile *High power 50W 2m /40W 70cms *Wide receive inc. civil & military airband *CTCSS & DCS with direct keypad mic. *1000 memories **£169 D**

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

FT-8800E *Low Price!* **£219 D**
*2m/70cm Dualband FM Mobile transceiver

FT-8900R *Low Price!* **£249 D**
*2m/70cm/6m/10m Quadband FM Mobile

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-1 F for VX-110/150 / 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 & **ADMS-4B** for FT-857/8 ***BOTH*** **£29.95** both these items require a separate CT-62 lead at **£29.95**

IC-E92 NEW

ICOM

2m/70cm Handheld with Built-in DSTAR

* *144-146MHz / 430-440MHz*
* *FM FMN WFM AM (Rx) DV*
* *5W/2.5W/0.5W/0.1W*
* *1304 memories*
* *100 scan ranges*
* *Rx range 0.495kHz-999.9MHz*
* *CTCSS, DTCS, DTMF*

Includes antenna, and charger.

A fully fledged digital radio using D- Star aswell as traditional dualband.

W&S £329.95 C

Icom VHF/UHF Handhelds

IC-E91 D-Star Ready

Latest dual-band handheld transceiver. receiver that covers 0.495 to 999MHz. **£239.95 C**

IC-E91 with D-Star **£349.95 C**
IC-V82 7W 2m Digital **£159.95 C**
IC-U82 70cms Digital **£159.95 C**
IC-E90 6m/2m/70cm **£199.95 C**
IC-T3H 2m 5W **£129.95 C**

Kenwood VHF/UHF Handhelds

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 **£135 C**
TH-K2ET 2m 5W FM **£145 C**
TH-K4E 79cm 5W FM **£139 C**

Yaesu VHF/UHF Handhelds

VX-7R (Black)

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-120 2m 5W w/8-key pad **£99 C**
VX-170 2m 5W w/16-key pad **£99 C**

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

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- Zoom Worldwide to Runway Level
- Network your Station with Others
- Self Powered from USB Port. Plug & Play!
- Centre Map on your Home - Direct Reception
- Everything you Need Apart from PC

Unlike it's competitor this is
True "Plug 'n Play"

£399.95

Accessories

RADAR-RAMA £49.95 C
External 1090MHz Antenna

RADAR-EXTENDER £79.95 C
1090MHz Gain Antenna

AS-1090 £179.95 C
Pre-Amplifier. Covers 1090MHz

RADAR-CBL-10M £42.95 A
10m ultra low loss cable

RADAR-CBL-15M £49.95 A
15m ultra low loss cable

WATSON

Official Distributer UK's Lowest Prices

Power-Mite-NF

NOISE OFFSET POWER SUPPLY

NEW

22 Amps of continuous power output with variable voltage plus the new Noise Offset Function (NF). This allows you to move any noise spikes out of the ham band with the front panel tuning control.

W&S £59.95 C

W-25AM WATSON POWER SUPPLIES

25A Variable Power Supply. **Output Voltage 0-15V DC *Output Current 25A (30A Peak) *Over Current Protected *Dual Meters *3 sets of Terminals *Cigar socket *Front Panel Fuse *Supply 230V AC 50Hz*

W&S £89.95 D

W-3A Output 3A, 13.8V DC, supply 230V AC £22.95 C
W-5A Output 5A, 13.8V DC, supply 230V AC £29.95 C
W-10AM Output 10A, 0-15V DC, supply 230V AC £59.95 D
W-25XM Output 25A, 9.7-17V DC, Dual meters £99.95 C
W-30AM Output 30A, 0-15V DC, Dual meters £119.95 D
W-25SM Output 22A, 13.8V DC, supply 230V/115V AC £79.95 C

DM-15W 15W DUMMY LOAD

Ideal for testing handhelds and lower powered transceivers. **Range DC-600Mhz *Power 15W (20W CW) *VSWR 1:1:1 *Connector PL-259 *50 Ohms Impedance *Size 34x72mm *Weight 76g*

W&S £15.95 A

Power-Max-25-NF

NOISE OFFSET POWER SUPPLY

NEW

This very compact base station supply delivers 22 Amps of continuous power with the new Noise Offset Function (NF) that moves noise out of the band. Includes cigar socket.

W&S £89.95 C

Bargain Price Antennas

Pre-tuned & Weather Sealed Fibre-glass encapsulation

W-30 2m/70cms 3/6dB length 1.15m 150W SO-239 £29.95 C
W-50 2m/70cms 4.5/7.2dB length 1.8m 150W SO-239 £39.95 C
W-300 2m/70cms 6.5/9dB length 3/1m 150W SO-239 £49.95 D
W-2000 6m/2m/70cms 2.15/6.2/8.4dB length 2.5m 150W £59.95 C

Mobile Whips Bargain Prices

Watson mobile antennas are made to a high specification and employ stainless steel whip sections with SO-239 receptors. All models are pre-tuned and will withstand at least 100 Watts RF.

Watson - the name you know!

W-2LE 2m 0dBv length 0.48m £9.95 C
W-285 2m 3.4dBv length 1.33m £12.95 C
W-77LS 2m/70cm 0/2.4dBv length 0.43m £10.95 C
W-770HB 2m/70cm 3/5.5dBv length 1.1m £16.95 C
W-7900 2m/70cm 5/7.5dBv length 1.58m £24.95 C
W-627 6/2/70cm 2/4.5/7.2dBv length 1.6m £27.95 C

Watson Weatherstations

W-8681 Wireless Weather Station

- ** LCD Touch Screen*
- ** Atomic Locked Date & Time*
- ** Indoor / Outdoor Temp.*
- ** Wind Speed & Direction*
- ** Rain Gauge*
- ** Indoor / Outdoor Humidity*
- ** Barometer with Trend Data*
- ** Forecaster & Weather Alarm*
- ** USB Connection to PC*
- ** PC Software Control & Data Programme*
- ** Historic Data Storage & Display*

W&S £69.95 D

W-8682 Wireless Weather Station

NEW

All you need to obtain a complete weather picture. The W-8682 is very similar to the W-8681 weather station, it offers all the same weather measurements & external sensors for temp, wind & rain. However, it does not feature a touch screen, or USB port for weather data. **£59.95 D**

W-8684 Bedside Weather Station

NEW

- ** Digital Clock 12 / 24 hours*
- ** Radio controlled time*
- ** Alarm Clock*
- ** Inside temperature °F or °C*
- ** Outside temperature °F or °C*
- ** Barometer sensor*
- ** Forecaster display*
- ** Humidity*
- ** Min / Max temp. & humid.*
- ** Perpetual calendar*
- ** Remote wireless sensor*
- ** Additional sensors option*

W&S £21.95 C

W-8683 Compact Weather Station

NEW

- ** Digital Clock 12 / 24 hours*
- ** Radio controlled time*
- ** Auto daylight saving*
- ** Alarm clock*
- ** In / Out temperature*
- ** In / Out Humidity*
- ** Min / max temp. & humidity*
- ** Barometer 24 hr. history*
- ** Forecaster display*
- ** Perpetual calander*
- ** Remote wireless sensor*
- ** Pressure Alarm*

£16.95 C

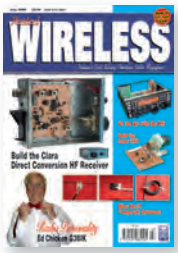
W-8685 Clock & Temp Display

NEW

- *• Digital Clock 12 / 24 hours*
- *• Inside temperature*
- *• Outside temperature*
- *• Min / Max temperature.*
- *• Remote wireless sensor*
- *• Additional sensors option*
- *• Panel size: 11 x 7.5cm*

£10.95 C

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



Practical Wireless July 2008

contents

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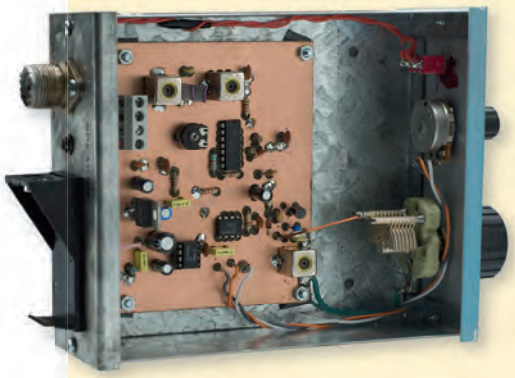

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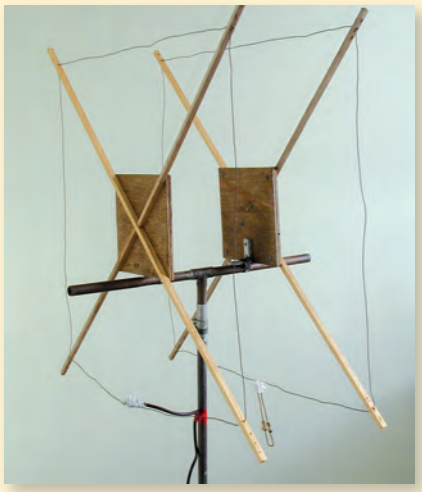

26

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Rob Mannion's keylines

Rob discusses how the hobby is perceived and has two news items!

On Saturday 19th April I was a guest of the **Radio Society of Great Britain** (RSGB) at the their AGM and dinner at the Novohotel in Bristol. When I arrived I tried to creep in without disturbing anyone (if anyone of my size can creep!) but felt honoured when the RSGB President **Colin Thomas G3PSM** welcomed me with an short announcement, before continuing with the meeting.

During the later stages of the session, a keen, fairly newly licensed Amateur raised the matter of the RSGB maintaining closer relations with professional bodies associated with electrical and electronic engineering. The young man said Amateur Radio interest had helped his career and he felt his suggestion would be beneficial for the RSGB. My ears then pricked up as **Peter Kirby G0TWW**, the RSGB's General Manager spoke on the matter.

Peter 's reply had an immediate effect on me and – in one short reply – I felt re-assured for the future of our hobby. Replying in a relaxed but confident manner – Peter kindly, but firmly reminded everyone present that the 'founding fathers' had set up the society to make our hobby available to the 'everyman'. In other words, Peter reminded everyone present that we as Radio Amateurs aren't elitists – instead we are specialists.

I felt re-assured because for many years I've tried to help remove the (often almost tangible) attitude that **we are** an elite group. I was also reminded of my first encounter with the elitism associated with our branch of the hobby in the Royal Navy. The memory that came flooding back was of a (seemingly) 8ft tall Chief Petty Officer (CPO) at HMS *Ganges* near Ipswich, when I joined the Navy.

Chatting to me, the 'Chief' asked what I wanted to do in the 'Senior Service'. I cheerfully ran through my plans and hopes for the future – and from his great height above me he nodded his approval – until I mentioned becoming a Radio Amateur.

The Chief then stopped nodding his approval, gave me a serious look and uttered the words I remembered many years later. "Sorry my lad, you'll achieve everything you want in the ranks – but you'll have to become an officer to become a Radio Amateur! Fortunately the Chief's widely held opinions have been swept aside and I'm pleased that Peter – of all people as he also started off at HMS *Ganges* – obviously agrees with me.

Amateur Radio **is not** elitist. Instead it's a specialist hobby that we can all support with our enthusiasm. We can also support the hobby by joining our national societies and welcoming anyone who is keen enough to 'have a go'. Well done Peter – you have my full support and the founding fathers of the RSGB can rest easy as we stride forward.

The QRP Contest Certificates

Unfortunately, we still have a number of *PW* 144MHz QRP Contest Certificates, or small sized-envelopes, in the office. These are either too small to carry the *PW* 75th anniversary certificate (a full sized A4 s.a.e. is required to avoid folding the certificate) or there's not enough details for us to be able to identify which contest entrant certificate is to be sent.

So, anyone still waiting for a certificate is asked to either send us the required envelope – with full details of the station operated – or telephone **Tex Swan G1TEX**, who is kindly handling the job for me. (Thanks Tex!). The 2008 contest certificate handling (25th anniversary contest) will be in the charge of **Colin Redwood G6MXL** the adjudicator (thanks Colin!)

George Dobbs G3RJV

Our long-serving, dedicated author the **Rev. George Dobbs G3RJV** retires as Vicar of St. Aidan's Church, Rochdale in July 2008. I'm planning to drive up to Rochdale to join in his last service and farewell evening to represent *PW* and its readers.

Moving house means upheaval for anyone, but for Radio Amateurs I think it's a nightmare! So, to help George as he sets up his new shack, he's choosing some of his favourite *Carrying On The Practical Way* (COTPW) projects to re-publish while he's moving and setting up his new shack. We hope you'll enjoy the articles and wish George and **Jo** well in their new home in the Manchester area.

Rob Mannion G3XFD/EI5IW

Practical Wireless

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

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

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

Practical Wireless

readers' letters

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

Contests, DX & Callsigns!

Dear Rob

I know that there has been some discussion, pro and anti, about contests on the Amateur Bands. I also did make my feelings known about the apparent lack of two-way exchange of details between DXpeditions and their contacts. It seems that many of those keen on working DXpeditions are content to let the conventions of sending and receiving full calls, reports etc., go in circumstances where they want a 'new one'. Well, that's up to them and the DXCC or other award authorities, I suppose. That being so, to what extent do people expect the spirit and the rules of contests to be kept to, I wonder? In particular, the rules concerning working people who are not taking part in the contest.

It's my experience that many entrants and operators of contest stations are not aware that non-contest stations do not have to provide serial numbers or even locator details, as long as enough details are available to calculate the points scored by the contesting station.

The issue seems, to me, to be the software used by many contest stations, which often seems to require a serial number when one is not necessarily needed under the rules. Non-entrants are either, in my experience, forced to give a serial number, when none was going to be given, or the number 001 is put in even if the non-contesting station plainly did not give it and may well have worked one or more other contest stations who all then put 001 in for the same non-contest station. This action, in my opinion, should negate the contact because the contest station hasn't observed the letter of the rules, let alone its spirit!

So, I wonder, what do the contest judges do about this? Would it be the case that, if I entered a check log showing no serial numbers, that points would be deducted from non-compliant entries? What about the

Star Letter

Radio Clocks & Anthorn

Dear Rob

Thanks for the June *PW*, it was interesting – not only for its good technical articles – but also the letters on radio clocks. As a keen user of, and experimenter with, highly stable frequency and time standards I was interested to see the letters lamenting the demise of the 60 kHz service from Rugby. Significantly, the letters published all came from the South coast – Cornwall, Devon and Somerset, locations now further removed from the 60kHz service by at least 140 miles. The relocation to Anthorn has clearly been detrimental to some users south of Rugby.

My own experience of the Anthorn signal is that it is stronger than the one that came from Rugby. My 60kHz receiver in Manchester now delivers a clearer output, even though Anthorn, near Carlisle is further away from me to the North than Rugby is to the South. In terms of propagation, I suspect the antenna site at Anthorn is superior to the one at Rugby. I stand to be corrected but I believe Anthorn's earth mat of long copper wires buried every 2° radially from the mast is more effective than the Rugby earth.

Additionally the Anthorn site is more favourably located for good ground conductivity, being at a low elevation and close to salt water. I believe only an increase of e.r.p. will help those suffering clock problems, although a tuned loop very close to the clock may enhance the reliability of data bit reception.

I know all this is no consolation to users in the South, but it raises questions on why the relocation was contrived. Was it largely for economic reasons, awarding the contract to a low bidder? Did BT surrender it as an unprofitable service? Or was it to extend the service area from what is a better l.f. and site? Readers in the South may disagree with the latter, but are users in far Scotland enjoying an improved field strength, and were their clocks unreliable before the relocation? What will be interesting is a comparison of measured field strength plots from Anthorn and archived Rugby records. Congratulations on an admirable magazine. Keep it up!

Ron Smith G3SVW
Sale
Cheshire

Thanks for your letter Ron. You've answered some questions and posed others that need answering! Personally, I have been told that the fact there was an existing v.l.f. site at Anthorn played a big part in the decision. Money-saving was certainly a deciding factor in the decision to re-site the 60kHz service and this has been confirmed by someone with direct knowledge of the situation, although I cannot reveal my source of information. We are now 'stuck' with Anthorn and I hope the e.r.p. can be increased so that we can get a more reliable service in the south west of England. ***Rob G3XFD****.*

point that all this seems to be driven by the logging software and not the contest rules? Also, if this rule is not observed – then what's the point in having it, why not do away with it and realise that most non-competing stations are bullied, or worse, assumed to have given a number and have done with the rule? Even the *PW* QRP Contest might need to look at this point and consider the effect of requiring people to either enter false details or coerce people into agreeing to a number they didn't give. I intend to read the *PW* QRP Contest Rules in the next issue of *PW* and will keep to them if I decide to contact stations but not give serial numbers.

If it's okay to ignore the rules concerning serial numbers and other details from non-contest stations, then what other rules would the contesters like to do away with because they do not fit the computer program that they use to log the contest, or would rather ignore for some other reason, I wonder?

Dave Ackrill G0DJA
Bolsover
Derbyshire

Thanks for your comments Dave! I've no doubt other readers would like to add to this debate! ***Rob G3XFD.***

Listening (Almost QSO-less) M3!

Dear Rob

I'm an almost 'QSO-less' new M3 who is spending a lot of time listening and I have to say that many Amateurs – particularly those on h.f. – are very polite and helpful. But I have to echo others in that I have been horrified with some of the behaviour I've heard on 2m repeaters – most of which would invalidate the licence.

Now to my point! I am still learning about radio but I'm active in the computing community and believe there may be something of a cross-over in that the Internet computing community can do to help with the time synchronisation issue highlighted by so many in the June issue of *PW*. To maintain message ordering for transaction management the issue of distributed but synchronised time had to be overcome many years ago. A standard was produced called Network Time Protocol (NTP), which most computer systems make use of under the covers. Essentially this protocol standard makes use of atomic clocks around the globe that synchronise with each other and account for drift and the time taken to communicate between NTP server nodes. Clients then synchronise their clocks against this. Most systems make use of this 'under the covers' and it's a very reliable and successful standard, which is probably why many people will not have heard of it!

To make use of it someone should check with their ISP for a server domain name of an NTP server to connect to. Each system is different, but Windows, Macs, Linux and most Unixes all make use of NTP. Personally, I have my own NTP server that sits on my network that communicates with NTP servers of more than one ISP and which is reset each night in a script.

If people are interested in making use of the proven NTP protocol or want more information please let me know and I will document it for the readers and put the details on the web. I might even go so far as to design a low end NTP server box running embedded Linux that people can build for themselves.

Colin Renouf M3WXH
Croydon
Surrey

Thanks for the suggestion Colin. You obviously have much to contribute to Amateur Radio! ***Rob G3XFD.***

Delayed Clocks!

Dear Rob

I have followed with interest the correspondence about the MSF radio controlled clocks in the June issue of *PW*. However, what is perhaps not realised is that some clocks and watches synchronise with the remote transmitter every hour but others do so less frequently.

In order to conserve battery power, many clocks attempt to receive the transmitter every four hours and others do so at midnight or at 4am. Some try at a specific time and try again four hours later if the first attempt was unsuccessful.

As the change from GMT or BST takes place at 0200UTC this can mean that some clocks don't show the one hour change the following morning. So, rather than removing the battery to force a reset, leaving the clock to receive the transmitter the following night will result in the clock changing to the correct local time. I've been caught out by this one until I discovered what was happening! 73

David Pratt G4DMP
Kippax
Leeds
West Yorkshire

Thanks David! My eldest daughter – ***Charlotte*** *– had a clock suffering from that very problem!* ***Rob G3XFD.***

No Problem Clocks In Whitstable!

Dear Rob

On reading the June 2008 issue of *PW*, I can confirm that I have had no problems with my radio controlled clocks. I have two here in my Whitstable QTH, one of them cost £7 new, the other cost £1.50 from a charity shop! And I should imagine that here in Kent, I'm about as far away as one could be (on the British mainland) from the transmitter in Cumbria. Just before writing to I did a test and put one of my clocks in a biscuit tin and did a re-set to force it to find a signal. It did so within about two minutes.

I suspect that many radio clock users are unaware of a hidden high noise level at 60kHz within their homes. I try to keep my QTH 'radio clean', by **never** having things like the TV set, set top boxes and computers, etc., operating whilst I'm on the air. These things generate noise even on standby.

However, there's more to the noise problem! I use **Greg Hands** *GH Noise* software, which calculates levels of galactic, atmospheric and man made noise from the ITU-R P372-8 noise study curves. Incidentally, Greg Hand is the man who developed the data engine for the Voice of America, and it's that engine that powers the *HAMCAP* software in the article of mine that *PW* published last year.

At 60KHz, the noise received in a bandwidth of 250Hz is about -33dbm, or S9+40db! For comparison purposes a dipole at 1.8MHz should see about S9+20db of noise if it's 100% efficient. The lower the noise from this point, the less efficient the

Editing Warrington Club Magazine

Dear Rob

This could be one or two letters – at your discretion – in response to subject matter in June *PW*! Although the **Warrington Amateur Radio Club's** magazine *QSX WARC* runs to only 50 or so copies and is almost exclusively issued to club members (occasionally visitors get a complimentary copy and back numbers do eventually appear on the club website) I do ask for permission to use copy. Usually there's a swift response agreeing subject to a mention of the source. What's frustrating is the absence of any reply and often the offender is well known!

Some time ago, an interesting obituary of a Radio Amateur appeared in *The Daily Telegraph* and after three requests for permission to quote I gave up. Well not quite, as I researched on the internet and found much of the original material used by the reporter and gave an in house talk instead. This was in stark contrast to the instant okay from *The Big Issue* in the North concerning an interesting item published there. In fact, I'm reminded of a heartfelt cry from a trade union official at a meeting with the management of the company he was negotiating with who said, "for God's sake say something even if it's only no!"

Radio Clocks: The difficulties faced by some radio clock users in the south following the removal of the transmitter from Rugby to Cumbria is interesting. Some years ago at the Llandudno rally some radio clocks were offered for sale at £5 each, which was a huge saving at the time. That was the good news – the downside was that the clocks received the signal from Frankfurt in Germany. Some careful experimentation on the positioning of the clocks was (and is) necessary here in the northwest of England and occasionally the clock 'hunts' for a while when the signal is lost. I wonder, however, whether a reliable signal may be present in the southeast and south. I am sure Frankfurt based clocks are readily available in Europe. Best wishes.

Ron Davies G0WJX
Culcheth
Warrington
Cheshire

Well done on your wise editorial policy Ron and thanks for the advice on the Frankfurt receiving clocks (many other readers have suggested this approach too). ***Rob G3XFD.***

antenna. So, you have at 60kHz a noise start point of S9+40db at 60kHz.

If you have an s.s.b. filter bandwidth of 2500Hz you increase the incoming noise figure by another 10db - S9+50db. And this is the sum of the galactic, atmospheric and 'typical' residential noise added together. It must also be remembered that an internal ferrite rod antenna is highly directional and the most convenient position of someone's radio clock may not be the best direction for maximum signal pickup.

And it must be remembered that radio clocks tend only to turn their 60kHz receiver on for only a few minutes after start up, to set the clock. Thereafter usually every 24 hours to re-synchronise the clock. What if the re-synch time is at a time when local noise is the highest, and possibly under the worst circumstances as per above (antenna position etc)? I think that the overall tendency for radio clock users is to forget their radio frequency knowledge and simply become nothing more than user consumers, no longer interested in how it works!

As Radio Amateurs - we have no excuse in forgetting how these consumer devices work, and should treat them with as much respect as we do with our own station equipment. I do, so perhaps that's why my clocks give me no problems.

Although I'm aware that having the TV, etc., off could be impossible in some households as the XYLs , who would then complain that they can't watch *Constipation Street* or *End Enders* (East Enders) and tend to spoil things. Regards to everyone at *PW*.

Andy Foad G0FTD
Whitstable
Kent

Thanks for the tips Andy. There are advantages to the bachelor life aren't there? ***Rob G3XFD***.

Anthorn Okay In Belgium!

Dear Rob

Living on Mainland Continental Europe, I can report to you that I have not experienced the reception problems with the Anthorn 60kHz transmissions. I have a radio controlled wrist watch and several radio controlled clocks. Some of them switch over to summer time, etc., automatically and others don't.

However, my PC is kept on accurate timed by using *DIMENSION FOUR* which is a free program downloadable from the Internet. This program updates your time from a variety of sources, at intervals of your choice, and is very accurate. There are in fact other programs that do this job over the Internet, but I only need one! I do hope that this information is useful to you and many other readers. Best wishes to everyone at *PW*.

Bill Abrahams (ON9CGB, G0MEU)
Wouterstraat 11 (or Postbus 38)
B-8510 Marke
Belgium

Thanks for your letter Bill! A number of of other PW readers from Belgium and Holland have written in to mention that they have no problems with the Anthorn transmissions. Than ks everyone! ***Rob G3XFD.***

Send your letters to:
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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**

news & products

A comprehensive round-up of what's happening in our hobby.

Ken GW1FKY Flies in Space!

Ken Eaton GW1FKY had always dreamed of one day flying in space, now, thanks to the Technical University of Delft, **GW1FKY** is orbiting the earth. When the team building the Delfi-C3 satellite, attended the AMSAT-UK International Space Colloquium they made a very generous offer to help boost AMSAT-UK's satellite building fund.

They decided to allow one Amateur's callsign to fly in space onboard their satellite. This chance to have your callsign fly on the satellite was auctioned at the Annual AMSAT-UK Dinner and there was fierce bidding to win this privilege. Ken Eaton GW1FKY was the winner with a bid that will greatly boost the satellite building fund and his callsign was put onboard the Delfi-C3 satellite that was launched from India.

The picture shows Ken, holding the commemorative poster along with members of the Delfi-C3 team. It is expected that the transponder will be made available for general Amateur use at the end of July.

Delfi-C3 Website: **http://www.delfic3.nl/**

Ken Eaton GW1FKY with members of team that built Delfi-C3.

East Timor DXpedition

The **Spanish Amateur Radio League** has obtained the callsign **4W6R** for the East Timor DXpedition in June. Most of the materials have already gone out in a container, by air, and the operators are finalising their preparations by getting their vaccinations.

The majority of this project's funding is provided by the Alicante Provincial Government and by URE. The rest of the budget, at this time, will be down to the operators although they have had some small, but useful, donations. They would like individuals and organisations to consider making contributions to this project.

Any QSL can be sent by via the Bureau c/o EA4URE. Or direct to **EA4URE, PO Box 220, 28080 Madrid, Spain.**

http://www.ure.es/hf/eadx/expediciones/4w2008/home.php?lang=en

Silent Keys

Stan Brown G4LU, passed away in mid-May at the age of 88, he'd been ill for a little while. Stan's friend **Ant Astley G0AJA** sums up his friend's life and career.

Stan Brown G4LU was a very busy man, he'd just clocked up 60 years of RSGB membership, he'd been Mayor of Oswestry and on the Borough Council, and been awarded an MBE in 2003. Stan had been very active in local politics too, not least as Parish Councillor for 38 years. He was a Chartered Engineer and Member of the Institute of Electrical Engineers.

Stan came to Oswestry in 1942 from Rugby, following a disastrous fire at that transmitter, to expedite the finishing of Criggion Radio Station as its General Manager. He went on to become manager of five of the largest GPO (later BT) transmitting stations in the country and retired in 1982.

A man of many and widespread interests, Stan campaigned for the retention of public footpaths and rights of way, researched and spoke widely on local history. He was deeply involved in at least two amateur radio societies as well as writing for *Practical Wireless*. He supported the Probus Club, local history and archaelogical societies, and was trustee of Oswestry's Memorial Hall. The list seems endless!

Above all else, Stan Brown G4LU was a family man devoted in particular to his two grandaughters, **Tamsin** and **Leila**. He is survived by his wife **Eleanor** and younger son Adam. His elder son **Simon (**who was a doctor), died in 1976 in a climbing accident. We shall all miss Stan's advice, anecdotes and friendly arguments. **Ant Astley G0AJA**.

Rob Mannion G3XFD comments: I was saddened to hear of Stan's passing and **Ant Astley** kindly agreed to represent *PW* at the funeral. Ant (who had many long, animated and friendly discussions with Stan!) mentioned that the church was packed full with G4LU's family and friends. Stan was a an amazing man and a great friend of Amateur Radio. The last time I saw him, after his stroke, he was determined to 'get on with it' and had planned a series of articles for *PW*. Unfortunately, it wasn't to be but his memorial will be the memories of his friendship and the many chats we had over the telephone and by E-mail. Like his old Rugby and Criggion transmitters, he had a gigantic reputation and I was proud to have him as a friend. Rest in peace Stan!

In Memory

Sadly, on April 18th **Leroy Bruce Cebik W4RNL** became a Silent Key. He was well known as an antenna guru, who shared his designs readily with the whole Amateur Radio community. He was a very kind and helpful man who will be missed worldwide. His website was a mine of extremely useful antenna design data and was considered to be the 'oracle' of design. There are plans to keep his website going as a memorial. **http://www.cebik.com/**

The picture of 'LB' that appears on the tribute pages (**www.antennex.com/Stones/st0508/lbc.htm**) by **Jack L. Stone**, publisher.

Trophy Winners

At the **Radio Society Of Great Britain** (RSGB) AGM on April 19th, the RSGB Board awarded **Hamtests.co.uk** the Kenwood Trophy for "*making significant contributions to Training and Development in Amateur Radio within the United Kingdom*". **Paul Gibson M0TZO** and **Peter Goodall M3PHP** collected the trophy in person at the AGM, held in Bristol.

Instructors and student interested in Amateur Radio will find **Hamtests.co.uk** ideal as it offers mock questions for the Foundation, Intermediate and Advanced exams. They have over 2,100 members, 500 questions and 37,000 mock tests have been performed. Paul and Peter would like to thank everyone who has offered and given help and assistance over the past two years.

www.hamtests.co.uk

RSGB President Colin Thomas G3PSM (left) awarding the trophy to Paul M0TZO (centre) and Peter M3PHP (right).

BBC Tours

Discover the inside story of BBC Broadcasting House with a fascinating tour of the first purpose-built broadcast centre in Britain. Built in art-deco style in 1932, the building has been undergoing sympathetic restoration and modernisation.

The tours, conducted by the BBC's guides, are likely to include art-deco highlights such as the famous main reception with its original mosaic floor; visits to the newly restored Radio Theatre, home to such iconic shows as The Goons and The News Quiz; the Council Chamber where BBC Governors and Board meetings used to take place and the new digital radio studios where BBC Radio 3 and 4 are recorded as well as a chance to hear the history of the famous Eric Gill sculptures that decorate the front of the building.

From summer 2008, the tours will also offer the chance to take part in a fully interactive Radio Drama Experience. Tours last approximately one and a half hours and are suitable for those aged 12 years and above. Pre-booking is essential as tickets are not available on the day and can be obtained by calling the booking line on **0870 603 03 04**. Tickets cost: Adult £6.50, Concession £5.50, Students £4.50, Children (between the ages of 12 and 15 years) £4.50 and a Family ticket (2 adults & 2 children or 1 adult & 3 children) £15.00.

The dates for the tours are June 8th, July 6th, August 3rd, September 7th, October 5th, November 2nd and December 7th. Broadcasting House is located in Portland Place, Upper Regent Street in London and the nearest underground station is Oxford Circus.

International Space Colloquium

The AMSAT-UK organisation will be holding their 23rd International Space Colloquium at the University of Surrey, Guildford from Friday 25th until Sunday 27th July. On Friday afternoon, in addition to the main lecture programme, there will be a special Beginners' Workshop to show newcomers how to use the many Amateur satellites that are available. It will be followed in the evening by a lakeside barbeque in an area of the University that featured in the hit ITV 1 television series *Primeval*.

There will a tour of the Surrey Space Centre facilities that's always popular and provides a unique opportunity to see satellites in various stages of construction. The event is open to all Radio Amateurs and short wave listeners (s.w.l.s). Both day passes and full packages comprising overnight accommodation and meals at the University are available. An online booking service is available with PayPal, Visa and Master Card payments accepted.

For further details contact:
Jim Heck G3WGM. Tel: 01258 453959.
E-mail: g3wgm@amsat.org
http://www.uk.amsat.org/Colloquium/

AMSAT-UK BBQ lake courtesy Martin Halliday.

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Bigger Band in Japan

Radio Amateurs in Japan have been given additional frequencies in the 3.5MHz (80m) co-primary shared band. Japanese Radio Amateurs are now allowed to operate on the following additional frequencies on 80/75 metres band: 3599 to 3612kHz
3680 to 3687kHz
3702 to 3716kHz
3745 to 3747kHz
3754 to 3770kHz.

Very Low Frequency Radio

The sounds of Very Low Frequency (v.l.f.) radio can be heard live on the web. A collection of live natural radio streams of the v.l.f. band from around the world is available at: **http://abelian.org:8040/vlf/**

INSPIRE VLF radio receiver at NASA's Marshall Space Flight Center
http://www.spaceweather.com/glossary/inspire.html
Renato Romero IK1QFK Very Low Frequency (v.l.f.) page
http://www.vlf.it/
Very Low Frequency Research Group
http://www-star.stanford.edu/~vlf/
Weak Signal software for LF
http://www.weaksignals.com/

Waters & Stanton Blog

Essex based **Waters and Stanton** (W&S) have introduced their very own web log (blog). They will be posting all sorts of news related to their company and about the products they sell into the blog. The blog, was started, specifically to keep everyone as up to date as possible with the latest information and happenings within W&S. Various members of staff are able to add articles to this blog, so you will see posts about all kinds of different things.

Readers can register as users and have the ability to post comments but, be aware, all postings are all checked over (moderated) before they show up on the comments section of each post. The address is **blog.wsplc.com** and it's now in operation. Waters & Stanton, **Spa House, 22 Main Road, Hockley, Essex SS5 4QS, Tel: 01702 206835.**

Did You Know G6HL?

The callsign G6HL, that belonged to the late **Wing Commander Ieuan Edward Hill**, who died in 1997, has been re-issued by Ofcom to the **North Norfolk Amateur Radio Group GB2MC** for use with G6HL's superb 1950s home-made station located at the Muckleburgh Collection, Weybourne, North Norfolk.

The Group plan to use the newly allocated call for the first time in the near future in the presence of G6HL's daughter. They would like to contact anyone who knew or worked Ieuan G6HL with a view to arranging some contacts with them on the day the G6HL call is re-activated. If you can help, please contact: **Tony Smith G4FAI, 13 Morley Road, Sheringham, Norfolk NR26 8JE. Tel: 01263 821936. E-mail: g4fai@btinternet.com**

Sea Cadets Course

Mike Stott G0NEE was asked put some Officer Cadets and staff of the Royal Navy Sea Cadets and Army Air Cadets through the Foundation licence as it's now part of their communications certificate

After an informal introduction to radio on the Friday evening, the course started in earnest at 9am on Saturday. On Sunday it was operating practice with some of the nets on in the morning and the exam at 3pm.

Mike said he really enjoyed his 'Sky, Surf and Turf Week End'! The next course is due to start very soon and Mike will be travelling south for this one too.

Portable Speaker Systems

The Traveller's Choice compact stereo speakers from Targus use ultra-thin NXT portable speakers that deliver clear and smooth sound quality making them the ideal choice for listening to music. They may also be used to give audio presentations or just to listen to your receiver or scanner. Designed for use while 'on the road', the Traveller's Choice speakers can be attached to laptop computers via USB or to the supplied battery pack powered by four AAA batteries.

Audio input is via a standard 3.5mm jack, ensuring the speakers are compatible with a host of sources. When not in use, the small, lightweight speakers clip together magnetically for maximum protection during storage. Launching in early summer 2008, the Targus Portable Speaker Book will initially be available from selected retailers in the United Kingdom but no price has been announced.

Radio Amateurs Help BBC Radio 4

Three radio amateurs played a vital role in the success of a high profile media event that saw the Radio 4 continuity announcers stage a 'Pilgrimage to the Pips'. As we reported in the March issue of *Practical Wireless*, the BBC Radio announcer **Jim Lee G4AEH** was preparing to join his Radio 4 colleagues on a charity walk to the former Royal Greenwich Observatory at Herstmonceux, the former home of the Greenwich Time Signal. The aim was to raise funds for the Lymphona Society, a charity which is supporting Rory Morrison, the Radio 4 news reader who is suffering from a very rare form of cancer.

A *Practical Wireless* reader then contacted the BBC with the news that the man who had been responsible for generating and maintaining the pips for nearly 30 years was **Tony Seabrook G3ZQB**. Jim managed to track down G3ZQB via QRZ.com and Tony was only too pleased to accept Jim's invitation, not only to join the announcers' pilgrimage on April 7th but also to be interviewed by **Clare Balding** for the *Ramblings* programme that was to be recorded during the walk.

But the Amateur Radio connection didn't end there! The walk was also filmed by the BBC's *Look East* programme based in Norwich. "G3ZQB and I were having a chat before the walk", said Jim, "when the *Look East* cameraman approached us and introduced himself as **Kevin M3UCW**! It turned out that his reporter was indisposed so he asked if I'd mind conducting the interviews for his TV report. He even got me to provide a commentary while trying to wade through ankle deep mud."

The M3UCW video and G3ZQB's Ramblings contribution can be accessed via **www.pilgrimagetopips.org.uk** where there's also information about making donations.

Jim G4AEH, was quick to acknowledge all the *PW* readers who played their part too. "Rory Morrison asked me if they were Amateur Radio callsigns that were appearing on the list of donors", says Jim who personally contacted those who had E-mail addresses on QRZ.com, to say thank you. "To those readers without E-mail addresses, Rory and the team have asked me to pass on their heartfelt thanks".

At the time of going to press, over £20,000 had been raised in donations and tax relief.

New Members Wanted

Members of the **Isle of Wight Raynet Group (G0IWR)** have just had their first annual general meeting (AGM) and are looking to expand their membership during their second year of operation. Anyone wishing to join should contact membership secretary **Tony Pegg** on 01983 868978 or join in on the Sunday net: 144.675MHz at 20:00. Both licensed and non-licensed members are welcome.

Listen Out For

Special callsign **SX2MT** (Makedonian Tombs), will be active in the International museums weekend (June 21st - 22nd). Activity will be from the Museum of Vergina, Royal Tombs, Hellas, Greece. Museum number IMW 5178. QSL via SV2KBB (Archelaos Iakovidis, PO Box 2, P.C.59100, Veria, Makedonia, Hellas, Greece), direct only or eQSL.

This summer, Icom UK is to sponsor a unique radio station on the outskirts of Kent. In fact, this special station called Red Sands Radio will be 8.5 miles offshore from Whitstable on the north coast of Kent in an old Second World War Army Sea Fort on the Red Sands. The radio station, which will be on-air from early July, will be broadcasting to thousands of listeners in Kent on 1278kHz and via the Internet at **www.redsandonline.co.uk**

As part of the sponsorship agreement, Icom UK are planning to operate an Amateur Radio special event station. Ofcom has issued **GB0RSR** for this occasion. **www.icomuk.co.uk** or **www.hamlife.co.uk**/

The **GX8LED** station will be active from Daventry Borough Hill, Marconi site from 0000-2400UTC Saturday, July 26th for International Marconi Day. It is the first time from this location for IMD (www.gb4imd.org.uk/) by the Northampton Radio Club. QSL via M0DOL, direct or bureau.

Young Ham

A new website has been set up by Eoghan Murray, James 2E0BMI, Steve M3SPF, Chris M3UBH, Dan KE5RRH and others. It's a website called YoungHam and is for young radio enthusiasts, be it short wave listeners, Amateur Radio operators or keen CBers, electronics enthusiasts and technology enthusiasts. They have a forum, user articles, videos, a podcast (upcoming) and much more.

www.youngham.net

New Morse Key

All the fixed parts of the **Begali Sculpture Morse key** are made from AISI-304 stainless steel. It is polished to a finish that should stay perfect for a lifetime, and, unlike plated surfaces, it's possible to remove any blemishes with fine abrasive compounds like jeweller's rouge or car polish.

The arms of this paddle key, with a 1:1 leverage ratio, are extremely short and are made from a lightweight alloy. The finger pieces are carved out of a light, yet robust, carbon fibre material that provides excellent tactile feedback. Like other paddle keys in the Begali range, the Sculpture key has the fine adjustments. Gold contacts are also a standard feature. A protective dust cover is also included. Available soon from: **Martin Lynch & Sons Ltd., Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS. Tel: 0845 2300 599. www.hamradio.co.uk**

rallies

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

Send all your rally info to

PW Publishing Ltd.,
Arrowsmith Court,
Station Approach,
Broadstone,
Dorset BH18 8PW
E-mail: newsdesk@pwpublishing.ltd.uk

June 15th
East Suffolk Wireless Revival
John Quarmby G3XDY on 01473 717830
www.btinternet.com/~thomassg/eswr.htm
The East Suffolk Wireless Revival will be held at the Suffolk Showground (Trinity Park), Felixstowe Road, Ipswich IP3 8UH. Gates open at 9.30am. There is ample car parking and well signposted access. The main attractions will be the radio car boot sale, Bring & Buy, Bookstall, HF station and local club stalls. Food and other refreshments will be available.

Newbury & Districts ARS Rally and Boot Sale
Phil Morris. Tel: 07771 504738
E-mail: rally@nadars.org.uk
www.nadars.org.uk
The 21st Newbury & District ARS Rally and Boot Sale will be held at the Newbury Showground - nearest postcode RG18 9JU. Pitches are £10 each or you can erect your own marquee for £50. The entry fee for visitors is £2. Gates open for visitors at 9am and 8am for sellers, car parking is free and catering is available.

Bangor & District ARS Radio & Computer Rally
Bill. Tel: 0289 1816707
E-mail: bill.langtry@btinternet.com
www.bdars.com
The Bangor & District ARS Radio & Computer Rally will be held at Crawfordsburn Country Club, Main St, Crawfordsburn, Bangor BT19 1JE. Doors open at 12 noon and admission is free. There will be trade stands and a Bring & Buy.

June 27th - 29th
Hamtronic Show
www.hamradio-friedrichshafen.de/html/en
The Hamtronic Show will be held at Messe Friedrichshafen, Neue Messe 1, 88046 Friedrichshafen, Germany. There will be trade stands, special interest groups and a large RSGB Bookstall.

June 29th
West of England Radio Rally
Shaun. Tel: (01225) 873 098
Email: rallymanager@westrally.org.uk
www.westrally.org.uk
The West of England Radio Rally will be held at the "Cheese & Grain" venue, Frome, Somerset. Doors open from 10am to 4pm. There will be inside and outside trade stands, local club stalls, free parking, cafe; disabled facilities (disabled car parking spaces, level/ramped access to all areas, disabled toilets).

July 5th
Reddish Rally
Nigel. Tel: 0161 428 8413 evenings and weekends
www.reddishrally.co.uk
The Reddish Radio Rally will be held in St. Mary's Parish Church Hall, St Mary's Drive, Off Reddish Road, Stockport, Cheshire SK5 7AX. Doors open at 10.30am and entry is £1. There will be car parking available. Tables are available at £10 each. Please note this is a Saturday rally as the venue is in use on Sundays!

July 6th
Barford Radio Rally
David. Tel: (01953) 458844
www.norfolkamateurradio.org
The Norfolk ARC Barford Radio Rally will be held in Barford Village Hall, Barford, Norfolk NR9 4AB. There will be car parking available and the doors open at 9am. There will be trade stands, a Bring & Buy, special interest groups and the RSGB bookstall.

July 6th
Cornish Mobile Rally
Ken. Tel: (01209) 821073
E-mail: keng0fic@fsmail.net
The Cornish RAC 45th Mobile Rally with Kernow Microscopical Society will be held at Penair School, Truro, Cornwall TR1 1TN. Doors open 10.30am (10.15am for disabled visitors). There will be trade stands, a Bring & Buy, refreshments, disabled facilities and car parking.

York Radio Rally
Arthur. Tel: 07841 120 738
E-mail: apalg8@aol.com
The York Radio Rally will be held at York Racecourse (Knavesmire) YO23 1EX. There will be trade stands, a Bring & Buy and free car parking. Doors open at 10.15 for disabled visitors and 10.30am for others.

July 13th
McMichael Rally and Boot Sale
M. Standen. Tel: 01189 723 504
E-mail: g0jms@radarc.org
http://www.radarc.org/MMRally.htm
The McMichael Rally and Boot Sale will be held at Reading Rugby Football Club, Holme Park Farm Lane, Sonning Lane (B4446), Sonning on Thames, Reading RG4 6ST, just off the A4 East of Reading, Berkshire. It is a large site and the boot sale area is on level ground. There will be Special Interest Groups, computer equipment, demonstrations and lectures, catering services, a fully licensed bar and plenty of parking areas with disabled special parking on level ground. Gates open at 9.30am and admission is £2. Gates open for sellers from 8.30am. Boot Sale Pitches costs £10, no booking required. Hall traders, tables £10 pre-booked or £12 on the day.

July 25th - 27th
AMSAT-UK Colloquium
Jim Heck. Tel: (01258) 453959
http://www.uk.amsat.org/Colloquium/
AMSAT-UK will be holding their 23rd International Space Colloquium at the University of Surrey, Guildford, Surrey GU2 7XH. The event is open to all Radio Amateurs and SWLs. Either Day passes or full packages comprising overnight accommodation and meals at the University are available. An online booking service is available with PayPal, Visa and Master Card payments accepted.

July 27th
Horncastle Summer Rally
Tony Nightingale. Tel: (01507) 527835
E-mail: G3ZPU@hotmail.com
The Horncastle Summer Rally will be held at Horncastle Youth Centre, Willow Row, Horncastle LN9 6DZ. Tables cost £5 and entry for visitors is £1. The venue is all on one level, making access easier for disabled visitors. Refreshments will be available, including hot bacon butties. Doors open 10.30am.

Colchester RA Rally & Computer Fair
David. Tel: 0776 654 3784
E-mail: colchesterradioamateurs@hotmail.co.uk
The 40th Colchester Radio Amateurs Rally and Computer Sale will take place at St Helena School, Sheepen Rd, Colchester, Essex, CO3 3LE. Doors open 10am to 3pm for visitors and 7.30am for traders. There will be all the usual traders, including Waters and Stanton and an RSGB Bookstall, a large number of boot traders, stalls from all the usual clubs and societies and a Bring & Buy. The venue is all on one level with disabled facilities. There is ample parking in the college opposite and limited disabled parking on the field.

August 3rd
West Somerset ARC Radio Boot Sale and Rally
Bob. Tel: (01643) 863462
www.westsomerset-arc.co.uk
The West Somerset ARC Radio Boot Sale and Rally will be held at Allerford Community Hall, Hare Park, Allerford, Minehead, Somerset TA24 8HL
Doors open at 10am and admission £1 with children under 16 free. Stands are £5.00 each (indoors and outside) and there will be loads of parking.

August 8th
Cockenzie & Port Seton ARC Junk Night
Bob Glasgow. Tel: 01875 811723
http://www.cpsarc.com/news.php
The Cockenzie & Port Seton ARC Junk Night will be held in the Cockenzie & Port Seton Community Centre (Main Hall). Disabled access is available and entry is £1 with all money donated to the British Heart Foundation. Bring along your own 'junk' and sell it yourself. Tables on a first come, first served basis from 6.30 to 10pm

August 10th
Flight Refuelling ARS Hamfest
Mike. Tel: (01202) 883479
E-mail: hamfest@frars.org.uk
The Flight Refuelling Hamfest will take place at Cobham Sports and Social Club Ground, Merley Park Road, Wimborne, Dorset BH21 3AA. Gates open at 10am and the admission will be £3.50.

King's Lynn ARC 19th Annual Rally and Car Boot
Ray. Tel: (01553) 671307
E-mail: ray-g3rsv@supanet.com
www.klarc.org.uk
The King's Lynn Amateur Radio Club Annual Rally and Car Boot Sale will be held at King's Lynn Caravan and Camping Park, PE33 0QR, (approx 3 miles E of King's Lynn off the A47). There will be free car parking, entry fee is £1.00, pitches £8.00 and doors open at 10am (8am for sellers). There will be trade stands, a Bring & Buy and refreshments.

Project

The Clara

Direct Conversion HF Receiver

My thought behind the Clara project was to build a simple receiver with a minimum of discrete components that would be capable of good communications performance, even on the often challenging 7MHz (40m) band. So with a bit of help from good friends the Clara was hatched!

The Clara is a direct conversion (DC) high frequency (h.f.) receiver. With it you can listen to continuous wave (c.w.) Morse and single sideband (s.s.b.). It's a single band design that covers 1.8, 3.5 or 7MHz, the band being determined by filter and oscillator components.

Using just four integrated circuits (i.c.s) and one transistor it's unlike many other simple receivers as I chose to use the robust MC1496 mixer as the main active component. This is not the easiest i.c. to configure but of all the currently manufactured full sized products I think it's the best available! From a design point of view, the MC1496 is more awkward to use than the newer SA602 and its derivatives as external d.c. biasing voltages are required at several pins in order for it to work properly. Oddly this includes the inputs, more on this later.

However, the '1496 confirmed reputation is that it's a 'stronger' mixer than the 602 and hence it should be more reliable in rejection of interference from nearby broadcast stations, known as BCI. The added benefit of variable gain within the '1496 gives rise to a simple yet proper radio frequency (r.f.) gain control, which is a useful tool in the battle against interference.

The Circuit

Let's now look at the circuit, **Fig. 1**, and I think that no matter how good the mixer stage is the first fundamental thing to consider is the local oscillator or variable frequency oscillator (v.f.o.). This needs to be frequency and temperature stable.

Thankfully a certain Mr. Hartley long since sorted this problem out and with a few tweaks his circuit forms the v.f.o. that drives the Clara. The design is configured here as a conventional free running oscillator with temperature drift compensating capacitors C2 and C4.

One of this pair of special ceramic capacitors C2 has a negative temperature co-efficient which counteracts any positive drift by the Toko oscillator coil L1. The

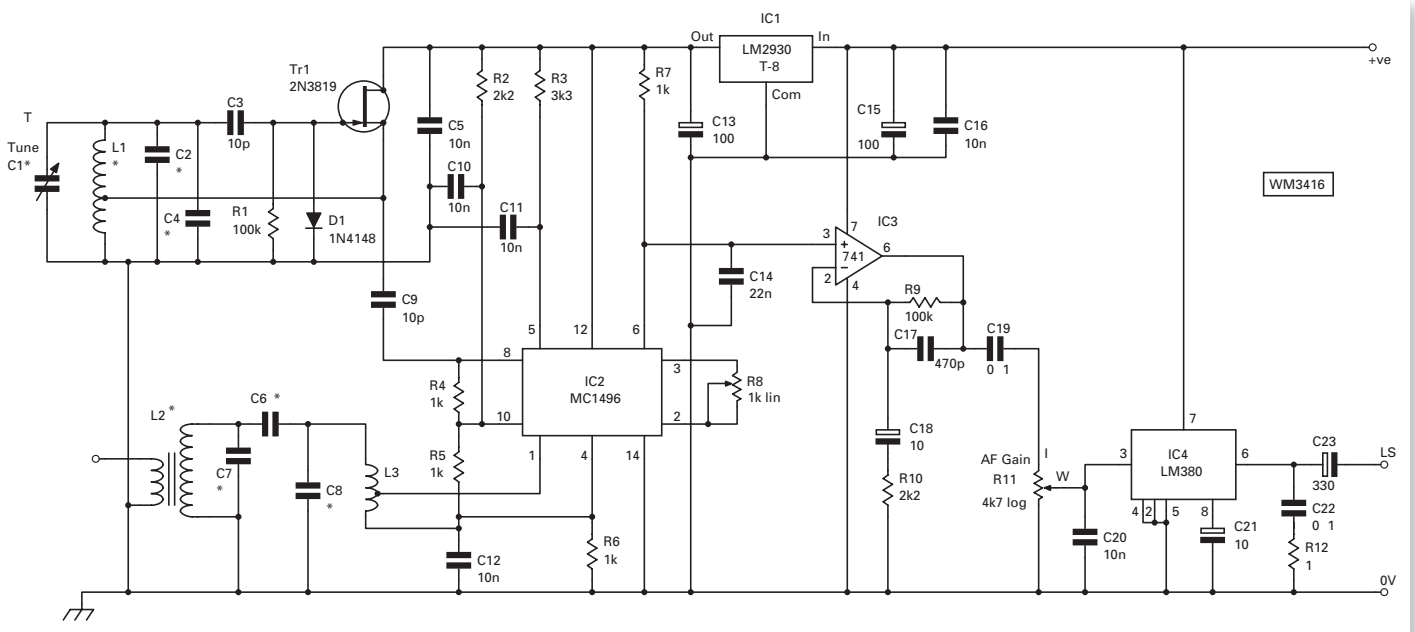


Fig. 1: The circuit of the PW Clara uses only three i.c.s in the receiver path.

Richard Booth G0TTL enjoys designing equipment and presents an unusual direct conversion receiver project using integrated circuits.

other capacitor C4 is NPO type and has a nominal zero coefficient. The theory being each coefficient cancels the other out and hence gives a good degree of thermal stability. It seems to work!

The resonant frequency of the oscillator based around the field effect transistor (f.e.t.) Tr1, is set by C2 and C4, the inductor L1 and the variable capacitor C1. The output of the v.f.o. is connected to the product detector by C9, 10pF. This low value capacitor loosely couples the two stages and makes sure that there is negligible load on the source of Tr1. It also ensures that the output of the v.f.o. is attenuated a little to suit the input of IC2.

The Clara's Heart

The heart of the Clara receiver is the mixer/product detector IC2. Low level signals from the antenna are applied to the 50Ω input impedance 5-pole band pass filter comprising of Toko coils L2, L3 and C6 – C8.

In order to match the input impedance of the 1496 the 1kΩ tap of L3 is used to feed the filtered r.f. into the product detector. Looking at the circuit you will see the rather unusual arrangement of the second resonator in the band pass filter. This is so that the bias voltage present on pin 4, which is controlled by R2, 4 and 5 set up the correct conditions on pin 1 of IC2, the low level signal input.

The internal gain of the MC1496 is controlled by R8, the r.f. gain control. The mixing process takes place between the v.f.o. and input r.f. signal, resulting in the resolved very low level audio product at pin 6 being developed across the load created by R7 and C14.

In order to drive the audio power stage these tiny audio signals need to be amplified and so it's then time to introduce our trusty old friend the 741 op amp, IC3. This is is set up as a non inverting amplifier with a nominal voltage gain of 50, set by R9 and R10.

In order to save on a few extra biasing components no coupling capacitor is needed between the mixer and pre-amplifier. The direct current (d.c.) voltage present on pin 6 of the mixer is approximately 6V, which is near enough half the supply voltage, perfect for biasing a 741 connected up in a single rail power supply circuit.

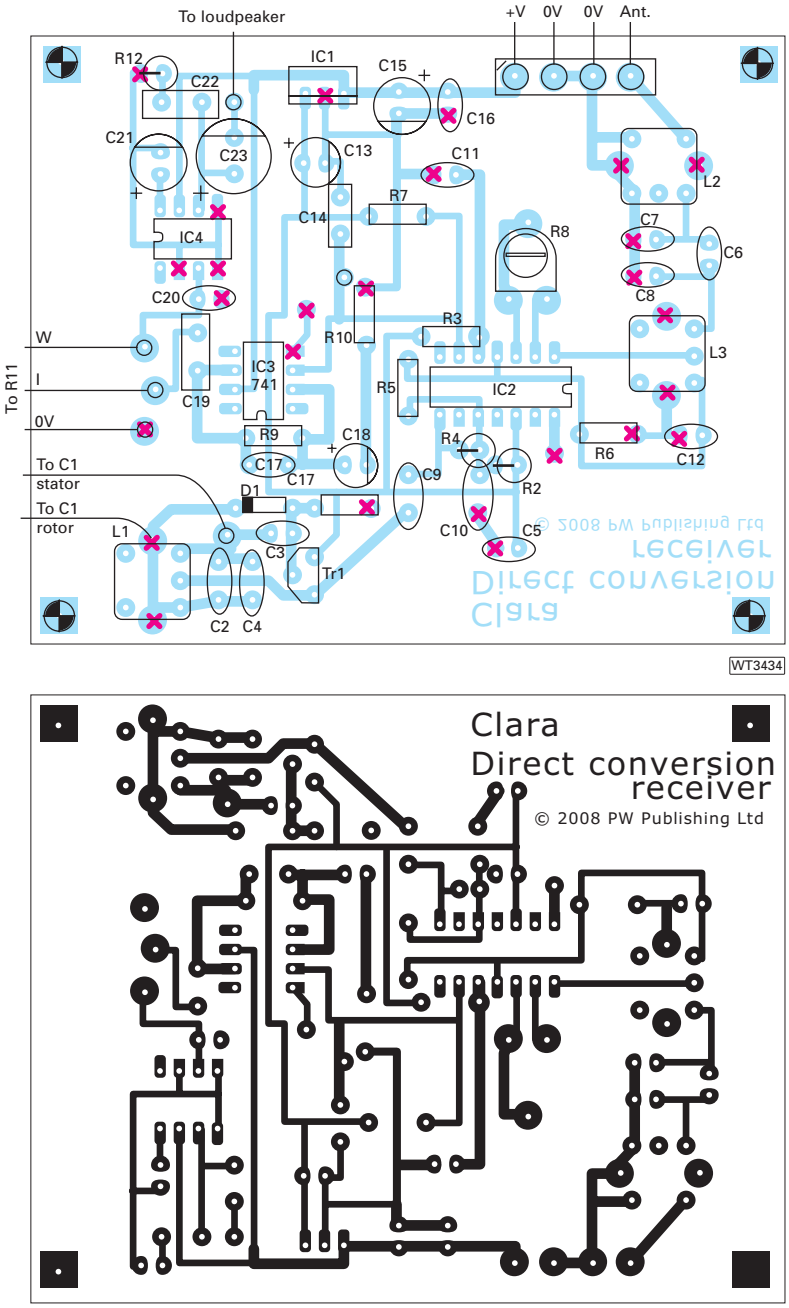


Fig. 2: The printed circuit board (p.c.b.) uses double-sided p.c.b. material with the upper, un-etched side used as a ground plane. Only the holes marked with red crosses need to be soldered to the earth plane, all other holes should be cleared around them to stop any short circuits to 0V.

Audio Bandwidth

As with all DC receiver designs, the selectivity of the receiver is governed by the a.f. bandwidth and for that purpose is restricted here by C17 in the feedback loop. This causes the audio gain above 3kHz to roll off and makes it suitable for s.s.b. 'phone reception.

The audio is at a level suitable to drive the a.f. power amplifier it passes via R11, the a.f. gain control to the input of IC4, an LM380N-8. This is the 8-pin version of the popular LM380N audio amplifier and again has a voltage gain of 50.

Grounding the spare input (pin 2) greatly improves the noise factor of the '380N and adding the output de-coupling components C22 and R12 cut out any tendency for self oscillation. The output is suitable to drive a speaker of 4 to 16Ω impedance.

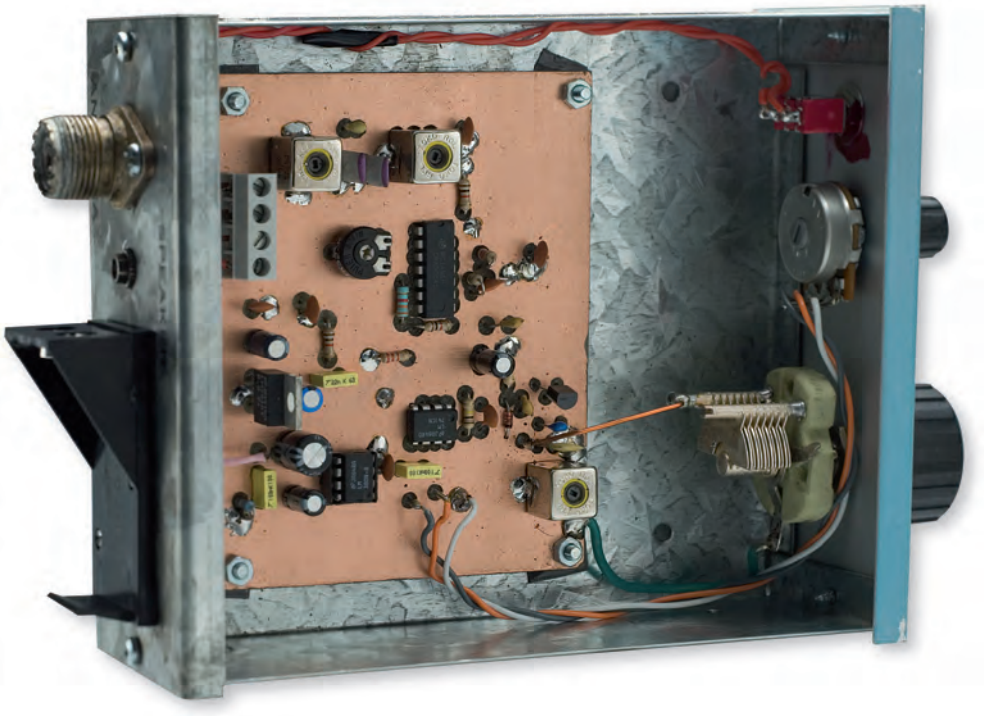
Finally, the voltage regulator, IC1, is a special low drop out (LDO) type that is used to supply the required 8V d.c. for IC2 and the v.f.o. circuit. An LDO device was chosen as this gives far better voltage stability than the cheaper 7808 devices. It also allows the receiver to be operated either

from a 9V battery or a standard power supply unit (p.s.u.) up to a maximum of 18V d.c.

Building The Clara

The Clara receiver is built on a single, double sided 80 x 100mm fibreglass printed circuit board (p.c.b.) as shown in **Fig. 2**. Its component side is a continuous ground plane with countersunk holes for components not requiring a ground connection. It is essential where marked on the layout diagram that connections are made on both sides of the p.c.b..

If *PW* readers decide to build the Clara 'ugly bug' style, I suggest that the layout is kept similar to the p.c.b. diagram and it's a good idea to keep the r.f. and v.f.o. sections as far apart as possible. Incidentally, my early prototypes were mounted on a small piece of timber floor boarding with a front panel made from p.c.b. material.



The prototype Clara receiver, mounted in a steel case.

My approach allows for simple, rigid construction and testing. Individual constructors can then box it up later as they see fit. The r.f. gain control can be either the p.c.b. mounted pre-set resistor or this can be replaced with a front panel mounted 1kΩ linear control.

Make sure any connections between the v.f.o. and tuning capacitors are made from stiff single core copper wire. **Please don't rely** on a single earth return between your front panel and the main p.c.b. Make at least three or four earth straps using the braiding from stripped down coaxial cable. The same goes for audio and power connections. Give each one its own piece of wire to ground.

The earthing techniques I've described helps to eliminate hum loops and other potential problems. Construction is best attempted in blocks, testing each stage as it's finished. I suggest readers follow this sequence, referring to the circuit diagram, parts layout and component list as you proceed. Components with (e) after their part number need to be carefully soldered to both sides of the board.

It's now time for me to describe some general 'bits' to make component placements easier. Please refer to the components list to select the correct Toko coils for the chosen band. Then fit L1, 2 and 3 remembering to solder the screening cans to the top side of the circuit board (A 25W soldering iron makes this easier). Make the two through board connections (marked TB) again soldering both sides of the board. Then fit the 4-way screw antenna and power connector, or alternatively solder pins use for this purpose.

Next, I'm looking at the power supplies and the audio amplifier. Make sure the polarity of any electrolytic capacitors fitted here are checked. Fit C16 (e), and C15 and 13 and then IC1. The centre pin of IC1 is soldered both sides.

The audio power amplifier can then be assembled. Fit R12 (e) – on end, C22, 21, 23 and 20 (e). Then fit IC4. I suggest that this is fitted in a dual in line (DIL) socket. The reason for this is that it will most likely fail if the supply is connected accidentally back to front. They go bang!

First Test!

The next job will be the first test! Carefully connect up the power supply, check the polarity twice before switching the power on! Measure the voltage at the output of IC1, point O, it should be 8V d.c. Then connect up to the loudspeaker to point LS (other side to ground) and using a screwdriver apply a finger to pin 3. It should be possible to hear some mains hum or other noise. If so great! – switch off and continue.

On to the audio pre-amplifier. As the mixer, IC2, provides the input biasing for the pre-amplifier this needs to be installed before testing the 741 stage. So, fit R6 (e), R7 and IC2 and connect the power supply for a brief test. Then check the voltage at pin 6 of IC2 (this should be approximately 7.5V).

Switch off and complete the audio pre-amplifier. Fit R9 and 10 (e), C18, 17, 19 and C14 and then IC3. For testing temporally connect a link between points I and W or fit R11 the a.f. gain control. Switch on and connect up the loudspeaker. Apply a finger to pin 3 of the '741, this should generate much louder (rough sounding) hum and buzzing. If it does – good!

The next job is to complete the mixer/product detector stage. First fit R8 the r.f. gain pre-set. I suggest the use of a pre-set variable resistor first of all and then individual constructors can decide if they need a front panel control later. Set the pre-set fully clockwise for maximum gain.

Then fit C12 (e), R5, 4, 3, and 2, then C11 (e), and 10 (e). Power up for some more tests. The voltage on both pins 8 and 10 of IC2 should be equal at approximately 3.7V. Touching a test meter probe on to pin 8 should produce some loud r.f. interference noises in the loud speaker. If all

is okay, switch off and prepare to build the v.f.o.

Good soldering and short leads are essential here as the v.f.o. is assembled! Fit C5 (e) and 3, R1 (e), and diode D1 – check polarity, followed by C9, and Tr1 (check orientation), and referring to the band specific components fit C2 (e) and 4 (e). Switch on.

A frequency counter makes the next test much quicker but if one is not available, then use a general coverage receiver with its antenna wire draped over the Clara p.c.b. Assuming some constructors will have a frequency counter, I suggest that they use an oscilloscope type divide-by-ten probe so that the circuit isn't loaded while the frequency of the oscillator is measured.

Connect the frequency counter to the cold side of C5 – that's the lead that connects to pin 8 of the 1496. **Note:** Without the tuning capacitor connected the oscillator will run higher in frequency. Next, adjust the core of L1 with a trimming tool so that the v.f.o. is roughly operating at the correct frequency. It will then be possible to connect up C1 (see the components list for suggestions about this) so that the tuning range can be checked and adjusted to the correct frequency coverage. Of course, it should be the same as the actual frequency range required, i.e. 3.5 to 3.8MHz for 80 metre band coverage.

If another receiver is being used to check the frequency, this will have to be to tuned over the frequency range on that receiver until a steady carrier is detected. Touching a finger onto the Clara v.f.o. components will prove that it's the signal required, rather than some international broadcast station warming its transmitters up!

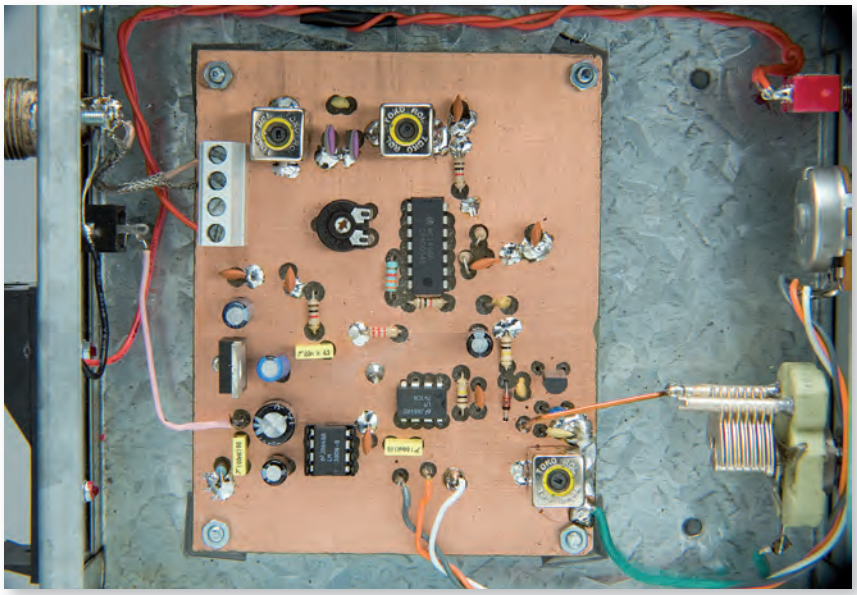
Proceed the setting up as I've already described. The best approach is set the upper limit first with the core of L1 and then tune down in frequency as the capacitance of C1 increases; following the signal down with the other receiver. The capacitor values I've chosen for the v.f.o. have been extensively tested and constructors should find the oscillator is pretty close to the required frequency without too much adjustment. When completed, switch off and fit the final components.

Filters & Final Alignment

The next stage is setting up the filters and final alignment. Referring to the band specific components fit C7 (e) and 8 (e) and finally C6. If this hasn't been yet done, connect up the a.f. gain potentiometer to points I and W; W being the centre wiper contact. Don't forget to 'ground' the free connection on this control.

At this stage it will be time to connect up the antenna. This should be tuned to the correct frequency and present a 50Ω match for best results. (Don't expect miracles from a random bit of wire hanging out of the back of the workshop!). Then, connect up the speaker and prepare to hear signals.

Try to find a station near the centre of the band or use a signal generator to provide a test signal. Next, the band pass filter has to be peaked by carefully adjusting the cores of L2 and 3 for best signal strength. During this alignment I suggest that constructors try adjusting the r.f. gain pre-



The assembled (sparesly populated) p.c.b.

set, back it off a little and then peak the filter again until no further improvements can be made. Congratulations, at the Clara receiver construction will be finished! Tune up and down the band, set the r.f. gain back at the required level and get used to driving the new toy.

Front Panel & Controls

Once the receiver is finished it will be time to start thinking about front panels and getting controls mounted. A simple piece of p.c.b. material is quite sufficient if individual constructors don't wish to go to the expense or effort of fitting the receiver into a case.

As I've already mentioned, I built several prototypes as in the 'open' style initially, using a small piece of floorboard timber for mounting purposes. The p.c.b. can easily be screwed onto the board and likewise, a front panel can be mounted the same way.

Mount the tuning capacitor as close to the v.f.o. circuitry as physically securely as possible. Use stiff single core wire for all v.f.o. connections. It might also be a good idea to think about adding a slow motion tuning drive, which would be a benefit, especially on 3.5MHz where tuning can be quite tight. Alternatively, the Clara can be fitted into an enclosure of personal choice. (However, expect to do some minor v.f.o. re-alignment if the tuning capacitor leads are disturbed re-housing the p.c.b.

Tuning Capacitors

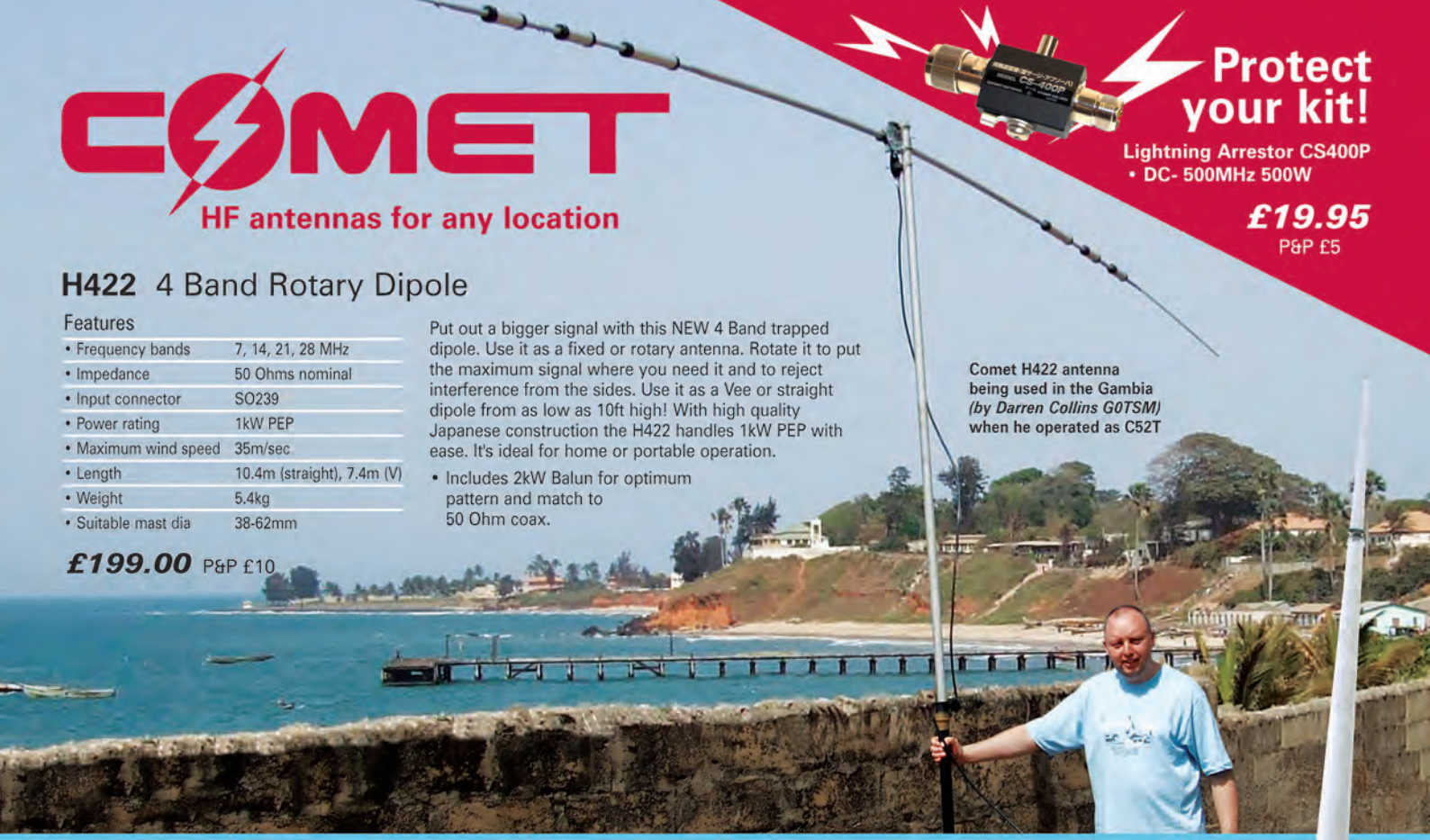
The Clara will work well with polyvaricon or even better with an air spaced capacitor. I calculated the v.f.o. values were so that a low value tuning capacitor could be used, with the idea that most constructors will have something suitable in their junk box.

If a polyvaricon is selected, it's likely to be a little higher in capacitance for bands other than 1.8MHz (160m or Top Band) than is required. If the capacitor chosen is around 75pF, try fitting a 33pF ceramic plate in series with it to limit the overall value. This may result in the tuning at one end of the band to be a little cramped however – so experiment with different series capacitors for the best compromise.

For 7MHz (40m) I suggest that readers try to find a polyvaricon with a v.h.f. tuning section – this would

COMET

HF antennas for any location



Protect your kit!

Lightning Arrestor CS400P
• DC- 500MHz 500W

£19.95
P&P £5

H422 4 Band Rotary Dipole

Features	
• Frequency bands	7, 14, 21, 28 MHz
• Impedance	50 Ohms nominal
• Input connector	SO239
• Power rating	1kW PEP
• Maximum wind speed	35m/sec
• Length	10.4m (straight), 7.4m (V)
• Weight	5.4kg
• Suitable mast dia	38-62mm

Put out a bigger signal with this NEW 4 Band trapped dipole. Use it as a fixed or rotary antenna. Rotate it to put the maximum signal where you need it and to reject interference from the sides. Use it as a Vee or straight dipole from as low as 10ft high! With high quality Japanese construction the H422 handles 1kW PEP with ease. It's ideal for home or portable operation.

- Includes 2kW Balun for optimum pattern and match to 50 Ohm coax.

£199.00 P&P £10

Comet H422 antenna being used in the Gambia *(by Darren Collins G0TSM)* when he operated as C52T

CWA 1000
Trapped Dipole

• Operating bands	80, 40, 20, 15, 10m
• Maximum power	500W PEP
• Total length	19.9m

A beautifully engineered Japanese Antenna covering the main HF bands (WARC bands with a tuner). Supplied with all fittings, balun and insulators.

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Compact HF Antenna for 3.5-70MHz

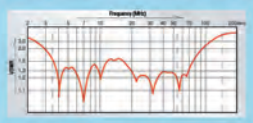
- **Three antennas in one:**
  Tee antenna (2.56m long)
  End-fed wire (10m long)
  Vertical broadband (10m high)
- **No radials needed**
- **Ideal for restricted spaces**
- **Balcony or pole mount**

Offers low SWR from 80m to 4m with no gaps! If you've a little more space then attach the supplied 10m wire for base-loaded Zepp configuration. Mount the VA-250 3m or more off the ground for instant all-band HF.

£249.00 P&P £10

CHA 250B Wide-Band Vertical
Covers 80m to 6m with no ATU and no gaps

Features
• Mounts at any height - needs no radials
• Transmit 80m through to 6m
• Receive 2 MHz - 90 MHz
• Transmit VSWR better than 1.5:1 throughout
• Rated at 250W PEP
• Only 7.2m high, weighs a mere 3.2kg
• Great performance on all bands
• Very low visual impact & low wind resistance



The Comet CHA 250B vertical covers all the way from 80m through to 6m with a VSWR of less than 1.5:1. It's probably the easiest vertical to install, simply mounting on any pole and requiring no radials. If you are restricted for antenna installation space, the CHA-250B could be the perfect answer.

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"Mounted at about 25ft and I am now working stations on all the bands I never even heard before"

"During the high winds we had a few weeks ago no damage, if I could give it 10 out of 5 - I would!"

£299.95 P&P £10

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normally be around 20pF and will give good linear coverage of that band. Note: remember to set any internal trimmers to minimum capacitance (i.e. plates fully unmeshed).

The same series capacitance rule applies for air spaced components. However, with this type you can always physically remove one or more of the moving plates to reduce the overall capacitance value and also retain linearity.

Using The Clara

Like all relatively simple receivers the final results that can be achieved by the Clara – have a lot to do with the antenna system used and a good resonant antenna with a reasonable *Q* is by far the best option. However, I'm sure constructors will be mildly surprised what can be heard with just a simple end fed wire tuned against earth with an a.m.u.

The 7MHz band is the 'challenge' for any kind of active direct conversion system! This is due to direct rectification of the massive 'in band' signals generated by high power broadcast stations using amplitude modulation (a.m.). Fortunately, the 1496 mixer is a tough little device with high overload margins and makes a good effort in reducing the problems. Incidentally, conditions change up and down (good and band) all the time, so try the receiver over a period of days.

If this is the first time using a direct conversion receiver has been used, the new operator may wonder why half the s.s.b. signals heard can't be resolved. Well don't worry, nothing is being missed!

The apparent problem occurs because during the detection process, the mixer produces both upper and lower sideband products, which are directly converted to audio. As there's no crystal filter or phasing system to get rid of the unwanted sideband, both are heard but only the original transmission sideband is legible.

With careful tuning the recovered audio will be of superb quality. The price we pay for this in a simple receiver is occasionally a little more interference. However, do remember the best filter money can buy is inside your head!

Operation from a 9V PP3 battery is quite feasible too, with a total current consumption at normal speaker volume of around 30mA.

Help & Enthusiasm

Finally, I would like to take this opportunity to thank **Tim Walford G3PCJ** for his help and enthusiasm in fault-finding my original circuit, building prototypes and for unwittingly suggesting most of it in past projects! Also thanks to **Andy Howgate G7WHM** for building and testing prototypes.

Just in case you are wondering who Clara is, well the answer is that it's the middle name of my assistant 18-month old engineer who spent several hours trying to undo my p.c.b. design efforts! I hope you have as much fun building this little receiver as I have had putting the various bits of it together. Please don't hesitate to get in touch and let me know how you get on. ●

Richard built one Clara prototype 'open style' on wooden board.

Component List

Capacitors

10pF	Ceramic Plate	C3, C9
470pF	Ceramic Disc	C17
10nF	Ceramic Disc	C5, C10, C11, C12, C16, C20
22nF	Polyester	C14
100nF	Polyester	C19, C22
10µF	35V Electrolytic	C18, C21
100µF	35V Electrolytic	C13, C15
330µF	35V Electrolytic	C23

Resistors all 0.25W watt 5% carbon

1Ω	R12
1kΩ	R4, R5, R6, R7
2.2kΩ	R2, R10
3.3kΩ	R3
100kΩ	R1, R9
1kΩ pre-set	R8 (see text)
4.7kΩ Log pot,	R11 a.f. Gain

Semiconductors

D1	1N4148	Tr1	2N3819
IC1	LM2930T-8	IC2	MC1496
IC3	LM741CN	IC4	LM380N-8

Band Specific Parts

All ceramic plate except NPO and N150 types. The N150 capacitors generally have an orange tip with buff coloured bodies and NPO/COG is usually blue or yellow resin dipped. **Note:** Do not use normal ceramic plate capacitors for C1 or 2 as stability will be impaired. For C1 use 25pF variable for 7MHz, 50pF for 3.5 and 75pF for 1.8MHz. (See main text for more details on tuning capacitor configurations).

1.8MHz	L1,2,3 TOKO 3333R	C2 220pF N150, C4 270pF NPO C7,8 150pF, C6 10pF
3.5MHz	L1,2,3 TOKO 3334R	C2 150pF N150, C4 100pF NPO C7,8 330pF, C6 22pF
7MHz	L1, 2, 3 TOKO 3334R	C2 56pF N150, C4 39pF NPO C7,8 82pF, C6 4p7

The p.c.b. connections

LS	Loudspeaker (8Ω)
W	Wiper (centre tag of volume control)
I	Input to volume control (top tag)
0v	Bottom tag of volume control to ground
+ve	9 – 18V d.c. supply positive, the two centre connections are for negative or ground.
ANT	Antenna
T	Tune. Connect the C1 to the p.c.b. with stiff single core copper wire.

Ready Drilled Boards

High quality double-sided and ready drilled p.c.b's for the Clara are available from the author. Price is £9.75 plus £1 postage and packing. Please make cheques payable to **Past Times Radio** and send to:- Past Times Radio, *School House*, Old School Lane, Wadworth, Doncaster DN11 9BW.

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ML&S Price
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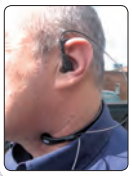

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- Input power: 10 - 200W PEP
- SWR: <2:1
- Power supply voltage: 12V +/- 10%
- Current consumption: <0.8A
- Auto tuning time: Approx. 2 seconds (first time tuning) Less than 1 second (return to memory frequency)
- Memory channels: 200
- Weight: 1.8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

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- Current consumption: <1.5A
- Memory channels: 800
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Peter Dodd's

antenna workshop

Peter Dodd G3LDO looks at antenna modelling using some popular programs and a home-brewed v.h.f. cubical quad.

The performance of an antenna is best described by plotting the relative field strengths around the antenna. The time-honoured way of checking either a h.f or v.h.f/u.h.f. antenna installation is to enlist the help of a friendly local Amateur to provide a transmitted signal.

It's then possible to then take S-meter readings at various beam headings while the antenna under test is being rotated. The results can then be plotted on polar graph paper to produce a polar diagram.

Polar Diagram

In an earlier *Antenna Workshop* [1] I described methods of plotting the polar diagram of an antenna using a computer, in particular a program called *PolarPlo*t, by **Bob Freeth, G4HFQ**. *Polar Plot* allows the antenna field strength to be converted into a form that can be read by the computer with suitable software to display the results.

Storage of data and the application of functions for normalisation and conversion from linear to log scales etc, are tasks amenable to computerisation. Additionally, very complex polar diagrams can be plotted (that would otherwise be difficult) using the manual method. An analysis of a three element 144MHz beam is shown in **Fig. 1**, which was done using a garden v.h.f. antenna test range as shown in the **Fig. 2**.

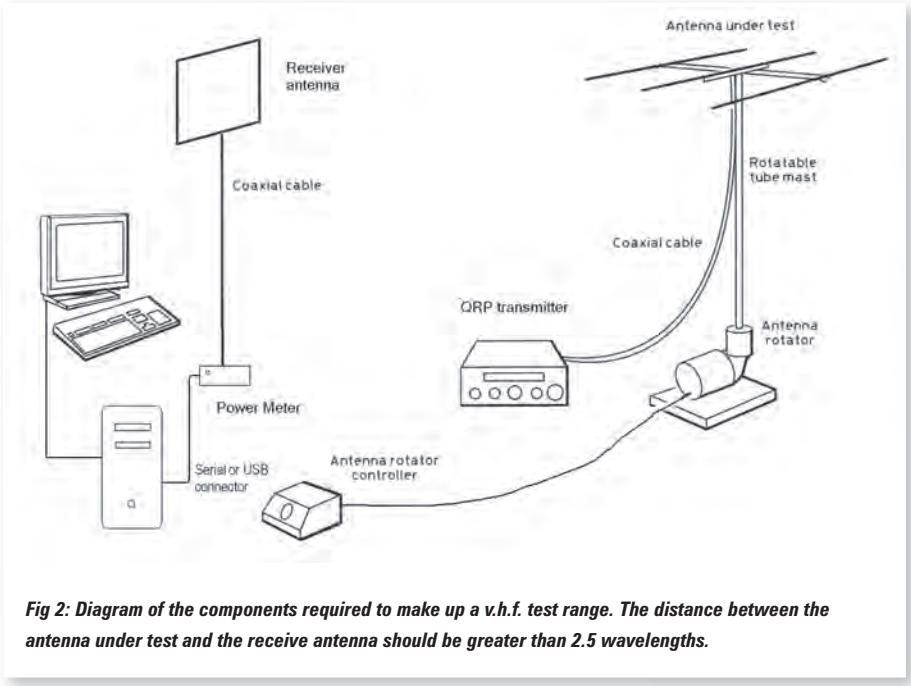

Fig 2: Diagram of the components required to make up a v.h.f. test range. The distance between the antenna under test and the receive antenna should be greater than 2.5 wavelengths.

The method described used a receiver as a field strength meter, whose audio output is fed into the line-in or microphone input of the computer soundcard. The volume of a beat note, in the single sideband (s.s.b.) or Morse mode (c.w.) of a plain unmodulated carrier, has good correlation with the radio frequency (r.f.) input level, provided the receiver is operated in a linear manner. This means that most of us will probably have all the necessary hardware for this project.

The disadvantage of the method is that the linearity is restricted to around 30dB and the r,f, and audio frequency (a.f.) levels have to be carefully set up. Best results could only be achieved with a desktop PC with a quality sound card. Many of the on-the-motherboard sound systems I've tried generated some residual noise at very low levels that affected the depth of the recorded nulls.

Versions of *Polar Plot* V3.1 and later can be used with the signal strength acquired by an external r.f. milliwatt power meter, which overcomes the limitations of the sound card. This gives a much better resolution to nulls below –30dB. An example of one of these meters, based on the Analog Devices AD8207 logarithmic amplifier integrated circuit was designed and constructed by **Thomas Scherrer OZ2CPU**, see **Fig 3**, (see also [2]). **David Bates M0DFT**, has also produced a similar watt meter especially for *Polar Plot*, which excludes the l.c.d. display used on the OZ2CPU meter.

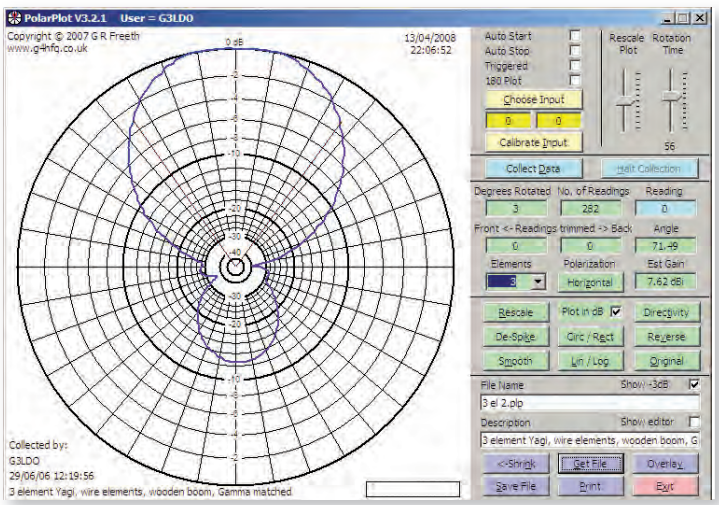

Fig 1: Polar diagram of a three element v.h.f. Yagi plotted using the ARRL dB Log Co-ordinate scale. The setting boxes (to the right) illustrate the range of processing that is available with Polar Plot.

Peter Dodd G3LDO
37 The Ridings
East Preston
West Sussex TN16 2TW
E-mail: g3ldo@ukonline.co.uk

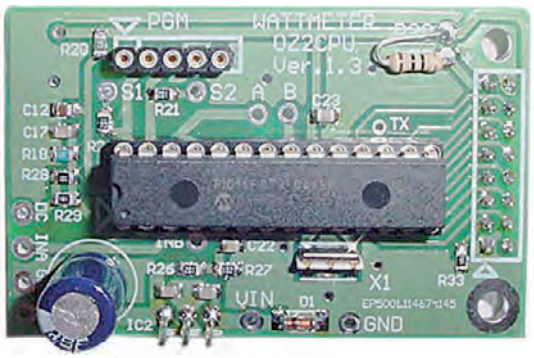

Fig 3: An example of an r.f. power meter, based on the Analog Devices AD8207 logarithmic amplifier integrated circuit from OZ2CPU's website [2]. The M0DFT wattmeter uses the same integrated circuit.

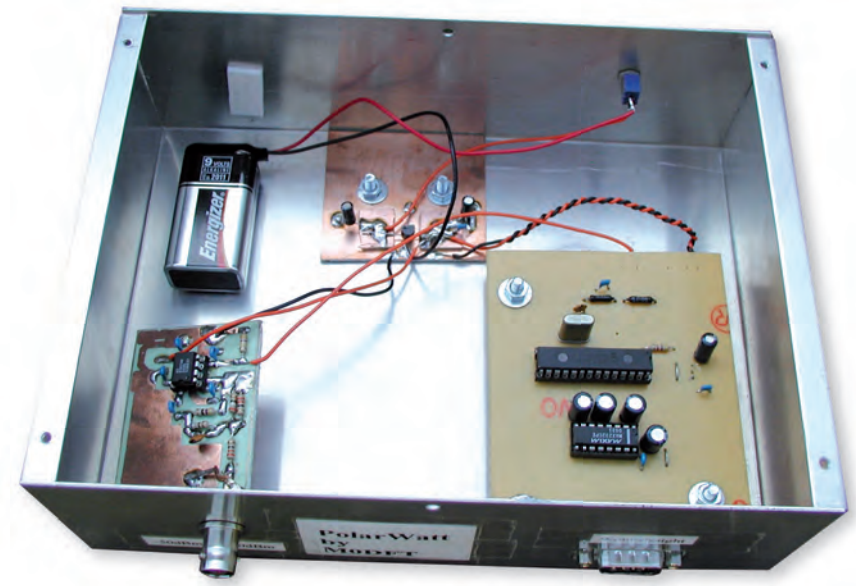

Fig 4: The M0DFT power meter designed specifically for use with Polar Plot (and now called Polar Watt!). The Analog Devices AD8207 circuit board is shown on the right while the PIC and serial digital conversion circuit board is shown on the left.

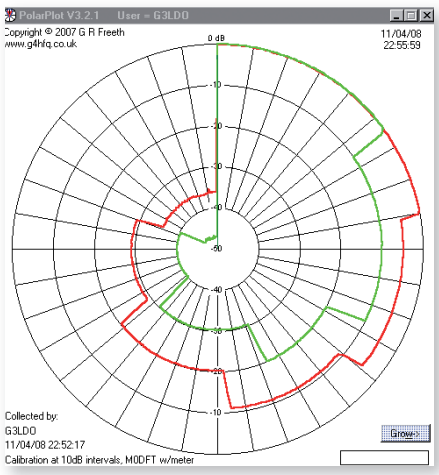

Fig 5: Calibration of linearity characteristics of Polar Plot using a receiver and a sound card (red plot) and a watt meter (green plot). This was done using an r.f. signal generator to provide signals at different 10dB levels.

The M0DFT power meter is shown in **Fig 4**. Both these meters use a PIC16F876 to convert the analogue output of the AD8207 so that it can be connected to the computer via a 9-pin serial cable. Thus the need for a receiver connected to the soundcard is eliminated, together with the complexity of setting the a.f. and r.f. levels.

A test calibration of the both the sound card and the watt meter is shown in **Fig 5**. I did the test using an r.f. signal generator to provide signals at different 10dB levels.

The Quad Plotted

In my recent contributions to *Antenna Workshop* I described aspects of quad antenna. I thought it would be nice to see how the quad performed using *Polar Plo*t.

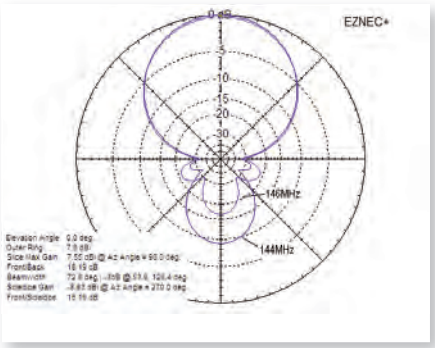

Fig 6: Azimuth Polar diagrams of an EZNEC5 model of the quad using EZNEC. Variation of reflector loop diameter is simulated using making separate plots on 144 and 146MHz and overlaying them

I first did an analysis of the two-element quad using *EZNEC5,* but first a word about computer modelling. On a parasitic beam – such as a Yagi or a quad – the length of the driven element has little or no effect on the directivity characteristics of the beam pattern, within limits. On the other hand, the length of the parasitic element (the reflector in this case) has a marked effect on beam pattern.

Altering the physical size of the reflector in a precise fashion is not simple in the computer model. However, it's possible to simulate different lengths of reflector by making measurements at different frequencies. This is achieved using the frequency sweep on *EZNEC* at 144 and 146MHz as shown in **Fig 6**. This simulation shows the effect of a short reflector (144MHz) and a longer reflector (electrically) when modelled at 146MHz.

So, how did real measurements using Polar Plo t compare with the computer model? To find out I constructed a quad for 144.5MHz as shown in **Fig 7**. The elements were made from 1mm diameter single strand copper wire, supported with 8mm square section wood battens.

The mast and boom were constructed from 15mm copper tubing with the element supports fixed to the boom with metal brackets and hose clamps (Jubilee clips). This arrangement allowed for easy adjustment of the element spacing.

The total element lengths were 2.110m for the reflector and 2.028m for driven element. Altering the resonant frequency of the reflector was easy on this real antenna and was adjusted using a variable stub. I connected the coaxial feed directly to the driven element.

I set the model quad was set so that the distance between the elements was 310mm (0.15 wavelengths) and the reflector stub was set so that it was 50mm long. The measurement frequency was 144.67MHz. The standing wave ration (s.w.r.) of the model configured this way was 1.8:1 and the calculated gain was 7.2dBi.

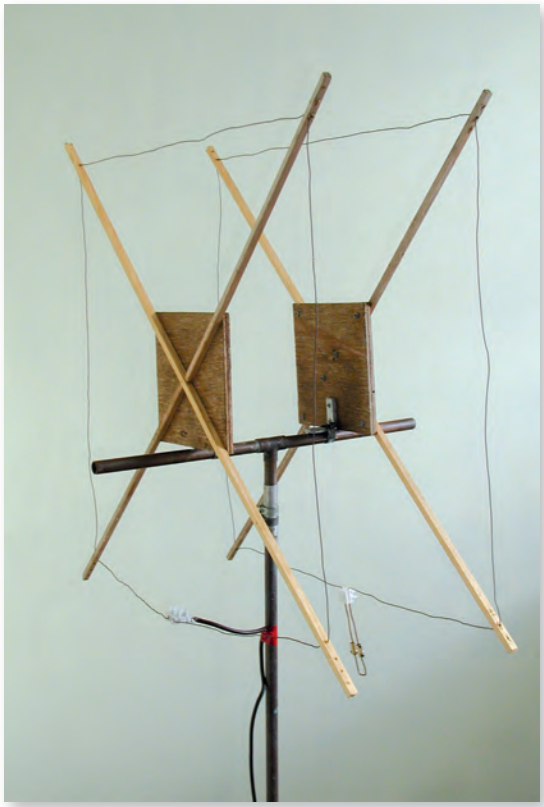

Fig 7: A 144.5MHz quad constructed from 1mm diameter single strand copper wire and supported with 8mm square section wood dowels. The boom and mast are made from 25mm copper pipe.

The Effect?

The effect of increasing the reflector loop size is shown in the *Polar Plot* measurements (see **Fig 8)**. As the reflector stub is increased from 50mm long (blue trace), to 70mm long (red trace), the front-to-back ratio increases and the gain decreases. As indicated, the results are very similar to the results given by *EZNEC5* although there are irregularities and a slight asymmetry, possibly due to the feed method.

Note: The results can be displayed on one of several polar scales, the most common in Amateur Radio today being the ARRL Log dB scale, which I've used in all the examples shown with the exception of the calibration shown in Fig 5.

Sometimes the original collected readings are irregular, for one reason or another, creating a ragged plot. This can be caused by noise on the signal, or wind blowing the antenna during the measurement!

In an attempt to produce a smoother looking plot, a smoothing facility is provided. However, I must stress here that the main objective should be to get a smooth plot in the first place and that this facility should only be used if the plot is very ragged. The smoothing routine performs an averaging process on the point being plotted by summing its value with the immediately preceding and immediately succeeding points. This rather rudimentary process is performed twice and the resulting averaged values are then plotted.

I've found that it's rarely possible to get the maximum part of the main lobe to occur with the same orientation every time I make measurements. However, *Polar Plot* has a facility to re-scale the plot so that the main lobe is made to equal 0dB while at the same time re-orientated to face 'north'.

The updated version of *Polar Plot* is free and can be downloaded from the Internet, see [3] and comes with full operating instructions.

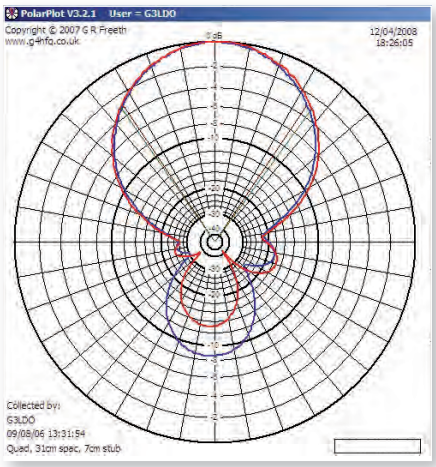

Fig 8: Polar diagrams of a quad-loop antenna shown in Fig 7. As the reflector stub is increased from 50mm long (blue trace), to 70mm long (red trace), the front-to-back ratio increases and the gain decreases. As you can see the results are very similar to the results given by EZNEC5 although there are irregularities and a slight asymmetry possibly due to the feed method.

Further Notes

The *Polar Plot* program has been updated – Version V3.2.1 March 2008 – and this corrected a problem collecting readings when using an OZ2CPU digital power meter. At one time Thomas OZ2CPU used to supply p.c.b.s. but boards can now be obtained from another source [4].

Version V3.2.0 June 2007 – added the ability to read power levels using LP-100-VCP and FTBMeter. This watt meter [5] is designed by **Larry Phipps N8LP** and can be used as an in-line instrument in the same way that a conventional s.w.r. /power meter. The specification is as follows:

LP-100A Digital Vector wattmeter with complex impedance display (R+jX)
Autoranging 50mW to 3kW (5 and 10kW options)
Bright, fast graphic VFD display
Simultaneous display of Power and SWR. (or REF PWR) in numerical & bargraph form. Additional displays for dBm, RL, compression and calibrated field strength in dBm.
Automatic band-by-band power correction with built-in frequency counter.
Peak hold mode
Flash upgradeable firmware
Serial interface
Free control, monitoring and plotting software
SWR alarm
NIST traceable calibration
Available as kit or assembled.
MSRP: $300 kit /$400 assembled.

The main advantage is that it comes as a kit or ready built. Full details can be found in a reprint of a QRX article on [5]. It has had had excellent reviews, see [6].

Cheerio for now!

●

References

[1] *Antenna Workshop*, *Practical Wireless* June 2006
[2] www.webx.dk/oz2cpu/
[3] www.g4hfq.co.uk
[4] www.elektor.com/magazines/2002/october/digital-rf-meter-with-lc-display/55968.lynkx.
[5] www.telepostinc.com/
[6] www.eham/reviews/detail/5891

Feature

Some radio controlled watches can struggle to up-date themselves from Anthorn, especially in electrically noisy locations.

Bring Back Rugby!

The development of 'quartz' clocks in the 1970s started a new era of low cost, reliable and relatively accurate timepieces. Radio Controlled clocks – mostly using the 60kHz Rugby service – took this a stage further and have now become the quality norm.

However, judging by the volume of letters in the *PW* June 2008 issue, the arrival of Anthorn in Cumbria, as a replacement for the Rugby transmitter on April 1st 2007, (What a prophetic date!) has severely dented confidence in radio clocks. Incidentally, the NPL Web site (**http://www.npl.co.uk**) is still using MSF when referring to Anthorn! (Not GBZ)

As stated, Anthorn is sited in the far north west on the Solway Firth, west of Carlisle and near the Scottish border. The new transmitter has an effective radiated power (e.r.p.) of 17kW, similar to Rugby but the signals has to traverse the mountain spine of England to reach the users in the far South. Clearly, Rugby was going to be missed!

Comparitive Signal Tests

During the commissioning phase of Anthorn, I carried out a series of comparative signal strength tests at my home in Swansea, South Wales (IO81BP) and found Anthorn to be consistently 10dB lower than Rugby. I discussed the findings with a senior staff scientist at National Physical Laboratory (NPL) who are responsible for the service and he confirmed the results. He also informed me that the minimum expected signal strength over the country was 100 microvolts/metre (100μV/metre) and that this was the actual level measured over most of the south of our island.

At this point, I thought it would be useful to have a short look at the digital encoding used in the 60kHz transmissions. In Britain, a precise 60kHz steady carrier is used marked, at the start of each second, by a break which either lasts 100ms to signify 0 or 200ms to signify 1.

Once successive seconds have been encoded and the end of the minute reached, a reset pulse is sent to enable the receiver to pass the frame of data it has just decoded to the display and start a new sequence. Technically, these units should be termed time code receivers rather than clocks. The design published in *Radio Communication* (February 1979) is of this type. The copy of the project I built still works, although it had to be modified to cope with the weak signal from Anthorn.

Although simple, the system works well under good conditions but deteriorates quickly with low signals and high interference levels. The system has a parity check but no error correction routine, so the display can freeze or be garbled.

Domestic radio controlled clocks get around the problems (but, of course, create others!) by incorporating a quartz clock module to drive the display. The radio decode is used to check the display and correct as necessary. However, due to battery considerations, this is invoked only once per hour or even once per day! This, unfortunately, creates the illusion that the clock is always locked to a time standard (Even when the transmitter is off air for routine maintenance!).

The quartz crystals used in the clocks aren't temperature compensated and 'free run' between checks and missing – or corrupted decodes – aren't flagged. Additionally, the duration and magnitude of errors is not normally available – but can be clearly seen when compared with a time code receiver updating every minute – unless, of course a GMT/BST (Greenwich Mean Time/British Summer Time) switch is involved, then there's no doubt! That said, the clocks are mass produced at modest cost for domestic use and are quite adequate for that purpose – provided we are aware of their shortcomings!

Analogue Or Digital

There are a number of radio controlled clocks available in either analogue or digital form that don't use the British time code transmissions at all. These (usually) are via the well known German based multi-outlet stores such as Aldi and Lidl and perform very well. The clocks received the transmissions from the DCF transmitter in Germany, which operates on 77kHz using a similar, but not identical encoding to Britain.

During my 60 years or so of involvement with radio, there have been many technological advances that have become commonplace, from operating aids to innovative communication systems based on computer processing power. Somewhere in that system will be a requirement for precise time or timing. The *PW* International Beacon Project 'clock' is an example of this and it was interesting to learn how the Editor updated his unit (using a stopwatch set by using the terrestrial television's teletext service). Incidentally, this highlights the practical difficulties of updating on unit from another without losing precision, particularly using a 'human' interface!

The JT65 System

For my own Amateur Radio operating accurate time references I'm indebted to **Joe Taylor K1JT** for his work in producing the **JT65** earth-moon-earth (EME) operating system. Prior to this, brute power, large antenna farms and high speed c.w. (Morse) was required.

Nowadays, a single yagi antenna and modest power will get me contacts using the mode. However, accurate timing **is extremely important**, so that the system clocks in all stations should be co-ordinated to Universal Time (UT) to better than one second!

Given that computer clocks are not temperature compensated and have no built-in update system and therefore always free run, some form of accurate updating is a must! (Yes, I'm Aware of Dsec, but it's better to keep the clock accurate).

In the past I used to abstract the coded seconds pulses from my time code receiver and input them to the computer via the parallel port, software decoded them and then updated the clock. However, now have a broadband Internet service, I now use **Symmtime (http://www.ntp-systems.com/symmtime.asp)** which connects to an internet Standard Time Server and updates the clock and also displays the millisecond correction applied.

Included in the *Symmtime* the facility has on-screen mini clock faces, which can be nominated to display local time in any DX location. The 2008 version is *Vista* software compatible.

Finally, what of the MSF transmitter at Rugby? Even though the magnificent looking masts have been demolished – does the transmitter still exist or has it become yet another pile of Historic scrap? Bring back Rugby I say!

●

Further Reading

The measurement of Time and the development of clocks down the ages is a fascinating subject. Some books well worth reading are: *Story of Time* (ISBN 1-85894-072-9): *Longitude* (ISBN 1-85702-714-0).

Having problems with his radio controlled clocks, Ron Harris GW8DUP suggests that the Rugby 60kHz transmitter should be resurrected!

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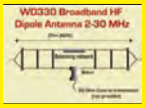

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June 19th is the Club barbeque and 26th is VHF NFD Planning, July 3rd is Antennas from the ground up Part 1 by Stewart G3RXQ, 5th/6th is VHF NFD and 10th is VHF NFD Feedback.

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Pete Milton. Tel: (01189) 695697
www.radarc.org
The Reading & District Amateur Radio Club meets on the second and fourth Thursday of the month at Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Berkshire RG5 4LY. June 26th is Amateur Radio goes to the Movies with Paul Whatton, July 10th is Summer Topic & Rally Planning and 13th is the McMichael Rally.

CHESHIRE

Chester & DRS
Graham. Tel: (07930) 655 121
E-mail: info@chesterdars.org.uk
www.chesterdars.org.uk
The Chester & District Radio Society meets on Tuesday evenings at the Burley Memorial Hall, Common Lane, Waverton, Chester CH3 7QT. June 24th NHS Radio Communications by Roger Howell, July 1st is Construction Challenge II by G80JQ, 15th is an Outside Event at Forest Hills Hotel and 22nd is Aerial Support by Dave Hicks.

Halton RC
Sam. Tel: (01928) 714231
http://g7wfs.sytes.net/hrc/index.htm
The Halton Radio Club meets in The Play Centre, Norton Hill, Windmill Hill, Runcorne WA7 6LJ every Thursday from 7.30 to 9.30pm. There's plenty of parking and full disabled access. June 26th & July 24th are video nights and on July 31st, Halton Radio is officially 10 years old.

Macclesfield & DRS
Ray King. Tel: (01260) 278431
www.gx4mws.com
The Macclesfield & District Radio Society meets every Monday at the Pack Horse Bowling Club, Westminster Road, Macclesfield SK10 3AT at 8pm. June 23rd, July 7th, 21st & 28th are On-the-air and social evenings, July 1st is the 144MHz RSGB Activity Contest Club Championship, 14th is an Aerial Construction Night G3VKF, M1REK.

Stockport RS
David Simcock. Tel: 0161 456 7832
www.stockportradiosociety.co.uk
The Stockport Radio Society meets on the first and third Tuesdays at the Bramhall Air Scouts HQ, Leewood Hall, Benja Fold off Ack Lane East, Bramhall, Stockport SK7 2BX. June 17th is an outdoor evening at Woodford Recreation Centre, July 1st is the Reddish Rally final preparation evening and 5th is the Reddish Rally.

Warrington Amateur Radio Club
Paul Carter. E-mail: g7odj@warc.org.uk
www.warc.org.uk
The Warrington Amateur Radio Club meets every Tuesday at 8pm at the Grappenhall Youth and Community Centre, Bellhouse Lane, Grappenhall, Warrington WA4 2SG. June 17th is Club Representation - Mike G4VSS, 19th is 80m SSB Contest, 21st/22nd is Museums on the Air Weekend, 24th is Vertical Antennas Part 2 with Keith G8MKO & John M0ANM and July 1st is Earthing (part 2) with Albert G3ZHE.

CORNWALL

Cornish RAC
Ian Williams. Tel: (01872) 561058
E-mail: ianporsche964@aol.com
www.cornishradioamateurclub.org.uk
The Cornish Radio Amateur Club meets at the Church Hall, Church Road, Perranarworthal, Truro TR3 7QE on the first Wednesday of every month at 7.30pm. There is also a Computer Section that meets at the same venue and time on the second Monday of every month, except December.

Poldhu ARC
Keith Matthew. Tel: (01326) 574441
E-mail: g0wys@yahoo.co.uk
www.gb2gm.org
The Poldhu Amateur Radio Club meets at The Marconi Centre, Poldhu Cove, Nr Mullion, Cornwall TR12 7JB. Tel: 01326 241656. July 8th is a Business Meeting plus a film (TBA).

COUNTY DOWN

Bangor and District ARS
Mike. Tel: 028 4277 2383
http://www.bdars.com
The Bangor and District Amateur Radio Society meets on the first Thursday of every month in 'The Boathouse', Harbour Car Park, Groomsport BT19 6JP at 8pm. Visitors and new members are most welcome.

COUNTY DURHAM

Bishop Auckland RAC
Mark Hill. Tel: (01388) 745353
http://barac.m0php.net/
The Bishop Auckland Radio Amateur Club meets every Thursday at 8pm in the Village Community Centre, Stanley Crook, Co. Durham DL15 9SN. Tuition for Foundation, Intermediate and Advanced licences is available. The club is registered as an RSGB exam centre.

Great Lumley AR&ES
David Barclay. Tel: 0191 3888113
E-mail: m0bpm@btinternet.com
The Great Lumley Amateur Radio & Electronics Society meets in the Community Centre, Front Street, Great Lumley, Chester-le-Street, Co. Durham DH3 4JD on Wednesday nights from 7 to 9pm.

DERBYSHIRE

South Normanton Alfreton and District ARC
A J Higton. Tel: (01773) 783658
E-mail: snadarc@linuxmail.org
www.snadarc.me.uk/
The South Normanton Alfreton and District Amateur Radio Club meets in the Village Hall, Community Centre, Market Street, South Normanton, Derbyshire DE55 2EJ.

DEVON

Exeter ARS
Paul Cheshire. Tel: 01392 660246
E-mail: pchesh-29@hotmail.co.uk
The Exeter Amateur Radio Society meets on the 2nd and the 4th Monday at 7.30pm in the Moose Centre, Spinning Path Lane, Blackboy Road, Exeter EX2 5RP. Tuition for Foundation, Intermediate and Advanced licence is available. The club is registered as an RSGB examination centre.

Torbay ARS
Dave Helliwell. E-mail: g6fsp@tars.org.uk
www.tars.org.uk
The Torbay Amateur Radio Society meets Fridays at 7.30pm in the Teignbridge District Scout Headquarters, Wolborough Street, Newton Abbot, Devon TQ12 1JR. June 27th is a visit and talk by Tim Walford of Walford Electronics demonstrating his range of Somerset Kits, July 4th & 18th are Operating Nights, 11th is a Natter Night and 25th is a talk by Tony Swale about Bletchley Park and the code breakers.

DORSET

Bournemouth RS
John. Tel: 07719 700 771
www.brswebsite.org.uk
The Bournemouth Radio Society meets on the first and third Friday of each month at the Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth BH10 7LH. Meetings take place in Room 5 at 8pm and members assemble in the bar from 7.30pm. Visitors are always welcome.

EAST SUSSEX

Brighton RC
Reg Moores. Tel: (01273) 503869
The Brighton Radio Club meets on the second and fourth Tuesdays of each month at the Vallance Community Centre, Conway Court, Sackville Road, Hove BN2 3WR at 7.30pm. Anyone wishing to know more are welcome to come along to a meeting, entrance is free.

Hastings E&RC
Gordon Sweet. Tel: (01424) 431909
E-mail: gordon@gsweet.fsnet.co.uk
www.herc.uk.net or http://g4cus.mysite.wanadoo-members.co.uk/
The Hastings Electronics & Radio Club meets on the third Wednesday at the Taplin Centre, Upper Maze Hill, St Leonards on Sea TN38 0LQ at 7pm. July 19th is a Summer Auction Used & Surplus Equipment.

ESSEX

Braintree & DARC
Keith. Tel: (01376) 329279
www.badars.org.uk
The Braintree & District Amateur Radio Society meets on the first and third Monday of the month in The Clubhouse, Braintree Hockey Club, Church Street, Bocking CM7 5LJ. June 30th is a Club Net via GB3BZ.

Colchester RA
David Chambers. Tel: 07766 543784
www.g3co.com.co.uk
The Colchester Radio Amateurs meets at 7.30pm on alternate Thursdays at St Helena School and The Colchester Institute, Sheepen Road, Colchester, Essex CO3 3LE. Members and non-members welcome. June 26th is Holiday DXpedition to Jersey with Kevan Pugh 2J0WMG and Mark Hickford MJ0MJH (Colchester Institute), July 10th is the Club Social/BBQ (Helena School).

Chelmsford ARS
Martyn Medcalf. Tel: (01245) 469008
E-mail: info2007@g0mwt.org.uk
www.g0mwt.org.uk
The Chelmsford Amateur Radio Society meets on the first Tuesday of each month in the Marconi Sports & Social Centre, Beehive Lane, Great Baddow, Chelmsford CM2 9RX at 7.30pm. July 1st is Solar Observing with Peter Meadows.

Loughton & Epping Forest ARS
Marc Litchman. Tel: 020 8502 1645
E-mail: info@lefars.org.uk
www.lefars.org.uk
The Loughton & Epping Forest ARS meet Friday fortnightly at All Saints House, Romford Road, Chigwell Row, Essex IG7 4QD between 7.45 and 10pm. All visitors will be made most welcome. June 20th is a Video Night, 'North Weald Airfield', 21st/22nd is GB2NWA (International Museums Weekend) at North Weald Airfield and 12th/13th is the Annual Summer Get-Together, Aylmers Farm, Old Harlow.

HAMPSHIRE

Fareham & District ARC
Ken Sapsed. Tel: 023 9279 7240
E-mail: secretary@fareham-darc.co.uk
www.fareham-darc.co.uk/
The Fareham & District Amateur Radio Club meets on Wednesdays evenings from 7.30pm in the Portchester Community Centre, Westlands Grove, Portchester, Fareham PO16 9AD. June 18th an evening with John G8BHB and 25th is out portable on Portsdown Hill, July 9th is a talk by Chris G8JFJ on Feeders and 16th is the 80m Club Contest SSB 8 to 9.30pm.

Horndean & District ARC
Stuart Swain. Tel: (02392) 472846
E-mail: g0fyx@msn.com
www.hdarc.co.uk
The Horndean & District Amateur Radio Club meets on the first and fourth Tuesdays each month in the Lovedean Village Hall, 160 Lovedean Lane, Lovedean, Hants PO8 9SF at 7.30pm. Visitors are always very welcome. June 24th is a talk by Graham Aiken JP 'Magistrates in the community', 29th is a coach trip to Greenwich, July 1st is a Natter night/social evening, 12th/13th the club will be operating a special event radio station from the Queen Elizabeth Country Park Show, near Petersfield and 22nd is a visit by Rob Mannion, Editor of Practical Wireless.

HUMBERSIDE

Hull & District ARS
Raymond Penny. Tel: (01482) 504618
E-mail: sirraymond@sirraymond.karoo.co.uk
The Hull & District Amateur Radio Society meets every Friday at the Walton Leisure Centre, Walton Street, off Anlaby Road, Hull HU3 6JB.

KENT

Bredhurst RATS
www.the-brats.co.uk
The Bredhurst Radio Amateur & Transmitting Society meets on Thursdays at the Parkwood Community Centre, Rainham, Gillingham, Kent ME8 9PN at 8.30pm. If you are interested in joining the club, write to: Membership, The BRATS c/o The Club Room, The Parkwood Community Centre, Long Catlis Road, Rainham, Gillingham, Kent, ME8 9PN. June 29th is a Top Band Operating Day.

Bromley & DARS
Graham
E-mail: bdars@grahamc.net
www.bdars.org
The Bromley & District Amateur Radio Society meets in The Victory Social Club, Kechill Gardens, Hayes, Kent BR2 7NH (off B265, Hayes Lane, Bromley) on the third Tuesday of the month at 7.30pm. June 17th is a DF Hunt and July 15th is an Operating Evening.

LANCASHIRE

Oldham RC
Christopher Cunliffe. Tel: 07749347142
E-mail: secretaryoarc@btinternet.com
www.oarc.org.uk
The Oldham Radio Club meets on Thursdays at Royton Air Training Corps, Hillside Avenue, Royton, Oldham OL2 6RF at 7:30pm. June 22nd is 50MHz backpackers, July 6th is the 144MHz 3rd backpackers from Moss Moor, 10th is a committee meeting and 20th is the144MHz 4th backpackers from Moss Moor.

Ellenroad RC
David. Tel: (01706) 358650
E-mail: info@ellenroadradioclub.org.uk
http://www.ellenroadradioclub.org.uk/info.htm
The Ellenroad Radio Club (ERC) meets every Monday evening from 7 to 9pm at the Ellenroad Steam Museum, Elizabethan Way, Newhey, Rochdale OL16 4LG. The museum houses the UK's only fully-working cotton mill engine, complete with its original steam raising plant and 220ft high chimney. Newcomers are always welcome and made to feel at home.

LINCOLNSHIRE

Eagle RG
Eddie Lingard. Tel: 01507 472695
E-mail: e.f.lingard@btinternet.com
www.eagleradiogroup.com
The Eagle Radio Group meets at The Eagle Hotel, Victoria Road, Mablethorpe LN12 2AJ on the second Tuesday of each month, meetings start at 8pm. The group operates an open policy so, if you are in the area, pop in. July 10th is a talk on antennas by Charlie G0CBM.

Spalding & DARS
Graham Boor. Tel: 07947764481
E-mail: secretary@sdars.org.uk

www.sdars.org.uk
The Spalding & District Amateur Radio Society meets at the Castle Sports Swimming Complex, Spalding PE11 1QF on Fridays at 7.30pm. June 1st is the Spalding Rally.

LONDON

Cray Valley Radio Society
Bob Treacher. Tel: 020 8265 7735
www.cvrs.org
The Cray Valley Radio Society meets on the first and third Thursdays of the month at the Progress Hall, Admiral Seymour Road, Eltham, London SE9 1SL at 7.30pm for 8pm.

Southgate ARC
Donald F Berry. Tel: 020 8360 3614, E-mail: dfberry@eggconnect.net
www.southgatearc.org
The Southgate Amateur Radio Club meets on the second Thursday of the month at Winchmore Hill Cricket Club, The Paulin Ground, Firs Lane, Winchmore Hill, London N21 3ER at 7.30pm.

Wimbledon and District ARS
Jim Bell. Tel: 020 8874 7456
E-Mail: james@jbell5.wanadoo.co.uk
www.gx3wim.org.uk
The Wimbledon & District Amateur Radio Society meets on the second and lat Friday of the month at Martin Way Methodist Church, Buckleigh Avenue, Merton Park, London SW19 9JZ. Visitors are welcome whether they are licensed or not. June 27th is an On Air and Summer Camp discussion.

THE LOTHIANS

Cockenzie & Port Seton ARC
Bob Glasgow. Tel: (01875) 811723
E-mail: gm4uyz@cpsarc.com
www.cpsarc.com/news.php
The Cockenzie & Port Seton Amateur Radio Club meets in the Thorntree Inn (Lounge Bar), High Street, Cockenzie, East Lothian EH32 0HP from 7pm till late. Organised talks are held in the Port Seton Community Centre, South Seton Park, Port Seton, East Lothian EH32 0EE. June 18th is a 20m Activity Night, 27th is a club night (change of date), July 5th/6th is VHF Field Day and 26/27th is the RSGB IOTA Contest from the Island of Tiree.

Lothians Radio Society
Tony Sigouin. Tel: 07739742367
E-mail: enquiries@lothiansradioscoiety.com
www.lothiansradiosociety.com
The Lothians Radio Society meets on the second and fourth Mondays of the month in the Royal Ettrick Hotel, 13 Ettrick Road, Edinburgh EH10 5BJ from 7pm. Membership costs £12 per year and includes a free BBQ every June! June 25th is the club barbecue.

MERSEYSIDE

Wirral & District ARC
Tom. Tel: 07050 291850
E-mail: secretary@wadrac.com
www.wadarc.com
The Wirral & District Amateur Radio Club meets at the Irby Cricket Club, Mill Lane, Irby CH61 4XQ on the second and fourth Wednesdays of each month. Other Wednesdays are informal (D&W) meetings at a local hostelry. June 25th is D&W The Railway, Meols, July 2nd is D&W The Anchor, Irby, 9th is The G8PMF 2m Revenge DF Hunt, 16th is D&W The Harp, Lower Neston and 23rd is the Club Family BBQ at ICC HQ.

NORFOLK

King's Lynn ARC Ray Dowsett, MBE. Tel: (01553) 671307 E-mail: ray-g3rsv@supanet.com http://www.klarc.org.uk
King's Lynn Amateur Radio Club meets every Thursday at the Scout HQ, Chequers Lane, West Winch, King's Lynn, PE33 0NY off the A10 at West Winch at 7.30pm. July 13th is a Field Day & Picnic.

Norfolk ARC
Mark Taylor. Tel: (01362) 691099
E-mail: narc@g0lgj.co.uk
www.norfolkamateurradio.org
The Norfolk Amateur Radio Club meets every Wednesday at the Happy Landings, Norwich Aviation Centre, Norwich Airport NR6 6JA a 7.30pm. June 18th is the Prep for the Barford Radio Rally and 25th is Bright Sparks/Informal, July 2nd is Q&A Ask the Panel, 9th is a talk and demo on Morse by G3LDI and G3PDH, 16th is a Trophy DF Hunt and 23rd is Bluetooth/Wi-Fi with David G7URP and Mark G0LGJ.

North Norfolk ARG
Tony Smith. Tel: (01263) 821936.
E-mail: g4fai@btinternet.com
www.radioclubs.net/nnarg/
The North Norfolk Amateur Radio Group meets in the Radio Hut at the Muckleburgh Collection Military Museum, Weybourne, North Norfolk NR25 7EG on Wednesdays and Thursdays from 10am to 4pm and some Sundays from 1 to 4pm. New members always welcome.

NORTHAMPTONSHIRE

Kettering & District Radio Society Lorna Froggatt. Tel: 0153 676 2523 E-mail: LornaSteveLorna@aol.com The Kettering & District Radio Society meets each Tuesday from 7 to 9pm in the winter at The Lilacs Pub, Church Street, Isham, Northants NN14 1HD and in the summer at the Carpetbagger Aviation Museum, Sunnyvale Farm Nursery, Harrington NN6 9PF. Foundation, Intermediate and Advanced courses are held regularly.

SHROPSHIRE

Salop ARS
Richard Golding. Tel : 01743 356195
The Salop Amateur Radio Society meets in The Telepost Club, Railway Lane, Abbey Foregate, Shrewsbury SY26BT on Thursday between 8 and 10.30pm.

Telford & District ARS
Mike Street. Tel: (01952) 299677
E-mail: mjstreetg3jkx@blueyonder.co.uk
www.tdars.org
The Telford & District Amateur Radio Society meets on Wednesdays at the Little Wenlock Village Hall, Malthouse Bank, Little Wenlock. Telford TF6 5BG at 8pm. June 18th is local 144MHz foxhunt at Little Wenlock starting 7.30pm, 25th - 30th is the Friedrichshafen trip, July 2nd is an Open House/Committee, 5th/6th is VHF NFD at the Long Mynd site, set-up 10am Saturday, 8th is a Hamfest Committee meeting and 9th is Going out portable at HQ.

SOMERSET

South Bristol ARC
Len Baker. Tel: (01275) 834282
E-mail: g4rzy@msn.com
www.sbarc.co.uk
The South Bristol Amateur Radio Club meets at the Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Whitchurch, Bristol BS14 0LN. June 18th is the club barbecue, 25th is an On the Air Evening July 2nd is Preparing for VHF NFD, 9th is VHF NFD Debriefing, 16th is a Digital Camera Evening and 23rd is an RSGB film.

Yeovil ARC
Gary.
E-mail: g.swain@tesco.net
www.yeovil-arc.com/
The Yeovil Amateur Radio Club meets at the Red Cross Centre, Grove Avenue, Yeovil BA20 2BE (on the corner where Grove Avenue meets Preston Road). June 19th is BYLARA with 2E1RBH, July 3rd is Brian's amateur radio with G4PDG & M1FFP, 5th/6th is Weekend operations at Bradford Peveral, 10th is HF radio noise with G3MYM, 17th is Restoring 1920s radio with M0WOB and 24th is VHF field day.

SOUTH GLOUCESTERSHIRE

Thornbury and South Gloucestershire ARC
Tony. Tel: (01454) 417048
E-mail: tonytsgarc@beeb.net
http://jma-databases.co.uk/tsgarc/index.php/Thornbury_%26_South_Gloucestershire_Amateur_Radio_Club
The Thornbury and South Gloucestershire Amateur Radio Club meets in the United Reformed Church Hall, on the corner of Chapel Street and Rock Street, Thornbury BS35 2BA at 7.30 - 9.30pm. July 2nd is a visit to the Model Flying Club.

SOUTH WALES

Barry ARS
Glyn Jones. Tel: (01446) 774522
E-mail: glyndxis@talktalk.net
www.bars.btik.com
The Barry Amateur Radio Society meets on Tuesdays from 7.30 to 10.30pm in the Sully Sports & Social Club, South Road, Sully CF64 9TG.

SOUTH YORKSHIRE

Axholme Radio Club
John Fennell. Tel: (01427) 872522
E-mail: g4hoy@tiscali.co.uk
The Axholme Radio Club meets at Hollytree Farm, Westend Road, Sandtoft, Epworth DN9 1LB on Wednesdays at 10amm to 4pm, Thursdays at 7 - 9pm and Saturdays from 10am - 4pm (other times by arrangement).

Sheffield ARC
Trevor Wood. Tel: 0114 2216947
E-mail: trevorwood6@yahoo.co.uk
www.sheffieldarc.org.uk
The Sheffield Amateur Radio Club meets at the SYPTE Social Club, Greenhill Main Road, Sheffield S8 7RH every Monday at 7.15pm. Thy hold all three types of classes for the Foundation, Intermediate and Advance levels of licensing. June 23rd is a Postcode Competition and 30th is a Foxhunt, July 7th is Radio Family Fortunes, 14th is Talk SOTA plus SSB contest planning and 21st is a video evening.

STAFFORDSHIRE

Tamworth Amateur Radio Society
Colin Marks. Tel: (01827) 700893
E-mail: colin.marks2@ntlworld.com
The Tamworth Amateur Radio Society meets every Thursday at 7.30pm at St Francis Church, Masefield Road, Leyfields, Tamworth B77 8JB. June 19th the club station is on the air G8TRS and 26th is an IMW talk.

SURREY

Sutton & Cheam RS
John Puttock. Tel: 020 8644 9945
E-mail: info@scrs.org.uk
www.scrs.org.uk
The Sutton & Cheam Radio Society meets on the third Thursday of the month at 7.30pm in Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey SM1 2EY. In addition to monthly meetings, licence training courses are held at regular intervals in Banstead Surrey. June 19th is Aircraft Radio Systems and the SBS-1 by Evan Duffield and July 3rd is a Natter Night.

SUFFOLK

Lowestoft & DARC
Charlotte Windsor. Tel: 01603 344 6139
E-mail: Secretary@gx3jrm.org.uk
The Lowestoft and District ARC meets every Thursday at the Club House, off Heath Road, Lowestoft NR33 starting around 8pm. A small friendly club with enthusiastic members who have a wealth of experience and knowledge. Regular talks and events held as well as contests.

TYNE & WEAR

Angel of the North RARC
Nancy Bone. Tel: 0191 477 0036
E-mail: nancybe2001@yahoo.co.uk
www.anarc.net
The Angel of the North Radio Amateur Radio Club meets every Monday 7 to 9pm at Whitehall Road Methodist Church Hall at the corner of Whitehall Road and Coatsworth Road, Bensham, Gateshead NE8 4LH. The entrance to radio club room is through door at the side of building next to the car park. The car park entrance is on Whitehall Road.

Tynemouth ARC
Tony Regnart. Tel: 0191 280 1981
E-mail: tony.regnart@gmail.com
www.gx0nwm.co.uk
The Tynemouth Amateur Radio Club meets each Friday from 7 to 9pm at St. Hilda's Church, Stanton Rd, North Shields, Tyne & Wear NE29 9QB. It's known locally as 'the church near the fire station'.

WEST MIDLANDS

Aldridge & Barr Beacon ARC
Roy Horton. Tel: (01922) 691646
E-mail: leslie137@btinternet.com
www.g0neq.co.uk
The Aldridge & Barr Beacon Amateur Radio Club is a daytime club and meets at the Aldridge Community Centre, Middlemore Lane, Aldridge, Walsall WS9 8AN on the first and third Monday of every month at 2pm to 4pm. They have a long wire and a 2 metre antenna for radio operation using the club callsign G0NEQ.

Midland AX25 Packet Radio Users Group
Miles. Tel: 01384 254199
www.maxpak.org.uk
The Midland AX25 Packet Radio Users Group, MaxPak, meets on the first Monday of the month at The Sir Robert Peel, 104 Bell Lane, Bloxwich, Walsall WS3 2JS. July 7th 2008 MaxPak Club Natter Night

Stourbridge and District ARS
John. Tel: (01562 700513)
www.g6oi.org.uk
The Stourbridge and District Amateur Radio Society meets on Monday evenings, except for Bank Holidays at The Radio Shack, Old Swinford Hospital School, Heath Lane, Stourbridge, West Midlands DY8 1QX at 8pm. June 23rd & 30th are Open Shack Nights,

Sutton Coldfield RS
Andy Sherman. Tel: (01827) 875155
E-mail: peugeotnut@hotmai.com
www.hamradio.piczo.com
The Sutton Coldfield Radio Society Meets on the second and fourth Monday of the month at 7.30pm (no meeting on bank holiday Mondays) in the Sutton Coldfield Rugby Club, 160 Walmley Road, Sutton Coldfield, West Midlands B762QA.

Wythall Radio Club
Chris Pettitt. Tel: (07710) 412 819
E-mail: g0eyo@wythallradioclub.co.uk
www.wythallradioclub.co.uk
The Wythall Radio Club is based at Wythall House, Silver Street, Wythall, near Birmingham B47 6LZ. They meet every Tuesday at 8pm and meetings are informal and friendly.

WEST SUSSEX

Horsham ARC
Andrew Vine. Tel: (01483) 272456
http://www.harc.org.uk/
The Horsham Amateur Radio Club meets on the first Thursday of the month at The Guide Hall, Denne Road, Horsham, West Sussex. June 20th is a social at The Dragon, Dragon's Green. July 3rd is Aerials Old and New with G3LHZ, 7th 80m CW Club Championship, 16th 80m SSB Club Championship and 24th is a Social at The Bat and Ball in Newpound.

Worthing & DARC
Roy or Joyce. Tel: (01903) 753893
www.wadarc.org.uk
The Worthing & District Amateur Radio Club meets every Wednesday at 8pm in the Lancing Parish Hall, South Street, Lancing, BN15 8AJ. There's a free car park at the rear and full disabled access. Visitors are always welcome. June 18th is Keep it Dry! with Norman M0EBI, 25th is WADARC DF Contest, July 6th Sunday Breakfast at Carats, 9th is Radio Astronomy with Jonathan G1EXG.

WEST YORKSHIRE

Pontefract & District Radio Club
Colin. Tel: (01977) 677006
E-mail: info@pontefractradioclub.org
www.pdars.com
The Pontefract & District Radio Club meets every Tuesday from 7pm and Thursday from 8pm at the Carleton Centre, Carleton Grange, Carleton Road, Pontefract, West Yorkshire WF8 3RJ.

WILTSHIRE

Trowbridge & District ARC
Ian Carter. Tel: (01225) 864698
E-mail: ian.l.carter@btinternet.com
http://uk.geocities.com/tdarc@btinternet.com
The Trowbridge & District Amateur Radio Club meets at Southwick Village Hall, Southwick (nearest postcode is BA14 9QN). June 18th is a Natter Night, 28th is GX2BQY at the Southwick & North Bradley Scout Fete, July 2nd is the annual 2m DF hunt with 7.30pm start from club HQ and 16th is a Natter Night.

WORCESTERSHIRE

Worcester RAA
Martin Carter. Tel: 07976 917987
E-mail: secretary@m0zoo.co.uk
www.wraa.co.uk
The Worcester Radio Amateurs Association meets on the second and fourth Tuesday at the Hallow Scout HQ, off Main Road, Hallow, Worcester WR2 6PP. Visitors, as always, will find a warm welcome at the new clubhouse, as will potential new members.

Club Secretaries

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!

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Tony Nailer's

doing it by design

Tony Nailer G4CFY discusses the process of building an off air frequency standard and guides us through the design.

In the last *Technical for the Terrified*, June *PW*, I gave an overview of the working of phase locked loops (p.l.l.), and I suggested it could be a subject for the *Doing it By Design series*.

The 4046 device is commonly used as a phase sensitive detector in complex loops but I have never seen it used in its entirety. The device has all the necessary functions to operate in a similar manner to the LM/NE567 p.l.l. integrated circuit (i.c,), at low frequencies.

Off-air frequencies standards are fairly popular projects and regularly appear in *PW*. The latest of these was in November 2006 by **Stefan Niewiadomski**. It amplified the Radio 4 signal and mixed it with a 200kHz signal, which had been divided down from a 10MHz source. The difference 2kHz signal was then mixed again with 2kHz produced by further dividing the 200kHz signal.

Many of these circuits suffer from jitter when viewed on an oscilloscope. However, I haven't built Stefan's design – even though it's popular and I regularly sell boards for it on the *PW* PCB Service.

Instinctively I feel that Stef's project might suffer jitter problems, because the 200kHz signal actually falls within the upper sideband of the Radio 4 signal. This means that the difference signal of 2kHz will have asymmetrical sidebands, down to zero with the lower, and up to 11kHz with the upper. This implies that the mean frequency may well move around quite a lot and give rise to the dreaded jitter.

Another article, by **Dave Allen** in March 2001 *PW*, simply used an LM567 to produce a 198kHz locked signal output. This I thought was a good idea, because if the phase detector is insensitive to amplitude modulation (a.m.), then the resultant 198kHz signal would be jitter free.

Locked 198kHz Loop

The first step I decided to try was to use the 4046 in its entirety as a locked 198kHz loop. Unfortunately, the data books for the device don't give much guidance to circuit values and only give a rough guide to a suitable circuit. This might explain why it has never become popular as a self-contained loop!

I built up a circuit like that shown in **Fig. 1**, but with slightly different component values. The frequency of the voltage controlled oscillator (v.c.o.) is defined by the capacitor between pins 6 and 7, together with the resistance from pin 12 to ground, as well as the supply rail. Changes of supply voltage dramatically affect the v.c..o. frequency, so it needs to be run from a three-terminal voltage regulator.

The network of three resistors and two capacitors connected between pin 2 and pin 9 form the loop filter. This controls the range over which the loop will lock together with the speed at which it locks. I use a computer program I've written to solve the component values for the loop filter. The values given allow a 30kHz lock range and a control range of 10kHz.

With the device running from an 8V d.c. supply rail the v.c.o capacitor was 560pF and the resistance about 13kΩ. When using a 6V rail the capacitor was 470pF and resistance about 15kΩ. The trimpot enabled the v.c.o. frequency to be tuned through 198kHz.

Next, I connected a Wien bridge oscillator running at 198kHz to the input pin 14. Levels above 400mV p-p produced a reliable lock (Quite exciting really!). This defined that an amplifier would be needed, to increase the Radio 4 signal picked up on a ferrite rod, from 1mV to 400mV.

Radio Four Receiver Amplifier

A suitable ferrite rod with long and

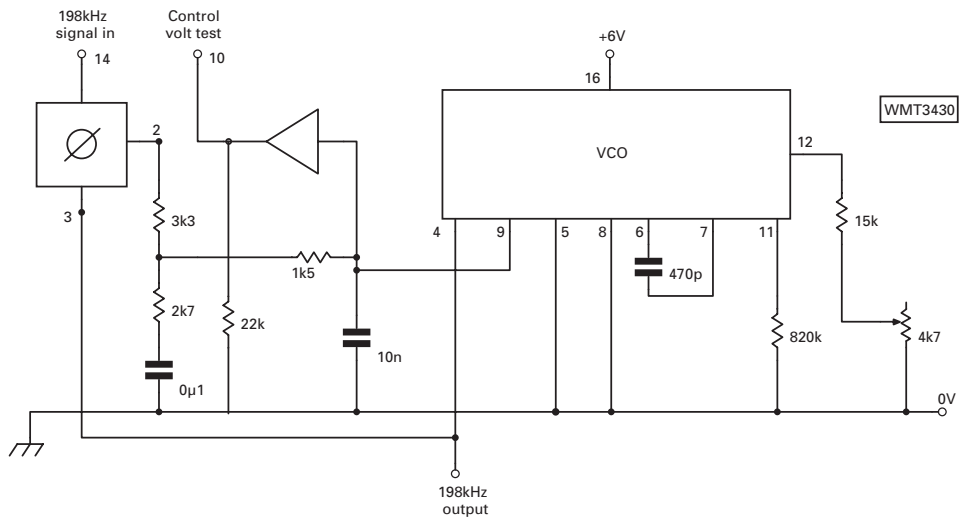

Fig. 1: Tony's original lash-up to investigate the properties of the 4046 phase-lock loop (p.l.l.) i.c.

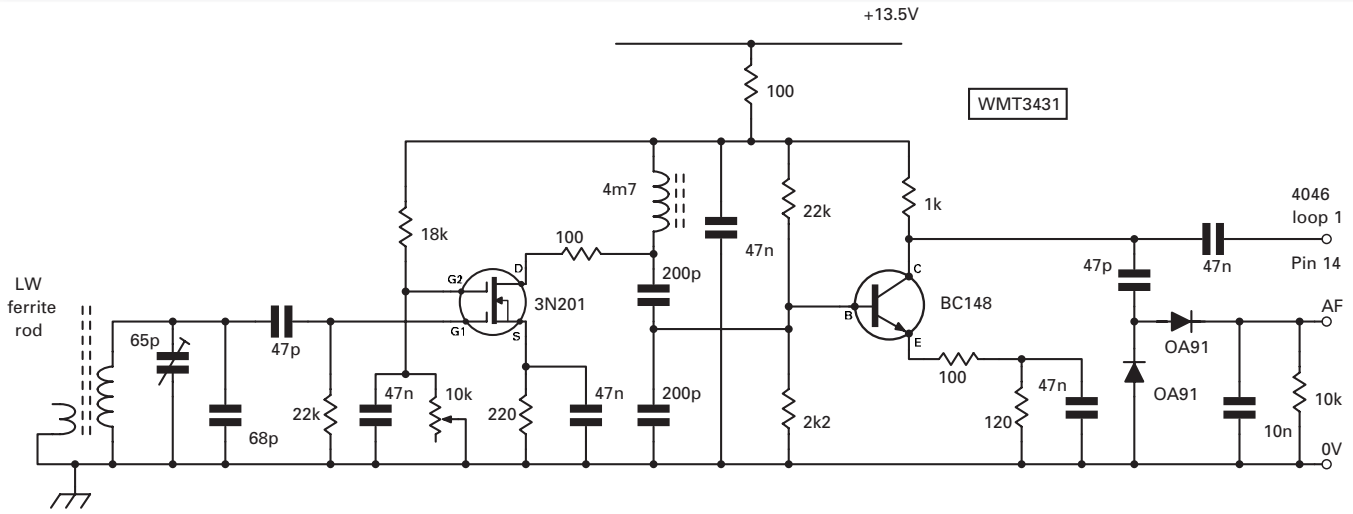

Fig. 2: the 198kHz pre-amplifier for the off-air device. The 4046 p.l.l. needs a higher drive level to get the best out of it.

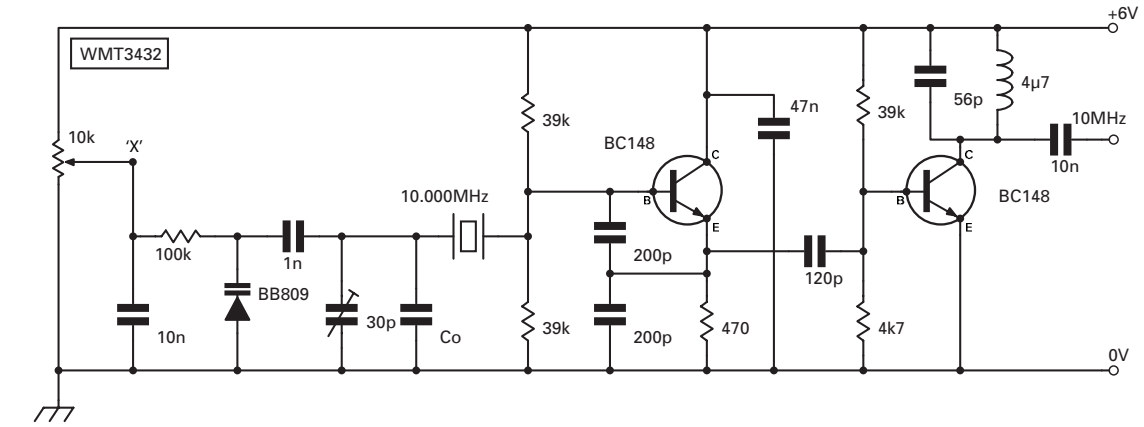

Fig. 3: The voltage controlled crystal oscillator, gives about ±250Hz of swing using the values shown here.

medium wave coils was obtained from Maplin Electronics. The l.w. coil supposedly was 4.1mH, which I calculated would require about 140pF to resonate it on 198kHz. However, as it turned out, when the coil was centred on the rod the inductance was about 4.7mH and only about 100pF was required.

My choice of amplifier was a 3N201 dual gate m.o.s.f.e.t. This is capable of achieving a high gain with good stability, providing a resistor is fitted in the drain circuit to prevent parasitic oscillations.

I chose to use a 4.7mH choke with a 100pF capacitor parallel tuning it in the drain circuit. In order to determine the correct frequency I chose to include an amplitude detector, so that with the aid of a pair of headphones or a bench audio frequency amplifier, I could actually listen to the Radio 4 signal.

The amplifier did work very well but the signal level at its output was only about 200mV. This was because I'm situated in darkest Dorset, which is a long way from any of the 198kHz broadcast stations at Droitwich (Worcestershire) and Westerglen and Burghead (in Scotland).

At the time I was using a magnifying bench light with a circular florescent tube. The interference from this was terrible and how the manufacturers get away with the lack electromagnetic compatibility (EMC) like this I'll never know! Switching it off made everything clear. Presumably when incandescent bulbs are made illegal, all long wave radio will also be switched off?

The ferrite rod was also sensitive to the v.c.o. signal and produced a heterodyne whistle if brought into proximity with that circuit. In practice I decided that will be necessary to have the ferrite rod antenna on the outside of an r.f. screened box, which contains the rest of the circuitry.

I then added an un-tuned amplifier – using a BC148 – to the m.o.s.f.e.t. amplifier and it gave nearly 1V p-p output, which is more than enough to drive the 4046. The circuit is shown in **Fig. 2**. When the output from this was coupled to the 4046 it locked immediately to Radio 4.

My frequency counter read the frequency of the v.c.o. as 198002Hz. The v.c.o. signal observed on the scope was without jitter. (So far so good!).

The 10MHz VXO

The 10MHz variable crystal oscillator

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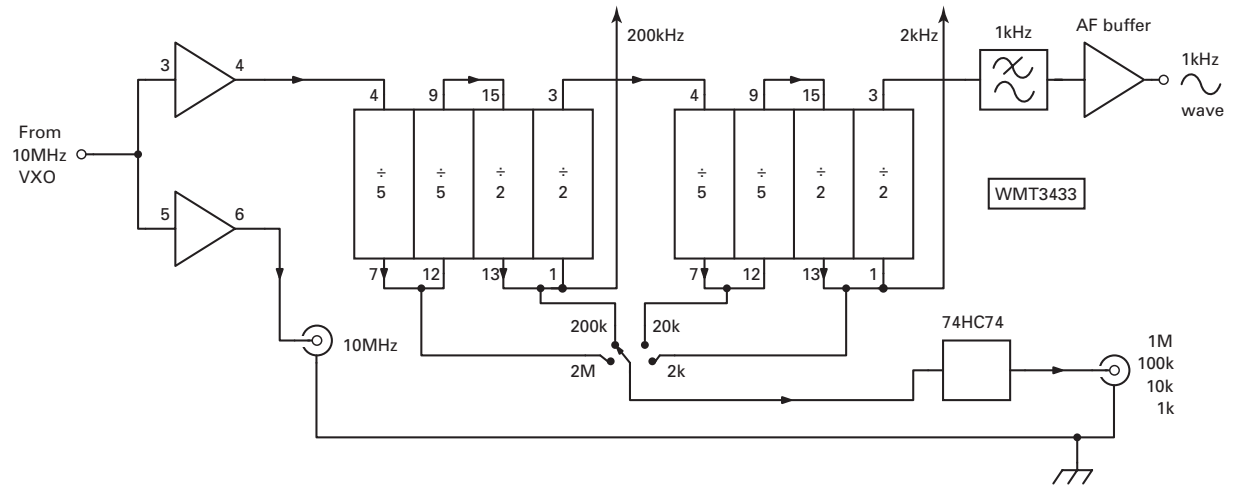


Fig. 4: The block diagram of the divider circuits to give the various digital signals used throughout the unit.

(VXO) is simply a standard Colpitts crystal oscillator with a 10MHz crystal with the load capacitance part provided by a varicap diode. The output signal taken from the emitter of such an oscillator is sharp at the top and flattened at the bottom, which means it contains large amounts of 2nd harmonic. I wasn't concerned in this case, as it would be fed to a high speed c.m.o.s. digital integrated circuit (i.c.) that will square it up anyway.

The output from my oscillator was only about 200mV, which would not be sufficient to drive the digital i.c. To overcome this, I used a simple amplifier with base bias set just below conduction and with a tuned collector, to amplify the signal to about 3V. The resultant oscillator and amplifier are shown in **Fig. 3**.

Please note that the varicap is driven from a trimpot acting as a potential divider from the 6V supply rail. This must be used to initially set the frequency at close to 10,000,000Hz with the trimpot in mid-position. Rotating the trimpot each way fully should produce a swing of about ±250Hz. This proves that the VXO can be tuned over a useful range with a supply rail voltage swing.

What was noticeable was that my various types of oscilloscope leads all produced different wave shapes! Traditional 'scope leads were useless and coaxial cable with short solder tails or with short leads and clips worked quite well.

The signal from the amplifier is not a square wave but instead it's more like a cross between a sine and saw-tooth wave. I intend to feed it through a high speed inverter i.c. to square it up, then take it to a stand-alone coaxial socket.

Digital Dividers

I used 74HC04 inverters to follow the 10MHz VXO as Stefan had, they prevented loading of the oscillator but did not square up the signal. (I'll obtain some Schmitt trigger inverters to see if they produce a squarer wave shape).

The choice by Stefan of the 74HC390 i.c. is really good as this device contains two divide-by-5 and two divide-by-2 stages. Tests using one of these proved that a divide-by-two stage gives a 1:1 mark space ratio output, whilst a divide-by-5 stage gives a 1:4 mark space ratio.

In order to provide a 1:1 ratio output at a variety of divide ratios, I decided to derive double what was required and then switch this to a divide-by-two stage using a 74HC74 D-type flip flop. Additionally, by choosing divide-by-two stages in the 74HC390s to give outputs on 200kHz and 2kHz, I would ensure the best shaped signals for the mixer and for the phase detector.

I used two 74HC390 i.c.s to achieve the full division from 10MHz down to 1kHz. The first was arranged to divide-by-5 to give 2MHz, divide-by-5 again to give 400kHz, then divide-by -2 to give 200kHz, and then divide-by-2 to give 100kHz. The second i.c. followed the same divide sequence giving 20, 4, 2, and 1kHz. The circuit is shown in **Fig. 4**.

The 2MHz, 200, 20 and 2kHz could then be fed to a 74HC74 to provide square wave outputs on 1MHz, 100, 10, and 1kHz. Additionally, I will include an elliptical low pass filter and buffer on the 1kHz signal to give a clean 1kHz sinewave. Supplies for the digital i.c.s were derived from a 78L06 three-terminal regulator.

Mixer Considerations

The output of the v.c.o section of the 4046 – as well as the 200kHz divided signal – are both 6V p-p square waves and in considering the type of mixer, I required one that could handle large signals. Most i.c. mixers, such as the S042P and NE602 saturate at about 200mV. It seemed silly to attenuate the signals down, and then have to amplify the output up to a usable level again!

Dual gate m.o.s.f.e.t.s are happy handling at least a 2V p-p swing on

gate 2, while gate 1 doesn't usually need quite as much swing. So, I chose the mixer circuit I had used in the 7MHz direct conversion receiver in DiBD 18, January 2007 *PW*. I built and tested this and it produced a sinewave output of 5V p-p from the driver transformer, **Fig. 5**.

Phase Detector

I chose to employ a 4046 as it's normally used (purely as a phase detector) but I also enabled the source follower by grounding the inhibit pin 5. This provided a handy monitoring point for the control voltage, on pin 10. The output from the phase detector, pin 2, was fed via a simple long time-constant low pass filter to drive the varicap at point 'X' on Fig. 3, in place of the trimpot. Initially, I selected Rx to be 1MΩ and Cx 1μF.

Lock Difficult

Lock was difficult to achieve and the control voltage range seemed very narrow and the cause of was difficult to determine! Tuning the VXO using the trimcap didn't cause the control voltage to compensate. I came to the conclusion that the loop wasn't locked. (Very strange!).

I then checked both of the signals being fed to the phase sensitive detector using a frequency counter, and they could be synchronised by adjusting the 10MHz VXO. When observed on the oscilloscope though, the one from the dividers was a near perfect 6V p-p square wave. The one from the mixer was a near perfect sinewave, but appeared at first to be frequency modulated and in time with the speech being received!

Further study of the oscilloscope trace revealed that there were three sinewaves. One which stayed still, and one on each side which moved out from the central one and back towards it again. What I was observing was the residual amplitude sidebands with equal and opposite phase relationship to the main sinewave!

The conclusion I came to was that the 1MΩ resistor and 1μF capacitor were too large to allow the loop to function (What is commonly referred to as being over-damped). I reduced the capacitor Cx from 1μF to 100nF and tuned the 10MHz VXO using the trimcap. Lock was then achieved and the control voltage held the frequency constant compensating for my trimming.

The control range extended from about 1V to 7V. So, I adjusted the trimcap so the control voltage sat at about 3.5V. Note: There was a small wavering movement on the control voltage, which proved the loop was in lock and compensating for changes in both loop frequencies.

Next, I reduced resistor Rx down to 100kΩ, then to 47kΩ and actually reduced the amplitude of the wavering. This suggested that the loop filtering now allowed quicker reaction to changes and that they were being corrected before they had gone too far.

Frequency measurements taken at this time – when my laboratory was 21.2°C (70°F), – the loop 1 read 0.198000MHz, and the VXO read 10.00005MHz. (Clearly my frequency counter needs a slight adjustment to make it read correctly!).

Successful Conclusion!

The dual-loop off-air frequency standard is successful in producing a jitter free output.

Now all I need to do is add on the 74HC74 dual D-type flip flop to provide true square wave outputs from 1MHz down to 1kHz. Also, I should add a low pass filter and buffer for a very low distortion 1kHz sinewave output.

A printed circuit board (p.c.b.) will be made and proved, and the layout details will be included in the next issue in this series. The p.c.b. and parts kit will also be available from Spectrum Communications. Cheerio until next time! ●

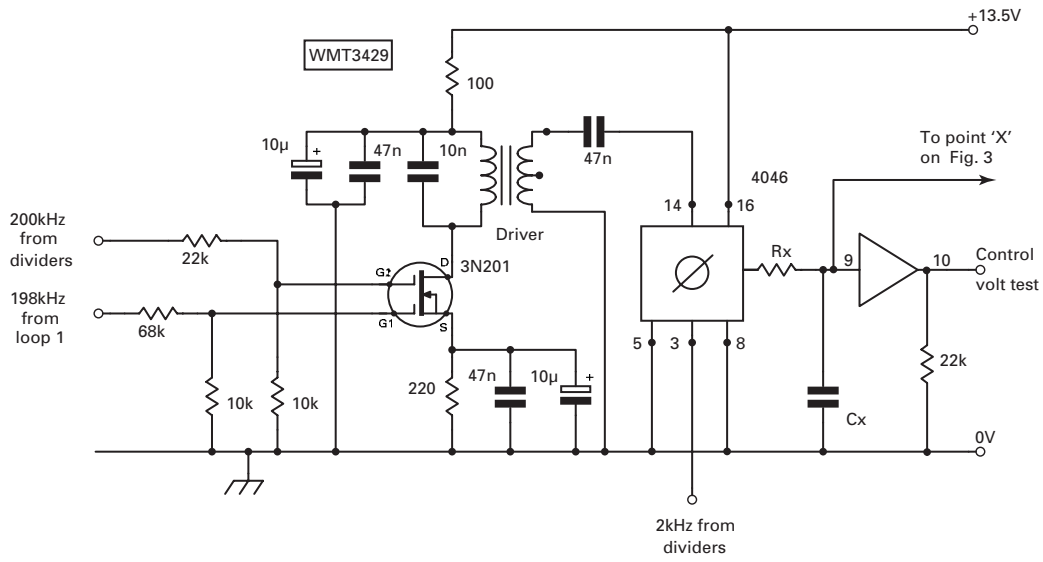


Fig. 5: The high level mixer uses a dual-gate m.o.s.f.e.t. to produce a 5V p-p output to feed into pin 14 of the 4046 p.l.l. chip.

Correspondence

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

Feature

Building & Using The Elecraft K3 Kit Transceiver Part 2

In Part 1, I described the basic principles behind the K3 as well as my own building experience with this 'no-solder' kit, including installation and testing of the 100W KPA3 amplifier and the KAT3 automatic antenna tuner. The K3 is a 'software-defined radio' and can be likened to a 'hardware receptacle' into which the software (a.k.a. firmware) is 'poured' – bringing it all to life.

From the outside, the transceiver's well-designed user interface looks deceptively simple – but 'underneath the hood' it's a powerful, complex and sophisticated piece of equipment.

It does, however, take time to learn how to use all the available features! So, I was delighted when the Editor **Rob G3XFD** offered me the opportunity to write Part 2 after a few months of operating the radio.

Software Development

Elecraft have a strong software development team who are interacting with (i.e. listening to!) the K3 user community. New firmware updates are periodically released. These are uploaded into the K3 using the free 'K3 Utility' programme from the Elecraft website. (see ref).

There are two main pieces of firmware – one for the Main Control Unit (MCU) and one for the digital signal Processing (DSP). Since I wrote Part 1 in January 2008, Elecraft have released some new updates (the latest versions I have are MCU 1.88 and DSP 1.70). These have enhanced the functionality in very many ways, including the ability to send and receive the popular data modes RTTY and PSK31 – without a computer attached! (more on this later).

The portrait of the K3 given in this article is therefore a 'snapshot' of 'work in progress'. From this it would be wrong to gain the impression that the radio is in some way not useable as it is – and in fact it's already extremely powerful, even without the very latest updates.

Elecraft's quoted value for the important close-in intermodulation distortion (IMD) dynamic range of more than 100dB has now been confirmed independently by Sherwood Engineering's measurements (see link). In comparison with other radios the K3 occupies first place in the Sherwood ranking, above the Flex-Radio 5000A and Ten-Tec Orion II.

Filtering & Bandwidth

The DSP bandwidth and shift-filtering work in tandem with the installed crystal filters. Reducing the bandwidth to appropriate levels for weak single sideband (s.s.b.) and Morse, continuous wave (c.w.) telegraphy signals improves intelligibility.

In practice I've have found that sliding the filter down a little in frequency can sometimes improve s.s.b. clarity. For c.w., the DSP bandwidth can be reduced to

Geoff Cottrell G3XGC completed his K3, has had several enjoyable months on the air and now shares his experiences with *PW* readers!

as little as 50Hz, and there is very little if any 'ringing' – the signal still sounds fine.

An excellent feature is the very effective Dual Pass-Band (**DPB**) filter for c.w. This gives the operator an awareness of what is happening on nearby frequencies but without losing 'focus' on the c.w. signal in the centre of the passband. The DPB can be extremely useful, for example in a contest and the DSP implements this feature by superimposing a broad, attenuated filter on top of a narrower one. For receiving RTTY, a dual-tone frequency shift keyer (f.s.k.) filter is used (see photo).

Decoded BPSK 31 signal from HB2008B on K3 showing decoded callsign scrolling across lower part of display. The CWT display shows a single bar in the centre indicating a correctly tuned-in signal.

Aiding Accurate Tuning

Elecraft have provided three methods to aid accurate tuning of both c.w. and digital data mode signals. One is the Spot button which mixes the sidetone with the receive audio to allow matching to the incoming signal at the correct pitch. This method is standard in many rigs.

The second method is activated by tapping the c.w. tune (**CWT**) button. This brings up an on-screen tuning display and, by tuning the variable frequency oscillator (v.f.o.) knob, the required signal can be centred in the display. But it doesn't end there!

With the CWT displayed, a tap on the Spot button activates an automatic tuning algorithm which gently 'slides' the v.f.o. frequency to accurately place the signal in the centre of the passband. While this is happening, it's possible to continue to read the incoming c.w. so that nothing is missed! Clever stuff – and one of my favourite features!

Auto spotting is also useful when tuning in BPSK31 signals, which are very sensitive to small frequency offset errors (of a few Hz). For BPSK31 the auto tuning feature gets very close to the centre frequency – a further small 'tweak' by hand may also be needed (see Photo).

With RTTY, the filter response has two peaks corresponding to the dual tone f.s.k. frequencies. To tune in the RTTY signal the v.f.o. is adjusted so that the ± bars on the CWT display are roughly equal. The tuning in this case is less critical.

Noise Reduction

The Noise Reduction (**NR**) button activates a short 'Finite Impulse Response' (FIR) DSP filter that constantly adjusts itself to the prevailing conditions. This filter naturally tends to eliminate purely random noise and give zero output. But when the algorithm senses the presence of a signal, it will try to build a filter to match and enhance the signal.

Because the filter has a short time delay, its band-width is wide, in fact wider than the narrower DSP filters that are available using the WIDTH control. The NR algorithm works best when the DSP and/or roofing crystal filter bandwidths are fairly wide. My first attempts at using the filter were made with fairly narrow bandwidths and I didn't see great improvements when using NR.

However, with wider bandwidths, I found that signals buried in noise are significantly enhanced. For example in c.w. using a 1 - 2.7 kHz bandwidth, weak signals emerge from the noise. Some signals were in fact inaudible without the NR activated, although they could be partially discerned by decreasing the bandwidth. In s.s.b. mode, the NR acts like a kind of 'squelch' which does not reduce audio fidelity too much.

My experience with NR in other transceivers has never really convinced me that weak signal readability can be improved very much, if at all. But the NR in the K3 is the best I've yet used. I couldn't detect any DSP artifacts (often referred to as 'burblings' and 'warblings') and the audio quality is very easy on the ears – like an analogue processor.

The Notch Filter (**NTCH**) can be set to either auto or manual. It's very sharp and effective in improving reception - particularly with the ubiquitous 'tuning stations'. In one case, the auto notch eliminated a carrier so well that I forgot it was there! For c.w., the manual NTCH option can sometimes be useful in eliminating nearby carriers and unwanted c.w. signals.

General coverage reception of broadcast stations using amplitude modulation (a.m.) from 50kHz to 30MHz was excellent, with only the basic 2.7 kHz crystal roofing filter installed. (An optional a.m. filter is available).

Noise Blanking

The K3 has two noise blankers (**NBs**): the KNB3 hardware module, and a DSP blanker. The KNB3 is a gated intermediate frequency (i.f.) blanker which has a broad input bandwidth optimised for suppressing pulse noise from, for example, power lines, QRN and car ignitions.

Both the threshold at which noise blanking occurs and the length of time the gate is opened van be varied. The DSP blanker can be used on other types of noise, including radar and noise with complex waveforms.

The two blankers can be used in combination and they can be useful. For example, I have a neighbour who sometimes operates an unsuppressed electrical garden waste disposal unit and it's a big source of broadband pulse-type QRM on the h.f. bands. However, by juggling the NB controls I was able to eliminate this very effectively indeed.

Data Modes

The K3 is well equipped for data modes, having BPSK31, RTTY and c.w. decoders. The decoded text scrolls past on the screen – especially useful for those learning c.w.

The Elecraft K3 Utility program can also be used to display decoded messages (as well as send them!) using a PC if preferred. The K3 also has a very special mode: 'CW to data' – which allows you to input a Morse message from the c.w. key or from internal keyer memory while the K3 translates it to data in real time and transmits the signal! Whilst this is going on, both the standard c.w. sidetone, as well as the data tones can be heard in the speaker or headphones. I was delighted to have made my first ever RTTY and BPSK31 QSOs this way - modes that I could easily get addicted to! So far I have made data QSOs with about 50 DXCC entities!

All the operations I've described are possible without a computer or keyboard connected, ideal for the casual data mode QSO. For more regular use of these modes the K3's buffered audio inputs and outputs can be used with a computer soundcard and dedicated software in the standard way.

Transmit Switching

As in the K2, the transmit-receive (T/R) switching is controlled by diodes. The break-in c.w. is excellent – very crisp and fast. On-air reports from local stations report that my K3 produced no discernable key clicks or phase noise and that they were able to hear weak DX stations that only needed to be more than ±200Hz from my c.w. signal. A pleasing result!

After a spell of extended operation at 100W, the K3's power amplifier (p.a.) gets warm (the temperature can be viewed on screen) and the rig's dual cooling fans start running. These are extremely quiet. The cooling fans in my desktop PC and 12V power supply make much more noise than those in the K3!

Automatic Antenna Tuner

The KAT3 automatic antenna tuner (a.a.t.u.) is based on an L/C network, capable of matching loads up to 10:1 standing wave ratio (s.w.r.) at 100W and 20:1 at 10W. I have tested the ability of the KAT3 to tune my simple wire antenna. This is a 40m (131ft) long inverted L wire antenna, designed mainly for 1.8MHz use. However, not having any more space in my small garden, this wire has to do for the other h.f. bands as well.

I found that the tuner was able to match my antenna (and the K3 memorised the settings) on all bands, 1.8 to 50MHz, with an s.w.r. of better than 1.3:1. The KAT3 option also comes with a second antenna socket, which I use for my 50MHz (6m) antenna. The antenna ports in use on a given band (including the separate receive antenna port) are 'remembered' by the K3 on a band-by-band basis. Additionally, the actual antennas connected to them can be 'named' and appear on the display.

Audio Equalisation

There's also a DSP eight-band receive/transmit audio equaliser (EQ) with up to ± 16dB per octave variation. This is useful for getting good transmitter s.s.b. audio quality with different microphones.

Decoded RTTY signal from ON3VY on K3 showing decoded callsign scrolling across lower part of display. Note the two peaks of the dual-tone FSK filter shown in the lower left of the screen. Above that the CWT display shows the correctly tuned-in RTTY with roughly equal numbers of bars in the ± parts of the display.

I've tested two microphones with the K3: a Heil HC4 microphone (in a Pro-set headphone boom) and a Kenwood MC-43S fist microphone with push-to-talk controls. Both microphones plugged straight into the front panel 8-pin socket and worked first time.

Incidentally, I also spent some time setting up each of the microphones for optimum 'communication-quality' audio. Having adjusted the microphone gain and audio compression to their recommended levels, I was able to fine-tune the EQ to tailor the transmit audio 'off-air' (using non-transmit monitoring and headphones).

Note: I recommend to any readers undertaking this type of test to use 'closed' style headphones for monitoring, This is because they block out as much background noise as possible and allow the operator to concentrate on the audio quality. I found that the two microphones I used each needed different EQ settings and on-air reports of audio quality have been very good.

On receive, I used an interesting feature called the 'binaural' mode (**AFX**), where the DSP can be used to generate either a 'fake' stereo image, or one where there is a short time delay between left (**L**) and right (**R**) headphones. This sounds very pleasant using headphones and seems to improve readability of weak signals. It certainly reduces listener fatigue during a long session. **Note:** The K3 can drive a pair of stereo 'bookshelf' size speakers, if desired.

Bandscope Facility

As I mentioned in Part 1 (June 2008 *PW*), the KXV3 option has a first i.f. output at 8.215MHz, for possible use with a bandscope. There's also K3 SoftRock 'Lite' kit (see **photo 3**) for the K3, which I've built and tested with my radio (see links).

The kit's external board takes the K3's i.f. output and converts it into signals that feed into a PC soundcard to produce a slice of r.f. spectrum that can be displayed on a PC screen. The software I used was 'Rocky 3' (created by **Alex Shovkoplyas VE3NEA**) which I found has worked well (see links).

The 50MHz Band

I've recently erected a refurbished simple two-element wire

Moxon antenna for 50MHz, ready for the sporadic Sp-E season. Using this, the GB3BUX (Buxton) beacon is clearly audible at my QTH in Oxford.

Although there's not been much Sp-E propagation so far this year, I was able to participate in a recent RSGB contest and can report a number of 6m QSOs with good reports from as far away as Devon in fairly flat conditions.

Stop press: Update on May 16th 2008 – last few days have seen Sp-E openings to Spain, Italy and Germany where a number of QSOs were made with my K3!

Transverter Operation

I have also tested the KXV3 transverter option interface using an Elecraft XV144 144MHz transverter (with 28 MHz i.f. frequency). It was straightforward to set up the K3 as an i.f. strip for the transverter. However, for this interface, I had to obtain a 'mini-D' 15-pin plug and make up a control cable to enable the XV144 functions.

There are menu settings in the K3 which allow up to nine transverter bands to be used, each with its own operational frequency, i.f. frequency, frequency offset and TX power level. The XV144 is configured to use a low (0-1mW) TX power level from the K3 to drive it to full power (about 25W).

So far, initial tests have been successful with this set-up and I can clearly hear the GB3VHF beacon from Wrotham (Kent) at about S6/7, using a simple 2-element Moxon antenna. With this setup I hope to have a go at the ***Practical Wireless*** **G4HLX QRP 144MHz** contest in June!

Mojo Attributes

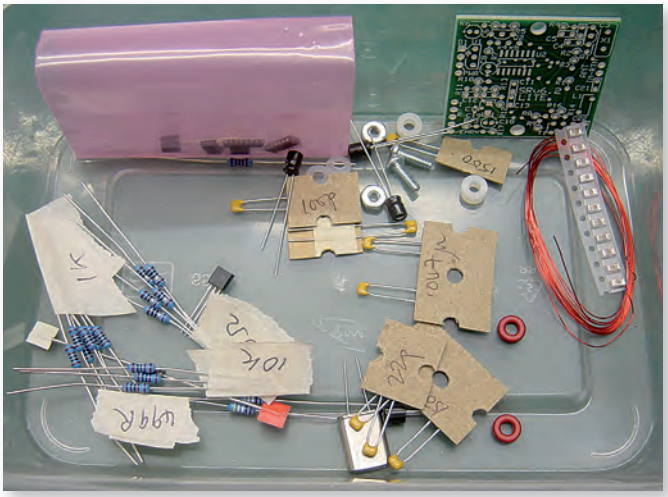
In **Neill Taylor G4HLX**'s 2003 *PW* K2 review he talks about the 'Mojo' (magic charm) attributed to the K2. So, does the K3 also have a Mojo? Yes, definitely! I had an enjoyable K3-K2 QSO with Neill (in Aix-en-Provence as **F5VLD**) on 7MHz s.s.b. and can confirm that the Mojo is also working for the K3!

An important part of the Mojo is the ability to hear weak stations well – so that when I call them my transmission will be well timed – increasing my chances of being heard. There have also been numerous occasions where the K3 Mojo has proved itself in this way!

Contest Operation

Contest operation is a severe test for any radio – and I put K3 through its paces in the 2008 CQWW 160m CW contest. The crowded band was really buzzing – with EU signals of up to S9+40dB – but I was still able to hear and work a number of the much weaker W and VE stations in the 'cracks' between the EU stations by juggling the DSP bandwidth and using the NR algorithms.

Other DX QSOs I have since logged on 1.8MHz include 9M2, HL3, XE1, 6Y1, 9Y4, some JAs, FM and VP6DX. Not a bad crop for a relatively short period of operation!



Kit of parts for the SoftRock 'Lite' K3 bandscope.

The 2008 VP6DX Dxpedition to Ducie Island is notable as it used K3s entirely and logged over 183,000 QSOs! Apparently, the operators were able to use two K3 stations in the same location with no proximity problems on even very narrow bands such as 10MHz! This alone says a lot about the robustness of the radio's front end in the presence of nearby strong signals.

With no second receiver fitted so far, listening to the DX station's split channel is straightforward. First, the DX station is tuned in using **VFO A**. Then the **A>B** button is tapped to copy this to **VFO B** (if tapped twice, the bandwidth and mode information is also transferred).

If the DX station is listening 'up', I tune VFO A up until I can hear the pile-up, and, if lucky, the actual station being worked. Then, tapping the A/B button swaps around the frequencies so that I can hear the DX station again and the pile-up is now in VFO B.

I will be transmitting on VFO B frequency, so this time I press (not tap) the A>B button (**SPLIT**). To monitor the pile-up and find the best frequency to call, I can either simply tap A/B again, or hold the **REV** button (which flips the v.f.o. frequencies whilst pressed).

The second method is a safer because there's less chance of accidentally calling the DX station on his own frequency. When the K3's second RX becomes available, it should be possible to hear both channels at once – in stereo! ●

Links

1) K3 technical details are on the Elecraft website **http://www.elecraft.com/**
2) Sherwood Engineering K3 measurements and comparisons **http://www.sherweng.com/table.html**
3) For the SoftRock "Lite" bandscope board for the K3, see **http://groups.yahoo.com/group/SoftRock40/**
3) Alex, VE3NEA's free "Rocky 3" software for the bandscope display **http://www.dxatlas.com/Rocky/**

Overall Conclusion

With the K3, Elecraft have succeeded in making a very significant step forward from the K2. At the same time – and this seems to be inevitable given the large number of features included – they have moved away from the Heathkit-style of homebrewer's project.

However, even though there is no soldering to do, the K3 is nevertheless a very satisfying radio to build and should appeal to a wide range of builders. The radio performs superbly and ergonomically – and, yes, I was right to be patient and wait for my order to be shipped! In the few months I have been operating it, I've discovered new and better ways of working with the K3 and it has become my main radio.

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Amateur

radio personality

'Ed' (Edwin) Chicken G3BIK

***Rob G3XFD**: "Thank you for agreeing to be featured as our Amateur Radio Personality Ed! You've had a remarkable life and the letters following your name, including MBE, surely reflect your adventures? When did you first get interested in radio?"*

Ed Chicken G3BIK: "It's my pleasure to join you Rob, I'm delighted to share my story with you for *PW* readers. My lifelong involvement with radio began at 15 years old in 1943 using Morse code on and about 500kHz at the Colwyn Bay Wireless College, North Wales where I obtained a PMG Certificate in Wireless Telegraphy.

Maritime receivers were still mainly t.r.f. types with reaction, but because the transmitters all used tone-modulated carrier (m.c.w.), the receiver's reaction control was used primarily to maximise the receiver's sensitivity, just on the verge of, but not quite 'plopping' into oscillation, such as would have been necessary for reception of c.w."

Ed Camel 'mobile' in Jordan!

***Rob G3XFD**: "Life in the Merchant Navy was incredibly dangerous in the Second World War Ed!*

Ed G3BIK: "Yes, it was risky as we crossed the Atlantic in slow merchant ships. However, We were warned to avoid turning the receiver's reaction up too far whilst at sea, as it could act as a transmitter on 500kHz enabling enemy U-boats to locate us!"

***Rob G3XFD**: " I know you're a very competent linguist Ed – especially in Spanish – when did you first learn other languages?*

Ed G3BIK: "My first contact with a foreign language took place when I was 16 years old when I sailed as Third Radio Officer aboard a small cargo-ship on a six week voyage to Uruguay. This is where I was impressed to hear the Captain conversing in Spanish with the River Pilot at Montevideo, talking about the German pocket-battleship *Admiral Graf Spee*, whose super-structure was clearly visible above the surface. Her commanding officer, Captain Langsdorff, had chosen to scuttle his ship on having to leave Uruguay after repairs, rather than face the waiting British Naval flotilla. He sent his crew across the river to freedom in Buenos Aires, Argentina, before committing suicide in Montevideo.

After Montevideo, we too went to Buenos Aires and I was presented with a Spanish/English dictionary, signed by the British Consul who had noted my interest in the local language. I still use it today.

Two British ships left Argentina that day to sail for East Africa, by different routes across the South Atlantic, to join a UK-bound convoy at Freetown Sierra Leone. Only we made it to Freetown.

***Rob G3XFD**: A narrow escape Ed, but I think you had some more adventures and managed to use your Spanish again very soon afterwards?*

Ed G3BIK: Yes Rob, engine failure gave me my first opportunity to break the mandatory radio silence on 500kHz, to seek help via the Americans in Panama. The IFF unit was used in earnest when a American *Catalina* flying boat came to meet us. We spent three weeks in Panama for repairs, so further expanding my interest in Spanish, which was later to become my second language.

My next trip, at 17 years old, was when I sailed as Radio Officer in Charge on an ancient and tiny cargo-vessel, headed for what was called 'Special Service'. This turned out to be the Normandy beach heads and thereafter.

The radio room – complete with spark transmitter – was in a wooden cabin on the boat deck but was clad in protective concrete slabs! Our Captain, after just having survived weeks of bombing on his previous ship while stranded on an Italian beach head, set about drinking the entire official supply of spirits.

Things came to a head when he realised that he was under attack from things not Nazi, and began to dose himself with medicines of which he was also in charge. So, with approval of the Chief Officer I used an Aldis lamp to signal for help from a nearby battleship, who sent a medic by launch.

***Rob G3XFD**: What happened next?*

Ed G3BIK: After he arrived the medical officer diagnosed acute alcoholic-poisoning, but out of courtesy to the Captain's rank and previous war-record, declared him the victim of war-fatigue and confined him to his cabin until our return to UK for reloading, where he was to be hospitalised. We then continued ferrying ammunition, food and fuel supplies to the troops at the liberated ports.

***Rob G3XFD**: You obviously had an eventful war Ed! What direction did your career take you in peacetime?*

Ed G3BIK: Having then left the Merchant Navy, I got a shore job mending domestic wireless sets, a service in demand because new sets weren't available. I applied for and was granted my own Amateur licence with callsign G3BIK. My PMG certificate exempted me from exams but I was still restricted to 10 watts of c.w. for the first year.

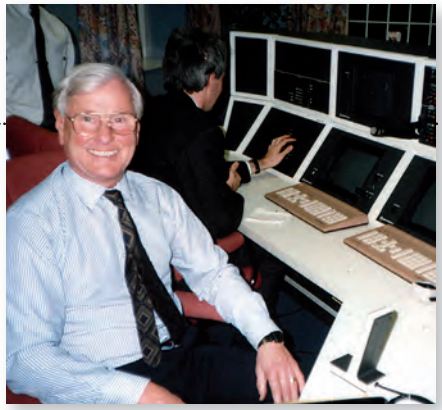
War surplus equipment became readily available at attractive prices but I couldn't take real advantage of that because my parent's home didn't have electricity! So, I acquired a battery-operated trawler-band two valved t.r.f. receiver with 'reaction', I used the house wireless-aerial

Several lifetime careers for one Radio Amateur!

Rob Mannion G3XFD chats to Ed Chicken G3BIK and finds that his fascinating life could provide several separate lifetimes!

Ed at sea!

The **Graf Spee's** *crew being evacuated.*



Ed was awarder the MBE for his ambulance and medical communications work.

and earth spike and began searching for Amateur transmissions on the 160 metre top-band. To my great delight I heard **G6UP** calling "CQ" in Morse, but only recognisable as c.w. tones after turning up the 'reaction'.

My excitement was boundless, as was the frustration of not yet having a transmitter to reply. That's when the wartime warning about the rash use of 'reaction' sprang to mind, so I unplugged the h.t. wander-plug and used it as a make-shift Morse key to tap out a response to G6UP in the hope that this would be my first ever G3BIK transmission.

Joy upon joy, he came back with "G3BIK de G6UP, UR 579c". I was fully readable and fairly strong but with some chirp! So the wartime concept of receiver acting as transmitter was proven right!

***Rob G3XFD**: A rather unusual example of 'make & mend' Ed – but what equipment eventually got G3BIK on the air permanently?*

Ed G3BIK: I then built my first real transmitter running eight watts into an 807 valve as crystal oscillator/doubler, powered by a 12V accumulator and a 12/200V d.c. vibrator pack, all ex-MoD, with taps off the 12V battery to give 2V for the receiver filaments and 6V for the 807 transmitter valve.

Later, with mains electricity I was able to seriously use my ex-Navy CR100 and ex-RAF 1155 h.f. communications receivers. I also experimented with TV reception using ex-goverment radar units with a one inch square raster screen area, when the nearest station was some 200 miles away at Sutton Coldfield.

***Rob G3XFD**: I understand you attracted an unbelieving visitor after transmitting with early transistors Ed?*

Ed G3BIK: Yes, it was quite funny really Rob. Although transistors were usually frighteningly expensive – the availability of low cost out-of-spec 'White Spot' transistors allowed me to experiment with low-power transmission on Top Band.

I then had a daytime QSO with an Amateur some 40 miles away in Cleveland and he asked what sort of transmitter I was using. Some 90 minutes later he rang my door-bell expressing disbelief of my transmitter details, so he'd come to see for himself! With a copy of my circuit, he stopped off en-route home and bought some white-spot transistors to build his own transistor QRP transmitter!

***Rob G3XFD**: I understand you went back to sea again Ed?*

Ed G3BIK: Yes, actually, I went back to sea a couple of times in the coming years taking with me the ex-RAF 1155 as a broadcast receiver for my cabin. But because British-built ships were still using 110V d.c. for the mains supply, I replaced the 6.3V valves with a range of octal based 2V valves to be fed by a 2V accumulator and used the ship's 110V d.c. mains as h.t. supply. I modified one of the i.f. stages to act as a *Q*-multiplier which worked like a charm, bringing in the 1500m BBC Light Programme on the equator south of Ceylon!

***Rob G3XFD**: You were also busy on dry land weren't you Ed?*

Ed G3BIK: Yes Rob, I did manage to also run a part-time TV repair business, which embraced the 're-gunning' and rejuvenation of faulty TV tubes, and the conversion of BBC-only TV sets for reception of the newly introduced ITV channel.

Meanwhile, I studied part-time for C&G Certificate in Telecoms Engineering, HNC Electronic Engineering plus Mechanics and Physics Heat Light & Sound, BSc in Applied Physics, MSc (with Distinction) in Advanced Experimental Physics, and wrote a PhD thesis on Spatial Strip-line Technology which sadly came to nought!

I also lectured on Space Communications to final year MSc and BSc Honours students, tutored local adults on home electronics and TV repairs, taught Spanish language to adults for 25 years, and got my local school registered as a C&G exam centre such that my Amateur Radio students could take their exams on-site.

At that same school, as part of the IEE 'Project Uncle' scheme to fly the Professional Engineering flag, I volunteered a half day per week for 11 years in the local school's CDT department and encouraged some students to set up a school's 2m Amateur Radio station.

I also served as Question Writer for C&G Radio Amateur exams, HM Census Officer, and local government Councillor.

***Rob G3XFD**: I'm intrigued about how you ended up working for the National Health Service Ed. How did it come about?*

Ed G3BIK: My professional post with the NHS came as the result of having seen an advert by my local Regional Hospital Board as they sought to appoint an Electrical Engineer to examine and resolve problems

with electronic equipment in hospitals.

Eventually, I had an informal chat with the Regional Officer concerned, a true Colonel of ex-military background and I asked of him the reasoning behind seeking an Electrical Engineer to do the work of a professional Electronic Engineer!

Replying, he told me that the existing NHS rule-book then only recognised three types of professional engineer, Civil, Mechanical, and Electrical! Our resulting discussion resulted in me being offered the post, which I accepted, but with the provision that 'Electronic Engineer' became a fully recognised and established professional role within the National Heath Service hierarchy! So it came to pass that I became the very first professional Electronic Engineer to be employed as such within the NHS – and I thoroughly enjoyed every minute of it!

Ambulance Services had traditionally been run by Local Authorities, with a random mix of radio channels and modulation systems such that inter-service communication was nigh impossible. But when they became part of the NHS, I was instrumental in rationalising the entire national system such that they all used high-band v.h.f. f.m. with each Service having its own assigned non-conflicting channel.

The costly provision of numerous hill-top radio sites led me as part of my forward planning to seek approval towards a pilot-trial of ambulance communications via satellite. I was then referred instead to the Ministry of Health in London whose official response was negative on the grounds that "not even the BBC were thinking yet of using satellites"!

I was able to donate, modify and instal redundant ambulance radio equipment to provide the local voluntary 'Doctors' Accident Service' with their own radio-communications channel, which in the pre-Paramedic era, revolutionised on-site medical attention at road accidents. It was also contributory to my being awarded the MBE by HM Queen Elizabeth II.

Ed visits the shack at 5B4NC.

Two trophies! At Buckingham Palace for the MBE and the RSGB Award.

My work then took me as advisor to many countries on behalf of the United Nations and British Council, including Central and South America, Cyprus, Qatar, Saudi Arabia, Karachi and Jordan. Whenever possible I sought to make personal contact with the local Amateur Radio club and was always made very welcome. In Jordan I was granted my own call-sign **JY8IK**.

At a recent radio rally, a stranger came up to our stall and said to my wife **Sheila**, "If you knew even some of the jobs your husband has had to do in his life, you would cry!" But of course she smiled because – of course – she knew!

***Rob G3XFD**: You've also been a busy writer too Ed!*

Ed G3BIK: Yes Rob, my numerous published articles on Amateur Radio and electronics topics seem to have left their mark, with the G3BIK PIC-based electronic keyers in use world-wide and many other articles in *Radio Communications* and *PW*. I'm also proud that the RSGB 80 Metre Low Power Contest winners cup in 1970 and the RSGB's Ostermeyer Trophy in 2006 for the most interesting published article.

***Rob G3XFD**: I think you still enjoy c.w. Ed?*

Ed G3BIK: Yes, I've always enjoyed c.w., and recently when trying out the technically brilliant Argo Morse-tutorial software, I was pleased to copy his random Morse at 50wpm, albeit without being able to write it down!

But now life has turned full circle and I'm once again transmitting on 501-504kHz, with ridiculously low power QRPP and at an incredibly low speed Morse. And as to the future, I have yet to try Moon-Bounce and Software Defined Radio!

Moonbounce (e.m.e.) is Ed's next challenge!

***Rob G3XFD**: Thank you for sharing your fascinating life story Ed, to do it full justice I would need 20 pages instead of three!*

Ed G3BIK: My pleasure Rob, it's been wonderful to look back at everything! ●

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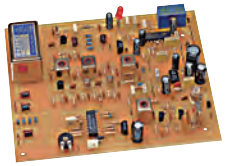

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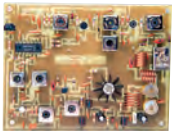

POUNDBURY 70MHz FRONT END as featured in this issue. Receive preamp and mixer, transmit mixer and three stage amplifier. Sensitivity 100nV on receive, output 250mW minimum on transmit. Works in conjunction with the POUNDBURY 9MHz SSB IF UNIT the PORTLAND VFO, and the MIXER-VFO board to create a tuneable 70MHz SSB transceiver. Also available is a 250mW to 25W two stage amplifier type TA4S3 to complete the project.
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CB to 10FM CONVERSION, suitable for CB's with LC7136/7 or TC9119P PLL IC's. Puts the rig on 29.31 - 29.70MHz. Each board is aligned prior to despatch. Data available for a variety of chassis types. Please state rig type when ordering. **SC29 Built & aligned £23.00**.

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The Rev. George Dobbs G3RJV looks at a 'super VXO' (Variable Crystal Oscillator) and an inscrutable Japanese proverb!

The Super VXO

"The reverse side also has a reverse side."

Japanese proverb

As readers might realise from the Japanese proverb, the Japanese can be quite inscrutable! In 1999, I was lucky enough to be invited as a guest speaker to the Japanese 'Ham Fair' in Yokohama. As it was my first (and only) visit to Japan, it was interesting and inspiring.

I was amazed by the ingenuity and skill of the Japanese Amateur Radio constructors and there were many examples of their work on display. The hospitality was excellent and my talk was an interesting experience, with a live, simultaneous, translation. One of the highlights of the visit was meeting, and spending time with, **Tadashi Okubo JH1FCZ**.

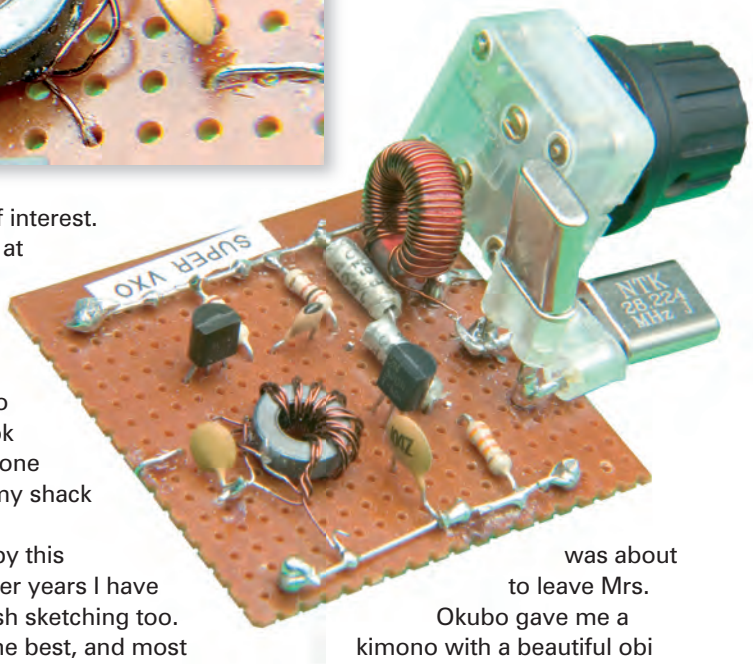
I already knew JH1FCZ through his little magazine, *Fancy Crazy Zippy* (the 'FCZ' of his callsign. I had been receiving the *Fancy Crazy Zippy* for some years. It was an excellent little magazine full of practical ideas and circuit but alas in Japanese but circuits are the same in every language.

Sadly, the *Fancy Crazy Zippy* is no longer published. After the convention I spend a delightful day with JH1FCZ at his QTH in suburban Tokyo. The front room of the house had a plate proclaiming "FCZ Lab". This room was half retail shop and half workshop.

The workbench was covered with bread-boarded projects and a wide range of components for Amateur Radio construction projects were on sale. It was the hobbyist's heaven complete with an interesting guide!

Tadashi and Mrs. Okubo were congenial and interesting hosts. They both showed delightful Japanese traits. When travelling around with Tadashi I was constantly using my camera to record future memories.

Tadashi carried no camera but a small sketchpad and pen. Whenever we paused he would do a quick ink sketch of anything of interest. Later in the evening, at his home, he took out his small set of water colour paints and applied a little colour wash to the sketches that took his fancy. I still have one of these framed on my shack wall.



The detail of the trifilliar-wound toroidal transformer and the layout of the whole project below.

I was so inspired by this approach, that in latter years I have taken up ink and wash sketching too. Without doubt it is the best, and most lasting, way to capture a memory.

Mrs. Okubo was delightful, a diminutive genteel lady. She asked about my experience of Japanese food. It had been very mixed experience because of eating at fast food places in Tokyo and convention food outlets. She determined to convert me to local cuisine and at roughly hourly intervals throughout the day invited me to the kitchen table to sample her food.

I would find a delicate porcelain plate or bowl, beautifully presented, with a sample of her cooking. Everything she offered was lovely to the eye and palate. I was not surprised to find that in the Shinto religion there's no tradition of saying grace, or offering thanks, at mealtimes.

The individual's thankfulness for food is expressed in the way it is cooked and then presented at table. Perhaps we could learn something about food from that tradition? As I was about to leave Mrs. Okubo gave me a kimono with a beautiful obi (belt) as a gift for **Jo** my wife.

Super VXO Design

Tadashi JH1FCZ is perhaps best known for the *Super VXO* design. The first article about the *Super VXO* appeared in the *Fancy Crazy Zippy* magazine in August 1980 (issue 64) written by the late **JA0AS** and JH1FCZ.

The article was followed by a longer article in *Textbook for Homebrewing of Electronic Circuits,* a book by JH1FCZ. From the title alone, I would like to see this book but it's out of print and was in Japanese. The Super VXO circuit is a version of the variable crystal oscillator that uses two crystals of the same frequency in the oscillator circuit.

The diagram, **Fig. 1**, shows typical VXO circuits. In practice a VXO is a crystal controlled oscillator that uses a variable capacitor alone, or in conjunction with an inductor, to shift the crystal frequency.

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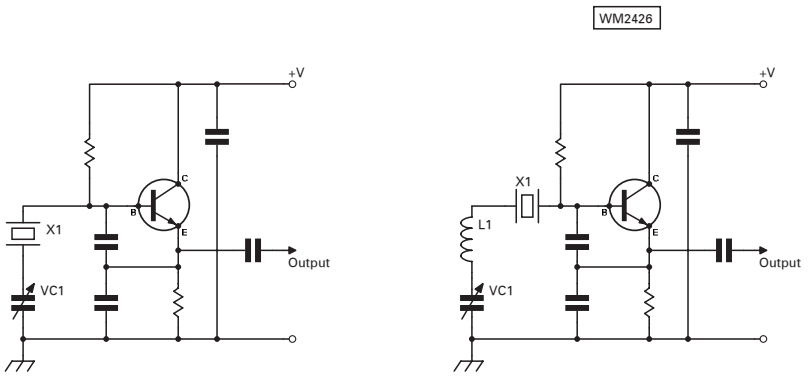

Fig. 1: Two forms of variable frequency crystal oscillator, using a capacitor allows the frequency to be moved downwards. Adding an inductor allows greater excursions both above and below the crystal frequency.

In a crystal oscillator the frequency of oscillation is controlled by a quartz crystal – the size and method of cutting of a small piece of quartz crystal forms a fixed and very stable tuned circuit. This results in a fixed frequency oscillator. However, it's possible to move the frequency of the oscillator using the methods shown in Fig. 1.

In Fig. 1 (left), a variable capacitor is placed in series with the crystal. As the capacitance is varied the frequency of the crystal oscillator can move around. The larger the value of VC1, the greater the oscillator move in frequency.

There are limitations to this approach. If the value of the capacitance is too high, the stability of the oscillator is compromised and Fig. 1 (right) shows a better version using a variable capacitor and an inductor in series with the crystal.

The introduction of the inductance increases the frequency shift process. In this circuit the frequency of the oscillator can be pulled more, though it may be rather lower in overall frequency. The amount of frequency offset depends upon the values of the capacitance and the inductance. The larger the values of inductance and capacitance, the larger the frequency swing. Again there are limitations – any attempts to achieve too great a frequency shift will result in instability.

Classic Circuit

The classic circuit of the *Super VXO* as it appeared in the original article in **Fig. 2**. A standard crystal oscillator uses a Colpitts configuration and the feedback to maintain oscillation is provided via a tapped capacitive network (C1 and 2) from the emitter to the base of the transistor.

The frequency controlling elements are X1, X2, L1 and VC1. It's like Fig. 1b, except that it uses two identical frequency crystals in parallel. This results in a much wider frequency variation while still maintaining good stability.

The theory of how the Super VXO works has been the subject of much speculation but the results bear out the viability of the circuit. I've described the circuit in earlier editions of this column but after reading some later articles on the subject, I decided to return to the idea and see what it could do with a little bench time.

Previous experiments with the *Super VXO* had shown me that to be effective in driving other circuitry it requires at least one buffer stage. So, I did my testing of the VXO using the circuit shown in **Fig. 3**. This follows a circuit suggested by **Minowa Makoto 7N3WVM**, a Japanese Amateur who has written extensively on the Super VXO.

The oscillator uses a common bipolar transistor and I used the easily available 2N3904 device but many other would serve the purpose (2N2222, BC108, etc.). Again, the circuit is that of the Colpitts oscillator with C1 and 2 providing the feedback path. This is followed by a simple f.e.t. buffer using an MPF102 device.

The trifilar transformer, T1, provides a lower impedance output for driving external circuits. I used a two-gang polyvaricon type variable capacitor; one side offering 160pF maximum capacitance and the other side 75pF maximum capacitance. This was ideal for my tests as I could use either capacitance values.

Trifilliar Alarmed?

Some readers may be alarmed by the making and use of, a trifilliar wound transformer. So, to help take the fear out of the job I'll describe how simple it is to make one! The transformer is wound on an FT37-43 core. Note that the 'FT' which designates a ferrite core, rather than a powdered iron core, which has a 'T' prefix.

Too start the process, cut three 250mm lengths of a small gauge enamelled copper wire; I used 0.32mm (30s.w.g.). Hold the three lengths of wire parallel and tie a knot close to one end joining all three wires at that end. Next, fix the tied ends of the wire either in a vice or the clip of a 'third hand' tool. Pull all three wires until they are parallel and taut and tie a knot in the other end to secure the wires. This will result in three parallel wires secured together at each end. To aid coupling, and indeed the winding process, it's usual to twist the three wires together with one twist per 3-4mm of length.

All that's required is about three or four twists on each 10mm of the wire. I simply fasten one end of the wires and slip a pencil between a couple of the wires at the free end. By turning the pencil, twists are added to the wires.

It's useful to pause from time to time and stroke the twists along the length to obtain an even distribution. When this has been achieved, using the twisted wires as if they were just one wire, wind eight turns through the core. Each pass through the core counts as one turn. Scrape the enamel off each of the six ends of the wires and tin the wires with solder.

Now for the interesting bit! Use the ohms (resistance) range of a test meter to identify the beginning and end of each separate wire. Splay out the wires as shown in Fig. 3a. The individual wires are designated as A to B (first wire) C to D (second wire) and E to F (third wire).

The inset drawing marked 'T1 – Detail', shows the electrical connections for these wires. This must be exactly as shown for the

Continued on page 52 ☛

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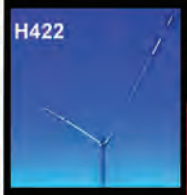

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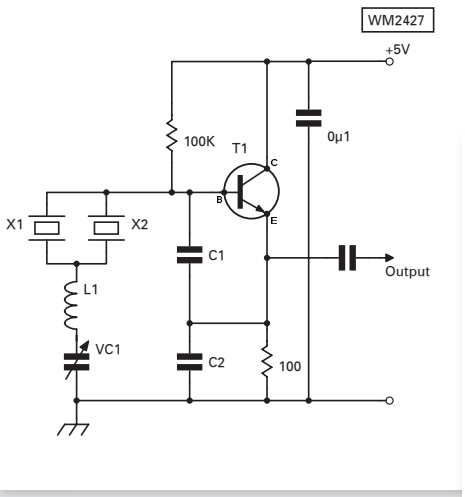

Fig. 3: Adding a buffer stage to the VXO would be adequate to drive the keying circuit of a QRP transmitter or an high level mixer circuit that needs several milliwatts of drive.

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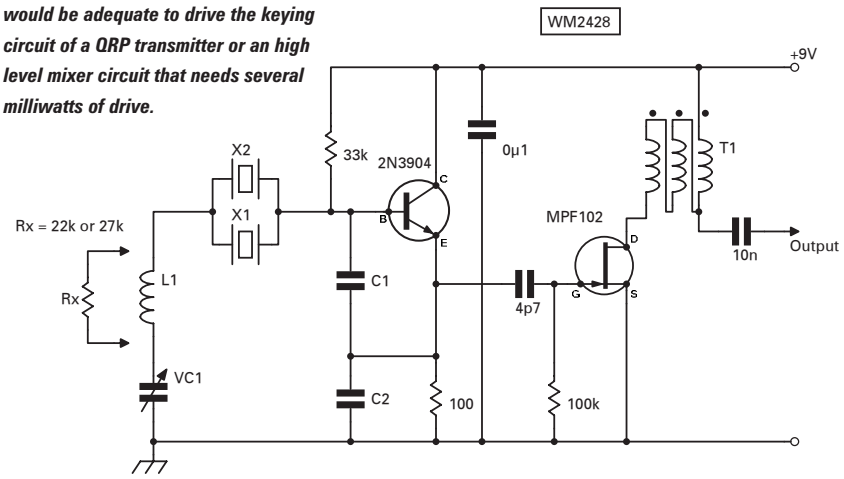

correct working of the transformer. In the completed circuit – A goes to the drain of the MPF102, B is connected to C, D is connected to E and this connection point goes to the output 10nF capacitor; F is connected to the positive of the 9V supply. Take some time and care to get these connections right! I built the circuit of Fig. 3 on perfboard but ugly construction would also be a good way to do it.

Early Experiments

I won't go into all my tests with the project as it would take too long, but I discovered two things early in the experiments. I was getting frequency instability with many of the values I tried for VC1 and L1.

Then I recalled having read that some users of this circuit had found frequency skip due to hysteresis effects in the inductor. Some cores, especially ferrite, are notorious for this effect where the varying magnetic field due to the oscillations lags behind the changes in the oscillator.

The simplest cure for the hysteris is to place a resistive load across the inductor. This is shown as 'Rx' in Fig. 3. I added a 22k resistor as shown and the problems all disappeared.

The other effect I noticed was caused by the physical nature of the inductor itself. I began my tests using off-the-self miniature pre-wounded moulded chokes. This involved no winding of coils and quick changes of inductor value.

In some cases I lacked a value I wanted to test and wound my own inductor and noticed I got a greater frequency shift with these larger home-made inductors. So, I abandoned the miniature moulded chokes and wound my own inductors for the rest of the tests.

I settled for using two values of variable capacitance provided by my polyvaricon variable capacitor – maximum values of 160pF and 75pF. After fiddling about with several values of inductance, I opted to use only two inductors with values of 5µH (micro-henry) and 10µH.

The inductors were both home wound with 35 turns of 0.32mm (30s. w.g.) wire on a T37-2 core provided about 5µH and 45 turns of 30s.w.g. on a T50-2 core provided about 10µH. It requires about 500mm of wire to wind the 5µH coil and about 800mm of wire to wind the 10µH coil. I'm quite limited in the number of pairs of identical frequency crystals I have within the Amateur Radio bands, so I settled for a pair of identical crystals on 14.050MHz.

The chart, **Fig. 4**, shows the results I obtained using the above combinations with one crystal and a pair of crystals. In each case adding the extra crystal significantly increased the frequency shift. These are only limited tests and I'll probably do more later.

The chosen values of inductance and capacitance are very conservative and greater swings will be had with higher values. However, the values did give a stable clean signal with some linearity of control. The reader must also bear in mind that the amount of shift also depends on individual samples of crystals.

14.050 MHz Crystal
5uH (with 22kΩ in Parallel)
35t. 30swg. T37-2 core
75pF Variable Capacitor
1 Crystal: 14.043 – 14.050MHz
2 Crystals: 14.039 – 14.053MHz

14.050 MHz Crystal
5uH (with 22kΩ in Parallel)
35t. 30swg. T37-2 core
160pF Variable Capacitor
1 Crystal: 14.042 – 14.050MHz
2 Crystals: 14.036 – 14.051MHz

14.050 MHz Crystal
10uH (22kΩ in Parallel)
45t. 30swg. T50-2 core
75pF Variable Capacitor
1 Crystal: 14.032 – 14.043MHz
2 Crystals: 13.991 – 14.041MHz

14.050 MHz Crystal
10uH (22kΩ in Parallel)
45t. 30swg. T50-2 core
160pF Variable Capacitor
1 Crystal: 14.028 – 14.043MHz
2 Crystals: 13.973 – 14.040MHz

Fig. 4: Some results of the experiments that George carried out with VXOs using one or two crystals.

My little experiments show that JH1FCZ offered we home constructors a very useful, simple, and worthwhile circuit idea in the Super VXO. I hope you enjoy building one as much as I did! ●

Editorial note: Please see Keylines for an announcement regarding COTPW.

Usual introduction in here please.

Amateur Radio Exams & Licences

In A State of Flux?

No, I'm not discussing magnetic flux, other than that from your antennas! Instead, I'm looking at the big changes that have come about and we'll find them still going on as our hobby develops into the future.

After the Second World War, Amateur Radio started up again and many new recruits came from the demobbed military radio personnel returned to 'Civvy street'. At the same time, a huge amount of surplus equipment poured onto the market. This also increased the interest in Radio especially among young people.

They sought practical hobbies and activities in those days and that's a state of affairs I'd like to try to return to. Modern youngsters taking up radio? How do we do that – have *PW* readers got any ideas?

City & Guilds

The City and Guilds (C&G) began to offer the Radio Amateurs' Examination (the RAE) from 1946 until it gave up the subject after the December 2003 exam. The original written exam (that could be a bit difficult – I remember having to draw the complete circuit of a superhet receiver, then describe the operation of each stage!), was dropped in 1979. It was replaced with the now familiar multiple choice papers. By negotiation with the RSGB, the G&G established the lower level Novice radio exam in 1991, relinquishing it in 2002.

The Radiocommunications Agency (RA) established the Foundation examination and licence. It took over the Novice exam, renaming it the Intermediate exam, and the RAE, renaming it the Full exam. This later became known as the 'Advanced exam'.

Thus the old single exam became a three tier 'incentive' licensing scheme, ending up at the same level as the old RAE.

Administered By RSGB

The Radio Society of Great Britain (RSGB) began to administer the exams for the RA. However, also in December 2003 things were happening fast as the function of the RA was transferred to the Office of Communications (Ofcom).

Ofcom is a regulatory body working on behalf of the Government and is not an examination 'institution'. Its function is to issue the licences. The RSGB represents Radio Amateurs' interests and therefore, I consider it to be unsuitable as an examining body.

The RSGB sponsored and set up the independent Radio Communications Foundation (the RCF). That foundation then set up an RCE (Radio Communications Examinations) committee. The RCE itself responds to an RCE Standards Committee – and over all that – the RCF appointed a Quality Manager... (Phew!). The RCF, RCE et. al. set the exams, hold the questions bank and so on.

At the same time the Society maintained an advisory role through its Amateur Radio Development Committee (ARDC). But don't worry – that's probably enough information from me on the admin/bureaucratic front!

Early RAE Days

Year after year in the early days of the RAE, I would find trainees from industry enrolling on the courses. People fascinated by radio technology would join the classes and they didn't necessarily take up active Amateur Radio. In my opinion this demonstrated that the RAE Course for the C&G was recognised as good technician training – valuable to industry. Indeed, many people were sorry to see the 'status' of the C&G wither away after the changes.

Locally, myself and others established our local Radio Society (the **Hilderstone Radio Society**, Thanet, Kent) after a particularly successful RAE Course back in the 1980s. The class members wanted to carry on meeting after the end of the Course. (I understand a good few Clubs started that way).

I feel our success is a pointer to how we might organise some of the new Courses in areas where few Clubs exist. Run a Course (as an Adult Education class) and propose that a Club group starts up in the locality – and 'whizzo', a new Club is formed... I'm sure the RCF would help, with demos by its mobile station bus GB4FUN.

The RSGB is working towards re-establishing this respect for the Advanced exam (the whole suit of them in fact). It's doing this through seeking recognition by the Qualifications Curriculum Authority (QCA). It might transpire that the communications exams will one day carry an NVQ status – and why not a GCSE Radio Technology subject?

Many radio clubs offer local Courses for the various exams. If yours doesn't, how about holding a special meeting? The agenda item would be to discuss setting up a Course, exam centre and group of Instructors (or as the RSGB calls them – 'Trainers')? A well qualified member can be appointed as local Examinations Secretary to administer the exams at your centre. Other keen members would become

Ken Smith G3JIX – involved with training new entrants to Amateur Radio for many years – voices his concerns and ideas.

Trainers. A Full licence holder can instruct all the exams, an Intermediate licensee can train Foundation candidates. If you are a Youth Worker in a Centre, or a Teacher, you can register as a Trainer – even without a licence!

The administration patheway gets your Club or Society registered as an Examination Centre. Candidates for Trainers supply two referees and fill out a disclosure form. If approved, they then receive an instructor's pack and in due course, attend a 'Train the Trainers' (TtT) day run by the RSGB. I attended one of the first, held at Telford a few years ago. I found the experience quite exhilerating and met many old friends. Nowadays, TtTs now appear as local events in various regions. The way to get a TtT going near you is to set up a demand, co-operate with the regional Clubs, and request a TtT.

All the exam syllabuses are available from the RCF and recently they have been updated to the latest licence requirements. The very good training manuals, *Foundation Licence Now!*, *Intermediate Licence – Building on the Foundation* and *Advance! The Full Licence Manual* published by the RSGB, are also up to the minute editions, available from the *PW* Bookstore.

Course Cost Low

The cost of these Amateur Radio Courses remains low because of the excellent self-help tradition of the movement. A small contribution to room-rent might arise and small amounts to offset actual expenses might accrue. Trainers nearly to a man (and woman!) contribute their time free as instructors. The examination fees are the only real expense, but that's not huge.

The conduct of the exams follows the usual security needs, with invigilators appointed who are independent of the face to face training. Others monitor the local marking (of Foundation and Intermediate papers – the Advanced exam is monitored and marked centrally).

Disabled candidates are particularly encouraged. Blind Amateurs receive help and advice from the **Radio Amateur Invalid and Blind Club** (RAIBC) and the local examination group offers an 'amanuensis' to assist such candidates. An amanuensis is someone who reads the questions, and the possible answers, and records responses on the answer sheets according to the candidate's instructions. The amanuensis should be an independent person (of integrity!) who doesn't know much about radio or the syllabuses of the exams. This is to avoid inevitable bias to which we're all subject!

Finally, your Club or Centre should be able to carry out the practical operating session that each Foundation candiate performs as a part of the exam, as well as a workshop area for project construction needed by Intermediate candidates as part of their exam.

Your team could organise these exams on demand and set a date, but you must give at least ten days notice to the RSGB. The Advanced examination has no extra practicals, and often various groups of trainees in a region enrol and go to a centre for the exam on one of the published dates. They do this as an alternative to setting up the examination at each of their Clubs or centres on one of the dates.

For Clubs to have a station, a workshop area, and other practical facilities is a great chance to re-introduce construction, test equipment use, antenna testing, demos and lectures. Why, that's what we always did in Amateur Radio – it's not just commercial black-box juggling you know!

Harry Leeming's

in the shop

Harry G3LLL chats about older linear amplifiers, automatic level controls and problems with variable frequency oscillators.

When contemplating connecting an older linear to a modern rig, the first thing to do is to measure the linear's switching voltage and current. With the linear in the standby mode connect a voltmeter to the switching relays connection (usually marked 'RLY') and chassis, and note the voltage.

Next disconnect the meter, set it to the 1A (one amp) range and connect it again. It should be possible to hear the linear's transmit–receive relay click and the meter will read the current taken by the relay, note this down as well.

Then take a look at the instruction book for the new rig and it should stipulate the maximum switching voltage and current that's permissible. Make sure that the readings obtained from the meter comply. If no such limits are stated, be sure to enquire from your supplier as to what they are!

Manufacturers – having persuaded the buyer to empty their piggy bank purchasing the latest 'all singing all dancing' transceiver – often seem to think that we will automatically purchase their accessories. Then they'll blame the buyer if damage is caused by connecting something else other than their products!

Where the new rig uses solid state switching, or a very small relay, it may be necessary to incorporate some sort of interface to handle the switching current and voltage of older linear amplifiers. For example, for the FT-757 (and for several of their other solid-state rigs) Yaesu made a switch box – the FRB757 – which is shown in **Figs 1** and **2**.

The transistor in the switch box takes the small switching current and voltage from the FT-757 and uses this to switch a relay. The relay is then used to switch the much larger relay in one of the older linear amplifiers.

Note: If a switching unit is needed, and one can't be found, it should be quite simple to knock something similar together, using almost any medium sized *pnp* transistor such as a BC461 and a 12V relay from a junk box).

Harry's ALC Query Service!

I get quite a few queries about the connection of the connections for the automatic level control (ALC) link to a linear amplifier. So, to remind anyone in doubt, the ALC link between a linear amplifier and the transmitter that's driving it, is intended to feed back information to prevent overdrive, which would result in distortion and splatter on peaks.

If a linear – that's not of the same make as the transceiver – there's every possibility that the ALC feedback link won't function correctly and may be better left off. The ALC link when functioning correctly is intended to limit the driving power, so as not to drive the linear into saturation (i.e. to flat top it), and so if a linear capable of more than the maximum power permitted for the licence issued, there's no point in linking up the ALC wire, as presumably other arrangements will have been made to limit the driving power. (What you haven't – and you have a linear that will give over a 1000 watts out – yet you are only licensed at 400W? You naughty Amateur!).

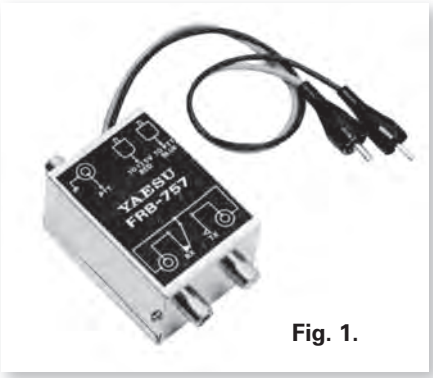

Fig. 1.

When using a very high frequency (v.h.f.) linear, the transmitter will often produce more output than the input of the linear will handle. So care must be taken to avoid overdriving it as this will cause a great deal of splatter. (I briefly mentioned the subject of power limitation in the October 2007 issue of *PW* and the simplest way to do this is to use a speech processor in the SSB mode.

More About Drift

Last month I looked at the problem of generating a stable frequency and in particularly the design of variable frequency oscillators (v.f.o.s) and so – how stable can we expect a rig to be?

Obviously some rigs are more stable than others, and modern synthesised rigs that rely on crystals for frequency generation, are inherently more stable than those using a v.f.o. Most oscillators, even those that are temperature compensated, will be happiest in an environment that's at a constant temperature and in this line the human body takes a bit of beating!

For example, my £8 Casio watch keeps time to better than a second a month if I wear it constantly and keep it at body temperature. But it loses time (goes slower) if I take it off at night!

I've just checked my FT-980, a rather old synthesised model that was once top of the range, in a fairly cool room. From switch on, it drifted around 200Hz in the first two hours at 10MHz and then hardly moved. (More modest price synthesised equipment might be expected to drift a little more).

The v.f.o. in most non-synthesised h.f. rigs covers a 600kHz tuning range at around either 5 or 9MHz, the final transmit and receive frequencies being obtained by mixing this with the output of crystals, see **Fig 3**. With these rigs the drift during the first hour, after five minutes warm up, can be expected to be in the range of between 500Hz and 1kHz. Whilst with patience it may be possible to modify or adjust equipment to make it more stable than this, the above is fairly normal so there's no point in looking for a fault that doesn't exist.

There are some v.f.o. controlled rigs – such as the Swan 500 and the Yaesu

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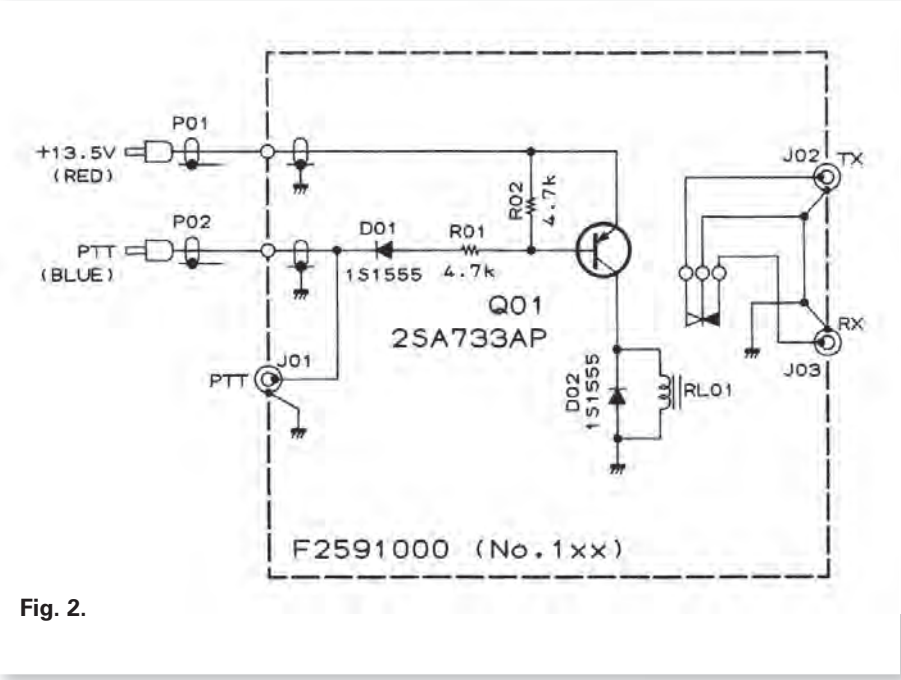


Fig. 2.

FR50B/FL50 combination – where the frequency range of the v.f.o. is band switched. This can create real problems, as the slightest variation in contact resistance of the range switch will cause a shift in frequency and the drift can sometimes be quite troublesome.

The FR50B set-up even tends to jump in frequency if a Morse key is pumped too enthusiastically. So, I always advised owners of these to either use an automatic keyer, or to mount the key on a separate table to the rig.

Checking VFO Drift?

In practice we can reliably presume that if a v.f.o. controlled h.f. rig drifts about the same amount on all bands, then it's the v.f.o. that 's altering in frequency. Fortunately, where the rig has a digital display v.f.o. drift can be monitored with reasonable assurance if the 1.8 and 3.5MHz ranges are selected, as the crystals can usually be assumed to be stable on these bands.

However, on (let's say) 21 or 28MHz, the crystals may shift a 100Hz or more as the equipment warms up. Whether the v.f.o. is drifting h.f. or low frequency (l.f.) is not so clear, as on some rigs the v.f.o. has to be tuned higher in frequency to make the receiver and transmitter tune l.f., and visa versa.

By far the best way to monitor a v.f.o. is to listen to it's output directly on a separate receiver. It can, of course, be checked with a frequency counter but when trying to trace faults it's much easier to listen for any change of pitch when poking around, than trying to look at what's going on and monitoring a counter or a digital display at the same time!

To monitor the v.f.o. connect a short length of insulated wire to the antenna socket of a reasonably stable receiver that covers the correct frequency range. Next, poke the other end near to where the wires come out of the v.f.o. It should then be possible to receive the v.f.o. on the receiver.

A really chronic case of frequency drift or jump should show up but in most cases it's unlikely to be possible to detect any frequency shift is in the receiver or the v.f.o. To avoid chasing 'red herrings', the monitoring receiver should be switched to its widest bandwidth in the amplitude modulation (a.m.) mode and then be tuned to receive a harmonic of a crystal calibrator, which has been allowed to warm up for at least an hour.

Alternatively, a strong BBC or other reliable broadcasting station broadcast station, that falls in the frequency range of the v.f.o. can be used. If the v.f.o. is then tuned to zero beat and the calibrator and the tuning left alone, the increase of pitch as the v.f.o. drifts will be readily audible (even over the garbled speech or music!) and the monitor receiver will only need keeping approximately on frequency.

After an hour or so the beat note between the calibrator and the v.f.o. will be heard to increase considerably in frequency – but how much has it drifted? If the person carrying out the test is musically inclined it might help to know that 'middle C' on the piano has a frequency of 440Hz. Otherwise note how far the analogue dial or digital display of the transceiver has to be retuned to return to zero beat and then decide as to whether there is or isn't enough drift to worry about.

Drift Or Jump

Changing temperature as the rig warms up, usually causes a very steady change of frequency over a length of time. Sudden changes of frequency are more likely to be caused by an intermittent connection. The latter can often be located by the highly scientific approach of poking and prodding at the case of the v.f.o. and every switch, relay, potentiometer and connection that has anything to do with it – taking particular note of the components feeding the clarifier (receiver/transmitter incremental) tuning input.

Common causes of frequency jump on Yaesu transceivers are the clarifier switches and relays. The relay should be cleaned with a switch cleaner that does not contain any lubricant, but strange as it may seem, the push button clarifier switches seem to

Problems? Harry's waiting to hear from You!

I like to hear about problems with older equipment, particularly pre 1990 Yaesu rigs. Please E-mail me, (add some radio related term in the subject heading, to differentiate against spam), or write and enclose a stamped addressed envelope. Remember that electricity is dangerous, if you are not familiar with safety precautions you must never work on your equipment whilst it is plugged into the mains. (Switching off at the wall socket does not necessarily make equipment safe).

respond best to WD40 and not to switch cleaning fluid of any kind!

The most obvious way to reduce long term drift caused by temperature change, is to reduce the temperature change. Make sure that all ventilation holes are free, and in particular with a valved rig be certain that the fan is sucking hot air out and not blowing it in!

Inside The VFO

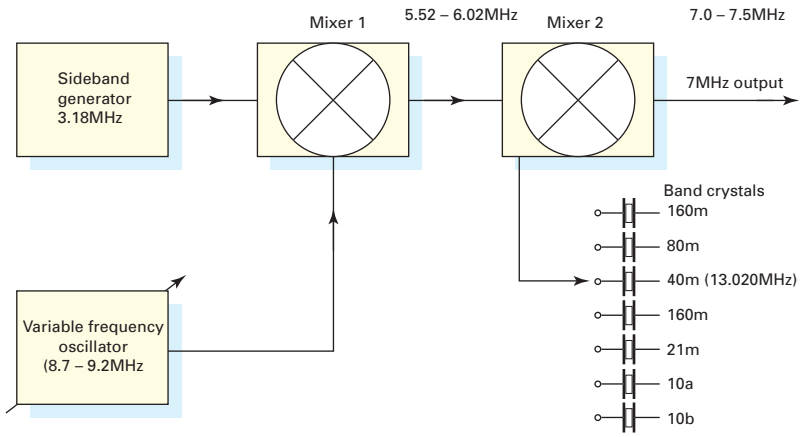
Once it has been established that the excessive shift of frequency is not due to an external bad contact or mechanical problem, check the clarifier and high tension (h.t.) feeds to the v.f.o. with a digital meter. If these are not altering when the frequency varies, we can be pretty sure that the fault is in the box. **Note:** At this stage it's extremely important to note that v.f.o.s are precision components, and must be treated as such.

Next, by looking at the main tuning capacitor it will be seen that the blades have been bent into rather odd angles and the urge to straighten them might appear! But don't even think about adjusting the tuning capacitor vanes in any way whatsoever – if they are touched the chances of ever getting the analogue dial calibration correct again are virtually nil.

Whoever set the variable capacitor vanes in Japan must have been practicing for years – I certainly cannot copy their skill even with my years in the trade! Please bear in mind that moving any of the component parts around in the v.f.o. will also effect the alignment, so avoid this where possible.

Next month I'll be look at servicing the v.f.o. itself and consider how to how to get the analogue dial tracking correctly again when I have finished. So, I'm look forward to your company 'in the shop' next time!

Fig. 3.



David Butler's

vhf dxer

Share your news, views and reports with fellow readers. Reports to David by the last Saturday of each month please.

This month David Butler G4ASR has reports of improving conditions on the v.h.f. bands.

There were some early signs during April that propagation on the v.h.f. bands was slowly recovering from the dormant conditions experienced during the winter period. A small number of Sporadic-E openings were reported on the 50MHz band but none reached any higher than this. One good auroral back-scatter opening was reported on April 23rd with contacts being made on the 70MHz and 144MHz bands.

Surprisingly the openings seemed to have been missed by all the active 50MHz operators. There was a small enhancement in tropospheric propagation towards the end of the month with contacts being made into southern France and Spain on the 144MHz and 430MHz bands but very little else was reported. April was quite a wet month and although this is not good for tropo openings it did enable some good 300 kilometre inter-UK rain-scatter contacts to be made on the 10GHz band.

The 50MHz Band

A total of ten Sporadic-E (Sp-E) openings were reported on April 13th, 15th, 19th, 20th, 22nd, 25th, 26th, 27th, 29th and 30th. Most were quite transitory but the openings on April 22nd and 27th were fairly lengthy in nature.

The opening on April 22nd started around 1410UTC and continued for over an hour. Stations in southern England (IO90, IO91, JO01) reported making s.s.b. contacts with IK0FTA (Italy JN61), IW0HLE (JN61), IW4ARD (JN64), I6BQI (JN72), IZ7AUH (JN80), IW7EBA (JN80) and 9A2Y (Croatia JN83).

There were three openings on April 27th, the first at 0800UTC to the station of IS0GQX (Sardinia JM49) and the second between 1055-1130UTC to IS0SWW (JN40) and a few stations in northern Italy (JN45). The main opening, between 1240-1500, was reported by operators in southern England who mentioned contacting the stations of HA1FV (Hungary JN97), HA3MQ (JN95), HG4FC (JN97), HA6NL (JN98), IW7EBE (JN71), IK7UXU (JN81), IZ7EUH (JN81), IQ8OM/8 (JN70), SV2DCD (Greece KN00), S51DI (Slovenia JN76), S57RR (JN65), YO2BBT (Romania KN05), YU1ACR (Serbia KN13), YU1FE (KN04) and 9A5ST (JN83)

Other stations contacted via Sp-E propagation during April included the stations of DK1MAX (Germany JN58), EA2LU (Spain IN92), EB7DBX (IM67), OE5MPL (Austria JN78) and SQ9IAU (Poland KN09).

Geomagnetic conditions were very quiet at the beginning of the month and this is very helpful for Earth-Moon-Earth (e.m.e.) communication on the 50MHz band. Between April 5th-13th the UK stations of G3FPQ, G4IGO, G4PCI and G5WQ reported making JT65A contacts with JR6EXN (Japan), W1JJ (USA), W7GJ, VK4ABW (Australia) and ZL3NW (New Zealand). Incidentally, the 50MHz station of **Gary Ashdown VK4ABW** now uses an antenna array of four 13-element Yagis, and that's really huge!

So, if Australia hasn't been worked on the 50MHz band now's the big chance! However, it's not particularly easy as 50MHz e.m.e. is challenging even under the most optimum of conditions. But if a single long Yagi of 6 or 7-elements, a 400W amplifier, low-loss feed lines and a low-noise receive system are available, working some of the DX stations I've just mentioned is possible.

Even when the 50MHz band is 'dead' there are still contacts to be made using meteor scatter (m.s.). Nowadays, most 6m stations use JT6M digital modulation to make a QSO via the meteor trails.

There's always a reasonable amount of activity even with daily

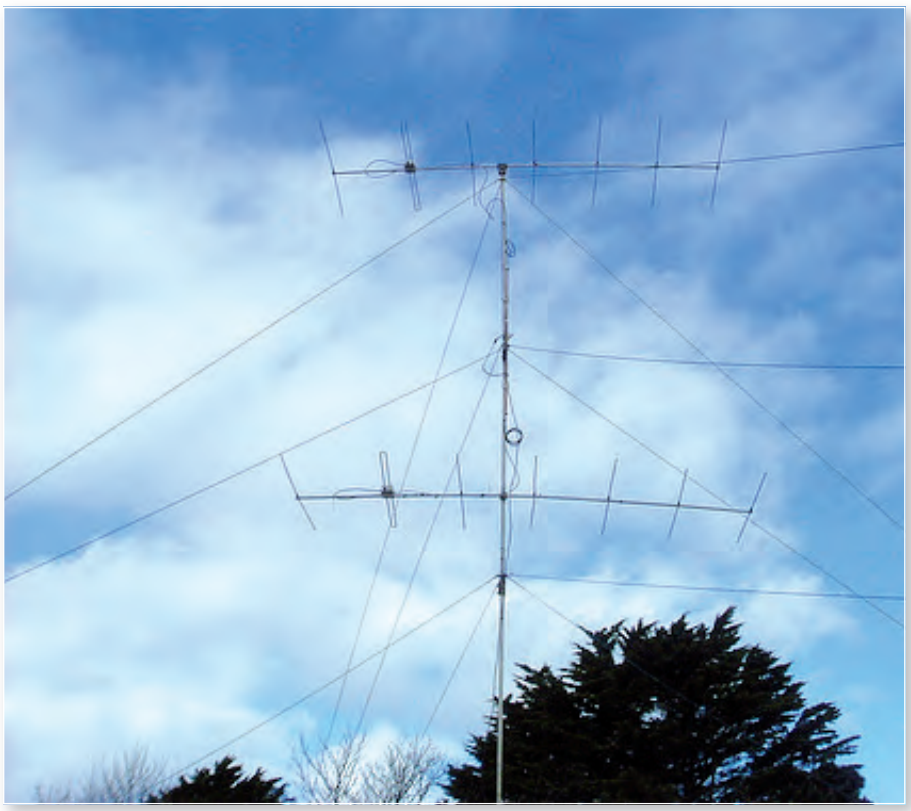


Fig. 1: 70MHz antennas at G4ADV/P 2 x 7-element Yagis
Photograph by Kevin Franks M0BFB

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Fig. 2: The 70MHz contest station of the Newquay Amateur Radio Club G4ADV/P
Photograph Copyright of Roger Mason G3TDM

random meteors but in the period from April 15th - 28th there was also a major shower, the Lyrids that peaked on April 22nd. Amongst the JT6M contacts reported from the UK during April were the stations of EA1XE (Spain IN62), EA6SA (Balearic Islands JM19), HA6NN (Hungary JN98), IK2DJV (Italy (JN45), LZ1UQ (Bulgaria KN12), OH8A (Finland KP24), OY3JE (Faroe Islands IP62), SM3BEI (Sweden JP18), SP6MLK (Poland JO80), S59MA (Slovenia JN76), 5Q6M (Denmark JO55) and 9A5CW (Croatia JN65).

The 70MHz Band

There's also a small amount of meteor scatter activity on the 70MHz band. During April a few enthusiasts reported making JT6M contacts with the stations of DI2PM (Germany JO30), I6BQI (Italy JN72), LX1FX (Luxembourg JN29), OK1DO (Czech Republic JO60), OK2POI (JN99), OK7FA (JO70), OZ2LD (Denmark JO54) and OZ3ZW (JO54). At times, activity does suffer a bit from the limited number of countries with access to the band but it's gradually getting better with a few more countries gaining permission to use 70MHz.

In the last few months I've mentioned that stations in Estonia (ES) now have a permanent allocation (70.140-70.300MHz). And the station of DI2PM (Germany) can use the spot frequency 69.950MHz until August 30th 2008 and that 20 Amateurs in the Czech Republic (OK) can use the band 70.200-70.300MHz until December 31 2008. Further to that news is a recent announcement that Radio Amateurs in Italy (I) may now use the band between April 30th to December 31st 2008. The technical parameters and operational conditions are the same as the 2007 experiment which were all modulation modes within the frequency sub-bands of 70.100MHz ±12.5kHz, 70.200MHz ±12.5kHz and 70.300MHz ±12.5kHz.

The maximum allowable power is 25W e.i.r.p. and the operational area is the whole of the Italian territory except for a 30km strip close to the Austrian, French and Swiss borders. The beacon I0JX (70.088MHz) was reactivated on April 30th and was immediately heard in southern England via meteor scatter. During the experiment last year there was also activity from IS0 (Sardinia), IT9 (Sicily), 1A0KM and 1A4A (Sovereign Military Order of Malta, SMOM), so we can probably expect to see those DXCC countries active again this summer.

On April 6th the **RSGB Contest Committee** held their first 70MHz contest of the year. This always creates welcome all-mode activity during the short 3-hour event held between 0900-1200UTC. A number of contest operators were active from the extremities of the UK that included the stations of G4ADV/P operating from Cornwall (as seen in the photographs, **Figs 1** and **2**, G4RFR from Dorset, GD0EMG on the Isle of Man and GM0USI and GM4FAM in Scotland. Over in North Wales the station of **Ron Price GW4EVX/P** operated from a portable site in Denbighshire. He used a 3-element Yagi for c.w. and s.s.b. contacts and a 5λ/8 wavelength vertical antenna for f.m. contacts.

A total of 22 contest QSOs were made by GW4EVX/P, 13 on s.s.b. and 9 on f.m. with stations in nine locator squares. His longest distance contact on s.s.b. was GM4JTJ (Angus IO86) at 383km and on f.m. the station of G0RXT (Derbyshire IO93) at a respectful 128km. Ron mentions that he nearly made a GM hat-trick by working GM4JR (Dumfries IO85) and GM4JTJ but just failed to work GM0USI whose signal faded into the noise just at the wrong time!

Being active during a contest is a great way of picking up new locator squares and countries. The next 70MHz contests in the RSGB calendar are during v.h.f. National Field Day between 0800-1400UTC on Sunday July 6th and the 70MHz UK activity contest between 1900-2130UTC on Tuesday July 26th. There will be activity on all modes and with a bit of luck there might even be a Sp-E opening during these events! So why not think about giving it a go?

If any readers are on during a Sp-E opening, then I suggested that a look out is kept for the J5FOUR beacon (Guinea Bissau IK21). It's now operating on 70.010MHz, running 20W into a 4-element Yagi pointed towards Europe. Although it's over 4500km away there's still a very good chance of it being heard in the UK at some time during the summer.

An auroral back-scatter opening was reported on the 70MHz band around 1630UTC on April 23rd. The Scottish stations of GM4FAM (Inverness IO77) and GM4VVX (Inverness IO78) reported making tone 'A' contacts with the stations of EI7IX (IO53), G0UWK (IO83) and G3JHM (IO91) but little else was reported at this time.

The 144MHz Band

Clive O'Hennessy GM4VVX mentioned that there was much more activity on the 144MHz band during the aurora on April 23rd. He was QRV between 1550-1800UTC and made a number of c.w. and s.s.b. contacts that included the stations of OH1ND (Finland KP00) at 1511km, EI2IP (IO61), PE1AHX (JO21), PA2RU (JO32), GM6HGF (IO75), G3JHM (IO91) and G7RAU (IO90). There's not very much auroral activity at the present time but it will definitely increase as we head towards solar maximum in a few years time.

Tropospheric conditions during April were not particularly good on the 144 and 430MHz bands. There was a small enhancement during the period April 25th-26th for UK stations located in southern England and Wales that allowed s.s.b. contacts to be made into Germany, southern France and northern Spain but nothing of any great distance was worked. Amongst the 144MHz stations contacted were DF0WD (JO42), DK1FG (JN59), EA1MX (IN73), EA1UU (IN83), F0EUA (JN16), F0FEK (JN19), F0FHU (JN06), F5ADT (IN94) and F6GPT (IN94).

There was much more DX activity to be found on the meteor scatter frequencies around 144.370MHz, especially during the Lyrids shower that occurred around April 15th -28th. Many FSK441 contacts were made from the UK that included the stations of HA5CRX (Hungary JN97), HA8AR (KN06), SP2JYR (Poland JO92), SP2MKO (JO93), UX5UL/P (Ukraine KN04), YL2GJW (Latvia KO06), YL3GDR (KO26), YT3I (Serbia KN05), YU1IO (KN04) and YU2DX (KN04).

Another station active on the v.h.f. bands during the period was GS3PYE/P operating from the Isle of Mull (IO76). The station was manned by members of "**Camb-Hams**", the social side of the **Cambridgeshire Repeater Group** that was originally formed from the old **Pye Telecoms Radio Club**. The group had equipment for the 50MHz band consisting of a Yaesu FT-897D transceiver and a 5-element F9FT Yagi, and for the 70MHz band with a Yaesu FT847 transceiver and a 4-element Jaybeam Yagi and the 144MHz band operations were provided for with an Icom IC-910H transceiver and a 17-element F9FT Yagi, all mounted on a 10M tall trailer tower. In total 45 QSOs were made on 50 and 70MHz bands using s.s.b. and JT6M and 55 QSOs on the 144MHz band using s.s.b. and FSK441 modulation.

Sporadic-E Season

I mentioned last month that during the summer months between May and August the ionospheric E-layer occasionally becomes 'charged' up. Patches or clouds of ionised metals sporadically form, creating a reflecting 'mirror' at a height of approximately 100km. Signals, often in excess of 150MHz, can be reflected off these clouds to create spectacular openings on the v.h.f. bands. Within seconds, a band that was previously 'dead' will become very much alive. On the 50MHz band it's normal to find one-hop signals on an almost daily basis from stations over 2000km away.

Note: The 70MHz band will also be open on many occasions but 4m operators need to be aware that many European countries have different band allocations from those in the UK.

The number of openings on the 144MHz band will be much less than on lower frequencies but the skip distance will generally be the same. On that band most openings (but not all) will lie somewhere between east and south of the UK so, if the beam is directed on a great-circle heading of 140°, it won't be far out from much of the action.

However, we should always be aware that openings can be in totally different directions – especially on the 50MHz band. Some spectacular DX can be worked on the 144MHz band via double-hop modes and contacts in excess of 3000km have been made many times by UK stations.

Statistically the best times to listen on the 144MHz band will be between 1100-1300UTC and 1700-2000UTC. Openings can last literally from tens of seconds to one or two hours but often the opening will be 10-20 minutes in duration giving us sufficient time to point the antennas in the correct direction.

The Deadlines

That's it for this month. Keep a particular look out for Sporadic-E openings on the 50MHz, 70MHz and 144MHz as they could be happening right now! And please don't forget to send me your DX reports or any other news to reach me before the last Saturday of the month.

73 David G4ASR

Roger Cooke's

morse mode

Roger Cooke G3LDI has some interesting feedback from his last Morse Mode!

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If *Morse Mode* (*MM*) readers have been following my advice, they should now be at the moaning stage, whereby it is normal to start complaining that not much progress with their own Morse has been made! However, I did warn readers that there would be no instant gratification, no 'overnight magic' that suddenly enables everyone to send and receive at 30wpm.!

Don't worry about the problem, it's quite normal! Just carry on with the practice, because it's practice that will bring success in time.

Those *MM* readers who have made progress with both receiving and sending with a straight key, then do have a go in the **Radio Society of Great Britain's** Club Cumulative CW (Morse) tests each month. There's also a slow speed (QRS) Corral at the top end of the c.w. band and most good operators will slow down for you to give you some experience.

I usually look at the QRS Corral for some of the slower participants, but I must admit that there haven't been too many. To the many high speed (QRQ) operators, I would appeal to some of them to look for some of the beginners and slow down to their speed!

Positive Feedback!

Again, this month the feedback to *MM* has been positive! One item came from **James Flint G0SDB**, who was a Marconi Marine Radio Officer. James downloaded a program called *JustLearnMorse*. This is written by **Sigurd Stenersen LB3KB** and is available at **http://justlearnmorsecode.com**

I have not used this program myself, but James mentions that he found two errors in it. One of these is the code for parenthesis. However, I've been licenced for 51 years now and have never in those entire years ever used parenthesis, nor have I heard it being used! Perhaps punctuation is more widely used in professional circles, but for Amateur Radio use, I normally only teach the period (full stop), comma, slash, break, and question mark.

Fig. 1: A key, said to have come from a ship that ran aground on the reef at San Andres Island in the West Indies a long time ago.

Fig. 2: Documentary evidence (?) purporting to show that Roger G3LDI has been in radio much longer than he admits to!

The other error James mentioned concerned prosigns, which are two letters that are sent without a space. I've also had my doubts on both those mentioned here, KN and CL. I have seen those listed as prosigns in most code listings. Radio Amateurs normally send them as two separate characters. I think they sound better that way, have always used them and teach them that way too. Most experienced c.w. active Amateur operators send them as separate letters. But I would be interested to hear what *MM* readers think.

Another *MM* reader **Erik Sjolund SMØAGD**, contacted me on seeing the picture of my old straight Morse key. He has an old key, which was given to him some years ago at San Andres Island in the West Indies shown in **Fig 1.** The owner said it came from a ship which ran up on a reef near the island a long time before. Printed on the brass plate is: **ELLIOT BROTHERS (LONDON) LIMITED**. I searched this name on the Internet (Google search brings up many references and websites!) and came up with some fascinating information. They have been making Morse keys for years. Have a read if you get a chance. There is quite a bit of interesting information on several related sites.

Volunteer For GB2CW

This month saw my first GB2CW volunteer as a result of my issuing my normal progress report as a bulletin on the Packet Network. It was from **Rodge Beavis-Jones G6XCJ**, who is now transmitting on 3.550MHz each evening from 1930 until 2000 p.m. local time. Thank you Rodge! Have a listen and do call in as life can be lonely as a Morse volunteer sometimes. We could use more however, so please feel free to contact me via E-mail to **g3ldi@yahoo.co.uk**

Two major c.w. contests are coming up in July. Even if some *MM* readers don't feel confident enough to take part, I ask them to have a listen and use the time as practice, so see how many calls can be read. The first one is on Saturday 1200 - Sunday 1200, July 12th/13th and is the IARU HF World Championship. The second is the RSGB IOTA (Islands On The Air) contest. This takes place on 26th-27th July, Saturday 1200 - Sunday 1200. See how many Islands can be collected, even from the listening-only mode. The practice will be extremely useful!

As a parting shot for this month, a 'friend' of mine, **Steve Nichols G0KYA** produced a picture at his recent Club talk to prove just how many years I've been operating c.w.! It's a picture of me with Marconi and Kemp in (I don't even remember the event!). **Fig 2.**
73 and May the Morse be with you!

Roger G3LDI

Colin Redwood's

what next?

Colin Redwood G6MXL chats about temporary antennas and offers a challenge!

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Talking to many Radio Amateurs over the years, I keep hearing stories from those who have bought expensive transceivers but have been disappointed with the results when they have been on the air. "I don't seem to be getting out", is a phrase I keep hearing.

For some, I suspect their disappointment is due to finding that there is no propagation at the time that they are trying to operate on the band in question. In many other cases, it becomes clear that the antenna system they are using is letting them down.

There's certainly no shortage of books and articles published about antennas. Despite this, I have a feeling that some Amateurs get quite confused and perplexed about the subject and seem strangely reluctant to experiment.

Perhaps it's a case of too much theory and not enough practical information! On the other hand, it's a desire to find the 'perfect antenna'?

In reality the perfect antenna simply **doesn't exist** – and we won't make contacts without an antenna. Hopefully then, this edition of *What Next? (WN?)* will go some way towards helping readers find the antenna they need, so let's get on and try out some simple antennas so that we can get on the air and make some contacts!

Absolute Basics

Over the next few months I'm going to explore some of the absolute basics for an effective antenna system and show *WN?* readers some practical experiments that they can carry out to prove how important these basic characteristics are. However, In doing so, I'm really intending to encourage our readers to experiment with antennas!

As I've briefly mentioned, there's no such thing as 'the best antenna'. So much depends on the location, the size of your plot, the type of soil, the band, what sort of contacts are needed and so on. Nevertheless there is one basic characteristic of an effective antenna system that I feel overrides all others, namely that the antenna should be resonant on the band it's planned to operate on.

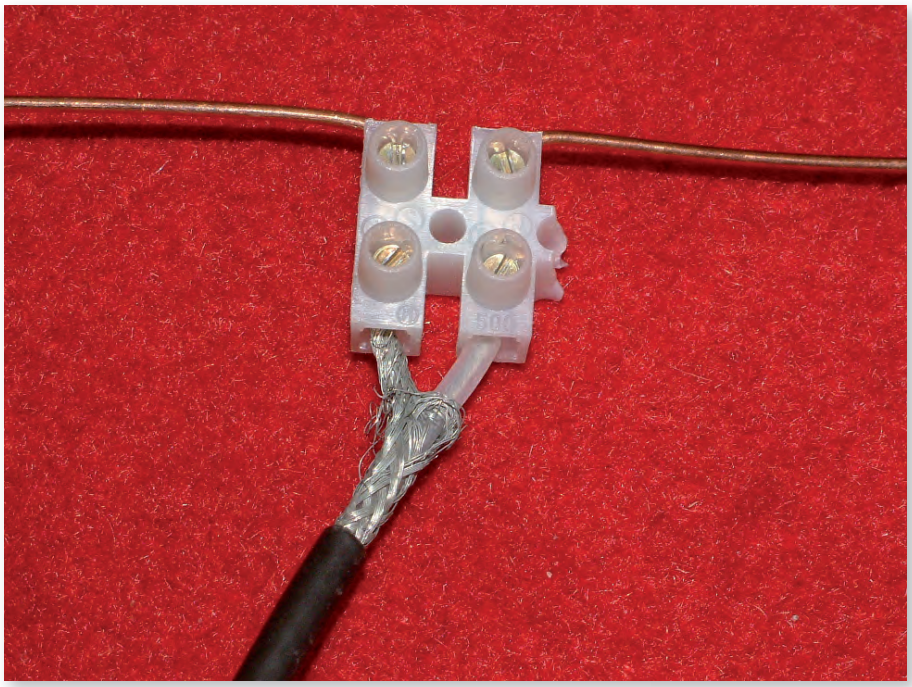
What do I mean by a resonant antenna? Very simply, the answer is that the antenna should be of the correct dimensions for the wavelength and hence frequency of the radio wave being transmitted or received. Please don't take my word for this! Instead, why not join me in conducting a simple experiment and see if the results agree with my statement about resonant antennas. We'll start by building two dipole antennas.

The first antenna will be cut for the 21MHz (15m) band, the second for the 14MHz (20m) band. **Note:** I'm assuming that the experimental antennas will be temporary in nature – and we'll look at more permanent installations on another occasion.

Most of us will know that the overall length of a dipole is $\lambda/2$ (half a wavelength. the upside down 'y' is called lambda and represents wavelength). The dimensions below are for the single sideband (s.s.b.) parts of the respective bands. Incidentally, I've taken the dimensions from **John Heys G3BDQ**'s excellent *Practical Wire Antennas* book published by the **Radio Society of Great Britain**, and of course, readers will recognise John's name as a regular *Antenna Workshop* author.

For the 21MHz (15m) band we need a piece of wire 6.71m (21feet 11inches) long. Add 60mm to the overall dimension for the c.w. section of the band. Cut the wire exactly in half (i.e. 3.36m for the s.s.b. part of the 21MHz band) and attach each half to a dipole centre (see picture).

For the 14MHz (20m) band we need a piece of wire 10.03m (32 feet 10inches) long. Add 110mm to the overall dimension for the c.w. part of



For a temporary testing phase a simple dipole centre can be made up from a two-section piece of a 'choc-block' connector. Note the better quality screening of the coaxial cable used.

the band. Cut the wire exactly in half (i.e. 5.02m for the s.s.b. part of the 14MHz band) and attach each half to a dipole centre (see picture).

Any reasonably strong wire will do – it doesn't need to be anything special for this experiment. At the 'free' ends, tie the ends of the wires to insulators and attach the other ends of the insulators to some string or rope.

There are two types of dipole centre available, one of which is 'hard-wired' so that no connectors are required and is therefore lighter. This is best suited to balanced feeder. The other, which is more expensive, has a SO239 socket which enables easier changing of coaxial feeder, etc. I prefer the latter as I find it easier to make a waterproof connection with it but it does add some weight, so they may not be so suitable for installations where the centre is not supported.

Either type of dipole centre will serve the purpose for this experiment. Alternatively for a really temporary arrangement you could use a choc-block type of terminal connector.

If twin feeder is preferred, attach the feeder to the dipole centre, attach one 'leg' of the dipole to one of the two wires making up the twin feeder. Then attach the other 'leg' of the dipole to the other wire that makes up the twin feeder.

If twin feeder isn't available, then 50Ω (or even 75Ω) coaxial cable can be used to feed the dipole. I'm sure that most new Amateurs will remember from their training courses that a balun should be used when connecting unbalanced coaxial feeder to a balanced antenna such as a dipole. Not to worry though – it's easy to make a choke balun by making a few turns of the feeder into a loop (see photo).

Erecting The Antennas

Next, we'll be ready to start erecting the antennas. Firstly, we'll put up the 21MHz dipole. **Note:** Do whatever possible to get the antenna up in the air as high up as can be managed. A top floor window at one end and a washing line pole or tree at the other will do nicely!

Then connect the feeder to the antenna (via the balun if coaxial feeder is being used) to the transceiver via an antenna tuning unit (a.t.u.). Back in the shack, while switched to low power, use the a.t.u. to match the 21MHz antenna as the lowest standing wave ratio (s.w.r.) reading as possible on the 14MHz band. As the antenna is not resonant on this band, it may be it rather more difficult than usual to get a good match. **Note:** Please be careful not to damage the transmitter (while switched to low power!) if it's not possible to get the s.w.r. below 3:1.

Made from plastic now, rather than from porcelain as used to be the case, this antenna end-insulator has two holes set at right-angles to one another. This type of end-insulator is often called an 'egg-insulator'.

Band Open!

During the summer, even at close to sunspot minimum, the 14MHz band should be open on many days from late morning until well into the afternoon at least. When the band is open, try to spend an hour trying to make some contacts on 14MHz using the 21MHz dipole. Use c.w. or s.s.b., whichever is preferred.

Try to exchange 'meaningful' signal reports with any stations worked on the air. Although maintaining a log is not mandatory these days, I'd suggest that all contacts made during the experiment **are logged**. Additionally, it helpful in the long run to make a note of the contacts made, (where the stations are and the reports sent and received).

Next take down the 21MHz dipole, and replace it with the 14MHz dipole at the same height, location and fed with same feeder. Use the a.t.u. to match the antenna and try to make some contacts on the 14MHz band using the 14MHz dipole. Again make a note of the number of contacts you have make, where the stations are and the reports you send and receive.

Personally, I think it would be a good idea to repeat the tests a few times, perhaps varying the sequence. This is an ideal way to prove that the results are due to the antennas and not due to changes in propagation or generous signal reports.

Colin's Expectations

My expectations are that readers joining in with the experiments will find that although they can probably hear about the same number of stations on the 21MHz antenna as the 14MHz antenna, they'll have made fewer contacts with generally lower signal reports on the 21MHz antenna than the 14MHz antenna.

Whilst using the 21MHz antenna it's likely that participating readers will have found themselves calling other stations and the other station not 'coming back'. Additionally, if they found themselves in a bit of a 'pile up', then they probably didn't crack it! Switching to the 14MHz antenna, my expectations are, that the reverse will happen. More contacts, better signal reports, stations coming back to the call and the cracking of more pile-ups!

If readers conduct these tests, I'd be pleased if they would send me the results (contact details in the end of this article). I'll then include them

in a future *WN?* article, so that we can all see the results and see if my predictions were correct and then we can draw our conclusions! Please try to get your results to me by the end of August.

If it's decided not to erect one of these antennas on a more permanent basis, I suggest that they are clearly labelled, so that it can be used for a temporary antenna, perhaps for a contest or holiday use in the future. I suggest this because in a few months time, it's easy forget which band that length of wire was resonant on!

Next month I'll look at the importance of height and demonstrate the impact of feeder loss at u.h.f.

Don't forget that when antennas are being worked on, please remember to carry out the work safely. It's certainly necessary to have someone else to hold any ladders while anyone is aloft using. Additionally, I recommend that everyone reads through the safety sections of the Foundation, Intermediate and Advanced Licence courses – we certainly don't want to lose any *WN?* readers! ●

Shopping List for the 21MHz and 14MHz dipoles

Wire for the dipoles
Dipole centres or 'choc block' terminal connectors (one for each band)
4 x insulators (two for each band)
String or rope (length according to local conditions)
Feeder – long enough to go from dipole centre to a.t.u. /transceiver with at least 1m to spare to make a balun if needed
Connectors to suite dipole centre (if needed) and a.t.u.

Most items should be available from amateur radio shops or from **W. H Westlake**. The string or rope should be available from a DIY store.

This picture should make it apparent how to use the egg-insulator at the ends of a dipole. In reality, this rope would become a little less effective as an insulator in wet weather, due to water retention. A polypropylene rope would be rather better.

An effective choke-balun for the higher h.f. bands can be made in coaxial feeder, simply by creating a five or six turn loop of about 100-150mm in diameter. To make an effective choke-balun for the lower h.f. bands, use 10-12 turns with the same diameter range.

Colin's waiting to hear from You!
I like to solve problems with anything to do with amateur radio! I can answer questions and publish my findings here for the benefit of all *PW* readers.

Remember the mains supply is potentially lethal. Unless you really know what you are doing, always pull the mains plug out, do not just switch off at the wall socket, when working on equipment.

Carl Mason's

hf highlights

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

I was rather pleased when the time came to put this month's column together as it allowed me to take a well earned break from building duties as I put together a new shack in the corner of a my spare bedroom. Although the equipment is much the same as before (FT-817, QRP Plus and SGC-2020 etc) my antenna will be different from the full size G5RV I have used previously.

Space is limited here and the garden is small but I do want to try and operate on as many bands as possible, so for the moment that will also mean QRP power levels, which is no bad thing. Due to local planning constraints I'll have to be very careful what I choose and it really needs to be as near invisible (to my neighbours) as I can make it!

Stealth is the name of the game here and if any reader has any suggestions for something suitable, either outside or possibly installed in the loft space, I would be interested to hear from readers. I will, of course, report back on the results once I've decided on the design and it's installed.

The DX News

On to this month's DX news and to Tajikistan, or as it's officially known the Republic of Tajikistan, which is a mountainous landlocked country in Central Asia with Afghanistan on its border to the south, Uzbekistan to the west, Kyrgyzstan to the north and the People's Republic of China to the east. It's from here that **Jean-Bernard F4EOH** will be active from Dushanbe as **EY8/F4EOH** until August 31st using s.s.b. on 14MHz. The QSL route will be given via the operator's instructions during the QSO.

After his island tour last year **Gianfranco Gervasi I6GFX** will be operating in Croatia once again and active on the h.f. bands as **9A/I6GFX** from the Croatian IOTA group EU-170 between the June 21st and 27th. The main QTH will be Verunic on Dugi Otok (Islands of Croatia Award CI-018) though Gianfrancco also plans to go and operate from several nearby islands including Baricevac (CI-659 a new one), Brscak (CI-299), Lagnici (CI-419), Luski (CI-304), Magarcic (CI-305), Mezanj (CI-307), Planatak Veli (CI-308), Rava (CI-099), Silo (CI-406), Utra (CI-298) and Zverinac (CI-150) but this will depend on the weather and being able to land. A QSL is good via the bureau or direct to **Via Tiraboschi, 16, 60131 Ancona An, Italy**. Online logs will be available at **www.gianfrancogervasi.it/search.html**

Readers of this *HF Highlights* (*HFHL*) column might also like to keep a look out for **Bernd Westphal DL8AAV** who will operate in Sweden and activate Tjorn Island EU-043 as **SD1B/6** between June 15th and 20th. He's expected to operate on most h.f. bands on or near the usual island/IOTA calling frequencies and a QSL is good via the bureau or direct to Meerdorfer Str. 7, 31224 Peine, Germany.

Special Callsigns

There are plenty of special callsigns being aired this month but only just enough space to mention a few. The first is **PY100JA,** which will be aired on all h.f. bands until the end of December to commemorate the 100th anniversary of the first Japanese immigration into Brazil. A QSL card will be available after September via PY2PA through the bureau or direct to **Jac Rocha, Avenida Dr. Francisco Paula V. Azevedo, 394, 05325-180, São Paulo, SP Brazil**.

The second callsign **4D75D** is the special anniversary call given to **Noel 'Ram' Idris DV8AIK**, a Philippine Radio Amateur who is a member and External Vice President of the Southern Philippines Amateur Radio Club Incorporated (SPARC 8 INC.). The call marks 75 years of the Philippine Amateur Radio Association (PARA) founded in 1932. This Diamond Anniversary callsign will be aired from Mindanao Island OC-130 on most bands until December 2008. Operation will be using s.s.b. on the 14 and 21MHz bands and readers can QSL direct to him at **26 P. Reyes Street, Zamboanga City, Phillipines**.

Finally, in Europe, Switzerland and Austria will jointly be hosting the UEFA Euro 2008 Football Championships at four different venues until the 29th June. A large number of special callsigns in the **HB2008AA-ZZ** and **OE2008AAA-ZZZ** series will be heard on the h.f. bands from the two countries and *HFHL* readers can QSL all callsigns via HB9DTE.

The two IARU societies, the **Union of Swiss Short Wave Amateurs** (USKA) and the **Austrian Radio League** (OEVSV) are sponsors of the 'Euro 2008 Award' and readers can apply after working a set number of special event stations, 10 (5x OE and 5x HB) for the Bronze award, 14 (7x HB and

OL30SPACE QSL worked by Steve M3SXA on 7MHz PSK31.

YT5G QSL worked by Martin M3VAM on 7MHz s.s.b.

EE7E QSL worked by Martin M3VAM on 14MHz s.s.b.

Carl Mason GW0VSW
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Jason Woodman M1PRO operating portable (Readers Reports14MHz)

7x OE) for the Silver award and 20 (10 x HB and 10 x OE) for the Gold award. Either s.s.b., c.w. or digital modes or a mixture of the three can be used. Full information can be found at **http://eurodiplom2008.oevsv.at** that also includes an example of the rather nice award.

Updates On QSL Manager

After many years **Carl McDaniel W3HC** is retiring as a QSL manager and his logbooks and all cards have been acquired by the QSL Managers' Society **www.qsl.net/qslmanagers/** All callsigns will now be assigned to new managers as soon as possible. However, as everyone will appreciate this could take a while! The new QSL route for the following callsigns, 7X5VRK, CO6AP, PY2KC, PS2T, PT5T, TU2XZ, YL2EC and ZY100S is via **Steven Larson N3SL**. Steven is already the manager for GM4YXI, 9M2/GM4YXI, GM3WOJ, GS2MP, 2S2MP, HH2PK, 4V2PK, 4V4H, VY1JA, KL7J (direct only to N3SL. No bureau cards), ZL1CT, ZL1V, CT9P, CT9X, V73CS and VK4UC. Please visit **www.qsl.net/n3sl/manager.htm** for on-line log checking of these calls. Those readers who have already sent a QSL via W3HC **don't need to resend their cards** as these will be forwarded to the new manager, while others are asked to please be patient and wait until all the new routes are announced.

Reader Reports

On to our reader reports now and it's the 1.8MHz log of Leighton **Smart GW0LBI** in Trelewis, Mid Glamorgan that starts us off. The band "was remarkably good for a change". according to Leighton who used 5W QRP to bag UX1UA (Ukraine) and 4O/YU1YV (Montenegro) before dropping his output to 1W to work R3ANT (European Russia) and DL1EV/P (Germany) on c.w.

At 5W again but this time Leighton was using s.s.b. and worked CN3A (Morocco), 9A2DQ (Croatia), SN3R (Poland), S56P (Slovenia), OG2P (Finland), HB10DX (Switzerland) and RW2F (Kaliningrad) and DR1A (Germany). All made his log around 2200UTC.

Turning up the power to 100W and using c.w., stations worked by Leighton included 9M2AX (West Malaysia), K1XM (USA) in Hudson, Massachusetts, 5B/LZ2HM (Cyprus) AS-004, and three new DXCC countries on the band, PJ5NA (Netherlands Antilles) on St. Eustatious Island SA-006, 5T5DC (Mauritania) and P43JB (Aruba) SA-036. All were worked between 2100 and 0100UTC using his Yaesu FT-100 and 61m (200ft) inverted 'L' wire antenna.

Also on the band was **Ted Trowell G2HKU** on the Isle of Sheppey in Kent, who used 'the key' once again and his Ten-Tec OMNI V at 70W and G5RV finding just one station MJ/K8PT (Jersey) EU-013 at 2200UTC.

The 7 & 10MHz Bands

On to the 7MHz band now and trying QRP was **Eric Masters G0KRT** in Worcester Park, Surrey, who used his Kenwood TS-570DG and 5W c.w. into a modified W3EDP antenna finding F6CRP (France) at 1017UTC.

Martyn Medcalf M3VAM in Chelmsford, Essex, spent some time on 7MHz and lists s.s.b. calls SQ2J (Poland) at 0948 followed later by IK8UND (Italy) 1349, DF2GN/P (Germany) 1506, YT5G (Serbia) 2015 and EA5DV (Spain) at 2241UTC using his usual Icom IC-746, SGC-237 auto tuner into a half-size G5RV.

In Athens, Greece **Panos Dadis SV1GRN** used his Icom IC-756 PROIII and long wire antenna to work s.s.b. stations I1ASP/P (Italy) 0650, E74EE (Bosnia-Herzegovina) 1725 for a new prefix, 4Z4DX (Israel) 1810, SP75T (Poland) 1856 celebrating the 75th Anniversary of the SP DX Contest QSL via SP7DQR. Panos then worked CT2JMR (Portugal) 1921, YO2MHD (Romania) 1943, 7X5VRK (Algeria) 1948 from Bou Saada Radio Club, UN7AD (Kazakhstan) 2026, RN3ZDD (European Russia) 2128, LY90Q (Lithuania) 2032 celebrating the 90th Anniversary of the Lithuanian Republic (QSL via LY4Q) and finally, US5QPF (Ukraine) at 2040UTC.

On 10MHz **Steve Pursey M3SXA** enjoyed operating some PSK using

K0RU QSL worked by Ted Trowell G2HKU on 14MHz c.w.

TB37F QSL worked by Martin Addison 2E0MCA on 14MHz s.s.b.

9A/I6GFX QSL for last years Croatian Island activity by Gianfranco Gervasi I6GFX (DX News).

an Icom IC-756 PROIII, SGC Smart Tuner and Signalink USB with MixW software and lists SP7AWG (Poland) 1004 and OK1DIB (Czech Republic) at 1012 using BPSK63 while EA5/DJ1MH (Spain) 0846, 9A4RC (Croatia) 0929, HA1ZW (Hungary) 1012, DD8HB (Germany), 1026, OE3EPW (Austria) 1027, OM8LA (Slovakia) 1518, LA6LPA (Norway) 1706, UW2ZM (Ukraine) 1727, IZ0BAK (Italy) 1840 and ES3BR (Estonia) 1841 followed using PSK31.

The c.w. of Ted G2HKU found DL2RVL/HI8 (Dominican Republic) NA-096, EA9EU (Ceuta & Melilla), 5T5DC (Mauritania) and EA6EU (Balearic Islands) EU-004 all around 2100UTC.

The 14MHz Band

The 14MHz band provided new reporter **Jason Woodman M1PRO** in Twickenham, Middlesex, with some interesting results as he enjoyed a weekend operating 'portable' from a location near Stokenchurch, Buckingham. Using a Yaesu FT-857D and 100W to a Sandpiper rotary dipole Jason lists s.s.b. contacts with EW7EW (Belarus) 1101, OG6N (Finland) 1107, TF3AO (Iceland) EU-021 at 1133, JO7CVU (Japan) in Sendai City, Miyagi for his best DX at 1237, YT1JN (Serbia) 1252 and 9A/S56WBV/MM who did not give his exact location at 1258UTC. It just goes to show what can be achieved with modest equipment if you are prepared to go out and try!

In East Finchley, in North London **Martin Addison 2E0MCA** made a good number of voice contacts here including HA605NF (Hungary) 1044 a special callsign for 80 years of the Hungarian Radio Society (QSL via HA6NF), SV8/DL8MCA (Greece) on Skiathos EU-072 at 1127, E73AD, (Bosnia-Herzegovina) 1129, SY8JZ (Greece) at 1153 on Samothraki Island EU-074, 4Z4QQ (Israel) 1204, LY1YE (Bulgaria) 1222, TB37F (Turkey) 1257 (QSL via LZ1NK). Then Martin worked WX3B (USA) 1448 Jim in Taneytown, Maryland, RV3ACA/TF (Iceland) EU-021 at 1513, F6GWP (France) 1514, RK1G (European Russia) 1606, Z38C (Macedonia) 1614, IZ7DOK (Italy) 1711, and CN8ZG (Morocco) at. 1729. next in the log was EH7SSM (Spain)1825, a special Call for Malaga's Holy Week (QSL via EA7URN) and VO1CRM (Canada) at 2110UTC using a Yaesu FT-2000 with Heil headset and up to 50W output to a half size G5RV.

Upping his power to 100W s.s.b. Eric G0KRT worked 3V8BB (Tunisia) 1414, C4N (Cyprus) AS-004 at 1419 and A42WT (Bhutan) at 1850UTC. Meanwhile the PSK of Steve M3SXA found UA9TK (Asiatic Russia) 0824, RW3DQC (European Russia) 1139, UT0IV (Ukraine) 1637, SV1LJU (Greece) 1707, RD3FW (Uzbekistan) 1756 and IS0IQZ (Sardinia) EU-024 at 1804UTC.

Back in Chelmsford, Martin M3VAM managed s.s.b. QSOs with CN2R (Morocco) 0906 QSL via W7EJ, US0LW (Ukraine) 0927, S52OW (Slovenia) 0932, LA9LMA (Norway) 0942, R3K (European Russia) 0942, EE7E (Spain) 1043 the contest call for EC7ABV, CQ3T (MaMartyndeira Island) AF-014 at 1051, EC5KB (Spain) 1243, OH6LXI (Finland) 1319YP9W (Romania) Martyn1347 and HA806NF (Hungary) at 1647UTC.

Incidentally, The Hungarian Radio Amateur Society commemorates the 80th anniversary of the foundation of the first Hungarian radio amateur organisation this year. Radio Amateurs in that country may use special callsigns by adding 80 after their prefix until 31st December. An award is available and further information can be found at **www.mrasz.hu/english/diplomak/mrasz80.htm**

Using the 'key' once again was Ted G2HKU who lists VP5/W5CW (Turks & Caicos Islands) NA-022 at 1200, YK9G (Syria) at 1600, 5T5DC (Mauritania), K0RU (USA) in Gardner, Kansas. Next came 7X7AN (Algeria), 4Z5AD/6O (Somalia), HZ1RN (Saudi Arabia), HI3AB Dominican republic), TI8/DL4MO (Costa Rica) and PJ4LS (Netherland Antilles) SA-006 between 1700 and 2100UTC.

The 18 & 21MHz Bands

On to the 18MHz band next and the c.w. of Ted G2HKU, which found 5T5DC (Mauritania) at 1200 and V25OP (Antigua) NA-100 around 1500UTC QSL via W9OP. Meanwhile operating from Greece Panos SV1GRN managed a few s.s.b. contacts including 5N8NDP (Nigeria) 0942 QSL via IK5JAN, ZD7X (St. Helena) AF-022 at 1044, 9K2HS (Kuwait) 1140 and CT2JMR (Portugal) once again at 1255UTC.

The 28MHz Band

The 28MHz band seems to have been in poor shape for a while and there was just one report and that was from Panos SV1GRN who managed to find Z31BC (Zimbabwe) using s.s.b. at 1052UTC. (Well done Panos!)

Signing Off

Well, that's just about it for another month and a busy one it has been, especially on the lower h.f. bands! There have been one or two openings occurring during the day on 21MHz and higher so it's worth you listening around on what might at first seem to be a dead band. I also suggest putting out a few CQ calls!

Once again my thanks to all our reporters for their logbooks and to Mauro Pregliasco I1JQJ/KB2TJM editor of the *425 DX Newsletter* for all the DX information. Finally, can I please remind everyone to use my 'new' E-mail address (given at the end of the column) for any reports or correspondence as my old one is now no longer in use. Until next time I wish you all good DX.

73, Carl GW0VSW

TRADERS TABLE

The equipment for sale on this page is secondhand or ex-demonstration

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Garmin GPS-II plus 12Ch. 500 Waypoints,BackTrack £79
Icom IC-R10 500kHz-1300MHz All Mode Hand Held Receiver 1000Ch. + RS-232.....£149
Icom IC-2000H 2m FM Mobile Transceiver 50W, 10W + Alphanumeric Memories.....£119
Uniden UBC-60XLT 66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells.....£55
Diamond SX-600 1.8-525MHz 200W SWR,PWR meter + 2 sensors.....£99
Tokyo HX-240 HF Transverter 3.5-28MHz with 2m IF 40W £125
LDG AT-1000 1.8-54MHz Automatic ATU 6-800 ohm 1000W max (100W 6m) with X-Needle Meter 12V at 1A.....£279
Yupiteru MVT-7300EU 521kHz-1320MHz All Mode Hand Held Receiver 1000Ch. + 8.33kHz step.....£139
Radio Shack Pro-528 25-1300MHz (with gaps) AM,FM Hand Held Receiver + Trunk Traking 1000Ch.Alpha & PC input.....£69
Optoelectronics M-1 10Hz-2.4GHz Frequency Counter + AC Adapter.....£119
Icom IC-R10 500kHz-1300MHz All Mode Hand Held Receiver 1000Ch. + RS-232.....£149
Watson W-10SM 12V 10A (max) Switch-Mode PSU £35
Yupiteru MVT-7300EU 521kHz-1320MHz All Mode Hand Held Receiver 1000Ch. + 8.33kHz step.....£139
Yaesu FC-30 1.8-30,50-54MHz Auto ATU for FT-897 100W 17-150ohm.....£179
Zetagi V2 2-Way Antenna Switch £9
SGC SG-235 1.8-30MHz Microprocessor controled ATU 500W with SmartLock pro Controller.....£499
Yaesu FC-30 1.8-30,50-54MHz Auto ATU for FT-897 100W 17-150ohm.....£179
MFJ MFJ-993RC Remote Control Unit for MFJ-993 Auto Tuner..... £25
Yaesu FT-890 HF All Mode Transceiver with Gen.Cov. RX 100W 12V.....£499
MFJ MFJ-1026 All Mode QRM Eliminator with Active Antenna.....£115
M.Modules MML144/30-LS 2m 1-3W in, 30W out Linear with Preamp.....£69
Sony NV-U70T GPS Navigation System + Europe Map Database, Touch Screen, Traffic Info, 1GB memory £199
AOR AR-8000 500kHz-1300MHz All Mode Hand Held Receiver1000Ch.....£149
Palstar R-30 1KHz-30MHz AM, SSB Communications Receiver.....£379
Hi-Mound Manipulator Morse Paddle Key.....£39
Alinco DJ-X2000 100kHz-2150MHz All Mode Hand Held Receiver + CTCSS, Alpha 2000Ch.....£189
MFJ MFJ-956 Shortwave Preselector.....£39
Alinco DJ-X3E 100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step.....£69
MFJ MFJ-202B 1-100MHz Receive Noise Bridge.....£45
MFJ MFJ-212 Antenna Matchmaker to Tune Antennas without Transmitting.....£59
Diamond SX-200 1.8-200MHZ SWR,PWR meter 200W.....£49
Yaesu ATAS-120 7-430MHz 120W Auto Tuning Antenna £179
Revex P-300E 12V 30A (max) Over Volts/Current Protected PSU.....£79
Icom SP-21 Matching Extension Speaker.....£59
Kenwood TS-2000X HF,6m,2m,70cm & 23cm All Mode Transceiver + Auto ATU & DSP.....£1,299
WinRadio WR-G313i 9kHz-30MHz All Mode PCI Internal Computer Controlled Communications Receiver.....£479
WinRadio WR-ADS-Full Advanced Digital Suite Option for G3 series receivers.....£99
Alinco DR-610 2m,70cm FM Mobile Transceiver 50W,35W (Remote Head).....£189
Kenwood PS-50 13.8V 20.5A Matching PSU.....£99
Icom IC-R8500 100kHz-2GHz All Mode Communications

WATERS & STANTON

01702 206835

Receiver 1000ch. 12V + PSU.....£749
Alinco DR-605E 2m,70cm FM Mobile Transceiver 50W,35W + CTCSS.....£149
Kenwood IF-232C RS 232 Interface for Kenwood transceivers.....£59
Kenwood TH-G71E 2m,70cm FM Palm Held Transceiver with CTCSS & Wide RX.....£119
Microset PT-1012 13.5V 10A (12A max) Stabilized PSU with Cigar Lighter Socket.....£49
Yaesu FP-700 13.5V Matching PSU with Extension Speaker....£89
Yupiteru MVT-3300 66-1000MHz (with gaps) AM,FM Hand Held Receiver 200Ch.....£59
Icom IC-706 II HF,6m,2m All Mode Mobile/Base Transceiver with Gen.Cov. 12V.....£399
West Mountain Radio RB/M8/C RigBlaster 8pin Cable Sound Card Data Interface.....£49
Yaesu FT-726R 2m,70cm + 10m All Mode Base Transceiver 10W Mains.....£399
Alinco DX-70TH HF,6m All Mode Mobile/Base Transceiver with Gen.Cov. & CTCSS 100W (HF & 6m) 12V.....£329
AOR AR-8200 III 530kHz-3GHz All Mode Hand Held Receiver 1000Ch. Alphanumeric.....£259
Kenwood TS-570DG HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP filter 100W 12V.....£599
Yaesu FT-2800M 2m FM Mobile Transceiver 65W + CTCSS & DTMF mic.....£99
Kenwood TS-570D G HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP filter 100W 12V.....£599
Kenwood TS-570D HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP filter 100W 12V.....£569
Icom IC-R8500 100kHz-2GHz All Mode Communications Receiver 1000ch. 12V + PSU.....£749
Kent KTPA Brass Twin Paddle Morse Key on Heavy Metal Base.....£49
Kent KSKA Brass Straight Morse Key on Wood Base £45
Kenwood TM-G707E 2m,70cm FM Mobile Transceiver 50W,35W + Full CTCSS & Remote Head feature.....£149
Watson W-25SM 12V 25A Switch Mode PSU £55
Watson W-10AM 12V Variable Regulated 10A PSU with Meters.....£39
Icom IC-746 HF,6m,2m All Mode Base Transceiver + Auto ATU, Gen.Cov. 12V.....£699
Icom IC-PCR2500 10kHz-3300MHz All Mode PC Controlled Receiver with USB 12V + psu.....£239
MultiCOM PMR-1000TX PMR446 Licence Free 446MHz Base Transceiver 4 x AA (not supplied) with charger.....£39
Realistic Pro-2022 66-960MHz (with gaps) AM,FM Base Mobile Scanner 200Ch.....£59
Yaesu ADMS-2H Programming Software and Serial Cable for FT-8900.....£25
Lowe HF-150 30kHz-30MHz All Mode Base/Portable Receiver 12V + psu.....£199
Target HF-3 Target 0-30MHz 12V Receiver.....£99
Yaesu FRT-7700 150kHz-30MHz Receive ATU for FRG-7700/8800.....£99
Microwave M MML144/100-S 2m 10W in, 100W out Linear with Preamp.....£99
Uniden UBC-105XLT 25-960MHz (with gaps) AM,FM + 8.33Mhz step 100Ch.....£55
GRE PSR-282 66-512MHz (with gaps) AM, FM Hand Held Receiver + 8.33MHz 200Ch. 4 x AA cells.....£59
GRE PSR-282 66-512MHz (with gaps) AM, FM Hand Held Receiver + 8.33MHz 200Ch. 4 x AA cells.....£59
MFJ MFJ-259 1.8-170MHz Digital SWR Analyser,Resistence£119
Yaesu CT-58 Quadra Lead interface cable for FT-100.....£19
Kenwood MC-50 Electret Desk Microphone.....£59
Daiwa PS-304 II 13.8V Variable 30A PSU with A/V meter £79
Yaesu SP-8 Matching Filtered Speaker 3W, 8ohm + 2 inputs...£89
Linear Amp UK Discovery 6 6m Valve Linear Amplifier 100W in, 1kW out.....£649
Kenwood TS-570D G HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP filter 100W 12V.....£599
Flex Radio SDR-1000-100 PC Controlled HF All Mode Transceiver + Gen Cov RX, DSP filtering, 100W 12V.....£599
Kenwood TS-570D G HF All Mode Base Transceiver with Gen. Cov. + ATU & DSP filter 100W 12V.....£599
MFJ MFJ-948 1.8-30MHz 300W ATU with Balun & Cross-needle Meter.....£75
Icom IC-R2 0.495-1309MHz AM,FM & WFM Hand Held Receiver 450Ch.....£79
Bhi NES10-2 Noise Eliminating Extension Speaker with Audio Out 12V.....£69
Icom IC-U82 70cm FM H/Held Transceiver with CTCSS, DTMF keypad, Ni-CD & charger.....£99
Icom IC-E208 2m,70cm FM Mobile Transceiver 50W,35W + CTCSS, DTMF mic (Remote Head).....£149

RADIOWORLD

01922 414796

IC-7800 Icom HF + 6m Trx.....£4995.00
Tentec Orion II HF transceiver with ATU.....£2795.00
Yaesu FT-2000D 200watts.....£1900.00
IC-756PRO-MKIII Icom HF + 6m Trx £1599.00
Yaesu FT-2000 IN STOCK 100W with internal power supp.....£1550.00
Icom IC-775DSP HF Base Transceiver £1499.00
Yaesu FT-1000 "CLASSIC" HF Transceiver £1399.00
OptoElectronics X Sweeper.....£1199.00
Yaesu FT-1000MP Mark -V Field £1199.00
AOR SR-2000 FFT Frequency Monitor.....£1190.00
Icom IC-756ProII HF / 6m Transceiver.....£1150.00
NEUMANN U 87 Ai condenser microphone.....£1100.00
Icom IC-910HX 2 / 70 /23cms Base.....£1099.00
Kenwood TS-2000 All Mode Multibander Transceiver £999.00
Yaesu FT-920AF HF / 6M Base.....£899.00
IC-7400 HF, 6m & 2m transceiver.....£899.00
Kenwood TS-950SD HF Transceiver.....£899.00
IC-910-HX Dual Band + 23cm Sat Trx.....£893.62
Yaesu FT-990 /AC.....£799.00
Kenwood TS-870S HF Transceiver.....£799.00
TS-480HX.....£799.00
Kenwood TS-790E Dual-Band Base / Mobile Transceiver.....£799.00
Yaesu FT-920.....£799.00
Icom IC-765 HF Base Transceiver.....£799.00
Icom IC-756Pro HF / 6m Transceiver.....£799.00
Yaesu FT-847 HF-6-2-70 Base.....£799.00
Icom IC-746 HF/6m Transceiver.....£799.00
AOR AR-7030+ HF Receiver.....£699.00
Kenwood TS-850S /AT.....£699.00
RANGER-811H Linear Amp UK 800W HF Linear Amplifier.....£699.00
Yaesu FT-736R 6m, 2m & 70cm Base.....£699.00
Icom IC-756.....£699.00
Icom IC-736 HF 6.....£699.00
Kenwood TS-570DG/E.....£675.00
Yaesu FT-736R 2m/70cm Base Multimode £599.00
AOR AR-7030.....£550.00
Icom IC-R7000 Mint Condition.....£550.00
Kenwood TS850S HF.....£550.00
Kenwood TS-690SAT HF -6m Transceiver £549.00
Yaesu FT-897D Multiband Portable Transceiver.....£499.00
Icom IC-706MKIIG.....£499.00
Yaesu FT-900/AT HF Transceiver.....£475.00
AOR AR-8600 Mk2 530kHz-3.000GHz Wide-band Receiver£450.00
Yaesu FTV-1000 200 W Transverter.....£450.00
Icom IC-R7000.....£449.00
Yaesu FT-890AT HF Transceiver.....£425.00
Icom IC-706MkII Mobile Transceiver £425.00
Yaesu FT-857 Mobile Transceiver.....£425.00
AOR AR-3000A Wide Band Receiver.....£425.00
Kenwood TS-440SAT HF Transceiver £399.00
Icom IC-706mk1.....£399.00
Yaesu FR-101 HF RX.....£399.00
Kenwood TS-50.....£399.00
Kenwood TS-680S HF / 6m.....£399.00
Icom IC-R72 Receiver.....£399.00
Yaesu FT-857D Multi-band Mobile £389.00
Icom IC-740 HF Transceiver £389.00
Alinco DX-77E HF Transceiver £379.00
Icom IC-718 HF Transceiver £359.00
Yaesu FT-101ZDmkIII HF Transceiver with FM fitted.....£350.00
AOR AR-3030 HF Rx.....£350.00
IC-R71E HF Receiver.....£349.00
Kenwood TM-255E 2m Mobile £329.00
Trio (Kenwood) TS-830S.....£325.00
Yaesu FT-902DM HF transceiver.....£325.00
A3S Cushcraft 3-Element Tribander.....£300.00
Kenwood TR-751E 2m Multi-mode transceiver.....£299.00
Yaesu FT-840 HF Transceiver £299.00
Yaesu FL-2100B All-mode HF linear amplifier.....£299.00
Trio TS-530SP.....£299.00
LDG AT-1000 Autotuner £299.00
Yaesu FT-726R VHF Base Transceiver £299.00
Yaesu FRG-100 HF Receiver £299.00

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.

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.

G2DYM/G4CFY AERIALS Custom made low noise, low TVI dipoles and trap dipoles. PVC covered stranded wire and 75 ohm feeder properly made-off. Epoxy potted traps. Centre piece and dog-bone insulators included. Spectrum Communications. Tel 01305 262 250. www.spectrumcomms.co.uk

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

Miscellaneous

ALL OLD RADIO EQUIPMENT WANTED Valves, valvetesters, military, domestic, crystal sets, pre-1950's televisions. Tel: 01782 517278.

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
Unit 4, Daux Road, Billingshurst, W. Sussex RH14 9SJ
TEL: 01403 785600. FAX: 01403 785656.
www.langrex.co.uk

Repairs

REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Kent Rigs, 52 Salisbury Road, Chatham, Kent ME4 5NN. Tel: 07903 023437.

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.

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: 0845 803 1979, Fax: 01202 659950.

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:.....

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Telephone No.:.....

Box Number @ 70p: Tick if appropriate ☐

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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 **0845 803 1979**.

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

4m (70MHz) FM TRANSCEIVER key KME-80. 16/32 channels, CTCSS, 15W output, fully programmed and aligned. Complete with speaker/microphone, £45 collected or carriage at cost. Tel: Bob G8VOI 02392 250830 (Waterlooville).

AVO FET TEST SET TT-167, £25. Marconi TF-2002A signal generator, £25.
Soundcraft series 200, 8 channel audio mixer, £100.
Racal 9084 signal generator, £95.
PRC-320 HF radio + accessories, £250.
Tel: Ray G6TSL QTHR 07774 173333 (Ross-on-Wye).

FRG-7 £45. Trio GR-59DS, £40. National HRO, £95. microset 13.5V, 35A power supply, £65. AVO meter, £35. AVO valve tester, £35.
All units must be collected. Ring after 6pm.
Tel: GI0SFT 028 7135 2804 (Londonderry).

ICOM IC-7400 HF/2/6m, mint, boxed, hardly used. Silent key sale, £650. No time wasters.
Tel: 01279 815020 (Essex).

KENWOOD SMC-33 remote control speaker mic. Also, Heatherlight headset mic assembly, £offers.
Tel: John G8BXO 01769 573382 (North Devon).

MURPHY B40 NAVAL RECEIVER good working order on all five bands. 600kHz-30MHz, 115 or 240V. Very heavy. Information on www.portabletubes.co.uk £120.Tel: 01367 718616 (Oxon).

RADCOM volumes 70 to 76 (1994-2000). Clean, good condition, free to collector. Tel: 01892 822836 (Kent).

SECRET WIRELESS WAR by Geoffrey Pidgeon. 370pp fascinating story of radio amateurs involvement monitoring German radio transmissions 1930/40s. Bletchley Park and equipment HROs, AR88s, etc. Price £37.50 plus postage. Perfect condition. Tel: 01745 570538 (Flintshire).

SILENT KEY SALE TS-930S all filters and auto ATU. Full service manual, excellent condition. Buyer collects, £300. Tel: Colin 01634 250427 (North Kent).

YAESU FT-2800 2m FM, £70. Yaesu FT-817 HF, 6,2, & 70cm, SSB filter, £200. Standard C-5800 2m, FM & SSB, £40. Kenwood AT-180 ATU, £50. Kenwood TR-2300 2m FM, £40. Tel: 01677 423349 after 6pm.

YUPITERU MVT-7100 hand-held receiver. Mint condition, boxed, leather case, handbook, PSU, £150 including P&P. Tel: George 01443 437345 (South Wales).

YUPITERU MVT-8000 wideband scanning receiver. Small desktop, 200 memories, 8-1300MHz, no gaps. Wide FM, NFM, AM, battery, mains, six steps like new, £90. Includes post. Tel: Frank 01608 663745 (Warwickshire).

WANTED

1982 CALLBOOK URGENTLY REQUIRED buy or borrow (UK). Charger for Standard C 2m/70cms hand-held transceiver. Will consider buying complete rig and charger if rig okay. Tel: Ray 0777 649 5381 after 6pm please (Dorset).

BC-342 OR BC-312 RX, nice condition. Tel: 01745 570538 (Flintshire).

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, 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 9pm (Sheffield).

VHF AIRBAND RECEIVER Scan DR-600 made by Swinburne Aviation, early 1980's. Tel: George 01443 437345 (Tonypandy).

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

VISA SWITCH AMERICAN EXPRESS MasterCard

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)	

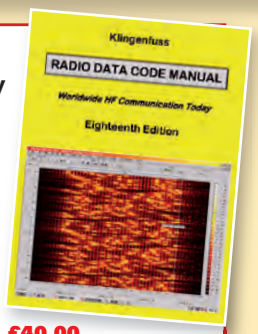
CONTACT DETAILS FOR ADVERT. Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number? Your advert, you decide! **PLEASE - No FAXed Ads!** (12)

B.B. July '08

THE PW PUBLISHING
RADIO BOOKSTORE

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

RADIO DATA CODE MANUAL
Worldwide HF Communication Today



£40.00

NEW IN STOCK NOW

The totally revised new edition has, again, more than 600 pages with 131 new graphics and screenshots.

This is the standard international reference book for COMINT ELINT MASINT SIGINT, and considered indispensable for the identification of really exotic HF radio stations. This manual is used worldwide by intelligence and radio monitoring services for training and operation.

THE UK & IRELAND FLIGHT ROUTES 2008

Early information about this new book suggests it will certainly fill the gap left by the superb, and now out of print, Flight Routings.

NEW IN STOCK NOW

- A5 spiral bound.
- Around 200 airline companies, including charter flights from British and Irish Airports.
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- Selection of overflights between Europe and the Americas.
- Flight numbers both company & ATC (where available).
- The ideal companion for both listeners and RadarBox & SBS users.
- Find where flights originate and terminate.
- Days of flight (frequency of flights).
- Around 250 pages.

£12.95

NEW IN STOCK NOW

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The popular annual guide has been fully revised to include the many changes that have affected registrations of civil aircraft in Britain over the past 12 months and continues to be the most widely respected and authoritative guide to the aircraft on the British register.
Fully comprehensive, the book also includes microlights, balloons, radio frequencies, airline flight codes and much else. Apart from featuring those civil aircraft registered in Britain, the book also includes the registrations of most civil airliners likely to be seen at British airports.

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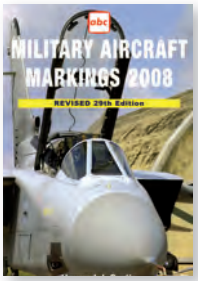
NEW IN STOCK NOW

MILITARY AIRCRAFT MARKINGS 2008



This new edition of abc Military Aircraft Markings has been fully revised to include the many changes that have affected military aircraft serials over the past year. This annual edition covers all the latest developments that have affected military aviation throughout the world and will appeal to all aviation enthusiasts who need the most up to date information available. One of the best selling military aviation titles published annually, the book provides comprehensive coverage of all elements of British airpower. abc Military Aircraft Markings also deals with military aircraft from other countries which are likely to be seen in the British Isles

£9.99

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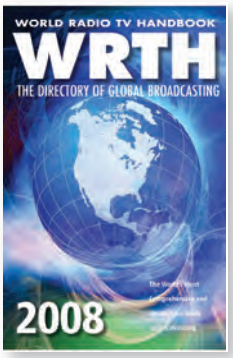

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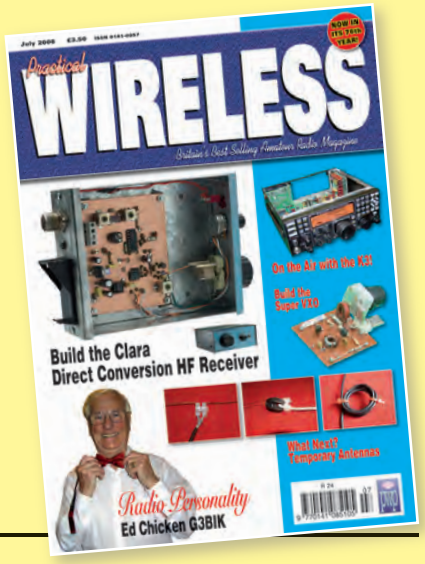

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Rob Mannion's

topical talk

This month Rob comments further on radio controlled clock problems and 'on the air' operating manners on v.h.f.

Sometimes in *PW* we really 'strike home' with a topical comment via the letters pages or in the *Keylines* editorial. Indeed, the comments I made on my own problems with radio controlled clocks really prompted readers to write in or telephone me at the offices!

As the letters pages overflowed I've contacted everyone who took the trouble to pass on their tips and advice. I was most impressed by the kindness readers showed and it's just another demonstration of the fellowship we share through *PW*. Thank you all!

Operating On VHF

After many years I've managed to get back on to the v.h.f. bands from my main Bournemouth QTH (rather than just as /M), thanks to the kind and helpful expertise of **Dave Mason G3ZPR**, President of the **Poole Radio Society** (my own club). Dave's practical skill provided me with a cross-boom to attach to my main mast and I now have a 70MHz ground plane and a dual band 50/144MHz antenna mounted at 10m (30ft) above my shack.

Over the weekend of May 10th – 11th, I dropped my mast (also made with the help of G3ZPR!) to renew the inverted V antenna wires and to mount the v.h.f. antennas. I'm now able to work along the coast to the Isle of Wight and eastwards and towards Torquay to the west on 144MHz. However, my most northerly QSO (so far) has been in the Salisbury area.

I've been able to receive the various UK beacons on both 50, 70 and 144MHz and the various UK. Although I've yet to have QSOs on either 4 or 6m! However, I've had much pleasure listening to some fairly distant QSO. I use the vague 'fairly distant' because despite listening into some very interesting technical discussions, I wasn't able to identify who and where the operators involved were!

Identifying Ourselves

Recently in *PW* I, along with other Amateurs, have raised the question of station identification on several occasions. We have been concerned that stations not identifying themselves have broken the regulations and not helped other operators to find out just how good our transmission is, or how good or bad propagation conditions are on the bands.

I was listening to the QSO on 144MHz for about an hour (the two operators involved were discussing re-installing computer software, ATV and PSK programs) and they were too far way for me to catch their attention during their quick changeover breaks. I did gather some clues to where they were from their accents, which placed them to the east of Bournemouth, perhaps in the Portsmouth area. I would have been pleased to work them to evaluate coverage from my new antennas!

A number of years ago readers may remember me discussing (in Keylines) the odd behaviour on 70MHz I encountered on the way to a club inside the M25 'belt' (or should that be crawl?) just to the south of London

The story started as I travelled along the M25 in the early evening when I heard a QSO – both unidentified stations were very strong – on a 70MHz f.m. working channel. Hoping to join the QSO I managed to attract their attention but was dismayed at the reaction.

Both stations heard me call in and discussed my strong signal, acknowledging that, "He wants to join in", before ignoring me and carrying on their discussions! Eventually, when I reached my destination near Epsom they were still chatting.

After an enjoyable evening at the club I returned home via the M25 and the same two stations were still on frequency after many hours. However, I didn't call as I realised they obviously considered the channel 'their frequency'.

I never did find out who the 70MHz stations were but the incident did disappoint me. Surely, that sort of behaviour isn't in the true spirit of Amateur Radio? My own approach is that, even if I don't have the time to work someone else calling in on the frequency, it's always a good idea to give my callsign and – at least – a quick report.

Rob Mannion G3XFD/EI5IW

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