December 2007 £3.35 ISSN 0141-0857

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Practical WIRELESS

pw

Amateur Radio Magazine

In Focus
Air Cadets in action!

Stroke Alternative
Portable with a shopping trolley!

Practically Yours
75 Years of Heritage & History - the final instalment

Product Review
miniVNA
Not just an antenna analyser!

Build
A resistive SWR bridge without a meter

R 50

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Both our shops invite you to come and join us for drinks and mince pies

Plus

Some Super Deals For One Day Only!

Come and grab yourself a bargain Christmas present

TM-D710E NEW KENWOOD

New Dual Band 50W Transceiver

We give you APRS, Built-in TNC
DTMF Mic and Weather Station ready

W&S £399 C

ULTIMETER Weather Instruments
The best in affordable weather technology.

The TM-D710e has been designed to accept the Peet Bros Ultimeter weather stations. This enables you to function as a weather reporting station.

Product details on opposite page >>>

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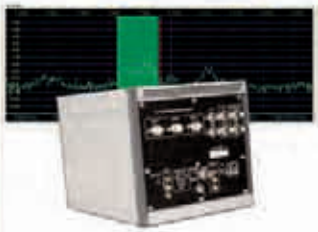
0% APR example: Cash price £600. Pay no deposit and pay the full amount within 6 months with zero interest*. Pay no interest OR 29.8% APR Repay £22.69 per month for 48 months, after the 6 month period. Total amount due £1089.20. Interest is calulated from the date of the agreement. All finance subject to status written quotation on request. *£29 admin charge for early payment.

LOW INTEREST CREDIT (LIC) FINANCE
13.9% APR We now offer Low APR finance over 24 / 36 / 48 month periods, payable from date of purchase. All finance subject to status written quotation on request.

FLEX-5000A NEW HF Transceiver 100W 160m-6m FlexRadio Systems



Performance Packed Radio!

This new software transceiver brings you performace and features no other radio in the world can offer!

SSB CW AM FM from milliwatts to 100W. 105dB dynamic range at 2kHz! 33dB intercept point. Single Firewire cable to PC. No sound card needed. 24 but sampling at 192kHz, TCXO 0.5ppm ref. xtal, True plug and play with PC or laptop, Self-test and calibrate, Many contest & DXing features - www.flex-radio.com

W&S £1695 D

FT-450 NEW YAESU

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

W&S £639 D

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

Also get voice recorder and announcer!

FT-450AT with Built-In ATU **£739 C**

MH-36EBJ	DTMF Mic	£57.95 A
MD-100ABX	Desk mic	£118.95 C
Proset	Headset with leads	£92.90 C
HP-200	Headphones	£22.95 C
Power Mite	Travel PSU	£49.95 C
MHG-1	Carry Handle	£6.95 A
FC-30	Ext auto ATU	£249.00 C
ATAS-120	Mobile Ant	£259.00 C
Sidekick	80-6m elec mobile ant	£299.95 D
SP-160	Mobile Speaker	£9.95 A
SP-2000	Sun Visor Spkr	£19.95 A

W & S present the new FT-450 with our inclusive 24 month warranty. This new model has been designed from the ground up, to harness Yaesu current technology into a no-nonsense HF transceiver. It comes with these mouth watering features:
4-pole roofing filter, Fast IF shift, Notch filter, Contour control, Digital mic equalizer, DSP VOX, Digital noise reduction, IF width control etc.

FT-2000 YAESU

1.8-30MHz +6m 100W

£1695 D

FT-2000D 200W

£2399 D

FT-897D YAESU

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

W&S £599 D

FT-857D YAESU

New Low Price!

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

W&S £499 D

FT-DX9000D YAESU

FT-DX9000D	£7,299 D
FT-DX9000CONTEST	£8,799 D
FT-DX9000MP	£8,299 D

FT-817ND YAESU

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

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

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!

W&S £249 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 feartures from the IC-758 and IC-7800 to give you a hefty transceiver packed with features.
Available Late Dec/Early Jan

W&S £TBA

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

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

Freephone Orderline

08000 73 73 88

Online Catalogue

www.wsplc.com

UK's Lowest Prices

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Zero Interest

Merry Christmas To All Our Customers!

A Seasonal Gift To Our Many Loyal W&S Clubcard Holders

If you make any purchase from us between now and Christmas 07 using your Clubcard then please claim your package of gifts from Yaesu, Kenwood and Icom. You must request your gift collection at the time of placing your order with us. This offer applies to mail order and shop purchases using your W&S Clubcard.

TS-2000

PW Deal: FREE Delivery on TS-2000 & TS-480 (ends 30/11/07)

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 **£1739 C**

TS-480SAT 100W HF+6m **£679 D**

IC-756PROIII

ICOM

HF + 6m 100W All-Mode

W&S £1995 D

IC-7000

ICOM

HF/VHF/UHF All-Mode Transceiver

W&S £899 D

Deal2: With TFT PAL TV Screen £989
Deal3: With TFT + Power-Mite PSU £1009

IC-7400

ICOM

100W HF-VHF

W&S £Phone

Deal: FREE SP-21 Spkr & SM-20 Base Mic

IC-718

ICOM

100W HF Transceiver

W&S £439.95 D

IC-706

ICOM

HF/VHF/UHF 100W Transceiver

Includes Travel Mite Dual Voltage PSU **W&S £Phone**

IC-703

ICOM

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

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.

£99.95 C

ANEM

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

£119.95 C

NEIM-1031

Noise Eliminating In-Line Module.

£129.95 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.

£99.95 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

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 keyped mic. *1000 memories **£169 D**

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

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

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

Yaesu ADMS Software

Programming Software For Your Radio

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

ADMS-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**

PEET Bros. Ham Radio Weather Stations

Ultimeter-100 £119.95 C

*Wind speed *Wind direction *Outside temperature *Wind chill factor *Date and time *Highs and lows *Long-term memory data

Ultimeter-800 £159.95 C

This is the next model up and adds
• *Humidity* • *Dew point option socket*
• *Indoor temperature* • *Static protection*
• *Illuminated keys* • *Blue LCD backlight.*

Ultimeter-2100 £219.95 C

The top model adds to the Ultimeter-800
• *Built-in pressure sensor*
• *Electrical output alarm trigger voltage*

All Models come with Software & data cable.

Icom VHF/UHF Handhelds

IC-E91

Latest dual-band handheld transceiver. receiver that covers 0.495 to 999MHz.

£239.95 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**
IC-E7 2m/70cm Wide Rx **£169.95 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 **£99 C**
TH-K2ET 2m 5W FM **£145 C**
TH-K4E 79cm 5W FM **£139 C**

Yaesu VHF/UHF Handhelds

VX-7R

Limited Special Offer

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

£209 C

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

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

WATERS & STANTON

Freephone Orderline 08000 73 73 88

General Enquiries 01702 206835 01702 204965

Online Catalogue www.wsplc.com

MFJ ATU's & Analysers

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

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

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

MFJ-948
1.8030MHz ATU 300W, large cross needle meter
£109.95 C

MFJ-993B
Auto ATU 1.8-30MHz, 300W SSB, 150W CW, Matches 6-800 Ohms
£189.95 C

MFJ-945E
Auto ATU 1.8-30MHz, 300W SSB, 150W CW, Matches 6-800 Ohms
£89.95 C

MFJ-949E
ATU / Dummy Load. 1.8-30MHz, 300W, large cross needle meter
£124.95 C

MFJ-901B
Versa Tuner. 1.8-30MHz, 200W,135x150x60mm, weight 760g
£74.95 C

MFJ-902
Travel Tuner 3.5-30MHz, 150W, Mobile & portable use, 90x60x80mm
£65.95 C

MFJ-259B
HF Digital SWR Analyser 1.8-170MHz, Freq Counter, SWR & Imped. meters, SO-239 (Ant), BNC (Counter).
£199.95 C

MFJ-269
HF Digital SWR Analyser 1.8-170MHz, 415-450MHz Freq, SWR & Imped. meters, N-Socket (Ant), BNC (Counter).
£269.95 C

SGC ATU's

SG-211
Mini-SmarTuner 1.8-60MHz
Back in Stock!
£189.95 D

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

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

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

Heil Audio Accessories

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

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

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

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

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

HSTA **£17.95 A**
Patch Leads for HTSS & HTDS.
HSTA-YM for Yaesu modular
HSTA-706 for Icom modular
HSTA-KM for Kenwood modular
HSTA-K8 for Kenwood 8-pin
HSTA-IC8 for Icom 8-pin
HSTA-KHT for Kenwood
HSTA-IHT for Icom handhelds
HSTA-VX for Yaesu handhelds

ABM-1 NEW Ramsey Airband Monitor Kit

Passengers can now hear the crew's VHF transmissions - Anywhere - AnytimeNo tuning required!

A passive airband monitor with no oscillator or IF - so no risk of interference even inside an aircraft cabin. It is highly sensitive (2uv) and will hear all local aircraft and is even safe to use inside aircraft cabins. The radio is only available in kit form (small components are ready mounted on board) and it takes around 3 hours to build. Has everything you need including smart case and earbud phones. PP3 battery required - not included.
£79.95 C

Watson Power Supplies

Power-Mite
£49.95 C
*11-15V Variable.
*20A continuous
*23A peak, 100 - 260V
*AC in. 2 x Meters
*150 x 55 x 165 mm

W-3A **£22.95 C**
Output 3A, 13.8V DC, supply 230V AC

W-5A **£29.95 C**
Output 5A, 13.8V DC, supply 230V AC

W-10AM **£59.95 D**
Output 10A, 0-15V DC, supply 230V AC

W-25AM **£89.95 D**
Output 25A, 0-15V DC, Dual meters

W-25XM **£99.95 C**
Output 25A, 9.7-17V DC, Dual meters

W-30AM **£119.95 D**
Output 30A, 0-15V DC, Dual meters

W-25SM **£79.95 C**
Output 22A (25peak), 13.8V DC, supply 230V / 115V AC

Diamond Power Supplies

GSV-3000
*Output voltage: 1 - 15V DC
*Output current 30A continuous
*Built-in cooling fan *Supply 230V AC 50Hz *Size 250x150x240mm
*Weight 9kg
£149.95 D

GSV-2500 **£119.95 D**
Output 25A, 5-15V DC, supply 230V AC, Switch Mode, Overvolts Protected. 21x11x22cm

GSV-4000 **£159.95 D**
Output 40A, 5-15V DC, supply 230V AC, Switch Mode, Overvolts Protected. 21x11x30cm

GSV-6000 **£299.95 D**
Output 60A, 1-15V DC, supply 230V AC, Switch Mode, Overvolts Protected. 21x11x36cm

Manson Power Supplies

EP-925
A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver.
£99.95 D

Cushcraft HF Antennas

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

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

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

A4-S **£569.95 D**
Tri-Band 4 element Yagi for 20m-10m. DXers delight 2kW, 8,9dB gain F/B 25dB. Turn radius 5.49m

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

R-6000 **£329.95 D**
6-band vertical 40m-6m, No seperate radials needed, 1.5kW, Height 5.8m.

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

Hustler HF Antennas

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

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

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

Adonis Wireless Mobile Mic

WX-2400 NEW

* Operates on 2.4GHz
* Easy to install
* Control unit powered through external lead
* Remote powered from coin cell
* Allows private conversations
* Tx & Rx PTTplus mic attached to remote unit
* Velcroed to steering wheel

Remote handsfree operation of your mobile rig in the car but without Bluetooth involvement. Mic lead not supplied.
£109.95 C

Optoelectronics Frequency Counters

Spectrum Scout NEW

Frequency Finder 10MHz - 2.6GHz with data display 1000 memories

* Freq. range: 10MHz - 2.6GHz
* Displays FCC bandplan info with each frequency
* RF signal strength bargraph
* Reaction Tune with some receivers
* Beeper & vibrator alert
* 11 different step sizes for data

The Spectrum Scout is a frequency counter that is capable of capturing the frequeny of a nearby transmitter and displaying the FCC bandplan data for that frequency.
£399.95 C

Garmin GPS Sat-Nav

Nuvi-200 NEW

* High sensitivity integrated GPS receiver by SiRF
* Integrated GPS patch antenna
* 320 x 240 pixel display
* Bright TFT display, 64K colours
* White backlight & touch screen
* Powerful built-in speaker
* Features 3D mapping & 2D Track-Up or North-Up perspectives

£149.95 C

We Stock A Massive Range of Garmin GPS Products Visit www.wsplc.com to see more

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Practical Wirelesscontents

December 2007
On Sale 8 November
Vol. 83 No. 11 Issue 1208
(January 2008 Issue on sale 13 December)

61 Practically Yours
75 Years of Heritage & History – Finale
In their superb articles, Chas Miller looks at early wireless techniques, while Stefan Niewiadomski profiles the work of Frank Rayer G3OGR.

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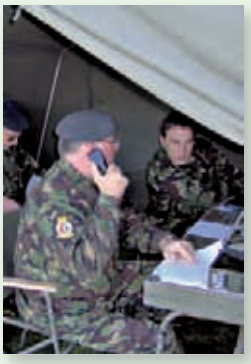

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Cover Subject
This month's cover shows off Tex Swann's photoshop genius. Would you ever guess that the screen shot of the software wasn't actually on screen when he took the photo?

Design: Steve Hunt
Main Photograph: Tex Swann G1TEX

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

Keylines

To make the admin side of *PW* more 'user friendly', Rob introduces some ideas to tackle correspondence and to provide efficient management of articles submitted by authors.

As a busy journalist I've always had a problem with correspondence! Every letter arriving from our readers is important and as Editor I try my best to reply as quickly as possible – if a response from me is necessary. However, despite the importance of letters the production of *PW* is of prime importance and it takes precedence over everything else and I'm sure readers will understand the situation.

Modern publishing, due to its very nature and the equipment used, means that fewer people are required to do the work and the specialised publications – *PW* amongst them – usually only require a few staff. So, in order to get the most benefit from my hours in the office I'm instituting some changes, which I think will benefit everyone who reads (or works on) the magazine but first, Tex and I are going to ask for your help!

Tackling Correspondence

Nowadays, most of the correspondence from readers comes in via E-mail. This is usually quite convenient because I can reply to it quickly and fit the job in with my daily production schedule. **I much appreciate an E-mail** – **rather than a letter** – because it can be dealt with very quickly. But, if you don't have a computer, cannot use E-mail or don't have any access to the Internet, you can always telephone me to discuss things. Even a ten minute conversation is three to four times quicker than the time required to type a letter. But whatever method you use, you can be sure that **Tex Swann G1TEX** or myself will be pleased to assist although please remember that *PW* production work takes precedence at all times!

Finally on this topic, although I do understand that the advent of E-mails has introduced letter writing to those who may have rarely written formal, polite letters, I very much appreciate knowing who has sent the E-mail and their address, etc., so we can help. I suggest this because some E-mails are brusque and abrupt, almost to the point of rudeness in their approach.

Some are so brusque that I can compare them with absolute strangers approaching me in in the street, literally ending up nose-to-nose and demanding information with none of the usual pleasantries of introduction normally expected. I have no doubt that many readers have received E-mails of this type but we can avoid originating them ourselves!

Anguish For Authors & Editor

I have been aware that our system for acknowledging, evaluating and processing articles for possible publication has not been as efficient as it should be. In short, the old system caused anguish for potential authors and the editorial staff alike.

In order to overcome the problems for everyone, I have taken over the article administration and introduced a completely new system. It will streamline the process of obtaining the constant flow of excellent articles provided to us by authors and keep everyone properly informed on the progress of the material towards publication.

By the time your read this Keylines the system will be in place. It will work as follow: Articles arriving at the *PW* offices (Recorded Delivery is recommended as an extra safeguard so your letter can be traced if the Royal Mail system loses it) should be accompanied by an A5 sized (half the size of this page) self-addressed envelope. On its arrival at the *PW* offices your envelope will be sent back (usually by return of post) to you by First Class post as an acknowledgement

In many cases it will also be possible to let authors have a decision on their work in the same envelope. Indeed, it's my intention to provide as much information as possible via a special template letter. This will provide the reference number for the article and the type of article category we've allocated and any other information, questions or request for further details.

We will then endeavour to keep authors informed as to the progress of the article as it's held in stock before publication. However, please bear in mind we only publish 12 times a year and – unless your article has been commissioned for a particular issue – it will (depending on its topicality) only appear when a suitable slot appears, due to our efforts in planning an editorial balance of subjects each month.

Potential authors can assist their article idea appearing sooner by working with the editorial staff by checking with us **before writing an article**. By adopting this straightforward approach, **Tex G1TEX** and I can work with our authors to provide what's required for *PW* and to get it published, as soon as possible. Incidentally, all the information I've mentioned here is available in the (**absolutely essential reading**) *Authors Guide* and you can obtain your copy (fully updated to October 2007) by contacting the office.

Articles that arrive in the office as 'unsolicited' material, where the author has prepared the article and sent it in to the office without consulting the editorial team will (I have no doubt) in most cases, be of interest to us but require re-writing and re-submission. However, by taking a few minutes to discuss any ideas with us, we can work together to streamline the publication process and publish the best articles on behalf of our readers. We look forward to working with you!

Rob Mannion G3XFD/EI5IW

services

Subscriptions
Subscriptions are available at £37 per annum to UK addresses, £45 Europe Airmail and £55 RoW Airmail. See the Subscriptions page for full details.

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.

Placing An Order
Orders for back numbers, binders and items from our Book Store should be sent to: PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone 0845 803 1979. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone 01202 659950. The E-mail address is bookstore@pwpublishing.ltd.uk

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

Send in your thoughts and win a voucher!

letters

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

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

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

Star Letter

Construction Nostalgia

● **Dear Rob,**

Your article in the November issue on budget construction in our early days (Introduction to the special *Practically Yours* historical section) reminded me of another project. Way back when early transistors, 'reds' and 'whites' cost an astronomical 10 and 15 shillings respectively, there was an alternative. I remember reading a short book *How to Construct Transistors*.

The idea was to break up a cheap germanium diode while leaving one wire still connected to the germanium as the base, and then connect two wires, a collector and an emitter. The challenging bit was that they had to separated by the distance of the thickness of a razor blade or alternatively a cigarette paper!

The performance of the home-made transistor could be greatly enhanced by 'forming' using an oscilloscope and this is where I abandoned the idea of the project . Who could afford an oscilloscope then! Did any readers have more success than myself ? Please tell – they were happy days!

Jonathan Walker
St. Just in Roseland
Cornwall

I also had a copy of the same book Jonathan but I also had little success! Charles Millers discusses early detectors this month (see Practically Yours) and his article reminded me of 'Amplifying Crystals'. Please join me on the Topical Talk page for further discussion on this fascinating idea.

To Rob Mannion G3XFD
The Editor
Practical Wireless
Arrowsmith Court
Station Approach
Broadstone
Dorset BH18 8PW

17th October 2007

Dear Rob,

WACRAL 'Golden Jubilee' Greetings

The year 2007 is the 50th Anniversary of '**The World Association of Christian Radio Amateurs and Listeners**' and, of course, the 75th Anniversary of *Practical Wireless*.

At the WACRAL Jubilee Conference and AGM last weekend, the members and executive instructed me to write offering our warmest congratulations to you and the staff of *PW* on this most auspicious event.

Who would have thought that in the 1950s when Fred Camm was celebrating his first twenty five years of successfully publishing *PW* and our own founder, the **Rev. Arthur Shepherd G3NGF**, launched the original WAMRAC, we would be both still thriving and planning for the challenges of the digital age?

We pray that, with God's Grace, you may continue to serve the future generations and their enjoyment of this amazing hobby – Amateur Radio.

Sincerely yours,

Phyl G6UFI

Rev. Phyl Fanning G6UFI
President 2007 WACRAL
RAF Wattisham
Ipswich

Thank you very much for your much appreciated letter Phyl. Everyone at the PW offices returns the compliments to your much respected organisation and we wish you well. Incidentally readers, WACRAL are due to feature in our In Focus *pages very soon!*

Poor Operating Standards & DXpeditions

● **Dear Rob,**

I'd like to respond to the letter from **Dave Ackrill G0DJA** regarding DXpeditions (Letters, November issue). Like Dave I deplore poor operating standards and while I was operating as **ZD9HGW** in Tristan da Cunha Island in the South Atlantic ocean I was overwhelmed with calls; even when trying to work friends back home on pre-arranged schedules. This was before the wide availability of E-mails and due to the very high cost of radio telephone charges, it was about the only way of keeping abreast with news from home.

In most cases, it's not the DX station that causes the problem, instead it's moronic operators calling, usually from certain European countries. Requests to take calls in alphanumeric order was normally ignored and if you did purposely ignore a station, they would simply lean on the key for ten minutes rendering the frequency useless.

Wherever possible, I tried to operate in a polite way, exchanging calls, reports, names and location; and when pileups occurred, tried to deal with them as quickly as possible, but again observing the basic principals of good operating. When being 'jammed' or suffering other forms of interference, I'd QSY without warning or simply switch off for ten minutes. It didn't take long for other stations to find me, packet DX clusters have a lot to answer for on that score!

It's not the DX station that is in the main the problem

letters

but certain stations that chase after such station ignoring basic operating standards and have no regard to others. Much of Dave's criticism could also be levelled at contest operators. Amateur Radio is many things to many people, while we all have our pet hate we have to learn to live with each other.

Let's face it, since the earliest days of radio communication, there have been those who through experimentation have sought to see how far their signals would travel and who might receive them, perhaps DXpeditions and those who seek to work them are only keeping alive a radio tradition.

Colin Topping GM6HGW
Gauldry
Fife Scotland

*From my experience – gained while operating GB75PW – I find myself agreeing with you completely Colin. When on air – as you observed yourself recently when we were operating from the **Kilmarnock & Loudon Club** in Scotland – invariably we have found ourselves in the centre of 'pile ups – especially on 7 and 14MHz and it takes time to sort out the jumble of stations calling. However, the vast majority of operators calling us have been incredibly patient (sometimes waiting for several hours) – especially when you bear in mind I like to complete a proper QSO with each station (rather than 'rubber stamping' QSOs). Despite the patience and kindness shown by the majority of waiting operators there's always someone who'll continue to call while we're already in a QSO. It also take very great patience from the operators of GB75PW and we always try our best to be as polite and helpful as possible. Fortunately, the vast majority of operators calling also try their best to 'work with us' and even relay details from weak stations, etc. To me, this sort of action shows the best side of Amateur Radio and like Colin, I think the rarer DX stations and DXpeditions are rarely to blame for any problems. Anyone who heard the 3B7C St. Brandon DXpedition on the air will surely agree that their operators were superb in the way they worked to help us to work them. A shining example as far as I'm concerned!*

What About VHF/UHF For GB75PW?

● **Dear Rob**,

I have been following the various GB75PW operations with much interest and have managed to hear you from all the locations so far. Indeed, I heard you operating from the **Kilmarnock & Loudon Club** in Scotland on the 18th and 19th of October (both your stations, operating independently on 3.5 and 7MHz, were very strong on s.s.b.).

Very often when I listen in to Special Event stations the QSOs are very brief, barely recording anything other than signal reports. But GB75PW is different – both you and the other operators took time to complete what I regard as a decent QSO before working the next station.

I was also impressed at just how patient the long list of callers were in waiting for GB75PW to try for a QSO. Rarely did I hear any bad tempered 'jostling' for attention as can often be heard on the DX bands. It was also obvious to me as a listener – that the stations who had been waiting for a long time to work GB75PW, were pleased to do so and weren't frustrated by the long wait they had due to the 'proper QSO' approach by your operators. It was a pleasure to listen in!

During one QSO – you were on the microphone yourself – I was interested to hear the other operator asking about GB75PW operations on v.h.f. Just as you were mentioning possible 70 and 144MHz operations I had to attend to domestic chores – rubbish collection time! So, perhaps for the benefit of those of us who want to work or receive GB75PW on all the bands you operate on – can you please let me know what you plan to do? (I have a good QTH for v.h.f. here in Bedminster).

Finally, from what you were saying over the air during your two day trip to Scotland – the K&LARC made you very welcome indeed. Listening here in my shack, I feel it was as if I was able to share in the friendly atmosphere too. Thanks for putting GB75PW on the air.

Tony Harding
Bedminster Down
Bristol

*As you've already gathered Tony – operating GB75PW from the Kilmarnock & Loudon Club was a delightful experience. **Len Paget GM0ONX** and a keen group of club members made us very welcome indeed. Much DX was worked (India, Indonesia and West Coast USA to name but a few) from their comfortable clubhouse complete with a generous antenna farm. A full report of the adventures of GB75PW will appear after the operations have ceased but I now invite you to join me on the Topical Talk pages to discuss the v.h.f/u.h.f. plans for GB75PW.*

rallies

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

November

Sunday November 18th: The Coulsdon ATS Annual Radio & Electronics Bazaar will be held at the 1st Coulsdon Scout HQ at the rear of the council car park, Lion Green Road, Coulsdon, Surrey. Doors open 10am and admission is £1.There will be a Bring & Buy.
Andy G8JAC
E-mail: g8jac@btinternet.com

December

Sunday December 2nd: The West Manchester Radio Club is holding its Red Rose Winter Rally at Lowton Civic Centre, just off the A580 East Lancs Road. This venue is all on one level, with disabled facilities and free parking. There will be a Bring & Buy, RSGB bookstall, the usual trade stands, component and special interest groups, licensed bar, catering and large social area. Doors open at 10am.
Steve. Tel: 01942 888900
www.wmrc.org.uk

Sunday December 2nd: The Bishop Auckland Radio Amateurs Club Rally will be held at Spennymoor Leisure Centre, Spennymoor, Co Durham. There will be radio, computer and electronics traders as well as a Bring & Buy. The site has refreshments and bar facilities. There will be plenty of car parking and admission is £1.50.
Mark G0GFG. Tel: 01388 745353

2008

Sunday January 27th: The Horncastle Winter Rally will be held at the 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. Usual refreshments will be available, including hot bacon butties. Doors open 10.30am.
Tony Nightingale. Tel: 01507 527835
E-mail: G3ZPU@hotmail.com

Sunday February 3rd: The RadioActive Rally will be held at Civic Hall, Nantwich Town Centre, Cheshire CW5 5DG. Doors will open at 10.30am and admission will be £3 (under 16 free). There will be trade stands, a Bring & Buy, special interest groups and car parking on site.
Roger M0ROJ. Tel: 01829 771440
E-mail: info@RadioActiveShow.co.uk
www.RadioActiveShow.co.uk

Sunday February 3rd: The South Essex Amateur Radio Society Rally will be held at 'Paddocks', Long Road, Canvey Island, Essex SS8 0JA. There will be free car parking with a disabled persons' area at the front. Admission is £2 and doors open at 10.30am. There will be trade and club stands, home-made catering and a 'Rent-a-table' option for private sellers (£3.50/hr).
Ken G0BBN. Tel: 01842 861089
E-mail: Hendryken@aol.com

news & products

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

Amateur Exam Classes

Milton Keynes Amateur Radio Society (MKARS) has, for some years now, been actively promoting Amateur Radio through the Foundation, Intermediate and Advanced level licence courses. In recognition of holding over ten examination sessions since the introduction of the Foundation licence in 2002, **MKARS** is delighted to have been presented with a certificate of achievement by the RSGB and the Radio Communications Foundation.

Early Foundation courses were run by **Tom Mitchell G3LMX** and **Dave Mapeley M0BZK**. Since January 2006 the Foundation courses have been run by **Andrew Thomas G8GNI/M5AEX** and **Frank Jackson M0JSZ** who have put 25 students through the Foundation exam, with a 100% pass rate. There are currently eight further students taking part in the course. The MKARS are currently running courses for the Foundation, Intermediate and Advanced level amateur radio exams. Further information may be found at: **www.mkars.org.uk** or **Andrew G8GNI** on **(01908) 263758**.

Hamcation

Not on the scale of the Dayton Hamvention but, if you should be in Florida on holiday in February, you may be interested in visiting the Orlando Hamcation. Held on February 8th - 10th at the Central Florida Fairgrounds, Orlando, Florida. They have a mix of traders, boot sale and flea market traders and also have classes for the ladies in case they don't wish to walk around all the radio bits! Tickets cost $10 for the three days and parking is free. Check out the details at: **www.hamcation.com** or you can write to: **Orlando HamCation, PO Box 547811, Orlando, FL 32854-7811, USA.**

American Radio Amateurs Help the Law

Some Radio Amateurs in Florida heard various robberies being planned over the Jupiter Farms **444.400MHz** CERT repeater but the voices didn't describe the house well enough to get the exact address. The amateurs kept listening for the vandals to show up again on the repeater. The next time the Amateurs were ready and had set up recording devices to capture the break-in as it transpired; they also called the police. Three suspects were captured and arrested: one at the scene, one who was walking down a nearby road and one at a local grocery store. The suspects were charged with burglary for the two break-ins; the three are also suspects in other local robberies.

Discrete Earpiece

Waters and Stanton now have a new transparent acoustic earpiece that will work with any Amateur Radio hand-helds. The curly transparent tube offers clear audio with a low profile appearance. There is a strong lapel clip at the end of the transparent tube to permit the black curly return lead from the audio interface to be unobtrusively taken back to the hand-held radio. A spare earpiece is also provided and versions are available terminated in either 3.5mm plug (WAT-999) or 2.5mm plug (WAT-999K). The price, inclusive of VAT, is £7.95.

Waters & Stanton PLC, Spa House, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835/204965. www.wsplc.com

news & products

Send all your news and club info to the PW offices
or E-mail:
pwnews@pwpublishing.ltd.uk

Amateur Radio Repeater Maps

Here's something useful for those travelling to the USA or Canada next year. You can now view the Amateur Radio Repeater Directory visually using Google Maps. You can view repeaters by state or search for the closest repeater to your location.

US repeaters: **http://www.ham-shack.com/repeater.html**

Canadian repeaters: **http://www.ham-shack.com/can_repeater.html**

New 60A PSU

The Palstar SPS-960 is a switched mode 60 Amp power supply. As it is lightweight – just 5.8kg – and has a high current output, it could be suitable for power hungry 200 Watt HF radios and for DXpeditions or travel/holiday use. A large liquid crystal display gives clear readings of current and voltage output – the voltage can be varied from 1 to 15V. The power supply has a rear-mounted cooling fan. The SPS-9600 retails for £179.95.

Full details from: **Nevada, Unit 1, Fitzherbert Road, Farlington, Portsmouth PO6 1TT. Tel: (02392) 313090. www.nevada.co.uk**

New 1kW Auto ATU

The AT-1000Pro has an Auto mode that automatically starts a tuning cycle any time the s.w.r. exceeds a limit you set. Also, there are provisions for two antennas; you can switch between them any time you need. For each antenna, there are 2,000 memories that store tuning parameters for almost instantaneous tuner setting whenever you transmit on or near a frequency you've used before. Just key and it tunes! The AT-1000Pro will operate at any power level between 5 and 1,000 watts peak RF input.

The AT-1000Pro will tune from 1.8 to 54MHz continuously and will match an amazing range of antennas, from Yagis and dipoles to inverted-Vs and slopers; virtually any coaxial-fed antenna from 6 to 1000 Ohms impedance (16 – 150 Ohms on 50MHz). Tuning time is usually under 4 seconds.

The introductory price is £399.95.

Martin Lynch & Sons Ltd.,
Outline House,
73 Guildford Street,
Chertsey, Surrey
KT16 9AS.
Tel: (01932) 567333
www.MLandS.co.uk

The LARS Grand Prize Draw

At the **Leicester Amateur Radio Show** in September, the Grand Prize Draw was drawn at the end of the second day. The winners and their prizes are listed here. The photograph shows **Peter Yardley** collecting his Yaesu FT-857.

Prize One: Yaesu FT-857 donated by Yaesu and won by Peter Yardley G0INS
Prize Two: Kenwood TMV-71E donated by Kenwood and won by Tony Wardle G4XZA
Prize 3: Icom IC-E91 donated by ICOM and won by Richard Hill G8THE
Prize Four: MFJ Mobile HF Antenna Tuner donated by Waters & Stanton and won by Terry Kelly
Prize Five: Lamco CGF6000 donated by LAM Communications and won by Bill Garner GM3UHT
Prize Six: Ten-Tec 80m QRP CW Transceiver donated by AOR TEN TEC UK and won by Mike Lemin G4UUB
Prize Seven: SPX-100 Portable plug & go 80-6m aerial donated by Moonraker and won by David Hart G4YG
Prize Eight: Philips FM 1000 4m Radio donated by TETRA and won by Len Tomlinson G8ONX
Prize Nine: 12-el ZL Special for 2m donated by Sandpiper and won by Alan Charlton M0NUZ
Prize Ten: BHI NES 10-2 MK II noise cancelling loudspeaker donated by bhi and won by M.Nicholls
Prize Eleven: Talksafe donated by RPF Communications and won by Derek Towle
Prize Twelve: Diamond DL30A Dummy Load 15W donated by Radioworld and won by Neil Leddington M3NFL

Coventry Anniversary Dinner

The Coventry Amateur Radio Society, the oldest affiliated to the RSGB, was founded in 1932. A 75th Anniversary dinner was held on September 21st, 2007 at the Coventry & North Warwickshire Cricket Club, Coventry. Guests were the Lord and Lady Mayoress of Coventry, Cllr **Dave Batten** and his wife **Lynn**, the BBC Announcer **Jim Lee G4AEH** and the President of the club, **Arthur Noakes G2FTK**. Arthur is the only living founder member of the society.

The dinner was attended by current and past members of the society. An excellent meal was followed by the presentation of the G2FDC 2m DF Trophy to G8GD & M0DVG and the G4ZMC Portable Activity Trophy to G4GEE. Jim G4AEH gave an amusing speech on his life in local and national radio as well as his continued (very active!) interest in Amateur Radio.

Josh Baxter M3HBM – the youngest member of the club at 11 years old, Arthur Noakes G2FTK – the oldest member of the club at 91 years old, The Lord Mayor of Coventry, Cllr Dave Batten, The Lady Mayoress of Coventry, Lynn Batten and Jim Lee G4AEH. Photograph by kind permission of Richard Bailey, G3WCQ.

UK Amateur Radio Licences

The UK regulator **Ofcom has supplied the figures for the total number of Amateur Ra**dio Licences issued as at September 30th, 2007 and it's good news as licence numbers have gone up again.

Grade	Sept 30th, 07	Aug 31st, 07	Change
Foundation	9,136	9,040	+ 96
Intermediate	3,908	3,885	+23
Full/Advanced	49,894	49,821	+73
Club Stations	1,253	1,247	+8

New Mock Test Site

Paul 2E0TZO and **Pete M3PHP** have started a website providing mock tests online for people to try and help them to get their Amateur Radio licence. Please feel free to visit and try them out.

The pair already have an extensive database of questions in the Intermediate section but are in need of more questions for the Foundation and Advance sections. So, please visit the website if you have questions you can offer.

http://www.hamtests.co.uk/

International Cipher Challenge

Milton Keynes Amateur Radio Society will be involved in the International Cipher Challenge that will take place on November 15th and 16th. Representatives from Heinz Nixdorf Museum Forum in Paderborn, Germany under the guidance of Norbert Ryska will prepare the plaintext message (in German) using the SZ42 machine loaned by Bletchley Park. The ciphertext will be transmitted by Radio Amateurs at the radio station DL0HNF located in the Heinz Nixdorf MuseumForum, Paderborn. Heinz- Peter Bleier will lead the team and plans to operate a special event station with a dedicated callsign specifically for the purpose. The transmission will be intercepted by two teams at Bletchley Park - the first will by MKARS operating amateur radio station call sign GB2BP. They will use current technology receivers and signal capture methods. The second team will be led by John Pether from The National Museum of Computing who will use the same type of equipment as used in the 'Y' (intercept) station in Knockholt in the Second World War. This equipment includes AR88 receivers with undulators connected for hardcopy output on strip tape which will eventually be passed to Colossus to find the Lorenz machine (the machine originally used to code the text) wheel settings then a Tunny simulator will be used to recover the plain text. Once the plain text has been recovered MKARS will transmit the plain text back to Germany using RTTY for validation and scoring.

At the same time as the international team receives the enciphered message, radio amateurs around the world will be able to receive the same radio broadcasts and try their hand at decrypting it. It will be fascinating to see who completes the job first!

www.tnmoc.org

Linked Repeaters

At present, there are 53 repeaters linked on the 'win system' in the USA and it continues to grow. Repeaters can join the network at anytime from anywhere in the world using IRLP. The 'WIN system' is probably the largest linked repeater system in the world! It is a non-profit, membership supported, linked repeater system where repeaters are 'on link' full time, meaning that they are all inter-connected, or Intertied together. Any repeater can be controlled from any other repeater down the link. They welcome all licensed Amateurs to join in and have some fun on the WIN System and, instead of requiring you to pay your dues before you can talk on the System, they feel that you should try it first.

http://www.winsystem.org/

Silent Key - Barry Davidson G3YSL

It is with great sadness that **Tynemouth Amateur Radio Club** records the death of **Barry G3YSL**, a victim of cancer, in August. Barry was one of the longest serving members and was a committee member and QSL manager for several years. He came to Amateur Radio through his scientific background as a science teacher and a proficient expertise in Morse learned in HM Forces. Always willing to share his knowledge with others, the quiet gentleman was much appreciated for his patience and tolerance and in c.w. for his 'good fist'.

Quartz Frequency Standard

The Novatech Model 2975AX Disciplined Quartz Frequency Standard provides sine wave outputs of 10MHz and 5MHz, along with a 20MHz synthesised output in a small bench-top case. IN and OUT signals of 1pps are available on the rear panel. The synthesised output, internally locked to the Quartz Oscillator, generates any frequency from 100Hz to 20MHz with a resolution of 1μHz. Front panel controls and display allow setting of the synthesised output, with the second line of the display indicating 1pps tracking status.

Only available in the US at the moment, at a cost of $1995 you can read more at:

http://www.novatech-instr.com/PDF_files/2975axds.pdf

ML&S Open Day

On Saturday, December 1st, **Martin Lynch & Sons Ltd** are holding their 20th Open Day. Major manufacturers such as Icom, Kenwood and Yaesu will be in attendance and you can enjoy the monster (free) hog roast and hot drinks. There will be discounts available across the whole range of products and, if you are amongst the first ten customers who buy an h.f. base station on the day, you will get a free Tivoli Audio Songbook or PAL Portable Radio worth up to £159. That will help keep the rest of the family happy!

Martin Lynch & Sons Ltd., Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS. Tel: (01932) 567333 www.MLandS.co.uk

club news

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

CHESHIRE
Chester & District Radio Society
Contact: Graham
Tel: (07930) 655 121
E-mail: info@chesterdars.org.uk
Website: www.chesterdars.org.uk
The Chester & District Radio Society meets on Tuesday evenings at the Burley Memorial Hall, Common Lane, Waverton, Chester CH3 7QT. November 20th is a Bring & Tell Night, 27th is a demonstration of the Icom ICR-1000 computer controlled radio by Brian Levitt and December 4th is the Christmas Social Evening.

Stockport RS
Contact: David Simcock
Tel: 0161 456 7832
Website: 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. November 20th is a talk on Synchronous and non synchronous Vibrators and Old Car Radios with John Shufflebotham M3NBU. December 4th is the Annual General Meeting.

COUNTY DOWN
Bangor and District ARS
Contact: Mike GI4XSF
Tel: 028 4277 2383
Website: http://www.bdars.com
Bangor and District Amateur Radio Society meets on the 1st Thursday of every month in "The Boathouse", Harbour Car Park, Groomsport at 8pm. Visitors and new members are most welcome. December 6th is an On the Air Night and January 3rd is the Annual Quiz Night.

COUNTY DURHAM
Great Lumley AR&ES
Contact: Nancy Bone
Tel: 0191 477 0036
E-mail: nancybone2001@yahoo.co.uk
Website: www.glares.org.uk
Great Lumley Amateur Radio & Electronics Society meets in the Community Centre, Front Street, Great Lumley, Chester le Street, Co Durham DH3 4JD every Wednesday 7.30 to 9.30pm. November 14th is a talk by Mike Stott G0NEE called "Enigma" with a short video and he will to display an electronic ENIGMA Machine.

DERBYSHIRE
South Normanton Alfreton and District ARC
Contact: A J Higton
Tel: (01773) 783658
E-mail: snadarc@linuxmail.org
Website: www.snadarc.me.uk/
South Normanton Alfreton and District Amateur Radio Club meets in the Village Hall, Community Centre, Market Street, South Normanton, Derbyshire DE55 2EJ. November 12th is an evening with Mark 2E0IQO and his trailer and mast (all will be revealed), 19th is a Junk Sale, 26th is a Fox Hunt with free fish & chip supper for thos taking park, December 3rd is a Morse Night with Eddie G4UIQ and 10th is the Christmas Party.

EAST LOTHIAN
Cockenzie & Port Seton ARC
Contact: Bob Glasgow
Tel: (01875) 811723
E-mail: gm4uyz@cpsarc.com
Website: http://www.cpsarc.com/news.php
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. November 16th is a talk by Colin GM0RLZ on Radiography in the Port Seton Community Centre Resources Room 2 at 7.30pm.

EAST SUSSEX
Hastings E&RC
Contact: Gordon Sweet
Tel: (01424) 431909
E-mail: gordon@gsweet.fsnet.co.uk
Website: www.herc.uk.net
The Hastings & District Radio Club meets on the third Wednesday at The Phoenix Hall, William Parker School, Parkstone Road, Hastings TN34 2NT at 7pm. November 21st is a visit to the Herstmonceux Observatory.

ESSEX
Braintree & DARC
Contac: Keith G4MIU
Tel: 01376 329279
Website: 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. November 19th is a Junk Sale and December 3rd is an evening Project Planning and Operating.

Chelmsford ARS
Contact: Martyn Medcalf G1EFL
Tel: (01245) 469008
E-mail: info2007@g0mwt.org.uk
Website: 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. December 4th is a joint meeting with Colchester Radio Club and is the Xmas Radio Photo Social.

HAMPSHIRE
Fareham & District ARC
Contact: Ken Sapsed
Tel: 023 9279 7240
E-mail: secretary@fareham-darc.co.uk
Website: www.fareham-darc.co.uk/
Fareham & District Amateur Radio Club meets on Wednesdays evenings from 7.30pm in the Portchester Community Centre, Westlands Grove, Portchester, Fareham PO16 9AD. November 14th is a debate, 'Do we need the ORSGB or Ofcom', 21st is an evening with Dave G7CFR and 28th is an evening with G4JLP.

Horndean & District ARC
Contact: Stuart Swain
Tel: (02392) 472846
E-mail: g0fyx@msn.com
Website: www.hdarc.co.uk
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. November 27th is a talk by Steve Ellis G7HEP on the 'Hallicrafters Restoration Project'.

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

KENT
Bredhurst RATS
Website: http://www.the-brats.net/
The Bredhurst Radio Amateur & Transmitting Society meets on Thursdays at the Parkwood Community Centre, Rainham, Gillingham, Kent ME8 9PN **at 8.30pm.** The Club holds a net 145.400MHz +/- Tuesdays at 9pm coverage about 15 miles around the Medway Towns Kent. 6th December is a Quiz Night with the first question at 9pm.

Bromley &DARS
Contact:
E-mail:
Website: www.bdars.org
The Bromley & District Amateur Radio Society meets in The Victory Social Club, Kechill Gardens, Hayes, Kent (off B265, Hayes Lane, Bromley) on the third Tuesday of the month at 7.30pm. November 20th is the Construction contest with Ian G4VTD.

LANCASHIRE
Oldham RC
Contact: Christopher Cunliffe G7OOD
E-mail: secretary@oarc.org.uk
Website: http://www.oarc.org.uk/
The Oldham Radio Club meets on Thursdays at No.1855 (Royton) Squadron Air Training Corps, Park Lane, Royton, Oldham at 7:30pm.

LONDON
Southgate ARC
Contact: Donald F Berry G4DFB
Tel: 020 8360 3614,
E-mail: dfberry@eggconnect.net
Website: www.southgatearc.org
The Southgate Amateur Radio Club meets on the 2nd Thursday of the month at Winchmore Hill Cricket Club, The Paulin Ground, Firs Lane, Winchmore Hill, London N21 3ER at 7.30pm. December 13th is the AGM.

NORFOLK
King's Lynn ARC
Contact: Ray Dowsett MBE
Tel: (01553) 671307
E-mail: ray-g3rsv@supanet.com
Website: 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.

SHROPSHIRE
Telford & District ARS
Contact: Mike Street G3JKX
Tel: (01952) 299677
E-mail: mjstreetg3jkx@blueyonder.co.uk
Website: www.tdars.org
The Telford & District Amateur Radio Society meets on Wednesdays at the Community Centre, Bank Road, Dawley Bank, Telford, Shropshire TF4 2AZ at 8pm. November 14th is Preparation for the RSGB Affiliated Societies Contest, 21st is a Surplus Equipment Sale and 28th is a video evening on the Hubble Space telescope.

SOMERSET
Trowbridge & District ARC
Contact: Ian Carter
Tel: (01225) 864698
E-mail: ian.l.carter@btinternet.com
Website: http://uk.geocities.com/tdarc@btinternet.com
Trowbridge & District Amateur Radio Club meets at Southwick Village Hall, Southwick (nearest postcode is BA14 9QN). December 5th is the Christmas Social, buffet and presentation evening.

South Bristol ARC
Contact: Len Baker
Tel: (01275) 834282
E-mail: g4rzy@msn.com
Website: www.sbarc.co.uk
South Bristol Amateur Radio Club meets at the Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Whitchurch, Bristol BS14 0LN. November 21st is the AGM.

SOUTH GLOUCESTERSHIRE
Thornbury and South Gloucestershire ARC
Contact: Tony
Tel: (01454) 417048
E-mail: tonytsgarc@beeb.net
Website: http://jma-databases.co.uk/tsgarc/index.php/Thornbury_%26_South_Gloucestershire_Amateur_Radio_Club
Thornbury and South Gloucestershire Amateur Radio Club meets in the United Reform Church Hall, on the corner of Chapel Street and Rock Street, Thornbury at 7.30 - 9.30pm. December 19th is the Chairman's Quiz and Social.

TYNE & WEAR
Tynemouth ARC
Contact: Tony Regnart
E-mail: tony.regnart@gmail.com
Website: http://www.gx0nwm.co.uk/

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'. November 16th is a talk on the Oscilloscope Octopus by Ian M3IGB.

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

Horsham ARC
Contact: Andrew Vine
Tel: 01483 272456
Website: 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. November 15th is a Social at The White Horse, Maplehurst, 18th is the G4HRS/P Sunday Morning 2m DF Hunt and December 6th is the AGM.

WORCESTERSHIRE
Worcester RAA
Contact: Daniel Thompson
E-mail: m3jjt@hotmail.co.uk
Website: http://g0wxj.demon.co.uk/
Worcester Radio Amateurs Association meets at the 3rd Worcester Scouts HQ, Vicar Street, Off Rainbow Hill, Worcester WR3 8EU. November 13th is a Digital Modes Skill Sharing Night where Mike G8XDX and others will be demonstrating various digital modes to Amateurs old and new.

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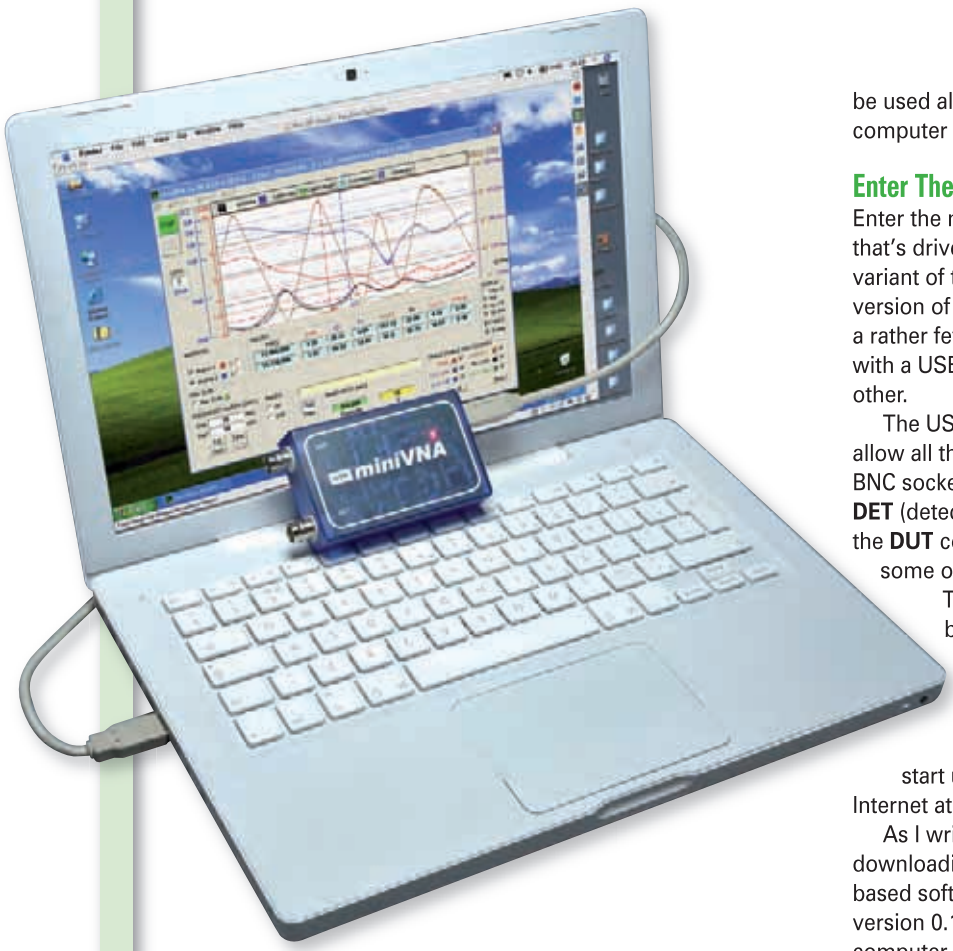
Not just an antenna analyser!

The *miniVNA*

antenna testing – and much more!



I consider that a system or box, capable of easily showing the matching and tuning of an antenna over a band of frequencies, one of the best instruments available to the antenna experimenter. For many years the systems and units available to the Amateur experimenter, have lagged a little way behind those available to the professional.

With the advent of the all-in one 'boxes' available from the likes of MFJ, and AEA the gap started to close. Over the last 10 years or more, I've owned and used various versions of MFJ's Antenna Analysers and I've found them extremely useful, not to mention informative of the state of an antenna's tuning and matching.

The MFJ units operated in the range 1.7-170MHz, with one version offering a range tripler to cover the 420-480MHz band. Some other units, often offering more information, operated only up to 30MHz or so. Bearing in mind that all my previous antenna analysers have been hand-held devices that could be used almost anywhere, could an analyser that's tied to a computer replace any one them?

Enter The miniVNA

Enter the miniVNA antenna analyser, a small piece of hardware that's driven from the USB port of a PC running a modern variant of the *Windows* operating system. There's also a *Linux* version of software to use with the hardware. The hardware is a rather fetching transparent blue box some 93 x 57 x 24mm with a USB socket at one end opposite two BNC sockets at the other.

The USB socket is for connection to a suitable computer to allow all the functions to be controlled from a PC, while the two BNC sockets are the **DUT** (device under test?) output and the **DET** (detector) input connectors. For basic antenna tests, only the **DUT** connection is required, while for transmission and some other tests, both connections are used.

To start using the miniVNA, it's necessary to install both a USB device driver and the actual software that controls the unit and calculates and displays the results. While the driver went on without problems, the *Antenna Network Analyser* software had 'timed-out' and needed updating before I could start using it. An updated version was available from the Internet at **www.miniradiosolutions.com**/

As I write this review, the *Windows* software for downloading has reached version v.2.3.0, while the *Linux*-based software *Gnome-Vector-Network-Analyzer* has reached version 0.1.2. As I run an Apple Macbook (portable Macintosh) computer for almost all my work, I had no alternative but to run *Windows* via virtualisation software, as there's presently no native Macintosh software available. All 'screen-grabs' are taken under these circumstances!

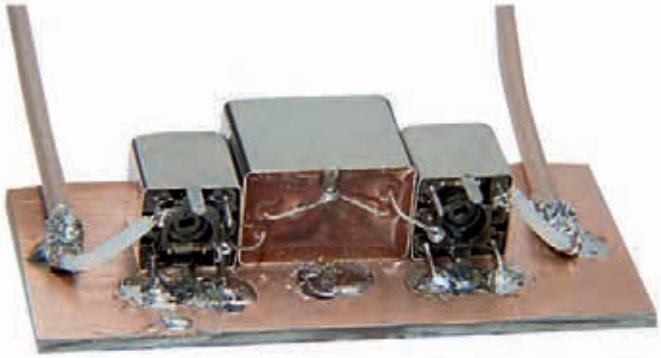
After setting up the USB port to use, it's a good idea to calibrate, frequency, reflection and transmission 'zero' settings. I've shown the frequency calibration screen in **Fig. 1**. This may be the most difficult to set for most readers unless you have access to an accurate frequency counter.

If you're unsure of the quality of your available counter, you can ignore this setting as the direct digital synthesiser (DDS) is fairly accurate – it's well within ±0.01%, which is more than accurate enough for most tests. The DDS generator outputs 500mV p-p into 50Ω, with up to 1000 frequency steps, between the variable lower and upper frequencies limits of 100kHz to 180MHz.

The number of frequency steps defines how often the display updates. When using 500 steps, the screen updates

Our Technical Editor Tex G1TEX was eager to get his hands on the latest piece of antenna test equipment. He found that it does an awful lot more – read on to find out what!

Fig. 8 (left): And here's how the set-up looked when measuring the filters.



tting two 10.7MHz i.f. transformers, helped improve the crystal filter's istics. See Fig. 12.

every second or so, while the maximum number of steps, 1000, causes screen updates every two seconds. I suppose that most users would set the **Start** frequency as the lower one and the **Stop** frequency as the higher one. But I noted that it also worked with the **Start** and **Stop** frequencies reversed. In this case the lower – **Stop** frequency is at the right-hand of the display, rather than the more normal left-hand side!

The first test I tried was to attach my station's h.f. antenna, based on an end-fed G5lJ antenna (as featured in Antenna Workshop), onto the DUT socket and the s.w.r. plot of **Fig. 2** was what I saw on the computer's screen. There are two 'cursors' on screen the red left-hand vertical line show that the system matches reasonably well on 1.8MHz, though to be honest this is due more to the length of the coaxial feeder rather than the antenna's length and matching.

Turning on all display options for my antenna, **Fig. 3**, shows a rather more initially confusing number of coloured plots, which includes s.w.r., Zin(Ω), Loss i(dB), Phase angle(°) and Rs and Xs, both in ohms. They're all parameter that can be very useful in optimising antenna! But if you're unsure how to apply them, then just using the s.w.r. plot is ideal for starters.

For my next test, I tried a simple end-fed (λ/2) 144MHz v.h.f. antenna as shown in the display of **Fig. 4**, that shows that the antenna is substantially 'flat' over the whole of the band. The display updates around once per second when the DDS covered the band in 500 steps. This allowed me to see the changes and adjust the matching capacitor quickly and easily.

Quick & Easy

Having found that the miniVNA makes plotting s.w.r. and matching parameters both quick and easy, I tried two low-pass filters as described by **Ed Wetherhold W3NQN** in his article *Filters – Cutting The Edge* (PW July 1998). The two filters I tried are shown in **Fig. 5**, the 3.5MHz band low-pass and **Fig. 6**, the 7MHz version.

The screen-grab of Fig. 5 shows that the roll-off of the filter is very steep, as the -3dB point is around 4.5MHz and the -40dB point is at only 6.2MHz. The flattening out of the curve at -50dB is due to the limitation of the sensing methods used in the miniVNA rather than of the filter itself. The response curve of Fig. 6 is for the 7MHz low-pass filter.

I discovered an unusual 'sting-in-the-tail' for the 3.5MHz filter, **Fig. 7**, when the oscillator went up to 180MHz. It turned out that the curve showed that there was a reduction of rejection towards the top end of the swept frequency. This could lead to interference from a 144MHz v.h.f. rig affecting a simple h.f. receiver, when none would be expected.

The photograph, **Fig. 8**, shows one of the filters being tested. I noted that the two h.f. low-pass filters offered very low in-band attenuation. This was a situation that wasn't mirrored when I tried a 144MHz band-pass filter, **Fig. 9**, that showed almost 2dB of in-band loss as opposed to less than 0.5dB of loss of the h.f. filters.

Next, I tried a crystal filter from a 'bagful' that I'd bought very cheaply as the seller said he was unable to provide information for them. A quick scan, **Fig. 10**, showed that the band-centre was at 10.7MHz. This screen shows only a limited range of 10.69–10.71MHz, arrived at after a series of more wider-band scans. The in-band ripple is due to the gross mis-match between the 50Ω of the miniVNA and the higher impedance (2kΩ approximated guess) of the crystal filter.

Adding two 10.7MHz i.f transformers, Fig. 11, to the crystal filter improved things. Calculations indicated that they'd match with an impedance of around 2kΩ into the filter. The in-band ripple then became much smoother and the losses became less too, **Fig. 12**.

Thinking a little more obliquely and I decided to treat a 7MHz amplifier as a band-pass filter, Albeit one that would need an attenuator at least 20dB, in between the **DUT** output of the miniVNA and the input of the amplifier.

The output of the amplifier was taken back to the **DET** input of the miniVNA. and the 'band-pass' characteristics are shown in **Fig. 13**. The actual gain of the amplifier at band-centre was the same as the setting of the attenuator, which was some 20dB.

One other use of my MFJ units has been finding best settings for notch filters, either LC or coaxial cable ones. So, a final test, was of a variable v.h.f. notch filter that I attached to the miniVNA, although the depth of the notch, **Fig. 14**, was rather poorer than I would have liked (-30dB at 86MHz and only -18dB at 172MHz).

Stable & Accurate

Because the DDS inside the miniVNA is both very stable and accurate in frequency, with the addition of a good attenuator, it will perform as an excellent signal generator. Such a shack signal generator combination, will have a maximum output of around half a volt peak-peak into 50Ω.

In conclusion, not only is the miniVNA a useful tool to check out filters (discrete L/C or crystal), or to act as a main station r.f. oscillator, the software has an option for some coaxial cable-based tests, such as determining cable length and losses to be made. The miniVNA also allows tuning and gain adjustments to be made on amplifiers, (**although caution is needed to keep the input to the DET socket within limits**).

In my enthusiasm for all the 'other' things that the miniVNA does, I mustn't forget that it's also an excellent tool for playing with antennas. All-in-all, this unit gets my unequivocal vote of approval as a decidedly good addition to any shack that already has a PC. So much so, that I'm going to be rather loath to give the review item back! ●

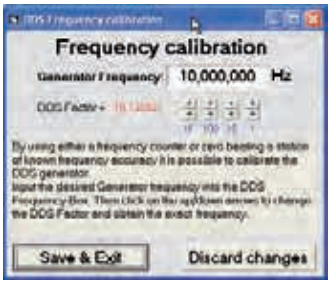


Fig. 1: Calibration of the direct digital synthesiser needs a known accurate counter for ease.

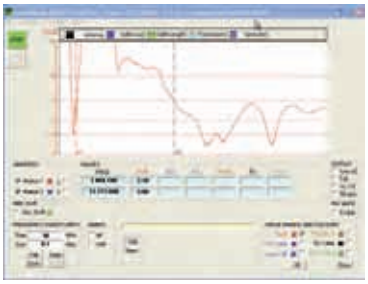


Fig. 2: The s.w.r. plot of my end-fed G5IJ antenna with its 20m long element.

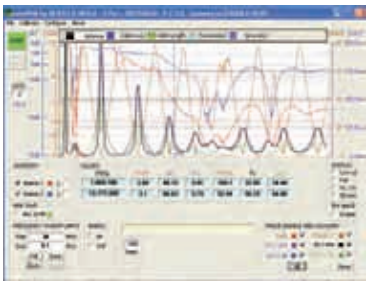


Fig.. 3: Looking far more complex, with all other parameters plotted for my antenna.

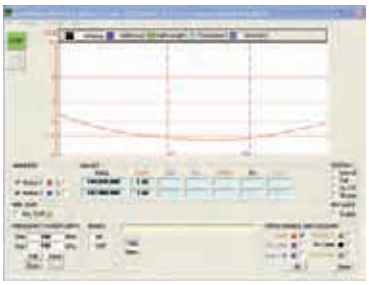


Fig. 4: The flat s.w.r. curve for an end-fed 144MHz antenna, when the tuning capacitor is set correctly.

Fig. 5: The pass-band and stop-band characteristics of a low-pass filter suitable for use after a 3.5MHz transmitter.,

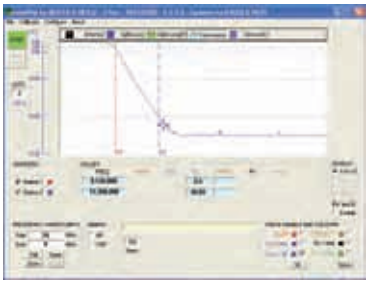


Fig. 6: The pass-band and stop-band characteristics of a low-pass filter suitable for use after a 7MHz transmitter.

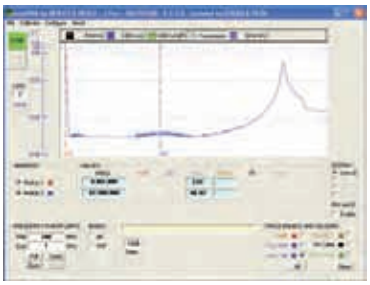


Fig. 7: a reduction in the stop-band performance at v.h.f. for the filter of Fig. 5.

Fig. 9: A 144MHz bandpass filter for a v.h.f. receiver. There's rather too much loss for this to be useful at anything other than low power.

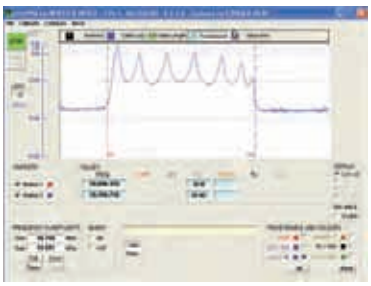


Fig. 10: Measurement of the bandpass characteristics of a 10.7MHz crystal filter, when feed from and into mismatched 50Ω terminations.

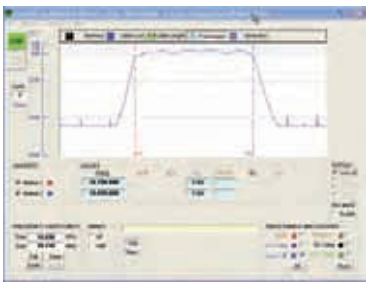


Fig. 12: Now looking much smoother. The spurious peaks and the -50dB signal limiting are due to the way that the miniVNA works rather than the filter.

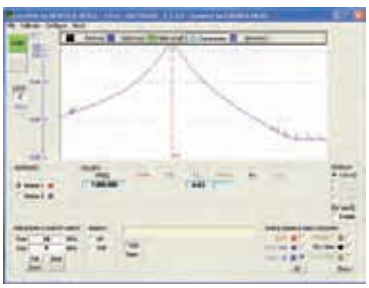


Fig. 13: Treating a 7MHz pre-amplifier as if it were a bandpass filter, after feeding its input via a 20dB attenenuator give this sort of curve.

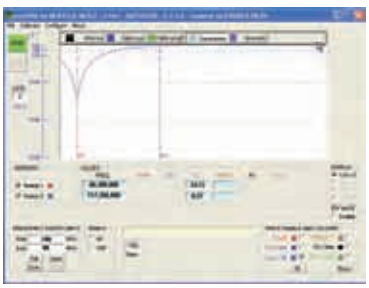


Fig. 14: A commercial v.h.f. notch filter gives a dip (tunable) of around -28dB at 87MHz and a poorer -18dB at 170+MHz.

Product: miniVNA Antenna Analyser

Company: WiMo Antenna und Elektronik GmbH, Am Gäxwald 14, D-76863 Herxheim, Germany

Pros & Cons

Pros: A superbly versatile unit that not only gives great information about antenna, but can be adapted to do many other functions and tests around the shack.

Cons: Portable only as far as you can carry a computer, but it should work well with almost any laptop.

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Double the bands for the cubical quad loop antenna.

Antenna Workshop

Peter Dodd G3LDO continues his discussion of the quad loop beam antenna by describing how to add additional band elements

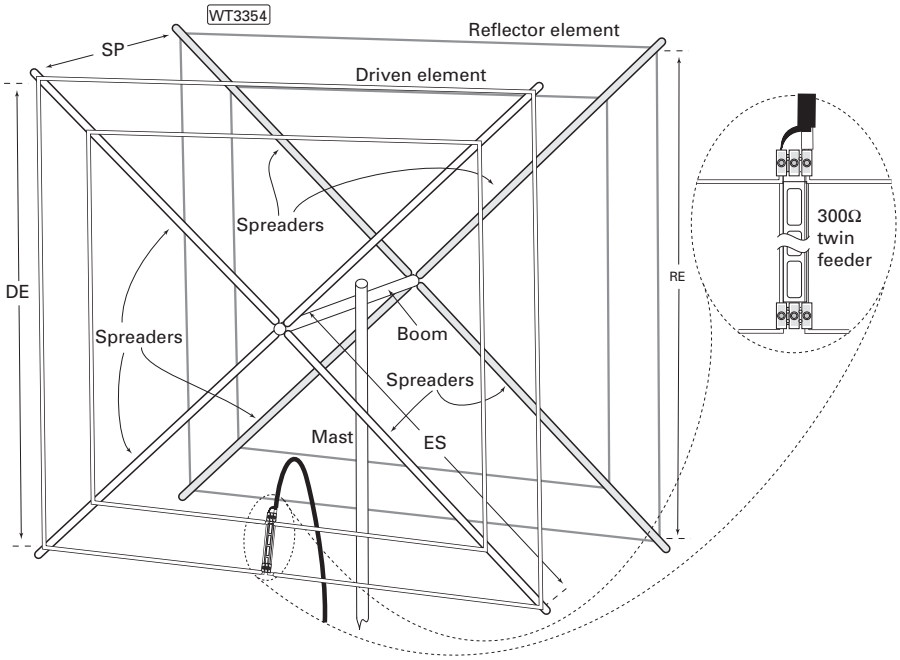

Fig. 1: Adding another band to a mono-band loop antenna. Dimensions are given in Table 1. The two separate band sections of the antenna are fed using 300Ω ladder line with the highest frequency band nearest to the feeder termination.

In the Antenna Workshops in the June 2007 issue of *PW,* I gave a description of the quad loop beam antenna and some ideas on how to construct one. This time I'll describe how additional bands can be added to our single-band version and suggest some simple ways of feeding it.

The advantage of the quad loop antenna is that it can be made into an excellent multi-band antenna simply by nesting elements for the different bands onto a common support structure. I have added an extra band, shown in **Fig. 1**, to the single band antenna of the June issue. The total area is no larger than that required by the largest beam of the group.

My first real DX antenna was a two-band quad loop antenna for 21 and 28MHz, that I constructed in 1959. That antenna was fed with the driven elements connected in parallel from a single length of 75Ω television coaxial cable. The antenna loaded without any problem on each band and the directional characteristics were also very satisfactory.

Because my experiments were so successful I formed the opinion that, for a multi-band quad loop antenna, all I had to do was connect all the driven elements in parallel and use a single feeder. However, this assumption, according to **W4RNL**, is incorrect if any one of the band elements on the antenna is harmonically related to any one other.

Frequency (MHz)		14.1	18.1	21.2	24.9	28.5
Driven Element length (DE)	(m)*	5.33	4.18	3.57	3.04	2.65
	(in)*	210	164	140	120	105
Reflector length (RE)	(m)*	5.56	4.38	3.73	3.17	2.77
	(in)*	219	172	147	125	109
Element Spacing (SP)	(m)	2.98	2.34	1.99	1.70	1.49
	(in)	117	92	79	67	59
Element support length (ES)	(m)	3.93	3.1	2.64	2.24	1.96
	(in)	155	122	104	89	77

*** Note:** These dimension are for one side of the quad. The total length of the element is four times the above figures.

Table1: Dimensions for a two-element loop beam. The dimensions have been calculated using EZNEC for a design giving a free-space gain around 7.5Bi and a front-to-back ratio greater than 15dB.

For example, for a three-band quad loop antenna for 14, 21 and 28MHz, when the antenna is energised on 28MHz the 14MHz element also presents a near matching impedance to the feeder – being a two-wavelength loop on that band. The effect is to damage the desirable quad loop antenna's directivity pattern on 28MHz. It's probable that this is the reason most multi-band quads, that I've seen, use a separate feeder for each band.

Simply Paralleling

Having mentioned that simply paralleling the driven elements could lead to inter-reaction of the elements, how would such an arrangement work for a simple 18 and 21MHz antenna I was considering? You could be forgiven for asking why I should make a quad loop antenna for 18 and 21MHz when the bulk of the DX on the upper h.f. frequencies is on 14MHz during this period of low sunspot activity. The answer is that there are two reasons for this approach.

One answer to the above question, of why 18/21MHz? is that I suffer insidious QRM on 14MHz, which has defied identification. I have made a recording available on my website if you would like to have a go identifying it. Look at **http://web.ukonline.co.uk/g3ldo** then select QRM Report on the Index page. The other reason is a constructional problem, to utilise the antenna on other bands.

I constructed my proposed 18 and 21MHz multi-band antenna as shown in Fig. 1 – but with the driven elements connected in parallel and fed using a single feeder. The s.w.r. values indicated that the matching on both bands was poor. I then tried connecting the two driven elements via a length of 300Ω ladder line feeder as shown, **Fig. 2**, which resulted in a dramatic improvement.

Recently, I've acquired a new measuring instrument, namely an AIM4170 Antenna Analyser, an instrument that works in conjunction with a computer to produce a graphical analysis of the antenna under test. Furthermore, the analysis can be adjusted to take the feeder's impedance transform effect into account, so the impedance values shown represent the impedance at the feedpoint of the antenna, as shown in the measurements of the 18 and 21MHz quad, see **Fig. 3**.

Not A Small Antenna

From Fig. 1 and **Table 1** you can see that a 14MHz quad loop isn't a small antenna. Each side of the antenna is well over 5m long and each spreader is nearly 4m (13ft) long. The lengths are provided as imperial (feet) because garden canes still seem to be sold in these units. Canes with lengths up to 10ft long seem to be easy to find.

If you are considering constructing an antenna for 14MHz the best type of structure for the fixing the spreaders to the boom is angle aluminium and car exhaust clamps shown in **Fig. 4**. The difference between the cane length and the required length can be made up with longer sections of aluminium angle. The canes, which should be first weather proofed with a couple of coats of outdoor varnish, can be fixed to the angle aluminium using hose clamps.

If you're using insulated wire for the wire elements then they may be fixed to the element supports using several layers

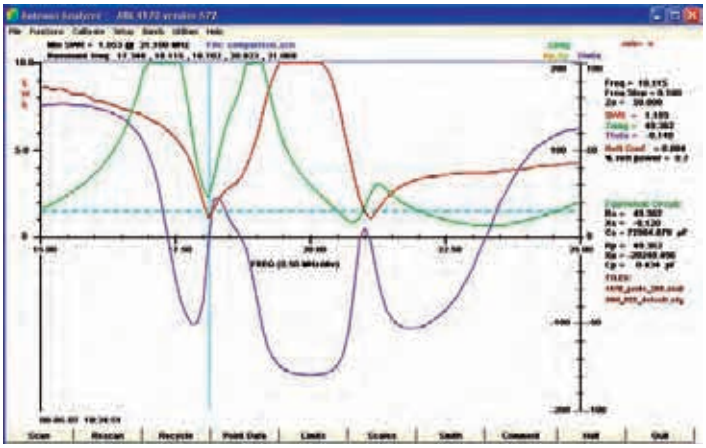

Fig. 3: Analysis for the18 and 21MHz bands, the more familiar s.w.r. plot is shown in red. The impedance at the blue frequency cursor setting is shown in polar form, magnitude and angle. The more familiar R±jX equivalent is also shown labelled 'Rs' and 'Xs' respectively.

of plastic tape. The problem is determining the exact points where the element is attached to the supports. If you add or remove some of the wire from an element during the tuning up phase then, unless the changes are very minor, the points where the elements fix to the supports will also change.

When making element length changes it's often difficult to gauge the correct distance along the support and if these distances are unequal the quad loop looks decidedly lopsided. Although a certain amount of asymmetry can be tolerated, with a multi-band antenna these asymmetries can make it look a mess.

One way around the asymmetry problem is to use a temporary fixing to of the element to the support, which can be easily adjusted until the antenna functions correctly and the structure looks right. You can use plastic clothes pegs provided that the support diameter is no larger than around 20mm.

My favourite temporary clip was bought from one of those emporiums that appear to sell everything. These clips are called mini-clamps and came on a shrink-wrapped card – eight for £1! The method of temporarily fixing the elements to the support is shown in **Fig. 5**.

No matter how carefully you follow an antenna construction plan with regard to dimensions you will be lucky if you get it right first time. It's no surprise that top DXer stations perform well because their owners spend considerable time and effort honing their antennas for maximum performance. This will involve lengthening or shortening wire elements and this is were the temporary element clips come in. When the quad is working satisfactorily the temporary clips can be replaced with a more permanent fixing.

Lower bands

An h.f. quad loop beam antenna, as described can also be used on all the lower h.f. bands, though not in its primary mode of operation. To do this, the quad loop antenna and its feeder are used as 'wire antenna' fed against earth using an a.t.u.

Fig. 2: The feeder support arrangement uses a plastic tube. This arrangement holds the feedpoint in place and holds the feeder clear of the mast when the antenna is used on the lower frequency bands. 'Choc-block' connectors are used as insulators and for fixing the ladder line to the elements.

Obviously, the method will only work if the feedpoint is off the ground and arranged so that it's well clear of the metal structures such as the boom or mast (the second reason for my method of construction). This can be achieved with feeder fixed to a plastic pipe insulated support, which holds the feeder clear of the mast as shown in Fig. 2.

My shack is located some distance from the antenna. The RG213 feeder takes a long convoluted route along the side of the house and along the inside of a hedge where it's connected to a length of RG58A/U to feed the antenna when it's in use on 18 and 21MHz bands. When used on the lower frequencies the RG213 is routed to a nearby garden shed and connected to the socket of an earthed a.t.u.

The RG58 coaxial cable from the antenna (with the inner and screen connected together) is connected to the 'wire antenna' connection of the a.t.u. As this a.t.u is the same distance from the mast as the mast is high, the coaxial feeder section of the antenna system forms a 45° sloping antenna for the lower frequencies.

The antenna elements form a considerable top loading 'capacity hat' and the antenna performs quite well on 1.8 and 3.5MHz bands. The performance of such a top loaded sloping antenna is dictated greatly by the quality of the r.f. earth connection. And in this sloping operation, it performs as well as any other wire antenna that I have tried here.

Fig. 4: Method of constructing a robust spider for a large antenna using angle aluminium and car exhaust clamps.

Fig. 5: to variations of the method of temporarily fixing a loop element to the spreaders during the tuning and adjusting phase.

Finally

This simple two-band antenna appears to work very well. It's possible to add all the higher h.f. bands to a quad antenna but the interaction of the elements makes the job of adjusting for the correct performance difficult. I plan to add additional bands to my quad loop beam antenna and I hope to make this the subject of future an Antenna Workshop. ●

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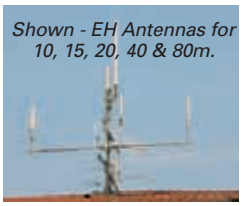

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Technical for the Terrified!

This month Tony Nailer G4CFY looks into small signal radio frequency amplifiers using transistors.

The bipolar transistor can be used as a small signal radio frequency (r.f.) amplifier to ultra high frequencies (u.h.f.), though for use as a receive front-end device, it is really limited to the high frequency (h.f.) bands. The circuit of a common-emitter amplifier with tuned input and output in shown in **Fig. 1**.

When only a moderate voltage gain is required, up to about 30 times (29.5dB), the device is usually very stable. The collector current required to achieve the best gain depends of the device but is usually in the region 1–10mA.

Typical devices suitable for intermediate frequency (i.f) and h.f. use are the types BF115, BF195, BF199, BF224, 2N2222, 2N2369A, and BSX20. These are pretty much interchangeable without changes to the biasing resistors. I'll now calculate the component values for the circuit, as an r.f. amplifier at a centre frequency of 29MHz.

The DC Biasing

The d.c. current gain of the above mentioned devices will be about 50. This means that for a quiescent collector current (Ic) of 2mA, the base current Ib will be 2mA/50 = 40μA. For stability purposes the base bias resistors should pass at least ten times the base current, though 20 times would be even better. Let the base bias be 800μA (or 0.8mA) and assume the supply rail is 12V. Then the series sum of the base bias resistors will be 12V/0.8mA = 15kΩ.

Assume that the voltage across the emitter resistor is 1V, then R5 = 1/(2mA) = 500 . For which we could use 470Ω. The actual emitter voltage will then be 2mA*470 = 0.94V.

The base to emitter junction voltage will be about 0.7V. So the base voltage will then be 0.95 + 0.7 = 1.64V. Now if the current through the bias resistors is 0.8mA, then R3 = 1.64/0.8 = 2.05kΩ. This means the resistor R2 will have (12 – 1.64) volts across it with 0.8mA flowing through it. R2= 10.36/0.8mA = 12.95kΩ.

Let me choose 1.8kΩ for R3 and 12kΩ for R2 Re-calculate to check if it will do. Vb/12V = R2(R2+R3), then Vb = 12*R2/(R2+R3). As this is a ratio we can ignore the kΩ part. Then Vb = 12*1.8/(1.8+12) = 1.565V. If I make R3 2.2kΩ and R2 12kΩ, then Vb becomes 1.86V.

The base current flowing in the base bias resistors will drop the voltage Vb by about 60mV. With R3 = 1.8kΩ the base voltage will be 1.5V, the emitter voltage 0.8V and emitter current 1.7mA. With R3 = 2.2kΩ the base voltage is 1.8V, the emitter voltage 1.1V, and emitter current 2.3mA. I will choose the latter.

The supply resistor R6 is chosen to drop about 1 to 1.5V at the chosen collector current. In this case 1/2.3mA = 435 ohms or 1.5V/2.3mA = 652 ohms. You could probably use either 470 or 560Ω.

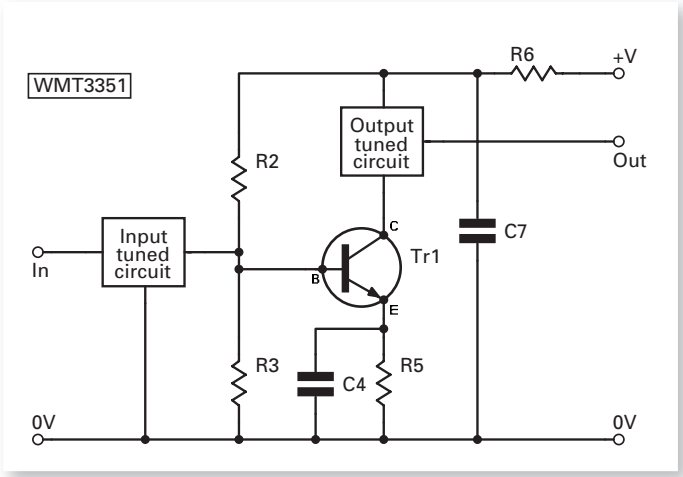

Fig. 1: The transistor and its biasing arrangements, without tuning components.

AC Conditions

The a.c. equivalent circuit is shown in **Fig. 2**. I have shown C3, C4 and C7 decoupling capacitors, which, if low enough impedance, would be considered a.c. short circuits, and normally not shown.

It's usual practice for the input impedance of voltage amplifiers to be made at least ten times the source impedance. The device then only loads the source voltage down to 90% of its unloaded level.

Bipolar transistors at frequencies up to 30MHz can have an input impedance of the order 2k–5kΩ. For general use assume 3.5kΩ. To drive the device then we need a source of 200–500Ω. Normally the input would be an antenna, which together with the use of an antenna tuning unit (a.t.u.) will present a resistance Ra of 50Ω.

Input tuned circuit

The input tuned circuit is arranged with a capacitive tap to the aerial, and the link winding to feed the transistor. I have chosen the TOKO coil 3335R, 1.2μH with a *Q* of 85. The dynamic resistance Rd of the tuned circuit will be XL*Q.

Now XL = 2*π*f*L,
so XL = 2*π*28*10^6*1.2*10^{-6}.

Fortunately the 10^6 cancels with the 10^{-6} and the rest is simply multiplied out to give XL = 211Ω. The dynamic resistance will then be Rd = 211*85 = 17.935kΩ.
The 28MHz Amateur band is 1.7MHz wide, which represents a *Q* of 28.75/1.7 = 16.9. This will require a loaded dynamic resistance of 16.9*211 = 3.566kΩ. My guess is that 3.9kΩ for resistor R1 will do the job. Let's see if this is true!

The total resistance Rt = Rd*R1/(Rd+R1) = 17935*3900/(17935+3900) = 3203Ω. This will probably do nicely.

The ratio of dynamic resistance Rt to antenna resistance Ra is equal to the square of the ratio of tapped capacitors C1 & C2. So that Rt/Ra = ((C1+C2) / C2)^2. Then the square root of Rd/Ra
= (C1+C2)/C2 = C1/(C2+1).
Putting values in, SqRt(3203/50)
= C1/C2 + 1 = 8.
C1/C2 = 8 – 1. So C1 = 7*C2.
Resonance occurs when Xc
= XL. And Xc = 1/(2*π*f*C) = 211Ω.
Changing the formula around gives;
C = 1/(2*π*f*211) Farads.
If the frequency (f) is in MHz then capacitance will be in μF.
C = 1/(2*π*29*211)μF.
C = 0.0000269uF = 26pF

This represents the series total of C1 & C2, the formula for which is Ct = (C1*C2)/(C1+C2).

We determined above that C1 = 7*C2, and can substitute this into the formula. Then
Ct = (7*C2*C2)/(7*C2+C2).
Ct = 7*C2^2/(8*C2).

The C2 on the bottom cancels with the squared on the top to give;
Ct = 7*C2/8 = 0.875*C2.
C2 = Ct/0.875 = 26/0.875 = 29.7pF.

C1 = 7*C2 = 7*29.7 =207.9pF.

Having done the calculations, it is clear that these do not match with standard component values. For simplicity I will choose C2 as 33pF and C1 as 220pF. This actually gives a total series value of 28.7pF. It also equates to ratio of a Rt to Ra of 58.8. With a dynamic resistance of 3203Ω, the antenna tap point will be just under 54.5Ω, (close enough).

The link winding of the coil 3335R is one quarter of the total turns. This corresponds to one sixteenth of the impedance. So for an Rt of 3203Ω, the transistor will be presented with 200Ω, a figure that's just about right.

Output tuned circuit

The output impedance of a transistor is of the order of 10k–100kΩ. Part of this is a small amount of collector capacitance, maybe 5pF. This is taken into consideration when choosing capacitors to achieve resonance.

I suggest we use the circuit already calculated but ignore the tap on the coil. The dynamic resistance will be 3205Ω. Now instead of using 33pF and 220pF, I have chosen 27pF and 180pF. The capacitive ratio is exactly the same, but the total capacitance is now only 23.5pF. If the collector capacitance is added in the total will be 28.5pF. Just right.

Circuit gain

The overall circuit gain is very difficult to determine in advance without proper characteristics for the transistor at the frequency of operation. Most constructors just wouldn't have this information. Also it is unlikely the data books will contain the information required for the frequency you wish to use.

All is not lost though, as you can use the ball-park values I quoted above. A d.c. and a.c gain factor β of say 50, and an input resistance rb of 3.5kΩ. The collector load now referred to as RL is 3.203kΩ.

There is also an internal emitter resistance *re* which is dependant upon emitter current, and found from *re* = 26/Ie(mA). In this case *re* = 26/2.3 = 11.3Ω.

And finally if there is any undecoupled resistance between emitter and ground it is given the notation Re. This resistor can then be used to adjust the gain of the stage.

A fairly accurate equation for voltage gain Av is; β*RL/(rb + β(Re +*re*)).

If we leave off capacitor C4 so the R5 is undecoupled then the gain will be;

Av = 50*3203/(3500+50*(470+11.3)),

Av = 160150/(3500+24065) = 5.76.

The voltage gain in dB is then $20*\log_{10}(5.81) = 15.3$dB.

If we put C4 back in, the gain becomes;

Av = 160150/(3500+50*11.3) = 39.4

The voltage gain in dB is then $20*\log_{10}(39.4) = 31.9$dB.

By making R5 a 470Ω trimmer potentiometer (trimpot), with C4 taken to the wiper, the stage gain can be adjusted to suit most applications.

Coupling and decoupling capacitors C3, C4, and C7. Let Xc = 1 / (2*π*f*C).

Now if Xc = 1Ω, then C = 1/ (2*π*f).

Tony Nailer G4CFY

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C = 1/ (2*π*29*10^6).

C = (1/182.2)μF. C = 0.00549uF, use 4.7nF.

Calculated circuit values: R1 3.9kΩ, R2 12kΩ, R3 2.2kΩ, R4 3.9kΩ, R5 470Ω fixed or trimpot, R6 470Ω. C1 33pF, C2 220pF, C3 4n7, C4 4n7, C5 27pF, C6 180pF, C7 4n7. L1 & L2 TOKO 3335R. Tr1 can be any from those listed in the text above. Combining Fig. 1 and Fig. 2 gives the complete circuit with values shown in **Fig. 3**.

I hope the exercise undertaken in this article is within the scope of followers of Technical for the Terrified and that it will encourage you to have go at design of tuned transistor stages. ●

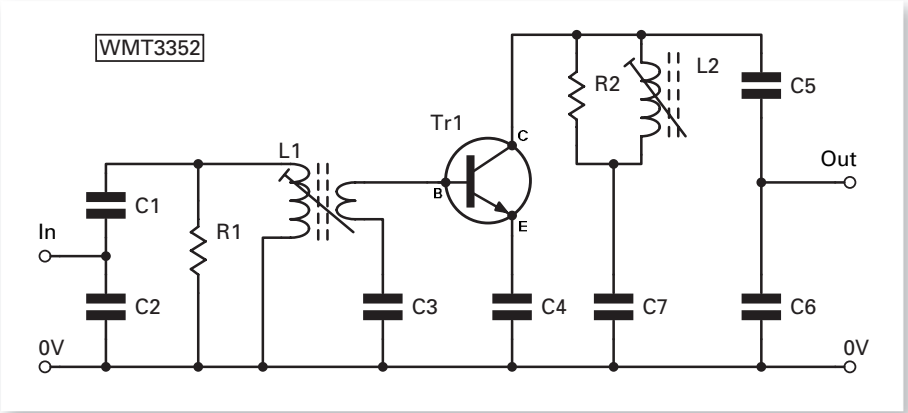

Fig. 2: The amplifier with only those components affecting frequency, matching and Q.

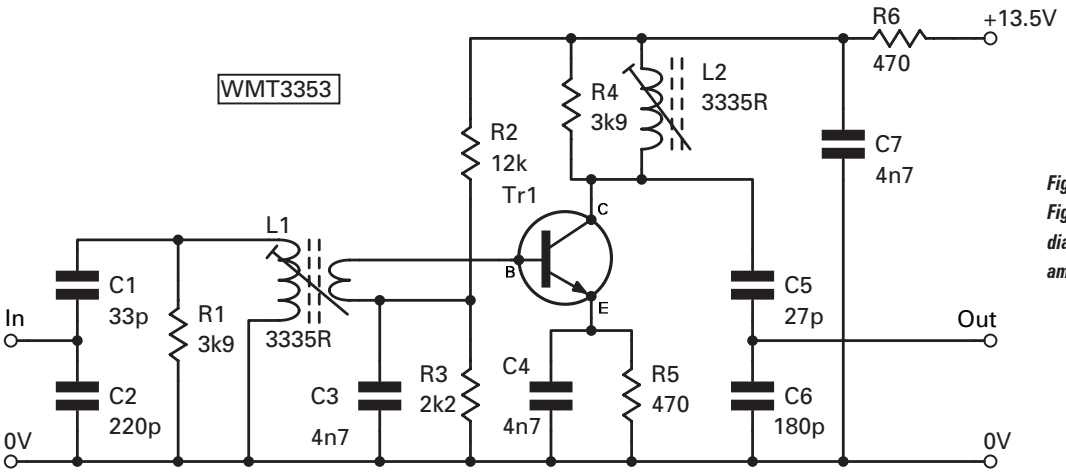

Fig. 3: Combining both Fig. 1 and Fig. 2 gives the overall circuit diagram of a transistorised r.f. amplifier.

Another look at monitoring s.w.r. levels.

Carrying on the Practical Way

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This month the Rev. George Dobbs G3RJV says he's, "Chatting about s.w.r. meters again" and there's no doubt it will be an interesting read – complete with a small project to put theory into practice – after digesting the appropriate quotation!

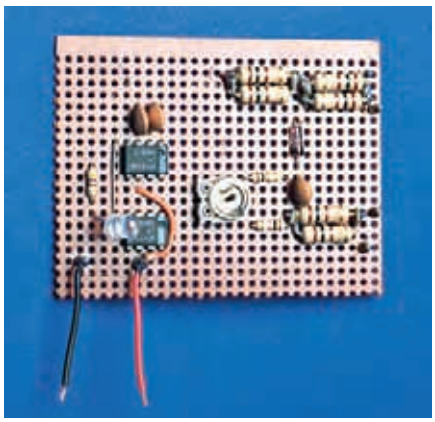
"Nothing right in my left brain. Nothing left in my right brain."
From a postcard

In a vain attempt to increase my drawing ability, I've been reading a book on perception, or how we see things. The book relies heavily on the 'right-brain – left-brain' theory. This is based on the premise that the left and right hemispheres of the brain process information in very different ways.

The concept of right-brain and left-brain thinking developed from the research in the late 1960s of an American psycho-biologist **Roger W. Sperry**. He discovered that the human brain has two very different ways of thinking. One (the right brain) is visual and processes information in an intuitive and simultaneous way, looking first at the whole picture then the details.

The other (the left brain) is verbal and processes information in an analytical and sequential way, looking first at the pieces then putting them together to get the whole. Sperry was awarded a Nobel Prize in 1981, although subsequent research has shown things aren't quite as polarised, or as simple as they were thought to be!

The thesis of my drawing book is that every mind can work in left-brain or right-brain modes. The left-brain is sequential, analytical and logical, preferring to name and measure things. The right-brain is simultaneous, intuitive and holistic,



preferring to see the bigger picture. It suggests that in order to draw things the subject to be drawn has to be seen in the right-brain mode. I may let readers know how I progress!

However, my art work led me to muse on my Amateur Radio construction – is it a left, or a right brain pursuit? As a technological hobby, I would assume it to be left-brain oriented but a lot of the Amateur Radio construction I have seen has been very creative.

The constructor takes the circuit diagram and using ad hoc techniques – such as 'ugly' construction or perf-board – and produces a finished project, which reflects the builder's own imaginative skill. This is why I am always telling Radio Amateurs that they don't need to be a technical wizard to build their own equipment. It's enough to leave the design and calculations to those who know about these things and simply enjoy the fabrication of your own equipment.

When people accuse me of being a "technical author", I fervently deny the accusation! I am just a Vicar with a soldering iron who enjoys making things and sharing it with others and I have no formal technical training. What theory I have has been picked up on the 'hoof' or sought out from books when things go wrong. So, to have a lot of enjoyment, a radio constructor needs only gather some parts, plug in the soldering iron and exercise the right-brain!

What I've just stated is also true in much of the application of Amateur Radio equipment. In the same way that we don't need to know the theory of the internal combustion engine to drive a car, most Radio Amateurs can get away with a fairly subjective knowledge of radio frequency theory. This is well illustrated in the use of standing wave ratio (s.w.r.) measurements to match a transmitter output to a particular antenna.

In the past I've listened, with interest, to talks with titles like "What is s.w.r.", or "The truth about v.s.w.r. measurements." I emerge somewhat wiser but still knowing that if I use even a simple s.w.r. meter between by antenna tuner and antenna, I can achieve better results. So, this month I thought I might take another look at the resistive s.w.r. meter – the easiest version to build.

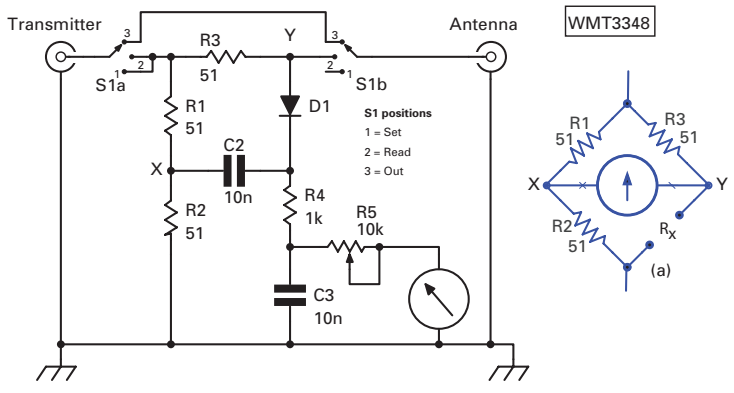


Fig. 1: The circuit of a low-power Wheatstone bridge s.w.r. meter. To reduce the waste of precious r.f power, switch position 3 by-passes the bridge completely.

Typical Circuit

The circuit of a typical resistive s.w.r. meter is shown in **Fig. 1**. It's based on the principle of the Wheatstone Bridge. Oddly enough, the Wheatstone Bridge was not invented by someone called Wheatstone! Instead, it was invented by **Samuel Hunter Christie** in 1833 and **Sir Charles Wheatstone** improved and popularised it in 1843.

A Wheatstone bridge is a circuit made of two voltage dividers connected in parallel with the same power supply or signal. The midpoints of the two voltage dividers are connected with a voltmeter, often a centre zero meter, between points X

and Y. The insert drawing as Fig. **1a** shows the basic arrangement, using the values in our s.w.r. meter.

When R1 equals R2 and R3 equals the unknown value, the bridge is said to be balanced because no voltage appears between X and Y. Because the measurements are usually made using the null point (no voltage detected between X and Y) it can be a very sensitive instrument.

In Fig. 1, 50Ω resistors form three sides of the bridge, the fourth being the antenna. The points X and Y in Fig.1 refer to the same places as X and Y in Fig. 1a. Because the resistors in the bridge are handling the signal from the transmitter, they must have a suitable power rating to match the transmitter output power.

Combination of parallel or series and parallel resistors may be used to achieve the required power dissipation needed in low power (QRP) applications this should not be a problem. When all four sides (or the 'arms') of the bridge are of equal resistance the circuit will show a null reading on the meter. Since the bridge is powered by the radio frequency signal from the transmitter, it has to be converted to a d.c. voltage for the meter reading and D1, C2, R4 and C3 make up a peak voltage detector circuit.

A two-pole three-way switch (S1a and S1b) is required for the operation of the circuit. When the switch is in position 1 (**Set**) the antenna is switched out of the circuit causing a mismatch and a high reading on the meter. This position can be used to set up the meter – by adjusting R5 – for full scale deflection. When the switch is in position 2 (**Read**) the antenna is in the circuit and the s.w.r. meter is ready for use.

An antenna tuner unit (a.t.u.) placed between the transmitter and the s.w.r. meter, can be adjusted for a null reading in the meter. When the null occurs, the antenna is matched to the nominal 50Ω impedance of the transmitter.

Position 3 on the switch reveals one of the disadvantages of this type of meter. During measurements, the resistance of the bridge is in the path between the transmitter and the antenna and this will result in a dissipation of some of the transmitter power. The loss of r.f. power from a QRP transmitter is wasting some of the small amount of available power. Because of the disadvantage, Position 3 (**Out**) is added so that the bridge can be by-passed during normal use of the transmitter and this means that s.w.r. meter is not available during normal use of the transmitter (to monitor s.w.r. during transmission).

No Problems Building

Building the s.w.r. bridge should present no problems – you only need to ensure the resistors can handle the transmitter output. Indeed, it's a simple project and I've sometimes built this circuit on the back of a four-pole, three-way, wafer switch using the contacts from the two unused switch sets as tags to mount the other components. Ideally, D1 should be a germanium diode and the meter can be one of the small edge-reading moving coil meters available on the surplus market.

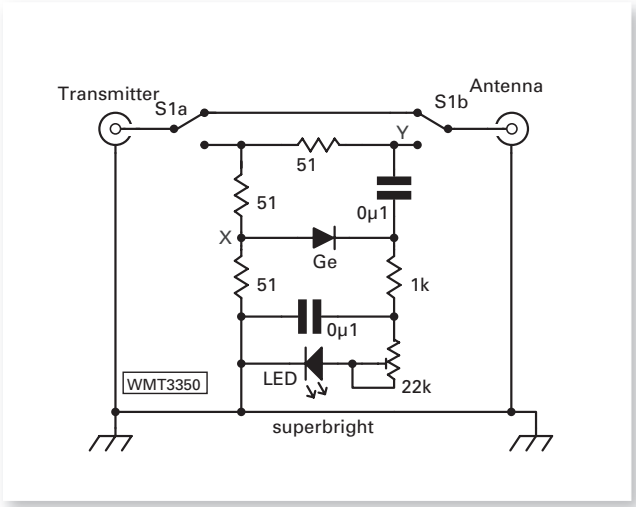


Fig. 2: Using the 'hyperbright' l.e.d. as an indicator, rather than a meter, is both effective and cheap.

Some constructors may consider that the use of a moving coil meter is adding an unnecessary cost to the project. The diagram, **Fig. 2**, shows a meter-less version. In this circuit the meter is replaced by a 'superbright' light emitting diode (l.e.d.) (I first saw this circuit idea in an article in the G QRP Club journal *Sprat*, which was contributed by **G0WQR**.

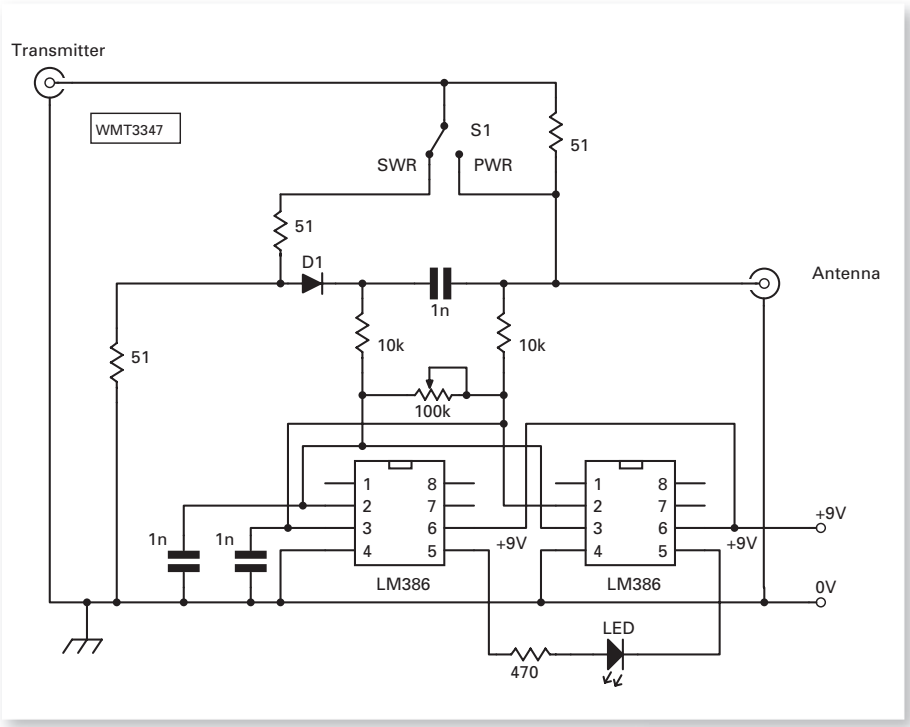


Fig. 3: Adding two LM386 i.c.s amplifiers gives a more accurate indication of the null point.

Interestingly, the superbright l.e.d. is remarkable because it will still glow when handling current of 10µA or less. The principle is the same as Fig. 1, but tuning for minimum s.w.r. will extinguish the l.e.d. However, this is a simple circuit that works very well.

For greater sensitivity, readers might like to try the circuit shown in **Fig. 3**. I first saw this in *Lo-Key*, the magazine of the **Australian QRP Club**, although they claimed that the source was **WA7JHZ**. In this circuit two LM386 integrated circuit (i.c.) audio amplifiers are used as d.c. amplifiers, with a voltage gain of 20, to drive the l.e.d. indicator.

Some readers may say, "Isn't that extravagant?" In answering – the last time I bought some LM386 chips, they were 50p each!

The 100kΩ sensitivity control is placed across the inputs of the two LM386 chips. The circuit shows only a single change-over switch to choose either s.w.r. reading or power out reading. In practice, I would be tempted to add another switch to bypass the s.w.r. meter, as in Fig. 1. Build it, try it and see – and get both sides of the brain working!

and Y. The insert drawing as Fig. **1a** shows the basic arrangement, using the values in our s.w.r. meter.

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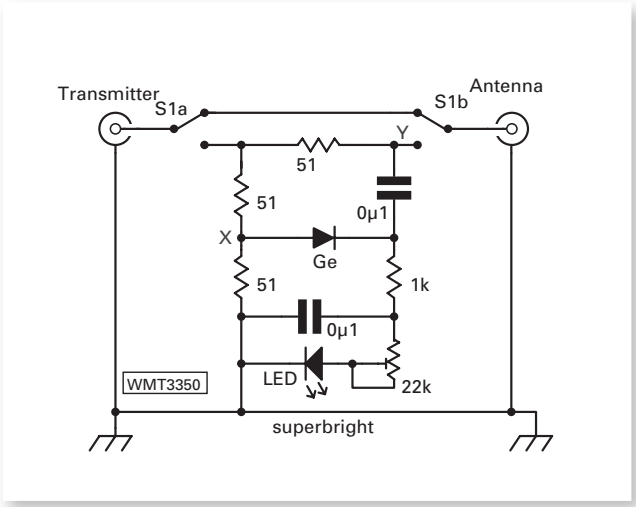

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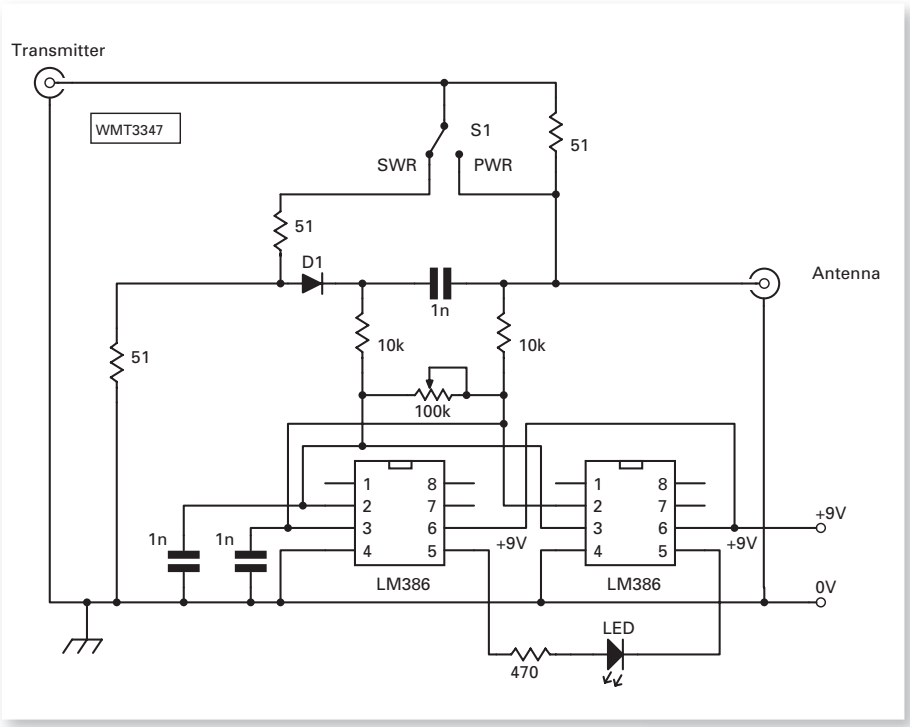

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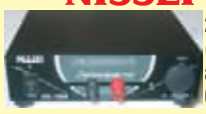

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132m (4.4mm) nylon guy (480Kg) £40.00

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A simple to fit but very handy mast pulley with rope guides to awvoid tangling. (Fits up to 2" mast) ..... **£8.99** + P&P £4.50

30m pack (4.4mm) nylon guy rope £12.50
132m roll 4.4m nylon guy (480Kg b/f) ..... £40.00 Del £7.50

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500kg brake winch. BARGAIN PRICE

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Winch wall bracket £19.99

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

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

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SET PRICE **£29.99** Del £12.50

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10 foot (collection only) 2" £29.99
2.4m (2") Ally pole 24.99
5 foot (2") Ally pole £9.99

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Fits most handies. Alinco, Kenwood, Yaesu.

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DB-770H (BNC)

2m/70cm Tx + wide Rx. High gain up to 5.5dB.

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P&P £4.00

The Stroke Alternative a station with a difference!

I've always had a natural tendency to take an alternative view of any radio related problems I might have. This one is no exception. I wanted to do some portable style operation, but have fixed station performance or better. So I started to gather a few thoughts - which were:

* Typical portable and backpack style operations often have a limited power source.
* Typical antennas for portable operation are often poor l.f. performers.
* There may not be a convenient tree or building to hang a full sized wire antenna.

In an attempt to get all bands to work well with as little compromise as possible - my Stroke Alternative station began to take shape. My idea was to have a portable structure but with a large enough power source and a large enough antenna to get good performance. An old two wheeled shopping trolley frame looked like a suitable candidate and so work began. The photographs of **Fig. 1, 2, 3** show the start.

The Basis

The basis for the 1.8-50MHz system revolves around an old aluminium CB antenna, extended to create an eight metre long vertical though retractable to about one metre for ease of storage and transportability. The original 27MHz matching transformer can be discarded and the SO239 connector connected directly to the vertical element. The performance of this antenna has been extremely pleasing, even when used at a fixed location.

Fig. 1: With the Rucksack out of the way, the basic set-up can be seen.

At first glance the antenna seems far too small for the lower h.f. bands. But losses are lower than you might think. Remember there's no real cable loss, it's virtually eliminated due to the inherent design of the Stroke Alternative system. The other kind of cable loss – known as mismatched line loss – is also virtually eliminated.

Fig. 2: the rig, automatic tuner and manual tuning components in action at the top of the trolley.

My seaside location reduces ground losses by some 20dB compared to an antenna used inland. A small antenna by the sea will outperform a large antenna over a poor ground, resulting in a better signal than many fixed stations.

The system may at first seem over-engineered but my system grew 'organically'. In some cases it may be best to view the antenna dimensions and replace my impedance matching circuits with one of your own designs or making.

For 144MHz I have a simple 3-element Yagi, constructed from an old Band II v.h.f. broadcast antenna. I also have a Slim Jim, inserted into some suitable water waste pipe, for vertical operation on this band. This antenna is inserted into the top

Andy Foad G0FTD shows his enthusiasm for Amateur Radio as he describes his shopping-trolley portable station.

of the lower section of the main antenna. The hose clip is then tightened to fasten the system, photographs **Fig. 4, 5** and **6** show more details.

Antenna Modes

Let's now look at some of the modes the main antenna works in and start with 50MHz. For operation at 50MHz the vertical antenna is retracted to become a quarter wave vertical element (3m long).

The other half of the system was about one metre of the trolley framework to form a slightly undersized dipole. The base of the old CB antenna and it's U-bracket forms a natural capacitor which is about 60pF. (This very close to being a 50Ω reactance at 50MHz).

In order to fine tune the reactance of the U-bracket and create a perfect match, an additional parallel capacitor was added across the feed-point. It's important to have a capacitor with the lowest minimum capacitance value for this to work properly.

The auto tuner is kept out of line (see below) as it was found to upset the matching – even in bypass mode. The results were then perfect, as the antenna both tunes and works very well.

Now I'll describe the antenna's action on the 7-28MHz bands, with the antenna fully extended to eight metres. Two 2.5m wire radials are used to form a vertically polarised off-centre fed dipole. And while these might seem rather short, the performance is outstanding! The radials plug into an earthing point located at the bottom centre of the equipment plate. It's also the most convenient in terms of radials. For the higher h.f. bands I used an auto a.t.u. for speed and maximum versatility.

I've also left the variable capacitor in circuit as it forms a neat way of being able to add better matching. Remember, that an auto a.t.u. uses a set of fixed value combinations to form a match and there are times when a value in between the fixed values would be better. The variable capacitor across the feed-point gives us a manual means of overcoming this problem. For this capacitor, a value of 5-150pF and is used to tune from h.f. to 50MHz.

The voltage rating of the variable capacitor is 250V and doesn't flash over when running 100W, though I've used only 2W to work Californian mobiles on 18.1MHz several times. I've had very good results too on 7 and 10.1MHz with this system, with which I can usually hear WWV and BPM everyday (the American and Chinese standard time and frequency stations). The best results are when using the 2.5m radials and nothing longer is needed.

At the time of writing I hold a 5MHz permit. So, I wanted to operate in this band to see how it could be used for emergency operation. Two quarter-wave wire radials are used here. The auto a.t.u. and the variable capacitor are used here to perform a match.

On the 3.5MHz band, the antenna is highly reactive

Fig. 3: The antenna base mounting plate is fitted to the fold-over handle.

Fig. 4: Photographed on a brisk winter's morning as the v.h.f. Yagi antenna is tried out.

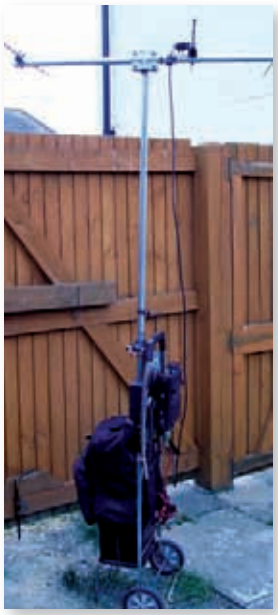

Fig. 5: The Yagi antenna again, against the fence to give you an idea of its height.

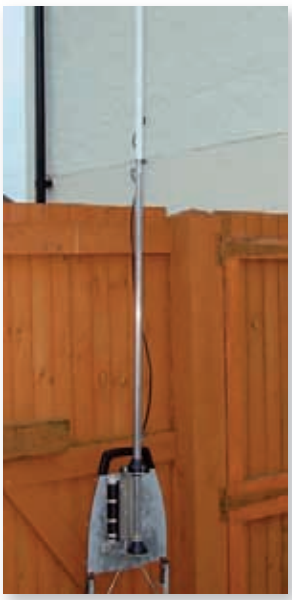

Fig. 6: My other 144MHz antenna is a Slim-Jim inside a section of white plastic water pipe.

Fig. 7: A closer look at the antenna mounting plate with the two tuning capacitors and the base-loading coil on the left-hand side.

Fig. 8: A close look at the battery and the supply leads.

COMET

HF antennas for any location

Comet H422 in use at GB0SH Strumble Head Lighthouse with Matthias M1DCV and Oliver MW3SDO.

H 422
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.

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CWA 1000
Trapped Dipole

• Operating bands	80, 40, 20, 15, 10m
• Maximum power	500W PEP
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Covers 80m to 6m with no ATU and no gaps

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- Transmit 80m through to 6m
- Receive 2 MHz - 90 MHz
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- Rated at 250W PEP
- Only 7.2m high, weighs a mere 3.2kg
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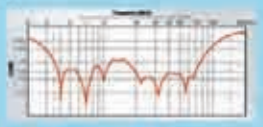
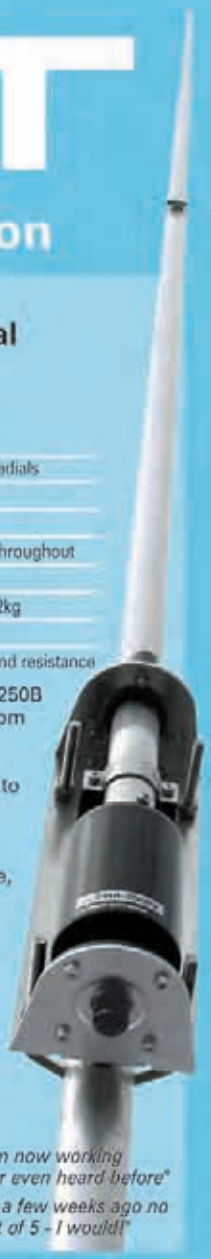


£299.95 P&P £10



Our customers say:

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

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GP9	144/430 MHz 8.5 / 11.9dbi 5.15m	129.95
GP15N	50/144/430 MHz 3 / 6.2 / 8.6dbi 2.42m	89.95
GP98	144/430/1200 MHz 2.94m long	129.95

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M24M	144/430MHz 1.7 / 4.17dbi 0.48m Long	24.00
M725	144/430MHz 1.7 / 3.5 dbi 0.52m Long	24.95

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CHS14	14MHz 0.95 long 250W	29.95
CHS21	21MHz 0.95m long 300W	29.95
CHS28	28MHz 0.95m long 300W	29.95
CHS50	50MHz 0.95m long 300W	29.95
HA035	3.5MHz 1.13m long 120W	39.95
HR50	50MHz 2.13m long 200W	39.95
UHV4	28/50144/430MHz 100/200W 1.39m long	69.95
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VHF/UHF Mobile Whips PL259 Fitting

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CHL350	28/50MHz 2.16m long 200W	39.95
SB14	50/144/430MHz 1.08m long	39.95
SB15	50/144MHz 1.53m long 120W	39.95
SB82	144/430MHz 0.46m long 60W - black	19.95
SD84	144/430MHz 0.92m long 60W - black	29.95
CS87500	Super Beam mobile whip 144/430Mhz	41.95
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CHF8	1/6 3.5/28/50MHz 74cm L 10W or Yaesu FT817	39.95
RX5	144/430/900MHz 44cm L 8W SMA	26.95
RX7	144/430/900MHz 44cm L 8W BNC	27.50
SH95	144/430/1200MHz 37cm L 10W BNC	27.95
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RS730	Trunk lip Mount adjustable	19.95
RMS	Magnetically mounted Gutter Clamp	25.00
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3D4M	4 metre cable SO239 to PL259 plug	15.50

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CF503C	50/144MHz Sockets SO239 - PL259/PL259	34.00
CF530C	50/144MHz w/leads SO239 - PL259/PL259	34.00
CF530A	50/430MHz w/lead PL259 - SO239/SO239	34.00
CF4160B	144/430MHz Sockets SO239 - PL259/PL259	29.00

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CFX431A	144/430/1200MHz N socket/PL259/N/N	46.00
CFX514N	50/144/430/MHz SO239/PL259/PL259/N	47.95

Baluns

CBL30	Balun (1:1) 1.7 - 30 MHz 1kW	21.95
TF400	Current balun 1:3 - 500MHz 400W	59.00
TF1800	Current balun 1:3 - 500MHz 1.8kW	69.00
TF5000	Current balun 1:3 - 500MHz 5 kW	79.00

Low Pass Filters

CF30H	Low Pass Filter 32 MHz 2kW	79.95
CF30MR	Low Pass Filter 32 MHz 1kW	29.95
CF30S	Low Pass Filter 32 Mhz 150 Watt	19.95
CF50MR	Low Pass Filter 57 MHz 1kW	29.95
CF50S	Low Pass Filter 57 MHz 150W	19.95

Line Noise Filters

TRF15	AC/DC line filter 15amp	64.95
TRF20	AC/DC line filter 20amp	69.95
TRF30	AC/DC line filter 30amp	89.95

Dummy Loads

D21M	Dummy Load DC- 600 MHz 100W PEP	18.50
DL1500C	Dummy Load DC- 600 MHz 1.5kW PEP	169.00

Earphones

H20F	Clip over earpiece - Yaesu Icom etc	12.50
H20K	Clip over earpiece - Kenwood	12.50

Lightning Arrestors

CS400P	Lightning Arrestor DC- 500MHz 500W	17.95

SWR/Power Meter
CD300H
1.8 - 30MHz 30/300/3kW
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Fig. 9: The hydrometer's density scale gives a better indication of the effective states of individual cells in a battery.

Fig. 10: The home-made balun fits into the plastic box with 4mm sockets as connectors.

Fig. 11: The field strength meter sits on a small plastic bracket on the vertical element of the antenna.

(being a little on the small size) and the auto a.t.u. starts to run out of steam. An inductance (18μH) can be used to base load the antenna and change the impedance to something the auto a.t.u. can handle. You can see the tapped inductor that I made on the main equipment plate in the photograph of **Fig. 7**.

The distance between the plate and the inductance shouldn't be too close. I used 20mm stand-offs that showed no effect on the inductance value. The 15m long radials are again in operation, giving excellent results even out in the back yard, with daytime coverage of the UK and northern Europe. In winter nightimes and operating from the beach. Seeing the S-meter needle showing S9+40db from north American stations is a big thrill!

On the 1.8MHz band, the 15m long wire radials are again used with a series inductance at the base of the antenna ands using the a.t.u. though it proved tricky to obtain a match. Sometimes, the variable capacitor would flashover when using more than 20W so, I bought a variable capacitor with an higher working voltage – it was rated for 750V.

At this point I decided not to use the auto a.t.u., forming an L-match with the new capacitor and the base loading coil. This variation was good way of obtaining a match with ease, using simple leads with 'banana' plug connectors for the interconnection. As the new capacitor has a slightly higher minimum capacitance than my original one, it no longer tunes the 50MHz system.

With the limitation of the new capacitor in mind, I've kept both variable capacitors on the equipment mounting plate so, that either can be inserted in-line. Each capacitor has a short wander lead fitted for this purpose, taking only a minute to swap them around. With the Stroke Alternative parked in my back yard, I could work around Europe and the UK easily even with low power on 1.8MHz.

Longer radials?

I expect some readers are wondering why I didn't use longer radials, such as full-sized quarter wavelength radials for the l.f. bands? Quite simply I think there's no point. Longer radials don't perform any useful function when they're longer than the main radiating element. (Earth stakes have proved ineffective too.) The soil conductivity and an earth stake may be good enough for low frequency, but at h.f. radio frequencies and above, the soil is far too lossy.

The two 15m radials I use just happen to be convenient lengths of wire I had to hand and I've left them as such. My view about longer radials on the h.f. bands is that they seem to send the radiation up at a high angle, a situation that's not much good for DX.

The off-centre fed system as I'm describing here is efficient, it provides a more uniform impedance over a given frequency range and the antenna can still radiate properly at low angles. Both practical tests and computer models have confirmed this.

Power Source

Now to consider the power source as shown in **Fig. 8** for which I considered both lead-acid and Gel-cells (filled with a 'jellied' electrolyte and reputed to be the safest). However they're expensive as are the suitable chargers (£120). Lead acid batteries are actually very safe – so long as the cell caps are done up of course! I did a roll-over test on the batteries and found that there was no electrolyte spilled.

In fact, I could only get a very small spillage if I tipped the battery hard over on the side towards the gas vent. With this in mind, I'm happy to use these as suitable for a power source **but my decision is no excuse for not taking suitable precautions where corrosive acid is concerned**. So please take care!

Fig. 12: Fishing line winders, often called 'crab-lines' are ideal to wind the radial wires onto.

Fig. 13: The Morse key in action strapped onto a leg (mine!).

Fig. 14: The microphone plug about to be fitted into the storage container made from a 35mm film canister.

Fig. 15: a closer look at the hole and slot cut into the canister's lid.

A 44Ah battery provides a solid five hours of s.s.b. talk time at 100W. In practice it lasts considerably longer when only making a few QSOs or when using low power.

I often pop out to the beach for a couple of hours of operating where I usually get about four afternoon's operating sessions from the battery before a recharge is needed. With a cost about £26 for a 44Ah battery and suitable chargers available for under £15 this combination represents good value for money.

When using batteries as a source of power for operation, I've noted some strange interactions between the low voltage and the transmitter. When operating with a battery that's almost in need of a recharge, my rig has appeared to function incorrectly. I've also noticed that the power output stage has become non-linear, resulting in a very poor and distorted signal.

Some clues to the poor output quality, have shown themselves as the peak power output hasn't shown on the meter. Or the r.f. power output has shown maximum at the start of an over but soon afterwards has started reducing. The **ALC** display on my IC-706 often starts to show higher readings when the battery is getting low.

When using lead-acid batteries, I **do not** rely upon the charger's status lights or even a voltmeter to show the state of the battery's charge. Such readings have often been proved to be highly misleading.

Keep the battery topped-up with a regular charge when not in use, don't leave standing for weeks unused or uncharged, as it this will result in premature battery failure. I've found that an overnight charge once a week is best if you intend have the battery unused for long periods.

When using a normal lead-acid battery, it's a good idea to invest in an hydrometer to check the battery's state of charge. An hydrometer, **Fig. 9**, is usually available from a good motor factors shop at about £14. It looks like a large plastic syringe with a float inside.

Although an hydrometer isn't cheap, it can show the relative states of all the cells in the lead-acid battery. The relative states of and the probable state of charge of each cell in a battery may be checked by comparing the density readings of the acid in each cell.

I have also learnt that a lead-acid battery loses 1% of it's capacity with every degree below 25°C operating temperature. This is useful to remember if you are into winter expeditions and why you have more problems starting your car in the winter!

Bits & Pieces

For storage and transportation of all the equipment, I use a rucksack, sitting on top of the battery and fastened at the top of the trolley frame. I have also added a single 12V cigar lighter socket to the top panel of the frame. This enables me to tap into the car battery easily for accessories. A map reading light is used in this socket for night time operation. It can also be used to power a mobile phone charging adapter or a handheld rig.

A combined 1:1 and 4:1 balun, **Fig. 10**, was made up for added versatility when playing with other antennas and feed lines. This can also be used for impedance matching. In such cases, it's the impedance transformation ratio we make use of, rather than the balancing effect.

I also carry a PMR446 handheld. This is useful when a group gets together at the same time but spread out across a field or length of beach. It can also be used to talk in curious visitors who want to see the real thing after you have just worked them. Spare fuses and any other tools can be included. I also carry a small field strength meter (f.s.m.), which is held in position at the base of the antenna element by a plastic bracket, **Fig. 11**.

Fig. 16: The LDG Z100 automatic antenna tuning unit in the 'normal' operating position.

Fig. 17: The Z100 swung away from the body of the rig so, that you can see the clips mounted on the upper side of the tuner unit.

The f.s.m. helps me to tune 'on the nose' when used with the variable capacitor across the feed-point (as previously described). For convenient and compact storage of the wire radials I use 'crab line' formers, **Fig. 12**. These are usually available from fishing or some hardware shops for as little as 50p to £1.

I use an Army issue Morse key from the Second World War, that was given to me by an old friend. It's mounted on a pair of straps that wrap around a leg as shown in the photograph, **Fig. 13**.

I also carry a pair of portable music player style earphones when external noise sources become a nuisance. These are the kind that pop in the ear as such storage and weight problems are minimised. Regarding excess weight, I think of my storage rucksack as military personnel would. Every item is carefully considered for space and weight. Like the military, I have no intention of carrying more baggage than I have to!

Connector Protection

If your rig uses the now favoured RJ45 telephone style connector then it's wise to think about protecting it. I learned the hard way about the problem of these connectors. (It's tempting to put the microphone in a jacket pocket or a rucksack for quick storage). However, what can happen to the plug in this situation, is that the small plastic latching lever gets caught on something and snaps off.

To overcome the problem of damage, I take an old 35mm film canister and drill a hole in the centre of its cap. Then carefully, I cut across the cap from the edge to the central hole and push the cable and connector into the cap and fasten the cap back on to the

canister as shown in **Fig. 14** and **Fig. 15**. I don't suffer from any r.f. feedback using 100W on any band, the clip-on ferrites are simply there for good measure.

For my automatic antenna tuning unit (a.a.t.u.), I chose the LDG Z100 unit because it was very compact. Obviously this is very important for my Stroke Alternative station.

Using two microphone hooks placed on the top of the LDG Z100, in combination with the bail-arm stand of my IC706 makes a very good mounting arrangement. This method of non-destructive mounting means that you haven't devalued the a.t.u. should you come to sell it at a later date. Photographs **Fig. 16** and **Fig. 17** show the arrangement.

Performance is fantastic, even from my back yard but on the beach, **Fig. 18**, performance can only be described as awesome! Remember the difference in attenuation between sea water and land based earth is usually about 20dB at very low angles. So, if you can make it to a seaside QTH then do so. It makes a world of difference that has to be seen to be believed. It's also so good to get away from all the noise sources too when portable.

Centre Of Attention

I usually operate from the beach for best results, where I often find myself at the centre of attention by onlookers keen to know what I'm up to. Oddly enough the biggest attraction seems to be Morse!

The sound of Morse seems to draw in the crowds much more than the voice of some distant station half way across the planet. Teenagers are fascinated by it and so too are the old timers who come over for a chat. It seems to be a good advert for Amateur Radio.

Hopefully this article has got your imagination working by now! No doubt there are other situations that the trolley idea could be applied. It could form the basis of a short-wave listening (s.w.l.) station,or a self contained emergency set up.

An old laptop could be pressed into service for the data modes. It just takes imagination. No longer do I dream of constant streams of reports about how good my signal is. They just keep on coming and coming. ●

Fig. 18: All ready for a day at the beach, a yacht mast pokes up above the groyne, in the background behind the Stroke Alternative station.

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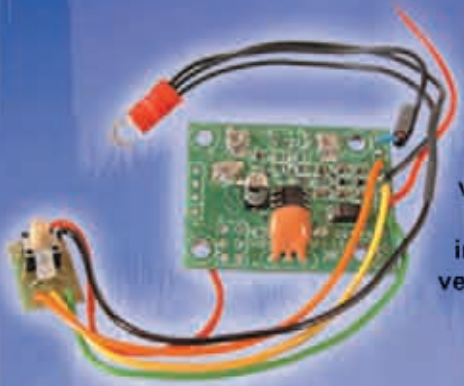
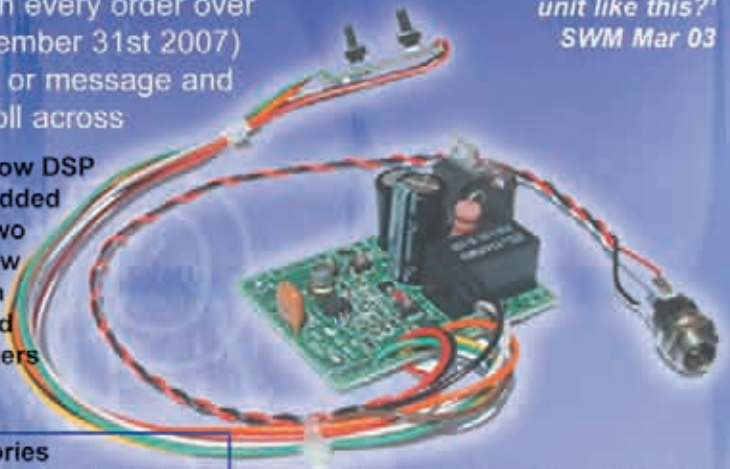


These small modules allow DSP noise cancellation to be added to existing equipment. Two versions are available, a low signal level for integration into radios and an amplified version for extension speakers



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'When you are communicating with weak and noisy QRP stations, the bhi add-on DSP filter could be worth its weight in gold' RadCom Dec 03

Radio mate £99.95

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Pocket references for Yaesu FT817, VX-2, VX-5, VX-6 and VX-7 £9.95

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NEDSP1062-KBD £104.95

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The Radio Mate compact keypad for the Yaesu **FT817**, **FT857** and **FT897** enables the user to get the best out of their radio. It has been designed to make many of the common functions quick and easy to use. The keypad does this with a number of fast, effective shortcuts.

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In the Shop with Harry Leeming G3LLL

This month, Harry Leeming G3LLL describes a useful method for making a 2-element delta loop antenna switchable, discusses the use of headphones and mentions the potential safety hazards when using a.c/d.c. equipment.

In the last session 'In The Shop' I discussed how at my previous home I had constructed, a 2-element high frequency (h.f.) fixed Delta Loop firing towards the USA. Of course, human nature is never satisfied and so I puzzled as to how I could reverse the direction.

Switches and relays mounted on the roof seem a recipe for trouble and then I realised that a length of feeder an exact multiple of half waves long has an special characteristic – whatever impedance is presented at one end, is duplicated at the other. This made me realise that by running a length of twin feeder from the reflector, I could switch it on and off from the shack.

To keep the loses as low as possible I used a length of slotted ribbon feeder. This has a velocity factor of about 90%, which means that it is about 10% longer electrically than it is physically. Fortunately the shack was near to the antenna and so a half wavelength of feeder was quite sufficient.

At 14MHz a half wavelength less 10% worked out at just over 10m (30ft), and so to be on the safe side I cut a length of around 35ft and attached this to the reflector. I then wired a one-turn loop to the shack end and measured the resonant frequency of the reflector plus feeder with the dip meter as before. It was of course too low and so I started to trim the feeder until once again the reflector was resonant just below 14MHz.

With the ribbon feeder short circuited the beam then worked as previously but if I open circuited the connection it became bi-directional and European and Mediterranean stations came up a couple of S-points. But how about getting some gain to the east?

Reflector As Director

I presumed that it should be possible to make the reflector work as a director and so I tried connecting an ex-broadcast receiver variable capacitor in series with the one turn loop as per **Fig 1**. Sure enough, with the capacitor at maximum I got resonance at around 13.8MHz, and with it towards minimum I could tune it to the higher frequency (14MHz) of the 20 metre band. Unfortunately, it didn't seem to peak up very sharply as a director and did not make much difference to the v.s.w.r.

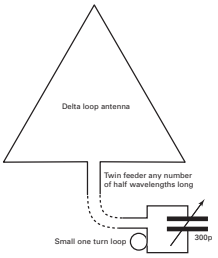

Fig. 1: An experimental tuneable delta loop element with a small coupling loop for checking resonance.

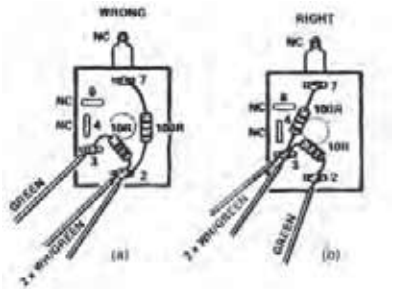

Fig. 2: Modifying the headphone wiring that's unable to switch off the internal speaker.

Another visit to the roof resulted in the parasitic element being moved, so that while the spacing was still 1.23m (4ft) at the top, it was now reduced to 1.85m (6ft) at the bottom. This really worked, and adjusting the cap then beamed reception and transmission east or west.

The front-to-back ratio was only about 2 or 3 S-points but that made a world of difference when trying to copy some weak DX stations. The v.s.w.r. varied from around 2:1 to 1:1 but as I fed everything from my antenna tuning unit (a.t.u.) this didn't matter. Later I fitted additional driven element loops for 21 and 28MHz (15 and 10 metres) and fed them in parallel with the same coaxial cable. A reflector was also installed for the 15 metre band.

What I've described isn't meant to be a full blow-by-blow DIY article but I hope it inspires someone to 'grow his or her own'. Incidentally, I've mentioned a few times the use of a dip meter, this being an instrument that might not be all that familiar to some Amateurs – it's very helpful in setting up antennas – and so next month I'll give a few more details regarding these very useful gadgets.

I now live in a small bungalow at the seaside, and all I have room for is a very bent multi-band dipole and a few other dipoles in the loft. I really miss my Delta loop!

Mono Headphones

Whilst most modern receivers and transceivers will operate with mono or stereo headphones, a lot of the older equipment is only intended to function correctly with headphones fitted with a mono jack plug. If you have trouble with the internal speaker not switching off, or any other problem with the 'phones, the first thing to do is to try fitting a mono jack plug.

However, when you remove the old plug be sure to take note of the connections! One or two wires will be connected to the chassis connection and the other two (the 'live' wires) will go to the tip and the connection nearest to the tip. Please remember that when you're fitting the mono plug, be sure to connect these two live wires to the tip, and the other one or two, to the sleeve that acts as the chassis connection.

Headphones and the FT-101E: If your FT-101E will still not switch off the speaker, even when fitted with a mono plug, please ear in mind that quite a lot of these transceivers 'escaped' with the phone jack socket wrongly wired. The diagrams in **Fig 2a** and **b** show how to correct this wiring error.

Hum & Sound Level

If you have a pair of modern 8Ω impedance high sensitivity headphones clamped firmly on your ears and you're feeding them with the full speaker output of a rig, you'll have to turn the volume control to almost minimum to maintain a pleasant level of sound. While doing this will bring down the sound level, it will also leave the hum and background noise at full gain. To reduce this, and also to protect your ears, all modern rigs are fitted with an attenuator, which reduces the feed to the headphones by a factor of 10:1 or more.

Some of the older valued rigs, such as the FT-401, weren't fitted with an attenuator on the headphone jack socket and so

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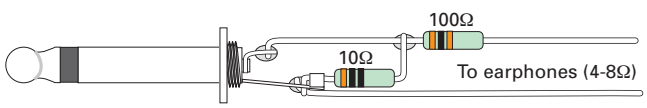

Fig. 3: A simple circuit that reduces the sound level in modern efficient headphones.

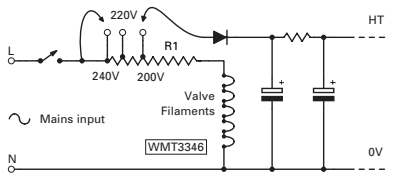

Fig. 4: This circuit was to be found on a.c./d.c. TVs and radios right up until the late 1950s. While saving the cost and weight of a transformer, it could made the set a danger to work on with its unearthed chassis.

excessive background noise is heard when modern headphones are plugged in. This problem can be tackled by making up an attenuator in the headphone's jack plug as per **Fig. 3**, or by using a pair of 'phones fitted with volume controls. **Note:** You should set the level of audio through the phones, so that it's about the same as that from the speaker.

To make things even more difficult, a few of the oldest valved receivers are designed for use with high impedance headphones. With these it's not possible to get sufficient volume from the headphone socket, as they are usually wired in circuit prior to the audio output valve. If you need headphones with this type of receiver, either ask around and see if someone can let you have a pair of high impedance phones, or rewire the 'phones to the loudspeaker terminals, via an attenuator as I've described.

Headphones & Safety

While most headphones are insulated, there's no guarantee that this will prevent you getting a shock under fault conditions. It's very therefore **very bad practice** to wear 'phones when poking around live equipment, (unless you want to know what it feels like to sit in the electric chair!). In this connection do be aware that there are still a few a.c./d.c. communications receivers around and my advice is that you should never wear headphones when listening to these – **even if a headphone socket is fitted**.

Safety & AC/DC Equipment

Most radio enthusiasts get called upon by neighbours to help when some piece of ancient radio equipment gives up! No doubt you'll at sometime or other come across old mains operated equipment that doesn't contain a mains transformer, and which is intended to be used on alternating current (a.c.) or direct current (d.c.) mains supplies. It's important that everyone understands that this kind of equipment is potentially dangerous, **even if you do not go as far as to take the back off!**

Amazingly, as it may seem to the modern reader, when I started work as an apprentice radio and TV engineer in the early 1950s, some of our customers were still on a 220V d.c. mains supply. With a d.c. supply you cannot, of course, use transformers and so all television sets – and many radios – of that era were designed so that they would work on both a.c. and d.c. mains supplies. It was also a good excuse for manufacturers to cut weight and cost by missing out the transformer!

The basic power supply circuit of an a.c./d.c. radio or TV is shown in **Fig. 4**. The mains voltage is reduced by R1, so as to be suitable to operate the heater supply.

The valves fitted to radios had fairly high voltage heaters, so as not to waste too much power and in the case of a TV set they added up to nearly 200V. The resistor, R1, set the voltage to match the local supply.

If the set was operating from a d.c. supply the rectifier did nothing useful, except to protect the equipment if the mains plug was accidentally wired in reverse. When operating from an a.c. supply it, of course, operated as a normal rectifier.

Theoretically a.c./d.c. equipment was safe if the mains plug was wired so that the chassis was connected to the neutral side of the mains but as many wall sockets were, and still are, wrongly wired or were then of the 2-pin variety, this protection could not be relied upon.

The danger with the a.c./d.c. form of equipment is that all the metalwork is connected directly to one side of the mains. If, for example, a knob fell off and the user grabbed the metal spindle, they were holding on to the mains supply. To protect against this, some equipment was fitted with volume controls that had plastic spindles – but not all manufacturers provided such protection.

Not all service engineers realised the danger and equipment that went into a workshop with a faulty switch or volume control, would often come out fitted with a metal-spindled replacement. Accidents did happen and I well remember getting an 'Urgent Modification' notice to check on one particular model of radio, which was fitted with a metal speaker grill. Someone had supplied the manufacturer with fixing screws that were a fraction too long and this resulted in the grill becoming live. Locally I read of two occasions where TV set owners tried to adjust their TV antenna in wet weather found them to be live and fell off the roof.

Note that the a.c./d.c. arrangement is particularly dicey when a single-pole on/off switch is fitted. With such a switch the chassis is still connected directly to the mains – even with the unit switched off.

Line Cord

Just after the Second World War quite a lot of 110V a.c./d.c. American-made receivers were imported. These were adapted to the UK mains voltage by attaching a mains lead that incorporated resistance wire and this lead was known as a line cord. People either coiled up the wire to make it neat (causing it to overheat) or cut it short and the radio burnt out on over-voltage.

As the insulation was only intended to be safe at 110V and some had exposed live part they were lethal. Some of these radios are still around and are valued as 'antiques' and my advice is that if you want to stand a chance of becoming a 'live' yourself – please keep well clear.

Remember also that most a.c./d.c. radio and TV equipment is now well over 50 years old. The insulation and safety were often questionable – even when the equipment was new – let alone now. Unless you really know what you are doing, and perhaps even then, these units are best consigned to history. You certainly don't want be held liable for any accidents that happen. ●

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Harry's waiting to hear from You!
As I am now retired, I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. If you want a direct reply please remember to send me your E-mail address or enclose a stamped addressed envelope. Send your letters to the address above.

Remember that 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.

IN FOCUS

Taking a look at Radio Communications in the Air Training Corps

Welcome to our *In Focus* pages, where I want to tell you something about our organisation and how your Amateur Radio hobby could help us. Hopefully, after reading about us you'll be tempted to share your expertise with our Cadets and you can be sure of a great welcome! **The Air Training Corps** (**ATC**) was formed by Royal Warrant in 1941 and sprang from the **Air Defence Cadet Corps**, founded in 1938 by the **Air League**. Although initially formed to meet the needs of a nation at war, the Corps continues to thrive as it enters the 21st Century and helps a new generation of young people to find a positive purpose in life.

With almost 41,000 members, aged from 13 to 20 years, in over 1,000 Squadrons, the ATC is one of the country's premier youth organisations, it's also the world's largest youth air training organisation and is supported by a volunteer Staff of nearly 10,000.

The Aims of the Air Training Corps are:

To promote and encourage among young people a practical interest in aviation and the Royal Air Force.

To provide training which will be useful in the Services and civilian life.

To foster the spirit of adventure and develop qualities of leadership and good citizenship

Our Vision

Our vision is to ensure that the Air Cadet Organisation (ACO), which includes the ATC and the Royal Air Force (RAF) section of the Combined Cadet Force (CCF), continues to flourish and remains true to the ideals laid down in its charters. This is particularly true of the provision of adequate aviation and other challenging activities to enable it to attract and retain membership and thereby provide example and leadership for the country's youth

Operations in the field using voice procedures.

Radio & The ATC

To give Air Cadets another practical skill that would be of an advantage in civilian and military life, the ACO introduced a progressive syllabus of radio communications training. Headquarters Air Cadets (HQAC) appoints an Officer to administer the provision of training to the Air Cadets in Radio Communications. Members of staff at Regions, Wings and Squadrons are appointed as Radio Communications Officers and it's their task to ensure that there is a common standard of training throughout the organisation.

Within the organisation there's a well-established high frequency (h.f.) long distance communications network, which is regularly used on frequencies assigned by the Ministry of Defence (MOD). The practical use of h.f. communications is controlled by HQAC through co-ordinators who are responsible for initiating area exercises and for giving specialist help. Each co-ordinator has a direct responsibility to Wing, the Regional Communications Officers and the Air Cadet Radio Communications Committee for the areas assigned.

The training syllabus introduces a new Cadet to the practical aspects of radio communication and forms the basic requirement for theoretical instruction which, when combined with around five hours of practical operation and a local test, leads to the provisional operator's standard allowing the Cadet to operate under supervision.

Ideally, some 20 hours of practical radio experience should follow and may include any of the practical exercises prescribed by the Squadron Radio Communications Officer (SRCO). When satisfied that the individual Cadet is competent

These pages are for the use of any organisation involved with Amateur Radio and *PW* invites all clubs to participate – all you need to do is to request the *In Focus* guide! It's a rather different organisation taking up the *In Focus* pages this month as Ralph Bateman RAFVR(T) M5EHG, sets out to recruit more Amateur Radio support for the Air Training Corps – a respected and long established organisation, already very active in Amateur Radio and wishing to become even busier with your help!

to operate a radio without supervision, the SRCO may put the Cadet forward for assessment by the Wing Radio Communications Officer (WRCO).

The achievement of full operator status – using very high frequency (v.h.f.) and ultra high frequency u.h.f.– will be given when the Cadet has demonstrated an ability to communicate effectively by radio. This will form a basis for future communicating skills in whatever field they move into.

Further progression in the study of communications is voluntary and can lead to the award of the Cadet Communicator Badge and Amateur Radio Licences. Suitably qualified Cadets may be appointed as Radio Communications Instructors, and both staff and Cadets can attend courses run by Headquarters Air Cadets and the RAF.

Last minute discussions before meeting the general public at a recent show.

Foundation Licence Training

Following the introduction of the 'new' Amateur Radio Licence on 1st January 2002, the Air Cadet Organisation negotiated with the **Radiocommunications Agency** (now replaced by **Ofcom**) and reached agreement that the ACO can operate the scheme and appoint its own instructors. An initial pilot course was organised and run by London & South East Region in October 2001, with a number of Cadets achieving the required standards.

Since that time training material has been produced together with the necessary administrative instructions and now forms an additional optional part of the Cadet Communicators Badge.

Air Cadet Radio Society

The Air Cadet Radio Society was founded to give assistance to those in the ACO who use Amateur Radio within the organisation. Its main objective is to look after the Amateur Radio Special Event call signs.

Wireless telegraphy (Morse code) signals were transmitted over the air on Wednesday, 12th February 1947, between Cadets of **No 269 Squadron Stoke Newington**, London, call sign **L7A1** and Cadets of **No 2124 Squadron Portishead Detached Flight (DF)**, call sign **D6Z2** (near Bristol). This is the first known contact within the ATC. Regular contacts were then made on alternate Tuesdays and Wednesdays on 5.498MHz. Later on, by kind permission of the **Commanding Officer of 501 Auxiliary Squadron**, contact was made between Cadets of Portishead and pilots flying Harvards on 4.660MHz using radiotelephony (Voice procedure).

Obtaining equipment has always been something of a scrounging exercise, with the ATC being the poor relations of the RAF! Through the years, all manner of equipment has been used including sets such as the TCS12, HROs, AR77E, R1082, CR100 (B28), T1154 and R1155, etc.

The three control stations and some of the sub-controllers at one time had 400W T1509s – fine for S9 signals but changing bands required a major re-tune! In 1957, the Morse code only rule was relaxed and the following year v.h.f. operation was permitted with the first channel allocated being on 103.25MHz on which TR 1985s were used. As time went on the network became almost totally radiotelephony and with the advent of single sideband (s.s.b.), the amplitude modulated (a.m.) equipment became obsolete.

It was time to scrounge again! Some of the equipment obtained included Civil Defence SSB 125s ex Embassy KWM2A, GR410, BCC32 etc. These were soon replaced with commercial PMR equipment and the channels were increased and included the addition of a few u.h.f. channels. However, there was never enough equipment to go around and this resulted in many squadrons having no active radio link.

Today the network is still active. The three regional networks have merged into one and this has caused a few operational problems and it's likely that the peak of activity has sadly passed. There are however, squadrons that still actively continue to operate the Sunday morning h.f. net.

Most squadrons have either v.h.f. or u.h.f. hand-held radios for the command and control of local squadron training exercises. Sometimes, squadrons within the Corps combine to take part in many and various radio based activities, some of which I have detailed below.

Air Cadet & Civil Air Patrol Radio

On Friday 14 April 2006 members of the **Air Cadet Radio Communications Flight from the Edinburgh and South Scotland Wing Easter Camp a**t MOD Machrihanish, made contact with the **Civil Air Patrol** in the United States. This was to commemorate the 100th anniversary of the first transatlantic transmissions made in January 1906 by Canadian Radio Pioneer **Reginald Aubrey Fessenden**. The Air Cadet radio station was located at Uisead Point, Machrihanish, which was the actual location of the original 1906 Fessenden radio tower.

At a special event station at the Tower Of London, members of the 2007 GB0TOL team from 126 and 348 squadrons, meet up with the Chief Yeoman Warder John Keohane BEM.

In the United States, members of the Civil Air Patrol set up their station at Brant Rock near Marshfield Massachusetts. This was the site of the Fessenden radio tower in the United States. By kind permission of the UK Ministry of Defence and the Department of Defense (sic) in the US, the Cadets used the historical call signs 'Radio Machrihanish' and 'Bravo Ocean' that were associated with the original 1906 transmissions. The Cadet stations commenced operation at 1100 hours local time.

It was 0600 Eastern Standard Time at Brant Rock and radio

conditions were poor, however, shortly after 1300 hours a faint voice was heard and in the noise the words 'Bravo Ocean' were logged. During the afternoon radio conditions continued to improve and the Civil Air Patrol and Air Cadet radio operators were able to exchange radio messages describing the locations of their respective stations and the relics of the original Fessenden radio stations, which were still visible at the Machrihanish and Brant Rock sites.

Special Event

Today, Air Cadets take part in many different events including the 50th anniversary exercise 'Radlin' which celebrated 50 years of the ATC, the 50th Anniversary celebrations in Hyde Park, the 60th Anniversary of Radio in the Air Cadets and the very popular **Royal International Air Tattoo** (RIAT) held in Fairford, Gloucestershire.

This year there were 681 Cadets from squadrons all over the UK working at RIAT. Cadets from various squadrons spent a week running the Ground Communications radio stations in two shifts of four operators. There was also a demonstration radio station running in the display area.

Callsigns used were MRV25 (Arena) and MRV33A (Ground Communications). Numerous Cadet and Amateur Radio callsigns were contacted by Cadets at Arena Communications. Cadets at Ground Comms (Task Control) had up to 75 call signs to look after on the busiest days!

Landmark Events

In the past the ATC has participated in many landmark public events such as nine years of Royal Tournaments – GB4ATC, G3ATC and GB8RT including 50th Anniversary of VE Day GB50VE, where at the last event the Cadet radio stand had one innovation that would have been appreciated on the Amateur Radio side, a remote receive site out at Uxbridge that relayed the h.f. signals via 430MHz to Earls Court. This facility removed a lot of the interference from the messages being exchanged with civil airliners over Europe and the North Atlantic.

The Cadets were actually permitted to talk to aircraft. This was achieved with the co-operation of the MOD who gave permission for the airliners to use a military frequency during the event and the operating company's giving their pilots authority to call the station.

It was quite a surprise to discover the number of pilots that had been Cadets in the ATC and many were still involved in the Corps. The Cadet station also had a low band v.h.f. station running which enabled them to talk to other Cadet units around the country. Both the remote h.f. and v.h.f. signals were fed to the stand using telephone pairs from the transceivers situated approximately 250 metres away, at the end of the roof away from the main antenna farm.

The ATC also take part in various Amateur Radio events such as **The International Museums on the Air** weekend, where Cadets have set up special event stations in such places as the **Tower of London GB0TOL**, the **RAF Museum** at Hendon **GX4IXL** and **East Midlands Aero Park GB2EMA**. They also support the **Royal Air Force Amateur Radio Society** (RAFARS) at their special event stations GB0RAF, where Cadets have assisted RAFARS members to set-up, operate and log calls to the stations.

Adult Staff Training

In order to ensure that there is a common standard of adult staff training throughout the organisation, the ATC organises adult communications instructor-training courses that are held at the **Royal Air Force College Cranwell**, Lincolnshire. Over five days the students visit sections including **RAF Digby**, the home of the **RAF Aerial Rigger School** and learn about equipment, antennas and voice procedures.

The course culminates in a field exercise where each team sets up a h.f. communications station. On the last course, with kind permission from **NCS Forest Moor** from **Kinloss Rescue** and **RAF Waddington**, students were able to exchange radio checks with various operational callsigns including military aircraft.

These cadets formed two shifts of operators for the ground comms station at RIAT, held annually in Fairford Gloucester.

An adult instructors' training course at the RAF Aerial Riggers School, RAF Digby.

We Need You!

We need you! The ATC is not just looking for Cadets, we also have vacancies for adult staff to help run and organise squadron activities. You can do this as either a Civilian Instructor, Adult Warrant Officer or take a Commission, as a Volunteer Reserve Officer - VR(T).

The ATC constantly assesses its past achievements, implements changes to meet the challenges of today and makes plans for the future. All kinds of people make up our volunteers and they come from many different backgrounds. Obviously, if you have direct experience of working with young people, or any relevant skills such as flying, gliding or radio communications, you would be particularly welcome but they are not essential as we will train you and support you at every stage.

However, it's vitally important that you have the kind of personal qualities we need, such as patience, maturity and responsibility. You should understand young people and be prepared to deal with their problems as well as their enthusiasm.

You'll need to be reasonably fit as physical exercise is an important part of our activities **but you don't have to be an athlete!** It's just as important to have someone who can deal with emotional upset when the Cadets are away from home as it is to have someone who can go rock climbing. You will also have to be organised, hopefully with good managerial and administrative skills, an ability to listen to problems and deal with them tactfully and appropriately.

Do you think you have something to offer us? Find out more about what volunteering with the ACO could offer you. Call us today on **0845 600 6601**. Or visit our web site at **www.air.cadets.org** site. We look forward to hearing from you! ●

VHF DXer

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This month David Butler G4ASR has reports of an unusual meteor shower and some excellent tropo openings.

Very little in the way of long-distance propagation was reported on the 50MHz band during September. This is hardly surprising as the Summer Sporadic-E (Sp-E) season is almost, but not quite, finished by that time of the year. The autumn equinox occurred during September and it is around this period that trans-equatorial propagation (t.e.p.) is most likely to be observed. One t.e.p. opening was reported on the 50MHz band to the Democratic Republic of Congo and to Uganda.

Only three short Sp-E openings were reported on the 70MHz band with the majority of DX traffic being worked on a daily basis via meteor scatter (m.s.). The rarely observed Aurigids meteor shower was particularly intense with some excellent s.s.b. contacts being made on the 144MHz band. Tropospheric propagation was particularly good on the 144MHz and 430MHz bands during September with openings to the Azores, Canary Islands, Spain and central Europe on a number of days.

The 50MHz Band

Sporadic-E propagation was reported on 9-days during September, all contacts being at single-hop distances within Europe. The longest distance contact made during this period was probably between the stations of **Dave Edwards G7RAU** (Isle of Wight IO90) and 9H1AW (Malta JM75) over a path of 2071km. Although most Sp-E openings in September were quite brief, stations throughout the UK managed to make contact with a further 20 DXCC countries. From Northern Ireland the stations of GI0BFD (IO64) and MI0CLP (IO64) reported s.s.b. QSOs with DH2UAK (Germany), EA5EF (Spain), IK2EAE (Italy), IS0GQX (Sardinia) and ON5LGS (Belgium).

The stations of GD6IA and MD0LON situated on the Isle of Man (IO74) made contacts with F4COT (France), S57AC (Slovenia), & 9A3QB (Croatia) and the station of GM0PLH (IO85) in Scotland contacted SQ2CDC (Poland) and LY2BAW (Lithuania). From the Kingdom of Wales the station of MW1MFY (IO81) found HA8JB (Hungary) and from the Bailiwick of Guernsey the station of MU0FAL (IN89) reported an s.s.b. QSO with CT1FFU (Portugal).

Impressive arrays at the location of DK5QN.

The English stations of 2E0WMG/M (JO01), G3VYF (JO01) and G4PBP (IO82) made contacts with LZ1AG (Bulgaria), OE3BCA (Austria), OK1MDK (Czech Republic), OM7AQ (Slovakia), UT1UV (Ukraine), YL2GB (Latvia), YO2LFP (Romania) and YU1FE (Yugoslavia).

A lengthy Sp-E opening occurred on September 10th with separate events around 0900UTC to OZ, between 1300-1400UTC to EA and the CN8IG beacon (Morocco), 1630-1800UTC to DL, HA, I, IS0, OE, SP, S5, YL, YU & 9A and between 1900-2100UTC to CN, CT & EA. At 1655UTC during the first of the evening openings **Stu McQuillian MM0BSM** (Stirling IO86) reported hearing the station of 5X1AB (Kampala, Uganda KJ60) over a 7000km path.

Later in the evening at 2200UTC **Donald McKay MM5AJW (Wick IO88)** heard the beacon of 9Q1D (Kinshasa, Democratic Republic of Congo JI75) peaking 429 over a 7168km path.

The propagation that made these reports possible was quite likely to be a mixture of Sp-E in the northern hemisphere linking into a southerly t.e.p. path. This dual propagation mode will become more noticeable in the next few years as we head towards Sun Spot maximum.

The 70MHz Band

To all intents and purposes September marked the end of the Sp-E season on the 70MHz band. Only three small openings were reported, on September 10th between 1700-1735UTC to Italy and Slovenia, September 12 between 0655-0800UTC again to Italy and Slovenia and during the morning of September 24th when the station of CT1HZE (Portugal IM57) reported hearing the UK beacons of **GB3BUX** (70.000MHz), **GB3BAA** (70.016MHz), **GB3CFG** (70.027MHz) and **GB3RAL** (70.050MHz).

With the lack of Sp-E propagation the only practical way of making daily DX contacts on the 70MHz band was via meteor scatter. All communication modes are possible but most operators use either Morse (c.w.), telephony (s.s.b.) or a data-mode. Nowadays the majority of DXers use **JT6M** which is a part of the *WSJT* suite of digital weak signal software applications developed by **Joe Taylor K1JT**.

Because of the extraordinary powerful software very brief pings and short bursts of signals can reveal parts of or even complete transmitted messages. It is possible to build up the message from pings, piecing together the call signs and reports corresponding to the standard IARU Region 1 reporting procedure. Most JT6M m.s. operation relies on random meteors. Although random, (i.e. daily input not a major shower) these occur surprisingly frequently and an apparent 'dead band' can become quite busy particularly at the weekend.

Of course, during major meteor showers there is more activity and many contacts are often made. Although JT6M is optimised for m.s. use on both the 50MHz and 70MHz bands it is equally effective for tropo, weak E-layer and other scatter modes of propagation. You don't need to run high power or large antenna arrays to make JT6M contacts. Many successful 70MHz QSOs using less than 50W and a 3-element Yagi antennas have been made.

Digital JT6M m.s. contacts made from the UK during September, included the stations of EI7IX (Ireland IO53), I3VWK (Italy JN55), IK4PMB (JN54), IZ4GWE (JN64), I6BQI (JN72), IS0/IK0BZY (Sardinia JM48), OY4TN (Faroe Island IP62), OY9JD (IP62), OZ1DOQ (Denmark JO56), OZ2LD (JO54), OZ2OE (JO45), OZ3ZW (JO54), S51DI (Slovenia JN76) and S56OL (JN75). Cross-

band JT6M contacts, typically between the 70MHz and 50MHz bands were also made with the stations of F5DQK (France JN18), LA4ANA (Norway JO59), LZ1ZX (Bulgaria KN32), OE5MPL (Austria JN78) and SP9HWY (Poland JO90).

One other station contacted via m.s. from the UK during September was **Klaus Dreckshage DL3YEE** (Germany JO42). He has received a temporary licence valid for the months of September and October that allows him to transmit on a spot frequency of 69.995MHz.

Klaus DL3YEE reported making JT6M contacts with the stations of G3JHM (Hampshire IO91), G4DEZ (Lincolnshire JO03), G4FUF (Essex JO01), G4MQL (Gloucestershire IO81), G4IGO (Somerset IO80), G4ZTR (Essex JO02), G7CNF (Somerset IO81), G0CHE (West Sussex IO90), G0UWK (Staffordshire IO83), GI4KSO (County Down IO64), GU8FBO (Guernsey IN89), GW8ASD (Clwyd IO83) and MW0HMV (Carmarthenshire IO71).

Unusual Meteor Shower

Around 2000 years ago Comet Kiess passed by the Sun, ejecting a cloud of dust particles. The comet returned in 1911, after completing one orbit. The dust particles were pushed by the Sun's light into slightly wider orbits and have been returning ever since, forming a thin ongoing stream of dust that usually passes just outside Earth's orbit. On occasions, the combined gravity of the solar system's planets moves this dust trail into Earth's path.

The Earth encountered the 2000-year-old dust in 1935, 1986, and 1994 causing a meteor shower known as the Aurigids. On September 1st this very unusual shower again encountered the orbit of the Earth creating some spectacular meteor scatter propagation. Predictions for a short-lived Aurigids shower on the Saturday morning proved spot on. For about one hour between 1100-1200UTC bursts of signals up to 5 minutes in duration could be heard on the 144MHz band. It was as intense as the famous 1998 Leonids meteor shower although that event lasted for over 12 hours.

Signals via the Aurigids were so strong that the majority of contacts were made using s.s.b. mostly around 144.300MHz the s.s.b. calling frequency or 144.200MHz the m.s. calling frequency. UK operators reported contacts with the stations of DD0VF (Germany JO61), DL4SD (JN49), DK5OX (JN59), EB1DRO (Spain IN70), EA4AYW (IN70), EA7TL (IM66), HA5CRX (Hungary JN97), HB9DFG (Switzerland JN37), IW2DAL (Italy JN45), I3MEK (JN55), IW4BET (JN54), I8MPO (JN70), IC8FAX (JN70), S50C (Slovenia JN76), LZ2FO (Bulgaria KN13), YT7C (Serbia KN05), YO2LEA/P (Romania KN06), YO5ALI/P (KN06), 4O3A (Montenegro JN89) and 9A4VW (Croatia JN85).

Tropospheric Openings

Some excellent tropospheric (tropo) propagation on the 144MHz and 430MHz bands was reported during days of stable autumnal weather in September. The first period of enhanced lift conditions coincided with the IARU Region 1 contest held over the weekend of September 1-2.

Operating portable from Scotland the station of **Allan Duncan GM4ZUK/P** (IO86) mentions working many contestants on the 144MHz band, his best DX being EA2BFM/P (IN83) at 1531km and EA1FDI/P (IN52) at 1624km.

At the opposite end of the country the station of **Tim Fern G4LOH** (Cornwall IO70) reports that the stations of EA3DJL/P, F6KEH/P and HB9WW (Switzerland JN36) were 59+ for hours at a time.

At 1552UTC on September 1st a sea duct opened up to the southwest of Tim's QTH allowing an s.s.b. contact to be made with the station of EA8BPX (Canary Islands IL18) over a 2589km path. The 144MHz station of **Dan Lee MW1MFY** (Glamorganshire IO81) also found that conditions were very good to the south of his QTH with s.s.b. contacts being made with many French stations. These included F1ERG/P (JN27), F1UCQ (JN12), F2CT/P (JN36), F6GEV/P (JN14), F6KEH/P (JN02) and F6KOU/P (JN24).

Other contacts made by Dan included the Spanish stations of EA1QS/P (IN52), ED1RCM (IN73), EA1UU (IN83), EA2BFM/P IN83) and EA3DJL/P (JN12). Other UK operators also mentioned the 144MHz contest stations of EA1CJF/P (IN72), EA1DDU (IN73), EA1OS/P (IN63), EE1URO (IN62), EB2GJK/P (IN93), EB3CZS/P (JN11), HB9DKZ (JN47), LX/PA1TK/P (Luxembourg JN29) and LX2A (JN39).

A duct across the North Sea was reported on September 4th by stations situated in East Anglia (JO02). Contacts on the 144MHz band were made with the stations of DL2OAT (Germany JO43), DL6BCT (JO43), DF9IC (JN48), OK1RI (Czech Republic JO60), OZ1ALS (Denmark JO45), OZ1DLD/P (JO45), OZ9HBO (JO46), OZ9KY (JO45) and SK7MW (Sweden JO65).

Another marine duct, this time to the southwest of the UK, allowed favourably located stations to hear a propagation beacon located on Flores Island in the Azores. Stations in southern England and Wales reported hearing CU8DUB (144.420MHz) in a 3-day period between September 5–7th.

One of the longest distance reports came from the station of MW1MFY who heard the beacon peaking 419 over the 2508km path. Incidentally the Azores beacon has been heard in the UK via tropo on 10 days this year during July, August and September. It's even been heard by the station of YU7EF (Serbia KN05) via Sp-E propagation on July 6th. The distance was a mere 4216km!

Tropo propagation was very good on the 430MHz band during the period September 8–11th. Stations in England and Wales reported making s.s.b. contacts with DH3NAN (JO60), DK3SE (JN37), DK5QN (JO42) his antennas are shown in the heading picture, DL5GAC (JN47), DF0CI (JO51), EA2TO/1 (IN52), F2CT (IN93), F5DE/P (JN05), OZ9KY (JO45) and SK7MW (JO65).

Propagation was very similar on the 144MHz band with stations in central England and Wales reporting s.s.b. QSOs with DK1FG (JN59), DK5EW (JN47), EA1QS (IN52), EA1UU (IN83), F1XAT (JN15), F5PEJ (JN09), F0CRM/P (JN26), F0EHA (IN98), F0FHU (JN06) and HB9G/P (JN36). The maritime mobile station of UT1FG/MM was also worked on both the 144MHz and 430MHz bands in 'wet' squares that included IN74, IN75, IN75, IN79, IN89, IO90, JO04, JO12 and JO13.

Exceptional lift conditions were reported during the weekend of September 15–16th on the 144MHz and 430MHz bands. Tropo contacts up to 1600km were made into Austria (OE), Croatia (9A), Czech Republic (OK), France (F), Germany (DL), Luxembourg (LX), Poland (SP), Slovakia OM) and Switzerland (HB9).

On the Isle of Wight the station of G7RAU made some excellent QSOs that included SP6VGJ (JO81) at 1250km, 9A5CW (JN65) 1270km, OK2KJT (JN99) 1384km, OK2ULQ (JN99) 1387km, OK2KW (JN99) 1389km, OM3TRN (JN99) 1398km, OM4ADR (JN98) 1424km and OK2BFH (JN99) at 1430km.

Paul Pasquet G4RRA (Devon IO80) found the 144MHz stations of OE9WLJ/9 (JN47) at 1062km, OK1XFJ/P (JO60) 1221km, OK1TEH (JO70) 1296km, OK1FPS (JN79) 1300km, OK1DOZ (JN79) 1392km, OK2MTM (JN89) 1510km, OK2ULQ (JN99) 1568km, OK2KW (JN99) 1570km, OM3TRN (JN99) 1580km and OM4ADR (JN98) for his best DX at 1607km. That's pretty good going but Tim G4LOH probably made the furthest distance contact of the opening when he worked OM3TRN (JN99) over a tropo path of 1673km.

Deadlines

That's it for this month. Propagation during November is generally fairly quiet at this point of the Solar Cycle. However there may always be an aurora or autumnal tropo to liven up the v.h.f. bands. If you hear anything or have any other news then please send the details to me before the last Saturday of each month. **73 David G4ASR**

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Valve & Vintage

As the shop open this month – Phil Cadman G4JCP is anticipating Christmas by wearing a sprig of holly in the lapel of his brown dustcoat! Putting half-packed gifts to one side, Phil looks back at the days when using a former v.h.f. PMR set was a bargain entry ticket to the v.h.f. bands for many cashed-strapped Radio Amateurs.

Merry Christmas to one and all! And hearty greetings from a frosted-windowed but festive V&V 'shop'. May I take this opportunity to thank everyone who sent their good wishes following my cardiac surgery. Thank you all very much indeed! Only thing is, now I'm almost fully recovered, there's all this talk about exercise and a healthy diet!

In my last column I looked back 75 years to the beginnings of broadcast television in the UK, which coincidentally began just one month before the first issue of *PW* appeared on the news stands. It's worth remembering the achievements of those pioneers, as television is currently undergoing quite a change. Here in the UK, there is a timetable whereby all analogue television transmissions will cease within the next six years. Well, maybe – that's the idea anyway!

Of course, the television change is in the full glare of publicity but there's another digital revolution quietly taking place in the Private Mobile Radio (PMR) industry. Here too, digital is the magic word. The Police have already largely gone digital and other Emergency and Public Services are following. It is simply a matter of time before the majority of PMR users - even the local taxi cabs - will be using digital radio networks.

Radio Amateurs & PMR

Radio Amateurs have long made use of ex-PMR gear. Either by incorporating components from redundant PMR equipment in their own projects, or by converting decommissioned PMR sets to work on Amateur frequencies. For example, many voice and packet repeaters use at least some ex-PMR components, and only a few years ago, one large PMR user disposed of a great many sets ,which were subsequently converted to work on 70MHz.

While it's possible to convert almost any PMR set to Amateur use, many are simply not worth the amount of work involved. However, those sets covering PMR frequency allocations which are – or were – very close to Amateur bands, may only need new crystals and some retuning.

Nowadays, although a synthesised PMR set might need a new (EP)ROM memory device – will this be the case in the future? Will digital PMR sets be convertible to Amateur use? Radio Amateurs are a resourceful lot but making use of these digital PMR sets when they're decommissioned, might be either impossible or, at least, impractical.

The questions I've posed made me think back to my own Amateur Radio origins and the 'vintage' PMR sets I've used. In December 1972 I took the Radio Amateurs' Examination (RAE) and in March the following year **G8HHK** - as I was then - was heard for the first time on 144MHz.

Like many new licensees, I listened on a general-coverage receiver fed by a 144MHz converter, while my transmitter was a converted PMR set: a Pye *Ranger* dash-mount a.m. radiotelephone running 10W input. Although the *Ranger*, launched in 1955, was intended for dash mounting, it was a whopping 150mm (6in) high by 280mm (11in) wide by 380mm (15in) deep, and weighed around 10kg (22 b). Yes, in those days, you could hang something that big below your dashboard!

For a neater installation, there was always the remote-mount (better known as boot-mount) version of the set, where the set itself was fitted in the boot, and a small control head went under the dash. A bit like some current Amateur transceivers.

The *Ranger series* – which included f.m. and higher power versions – was a direct descendant of the Pye *Reporter*, a series introduced in 1951 (and not to be confused with the Transistor *Reporter* type AM5D or the later all-transistor *Reporter* type MF6AM). I have a late version Reporter which is, unfortunately, in very poor condition, as you can see from the photograph **Fig. 1**.

Both the *Reporter* and *Ranger* were crystal controlled and used valves throughout. Initially, both sets used a vibrator to transform the 12V d.c. supply the h.t., but late-model Rangers had transistor inverters and were known, not surprisingly, as transistor *Rangers*.

Crystal Controlled

In the early 1970s, most 144MHz and 432MHz operators still used crystal-controlled amplitude modulated (a.m.) transmitters and followed band plans which were quite different to today's mode-based plans. Most of the 144MHz (and 432MHz) band was split into sections, with each section being allocated to a different geographical area (zone).

For example, according to the 144MHz band plan, I lived in Zone C (the Midlands) and so was supposed to transmit somewhere between 145.1 and 145.5MHz. Like today, the very bottom of the band was allocated to c.w., but curiously, the country-wide s.s.b. calling frequency was 145.41MHz. I wonder why it was such a peculiar frequency – anybody know the answer?

So how did we work one another? Simple. You called 'CQ' for about five minutes (no joke!) and then said whether you were tuning 'high to low', or 'low to high'.

Of course, the person answering you also had to call for maybe several minutes to make sure you heard the call. During contests, the more serious entrants would have one converter feeding two receivers and announce they were either tuning 'both ends in' or 'the middle out'. (Show-offs!).

Smaller Hybrids

The all-valved *Reporter* and *Ranger* were somewhat large for mounting under the

Fig. 2: A little younger than the Reporter of Fig. 1, the Cambridge, still had a valved transmitter but had a transistorised receiver.

Fig. 1: An older Pye Reporter v.h.f. a.m. transceiver opened up to show the innards – and from the state of the front-panel its age!

dashboard, so once semiconductors capable of amplifying at radio frequencies became available, smaller hybrid sets were produced. These had all-transistor receivers and valved transmitters, and invariably used transistorised switching inverters for the high tension (h.t.).

The Pye *Cambridge* – from 1961 – is one such example, see **Fig. 2**. This set led to the situation where a Pye *Cambridge* radiotelephone could sometimes be found fitted in an Austin *Cambridge* motor vehicle. Of course, as soon as r.f. power transistors became financially viable for PMR use, all-transistor sets were designed and marketed. Oblivious to this quest for smaller sets was the wonderfully huge, boot-mount *Vanguard*, sold from 1962 until 1970. All the *Vanguards* ran high power, with a.m. sets specified at 20W output, and f.m. sets pushing out 60W or 100W. There was also a 30W output u.h.f. f.m. version.

Even Pye's own service engineers (well, one at least) thought they were a bit on the big side at 310mm (12in) wide by 180mm (7in) high by 360mm (14in) deep. But their generous dimensions did make them easy to work on and I liked them! The new fully transistorised sets were very much smaller and lighter than previous sets, not just because transistor transmitters were smaller than their valved counterparts (although transistor transmitters needed more stages to achieve a given power level), but also because there was no need to generate a h.t. supply.

The inverter transformer and associated h.t. components disappeared and far less internal ventilation was required. Basically it only needed the case itself and maybe a heat sink keeping the power transistors sufficiently cool. Actually, that might be true for PMR use but the designers never envisaged their sets might one day be subjected to the 15 minute-plus overs beloved of seasoned Amateur band Rag Chewers!

Personal Favourites

Pye's first all-semiconductor PMR mobile – introduced in 1967 – is one of my personal favourites, the *Westminster*, or '*Wessie*' as it is affectionately known, see **Fig. 3**. Only the high-power boot-mount version of this set had a valved power amplifier (p.a.).

Like previous series, the *Wessie* was available in a.m. and f.m., dash-mount and boot-mount variants. Not forgetting a purpose-built version for mounting on motorcycles.

The construction of the set was quite interesting, it's essentially modular and uses small printed circuit board (p.c.b.) modules mounted on a double-sided aluminium chassis. The top of an a.m. *Wessie* chassis – **Fig. 4.** – shows this quite clearly.

In Fig. 4 It's easy to make out the transmit power amplifier (the long black thing!) and antenna filter, flanked by the transmit multiplier (next to the antenna change-over relay) and the receiver front end. The other modules are the receiver audio amplifier, the 10.7MHz i.f. strip with second mixer and the second local oscillator. The plain tin box is a 455kHz filter.

I liked the *Wessie* because even if the set as a whole wasn't easily convertible to Amateur use, I could still use individual p.c.b. modules in my own projects. It was also possible to make use of the case and some modules – such as the audio amplifier – to complete a home brew design.

In fact, the modular approach helped Pye build the *Whitehall* (another wonderfully English name), which was an a.m./f.m. boot-mount set made for the Home Office. At a time when some Police Forces used a.m. sets while others used f.m. sets, the Whitehall allowed communication regardless of the modulation method in use. All that Pye had to do was put a collection of both a.m. and f.m. *Westminster* modules into one box and switch between the two.

Other Pye Sets

Other Pye sets I've had experience with, are the *Europa* and the M290/MX290 series. The *Europa* is rather like an updated *Westminster* but the traditional Pye blue colour was replaced by black and the whole set was built on just two p.c.b.s. While the *Wessie's* modules allowed a mix-and-match approach, the set's assembly was very labour intensive.

In future, there would always be the need to reduce labour costs and to make the physical construction of sets as simple as possible. Pye's philosophy is exemplified by the M290/MX290 series. Both sets use a simple die-cast frame and all the r.f. and a.f. circuitry is on one double-sided p.c.b.

There is one more p.c.b. in the set which is used for tone signalling. The two series of sets are often confused as they look remarkably similar. However, the M290 series are crystal controlled, needing two crystals per channel, while the MX290 series are synthesised. This potentially makes the MX290 series far less costly to convert to amateur use and allows for limited experimentation. Even the MX293 a.m. sets (usually available very cheaply) are worth keeping as the synthesiser may be of some use in a home brew project. But do make sure what you're buying, if in doubt – please ask!

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Fig. 3: The Pye Westminster, or 'Wessie' was one of Phil's favourite ex-PMR rigs.

Fig. 4: Peering from above at the insides of the 'Wessie' shows the modular construction methods used.

With new Amateur transceivers costing less in real terms than ever before, converting ex-PMR sets is not as popular as it was. But the Europa and later PMR sets are still attractive for dedicated Packet use, for experimentation, and for operation on 70MHz.

Although some of the sets I've mentioned are relatively modern, the widespread adoption of digital PMR systems will one day make them all vintage technology. Fortunately, the historical value of these sets – and indeed all of Pye's telecommunications products – have been recognised and there is now a **Pye Telecom History Group**. The Group has a web site at: **www.pyetelecomhistory.org**

Hmm. Time for me to become history too. I hope you all have a joyous festive season and I trust I'll see you back in the V&V 'shop' next year. Until then, please send your comments and letters to me, either via E-mail to: phil@g4jcp.freeserve.co.uk, or by mail to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.** Happy Christmas! ●

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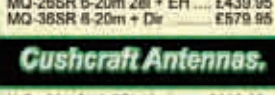

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Share your news, views and reports with fellow readers. Reports to Carl by the 15th of each month please.

HF Highlights

This month Carl looks at some of the happenings in the first decade of radio after a round-up of the latest news.

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Finding a QSL route can always be a problem and I often get requests for help obtaining cards. Occasionally a call is familiar and I am able to look a call up through my logbook or previous DX information. However, this can be very time consuming so anything that helps speed up this process is always welcome.

You may be interested to hear that **Paul Delmelle ON6DP** maintains a large QSL Manager database that now contains nearly 75,100 QSL routes. You can find this at **www.dd3kf.de/on6dp.htm** and a simple freeware tool to handle this database, developed by **Josef Rohner HB9CIC** can be found at **www.qslnet.de/hb9cic** While I cannot guarantee you will find the call you need there it is certainly a very good place to start!

DX News

On to this month's DX news now and to **Robert 'Bud' Stevenson AA3B**, who will be active in Antigua & Barbuda NA-100 as **V26K** between November 23rd and 28th. Activity will include an entry in the CQ WW CW Contest as a Single-Operator/All-Band/Low-Power category. Outside the contest Bud will be active using c.w. only and the QSL route is via AA3B.

By the time you read this **Chris Vernon GM0TQJ** will have left his home in Forres on the Moray Firth in Scotland and be active as **VP8CXV** from East Falkland SA-002 until January 15th 2008. Chris plans to operate mainly s.s.b. with possibly some RTTY and PSK31 when he can in his spare time and you can QSL via his home call.

A new Island On The Air (IOTA) will be activated by **Radio Amateur Association of Greece** (RAAG) President **Manos Darkadakis SV1IW** and other seven Greek operators who will be using the call **YK9SV** from Arwad Island AS-186 in Syria until November15th. The group plan to operate c.w., s.s.b., RTTY and PSK31 on all h.f. bands and plan to have at least two stations running at all times. More information can be found at **www.raag.org/arwad** and you can QSL via **SV1JG**.

Tom Callas KC0W has now moved to the island of St. Helena AF-022 where he is expected to remain for several years. His new callsign is **ZD7X** and he expects to operate on all h.f. bands using c.w., s.s.b., RTTY and some PSK31. Tom also plans to operate in all the major contests and if you work him a QSL is good via **W0MM**.

In European Russia a special event station **R450KB** will operate until November 30th commemorating the 450th anniversary of the association of Kabardino-Balkaria with Russia. Look for the call to be aired on most h.f. bands particularly 14MHz and the QSL route will be via **UA6XT,** either through the bureau or direct to **Kenzhekulov Anatoly, 360024 Nal'chik, POB 4, Russia**.

An award is available for R450KB and information on this can be found at www.r6x.ru you have until 31st December to acquire 450 points which are awarded for working stations in Kabardino-Balkarian (**RA6X, UA6X**), Karachaevo-Circassia (**RA6E, UA6E**), Adygea (**RA6Y, UA6Y**) and Russia (**R, UA-UI**).

Finally, as many of you know this year Jamboree on the Air (JOTA) celebrates its 50th year. This is an on-the-air event sponsored by the World Scout Bureau which was founded in 1958 by **Les Mitchell G3BHK** and has become by far the largest Scouting event. The JOTA now boasts the participation of nearly half a million Scouts and Guides world-wide in well over 100 countries and involving as many as 10,000 Amateur Radio Stations. **Chris Chapman G0IPU** and regular *PW* reporter **Martyn Medcalf M3VAM** will be running a station **GB50CS** at the Second Scout HQ in Lawn Lane in Chelmsford from November 19th to 21st on all h.f. bands and look forward to working as many readers as possible during that time.

Spanish Prefixes

Founded in Paris in 1865 as the International Telegraph Union (ITU), the Union underwent a slight name change to 'International Telecommunication Union' at the Madrid Plenipotentiary Conference way back in 1932. Prefix hunters will be pleased to hear that Spanish operators will be able to mark this change's 75th anniversary by replacing their **EA**, **EB** and **EC** prefixes with **AO**, **AN** and **AM** until December 9th.

On QSL Information

This month's QSL information begins with the French call **TM7A**. The manager for this was **F8BBL** but only for the operation that took place in May 2003 from Banc d'Arguin EU-159. The callsign was re-issued this year and again was used between February 24th and March 9th this year. For these operations, any QSLs should go to **Evelyn Terrail F5RPB** via the bureau.

Jouko Hayrynen OH1RX was active from Greenland on July 20-25th as **OX/OH1RX** and requests for cards should be sent 'via the bureau only' with neither direct nor eQSLs!

Namibian operator **Frank Steinhauser V51AS** has got a new mailing address and all cards should now go to **Heinrich-Heine-Strasse 35, 72555 Metzingen, Germany** and the previous Olching address is no longer valid.

Any QSL cards for contacts made

with **LZ/G4EDG** on St. Ivan Island EU-181 operated by **Steve Taylor G4EDG**, **Vasil Shatarov LZ1CL** and **Tony Stefanov LZ1JZ** between June 19th and 23rd this year should be sent to **LZ1JZ, P.O Box 43, Harmanli 6450, Bulgaria**. Incidentally, Tony is also the QSL manager for **DU1LWQ, FK8DD, LZ1KSP, LZ7J, OA4DKC, OA4SJ, P29K, SV1/LZ1JZ, TF1VG, TF60VG** and **TX1A**.

Your Reports

On to your reports now and **Owen Williams G0PHT** in Biggleswade, Bedfordshire who used a Yaesu FT-747 with 100W to a dipole and using voice worked 7MHz stations TM2RWC (France) a special call for the Rugby World Cup at 0758 and later CU6/CU3DJ (Azores) EU-033 at 2012UTC.

Also on the band was **Martin Addison 2E0MCA** in East Finchley, North London who used a Yaesu FT-2000 and 10W to a folded half-size G5RV, logging DL40RRDXA (Germany) a special call to mark 40 years of the Ruhr-Rhein DX Association at 0712, F5VBY (France) 0719, LA0HK (Norway) 0749 and PA100S (Netherlands) a special call for 100 years of World Scouting at 0915UTC.

The 14MHz Band

The 14MHz band provided Owen with OX/PA3EXX/P (Greenland) NA-018 at 1718 and HC2AQ (Ecuador) at 2247UTC while Martin found OJ0B (Market Reef) EU-053 at 0619, 9A/IV3EPO (Croatia) on the island of Hvar EU-016 at 0626, IZ7GWZ (Italy) 0632, DK0FR (Germany) a special call celebrating 100 years of aviation at Freiburg Aerodrome at 1010, 9H3YM (Malta) EU-023 at 1227, HB0/DL9ABF/M (Liechtenstein) 1401, SE50A (Sweden) Ernie in Malung with a special call celebrating 50 years in HAM radio at 1924, HG15SD (Hungary) 1932, KP4BME (Puerto Rico) NA-099 at 2005, 5Z4FM (Kenya) 2034, JA7AKH (Japan) AS-066 at 2112 and VE1CJB (Canada) at 2149UTC.

The 14MHz band was the hunting ground of new reporter **Daran Josey MW0HMV** in Llanelli, Carmarthenshire who managed to work over 100 DX prefixes in just a few weeks. Voice calls making his log included Z22JE (Zimbabwe), 4Z5PG (Israel), VU2RBI (India), UN7MMM (Kazakhstan), SV9GVP (Crete) EU-015, 7X5VRK (Algeria), PY2RDS (Brazil), FS5HS (St. Martin) NA-105, YS1FEA (El Salvador), 9Y4D (Trinidad & Tobago) SA-011, A41MX Oman), KP3A (Puerto Rico) NA-099, 8R1AK/P (Guyana), V55V (Namibia), JA7NVF (Japan), 9N7JO (Nepal), J3/DL7VOG (Grenada) NA-024, EX2M (Kyrgyzstan), 9M4DXX (West Malaysia), OX3KQ (Greenland) NA-018 and 3B7C (St Brandon) AF-001 to name a few. Daran was using a Kenwood TS-2000 with a home-made cubical quad antenna just a few feet above ground and up to 400W out with the help of an Expert 1K-FA amplifier.

In Chelmsford, Essex **Martyn Medcalf M3VAM** used his Icom IC-746 and half size G5RV antenna with an SGC-237 auto-tuner once again working s.s.b. calls OZ7AKT (Denmark) 1057, SP5XSD/1 (Poland) 1058 on EU-132 Koszalin Province Group 1058, DQ4W (Germany) 1325, F5AMH (France) 1328, LZ3FN (Bulgaria) 1331, IZ1LBG (Italy) 1348, ES1QD/5 (Estonia) 1556 and UA4LCH (European Russia) 1708UTC.

The 18 & 21MHz Bands

In Dumfries, Scotland **Jim Pedley GM7TUD** fired up his Kenwood TS-450 and using 100W to a Cushcraft MA5B mini beam on 18MHz and lists s.s.b. stations 3B7C (St Brandon) 0746, 1A0KM (Sovereign Military Order of Malta) EU-023 at 1116, VR10XMT (Hong Kong) AS-006 at 1210 and EG3MED (Spain) at 1657UTC. A move to the 21MHz band found A52AM (Bhutan) 0721, YC5OUB (Indonesia), 5H3EE (Tanzania) 1012, 4X7AZ (Israel) 1050, PY7RP (Brazil) 1105 and LU4DX (Argentina) 1139UTC.

The 24 & 28MHz Band

Jim also tried the higher bands with some success working CQ4IPY (Portugal) 0947, 3B7C once again at 1056, SY8AN (Greece) 1122 and AO5KB (Spain) at 1106 on 24MHz while 28MHz, open for a while, allowed ZC4LI (UK Sovereign Bases on Cyprus) AS-004 at 0822, IB0/OM0C (Italy) Lazio Region Group EU-045 at 0830, OH0Z (Aland Island) EU-002 at 0950, IS0/OM3LA (Sardinia) EU-024 at 1141 and EA6/M0DLL (Balearic Islands) EU-004 at 1239UTC.

Signing Off

Well that's it for another month and special thanks to all our reporters for their logbooks.. Most bands have been open at some time during the day though 7 and 14MHz seem to be the most reliable at the moment! Listening to a silent band does not always mean there is nothing to work. Try putting out a few 'CQ' calls and you may be pleasantly surprised.

My thanks also to **Mauro Pregliasco I1JQJ/KB2TJM** editor of the 425 DX Newsletter for the DX information. Until next time have a good DX filled month.

73, Carl GW0VSW

75 Years Celebrations

History of HF operations during 1900-1910

1901 - On December 12th **Guglielmo Marconi** transmits a Morse signal of the letter 'S' across the Atlantic. The signal was transmitted from Poldhu in Cornwall and was received by Marconi himself at St. John's, Newfoundland.

1902 - Oliver Heaviside predicted that there was a conducting layer in the atmosphere that would allow radio waves to follow the curvature of the earth. This became known as the Heaverside Layer and its existence was proved in 1923 when radio pulses were transmitted vertically upward and the returning pulses from the reflecting layer were received.

1905 - Marconi patented his directive horizontal antenna or beam. **Horace G. Martin** introduces the Vibroplex semi-automatic telegraph key more commonly called a 'bug'. The use of 500kHz as the International Distress Frequency became common.

1906 - In January, Canadian inventor **Reginald Fessenden** used his rotary-spark transmitters to make the first successful two-way transatlantic transmission, exchanging Morse code messages between a station constructed at Brant Rock, Massachusetts and an identical one built at Machrihanish in Scotland. Interestingly, Marconi had only achieved one-way transmissions at this time! The first 'wireless' communication of both speech and music was made later in the year on December 24th when Fessenden spoke and broadcast music by radio from Brant Rock to ships in the Atlantic Ocean using a 100kHz two kilowatt alternator.

Lee DeForest invented a three-element vacuum-tube detector which he called an Audion which was crude and unreliable. After a few years a group of scientists and engineers led by AT&T's **Dr. Harold Arnold** improved vacuum-tubes into robust and powerful amplifiers which went on to revolutionise radio reception. On November 3rd the Berlin International Wireless Telegraph Convention defined the call letters, signals and operating procedures for coastal stations and ships at sea.

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In Vision

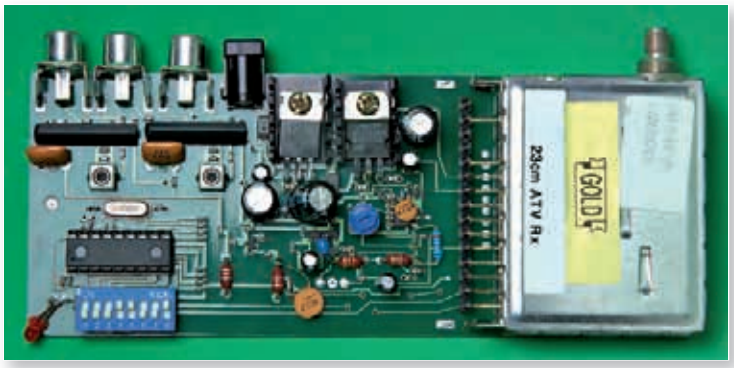
Graham Hankins G8EMX
E-mail: g8emx@tiscali.co.uk

Graham G8EMX tells of his new ATV receiver from the Internet and appeals for an editor for the *CQ-TV* magazine

First, the good news! I've bought a new receiver for 1.3GHz (24cm) Amateur Television (ATV)! The board, that was commonly known as the 'G1MFG' receiver while **Giles Read** went to rallies, is still available from an internet source. Incidentally, Giles, is now the Managing Editor of the RSGB's *RadCom*!

The 24cm ATV board was ordered from web site **www.13cm.co.uk** Receipt of my payment was promptly acknowledged by email from 'Nigel' and the ubiquitous padded bag arrived a little later. This is not a new site, as I'd known of it for some time as they used to advertise in the British Amateur TV Club's magazine *CQ-TV* (though no longer – as mentioned in October's column).

When the envelope arrived, there were only two items in it – the receiver and the list of dual-in-line (d.i.l.) switch settings for input frequencies. There are eight tiny d.i.l. switches in an i.c. size package, so that is how many combinations? Come on – remember your binary out there! Well, lots, anyway. But of course, the ATV operator is not frantically throwing switches all the time, tuning the band. 1.3GHz ATV generally uses around three carriers; 1249MHz for repeater inputs, around 1310MHz for repeater outputs and 1255MHz simplex. So, the receiver usually needs just two settings. Not so daunting after all, then!



Graham's 24cm ATV board

New Editor Required

Logically, I should start this bit as 'now, the bad news' but that would be too pessimistic. Let's just say that the BATC again needs a new editor for its quarterly magazine *CQ-TV* and is taking a hard look at its entire operation.

Brian Kelly became Editor at the club's general meeting, but said at the time that he could only do the job for a year, due to other demands on his time. Brian duly produced four editions then made quite clear that he could do no more.

Now although two members (I'm one of them) have volunteered to take on the task – the BATC committee is, at the time of writing, undecided on the best way forward on this and other issues.

There's one big problem with the Amateur Television hobby – finding another ATV station to contact. Unless the station is within an area served by an ATV repeater, the chances of finding a direct contact can be very slim.

When ATV was on 435MHz, local and more distant contacts were fairly commonplace and much innovation went on to exchange pictures. But the move to 1.2GHz – and above – radically changed all this. Now, many Amateurs have found themselves unable to operate on 1.3GHz, simply due to hills, high buildings, trees, whatever.

Putting any repeater on-air is a significant undertaking, both in technical expertise and timescale, so many ATV operators have just moved on to other modes. Those really keen operators go portable but this is very different to just 'popping into the shack for a few contacts'. So, with this in mind, the BATC probably has some serious thinking to do.

Analogue TV

I spent a few weeks in Manchester, an exciting city with much to offer, during September. This is the Granada TV region of course and on most nights ITV was running an advert reminding its audience that analogue TV would be closing down when the region went over to digital TV in 2009. As 2008 is only a matter of days away, that should concentrate the mind of every television viewer in the north west.

Back to ATV and more emails from readers of 'In Vision'. **Dave G0DJA** wrote "I always try to read all of the regular sections in *PW*, including your In Vision page. I always find something of interest in all of the contributions, even if they don't prompt me to respond straight away.

"Your comments on the seeming lack of new people into the TV area of Amateur Radio, together with comments from other people on the subject, are very relevant, but not only confined to your area of Amateur Radio. All modes of operation need their enthusiasts and they need to get other people to be interested in them. I failed my c.w. test twice, eventually passed and now quite enjoy the mode. If I had passed first time, the c.w. key would probably have been out of the window that same day..."

And **Frank Bailey** writes: "I always find your column interesting, if I had more time I would get into ATV myself but as it is with living in France in a house which needs so many jobs doing I hardly have time even to switch on the rig.

"You mentioned a shortage of analogue satellite receivers in the UK. Well you can buy them new in France as they still use them here. Many of the larger d.i.y. shops sell them, usually as a complete kit with the low noise block and dish. Avoid buying a 'numerique', which is a digital type. I have two analogue receivers here, with the intent of converting them to ATV. I understand that the polarising supply needs removing but what do you do for an antenna?" Good question Frank, after finding a receiver, my next task is to look for a supply of ATV antennas. Things should really not be this difficult!

I'll close this last In Vision for 2007 by wishing everyone a Merry Christmas and Happy New Year, and this includes **Donna Vincent G7TZB**. Donna was Group Production Editor at *Practical Wireless* and my sub-editor for most of the time I have been writing this column.

For those who didn't see the announcement, Donna has left the magazine to pursue further challenges and said her farewells to various authors at the Donington Rally. Donna, it was a privilege corresponding with you and my very best wishes for your future. **Graham G3EMX**

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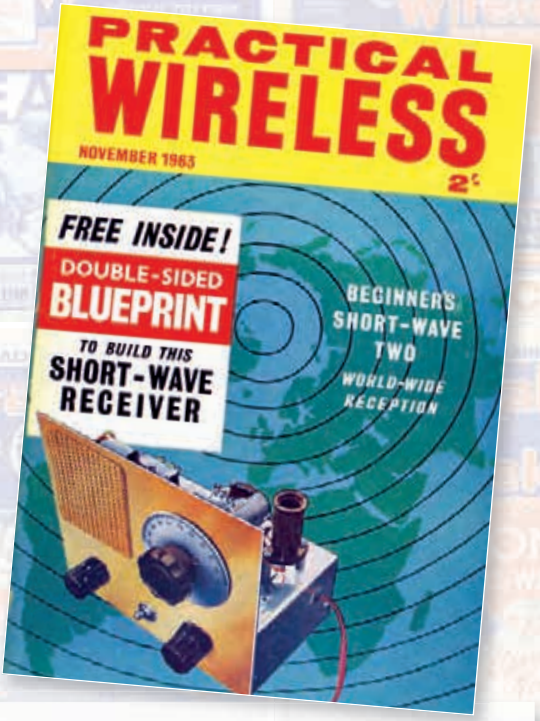


It's been an incredibly hectic year for everyone involved in producing *PW*! Along with preparing the magazine for publication **Tex G1TEX** and I – with a host of supporters – have been running our Special Event station GB75PW while **Steve Hunt,** our Art Editor, has been rising to the challenge of presenting vintage material in the best way possible!

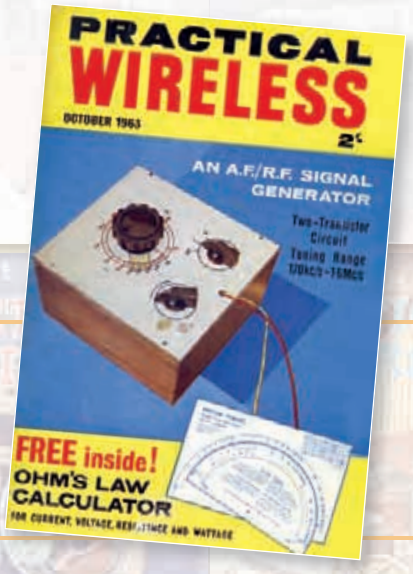
In rounding off our special year, I thank Tex, Steve and everyone based at the *PW* offices in Broadstone for all the extra hard work they've contributed, ranging from scanning-in of delicate archive material for *PW* and the special commemorative CDROM (Well done Tex!) – everything has involved much hard work but the final result has been worth the effort! I must also thank everyone who has supported the GB75PW operations – without your help we could not have shared our celebration 'on the air' – and around the world – so effectively!

This Month's Articles

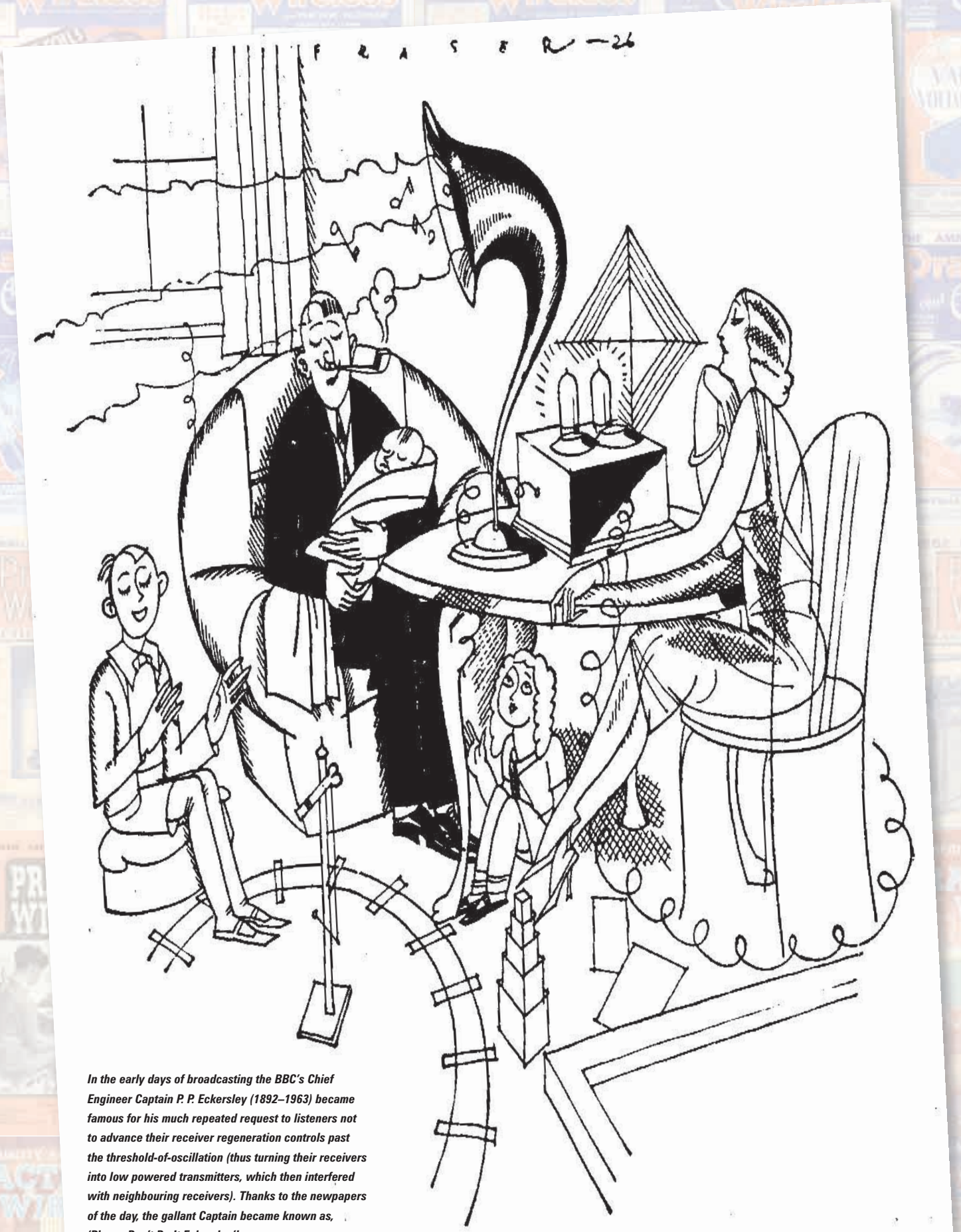
In the last of his special series of articles, **Charles Miller** – Editor of *The Radiophile* – takes at look at the early detectors used for radio, before discussing early valve technology and dubious early marketing techniques! Charles then rounds off his special selection of articles by describing the quest for *Q* (all is explained in the article!) and finishes off with a brief – rather wry – look at the early use of phonetics by 'Uncle Vic' on the Amateur Bands! Intrigued? – read on and enjoy the mystery as it unravels in this month's final Practically Yours – 75 Years of Heritage and History vintage offering!

Finally, **Stef Niewiadomski** provides a truly fascinating insight to the life and work of **Frank Rayer G3OGR**. Stef, like many radio enthusiasts and Amateurs, considers he owes much to the late G3OGR's projects and articles. The article is his own tribute to the prolific writer who provided so much pleasure for the radio enthusiast and (as Stef discovered) was also a busy science fiction author!

Personally, I think that – like me – readers will be amazed at just what G3OGR achieved in his lifetime and it's entirely appropriate that we feature the up-date on his life in the very last special article in *PW*'s 75th year! Enjoy!



To round off the anniversary year, Rob Mannion G3XFD introduces the final articles in the *Practically Yours – 75 Years of Heritage and History* series.



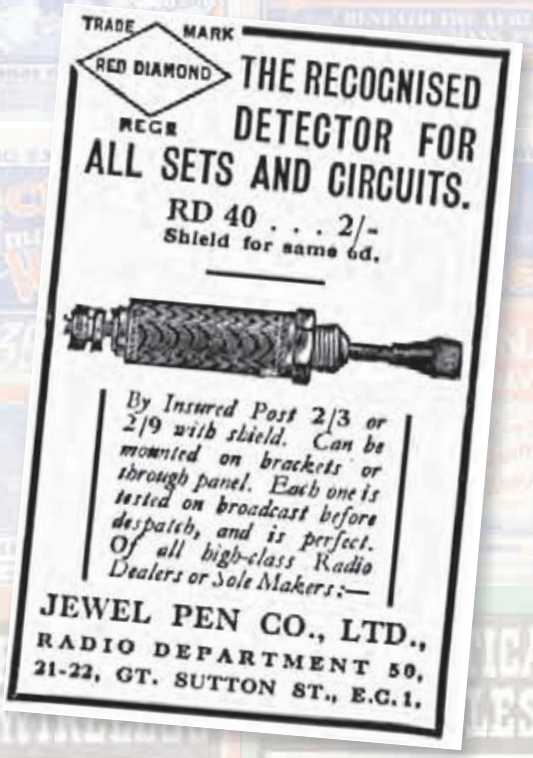
In the early days of broadcasting the BBC's Chief Engineer Captain P. P. Eckersley (1892–1963) became famous for his much repeated request to listeners not to advance their receiver regeneration controls past the threshold-of-oscillation (thus turning their receivers into low powered transmitters, which then interfered with neighbouring receivers). Thanks to the newpapers of the day, the gallant Captain became known as, 'Please Don't Do It Eckersley'!

Feature

The Development of Detectors

By Charles Miller

The reception of the early wireless transmissions required suitable detectors. Nowadays, although we may take the humble semiconductor diode for granted, the early experimenter had to contend with magnets and clockwork motors! To explain the mysteries of early detectors, in his final series of special articles, Charles Miller the Editor of *The Radiophile* takes us back to the very beginnings of wireless communications.



In order to turn radio signals entering a receiver into electrical impulses audible in headphones some kind of 'detector' was necessary. The earliest type was the coherer, developed by **Professor Branly** in France and **Sir Oliver Lodge** in England and was later improved by **Guglielmo Marconi**. Basically it was a glass tube filled with metallic filings and having a terminal at either end. When wired in series with a battery and a galvanometer, at rest it had a high resistance and passed very little current. But when influenced by radio waves its resistance decreased sharply and the current through it rose accordingly.

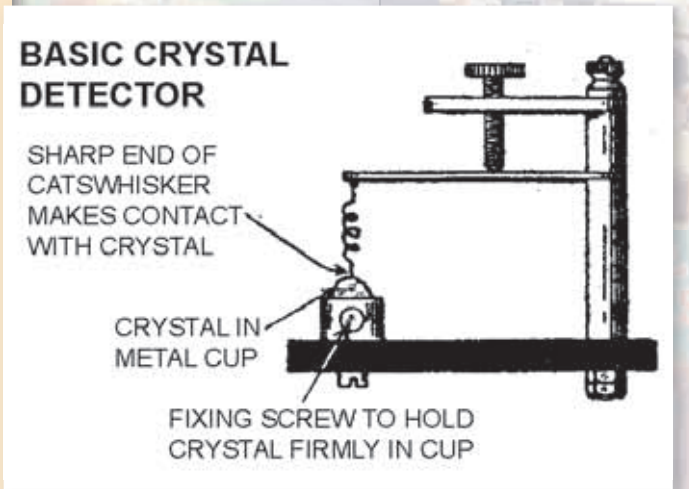
The problem was that after each signal had been received the filings had to be 'decohered' by physical tapping of the glass tube. Although a device was developed which automatically did this during reception the coherer was slow and uncertain in its action and was replaced from 1902 by the 'Marconi Magnetic Detector', a wondrous device involving an endless loop of fine wires bound together, being driven by clockwork around the poles of a horseshoe magnet.

Two coils encircled the loop, one carrying the received radio signals, the other connected to headphones. The radio signals modified the amount of magnetism that had been induced into the loop by the permanent magnet, which in turn produced voltages in the headphone coils. One of these could have been built by an experimenter with the necessary clock-making skills but it seems highly unlikely that it achieved anything approaching popularity.

Meanwhile, **Dr. J.A. Fleming** was developing his thermionic diode, which proved to be extremely reliable and was taken up with enthusiasm by commercial radio users. It's again doubtful that many found their way into private hands.

Crystal Detectors

The first crystal detectors appeared in 1906. These employed silicon carbide, commercially available as carborundum and used for grinding metal. It's what we would now call a semiconductor, passing electricity more readily in one direction than the other and when



connected between a tuned circuit and a pair of headphones it converted incoming radio signals to direct current electrical pulses.

Firm contact to the carborundum was made by strips of spring-steel, which made this type of detector vibration proof and highly reliable. The only snag was that it needed to be polarised by a small battery and a balancing potentiometer.

About 20 years later someone devised a method of obtaining the polarising voltage by means of two rods of different metals, which when driven into the ground a foot or so apart, developed a potential difference between them. It was a good wheeze but unfortunately came rather too late in the day to gain popularity. Nevertheless, anyone wishing to have a go and who has available a couple of safety razor blades, a bit of carborundum and rods of – let's say, steel and copper – still might get some interesting results!

The carborundum detector was called 'permanent' because once set up it needed no adjustment. This useful property could also be obtained without the need for polarisation by placing two different types of crystal (typically zincite and copper pyrites) in intimate contact. However, permanent detectors did have a drawback, because their sensitivity was low.

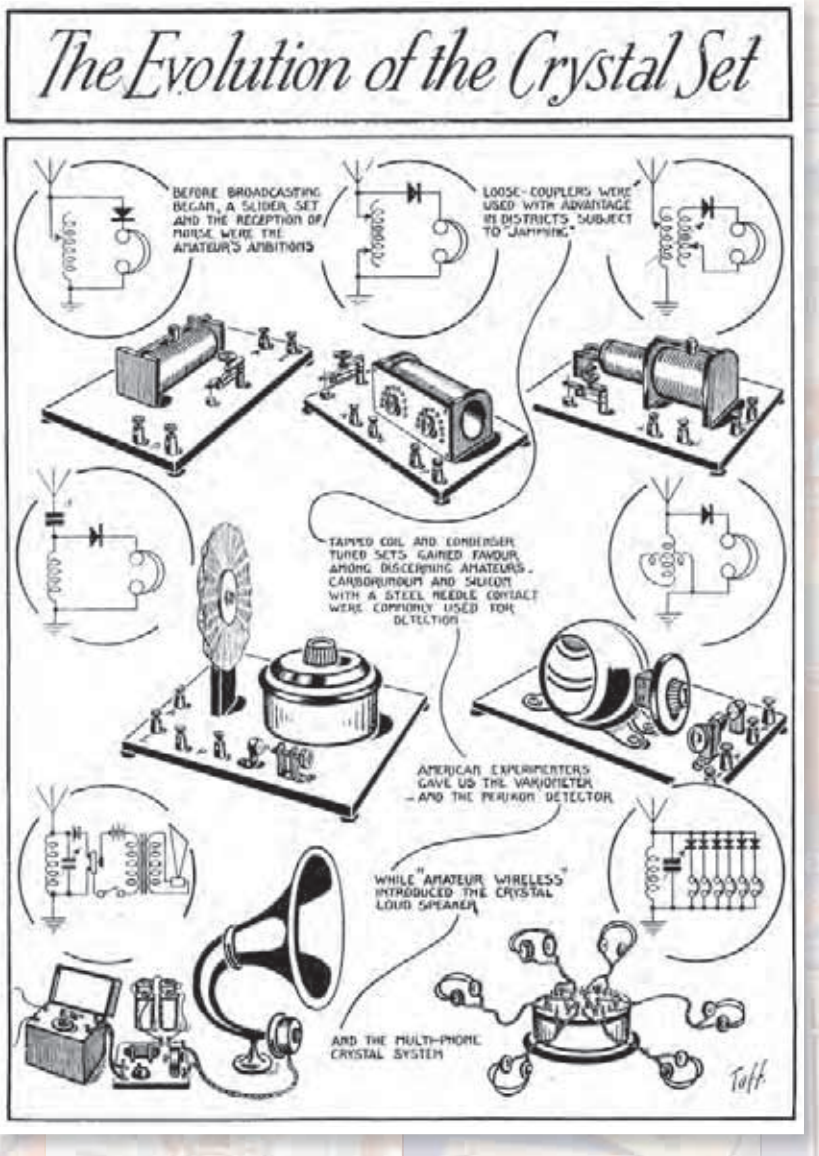
Much better results – from the point of view of signal strength in the headphones – could be obtained by using a small piece of galena (lead sulphide) held in a metal cup forming one connexion and with a point contact device for the other. This was a small springy coil of brass, silver or even gold wire attached to the end of a thin rod which itself was mounted in a way which gave free movement. Known as the 'cat's whisker', this had patiently to be adjusted until a sensitive spot was found on the face of the galena.

Even today there's a thrill to be had by 'tickling the crystal' and plucking speech and music from the air but anyone who does so, starts with the great advantage of knowing that – however tricky it may be to find the right spot on the crystal – there will certainly be something being broadcast and eventual success is guaranteed. It would have been totally different, though, for experimenters in the pre-broadcasting age seeking signals to and from ships and their tenacity and patience must have been almost heroic.

Natural Galena Trade

Natural galena was sold under many and various trade names, most of them ending in -Vee, while a highly sensitive synthetic type called 'Radiocite' was developed by **Leslie McMichael** and **Rene Klein**.

Experimenters with a basic knowledge of chemistry could make their own detector material by adding flowers of sulphur to molten lead, the latter often being obtained by sacrificing a toy lead soldier. Probably the 'Health and Safety Thought Police' would have a fit if this was a general practice nowadays but what the heck!! If they had been in existence in prehistoric days we would all still be shivering in cave dwellings, unable to build fires because of the danger of getting burned!



Feature

The Valve Grows Up

By Charles Miller

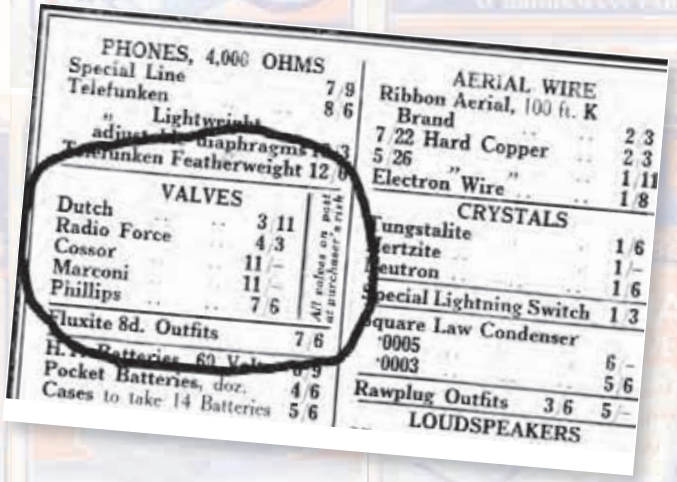
Dr. Fleming's diode was called a valve because it emulated the same principle of a mechanical valve by letting something – in this case an electric current – through in one direction but not in the other. It had but one use in early radio receivers, that being to act as a detector.

The triode, nominally invented by **Dr. Lee de Forest**, was brought to practical use by **Dr. Arnold** of the Western Electric Company. It could amplify, which meant that for the first time very weak radio or audio signals could be, in effect, magnified many, many times.

The triode's first role was in telephone systems in the USA, to make long distance calls fully audible to subscribers at either end. Whilst telephone amplifiers were being developed for this purpose it was discovered that in certain circumstances the valves became unstable and burst into oscillation.

The oscillation was just a nuisance to the engineers concerned, until somebody realised that it was a non-mechanical generator of radio signals. From that moment all-electronic transmission of speech and music became possible, as opposed to the early experiments with modulated spark transmitters.

As with most notable inventions, development work on valves was being carried out simultaneously in a number of countries. By the time of the outbreak of the First World War, the opposing sides were in a position to use radio communications for military purposes.



Perhaps the single most successful valve to appear in Europe during the war was the French R-type, with tens of thousands of them being produced in Britain alone by, notably, A.C. Cossor & Co., Ltd. This was an old-established manufacturer of scientific glassware, which actually had made cathode ray tubes (c.r.t.s) at the turn of the century.

Also involved in valve production were The British Thompson-Houston Company; the Edison-Swan Electric Co. (Ediswan); and the Osram Company (wholly owned by the General Electric Company). The last three firms were large manufacturers of electric lamps and thus had vast experience of making filaments and evacuating glass bulbs.

In 1919 the Marconi Wireless Telegraphy Co. (MWT) and G.E.C. made an agreement to set up a jointly owned new firm known as the Marconi-Osram Valve Company (M-O.V.) which would produce valves for both parent companies under their different brand names and trade marks. Shortly afterwards, **Captain S. R. Mullard**, who had had experience in the manufacture of electric lamps, set up the Mullard Radio Valve Co., Ltd.

Ostensibly, all these firms were in competition with each other but below the surface a complex network of mutual financial interests and shareholding existed which ensured co-operation between them. They also set up the British Valvemakers Association (BVA), which was one of the cosiest and most financially rewarding cartels to exist in this country.

Price fixing was the name of the BVA's game and for years they were kept artificially high to the extent that valves cost in Britain from four to six times more than equivalent types in the USA. However, as might be expected, enterprising salesmen brought in valves from abroad and sold at far below BVA prices whilst still making useful profits.

Sold Into 1920s

The R-type valve was still being sold well into the 1920s both in its original form and also, by Mullard as the ORA type (Oscillates, Receives, Amplifies) with basically the same electrode structure mounted vertically in a tubular envelope. Both these types were 'bright emitters' with filaments not

unlike those of electric lamps. These drew 0.64A at 4V and thus needed heavy-duty low tension (l.t.) accumulators to power them when used in multi-valved sets.

When more economical dull-emitting filaments were developed the R-type became the DER, which drew a fraction of the l.t. current, whilst Cossor introduced the Wuncell' valve, its name indicating that the filament could be powered by a single 2V accumulator.

Detailed research resulted in different types being produced for different jobs such as high frequency (h.f.) amplification, detection, l.f. amplification and power output. An example of the last was the Mullard DFA1 of 1925, which cost no less than 30 shillings (30s), more than the wages of many workers. It was a happy time to have shares in a valve making company!

Although experimental four-electrode valves were made from the start of the 1920s it was not until the introduction of the screen-grid valve that the problem of stable and really effective high frequency amplification was solved.

The first example to go on general sale, the M-O S625, which was released just 80 years ago in September 1927. With an amplification factor of 110 it made possible actual stage gain factors of up to 50.

Before very long, Cossor produced its own screen grid valve, the 610SG, which had an even better amplification factor of 200 but still better, was the figure of 800 delivered by the 410SG. It was this sort of performance that virtually killed off superhets until the early 1930s.

Another major valve introduction that comes into the period under discussion was the pentode, which was able to deliver higher power output to a loudspeaker than a triode but with reduced anode current. It was originally developed by Philips, Ltd., which jealously guarded its patent rights for a considerable time, but inevitably other valve manufacturers were soon offering examples of their own

Three Valves in One

Undoubtedly the most extraordinary valve to appear in the late 1920s was the Loewe RNF7, which was actually three triodes in one envelope along with all the necessary components to couple them together. One of these valves made it possible to construct a complete radio receiver with only an aerial tuning coil and condenser at the one end and a loudspeaker at the other.

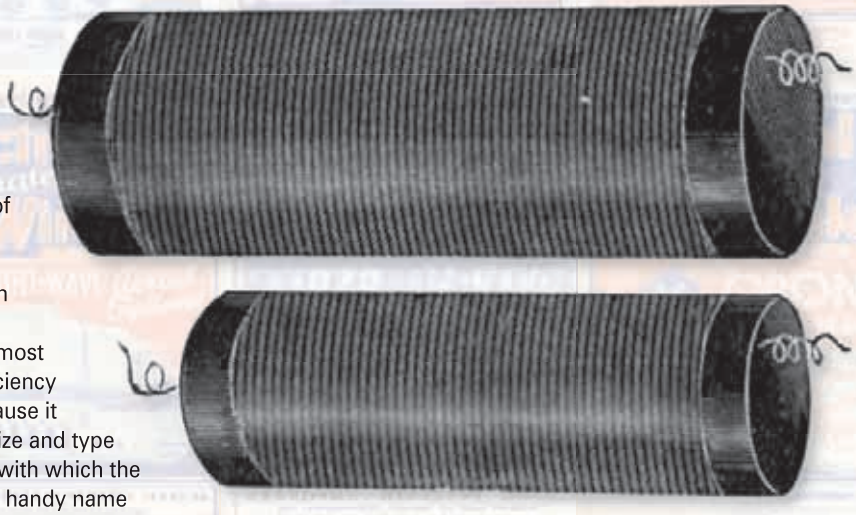
"Three-valve power at one-valve cost!" said the advertisements, which at 43/6d, was not too wide of the mark when taking into account the equivalent price of the internal components had they to be bought separately, plus the royalties. There was also a double valve, costing 32/6d containing two h.f. amplifiers which, if installed ahead of the RNF7, provided the hobbyist with a long-distance receiver that could be made up with ease.

The Loewe firm, which was based in Germany, went on making ever more sophisticated multiple valves into the late 1930s. And, as Loewe-Opta, the company is still making electronic equipment.

Feature

The Quest for *Q*

By Charles Miller

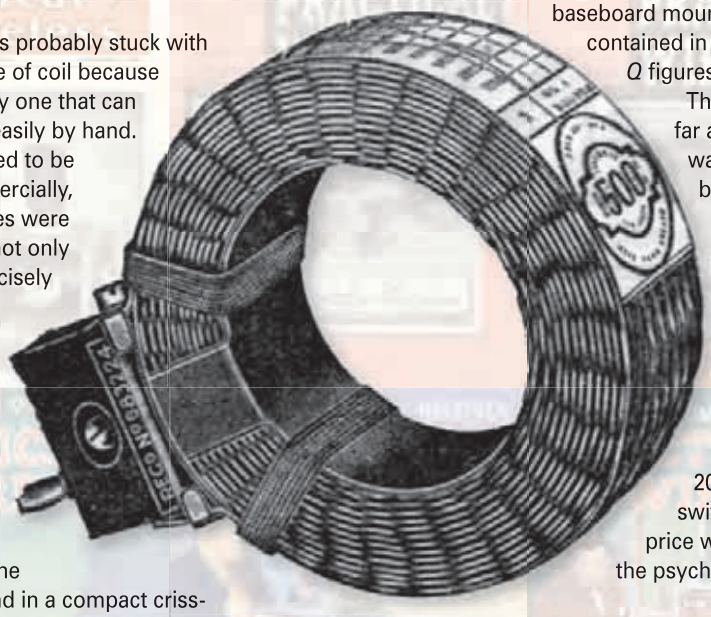


The usual type of tuning coil home-made by hobbyists was made up to form the single-layer solenoid type wound on a wood or cardboard former. Wireless magazines provided formulae as to how many turns of wire were required on a particular size of former to cover a desired range of wavelengths when used in conjunction with a certain value of tuning condenser, commonly 0.0005μF, known colloquially as "three Os five".

If followed faithfully the figures given would most certainly give the required coverage but the efficiency of the finished article was open to question because it depended on a number of factors, such as the size and type of former, the gauge of wire used, the neatness with which the turns were applied and various others. To give a handy name for the 'goodness' of a coil the term *Q* was coined; the higher the *Q* the better the coil and vice versa.

Stuck With It

The hobbyist was probably stuck with the solenoid type of coil because it's really the only one that can easily be made easily by hand. When coils started to be produced commercially, winding machines were devised, which not only laid on turns precisely but also enabled other formats to be used.



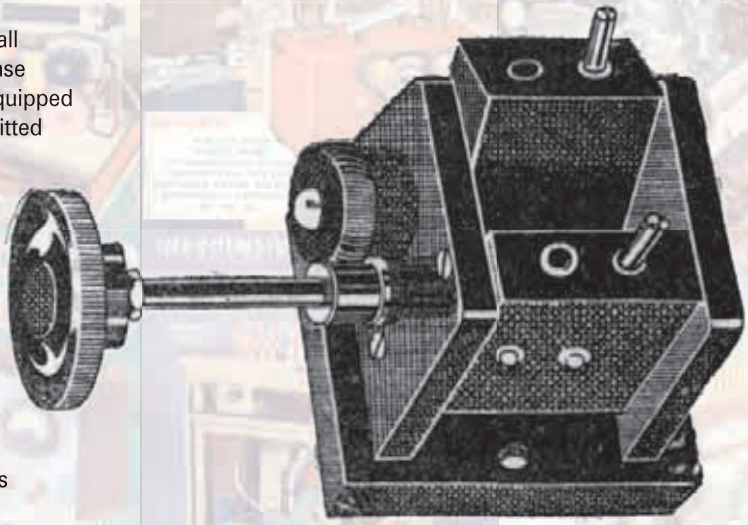
One of the most popular commercial coil formats was the 'basket weave' type (right) in which the turns were wound in a compact criss-cross pattern that endowed them with sufficient rigidity not to need a former. The result was a coil of small overall dimensions subsequently mounted on a small base made of Ebonite or some other insulator material and equipped with non-reversible plug and socket connectors, which fitted into special coil holders on the baseboard or front panel of a receiver.

The coils were made with specific numbers of turns to cover various wave ranges and for aerial coupling or reaction purposes, with the non-reversible bases ensuring that they would be mounted in the correct phase. Basket coils enjoyed great popularity and their *Q* was superior to that of simple solenoids – but there was still much room for improvement in that respect.

Later on there was a reversion to solenoid coils but of much more compact design and having dual windings for coupling the aerial to the grid of a high frequency amplifier – or for coupling its anode to the grid circuit of a detector. They were fitted with six-pin bases to fit into baseboard mounted sockets, which in some cases were contained in metal screening cans, and reasonably good *Q* figures were obtained.

The drawback of any type of plug-in coil as far as the listener, if perhaps not the hobbyist, was concerned was that they needed to be changed if stations on widely different wavelengths were to be received, such as was the case when the BBC opened its 5XX long wave transmitters at Daventry. The answer to this was the introduction of multi-wave coils having several windings which could be selected at will by means of a simple switch.

A typical example in 1927 was the Wearite type WG1 which covered from 200m to 1800m and came complete with switch and variable aerial coupling device; its price was 19s/6d, doubtless chosen to be below the psychological 'pound' barrier. Before long a

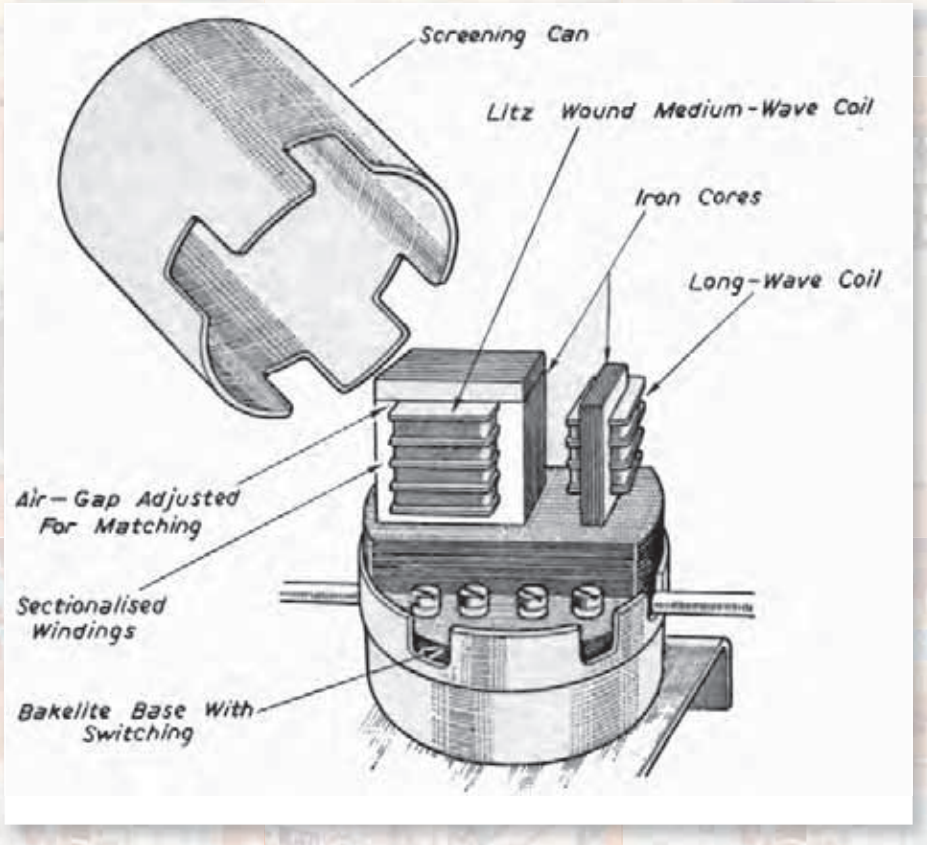


number of other firms were producing multi-wave coils but the quest for better *Q* went on.

Litz Wire

The first big breakthrough came with the introduction of Litzendraht (usually abbreviated to Litz) wire. It had been discovered that the high frequency currents in a coil ran around the outside of the wire used so theoretically the larger the gauge of the wire the more efficient the coil would be although, of course, it was not practicable to use thick wire for coils in domestic receivers.

When Litz wire was made to any particular overall gauge, the wire was made up of a large number of extremely thin insulated conductors round each of which the h.f. currents passed with ease due to the 'skin' effect. It was more difficult and expensive to manufacture than conventional solid wires but the advantages it offered made its price well worth while. By the end of the 1920s hobbyists were able to employ tuning coils with *Q* factors far and away greater than those common at the beginning of the decade.



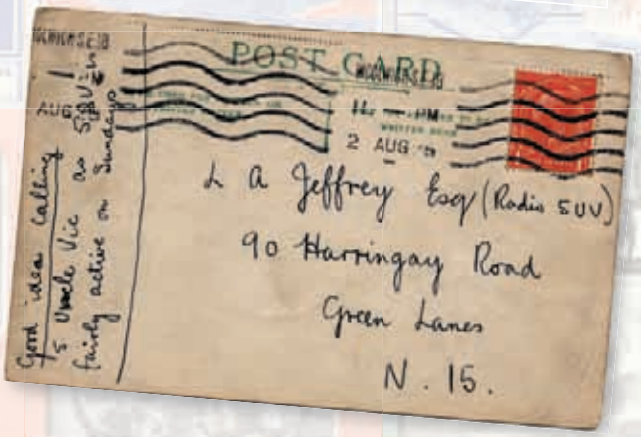
Although their general use by hobbyists came later than the period we are dealing with in this article, iron-dust cores were the next great step forward. As a result of research carried out, primarily for telephone repeaters, it was found that if iron was reduced to powder and then formed by means of adhesive into rods or slabs that could be placed inside or around coil formers, it then had the property of increasing both the inductance and the *Q* of the windings.

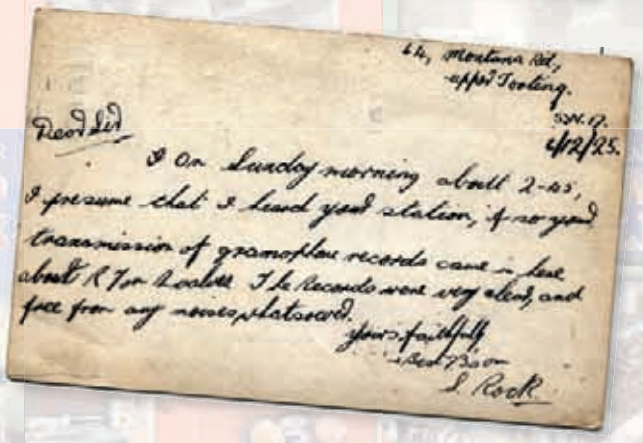
It was estimated that in 1934 nearly a third of all commercially built radio receivers used iron dust cores, with the proportion rising steadily; it was probably nearer three-quarters by the end of that decade. Incidentally, for those interested in the subject of winding their own coils, F. J. Camm's *Wireless Coils, Chokes and Transformers* can be highly recommended.

Feature

Whatever Happened to Uncle Vic?

Asks Charles Miller





One of the few 1920s publications to cater for transmitting amateurs was the *T and R* (transmit and receive) *Bulletin* produced by the **Radio Society of Great Britain.** It offered designs for home-built equipment and also helpful advice for those who needed guidance.

Possibly, the *T&R Bulletin* had a reader in **Mr. L.A. Jeffrey** of 90, Harringay Road, Green Lanes, London N15 who as **5UV** (later **G5UV**) was very active in the mid 1920s, as we know from a collection of QSL cards that has come into the hands of *The Radiophile*. The cards make fascinating reading and something that is very noticeable is that the post marks on them are actually legible, which is more than can be said about present-day post marks!

The first post mark may have given Mr. Jeffrey high hopes for it was from **W.J. Forster** of Liverpool who reported that towards midnight on January 29th he picked up what he thought was 5UG, Middlesex. He couldn't find this in his lists of call signs and wondered if he had misheard G for V.

It appears that some time after this Mr. Jeffrey adopted the phonetic 'Uncle Vic' to avoid further confusion. The next card, dated April 4th 1925 was from no less a person than **T.A. St. Johnston 6UT**, *T & R* Secretary of the RSGB, who gave a very favourable report of Uncle Vic's signals as received in Chingford, Essex.

On 7th June 'Uncle Vic' was picked up by **G. H. Henshall** of Eltham on a 'crystal receiver (special)' at R5-R4 which gave a rectified current from the detector of up to 5.46μA using a single-wire aerial 38 feet high that was directional towards the north. On that night 5UV was again in contact with 6UT, from whose QSL card we learn that Uncle Vic was was working on 168 metres and coming in at R6.

On the 2nd of August he was heard by **W. J. H. Kempton** of Plumstead on a single-valve receiver using a Reinartz circuit, when his "speech (was) gradually improving...clear and easily audible." In a PS Mr. Kempton expressed his approval of the Uncle Vic callsign which avoided confusion with 5QV.

On the same day Uncle Vic worked **W. I Turberville-Crewe 5CT**, of Golders Green who was using a two valved (detector – l.f.) receiver and who reported R5 signals. On November 1st Uncle Vic was heard by **H. A. G. Quaintance** who reported "fair" phone speech on a three valved (h.f., detector, l.f.) receiver. Considering that Mr. Quaintance gave his address as also in Green Lanes it would have been surprising if reception hadn't been pretty

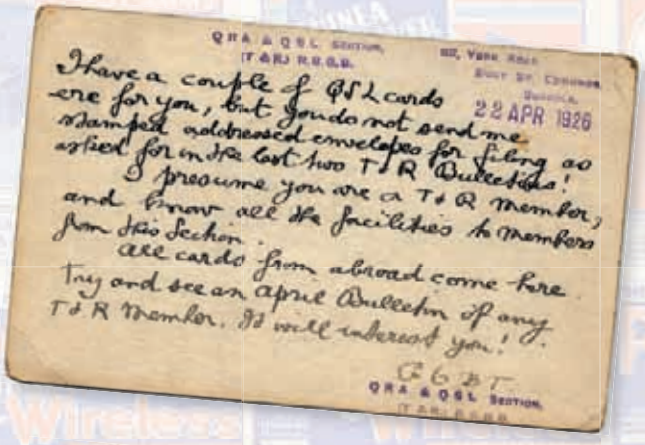
This month, Charles Miller takes a wry look at the early use of phonetics in Amateur Radio communications – by looking at the evidence provided by 5UV – 'Uncle Vic' – and his QSL cards. Charles also asks, "Do you remember this pioneering Amateur?"

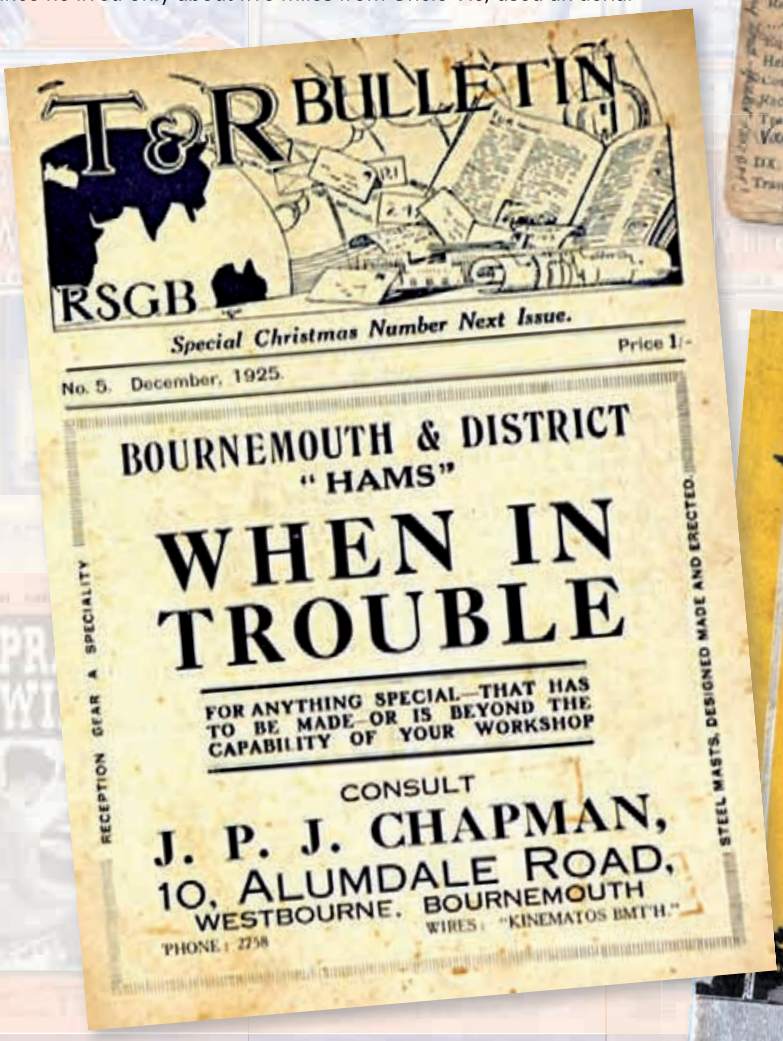
good! He also asked Uncle Vic to let him know what wavelength he was using so that he could calibrate his set.

Reprimand From G6BT

On December 5th, **S. Rock** of Upper Tooting reported, "presumed that I heard your station, if so your transmission of gramophone records came in at about R7 on [a] 4-valve [receiver]. The records were very clear and free from any noises whatsoever." However, on 22nd April, 1926 Uncle Vic received a reprimand from **G6BT** of the QRA and QSL Section (T and R), RSGB because he had not provided stamped addressed envelopes for the couple of QSL cards that had arrived from abroad. "I presume that you are a T & R Member and know all the facilities to members from this section. All cards from abroad come here. Try and see an April *Bulletin* of any T & R Member. It will interest you!"

Sadly, we don't know what Uncle Vic would have found so gripping. The final card is dated December 4th 1927 and came from **F. C. Mason 2BXM** of Forburg Road, London N16 who reported that Uncle Vic came in a R8 on a loudspeaker driven by a two-valved (detector – l.f.) receiver. This was only to be expected since he lived only about five miles from Uncle Vic, used an aerial





of 100ft in length, 50ft high in conjunction with a 20ft counterpoise and a buried earth plate!

So, there we have to leave Uncle Vic. Did he continue his activities into the 1930s and even later? Maybe some reader of *Practical Wireless* may be able to tell us!

Francis George Rayer G3OGR

a deeper look at his work and pen names

Editorial introduction: It seems fitting to round off the 75th anniversary year of *PW* with a further and more detailed tribute to the late **Frank Rayer G3OGR**. It's especially well timed as far as I'm concerned because – as Stef says – many of us owe much to G3OGR's work. I've made an exception for this article because although Stef only offered it recently – we were able to place it in the very last issue for 2007. We are moving forward in 2008 and this is the last 'looking back' type feature for the foreseeable future. I thank Stef for his work and I must say that I have been astounded at the versatility of Frank Rayer – writing everything from romantic novels to science fiction – he must have been a very exceptional individual. Incidentally, I take the opportunity to thank the anonymous reader who kindly sent me a copy of one of G3OGR's (very *Dan Dare* like) science fiction novels. As an *Eagle* comic fan I thoroughly enjoyed it! **Rob G3XFD**.

Although Stef Niewadomski is not a Radio Amateur, he is – as a busy technical writer himself – following in the footsteps of the late Frank Rayer G3OGR. Stef's always been fascinated in the man behind the various pen names and presents his findings in yet another fascinating article for *PW*!

The continued interest in the life and writing of Francis George Rayer G3OGR, as shown by recent letters in *PW*, is evidence of how fondly and firmly he is embedded in the lore of the hobby of Amateur Radio. The influence of his writing in the formative years of many long time readers and writers (including me) of the magazine is well recognised.

In the 75th anniversary year of *PW*, the publication of articles by G3OGR and **R F Graham** has stimulated discussion on Frank Rayer's pen names. Most recently an interesting letter from **Dave Porter G4OYX** summed up his suspicions as to Frank Rayer's various disguised names

When I started researching this article, I did so with a view of 'proving' the G3OGR – R F Graham connection. However, I didn't realise the true nature and extent of G3OGR's writing output between the late 1940s and his death in 1981, although this was hinted at in **Rob Mannion G3XFD**'s article *Mr Project – The F G Rayer Story* in *PW* October 2002, written with much input from G3OGR's son, **William**. The article answered many questions about the man and mentioned his other writings, besides what we saw in *PW* and other radio and electronics magazines during the 1950s, 1960s and 1970s.

My 'guesstimate' from the 2007 viewpoint, is that what we grew up with in *PW* during the 1950s to 1970s period was much less than half of what G3OGR actually wrote! Although it can be argued that the constructional aspect of his radio/electronics projects (and his DIY projects, see later) must have accounted for more time than 'simply' writing science fiction stories.

Captain R F Graham?

On the question of whether G3OGR and (Captain) R F Graham were one and the same person, certainly the circumstantial evidence points to a 'yes he was'. When R F Graham first appears in *PW* in the mid-1950s, he seems to be G3OGR's transistor personality, while G3OGR concerns himself almost exclusively with tried and tested valve circuits. So, for example, in the July 1957 issue of *PW*, the second part of *An Amateur Communications-type Receiver* (using good old octal valves) by F G Rayer, and *A Diode and 3 Transistor Portable* (using OC70/71/72 transistors) by Capt. R F Graham are published.

The attachment of F G Rayer to his callsign doesn't occur until *PW* August 1964, with the publication of *End Fed Aerials* by F G Rayer G3OGR, though he received the callsign in July 1960. You'd think that from then onwards Frank Rayer would insist on the permanent attachment of name and callsign. However, there are examples of articles in 1965 onwards where the name F G Rayer and his callsign G3OGR are detached from each other and maybe they were even used to imply different author identities.

The name R F Graham occurs most often when F G Rayer has an article published in the same issue of *PW*. This pattern occurs on no less than 21 occasions between 1957 and 1970 (and maybe beyond this, for which I don't have records).

During the same 14 year period R F Graham has only four articles published in months when G3OGR is not published.

My theory is that the editor of *PW* at the time (the great F J Camm up to his death in February 1959, followed by the anonymous 'The Editor') had a policy of publishing only one article by an author in a given issue of the magazine. In retrospect the use of F G Rayer, G3OGR and R F Graham looks like a crude way of circumventing the rule for such a prolific (and presumably popular) author.

I thought I had F J Camm's rule worked out until I saw the December 1958 copy of *PW*! It's at this point where the whole theory falls apart as F G Rayer has three articles attributed to him, namely: *AC Pre-tuned Superhet*, *Power Transistors* and *The Beginner's Superhet*. Maybe even the great F J Camm or his editorial staff lost the plot sometimes?

Camm's Admiration?

I suspect that Fred Camm admired G3OGR's writings greatly as both men were prolific authors on a wide range of subjects including, but certainly not limited to, radio and electronics. And Camm helped Rayer as much as possible to accommodate his output. We must remember that G3OGR was making a living from writing and not just treating it as a part-time occupation as most writers did at the time (and still do) in Amateur Radio magazines.

Frank Rayer also had two articles published in the same issue of *PW* a few times in the 1960s, for example in November 1962. So, if the system was in force during Fred Camm's period, it certainly broke down more often after his editorship was over.

The radio frequency (r.f.) section of G3OGR's *Beginner's TRF4* article in the August 1966 issue of *PW* , is identical to that of R F Graham's *TRF5 Pocket Portable* in the May 1968 issue, down to the last resistor and capacitor value! The audio frequency (a.f.) output stages use the same Newmarket NKT251 transistors. Only the 'bit in the middle' is different, with an extra transistor a.f. stage added in the later article, so perhaps G3OGR realised his radio need a bit more gain and corrected this under the guise of R F Graham?

Another article published in the May 1968 issue entitled *End Fed Aerial Tuner*, appeared as 'by F G Rayer, G3OGR' and following the rule I've mentioned, G3OGR couldn't have used his own name for the *TRF5* project. Interestingly, G3OGR had another article – *Imperial Transmitter, Part III*, published in the August 1966 issue of *PW*, under the name F G Rayer, G3OGR.

Frank Rayer's writings in *PW* were concerned mainly with Amateur Radio (receivers, transmitters, aerials, etc., for the Amateur bands), signal generators, calibrators, broadcast and communications receivers (valve-based initially and then using diodes and transistors) and radio control. From its inception, *PW* had promoted the home building of broadcast receivers at a time when ready-made receivers were an expensive luxury. And – up to the end of the 1960s – where at this time the designs were almost exclusively transistorised – hardly a month went by without such a project being published, many of them being G3OGR's designs.

Stefan's Library

Although I have a good collection of *PW*s for the late 1950s and 1960s, I don't have many other radio magazines of the period. Rummaging on my book shelves produced just two issues of *The Short Wave Magazine*, and magically G3OGR is published in both! The February 1968 issue has his *Practical Top Band Transmitter Circuits*, and October 1969 has *Second-Channel BCI*, both attributed to F G Rayer, AIERE, G3OGR.

Perhaps other authors could comment more comprehensively on G3OGR's output for *SWM*, and also *Radio Constructor*, *Practical Electronics* and *Practical Television*? Also, I wonder if he penetrated the RSGB's *Bulletin* (and *Radio Communication* as it became later) and *Wireless World*? I'm pretty sure he was published in the USA, but I don't have any details of anything that was published.

I've exchanged E-mails recently with G3OGR's son, **William** (formerly **G8PWR**) and he confirms that his father used the R F Graham pseudonym, amongst others, (including **George Longdon**, see later for how he used this name). William believes that a list of his father's pen names existed in his old papers but was probably thrown away many years ago. So, sadly we may never know the true extent of G3OGR's psendonymes in radio magazines.

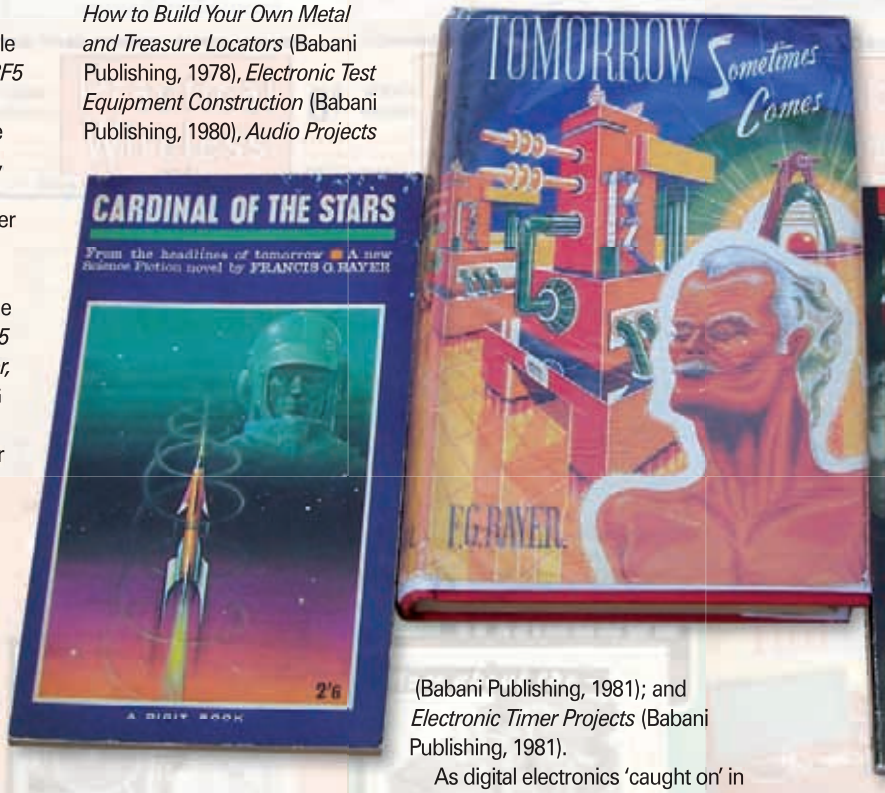
Other Work

So far I've only concerned myself with G3OGR's articles for radio magazines, for which he's well known and respected. In fact he was also a great writer of books. For example, his radio interest gave us: *Amateur Radio* (published in 1964 by Arco Publications, with later re-printings); *Transistor Receivers and Amplifiers* (Focal Press, 1965); and *How to Make Walkie-Talkies* (Babani Publishing, 1977).

The walkie-ta kies described in G3OGR's book were designed for Licensed Amateur use in the Amateur bands, typically the 28 and 144MHz bands, though some circuits for 160m and 80m (1.8 and 3.5MHz) were described. This was of course in the days before legal Citizens' Band (CB) operation was permitted.

Frank Rayer dealt with many publishers, but a long and fruitful relationship was maintained with Bernard Babani Publishing, for whom he generated many slim volumes (typically 100 pages).

A little later in his writing career his more general electronics interests gave us the titles: *Electrical Hobbies* (Nutshell Books, 1964), *Electrical Experiments* (Pegasus Books, 1968); *50 (FET) Field Effect Transistor Projects* (Babani Publishing, 1977), *Fifty Projects Using Relays, SCRs and Triacs* (Babani Publishing, 1977), *How to Build Your Own Metal and Treasure Locators* (Babani Publishing, 1978), *Electronic Test Equipment Construction* (Babani Publishing, 1980), *Audio Projects* (Babani Publishing, 1981); and *Electronic Timer Projects* (Babani Publishing, 1981).



As digital electronics 'caught on' in the late 1960s onwards G3OGR met the need for educational books in this field. Amongst his many books on the subject are: *Popular Electronics and Computers* (Arco Publishing, 1968), *Electronic Game Projects* (Newnes Publishing, 1979), *Counter Driver and Numeral Display Projects* (Babani Publishing, 1980); *Digital Integrated Circuits Projects* (Babani Publishing, 1981); and *Integrated Circuit Projects for Beginners* (Babani Publishing, published posthumously in 1982). Frank Rayer's interest in radio control (as evidenced by his many magazine articles on the subject) also resulted in at least one book, namely *Radio Control for Beginners* (Babani Publishing, 1980).

It's worth noting that G3OGR also tackled a tricky subject in *How to Build Your Own Solid State Oscilloscope* (Babani Publishing, 1979). In this book he describes an oscilloscope using all solid state components (except for the cathode ray tube, c.r.t., itself of course), including high tension (h.t.) and extra high tension (e.h.t.) voltage generation.

First Novel

The novel – *Lady in Danger* – published by Grafton publications – was G3OGR's first published book in 1948, under their series "Exciting Romance". Unfortunately I haven't been able to obtain a copy of the book. The only copy I could track down is in the British Library and they will only allow it to be read on-site. I conclude from this that the book didn't sell too many copies and so isn't generally around in any quantity, though the 1948 publication date gives plenty of time for most copies to be lost or thrown away*.

The reading on-site rule seems to be the normal policy for the British Library and their policy should not be seen as reflecting how successful a book has been. I now have several copies of G3OGR's science fiction novels and I have been surprised to see just how often his fiction books turn up in second hand shops and on the Internet. **G3XFD.*

Science Fiction Writings

Frank Rayer's interest in science fiction writing possibly resulted in four full-length novels, namely: *Tomorrow Sometimes Comes* (Home and Van Thal, 1951) which starts with the event feared and expected sooner or later by all in the west at the time – atomic war, *Journey to the Stars* (Arcadia House, 1964), *The Iron and the Anger* (Digit Books, 1964); and *Cardinal of the Stars* (Digit Books, 1964). As you can see – 1964 is certainly a significant year in G3OGR's publishing career!

I used the phrase 'possibly four novels' here because *Journey to the Stars* is actually *Cardinal of the Stars* under a different title. According to William Rayer, *Journey to the Stars* is a pirated copy of Cardinal of the Stars published in the USA, which is where most second-hand copies of this book now seem to be located. Of course, G3OGR was very upset about this pirating, but the cost of legal action was prohibitive and risky and was not pursued.

Assuming that G3OGR wrote the two unique science fiction books that were published in 1964 in the couple of years previously, there's no obvious slackening in those years in the frequency of his radio articles in *PW* – they continued at the normal prodigious rate!

I'm a fan of science fiction writing and so I was looking forward to reading G3OGR's work in the genre, although I was somewhat apprehensive about its quality. It may seem contradictory, but much science fiction writing dates very quickly and 'old' stories in the genre are sometimes not easy to read. However, I have to say I was pleasantly surprised and his work is not as dated as I thought it might be. It was easy-to-read and built to an exciting climax on the last page.

Writing Flavour

To provide a flavour of what G3OGR produced in his science fiction works, *Tomorrow Sometimes Comes* starts with an atomic (sic) war. And here, I suppose, G3OGR was simply reflecting the obsession and fear from the early 1950s that sooner or later mankind would suffer this fate. Within the story, a huge centralised computer, the Mens Magna, controls the city where many of the descendants of the survivors live.

The computer appears to be benevolent at first but ultimately concludes with its rigid logic that mankind is unfit to be the dominant life form on Earth and therefore must be destroyed along with the whole planet. The computer also concludes that the only logical alternative is that the past is altered so that it – and therefore its conclusion and its effect – cannot exist. The Mens Magna concept was developed in several of G3OGR's short stories before it put in an appearance in *Tomorrow Sometimes Comes*.

Mantley Rawson, the main character in the book, survived the war by being accidentally placed in suspended animation (actually he is undergoing an operation when the war breaks out and stays under anaesthetic for many years). When Rawson recovers he is hated because his actions (based on false information) started the war. He has to hide his identity from the majority of the population, while he strives to undo what he's done with the help of the Mens Magna via a neat piece of pseudo time travel and creation of an alternative future.

A future with a small number of huge centralised computers was a commonly accepted view in science and science fiction in the 1950s and 1960s of how computing would develop and G3OGR is simply repeating that view. The opinion at the time was that about half a dozen big computers would satisfy the computing needs of the entire planet and no-one seems to have anticipated the massive proliferation of personal computing, which is the way the future actually turned out!

Dark Story

Frank Rayer's science fiction novel *Iron and the Anger* is a dark story also set on a post-nuclear war Earth in the distant future, where a highly regulated three-caste (Masters, Workers and Intellectuals) social system is breaking down. Mankind is threatened to the point of destruction by semi-autonomous machines containing brain-like "Mensite" crystals, under the ultimate centralised control of a large crystal "integrator" (we read it as 'computer' here).

The author's radio background comes to surface every now and then. For example, the machines were originally radio-controlled and when the main character **James Lindley** describes how the crystals work: "It is piezoelectrical (sic). Piezo crystals produce electricity when mechanically stressed. Electrically stressed, they vibrate mechanically. They are much used in electronic devices." As in *Tomorrow Sometimes Comes* James Lindley is another main character who accidentally enabled the crystals to be used against mankind and who therefore has to hide his identity from the masses while he tries to undo what he did!

In fact the Mensite crystals are multi-celled and can store intelligence: perhaps G3OGR was anticipating complex integrated circuits, beyond even what we are capable of producing today, capable of acting like brains. Interestingly, G3OGR also postulates in this book– and in *Tomorrow Sometimes Comes* – that the effect of radiation from the atomic war produces a number of mutated humans now capable of telepathy.

Cardinal of the Stars (also *Journey to the Stars*) is set in a future when mankind has expanded to the stars and is just making first contact with an alien race, initially with disastrous consequences. The "Cardinal" is a Pimpernel-type character, hunted by the authorities but who – in the end – holds the key to mankind's successful co-existence with the aliens.

Frank Rayer brings a fair amount of his radio knowledge into the story, his main character (not the Cardinal) is equipped with a microwave transceiver hidden in a book. It also turns out that the reason the aliens attack earth ships is because they are ultra-sensitive to radio waves and so regard any attempt to contact them via radio as an act of aggression. Strangely, despite inventing faster-than-light travel through "inter-space", the only reliable method of communication between man's space ships is via Morse code! (As an aside, one of the space ships in the story is called *The Mannion*).*

***The name Mannion – in the both original Irish Gaelic and English – means a 'minion' (a type of servant) perhaps it's an appropriate name as a spaceship 'serves' its passengers! **Rob Mannion**.*

Short Story Magazines

Frank Rayer also wrote many short stories for science fiction magazines from the late 1940s to the mid 1960s, benefiting from the boom in the subject in the 1950s, no doubt stimulated by the appearance of rockets, the space race and unidentified flying object (UFO) sightings. The science fiction magazines included *New Worlds*,

Science Fantasy, *Authentic*, *Nebula* and *SF Adventures*. He kept good company with the greats of the science fiction world; authors sharing the same issues with G3OGR include **Brian W Aldiss**, **J G Ballard** and even the great **Arthur C Clarke**.

For example, in *New Worlds* 119 (June 1962), G3OGR has *Sacrifice* published, and *Six-Fingered Jacks* by E R James (G3OGR's cousin and also William's 'Uncle Ernest') is present. The well-known science fiction writers Brian W Aldiss and J G Ballard were published in the same issue.

The May 1960 edition of *New Worlds* is interesting in that it has *Alien* by G3OGR, *Sprinkler System* by E R James, and *Continuity Man* by George Longdon, who was in fact our friend again, writing under a pseudonym. So, the practice of using pseudonyms wasn't restricted to radio magazines (Longdon was also the name of the village in Worcestershire where the Rayer house, *The Reddings*, was located).

The cover of this magazine is reproduced on the first page of this article with a fantastic view of a railway system on a volcanically very active planet, which I couldn't resist showing for the delectation of the Editor and other railway fans. The locomotive's design shows a strange mixture of Stephenson's *Rocket*, and features of various vintages of steam and diesel locomotives. You would have thought on this futuristic planet that they would have at least standardised on a single track gauge!

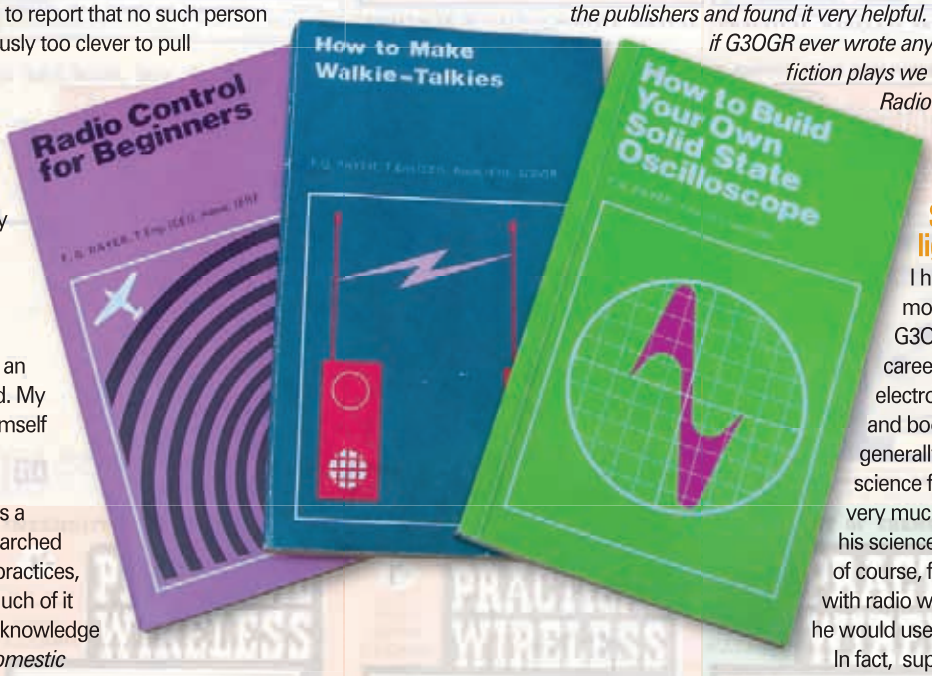
I have to admit I was looking for a character in G3OGR's science fiction writings called Captain R F Graham, maybe the commander of a space ship, worthy of his rank. I have to report that no such person was found. G3OGR was obviously too clever to pull this stunt!

Restoring *The Reddings*

In the October 2002 issue of *PW*, writing on the subject of *The Reddings* (the Rayer family house in Gloucestershire) William Rayer said, "My father gradually restored the house, putting in wiring ….." and "Heating, a bathroom and an indoor toilet were also installed. My father did much of the work himself …"

Ever on the lookout for an opportunity to earn his living as a writer, G3OGR must have researched building and domestic wiring practices, planned the work, executed much of it himself and used the practical knowledge he gained to write *Repair of Domestic Electrical Appliances* (Arco Handybooks, 1961); *Electricity in the Home* (Arco Handybooks, 1962); and ultimately *A Guide to Outdoor Building* (Arthur Barker Publishing, 1970).

Incidentally, I believe G3OGR also wrote for *The Reader's Digest*, although I have not (yet) managed to track down any of this writing.



Published Abroad

A whole area of investigation that I haven't looked into in any detail is G3OGR's books and articles that were published abroad in non-English languages. A quick look on the French and German Amazon websites reveals *Le Cardinal des Etoiles*, *Le Lendemain de la Machine* and *Utopia – Zukunftsromane Nr. 370 Gefangen in fremden Körpen*.

So, who knows how much of his work appeared in mainland Europe and further afield?

Teaching Others How to Write

In the October 2002 *PW* article, William Rayer mentioned that his father and William's cousin – **E R James** – ran a training course for prospective writers. I managed to track down a book G3OGR wrote about writing and getting work published, namely *Modern Fiction–Writing Technique*, published by Bond Street Publishers Ltd in 1960.

The foreword of the book says "Author of 1,000 published stories and articles in British and overseas periodicals and magazines … " Maybe a slight exaggeration?* The slim book gives practical advice on plots, characters, dialogue, action story settings, etc., as well as advice on where and how to submit manuscripts with the best chance of success.

There's an interesting comment in the 'Pen Names' section of the book: "Occasionally an editor will choose and suggest a pen name. For example, he may wish to use two stories by the same writer in a single issue of his periodical or magazine but to conceal this from readers by placing a pseudonym on one." Incidentally, I can't find this title on the British Library Catalogue, so maybe it was not published for general distribution, but only for those attending the training courses?

Perhaps it wasn't an exaggeration Stefan! As I've discovered when working (as a freelance writer) and researching transport and technical topics for the area, along with his magazine and book writing I found that G3OGR also wrote for county magazines, weekly and daily newspapers in Worcestershire and what is now vaguely known as the 'West Midlands'. However, it's not surprising that his newspaper work is not so well known as, unlike magazines, old newspapers rarely survive.* Modern Fiction Writing Techniques *once appeared in the BBC's Guide For Writers For Radio (I had a copy myself some years ago) and G3OGR's booklet on the list of suggested reading. I purchased a copy direct from the publishers and found it very helpful. I often wonder if G3OGR ever wrote any of the science fiction plays we heard on BBC Radio 4 – perhaps under yet another name?* ***Editor*.

Shed More light?

I hope I've shed more light on G3OGR's writing career, both in radio and electronics magazines and books, but also more generally in the world of science fiction and DIY. I very much enjoyed reading his science fiction looking, of course, for his connection with radio which I wondered if he would use in his stories!

In fact, I suppose it's true to say that from the point of view of long-term recognition he was more successful in our world of radio and electronics than in the science fiction orbit, though clearly his interest in science fiction was very important to him. By the early 1960s G3OGR seems to have realised that the science fiction pulp-boom was over (driven to the wall by popular television) and so he starts to concentrate on writing radio and electronic books, as well as keeping up his magazine article output.

It's said that Frank Rayer was encouraged to write on radio subjects by F J Camm after he wrote a letter to *PW* in 1939 and maybe this also triggered his writing on other subjects? Overall, his writing career lasted for some 40 years or so, pretty much up to his death in July 1981 and some of his books were published posthumously.

I've avoided giving a full list of his books here, just a representative summary that shows the depth and breadth of G3OGR's output (I can supply a full list to the Editor if readers request it). As far as I can see, Frank Rayer had at least 36 books published (or 35 if you don't count the pirated *Journey to the Stars*) about radio, electronics, electricity, DIY, romantic fiction, science fiction and the art of writing itself. I say at least 36 because to some extent the total depends on how you define a book. For example, G3OGR is attributed as author of *Coming of the Darakula*

(Hamilton & Co, 1952), a science fiction pulp-fiction magazine/booklet, and other similar publications.

Often, de-mystifying a person reduces the sense of awe felt for them but this is certainly not true for me in the case of Frank Rayer and I hope it isn't for you. As it is for many other radio enthusiasts, he will always be a great hero of mine and he's someone to aspire towards when I'm looking for inspiration for that next project to start, or perhaps more importantly, when I'm trying to finish a project, which is often much harder to do.

Frank Rayer G3OGR on the Internet

There are many references to G3OGR's radio, electronics and science fiction writings on the Internet. A brief summary of his science fiction work can be seen at: **www.fantasticfiction.co.uk/r/francis-g-rayer/**
A more comprehensive list of G3OGR's science fiction book and magazine writing can be seen at: **www.zone-sf.com/frangrayer.html**
The British Library's interactive catalogue at: **http://catalogue.bl.uk/F/?func=file&file_name=login-bl-list** will list most of G3OGR's books if his name is entered as author.
The second hand book dealers on **www.amazon.co.uk/** and **www.amazon.com** have many G3OGR books in stock.
Another source of Frank Rayer's books is **www.ebay.co.uk/** and **www.ebay.com/**

Francis G Rayer books

Title	Year	Publisher	Category
Lady in Danger	1948	Grafton Publications	Romance
Worlds at War (G3OGR and others)	1950	Tempest Publishing Company	Science Fiction
Tomorrow Sometimes Comes	1951	Home and Van Thal	Science Fiction
Coming of the Darakula (book?)	1952	Hamilton and Co	Science Fiction
Modern Fiction-Writing Technique	1960	Bond Street Publishers Ltd	Writing
Repair of Domestic Electrical Appliances	1961	Arco Handybooks	Do-it-Yourself
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Journey to the Stars	1964	Arcadia House	Science Fiction
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Transistor Receivers and Amplifiers	1965	Focal Press	Radio
Electrical Experiments (The Pegasus Book of ..)	1968	Pegasus Books	Electrical
Popular Electronics and Computers	1968	Arco Publishing	Electronics
Radio Experiments	1968	Pegasus Books	Radio
A Guide to Outdoor Building	1970	Arthur Barker Publishing	Do-it-Yourself
Electronic Experiments (The Pegasus Book of ..)	1971	Pegasus Books	Electronics
Two Transistor Electronic Projects	1976	Babani Publishing	Electronics
Handbook of IC Audio Preamplifier and Power Amplifier Construction	1976	Babani Publishing	Electronics
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How to Make Walkie-Talkies	1977	Babani Publishing	Radio
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Audio Projects	1981	Babani Publishing	Electronics
Projects in Amateur Radio and Short Wave Listening	1981	Newnes Technical	Radio
Integrated Circuit Projects for Beginners	1982	Babani Publishing	Electronics
Beginner's Guide to Amateur Radio	1982	Newnes Technical	Radio

Finale

That's the final part of our very special supplement, which has been running all through 2007! We hope you have enjoyed joining the *PW* team as we looked back through 75 years of *Practical Wireless* and beyond!

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Topical Talk

In this month's topical chat Rob G3XFD comments further on a letter from Jonathan Walker regarding 'alternative transistors' and on the planned GB75PW v.h.f./u.h.f. operations.

Jonathan Walker – writing from Cornwall – really stirred up some memories for me when he mentioned red spot and white spot transistors. Unfortunately, when such transistors were available they were often out of the range of my pocket money – despite being relatively cheap!

My own local radio shop - Bevois Valley Radio in Southampton (It's now a branch of Maplin Electronics) sold a cheaper brand of transistors under the brand name of TSL. They were around 3s (15 pence) each and although not so good at higher frequencies (h.f.), they were very useful at audio frequencies (a.f.). Amazingly perhaps, I still have several of the transistors I purchased with my pocket money and – 45 years or so later – they still work!

Jonathan's memories of the suggested idea of breaking open a diode and attempting to make a DIY transistor reminds me of the 'amplifying crystal detector' my late maternal grandfather – **Fred Durnford 2FD** – often mentioned. 'Grandpop' as he was always called, insisted that he had successfully made an 'Amplifying Crystal' back in the 1920s, although it was very difficult to set up and use.

Describing the idea to me, Grandpop said that a special bias supply and an extra 'current supply' had to be used with the crystal material. Significantly, he also told me that he got the best results from a rather poor quality piece of Galena that was contaminated with other material.

Looking back from the viewpoint of 2007, I'm left wondering – did my grandfather (along with the many other wireless constructors who report the same successes) actually make semiconductor amplifiers accidentally? The Bell Laboratories in the USA – who patented the term transistor – didn't formally announce the transistor until around 1947 but perhaps early enthusiasts had beaten them to it?

In the article on early detectors – in this issue – Charles Miller discusses the carborundum detector that requires a biasing supply. Perhaps my grandfather and the many other keen enthusiasts transferred the idea to use with coke, coal and contaminated galena? Significantly, it's worth remembering that germanium was often found in coal – particularly in the ash from coal originating from Newcastle and Northumberland in the north east of England and, of course, early semiconductors used the same material.

When I have time – perhaps if I ever retire from *PW* – I'll have time to try and re-create the 'amplifying crystals'. However, I'm sure I won't be alone in wanting to try the idea – and if you've beaten me to it – please let us know!

Working GB75PW On VHF

The E-mail from **Tony Harding** in Bristol (letters this month) raises the question of possible v.h.f./u.h.f. operations for GB75PW before December 31st (When the NOV expires). In replying, I'm grateful for Tony for raising the question because we are hoping to run GB75PW on 70 and 144MHz soon.

Originally, we had intended to operate from a site near Shaftesbury in north Dorset. Unfortunately, due to circumstances, this has not been possible. However, I'm planning to operate on both 70 and 144MHz during December on at least one Saturday afternoon and I'll announce the schedule on the **Southgate Amateur Radio Club's** website – thanks to the co-operation of **Richard Brunton G4TUT** who runs this most useful site.

Additionally, anyone who is keen to work GB75PW on v.h.f./u.h.f., is welcome to contact me at the *PW* offices by telephone or E-mail and I'll be pleased to provide an up-date for them. We look forward to working you on either v.h.f. or u.h.f. soon!

Rob Mannion G3XFD/EI5IW

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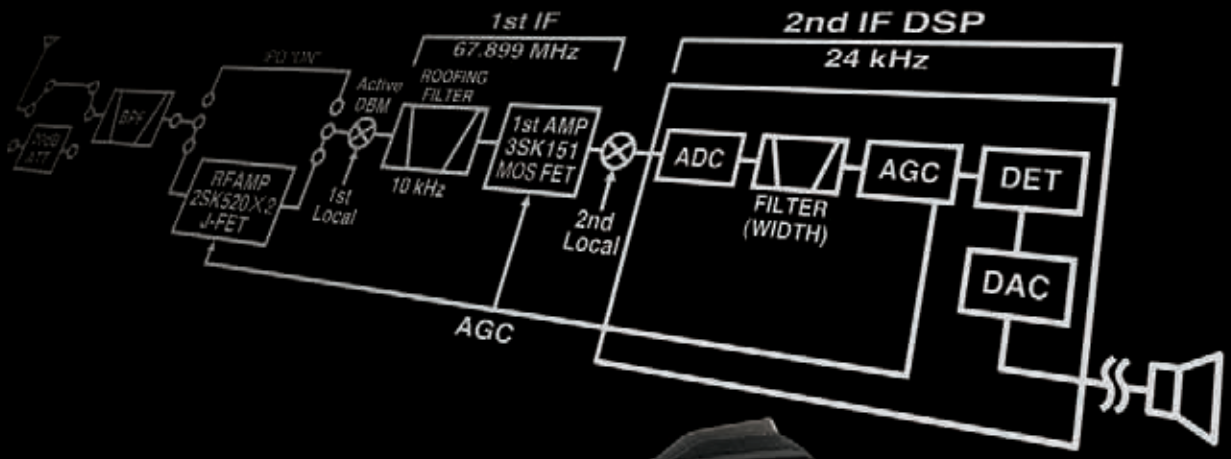

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