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ICOM IC-7800 NEW £6400 C

HF + 50MHz 200W Transceiver
Latest 'top-of-the-range' transceiver from Icom. 200W output power, built-in ATU and power supply. Two completely independent receivers, four 32-bit floating point DSP units, flexible DSP filter capability. Massive 7in wide (800x400 pixel) colour TFT LCD. Multi-function spectrum scope.

IC-7800-PACK **£6995**
Includes Rig + 17" monitor, keyboard & SM-20 Mic

ICOM IC-756 PRO III NEW £2099 C

The IC-756PRO III marked its debut at the Leicester Amateur Radio Show at Donington. This is Icom's latest HF transceiver and incorporates many of the features from its predecessors and from the new technology used in the IC-7800.

IC-756 PRO II ***Last Few*** **£1899 C**

ICOM IC-7400 SPECIAL OFFER £1299 C

HF/VHF 100W transceiver. Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II.
Comes with *FREE* SP-21 Speaker & SM-20 Desk mic worth £219.

ICOM IC-706 IIG DSP £769 C

HF/VHF/UHF mobile DSP transceiver. Its relative small size not only makes it a great mobile rig but also for fixed station use as well. HF general coverage Rx and VHF & UHF.

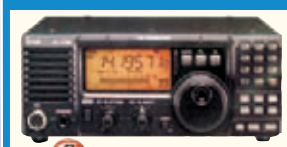
ICOM IC-703 SPECIAL OFFER £539 C

HF/50MHz Transceiver 0.1-10W Portable, Mobile, Base Station. (9-15.87V DC) Designed especially for the Foundation Licence/QRP. Built-in features auto ATU, DSP memory keyer. (5W when using 9.6V batts)

START HERE!

FREE! ***Icom 703 Logbook - while stocks last***

ICOM IC-718 £449 C



HF 100W transceiver. Covers all HF bands plus wideband receive. C/w auto notch, dual VFO, SWR meter etc. Options include extnl ATU DSP & filters.

BUDGET BARGAIN

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm. Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm.

IC-910H version £1099

KENWOOD TS-2000 £1599 C

Top-of-the-range 100W Kenwood transceiver. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

TS-2000X + 23CMS £1899

KENWOOD TS-870S DSP £1399 C

HF DSP 100W base station. Excellent all round rig great for DX working with its ability to winkle out weak stations using its true IF DSP. No filters to buy.

KENWOOD TS-570DGE £849 C

HF100W base station with built-in auto ATU. Very popular rig, excellent performance on SSB and CW. Two fitted antenna sockets - very handy.

RELIABLE & EASY

YAESU FT-1000 MKV £2349 C

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU - Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity.

YAESU FT-1000 FIELD £1749 C

100W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC / 13.8V DC - Building on the success of the FT-1000MkV, the Field has become a respected leader in its class.

YAESU FT-897D NEW £899 C

100W HF rig plus 2m and 70cms (50W/20W) 13.8V external supply / internal optional FP-30V AC power supply / self powered portable using optional Ni-MH pack at 20W output. Compatible with FC-30 auto ATU and ATAS 120/100 antennas. The "must have" radio for 2003.
Now with TXCO fitted.

YAESU FT-857D NEW £649 C

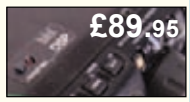
HF/50/144/430MHz Mobile Transceiver HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC) Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband receive, built-in memory keyer, detachable front panel, DSP unit fitted.

YAESU FT-847 £1199 C

Covering 1.8 to 440MHz, this all-in-one transceiver offers unbeatable value. 100W on HF plus 6m, and 50W on 2m and 70cm. You get genuine RF clipping on SSB for up to 6dB gain and there are 4 seperate antenna sockets.

YAESU FT-817ND £499 C

bhi DSP Module now available!



160m - 70cms. Up to 5W output all modes. ***Now with Ni-MH battery, charger & DC lead.*** **£589 with DSP ready fitted.**

NEW DSP Module
bhi have produced a lovely 4-stage DSP module that can be fitted inside the FT-817. The module costs £89 (plus a fitting charge of £25 for retro-fitting to existing models). This includes installing a mini switch and LED on top cover.

NEW FT-817 Clip on metal front support stand.
In stock now £14.95 +£1 P&P

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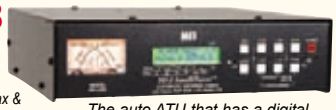
MFJ-993



**Auto ATU with digital data dis[play*1.8-30MHz *Long wire, coax & balanced line *300W SSB, 150W CW *Cross needle metering *Size 255 x 70 x 235mm *Weight 1.8kg*

The auto ATU that has a digital data display and can even handle wires!

£249.95 C

MFJ-991

Similar to the MFJ-993 but handles 150W SSB/100W CW and matches 6-3200 Ohms. Does not have digital VSWR meter LCD readout aural VSWR, antenna switch or 4:1 balun.

Auto ATU

£209.95 B

MFJ-941E

A great budget ATU. All the great MFJ features that make it ideal for base station use. **1.8-30MHz *300W *Cross needle meter *VSWR & PWR 30/300W *Terminals for wires and bal. lines *Internal 4:1 balun *Ext. Dummy load socket *SO-239 sockets *Size 260 x 180 x 70mm*

Manual ATU

£129.95 B

MFJ-974H

A true balanced line ATU that is ready made for open wire feeder. Extremely accurate balancing provides optimum performance. It can also be used for long wires and coax. Great for all-band doublets. **1.8-54MHz (MFJ-974H) *300W *Balanced, wire or coax *SO-239 sockets *Size 195 x 155 x 220mm *Weight 2.05kg*

£179.95 C

MFJ-904H

Just the job for portable use. It's so small! **3.5-30MHz (80 - 10m) *150W wire, coax, balanced *Internal 4:1 balun *SO-239 sockets *Size 180w x 60h x 80d (mm) *Weight 650g*

Manual ATU

Mobile and portable use

£129.95 B

MFJ-962D

Ideal for use with linears. Gandles balanced, coax and wire. **1.8-30MHz *1.5kW Roller Coaster *VSWR meter *6-way antenna/load switch *Buit-in 4:1 balun *2 coax positions *Size: 270x375x115mm*

Manual ATU

£279.95 C

YAESU FT-7800 NEW — £239 C

Yaesu's Powerful low cost answer!

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

YAESU FT-8900R NEW — £339 C

Want the best of all worlds then the FT-8900R is just the ticket! A rig with four of the most popular mobile bands - 10m/6m/2m & 70cm. Detachable head. Airband Receive.

YAESU FT-2800M — £159 C

The FT-2800M 2m FM 65W High Power mobile transceiver. Rugged construction, excellent receiver performance and direct keypad entry.

ICOM IC-2200H NEW — £199 B

The IC-2200H is the latest version of this popular high power 2m mobile rig. It has 207 memories inc 1 call channel & 6 scan edge memory channels.

**144 - 146MHz FM *65/25/10/5W RF o/p *CTCSS & DTCS *Green/amber display *Audio: 2.4W o/p *Tx 15A (65W) *Rx 1A (max audio) *Standby 0.8A *Power 13.8V DC *Size: 140x40x146mm*

KENWOOD TMD-700E — £449 C

Certainly the best dual band mobile transceiver with APRS. Does not need extra high cost boards to function. The only extra if required is a compatible GPS receiver.

OTHER MODELS...

ICOM			
IC-2725E	Dual Band FM Transceiver	**£269**	C
IC-2100H	2m 55W FM Mobile	**£229**	C
YAESU			
FT-8800E	2m/70cm Mobile	**£289**	C
KENWOOD			
TM-G707E	2m/70cm Mobile	**£289**	C
TM-V7E	2m/70cm Mobile	**£359**	C

YAESU VX-110 — £119 B

Combining the ruggedness of the VX-150 with the simplicity of 8-Key operation, the VX-110 is a fully featured 2m handheld ideal for the most demanding of applications. It has a die-cast case, large speaker and illuminated keypad.

ICOM IC-E90 — £269 B

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig.

ICOM IC-T3H — £129 B

The IC-T3H 2m handheld features tough quality but with slim looks. Its striking green polycarbonate case has been ergonomically designed. The rig is capable of providing a powerful 5.5W output with either Ni-Cad or Ni-MH battery packs. Supplied with charger and rechargeable battery.

KENWOOD TH-D7E — £319 B

DATA COMMUNICATOR

One of the most successful handhelds over the past few years. It has a built-in TNC for Packet use. You can also use it for APRS operation in conjunction with an external GPS unit. Plus NMEA, 200 memos, and up to 5W output.

KENWOOD TH-F7E — £249 B

WITH EXTRA WIDE RX COVERAGE

- 144-146MHz Tx/Rx: FM
- 430-440MHz Tx/Rx: FM

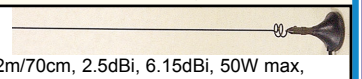
Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

OTHER MODELS...

ICOM			
IC-E208	Dual Band FM Mobile	**£279**	B
YAESU			
VX-7R	6m/2m/70cm Handheld	**£299**	B
VX-2E	Dual Band FM Handheld	**£169**	B
KENWOOD			
TH-G71E	2m/70cm Handheld	**£199**	B

MOBILE ANTENNAS

WATSON ANTENNAS (PL-259 base type)



Comes with coax & BNC

WSM-270. 2m/70cm, 2.5dBi, 6.15dBi, 50W max, micro-magnetic 29mm base, length 0.46m. **£19.95** A

W-2LE	2m quarter wave 2.1dBi 0.45m	**£9.95**	A
W-285	2m 3.4dB 0.48m (fold over base)	**£14.95**	B
W-77LS	2m/70cm 0/2.5dB 0.42m	**£14.95**	B
W-770HB	2m/70cm 3/5.5dB 1.1m	**£24.95**	B
W-7900	2m/70cm 5.6/7.6dB	**£32.95**	B
W-627	6m/2m/70cm 2.15/4.8/7.2dB 1.6m	**£34.95**	B
WGM-270	2m/70cm On glass 3.7m coax 50W	**£29.95**	B

MOBILE BASES

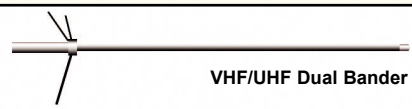
WATSON

WM-14B. Large diameter 14cm magnetic mount SO-239, c/w 5m RG-58 & PL-259

W-3HM	Adjustable hatch mount	**£14.95**	A
WM-08B	8cm mag mount, 5m cable PL-259	**£9.95**	A
WM-14B	14cm hvy duty mag mount+cable	**£12.95**	A
WSM-88V	BNC mag mount plus 3m cable	**£14.95**	A
W-3CK	5m 5D-FB cable assembly+pigtail	**£18.95**	A
W-ECH	5m standard cable kit assembly	**£12.95**	A

BASE STATION ANTENNAS

DIAMOND

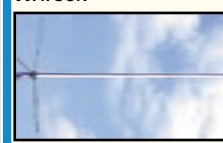


VHF/UHF Dual Bander

X-50	2m/70cm colinear 6/8dB 2.5m	**£54.95**	C
X-50N	2m/70cm colinear 6.5/9dB 3.1m	**£59.95**	C
V-2000	6m/2m/70cm 2.15/6.2/8.4dB 2.5m	**£89.95**	C

CHECK OUR WEBSITE FOR FULL DIAMOND RANGE

WATSON



W-300. Very popular dualband base antenna. Supplied with u-bolts for mast fixing.

W-30	2m/70cm colinear 3/6dB 1.15m long	**£39.95**	C
W-50	2m/70cm colinear 4.5/7.2dB 1.8m long	**£49.95**	C
W-300	2m/70cm colinear 6.5/9dB 3.1m long	**£64.95**	C
W-2000	6m/2m/70cm 2.15/6.2/8.4dBi 2.5m	**£69.95**	C

WATSON W-25XM PSU NEW — £99.95 B

A compact sized switch mode power supply that will run your base HF station with ease.

**Output Voltage 10 - 18V DC *Output Current 22A / 25A peak *Over current protected *Rubber Feet *Supply 230V / 115V AC 50/60Hz *Switchable dual voltage input *Size 220 x 180 x 73mm *Weight 1.8kg*

WATSON W-25SM PSU — £79.95 B

Very popular budget switch mode power supply. **Output voltage 13.8V DC *Output current of 22A (25A peak) *Front panel output terminals *Over current & voltage protection *Quiet operation*

WATSON W-25AM PSU — £89.95 C

DC power supply for the shack & esp. for use with 100W transceivers. Separate voltage and current meters. **Output voltage 0-15V DC *Output current of 25A (30A peak). *3 sets of output terminals *10A cigar socket. *Over current protection*

WATERS & STANTON

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PRICE MATCH

VERTICAL ANTENNAS

Hustler Mobiles

Get top performance when on the move. Purchase the **MO-3 base** (137cm) for **£24.95** or the **MO-4 base** (68cm) for **£22.95**. Then add the resonator of your choice. **RM-10, RM-12, RM-15**, all **£19.95** ea. **RM-17, RM-20 £24.95** ea. **RM-40 £26.95, RM-80 £29.95**

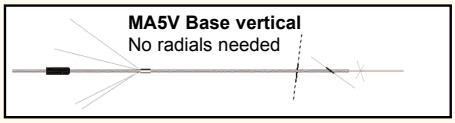
Resonator

Base section
MO-3 or MO-4

CUSHCRAFT BASE ANTENNAS

MA6V	20-17-15-12-10-6m 250W PEP	**£269.95**	C
MA5V	20-17-14-12-10m 250W PEP	**£239.95**	C

MA5V Base vertical
No radials needed



R8	40-30-20-17-15-12-10-6m 1.5kW	**£469.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£329.95**	C

BUTTERNUT BASE ANTENNAS

HF9V-X	80-6m 7.9m 1kW PEP	**£349.95**	C
HF6V-X	80-40-30-20-15-10m 7.9m 2kW	**£299.95**	C
HF2V	80-40m 9.75m (160m opt) 1kW	**£229.95**	C

HY-GAIN BASE ANTENNAS

AV-640	40-6m 1.5kW, 300W 6m (PEP)	**£369.95**	C
AV-620	20-6m 1.5kW, 500W 6m (PEP)	**£279.95**	C
AV-14AVQ	40-20-15-10m 1.5kW PEP	**£169.95**	C
AV-12AVQ	20-15-10m 1.5kW PEP	**£139.95**	C
DX-88	80-10m 1.5kW, 250W 30m	**£369.95**	C

HARI High quality German traps. (Pairs)
200W 20m £44.95 40m £49.95 80m £53.95
1kW 20m £59.95 40m £64.95 80m £73.95

HARI High quality German Baluns SO-239
200W 1:1, 4:1 or 6:1 £25.95 ea.
1kw 1:1 £34.95 4:1 or 6:1 £41.95 ea

HORIZONTAL BEAMS & DIPOLES

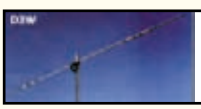
CUSHCRAFT

Premier HF beam used around the world by serious DX'ers.

X-7	20/15/10m 7 el. Yagi 2kW	**£669.95**	D

Not got the space for a full sized HF beam antenna, then the mini beam MA-5B should be considered.

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£369.95**	C
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£569.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£379.95**	D
D-3	10-15-20m dipole element 2kW	**£249.95**	C



Don't want a wire antenna but can't fit a Yagi, then consider a rotatable dipole.

D-3W	12-17-30m dipole element 2kW	**£249.95**	C
D-4	10-40m dipole element 2kW	**£349.95**	C
D-40	40m dipole element 2kW	**£319.95**	C
TEN-3	10m 3 el. Yagi 2kW	**£229.95**	C
ASL-2010	13.5-32MHz 8 el. log periodic	**£749.95**	C

RADIO WORKS

A choice of quality wire antennas available to fit almost any circumstances.

CW-160	160-10m 76.8m long	**£129.95**	C
CWS-160	160-10m 40.5m long	**£119.95**	C
CW-80	80-10m 40.5m long	**£89.95**	C
CWS-80	80-10m 20.1m long	**£109.95**	C
CW-40	40-10m 20.1m long	**£84.95**	C
CW-20	20-10m 10.36m long	**£89.95**	C
CW-620	20-6m 9.7m (32ft) long	**£89.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£59.95**	B

YUPITERU MVT-3300 SCANNER £129 B

The MVT-3300EU covers most of the useful bands in the VHF and UHF spectrum. It has 200 memories as standard with a range of band and security channels as well. It has functions normally associated with more expensive sets such as pre-setting the receiving mode and frequency step, Duplex reception with "One Touch" function, Auto-Write and Search-Pass memory functions. There is also a Decipherment function to receive certain scrambled communications.

WATSON FC-130 Freq. Counter £59.95 B

SPECIAL PRICE

The FC-130 is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

WATSON BASE ANTENNAS

Unbeatable Value!

Model	Freq	L(m)	dB	Price
W-30	2/70	1.15	3/6	39.95 B
W-50	2/70	1.8	4.5/7.2	£49.95 C
W-300	2/70	3.1	6.5/9	£64.95 C
W-2000	6/2/70	2.5	2/6/8.4	£69.95 C

These antennas are solidly made of fibreglass, die-cast alloy and stainless steel. Guaranteed lowest prices in the UK.

Totally weatherproof
Pre-tuned & Unbeatable

MFJ-971 QRP Portable ATU £99.95 C

*1.8 - 30MHz *300W/30W/6W selectable *Cross needle meter *12V DC Ext. *SO-239 sockets *Tunes wire, coax, balanced line *Terminals & earth post *Size 160 x 150 x 60mm *Weight 870g

The MFJ-971 is the ideal QRP ATU to have on hand. It incorporates a cross needle SWR meter and displays forward or reflected power and SWR simultaneously.

HUSTLER ZERO SPACE DX ANTENNAS

No Space Needed!

"Ground Level Wonder"

Run full legal power - 80m to 10m
No masts or guys.
Low VSWR 50 Ohm feed.

These HF verticals will take **1kW of power**, work at **ground level**, and are **self-supporting.** A single earth rod will get you going. Add buried radials for even better results. These are **rugged, well-built** antennas that American hams have been using for years. Now they are available in the UK from our three stores.

4BTV		
40-20-15-10m. 6.52m high.	**£149.95**	C
5BTV		
80-40-20-15-10m. 7.64m high.	**£179.95**	C
6BTV		
80-40-30-20-15-10m. 7.3m.	**£209.95**	C

NOTE: 80m coverage limited to 100kHz on 5BTV & 6BTV

YAESU VR-120D £139 B

The VR-120D handheld scanning receiver covers from 100kHz to 1300MHz. AM/FM/WFM modes (inc. preprogrammed broadcast freqs). The VR-120D's small size and tough polycarbonate case allows you to take it anywhere -hiking, skiing or while walking around town. Power is provided by 2 x AA batteries (not supplied). Ni-Cad batteries and charger are available as options.

RIGBLASTER-PLUS

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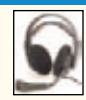

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Station Approach
BROADSTONE
Dorset BH18 8PW
Directors: Stephen Hunt & Roger Hall

Editorial Department
☎ 0870 224 7810
Fax: 0870 224 7850

Editor
Rob Mannion G3XFD/EI5IW
rob@pwpublishing.ltd.uk

Production Editor
Donna Vincent G7TZB/M3TZB
donna@pwpublishing.ltd.uk

Deputy Production Editor
Zoë Shortland
zoe@pwpublishing.ltd.uk

Technical Editor
NG (Tex) Swann G1TEX/M3NGS
tex@pwpublishing.ltd.uk

Art Department
☎ 0870 224 7820
Fax: 0870 224 7850

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

Layouts
Bob Kemp
bob@pwpublishing.ltd.uk

Typesetting
Peter Eldrett
peter@pwpublishing.ltd.uk

Sales Department
Fax: 0870 224 7850

Advertisements
Eileen Saunders M3TTO
eileen@pwpublishing.ltd.uk
☎ 0870 224 7820

Book Orders
Clive Hardy G4SLU
clive@pwpublishing.ltd.uk
☎ 0870 224 7830

Subscription Orders
Joan Adams
joan@pwpublishing.ltd.uk
☎ 0870 224 7830

Subscription Administration
(For all queries regarding exisiting subscriptions)
Kathy Moore
Kat.Subs@btinternet.com
☎ 01590 641148

Finance Department
☎ 0870 224 7840
Fax: 0870 224 7850

Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Finance Assistant
Margaret Hasted
margaret@pwpublishing.ltd.uk

Website
www.pwpublishing.ltd.uk

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Cover subject

With the festive season just around the corner this issue is full of goodies just as the cover shows. We've wrapped up a variety of articles for you to enjoy and hope that Santa fills your sack with radio treats galore.
Happy radio reading and compliments of the season to you all.
Design: Steve Hunt
Photograph: Tex Swann G1TEX/M3NGS

December features

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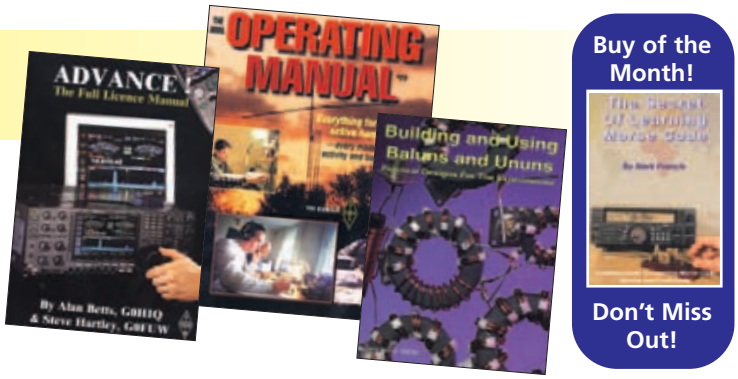

Page 70. The biggest and best selection of radio related books anywhere!

December **regulars**

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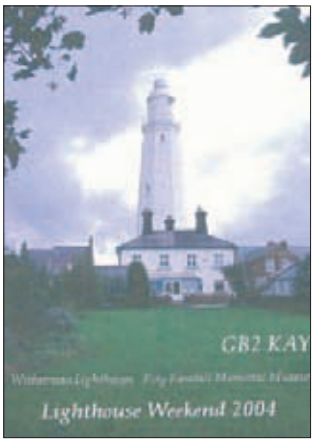

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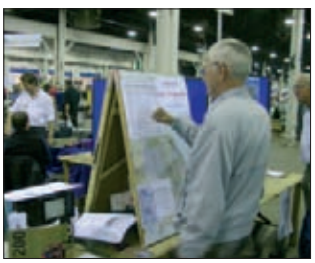

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author info

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

VHF DXer
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed
Herefordshire
HR2 0HP
Tel: (01873) 860679
E-mail: g4asr@btinternet.com

HF Highlights
Carl Mason GW0VSW
12 Llwyn-y-Bryn
Crymlyn Parc
Skewen
West Glamorgan
SA10 6DX
Tel: (01792) 817321
E-mail:
carl@gw0vsw.freeserve.co.uk

Data Burst
Roger Cooke G3LDI
The Old Nursey
The Drift
Swardeston
Norwich
Norfolk NR14 8LQ
Tel: (01508) 570278
E-mail:
rcooke@g3ldi.freeserve.co.uk
Packet: G3LDI@GB7LDI

Robin Trebilcock GW3ZCF
15 Broadmead Crescent
Bishopston
Swansea
SA3 3BA
Tel: (01792) 234836
E-mail: robin2@clara.co.uk

In Vision
Graham Hankins G8EMX
17 Cottesbrook Road
Acocks Green
Birmingham
B27 6LE
E-mail: g8emx@tiscali.co.uk

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rob mannion's keylines

Welcome to 'Keylines'! Each month Rob introduces topics of interest and comments on current news.

As I write this month's Keylines the Ofcom government department, who took over from the Radiocommunications Agency (RA), have been operating for less than a year. In that short time I have formed the opinion that the wide embracing remit given to this huge octopus of an organisation is totally unworkable. This is backed up by what I read and see in the news. So, I know I'm not alone in thinking that Ofcom has an impossible task, despite heroic efforts from its large number of staff.

Hardly a day goes by without a number of E-mails arriving on my computer. Unfortunately, very few indeed have anything to do with Amateur Radio or communications regulation/enforcement. Indeed, most seem to be dealing with media arrangements, press complaints, etc. I even received one discussing the appointments of Gaelic speaking committee members for BBC Radio Scotland! As keen as I am in promoting our native languages, I can't help much!

Before it disappeared the RA bequeathed a number of staff to Ofcom. The legacy of these skilled specialists at least left Amateur Radio dealing with respected people who understand the hobby. Indeed, some are active Amateurs themselves. Unfortunately, it's a temporary arrangement and is likely to cease in 2005. So it's looking very likely we'll be losing the Amateur Radio Section as we know it as the specialists return to the Civil Service from secondment to Ofcom (which is not generally a Civil Service organisation).

The role of the **Radio Society of Great Britain** (RSGB) and the united strength of our hobby will, in my opinion, then become extremely important when dealing with a regulator with few technically aware staff. I think that anyone who shares my concerns should express them by writing to Ofcom. You can be sure I'll be doing so!

Hillcrest Society Visit

On Thursday 30 September I went on a *PW* Club Visit to the **Hillcrest Amateur Radio Society** (see Topical Talk) in Dudley, West Midlands. I was made very welcome and am now the proud owner of an embroidered T-shirt with the Hillcrest motif. It fits too, thank you folks!

Leicester Show

The Leicester Show on Friday 1 and Saturday 2 October this year was a resounding success for *PW*. I say this because I normally start to lose my voice (by talking to readers) late on Friday afternoon. This year my voice was in QSB before lunch! It was great to meet you all.

On the Saturday I shared my birthday with a large number of readers who enjoyed a slice of cake and either fruit juice or vintage perry. The celebrations started with *Radio Active* Editor **Elaine Richards G4FLM** and Group Production Editor **Donna Vincent G7TZB/M3TZB** providing me with a selection of little cakes with candles. Later, a delegation of the famous maroon blazers from the LARS Committee arrived complete with card, bottle of champagne (it will be used to 'launch' my new shack later) and greetings over the public address system. Thanks everyone, if you've got to work on your birthday, it's best to share it with friends!

The former Radiocommunications Agency is much missed by Rob G3XFD and he considers the remit issued to Ofcom to be unworkable (see text).

Otley & Rochdale

As Leicester was later this year I ended up driving more than 1600 miles on *PW* business in less than ten days! First on Thursday 7 October I was at the **Otley Amateur Radio Society** in West Yorkshire. It was my second visit and an enjoyable evening and I was proud to be made an Honorary Member. Thank you everyone!

The second trip was to the **G QRP Club's** Mini Convention at Rochdale on Saturday 9 October was one of the busiest I've ever attended. It has become a full blown, extremely popular convention in my opinion. I even met two friends who'd made the journey from the Isle of Wight, such is the attraction of Rochdale every year.

As usual the annual *PW* 'State of the Nation' talk was very well attended. Thank you for the welcome **Rev George G3RJV** and to all readers who attended to provide the essential feedback, questions and advice.

Buggy Breakdown

Finally, although this year's LARS proved to be very successful, my battery buggy broke down! However, thanks to a very kind member of the LARS staff and thanks to an Amateur with a Scottish accent, an impromptu AA (Amateur Aid) service was provided. However, the knight in shining armour shouldn't be anonymous and I'd like to formally thank him by name.

The buggy has an extremely difficult-to-trace intermittent fault on the main microprocessor p.c.b. that started after the warranty finished. I'm seeking help because I've no doubt that there'll be *PW* readers working with this sort of equipment and I'll be delighted if anyone can offer advice. Nobody has been able to locate the fault yet and we all know just how elusive intermittent faults can be! Cheerio for now everyone.

Rob G3XFD

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

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. See page 72 for details.

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Technical Help

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

amateur radio waves

Make your own 'waves' by writing into *PW* with your comments, ideas, opinions and general 'feedback'.

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

Saving Our Radio Heritage

● **Dear Sir**

Like John Bunyan "*...as I slept I dreamed...*" and it, too, was of a celestial city - of sorts! It was the Headquarters of English Heritage. I saw a Dicken's period office with men in choker collars and spats over their shoes sitting at tall desks lit by candles and the odd fishtail gas burner. Their desk calendars finished at 31 December 1899.

No, this fantasy was not provoked by over-indulgence at supper-time but by an article in our local evening paper that English heritage had awarded £2million to restore a 19th century tile factory in Telford. I'm sure it is worth it, but is there nothing in the 20th Century worth preserving or has that century passed without comment?

Well to be fair, this Rip Van Winklesque organisation has put Grade II listings on the Goonhilly 1 microwave antenna and the PO/BT Tower in London, which will no doubt gladden the hearts of BT Management if they can get financial aid to keep them in good fettle. Similarly, with this latter-day surge of interest they have graded the radar transmitter building at Bawdsey Manor, but is not the counterpart receiver building, if it still exists, just as important? But what of all the wireless developments that have preceded these items of relatively recent importance?

True, at what seems to be their turnover date, wireless in the 1880/90s was a laboratory toy, but the turn of the century saw the birth of wireless as we know it, with Marconi's breathtaking success in spanning the Atlantic. From that achievement sprang the coastal radio stations around our shores giving succour to our Merchant marine. Then came the powerful Marconi Station at Caernarfon and its receivers at Towyn by which communication with the Antipodes was first achieved. All that remains of them are the buildings and a few concrete relics on the mountainside of the transmitter site.

Then came the start of the Empire Chain with the building of the Leafield Station, interrupted by the First World War, but later to be overtaken after the war by the building of GBR at Rugby, then the most powerful valve transmitter in existence. Only the buildings remain of some of the Marconi Beam Stations, which were in the forefront of world-wide telegraphic communication except for a small section of a transmitter in London's South Kensington Science Museum.

All the PO/BT telephony and telegraphy transmitters reaching to all corners of the globe have been swept away in wanton destruction together with their receiver counterparts at Baldock, Bearley and Somerton. Similarly, the big VLF stations GBR and GBZ, at Rugby and Criggion respectively, were dismantled in indecent haste when their work finished in March 2003. To the Navy during Second World War they were just as important as Bawdsey was to the RAF. Criggion actually participated in the end of the German Battleship *Bismarck* and during the Cold War played its part along with the Nato station at Anthorn. Their masts, which provided a skyline for many decades in both localities have been felled.

Four masts remain at Rugby supporting the antenna for the MSF Standard Frequency and Time transmitter, which is due to finish in 2007. Unless policy changes, that too, will disappear from the face of the earth leaving an empty shell of a building in its place and how long will that last given talk of pressures for housing and industrial uses?

In fact, all that has happened in the wireless field, from its earliest commercial endeavours right through the 20th Century and into the present one, has been lost with only empty buildings in some cases as a remembrance of a vanished heritage. Not even a blue plaque in place!

Whilst there is no objection to industrial monuments of the 19th century and earlier being preserved for future generations to study, policy surely ought to be altered to preserve those aspects of development, which have resulted from the increased pace of invention and application?

English Heritage, you have belatedly woken up to the knowledge of the heritage value of relatively recent wireless developments. Will you now try to retrieve what little has been left of earlier endeavours even if only to erect some form of monument to commemorate the activities on these sites such as the Poldhu Monument and the Plaque at Alum Bay in the Isle of Wight? Something must be done before memory fades completely!

Incidentally, my official title before retirement was Area Manager Western Group of Transmitting Stations. It doesn't mean much nowadays, but The Group comprised Rugby, Criggion, Anthorn, VLF stations and Ongar and Leafield h.f. stations before they were closed. Regards to everyone on *PW*.

Stan Brown G4LU
Oswestry
Shropshire

Editor's comment: Stan and I discussed his proposed letter following two occasions when I had driven past the Rugby site recently. It's obvious to anyone - let alone those interested in the history of technology - that BT want to be rid of these sites as soon as possible. Unfortunately for them, long before it became the property of a huge private company it belonged to the state and played an extremely important role in the history of our nation. In my opinion (and that of Stan G4LU) that role, and the site itself should not be lost in the same way other sites have been. Readers who are also concerned are asked to write directly to Simon Thurley, Chief Executive of English Heritage, 23 Saville Row, London W1S 2ET and also to Tessa Jowell, Secretary of State, Ministry of Arts, Culture & Sport at 2 - 4 Cockspur Street, London SW1Y 5DH. We must not let this centrepiece of radio communications history be lost.

Unfamiliar Chinese Transistors

● **Dear Sir**

Recent electronic apparatus manufactured in China uses transistors with unfamiliar type numbers, i.e. H331, C331 and C118. These are standard cased, not SMDs. They check out as being bipolar type transistors, but it's impossible to identify the lead-outs if they require to be replaced.

This will be a problem if imported rigs of far eastern origin use these semi-conductors. A trawl of the Internet has produced no information. Have any readers any information on these types?

Frank Bailey F1VFG/M1EYH
Montpon-Menesterol
France

Editor's comments: An interesting problem Frank. I doubt very much indeed if we can get information from the Chinese Manufacturers directly, but I feel sure there's someone who could help. With the flood of cheap imports arriving here now, I wonder how long before we see the first Amateur Radio equipment from mainland China? Judging from the high quality electronics already available, it will not be long!

Dumbed Down?

● **Dear Sir**
The letter from **Jon Robson G7MQL** in the November issue of *PW* (Dumbed Down?) raises some interesting issues about editorial policy and construction techniques. I respect his views, but must challenge some of the points he has made.

Jon is critical of the 'standards of construction' in the Editor's recent resistance/capacitance bridge project. Many experienced home-brewers favour the open form of construction adopted for this project rather than a printed circuit board, as the circuit remains accessible for modification and experimentation. Perhaps the power leads could have been shorter, but it's unlikely that the overall performance of the bridge would have been improved by a higher standard of carpentry or by the use of cable ties instead of hot melt glue.

I know from my own experiences that efforts to achieve nice looking circuit construction don't always result in better performance. In fact, the converse can be true. Nevertheless, there's nothing stopping a reader from adopting a different construction approach if they wish to do so.

I hope *PW* contributors will not be deterred from submitting interesting projects for publication, for fear of criticism if their designs or construction techniques are not in accordance with the highest professional standards. Our hobby is about **amateur experimentation** and it is important that the free flow of ideas via *PW* is not stifled.

Despite 40 years in the hobby, I still think that the Radio Basics articles are a good read and if they have encouraged newcomers into our hobby then so much the better. This is not 'dumbing down' in my view - it is about making *PW* relevant to all abilities within the readership. So my message to Rob Mannion G3XFD and the whole of the *PW* team is keep up the good work!

Brian George
Orpington
Kent

No Junk Box!

● **Dear Sir**
Back in the halcyon days of the early 1970s I was quite deeply into Amateur Radio, particularly the h.f. bands and enjoyed constructing and tinkering with all sorts of radio projects. Marriage with its responsibilities, plus moving into a flat with very limited space, together with lack of funds, etc., meant that I went into stand-by mode.

A few weeks ago I chanced to see a copy of *PW* on the shelves at WH Smith and, being tempted, fell for it. True to my recollections of *PW*s of old, it was both entertaining and informative. Yes, some old favourites had disappeared (Practically Wireless, by Henry), new stuff has appeared and valves have become an historical item but the style and content of the articles are still reassuringly comfortable to a 'returnee'.

One thing does bother me, though. I used to have a reasonable junk-box full of useful odds and ends like variable capacitors, coil formers, switches, odd meters, knobs, dials, slow-motion drives and the like, picked up cheap from various shops (mainly Amateur Wireless in Corporation Street, Birmingham, long since gone). So my question is, can anyone tell me just where the blazes (in Britain) you can still obtain such precious goodies, especially air-spaced variable capacitors, as I'm itching to (re)build an a.t.u!

Again, congratulations on the magazine, to which I will be a regular subscriber.

Andy Buxton
Dudley
West Midlands

Editor's comment: You'll soon be on your way Andy! I think we'll recruit readers to help here, so please join me on the Topical Talk page.

Living In The Past?

● **Dear Sir**
I thought I must write to you regarding a letter that you published in the October 2004 edition, regarding living in the past by **Len Paget GM0ONX**. I

European Pile-Up

● **Dear Sir**
As I'm typing this it's 0845 on Saturday morning and I am sitting here in the shack listening to one of the worst European pile-ups I have ever heard on the h.f. bands. This has prompted me to put pen to paper (or fingers to keyboard) and ask the question why?

I am a DX-chaser trying for the different awards. I also enjoy a good pile-up, the satisfaction of cracking it using my little station, is second to none. But as of yet I have only heard the EU stations calling, I have not heard any of them give a report to the DX (which by the way is T6EE in Afghanistan as I write) or heard the DX station.

This also happened last night when VP8SGB suddenly appeared on the 14MHz band, the DX cluster also stated that this station was a pirate, but as the great **Bob Locher W9KNI** says in his book *The Complete DXer*, "work em first, worry later".

A comment I heard on the bands a couple of weeks ago from American Amateurs was: "How does any European work DX? Have you heard the Zoo on 14MHz"? With this in mind, surely there must be a time to shut up and listen?

Many years ago I worked in sales and on one of the first courses I attended the tutor gave me a saying that I apply even to this day in all aspects of life. It especially applies in this wonderful hobby of ours and is: "God gave us two ears and one mouth, do you think he was trying to tell us something"?

As I say, the saying definitely applies to this hobby. Surely 20 minutes spent listening to the DX is better than 30 minutes shouting out your callsign (or the last two letters as seems to be the norm now) to deaf ears?

If you listen to a pile-up for long enough the DX station will give away a pattern on how they are working and listening (if our multi-kilowatt European Cousins shut up long enough) to them is the only way. Whether this is by calling at the end of a pile-up or just as the last station worked is signing (tail gating) they will give the clues.

Some DX will only work if you call with your full callsign (the shortened version is classed as a pirate call and not valid on the Amateur bands). Humans are all creatures of habit and when we find something we are comfortable with, we'll use it. This is the same for a person from West Kiribati or West Bromwich.

Surely, as part of the licensing terms and conditions we must be able to prove our abilities to operate and listening to the bands must be the best way to learn? I know this was how our older UK licence holders had to go about obtaining their ticket, before the RAE as was. Now these Amateurs are some of the world's top DXers.

I also have friends who have obtained their M3 calls and have been s.w.l.s (for want of a better term) and these guys are just as good at operating, if not better, than some of our European and UK stations who have been licensed for years. I know there is a practical part to the exams now, but this still does not provide the experience of listening to what is happening.

One of your sister publications has commented on the lack of response to their listeners' columns (especially on the h.f. bands) and the decline in the availability of a good receiver at a price to suit the ordinary person's pocket. None of the big three (Icom, Yaesu or Kenwood) now make a purely h.f. receiver and the ones that have been manufactured recently are at a price of a small transceiver. So could this be the problem?

Gripe over! Top magazine, thank you and keep up the good work. Maybe an article on listening or general DX operating might go down well?

Chris Colclough G1VDP
Nuneaton
Warwickshire

Editor: Some interesting comments and suggestions Chris. Over to you readers – we're listening for your comments at rob@pwpublishing.ltd.uk

am a '30 something' who is probably typical of many today, having a wife, 2.4 children (four in my case) a pair of cars (hers is far better than mine) and enough bills for a small country. I have reached the age when I find that I need 'something' different to occupy my time, but 'something' that will not take all my time.

Like many people I know of a similar age, we are all looking for 'something' and for me it is Amateur Radio, but again this subject in itself is vast and varied. My local society (Scarborough) are full of many and varied people of all ages, although to be honest the majority are of the wiser (elder) variety, but these are perhaps the wisest and kindest people I have yet to meet. One simply has to ask and there is always at least one person offering help, I am actively encouraging my friends to come along.

As for out-of-date magazines, well perhaps, for me and perhaps the other younger members of the club things like h.f., v.h.f. and other field days are great fun. Also things like SOTA and IOTA are of great interest as well as of course the modern day super rig if I may call it that, the FT-817. The modern day QRP mobile/portable rig along with antennas are great fun to build and use.

Yes it's true, home-brewing does tend to take a back seat compared to a few years ago (we can't build things like the FT-817), but now we are home-brewing speech processors, lightweight a.t.u.s and of course antennas (antennas by the hundreds) both h.f., v.h.f. and u.h.f.

We – the other club members and I - also delve into things like RTTY, slow scan TV and the like, some of us do build the little QRP transmitters, but mostly we read the article and put it on file, for perhaps when we are a little wiser ourselves.

Yes perhaps a look into your content of the magazine, but generally you're not far off. As in all things modern getting people away from the PC or the other one eyed beast, the TV, is never going to be easy. Regards.

Angus Young (sitting foundation course)
Scarborugh
North Yorkshire

Have A Go Peter!

● **Dear Sir**
Reading the Star Letter in October's issue of *PW* by **Peter Hague**, I just thought I'd add my 10 Eurocent's worth. I hope that Peter Hague does decide to get his fingers into something practical again, apart from *Practical Wireless* that is. It would appear that he has a sound technical background and therefore it shouldn't be all that difficult for him and I don't think that he would be at all disappointed.

I was also a late entrant into this fascinating hobby and it was only through the perseverance of my radio club colleagues that I got my full Licence, it was the Morse Code segment that put me off. It was only after I got down to learning it seriously that I realised how foolish I had been to be unnecessarily afraid. So, come on Peter, go for it, join your local radio club and prepare to enjoy yourself!

I would also like to comment on the Kenwood service department and especially **Dave Wilkins G5HY**. I had to return my TS-480SAT and I was kept fully informed by Dave via E-mail. Dave answered all my queries promptly and the total time from receipt of my radio to its return was five days, truly excellent service!

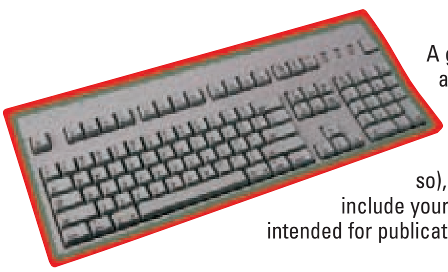
Finally, in Keylines the Editor mentions the December 1943 issue of *PW*, how about a reproduction special issue? It would bring back memories for some and show others that back then it wasn't just a question of unpacking a black box - as it mostly is today for many of us, myself included.

John Flynn EA7EUF
Spain

Editor's comment: Thanks for the encouragement John - I feel sure Peter will take note. I'll enquire about the possibilities of a 'special issue' with my Publishers, although there's nothing to stop us re-publishing the Douglas Hall circuit itself if readers ask for it to be included in the Classic Projects series later in 2005.

● Keep your letters coming to fill *PW*'s postbag

Letters Received Via E-mail



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

amateur radio rallies

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

November 14
The South Yorkshire Repeater Group's Great Northern Hamfest
Contact: Ernie Bailey G4LUE
Tel: (01226) 716339/(07984) 191873 between 1800 & 2000
To be held at the Metrodome Leisure Centre, Queens Road, Barnsley, South Yorkshire. Doors open at 1000. The leisure complex is in the town centre and is less than two miles from J37 on the M1 motorway, just five minutes walk from the train and bus station (follow the brown Metrodome signs from all directions). The venue is all on one level with excellent disabled facilities. Featured will be all the usual trade stands, component and specialist interest groups, along with a large Bring & Buy. Admission is £2.50.

November 21
The Third Mayo Rally
Contact: Padraic Baynes EI9JA
Tel: 087 695 7154
The third Mayo Rally will take place at the usual venue - the Belmont Hotel, Knock. Already the rally has attracted much attention from traders, with a number of bookings from UK based firms joining the large number of exhibitors from Ireland. The rally will follow the proven successful format of previous Mayo shows, with a large Bring & Buy section, a number of demonstrations and presentations as well as the large number of traders, making the Rally one of the best in Ireland - doors open at 1130. The club will host a dinner on the night before the rally, and a prominent guest speaker has been lined up by the Mayo REN for the occasion. **(PW Editor Rob G3XFD/EI5IW will be delighted to meet you there too!)**.

December 5
The Bishop Auckland Radio Amateurs Club's Rally
Contact: Mark G0GFG
Tel: (01388) 745353
Taking place at Spennymore Leisure Centre. Please note that this venue is ideally suited for traders and disabled visitors, as it boasts good parking and access to a large ground floor hall. There will be the usual radio, computer and electronics, plus a Bring & Buy stall, as well as catering and bar facilities. Morse tests are available on demand. As you can imagine, there is a lot for those members of the family not interested in radio to do within the confines of the Leisure Centre. Doors open 1100 (1030 for disabled visitors) and admission is just £1 (under 14 free of charge with adult). Talk-in on S22.

2005

March 20
The Cambridge & District Amateur Radio Club's Rally
Contact: John Bonner G0GKP
Tel: (01954) 200072
E-mail: j.bonner@ntlworld.com
The rally is to be held at Britten Arena, Wood Green Animal Shelter, King's Bush Farm, London Road, Godmanchester. Doors open at 1000 and entrance fee is just £2 (concession for OAP/disabled, children free). There will be free parking for up to 2000 cars, along with a bar and restaurant on site. There will also be a Bring & Buy and a Talk-in on S22.

April 10
The Yeovil ARC's 21st QRP Convention
E-mail: george@mudford.fstnet.co.uk
The Yeovil ARC have booked the Digby Hall, Sherbourne for their 21st QRP Convention, the popular get together of QRPers from the South and West of England. Doors open at 1000 and car parking is free in the town centre carparks, which adjoin the hall. Follow the black and white Town Centre signs, off the A30 Yeovil to Salisbury Road. There will be two talks in the morning and another after visitors have enjoyed the excellent food available and browsed the many trade stands. Also, the Construction Challenge will be adjudicated and certificates will be presented to winners of the QRP Convention CW Funrun, which takes place prior to the Convention on the evenings 14-18th March, 1900-2100. Rules available from G3ICO.

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.

KENWOOD

STRONG FOUNDATIONS

To build your hobby you need to start from a strong foundation. No matter how new or how old your callsign is, the TS-570DG is the perfect mid-size rig for mobile or station operations. Designed to answer the call in any application, this heavy-duty HF transceiver boasts a large heatsink and improved heat dissipation characteristics for extra reliability. But most importantly, the TS-570DG incorporates Kenwood's own 16-bit DSP AF signal processing that enables it to provide you with extremely effective interference reduction plus high-quality TX and RX audio. Additionally, a central frequency control system offers high frequency stability while a large, positive-type LCD display ensures greater visibility for easy operation. Completely equipped with a preset auto antenna tuner and ideally sized, the TS-570DG is sure to become standard equipment for operators who demand the very best.

▮ 16-bit DSP noise reduction ▮ DSP filters ▮ DSP voice equalizer/speech processor ▮ Large LCD display ▮ S/PWR/COMP/SWL/ALC meters ▮ Preset auto antenna tuner ▮ CW auto tune ▮ Menu system ▮ 100 memory channels ▮ Quick memory ▮ 10-key direct frequency entry ▮ Operating guidance feature ▮ Mobile/station size (270 x 96mm) ▮ Heavy-duty design ▮ 5W QRP operation ▮ Built-in electronic keyer ▮ CW message memory ▮ CW reverse mode ▮ Full break-in and semi break-in ▮ High-speed 57600 bps PC control ▮ Dedicated packet port

HF TRANSCEIVER TS-570DG

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

amateur radio news

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

Product News

Improved Speaker

British Manufacturer bhi are pleased to announce the launch of their new improved NES10-2 MkII noise eliminating speaker.

Due to feedback received about the original NES10-2 speaker, the unit now has the additional feature of an on/off/bypass switch. The retail price remains the same at £99.95, which includes the 1030-FPL fused DC power lead and full operating instructions. Details of the improved product can be found on the bhi website at **www.bhi-ltd.co.uk** The NES10-2 MkII is available direct from bhi or from any of their approved dealers.

bhi Ltd
Tel: 0870 240 7258
FAX: 0870 240 7259
www.bhi-ltd.co.uk

Please Note!

Fareham on the Web

You can now find out about the activities of the Fareham & District ARC on the Internet.

The Fareham & District Amateur Radio club has recently launched a website to promote the club and its activities. The site is still undergoing construction in some areas, but there's lots of information available already. To see for yourself, point your browser at: **www.fareham-darc.co.uk**

The Fareham & District ARC has been running for 36 years and was founded in a bid to pursue the technical exploration and development of Amateur Radio by a sharing of knowledge among its members. These days the club meets on a Wednesday evening from 1930hours at the Portchester Community Centre and the meetings include talks and discussions on many aspects of Amateur Radio and topics of a technical nature by members and guest speakers.

A radio 'net on the 144MHz band (normally 145.475MHz) every Tuesday evening from 2000 local time is held by the club as are: Natter nights on the air, Quiz evenings and Junk sales. The club also attends various contests and rallies and supports other local community events.

New members or anyone who has an interest in Amateur Radio is always welcome to go along and join in. For more information regarding the club and its activities please contact **enquiries@fareham-darc.co.uk**

Super-Sale Open Day

Visit Martin Lynch in December

Martin Lynch & Sons invite you to their 15th Super-Sale Open Day and celebration of the opening of their new HQ and showroom in Chertsey, Surrey taking place on 4 December 2004.

Following their move from London to Surrey, the ML&S Team say it has already proved successful thanks to a combination of private parking for customers, (this new location has enough parking for up to 70 cars together with several public car parks within walking distance), a huge increase in showroom stock being displayed and more hands-on-deck to cope with the demand.

During the open day on 4 December 2004 Martin and the Lynch Mob have organised a Boot Sale in their rear car park, which will also be accompanied by a hog roast sponsored by Icom, Kenwood and Yaesu. They are also announcing at least three important new product lines to their range, which include:

- Barenco antenna hardware being available to buy over the counter in the ML&S showroom.
- Tigertronics software available from stock, including the very popular SL-1 Signalink. Tigertronics are best known for their excellent Signalink Sound card interface, which ML&S have sponsored the control software for since day one. See **www.tigertronics.com** for more information.
- New Communications Solutions (NCS) who are a new American manufacturer who produce very 'high quality' Multi-Switcher Rig controllers, which allow operators with more than one rig in their shack to use just one Microphone, Keyer and TNC. It's something we have all tried building over the years and now NCS have saved you the bother! See **www.ncsradio.com** for more details.

Representatives from Yaesu, Kenwood & Icom will be there together with the RSGB, PW Publishing Ltd., RAIBC and other club stalls. So why not go along and join in the celebrations?

Martin Lynch & Sons Ltd.,
Outline House, 73 Guildford Street,
Chertsey, Surrey KT16 9AS
Tel: 0845 2300 599
E-mail: Martin@MLandS.co.uk
Website: www.HamRadio.co.uk

Grant for Guides

Building Foundations

John Chisholm M5TTT, radio instructor, notified the Newsdesk about the JOTA success of Northamptonshire Guides

Last year The Northamptonshire 77th Guides were awarded a £5000 lottery grant for equipment to train Guides to Foundation level and also to run special event stations in a bid to show Guides what Amateur Radio has to offer. The photograph shown here is of the girls of the 77th Northampton Guides with their Guide Leader **Sue Hall M5AFY** running a JOTA station where contacts were made as far afield as Tasmania.

Some guides sent messages to as many as 15 different contacts. Note: All the Guides in the picture who are not qualified will be on the next Foundation course. This just goes to show that anyone can enjoy the delights of Amateur Radio with a little help and encouragement, so John told the *PW* Newsdesk.

Hot Technology

Go Digital This Christmas!

With the ever increasing popularity of digital radio the Digital Radio Development Bureau (DRDB) have launched a new website, specifically designed for the consumer.

The DAB market has moved on since the DRDB site was first launched in December 2002. There are now more than triple the number of products available in stores. Retailers have grown from 600 to 6000 and services available on DAB have mushroomed to more than 400.

Over the next four years, the DRDB forecasts that some 12 million DAB digital radios will be sold in the UK, making the market worth nearly half a billion pounds by the end of 2008. Ian Dickens the DRDB chief executive says "The original Digital Radio Now website has always been popular with consumers, but as the market grows, we feel it too needs to expand. The new site delivers added functions designed to make buying a DAB digital radio as simple as possible". The new website, which can be found at **www.digitalradionow.com** includes:

- The definitive DAB digital radio postcode checker for station availability
- A complete, up-to-date list of every DAB digital radio product on the market
- A new, unique micro site that allows consumers to search by product type, price, brand, features, etc., to come up with a printable list of products that fit the bill precisely
- A list of retailers stocking DAB digital radios in the consumer's immediate area, complete with contact details and map
- Useful FAQs on DAB
- Comprehensive links
- News about products, stations and retailer initiatives

So, if you fancy trying something different, why not go digital?

Can You Help?

Tennamast Trophy Trail

Norrie Brown GM4VHZ of Tennamast (Scotland) Ltd. asks for your help in tracking down the missing Tennamast Trophy. It's somewhere in Scotland, can you help find it?

Tennamast (Scotland) Ltd., have supported the *Practical Wireless* 144MHz QRP Contest for many years by sponsoring the **Tennamast Trophy**, which is also "**In Memoriam to Frank Hall GM8BZX**", the former President of the Radio Society of Great Britain.

Norrie Brown GM4VHZ, who runs Tennamast in partnership with his wife **Rose,** has contacted *PW* to ask for help. Unfortunately, it seems as though Norrie and Rose have lost contact with the 2003 trophy winners and their attempts at getting hold of them have been unsuccessful.

Last year's winners of the Tennamast Trophy were the **Forth Valley Contest Group** operating as **MM0FVC/P**. The photograph here shows the winners as published in the December 2003 issue of *PW*.

If you can contact any of the group, please ask them to telephone Norrie GM4VHZ at Tennamast (Scotland) on **(01505) 503824** as soon as possible because the 2004 winners would like to receive their award!

- Can you help track down the missing Tennamast Trophy? If you can contact Keith GM0FZM (left), Colin GM0CLN, Robert MM0ANT or John MM0CCC, please telephone Norrie Brown GM4VHZ at Tennamast.

Encouraging Budding Builders

Calling All Junk & Surplus Traders!

With the influx of keen new Radio Amateurs into the hobby PW is seeking help from all specialised traders, especially those who can supply bulk components, metal work and what's often wrongly called Junk!

If you're a trader who specialises in what's often called 'the junky bits' the Amateur Radio hobby needs your help! The Editor, **Rob Mannion G3XFD** writes; "With the large number of keen new Radio Amateurs joining us in the hobby and wanting to learn more by building their own equipment, we have problems. This is because they've perhaps only recently become engrossed in the hobby and don't have a stock of what we traditionally call 'junk'.

Of course, the junk isn't rubbish at all to those in the know. Instead it's usually extremely useful recovered or surplus radio components, printed circuit board off-cuts, plugs, switches and whatever can be obtained at reasonable prices! Traditionally, traders who specialise in selling the material the constructor needs has often only to attend radio rallies, boot sales and other events where large groups of enthusiasts gather. Unfortunately, for both the trader and the radio hobbyist such traders rarely advertise their wares. And of course, we know that's often because their stock is continually changing. It's the nature of the surplus radio component/hardware industry.

However, in an effort to assist everyone involved, I'm planning to devote an entire Radio Basics column to provide details of what's available, who is selling it and where and how junky style radio components, p.c.b. material, etc., can be obtained. This is planned to appear in the February issue of *PW*. There's no obligation to advertise in the magazine, although of course, this would be to the advantage of everyone! It also goes without saying that we'll most certainly support our existing advertisers.

So, if you can offer difficult-to-buy aluminium chassis material, cables, wires, recoverable components and anything else which could be useful to a keen novice constructor, I ask you to contact me at *PW* as soon as possible.

Additionally, if anyone knows of a trader who they think we should know about, a telephone call or E-mail to the *PW* offices would be most helpful. All you need to do is to let us know who and where they are, and how we can contact them.

For further comment on the planned Radio Basics special please turn to Topical Talk on page 77. Thank you".

Rob Mannion G3XFD

Are You Twinned?

Is your Amateur Radio Club or Society twinned with another in your home country or abroad? Or perhaps you're thinking about it? If so, PW would like to hear from you.

If your Amateur Radio Club or Society has an existing twinning arrangement with another organisation, perhaps in another country or a different part or your home country, *PW* would like to hear from you. This extension of our internationally popular hobby deserves more publicity and because of this, a major feature is planned for the magazine during 2005.

The Editor writes; "Twinning of Amateur Radio clubs and societies has been going on for many years. The clubs involved have been thoroughly enjoying themselves and extending the hand of friendship, together with the fellowship that naturally accompanies our hobby. The problem is that although they know about the idea and the advantages, they're so busy enjoying the arrangement, the rest of us don't know much about it!

So, what goes on with a twinning relationship? How do you set about finding a club to make an informal but firm partnership with? If you're already involved in twinning, did it come about because your town or city has a rather special relationship with a town abroad?

Whatever your situation, if you are involved with or would like to organise a twinning with another club please write to me. Let me know your situation and provide photographs of your club and its members, especially if you've already enjoyed a trip to your twinned club. On the other hand, photographs and details of your club may well encourage another like-minded club to contact you to suggest a link-up.

Our hobby is unique by making the previously difficult task of communicating very much easier. We have the advantage over many other pastimes so, let's take full advantage and further extend the hand of friendship. You never know we could see Somerset cider being swapped with Breton cider with France, Limerick and Lancaster sharing friendship, along with Inverness and Ilfracombe discovering the common links and differences.

I look forward to greeting a heavily laden Postman and to many E-mails on the subject arriving in my Inbox.

Rob Mannion G3XFD

Competition Update

Rob Mannion G3XFD provides an update on the delayed adjudication stages of the 2004 Club Spotlight competition.

Rob writes: "On behalf of everyone involved with the annual Kenwood and *Practical Wireless* Club Spotlight Club Magazine Competition I have to apologise for unavoidable delays in this year's adjudication process and the frustration it must cause to the entrants. This is due to pressure on editorial time and space. It certainly does not reflect any lack of interest from the *PW* staff, the judges or myself!

We're hoping to get the adjudication process finalised as soon as we can. In the meantime if anyone can tell me how we can turn a 24 hour day into 36 hours, I ask them to contact me immediately! My sincere apologies to everyone involved".

Rob G3XFD

Practical Wireless Direct

Did you know that you can buy the current issue of Britain's best selling Amateur Radio Magazine direct from the Publishers?

Some readers may be experiencing difficulties in finding copies of *PW* in their local WH Smith stores or independent newsagent. So, as we don't want you to miss out on your favourite radio read, we'd like to remind you that you can buy current issues at cover price direct from us.

Simply send a cheque (payable to PW Publishing Ltd.), Postal Order or Credit Card details for the cover price (£2.95 inclusive of P&P, UK only, overseas customers please add £2.75) with your name and address to **Clive Hardy G4SLU** in the Book Store and your copy will sent out to you (**cash not accepted**). This service is also available for copies of *Short Wave Magazine* (£3.25) and *Radio Active* (£2.75).

Additionally, if you've missed an issue of any one of the three radio magazines you can order Back Issues in the same way (stocks permitting). Back Issue prices are as follows: **PW - £4.70; SWM - £5 and RA - £4.50 all inclusive of P&P** to **UK** addresses, please add £1 extra for overseas orders (making a total of *PW* - £5.70, *SWM* - £6, *RA* - £5.50) or call Clive for details of bulk postings. Alternatively, you may like to consider a subscription, especially with Christmas approaching, see page 76 of this issue for details.

Book Store
PW Publishing Ltd., Arrowsmith Court
Station Approach, Broadstone, Dorset BH18 8PW
Tel: 0870 224 7830
Fax: 0870 224 7850
E-mail: clive@pwpublishing.ltd.uk

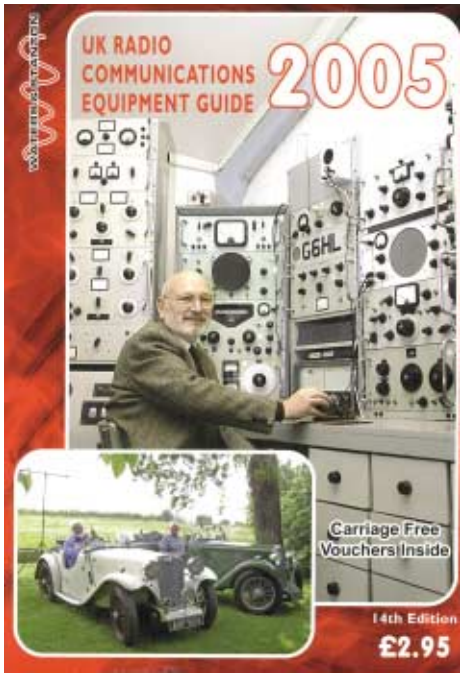
Waters & Stanton News

New Products Galore!

The 2005 edition of the Waters & Stanton Catalogue is now available containing lots of new products.

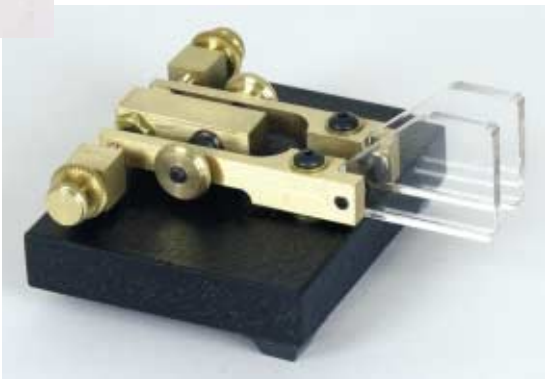
The new catalogue has over 380 pages, so there's plenty to look at, including two vouchers for free carriage when making a purchase. It also includes short articles on antennas, microphones, amateur events and a DXpedition in two vintage cars to France. Whether you're looking for batteries or books, a receiver or rotator, products are alphabetically listed and individually described.

The Waters and Stanton 2005 catalogue is now available priced £2.95 plus £1.75 P&P.



Waters and Stanton plc
Spa House
22 Main Road
Hockley
Essex
SS5 4QS
Tel: (01702) 206835
Website: www.wsplc.com

A selection of four of the most popular products from the Vibroplex range of American made Morse keys are now available direct from Waters & Stanton, as they have been appointed the UK agents. The selection includes the V-CWJ Code Warrior Junior iambic key, priced at £99.95; the V-ID lambic Deluxe highly polished keyer, priced at £169.95 and the V-VKD VibroKeyer Deluxe single paddle key priced at £164.95.



Leicester Show

An American Visitor

Bob Heil of Heil Microphone fame attended this year's Leicester Show over the weekend of October 1 & 2nd.

The Waters & Stanton stand at the Leicester Show played host to **Bob Heil K9EID**, who exhibited some of his acclaimed products. Bob also gave a lecture on sound reproduction in the Amateur Radio station called 'It All Starts at the Microphone'.

During the two days of the Leicester Show Bob Heil took the opportunity to visit the Icom stand to display his new studio quality microphone and boom assembly specifically designed for use with the new IC-7800 transceiver. The microphone will be available at the end of the year but the price is yet to be confirmed. A similar microphone is being designed for the new Yaesu FT-9000 transceiver to be released in 2005.

Bob Heil K9EID on the Icom UK stand at the Leicester Show demonstrating his studio quality microphone and boom assembly for the IC-7800 transceiver.

For full details of the Heil product range contact Waters & Stanton PLC on **(01702) 206835** or take a look at **www.wsplc.com**

amateur radio clubs

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

BRISTOL
South Bristol Amateur Radio Club
Contact: **Len Baker**
Tel: **(01275) 834282**
Website: **www.sbarc.co.uk**
The South Bristol Amateur Radio Club meet at the Whitchurch Folkhouse, Bridge Farm House, East Dundry Road, Whitchurch, Bristol BS14 0LN. Lots of events coming up, **17 November**: AGM, **24th**: On The Air evening. Visit the above website for more information.

DORSET
Bournemouth Radio Society
Contact: **Chris Ellis M5AGG**
Tel: **(01202) 893126**
Website: **brswebsite.freeserve.co.uk**
Members of the Bournemouth Radio Society meet on the 1st and 3rd Fridays of each month at 1930 for 2000 at the Kinson Community Centre, Millhams Road, Kinson, Bournemouth. Just a few of the up and coming events include: **19 November**: **Colin G6MXL** of Poole ARS - Contesting, **3 December**: Members - Chairman's Pint, **17th**: Selected Members - My Other Hobby. Check out the above website for more details about the club and their activities.

GLAMORGAN
Hoover (Merthyr) Amateur Radio Club
Contact: **Mr Howell Thomas MW0ATG**
Tel: **(01443) 400664**
The Hoover Amateur Radio Club at Merthyr Tydfil are now seeking applications from anyone interested in attending Foundation and Intermediate Licence courses at their club.
Please contact them via the above details for more information.

LONDON
Southgate Amateur Radio Club
Website: **www.southgatearc.org**
Members of the Southgate Amateur Radio Club meet on the second Thursday of the month at Winchmore Hill Cricket Club, The Paulin Ground, Firs Lane Winchmore Hill, London N21 3ER, commencing at 1930 for an 2000 start. A guest speaker is usually invited to give a talk on a subject of interest. Membership is open to all who are interested in the many facets of Amateur Radio, the numerous and varied activities and is not restricted to those who hold transmitting licences. Members range in age from youngsters to senior citizens and visitors and new members are always made most welcome.

WEST SUSSEX
Horsham Amateur Radio Club
Website: **www.harc.org.uk**
The Horsham Amateur Radio Club meet on the first Thursday of the month at The Guide Hall, Denne Road, Horsham, West Sussex. Plenty of events are planned throughout the year, so log onto their website and see what's happening throughout the coming months.

Keep those details coming in!

Looking at....

Volts, Amperes, Watts and Decibels Part 2

Gordon King G4VFV

continues his look at Volts, Amps, Watts and Decibels.

The performance of a receiver (and more particularly a transmitter!) can be adversely affected when presented with a heavily reactive or incorrect value antenna load. This may also encourage inaccurate S-meter readings on receive, depending on the nature of the circuit. To minimise problems of this kind the trick is to achieve the optimum power transfer from the antenna to the receiver.

By convention, Amateur Radio equipment, communication receivers and associated coaxial cables are commonly engineered for an impedance of 50Ω. On the domestic front however, television receivers and their kin are geared to 75Ω. From first principles and to embrace the least mathematics, the little diagrams in **Fig. 1** illustrate the power transfer business.

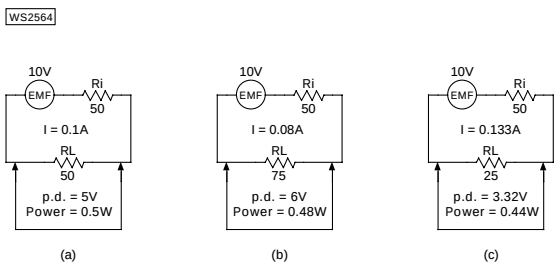


Fig. 1: Maximum power transfer occurs only under conditions of correct matching when the load resistance (RL) has the same value as the internal resistance of the source (Ri). This is shown at (a). Two conditions of mismatch are shown at (b) and (c). Here the power in RL is less than maximum. In all three examples the e.m.f. is 10V and Ri 50Ω. The diagrams also show the current (I) and the p.d. under the different load conditions.

Diagram (a) in Fig. 1 shows the perfectly 'matched' situation where the 50Ω source (Ri) is matched by the 50Ω load R_L. The source e.m.f. is 10V so, from Ohm's law, the current (I) works out to 0.1A, or 100mA (I = V/R), and the p.d. across R_L to 5V (V = I x R) while the power into R_L is equal to I squared times R_L, which works out to 0.5W.

Using the same arithmetic, diagram (b) shows the results when R_L is increased to 75Ω, the power dropping to 0.48W and diagram (c) when R_L is decreased to 25Ω the power dropping to 0.44W. A mismatch makes it impossible to obtain maximum power transfer.

To ensure that a receiver 'sees' a correctly matched load and therefore obtains the maximum signal power from the antenna, steps must be taken to balance out any capacitive or inductive reactance. This is quite a story in itself and outside the scope of this instalment (but another peep at Looking At the Capture of a Radio Wave in the March 2004 issue of *PW* might be worthwhile). The matching requirements, of course, are taken care of by antenna design and/or by the use of an antenna matching device.

Back To The Decibel

As well as microvolts of potential difference (p.d.), the signal input to a receiver can also be expressed as power in terms of dBm. This is the **ratio** of the input **power** relative to one milliwatt (mW) expressed as a decibel. For example, an input power of 1mW is given as 0dBm, a greater power as **plus** so many dBm and a lesser power as **minus** so many dBm.

Let's put some figures to this, let's say that an antenna is delivering a signal of 20 microvolts (μV) ($20x10^{-6}$V) p.d. across the 50Ω antenna input of a receiver. The input power in watts would be equal to the voltage (in volts, not microvolts) squared divided by 50, which works out to the incredibly small power $8x10^{-12}$W, or $8x10^{-9}$mW. Expressed as a dB ratio relative to 1mW this resolves to $10\log(8x10^{-9})$, which is close to -81dBm, as can quickly be discovered with the aid of a scientific calculator. Nothing to get bugged about these days, and no need for strings of dB tables any more!

As another example take the 0.5W shown in Fig.1(a) and convert it to mW by multiplying by 1,000. This gives 500mW. To express this in terms of dB relative to 1mW we merely find the log of 500, which is virtually 2.7 and then multiply by 10, which gives 27dBm (positive this time). That's all there is to it really!

It's easy to get back to the power and from there to the p.d. first by dividing the dBm figure by 10 and then finding the antilog of this new figure. This gives the power in mW. The power in watts can then be found by dividing the answer in mW by a 1000. Finally, we can get back to the p.d. by using the calculator to find the square-root of the product of the power in watts and the resistance in ohms.

Let's say an S-meter is calibrated in accordance with the proposals of the 1981 Conference of the International Radio Union (IARU), such that S9 corresponds to an antenna p.d. of 50μV. Then, assuming that the antenna coupling is 50Ω non-reactive, by using the foregoing arithmetic we find that this is equivalent to a power of -73dBm. To become conversant with the tricks of the calculator it might be a good idea to work this out and then convert back to the 50μV across 50Ω.

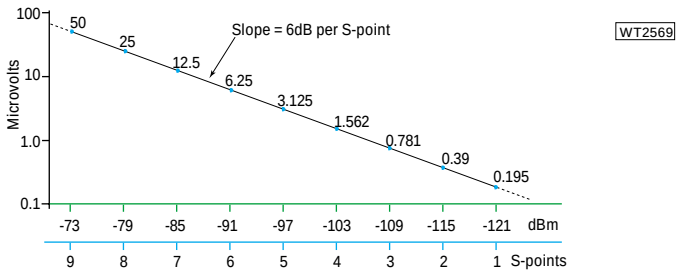


Fig. 2: Showing the relationship between p.d. across 50Ω and dBm from S9 down to S1 when there is a difference of 6dB between each S-point.

The diagram, **Fig. 2,** shows the relationship between the p.d. across 50Ω and the input power in terms of dBm of an S-meter based on 6dB per S-point. Sadly, however, as revealed in Looking At The S-Meter instalment in the May 2001 issue of *PW*, relatively few S-meters seem to be so accurately and conveniently calibrated.

Well, that ties things up for now. Hoping to see you again in the future. In the meantime, enjoy your Amateur Radio, it really is a super hobby!

PW

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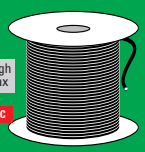

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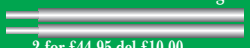

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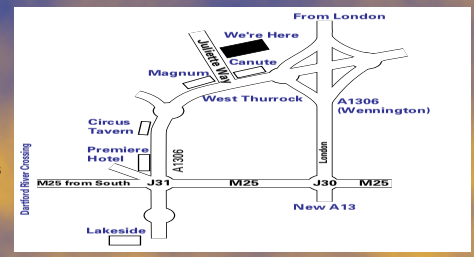

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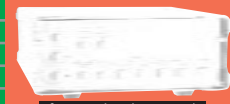

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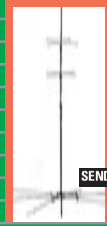

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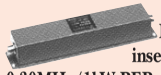

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Remembering the...

Blueprint Bonanza

The 'free blueprint' in *Practical Wireless* has an interesting history and pre-dates the magazine itself. Rob Mannion G3XFD has been looking back to the very early days of the radio hobby and found some real treasures!

During the 14 years or so when I've had the pleasure in providing the club talk *Practical Wireless, Past, Present and Future* most of the audiences were very surprised when I mentioned the fact that *PW* itself, now a rare survivor, was actually a late comer on the radio hobby scene. And indeed it was!

In fact, by the time *PW* was launched in the autumn of 1932 the hobby wireless scene has grown, blossomed and settled down to produce a ripe harvest of hobbyists and fewer magazines. Many of the magazines, which had appeared and flourished in the 1920s and into the early 1930s had begun to fade by the time *PW* appeared.

Don't forget also, that the '*PW*' I'm referring to in this instance is *Practical Wireless* and not *Popular Wireless* which, as far as I've been able to confirm, was eventually absorbed by this magazine in the early 1930s. But of course, if you know better I have no doubt you'll tell me so!

Note: It's perhaps worth mentioning at this point, to emphasis that *Practical Wireless* was not a relaunched and renamed *Popular Wireless*. I emphasise this point because occasionally I meet enthusiasts who are under the impression that this was the case. It wasn't, because in fact *Popular Wireless* continued its own honourable publication until it ceased publication sometime - a date I can't confirm - during the mid-1930s.

Blueprints & Designs

It's essential when mentioning blueprints and early designs to consider the incredible efforts and marvellous (for the time) designs, which the predecessors of *PW* published for the hobbyist. So, it's entirely appropriate for me to look back further than the launch of *PW* itself, back to the days when *Amateur Wireless, Popular Wireless*, etc., were in their heyday.

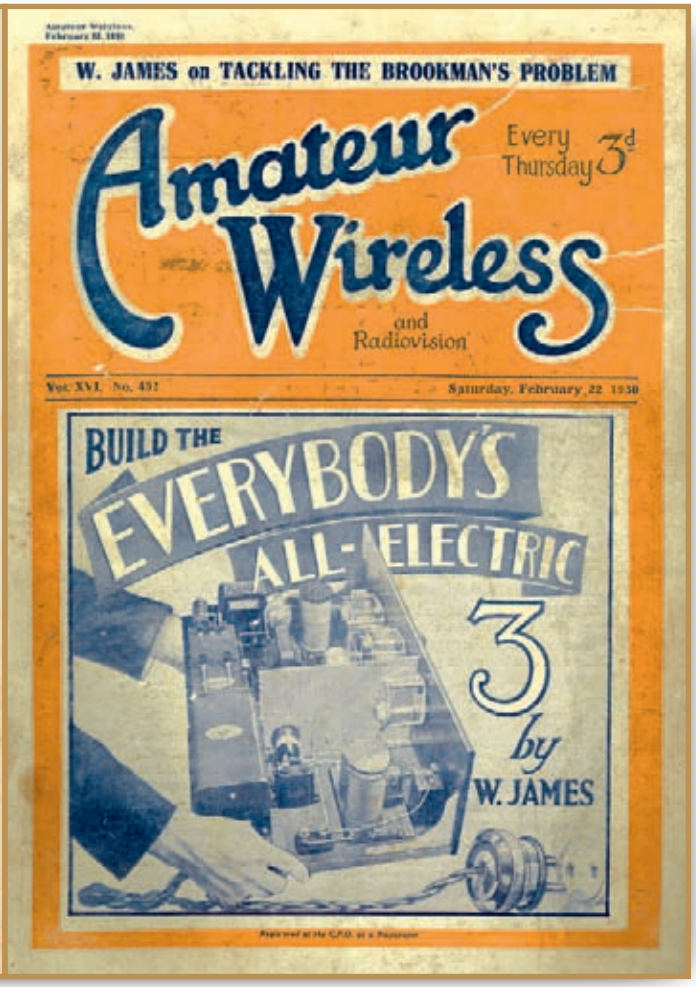
Over the years I've worked on this magazine, many readers have asked me whether or not our archives here in Broadstone, Dorset, are complete. In answering, I'm pleased to assure them that we have complete archives for *PW* itself going back to September 1932 when the magazine first appeared.

Most of the early archives here in the offices are in bound form, in other words the magazines aren't loose, individual copies. Another problem is that in the early days the publishers didn't bother to preserve the front cover, which often carried important title information and set the scene historically. That's a real shame!

I'm pleased to say that within a year or so of *PW*'s introduction, the front covers were also preserved in the bound issues. Additionally, both **Tex Swann G1TEX/M3NGS** (who by default and personal devotion has become our unofficial archivist) and I both have substantial personal collections of loose issues. And, as readers often discover when I visit their clubs, they are truly fascinating!

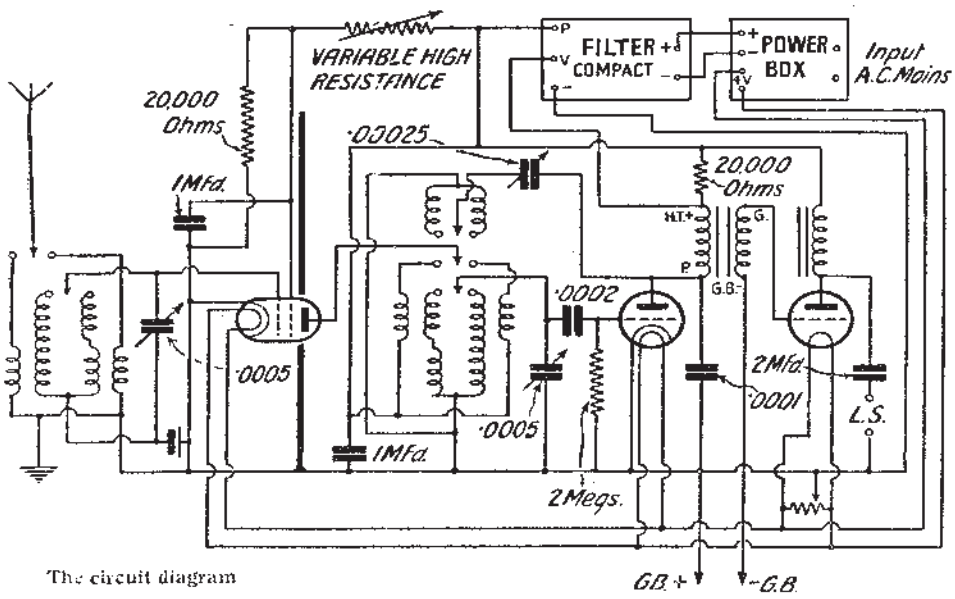
Unfortunately, due to the nature of the magazines and archives, we have very few of the original blueprints. There are one or two, but generally speaking I can be quite frank and say that the blueprint collection (pre Second World War) is incomplete. This is because they could easily slip out of the magazine, or (more than likely) they were used by the original reader.

Several years ago now I was delighted when the son of a reader who had died, honoured his late



● Fig. 1: The weekly copy of *Practical and Amateur Wireless (and Amateur Television)* dated Wednesday 13 April 1935 came complete with the F. J. Camm designed All-Wave Silver Souvenir, named as such because of that year's Royal Silver Jubilee, incorporating a long, medium and short wave design (to be fully featured in a future article). In this article Rob G3XFD looks back of the long history of the free blueprint in *PW* and also at the pioneering designs published before the magazine arrived on the bookshelves in 1932.

● Fig. 2: The front cover of *Amateur Wireless and Radiovision* magazine from 22 February 1930. Apart from the fact that the (then) newly commisioned high power BBC transmitter at Brookman's Park (north of London) was obviously causing problems for some listeners, the main item of interest is the *Everybody's All-Electric 3* receiver project. Although a blueprint was available it wasn't included with the magazines, although full instructions were within the issue (see text).



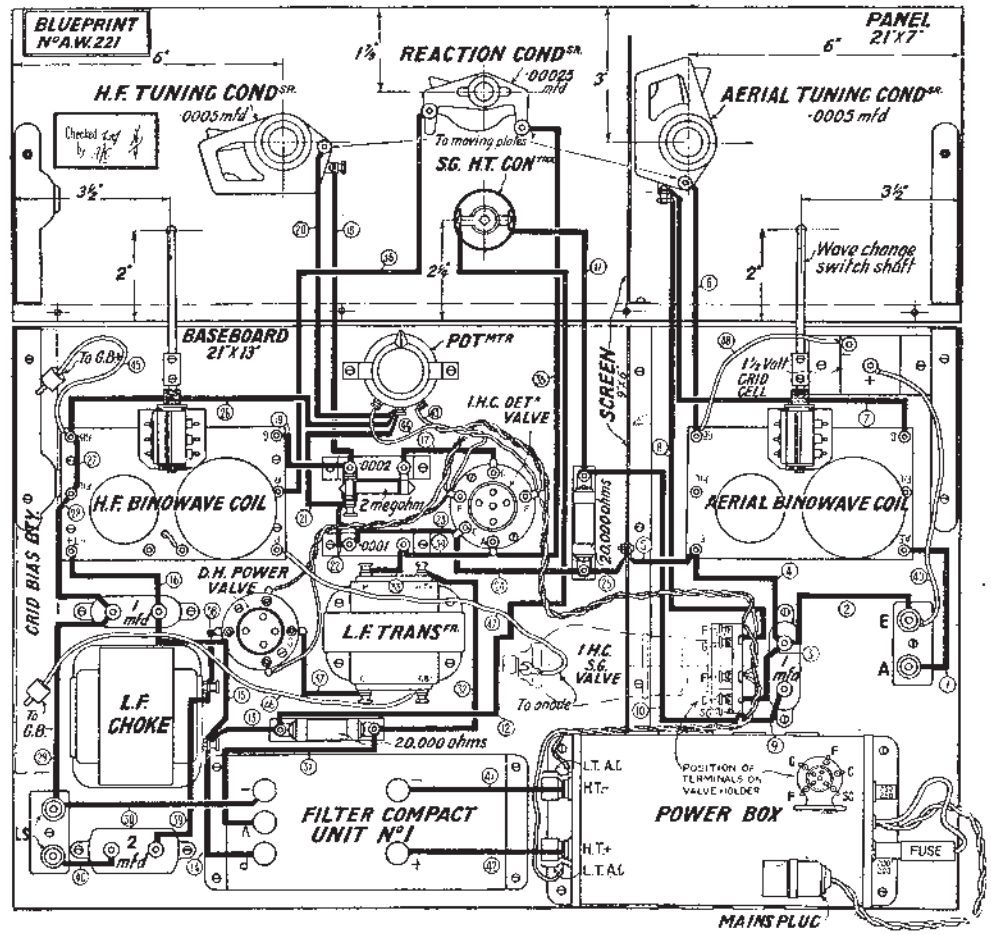
The circuit diagram

● Fig. 3: The circuit diagram of the *Amateur Wireless Everybody's All Electric 3* receiver. The growth of the domestic 'mains;' supply meant that many listeners could operate their receivers without the use of high tension batteries and accumulator. Note however, that no circuit was provided for the 'Power Box' and 'Compact' filter (see text).

father's bequest and sent me a large box full of 1930s *PW*s. However, the magazines weren't for use in the official archives, instead they were given to me to take on my club visits for everyone to enjoy, despite the fact that they would (and are) beginning to disintegrate. This problem was foreseen, but we were all agreed it was important to share the collection.

Incidentally, I usually raise a laugh when I begin my club visit talk by telling everyone present that they shouldn't hesitate to read the archive *PW*s circulating during the talk. Instead, I tell them that when I see the entire audience are engrossed in the magazines, I'd stop the talk and join them!

Joking apart, the archive *PW*s are truly fascinating. Occasionally several will disappear (because the reader has spotted something of interest) and they catch up with



The wiring diagram of "Everybody's All-electric 3." You can obtain a full-size Blueprint, price 1/-, which will be of great assistance in the construction of the set

- Fig. 4 (above): The wiring diagram and layout instructions for the *Everybody's All Electric 3*. In 1930 the provision of a comprehensive point-to-point wiring diagram was essential for home constructors and sometimes, in early designs, no theoretical circuit was provided either. It was assumed all the constructor required was the practical information. An original caption for this diagram drew attention to the full size blueprint, available for one shilling (5p).

- Fig. 5 (left): The front cover of *Amateur Wireless* for 12 July 1930 promoted a very simple receiver, and it was obviously a design which had appeared sometime before - perhaps in the late 1920s? (see text).

me some time later having been posted separately! Obviously I don't mind this happening, especially when you bear in mind the magazines were gifted to me specifically to share with everyone via the talks.

I regularly lose track of one or two copies during a club visit or show. However, invariably - so far - they are returned after they've been thoroughly read by the borrower, usually within a month or so.

Sharing Note: *I would very much appreciate the three copies (from July 1935) back when the reader who was enjoying reading them at the Leicester Show. He told me that his club was mentioned in one issue, and that he even saw his late father's name in one.*

Although I don't know the reader's name, I remember that the club was in South Yorkshire and I would very much appreciate them back when he's finished with them!

Of course, I would also be very pleased to loan specific issues from the travelling archive collection to anyone who requires them for research, etc. After all, as the original owner decreed, they are for the use and enjoyment of everyone. I'm just the librarian!

Pristine Condition

The magazines bequeathed to me for the travelling archives were all in pristine condition and a number of them had the free blueprints still in place. However, by far the best was the weekly issue* from Wednesday 13 April 1935, **Fig. 1** and it was complete with an equally pristine blueprint, which will be fully featured in another article on this topic. You'll notice from the cover that by this time the magazine had absorbed *Amateur Wireless* and also incorporated the *Amateur Television* title.

So, with that quick, specific look back at *PW* to set the scene, it's time to look closely at what the magazine's forerunners did for the radio hobby. I'm doing it this way because they had been very successful providing ideas for the insatiable home constructors who were ever hungry for new ideas.

* *From its inception in 1932 Practical Wireless was weekly until the wartime paper shortage in 1940. The magazine has been produced monthly since then and*

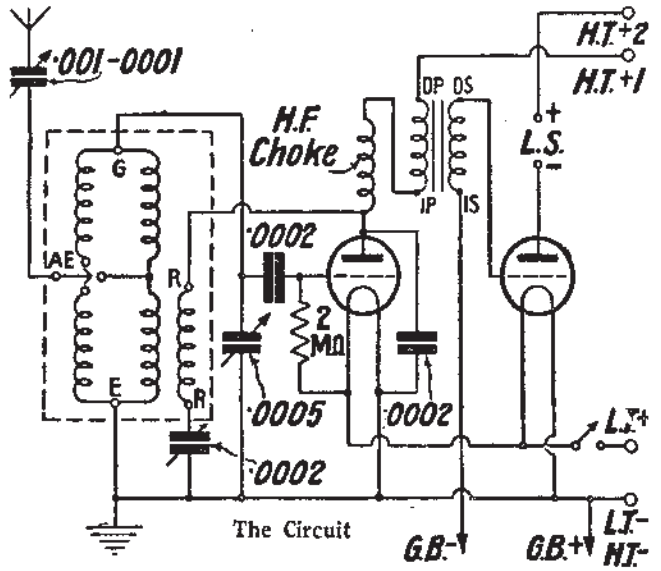


Fig. 6: Circuit and some text details of *The 1930 Talisman Two* design from *Amateur Wireless*. The design will still give good results. although Rob G3XFD suggests that if he re-created the receiver he would actually avoid the use of an interstage transformer. Literally any triode audio valve will work in this circuit (see text).

(as I say during club talks) it's with great relief we are still a monthly publication. This comment is usually accompanied by knowing, understanding grins and sympathetic comments!

Everybody's All Electric 3

In the late 1920s and on into the 1930s *Amateur Wireless* was in the forefront of producing good, easy-to-build designs for the home constructor. The front cover of the 22 February 1930 magazine, **Fig. 2**, shows a design which included mains power operation - an increasing trend as the mains electricity supply spread through towns, cities and gradually out into the countryside.

For some constructors their local supply was direct current (d.c.) and this could cause a few problems if a receiver design was aimed at those fortunate enough to have access to alternating current (a.c.) mains. Older *PW* readers have often mentioned using physically large dropper resistors connected to the d.c. mains to reduce the voltage to charge their accumulators! Very often a lightbulb was placed in series with the accumulators on charge, the theory being that when the accumulators were fully charged the bulb would become very dim or extinguish altogether. I wonder how often the bulb failed leaving one side at full mains potential?

Looking back nowadays it's easy to forget why d.c. was used so commonly and lasted for so long as a power source. However, when we see old photographs showing overhead wires for trams and the trolley bus systems then in use, it's serves as a reminder that very often the local Municipally owned power stations produced power for traction purposes from their own power stations. They then realised that there was a demand for electricity in private homes which they could cater for.

The d.c. power supplies from local authority owned power stations lingered on until well after the demise of trams. and sometimes into the trolley bus era.

As a schoolboy I used to cycle all the way from Southampton to Bournemouth to see the 'Yellow Perils' (so called because they would glide up behind a cyclist!) trolley-bus system in action in the town where I now live.

The sight of the eerie purple glow from a Hackbridge-Hewittic (later GEC) traction supply glass bulb mercury arc rectifier at work was both creepy and fascinating at the same time! Incidentally, one area of Southampton (it was close to an old tram depot) retained its d.c. power supply for street lighting into the late 1960s.

But back to *PW!* The *Amateur Wireless* design shown in **Fig. 3**, is of course a tuned radio frequency (t.r.f.) design. Although it had limitations the receiver would be easy to set-up and work. Unfortunately though, there was a drawback as the set could also transmit on the frequency it was tuned into!

Just imagine it, all those long wire antennas running down the back garden - parallel with all the neighbour's wires. It was no wonder that **Captain Eckersley** (the BBC's first Chief Engineer) is often quoted as asking listeners; "please don't do it"! The "Don't do it" referred to advancing the reaction control past the threshold of oscillation when it could then radiate an interfering signal quite effectively enough to cause interference over half a mile or so!

I've often recommended that interested readers should consult the *BBC Engineering History 1922-1972* by **Edward Pawley**. The BBC itself seems to have lost interest in their eventful engineering history (especially now that most of their engineering infrastructure has been sold off) and aren't in re-printing or up-dating this most import publication. Fortunately, although long out-of-print it's often available from libraries by special order. It comes as very highly recommended reading by G3XFD!

Looking at the design in Fig. 3 and **Fig. 4,** the use of an audio frequency (a.f.) inter-stage coupling transformer can be seen. Interestingly, the triode audio output stage uses an a.f. choke as an anode load, with the result audio output being capacitively coupled to the loudspeaker. Strangely enough, although many of the old components have disappeared, relatively large numbers of the interstage coupling transformers still survive. Up until recently you would have been able to see an old Ferranti transformer of this type doing service in the G3XFD workshop inside an audio oscillator. It was still working well for 75 years old!

Finally, on this circuit, it appears as though the designers were encouraging their readers to buy ready-made power supplies. The magazine carried several adverts from companies who could provide them for anywhere between £5 and £15, quite a lot of money in those days!

The 1930 Talisman Two

The 1930 Talisman Two design, shown featured in **Fig. 5**, on the front cover of *Amateur Wireless* for 12 July 1930, was a far simpler receiver than the mains powered design, which had been published earlier that year. In fact, and to be quite honest, the circuit, **Fig. 6**, clearly shows it's a very simple project indeed.

The reason why the *Talisman Two* is seemingly such a simple design is that it had obviously been published much earlier. Reading the text of the article it's made clear - just as *PW* has reproduced 'favourites' - they had reproduced a much earlier design. Just how old it was is not easy to discover as no reference to the original date was mentioned. However, part of the success of the design seems to be (from what's said in the article!) the efficiency of the coils used.

Basically of course the receiver is just a regenerative detector triode using an interstrage a.f. transformer to another triode which obviously had the h.t. passing through the loudspeaker windings. I'm not critical of the design, even from a 2004 viewpoint because I know that even today such a simple receiver will still provide excellent results in return for a little care in construction and skilled operation.

Nowadays, if I were to re-create the circuit I would probably avoid using a.f. interstage transformer coupling but would use a suitable a.f. output transformer for the audio output stage. It's also interesting to note that *PW* itself was still publishing very workable design of this sort (albeit using mains derived h.t. rather than a battery supply) in the 1960s. I even describe one in Radio Basics this month in an article discussing detectors (see pages 28-29).

Later Designs

Next time, in what I plan to be the start of a short series, I'll be looking at later designs from other magazines and, as mentioned already, also at the start of *PW*'s own blueprint circuits. These designs became the back bone of the magazine as we know it today and also of course provided the various *Practical Wireless Circuits* books that ran to many editions.

I'll also be looking at the - very collectable - cheaply produced *Wireless Encyclopaedias,* which although not seemingly directly connected with *PW* and Fred Camm, were actually part and parcel of the heritage of our favourite magazine. **PW**

radio basics

This month Rob Mannion G3XFD continues his chat to readers on the type of detectors we can use in simpler projects. On the menu this time are the regenerative and infinite impedance detectors.

Those radio enthusiasts who have been involved in the hobby since the days when we only had the valve, will remember the wonderfully exciting results that can be obtained from a single valve regenerative detector. Tremendous signal gain could (and still can) be achieved with extreme ease using simple circuitry. However, as I remind everyone in our scientific hobby, it's not possible to get something for free in physics. There's always a price to pay!

With the simple circuits shown, **Fig. 1**, a classic *PW* valve project (from the July 1966 issue) and the other, **Fig. 2**, is an equivalent transistorised (f.e.t.) version). The same process occurs in both circuits; the amplified incoming signal is fed back to the device input. It then re-enters the device and is again amplified and in practice very high signal gains can be achieved as the signal is amplified every time it passes through the active device (the valve or the semiconductor).

In the case of the valve detector the input is called the **grid** and is represented by the dashed line between the **anode** and the **cathode**. In the transistor (in this case a field effect transistor or f.e.t.) the input is via the **gate**, which is electrically considered to be between the **source** and the **drain**. However, in physical practice the f.e.t.'s structure will almost certainly be far more complicated than I suggest in this simplified explanation. But for the purposes of RB we'll assume life is as simple as I've described!

The positive feedback (which is what it is of course) has to be controlled and adjusted very carefully. In the past I've often mentioned the convenient analogy of the out-of-control public address amplifier before. I'm now going to do so again!

Most of us will have suffered from the effects of a howling and whistling loudspeaker system at one time or another. It's usually most unpleasant, but just before the system does start to howl (usually as the microphone is placed too close to the loudspeakers) it's possible to notice that it becomes super-sensitive. It can be possible to hear very low level speech from some distance away. The effect is momentary but nevertheless it's quite remarkably effective.

There are various ways of controlling the feedback in a regenerative radio detector circuit and its often a matter of choice for the constructor. There are disadvantages with the system whatever method you choose. Additionally, when using a simple detector such as this, you'll always have to re-adjust the controls to maintain the amount of regeneration to obtain the best results every time the frequency is changed. However, as those who have enjoyed using this type of receiver - that's part of the fun and enjoyment!

The traditional way of controlling the regeneration/feedback was normally to feed a suitable output from the detector valve and 'inject' it into the incoming signal. This was usually done by having a separate coil (inductor) winding either placed (coupled) near to the main input winding, as in Fig. 1, or, occasionally wound in-between the main winding.

Very often the regeneration would be controlled by the use of a variable capacitor of around 300pF maximum capacitor. The amount fed-back signal would then be adjusted by the operator using this control.

Sometimes however, and I've used this technique myself very successfully, the actual feedback winding is mounted on a separate mechanical coupler. This is an extremely old way of doing it but is extremely effective. All that has to be done is to gradually move the feedback (regeneration) inductor, usually on a picot, closer to the main winding. Using this method it's possible to obtain extremely fine control of the all important 'threshold' point with superb sensitivity and by just passing the threshold point, with the circuit just entering into oscillation, both c.w. (Morse) and single sideband signals can be resolved.

Another, much simpler method of controlling the level of feedback is by incorporating a fixed amount of feedback (usually by using a capacitor) and then actually carefully controlling the gain of the detector stage itself. This is usually achieved by varying the high tension supply to the 2nd grid of a pentode valve, or in the case of a semiconductor detector by also altering the stage's gain, usually by a variable resistor. (See Fig. 2). **Note:** The feedback 'loop' in the circuit featured in Fig. 2, is obtained via the source (S) and gate (G) pathways with the use of a tapping point on the oscillator's coil/inductor. This removes the need for a separate feedback winding.

In practice I've much preferred using the fixed level of feedback, with variable gain stage system. It works very well indeed, but it does require a good quality variable resistor. My advice is that you choose to use this form of regeneration control and that you try, whenever possible, to use a wirewound variable resistor. This is because it's much less likely to cause problems with a 'noisy' resistive track.

I have no doubt that you'll have come across problems before with a 'scratchy' volume/on-off control on a radio receiver. Here the resistive track at the point between where the on/off switch actually toggles on or off often becomes worn. The result is a crashing/scratching sound as the radio come to life and it can be most annoying!

However, when the same intermittent resistive effect occurs on a variable resistor being used to control regeneration it becomes much more frustrating. This is because the 'threshold' (of oscillation, where the circuit reaches the point where it 'takes off' in the same way as the errant audio amplifier 'howls') becomes far more difficult to define.

The problem often leads to annoying slight changes of frequency, either up or down. My advice is to always use the best quality variable resistor possible when using the fixed feedback, variable gain stage circuit. Keep a look out for those all-too-rare wirewound variable resistors!

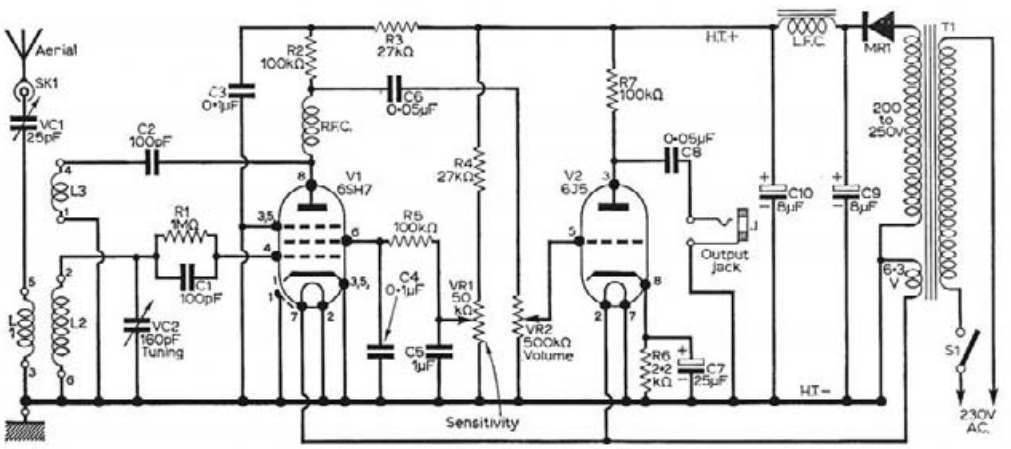


Fig. 1: A traditional one valve regenerative detector, one audio amplifier *PW* project published in July 1966. Here the r.f. feedback is fixed and is routed via C2. The gain (and regeneration) of V1 is controlled via VR1 (see text).

So, as I've mentioned just how important the threshold of oscillation point is with the regenerative type of detector - let's now take a look at the techniques involved. It will be time well spent.

Major Difficulty

Most readers will know I'm extremely approachable to discuss the radio hobby, whether it be by telephone to the office, E-mails, by letter or on the air. And from what I've heard from RB readers I know that, although many of you use this effective circuitry successfully, just as many of you have found regenerative detectors extremely difficult to use!

In essence, to use a regenerative detector successfully you need to be patient, careful and to be prepared to spend time learning just how to adjust your receiver's controls. It's as simple as that! However, when you add slow motion controls and other methods of providing careful adjustments of settings, you'll have made your job operating the equipment much easier.

Slow motion controls (fitted on the regen/gain control) can be expensive and perhaps even unobtainable for some constructors. So, why not improvise? Let's look at some ideas.

Readers will no doubt remember the long plastic cursor/pointer (made from an old audio cassette case) used on the RB Resistance/Capacitance Bridge. Here, this useful device is used to help make a larger scale for easier reading. However, remembering the effects of levers and fulcrums, why not use the principles in reverse by using a long pointer as the **control** for a variable resistor?

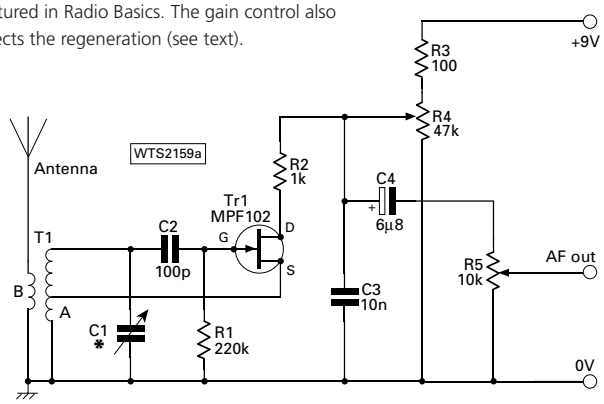
Obviously, taking as much space on a receiver's control panel for one control would normally be considered ridiculous. But in the case of a regenerative detector where the locating of, and adjustment of the 'threshold' point is so important, I think it can be justified. In the past I've made the regeneration control the centre point of a front panel, with the receiver's tuning below the 'regen' control's knob. This is quite convenient because few variable resistors ever approach more than 320° of rotation. My use of such an idea pre-dates the multi-turn variable resistor/potentiometers available today, but the idea is still work.

With the long lever approach it's possible to get extremely fine control of the threshold point. In fact, if the outer edge of the pointer corresponds to a marked scale it's possible to see just how much scale length you've provided.

All you do then is to listen for the audible 'plop' and subsequent hiss, which will be heard in the headphones or loudspeaker as you adjust the control. The skill - and fun - in operating the control is coaxing the utmost out of such a simple circuit. Don't forget, the most sensitive point for amplitude modulation (a.m.) will be just before the circuit breaks into oscillations (increased rushing/hissing noise in the) and fractionally after this for c.w. (Morse) and s.s.b. reception.

Oh! Just before I go off onto another topic, I should mention that I've also used the long lever cursor type of control for tuning varactor (Varicap) diodes. Using the system you can end up with the equivalent tuning scale length so effectively used on the famous Eddystone receivers. Try it for yourself!

● Fig. 2: A modern f.e.t. regenerative detector as featured in Radio Basics. The gain control also effects the regeneration (see text).

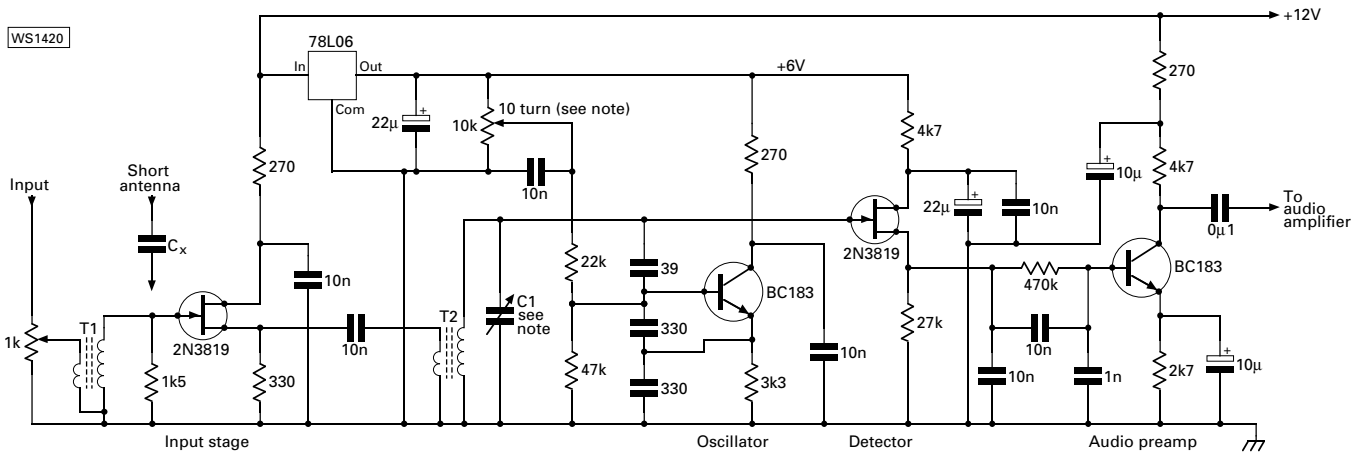


Infinite Impedance Detector

As is usual when I start writing about a particular topic, I end up discovering more information I think will be useful to readers. In this case I have to say thank you to **Tex Swann G1TEX/M3NGS** because he reminded me of a circuit, which was featured in *PW* fairly recently.

The circuit shown in **Fig. 3**, featured in the **Rev. George Dobbs G3RJV's** Carrying On The Practical Way (COTPW) in May 2000. Based on **Colin Davies G3VMU's** 'Nicky's TRF', published in the G QRP Club's journal, *Sprat*. It employs both the infinite impedance detector regeneration and it works extremely well. Readers may remember the *PW* Cadet, the basic receiver, which was designed and supplied by **Tim Walford G3PCJ** of **Walford Electronics**. Incidentally, as an a.m. detector on the h.f. broadcast bands it proved excellent and I can thoroughly recommend this approach.

However, if you want to resolve s.s.b. or c.w. something has to be added and in the circuit shown in Fig. 3, G3RJV demonstrates a very clever idea. This circuit uses the infinite impedance detector together with a separate oscillator which provides gain and also acts as a *Q* multiplier.



● Fig. 3: The infinite impedance detector project presented by G3RJV, based on 'Nicky's TRF' (see text).

The *Q* factor (think of it as the quality factor of an inductor or a circuit containing inductance) is extremely important. Basically speaking, the higher the *Q* of a circuit the more selective it is. In other words, this means a high *Q* circuit tends to respond much less to a transmission outside of its tuning range. In practice this means that if you're listening to a weak station and there's another much more powerful station operating a few kilohertz away there's less chance of the strong signals interfering with the weaker station.

In the circuit G3RJV described and published in COTPW the receiver incorporated an effective *Q*-multiplier to work with the detector. It's very effective indeed. Next time I'm planning to look more deeply into the infinite impedance detector, as it's such a reliable system which can provide the constructor with a great deal of basic radio fun.

PW

The Vectis Run Part 12

By Rupert Templeman

It's January 1939 and Travelling Wireless Technician-Salesman Alan Edward's monthly visit to the Isle of Wight, 'The Vectis Run', has turned into a nightmarish adventure. He's been rescued…but it appears the foreign agents have escaped!

It didn't take long for Mike Coley to clamber up and over the large furniture lorry - he'd realised what it was as he started his climb. From the vehicle's roof he was able to enter the building by prising a roof skylight open and squeezing through the small opening. Within a few moments Mike had been led by her shouts to where Marjit was waiting for him, with a drawn looking Alan peering up from his temporary prison.

Alan spoke first "Took your time Coley didn't you"? This was said with a barely discernible grin under the grime coating his face.

"No problem Alan" replied Mike, grinning down in reply to his dishevelled friend. "You could have at least washed your face before your visitors arrived though"!

However, their good-natured banter was interrupted by the sound of voices outside. A large vehicle was revving its engine up obviously under load, as it was accompanied by the screeching sounds of metal-on-metal.

Mike, quickly realising what was happening, spoke first. "Mr Jones and his men must have arrived, they're obviously pushing the furniture lorry away from the doors so they can get in".

"So that's why Marjit found it so dark", Alan replied. "That was the lorry, which took my van. I hope it's still inside, otherwise my boss will want to know"!

After Mike had pulled his friend out of the cellar, their conversation continued, as Alan explained how he'd been captured. He was then rudely interrupted as Jones strode in – literally pushing Mike aside - and he immediately addressed Alan.

"Your van is the least of our worries Alan", Jones said. "We've lost the foreign agents, we've got to move quickly before they escape – possibly taking a secret of national importance with them". Then, just as abruptly, Jones turned and left the room.

Marjit watched over Alan protectively as two men, both armed with hacksaws, cut the chains and the shackles from his ankles. Mike was also looking, closely watching the most beautiful girl he'd ever seen, recognising that Alan had made a conquest without seemingly even knowing it!

Gathering The Troops

Very soon there was a real gathering of the troops as Jones provided an update to the new arrivals. Meanwhile Alan and Marjit were receiving medical attention - she for shock and he for the effects of cold and cramp. Mysteriously, Army rum had appeared and even though neither had ever tasted the heavy brew - it was quickly consumed and Mike could see they both noticeably glowed with the after-effects.

Jones came to the point and grimly announced; "We appear to have lost the agents. They've gone to ground, almost certainly at the Solent end of the estuary. Obviously, they have a pick-up arranged either from a ship, such as a small coaster or as in the best espionage films we see in the cinema, a submarine. But as it's now very dark and the moon has now set we'll have to move very quickly. They must not escape.

Another Secret Service type appeared alongside Jones and whispered something. Excusing himself, Jones moved outside, leaving Alan, Fred Cotton and Ivor Richards – who'd also arrived - discussing what they could do to help further. Fred however, left the room to telephone Karl Rheibach in Ventnor from the local public telephone box to bring him up-to-date.

Reinforcements Arrive

Before Fred left, he'd explained that very few people lived in the area. But it was teeming with life now...the group could see the shadowy shapes of large Army lorries, together with Police vehicles arriving at the old Customs House.

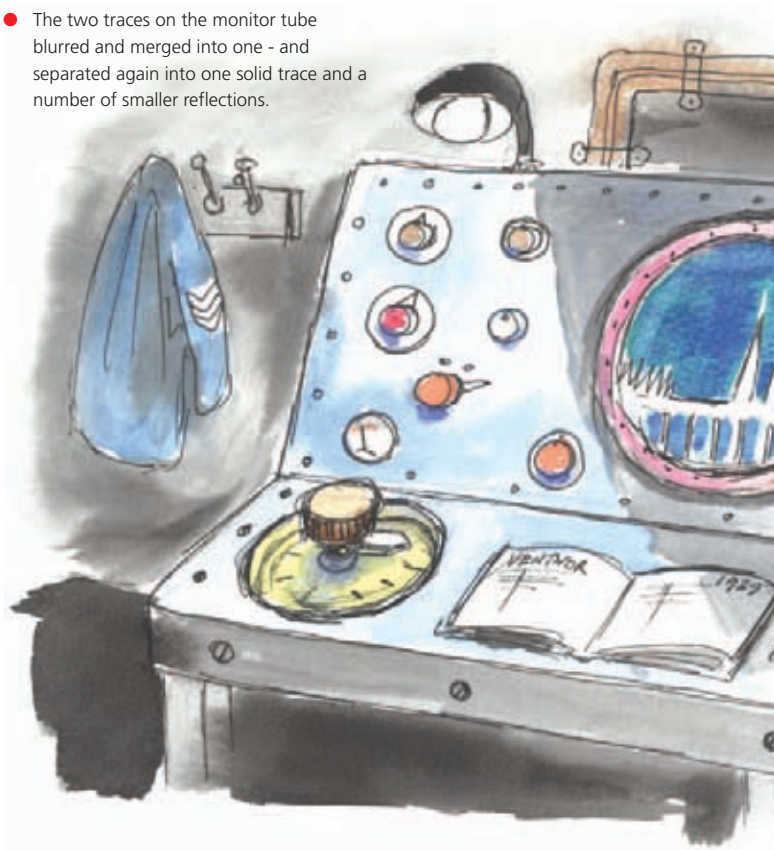
As the new arrivals dispersed to search the countryside Fred Cotton, after telephoning Karl Rhiebach, led his friends outside to watch what was going on. The scene was remarkable because of what appeared to be hundreds of torches dancing in the darkness as the person holding the torch walked through the undergrowth and reeds surrounding the estuary. Voices calling to each other could be heard and a number of bobbing lights in small boats added to the effect as the torch light and powerful spotlights from a motorboat reflected off the water.

Mike Coley summed the scene up for the group. "I'd be scared stiff if I was out there hiding" he said.

Fred replied "I think they've already prepared a pick-up point where the submarine – it's got to be a submarine – can surface and rescue them. It can be done so quickly and quietly, and unless there's a Royal Navy ship in the area now, they'll surely escape"!

Suddenly, Marjit, whose hearing was acute, grabbed Alan's arm "I can hear an aeroplane - it's coming this way"!

The group strained to hear the distant aero engine. As it grew louder Alan wondered if it was the Cierva autogyro again, perhaps Jones had managed to persuade the aircraft's pilot to join in the search? In the distance above the seaward end of the estuary they



The two traces on the monitor tube blurred and merged into one - and separated again into one solid trace and a number of smaller reflections.

could all just make out the shadow shape of an aircraft and it had no navigation lights!

From the shingle beach overlooking the Solent Jones and his men were also following the dim shape of the aircraft, which was only visible because of the faint blue flames from the shielded engine exhausts. Jones was intrigued – even in the dark he could make out it had an unusual shape - more of a rectangular blob than the sleek shape he was used to.

But it was now all too obvious that the machine was circling, looking for something. Then, both he and his men saw pinpricks of moving lights - obviously on the surface of the sea. The aircraft then began losing height, as the pilot also spotted the lights.

"Its going to crash Sir", one of the Secret Service men called out to Jones; "look – it's almost in the water"!

"No, it's not crashing" Jones shouted as he recognised what the lumpy shape was. "It's a sea-plane landing. They're being picked up by aircraft, not a submarine". The fury in his voice was almost tangible.

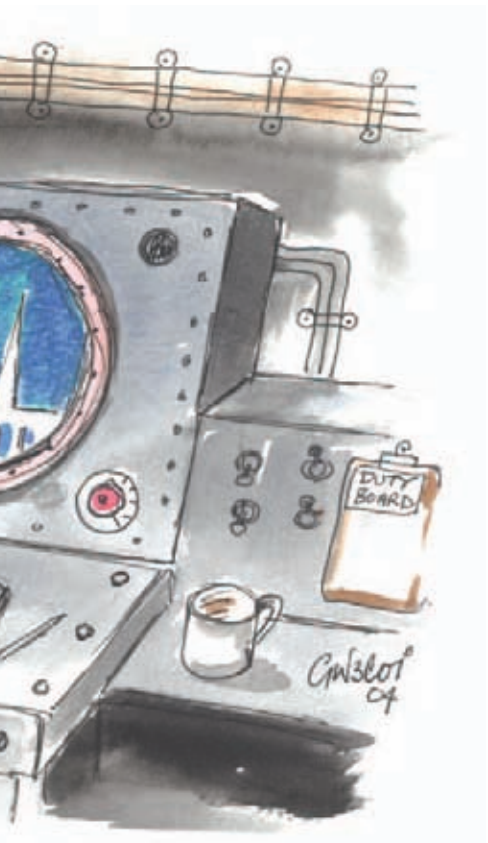
Within moments the aircraft had obviously landed and was forging across the water to the bobbing pin-point of light. In sheer frustration Jones ordered his men to fire at the aircraft although it was over four hundred yards away. "Aim at the light - that's their boat" he said. He aimed his own gun at the luminous bow wave produced by the aircraft's bulky floats.

Shooting was futile - the aircraft was already speeding up on its take-off run. The Royal Navy ships on their way to intercept the expected submarine were only at the moment passing Cowes, even their 34-knot top speed wasn't fast enough.

Gesturing to a nearby colleague Jones was soon talking into a wireless telephone. The orders came thick and fast – they had to stop the aircraft! However, it was too late, it rose from the sea and headed towards the English Channel.

Double Trace

The late watch on the newly-commissioned Ventnor Chain Home Radio Direction Finding station were settling in for a peaceful shift. The RAF operators had been fascinated to see the Cierva Autogyro arrive to become an almost stationary target for calibration purposes. This enabled the technicians to calibrate out the ground reflections on the cathode ray screens and to provide accurate distance ranging markings.



Although the operators could not yet evaluate height with the new system, calculating distance and direction was no problem. The invaluable help of the autogyro had made a difficult job much easier. The unusual aircraft with its windmilling rotor blades had attracted much attention from the townspeople below. If only the RAF men could share the pride in their station - but as it was top secret installation - there could be no risk of any 'careless talk'.

Then, much to the duty staff's surprise their Commanding Officer arrived in the operations room, looking flustered and extremely concerned. Although very new to the job, the duty crew followed his instructions and watched their cathode ray tube screens. Meanwhile, their CO was speaking into the telephone – the one labelled Fighter Command.

Very soon the operators were reporting a single trace, growing fainter as it flew out over the English Channel. Following instructions from their CO the men watched very closely, while he provided a running commentary on the telephone. Then a second trace appeared, the rapidly changing range indicated it was moving much faster. From what the operators overheard, their CO was obviously passing instructions on to the telephone, directing the second aircraft now visible as a pulse on their screen.

The two traces blurred and merged briefly, then one - much smaller trace - became several smaller traces before the screen only showed one. That trace came closer until it was lost in the Ventnor CH's ground reflections. The operators heard the aircraft roar overhead on its way back to its mainland base. The job, whatever it was, had been achieved and the watch continued into the night but the event had been overhead in the town far below.

Karl Rheibach had been walking towards the Ventnor Winter Gardens when he heard the faint sound of machine gun fire out to sea and a fireball falling from the sky. Then, growing ever closer, he heard the unmistakable sound of a high performance aero engine and saw the shadowy – unlit – shape of an aircraft fly right over the St. Boniface Down installation. Having been alerted by Fred Cotton he knew, even though he hadn't been given any details, that the Foreign Agents would never reach home. The secret was safe.

No Return

Turning away from the Wireless-Telephone, Jones handed the microphone back to the operator. With a triumphant look on his face he announced to Alan and his friends that with the help of the RAF the secret installation at Ventnor was safe. He could say no more but they'd all played a very important part in 'Safeguarding the Realm' as he rather quaintly put it.

The next announcement came as a shock for everyone. "Of course" said Jones "none of you can return to your previous work for security reasons. We'll have special security protected jobs for everyone, except you Alan"!

Alan went paler than usual. What had he done wrong he wondered?

"No, instead", said Jones "there's a special place for you my Lad - I know you wanted to join the Royal Air Force - and it's been decided your eyesight problem won't be a disadvantage in the special wireless work in mind. Would you like to accept the offer?

"Yes Sir" said Alan with obvious relief, squeezing Marjit's hand and grinning from ear to ear. "I would very much indeed"! **PW**

Postscript

Following his wartime service in the RAF, where he rose to the rank of Flight Lieutenant on what we now know as Radar, Alan Edwards finally returned to 'civvy street' in 1949. Alan never returned to his old job, instead he and his Dutch wife Marjit settled in Lymington in the New Forest. From his Television and Radio shop he had an excellent location for using the new 144Mc/s Amateur Radio band - to work Fred Cotton in Freshwater on the Island. Mike Coley, still working for the RAF as a civilian, often joined in from his home in Newport. The Chain Home station above Ventnor had an eventful part to play during the War and was eventually replaced by a modern radar system controlled from London. It's still operational, a peaceful use for a system developed originally for defence.

I still keep in contact with Alan and he has many stories to share with us.

Rupert Templeman.

A Simple Computer Radio Interface

Glen Collie MM5TUW found that operating with some of the digital modes is easier than you might think. Here's his simple interface to prove it!

I enjoy QRP operating and now that the sunspot cycle has passed its peak so that voice and Morse DX are beginning to drop, I've started to look at the new digital modes. On the Databurst pages of *PW* and elsewhere, I have read that these modes are particularly effective at low signal levels. I've also found a great deal of good software available on the Internet.

The one common factor found in most of the software, is the use of the computer's soundcard as the digital interface. This requires two audio connections, with one between the soundcard's output and the audio input on the radio. The second connection is from the audio output on the radio to the card's 'line-in'.

All that's needed now is a connection between the computer and the radio, to switch between transmit and receive as needed. So, I built the little circuit shown in **Fig. 1** as an interface.

Transmit Control

As an alternative to circuit building, I had considered using the transceiver's voice activated transmit or VOX, as that would have got me on-air with a couple of patch leads. But VOX as a substitute for 'firm computer control' did not fill me with confidence especially as the software has built-in provision to trigger the 'push to talk' (p.t.t.), via the computer's RS-232 serial port.

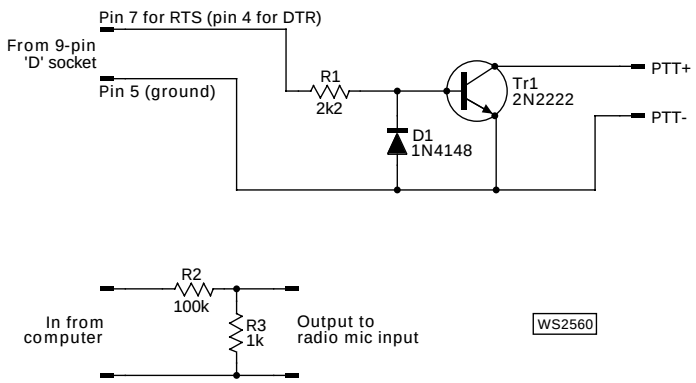


Fig. 1: Circuit diagram of the very simple data interface.

My PC's serial port has two available outputs that can be used as a T/R control: the Data Terminal Ready (DTR) line and the Ready to Send (RTS) line. On a 9-pin serial port, shown in **Fig. 2**, DTR is to be found on pin 4 and RTS is on pin 7. The necessary 0V return or 'ground' is pin 5. Some older computers may use a 25-pin serial connector, shown in **Fig. 3**, on which pin 20 is the DTR, pin 4 is the RTS and pin 7 is ground connection. Either the DTR or the RTS line can be used (but not both). I decided to use the RTS line for my interface.

When I select transmit on the computer, the software sends the RTS (or DTR) line high (a positive voltage), while in receive, the RTS (or DTR) goes low (a negative voltage). These voltages can range between four to 20V according to the standard used. On my computer, I found a voltage of +9V in transmit and -9V in receive. However, my transceiver, a Yaesu FT-817, uses the 'pull a positive line to ground' to control the p.t.t.

The Interface

In the simple interface, the switching transistor Tr1 is a 2N2222 *npn* switching type. When the software switches to transmit,

the positive going RTS is applied to the transistor's base through limiting resistor R1. This causes the emitter/collector junction to conduct and pulls the p.t.t. line to ground, switching the radio into transmit. The diode, D1 protects the base junction of the transistor, keeps the -9V away from it. The interface will then be as good as finished.

Well, not quite finished! As the second part of my interface needed, is a simple attenuator. This circuit reduces the one volt output from the line output of the soundcard to a 'safer' 10mV for the microphone input of the transceiver. This latter circuit is really an optional parts of the interface, depending on what sort of inputs are available on your radio. The FT-817 has a data input, which will accept 1V peak-to-peak so, I could have used a straight through connection.

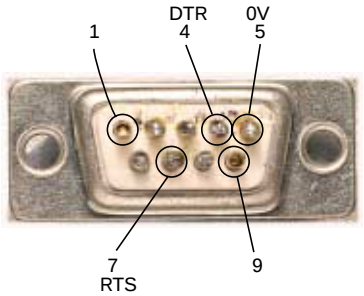
I've found that this simple circuit, shown in the pictures **Fig. 4** and **Fig. 5**, works in almost all cases, providing there are no ground loop problems in the shack (and in mine there aren't). Some authors suggest that isolation between the computer and the transceiver is required, advising the use of telephone transformers in the audio lines and even opto-isolators for the p.t.t. controller. I've not suffered any problems so, I suggest you try this cheap option first and add the expensive complications afterwards if needed.

If you'd like to find out more about your rig first, then a great source for information on individual rigs is at **www.qsl.net/wm2u/interface.html** On these pages, there are listings for just about every type and model of radio imaginable. Plus there are numerous variations on this simple interface.

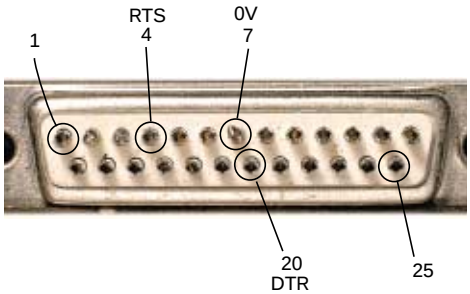
The PSK Digital Mode

Now that the simple interface has been described, let's look at the PSK digital modes and I'll gloss over the variations of PSK, just calling them PSK. The Phase Shift Keying (PSK) modes were developed by **Peter Martinez G3PLX** and he has a full explanation at **www.psk31.com** The numbers 31 and 63 refer to the mode's baud rate or data transmission speed. The main area of activity for PSK centres on 14.070MHz on the 20m band and 21.070MHz on the 15m band.

My first experience of a 'keyboard-to-keyboard' QSO was using BPSK and because it is currently the most popular, I will describe what happens in depth. The other modes available are similar in use, if somewhat different in technical aspects.



● Fig. 2: A 9-way serial free socket see from behind.



● Fig. 3: The rear of a 25-way free socket looks like this.

The original code for PSK was written by **Pawel Jalocha SP9VRC**, then developed by Peter Martinez and others. In describing what it actually does Peter says: "Instead of the traditional frequency-shift keying, the information is transmitted by patterns of polarity-reversals (sometimes called 180° phase shifts). This process can be thought of as equivalent to sending information by swapping-over the two wires to the antenna, although, of course, the keying is more usually done back in the audio input into the transceiver".

And the method works beautifully. It's fast enough for typed information, takes up very little bandwidth and can be used to communicate when the signal strength is so weak it cannot be detected by ear!

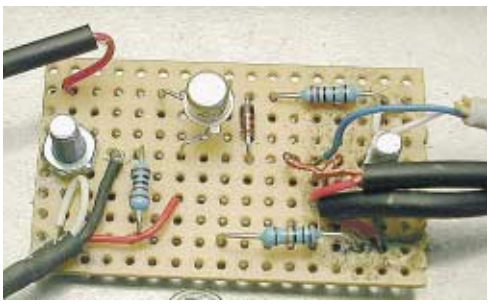
DigiPan Software

Now let's quickly look at the *Digipan* software, a piece of software that I first tried with my new interface. The *DigiPan* software program was written by the joint efforts of **Howard Teller KH6TY**, **Nick Fedoseev UT2UZ** and **Denis Nechitailov UU9JDR**. It's freeware, which means you can download it from **www.digipan.net** and use it completely free of charge. It supports BPSK31, QPSK31, BPSK63, FSK31 (and PACTOR in receive mode only).

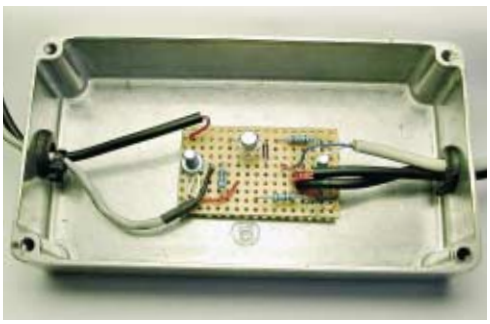
The installation file for *Digipan* comes as a self-extracting archive (.exe) file and is about 700kB in size. To install *DigiPan* merely double click on the archive file and follow the on-screen instructions. The first time you run the software you will need to do some basic configuration.

You need to tell *DigiPan* the serial port that the transmit control interface is connected to. From the configure menu choose the 'serial port' item, then select your com port from the list. Tick the box for either RTS or DTR line as shown in **Fig. 6**.

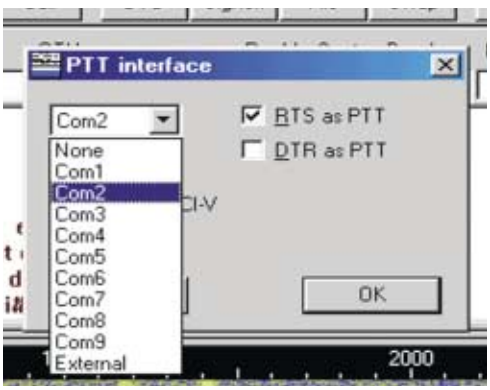
The second step when setting up *Digipan*, is to select a soundcard and then choose a sample rate. If you have only one soundcard the software will probably find it automatically, although it's a good idea to check. You can use the same soundcard for both, but if you have more than one card, you will need to select which to use as the input and the output (**Fig. 7**).



● Fig. 4: It could hardly be simpler than this!

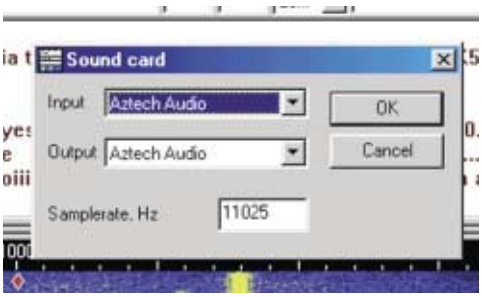


● Fig. 5: The interface mounted in a die-cast metal box to reduce r.f. interference.

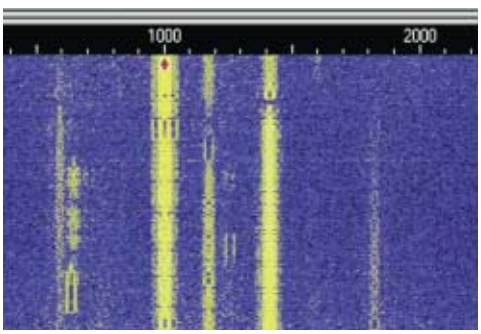


● Fig. 6: The transmit line interface selection menu.

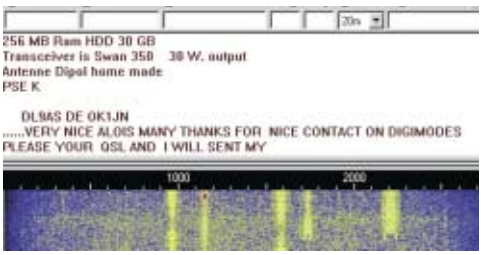
As soon as you've made the connections between the computer, interface and your radio, you are now ready to try it out. The 14MHz band, on 14.070MHz, is a good place to start, because there's almost invariably some activity. Tune to exactly 14.070 MHz. You will see a blue-black display in the lower half of the screen which appears to be flowing slowly downward. This is the 'Waterfall' and is a visual representation of the audio spectrum, from 0-4kHz of your receiver frequency (**Fig. 8)**.



● Fig. 7: You may need to set the soundcard for input and output to.



● Fig. 8: A correct audio level into the soundcard gives a waterfall display that shows activity on the band.



● Fig. 9: In the upper window you can read a fragment of the signal that's seen at 1150Hz

You should adjust the receiver audio level to give a display of similar colours to those of Fig. 8. The useable bandwidth of the waterfall display depends on the i.f. bandwidth of your radio and which filters you have installed. Obviously if you are using a narrow filter, the display will show less information, because the software cannot 'hear' anything which is being filtered out.

If there are any stations present, you will see a yellow stripe moving down the waterfall. When a station stops transmitting a gap appears in the stripe. The width of the stripe indicates the signal bandwidth and its intensity represents the signal strength. As you become more familiar with the software you will be able to tell the different modes by the appearance of the stripe. If you see a yellow haze to the blue background and a red stripe up the centre of the yellow, then you need to reduce the audio level from your receiver or 'waterfall drive' using the configuration menu.

To 'listen' to a station, click in the waterfall, anywhere within the station's yellow stripe. A small red diamond will show you where you are listening. After a few seconds, (assuming the station is transmitting using the same mode as you are listening on) the text will start to appear in the white window above the waterfall (**Fig. 9)**.

The width of the yellow stripe gives you some idea of the bandwidth taken up by BPSK31. If the band is busy and open for DX, you will see a lot of stripes. The faint ones, as you would guess, are the weaker stations. I am constantly amazed at how close together stations can operate and we can still pull out a useful signal. I have also had a successful QSO with stations which I cannot hear on the audio output, but can just see a faint yellow trace. These are stations that I know I could not work even on c.w. let alone on s.s.b.

Keyboard Etiquette

Just a quick word about the etiquette for using these keyboard modes, which tends to be much like operating Morse, with the use of K and KN to end transmissions. A station's location is quoted using the Maidenhead Locator and the town. To reply to a station sending a CQ hit the F9 key, click on the T/R macro button, or use the menu options to transmit. Then type or use one of the macros. Everything you type will appear in the message area on the other station's screen (assuming you can be heard).

One thing to remember is, because of the way PSK31 works, lower case letters are 'digitally' smaller than upper case letters and therefore take up less bandwidth and so are sent faster. Also, like c.w., the most common letters are smaller and quicker to send than the less common ones.

Digipan Macros

Because a lot of what you send tends to be repetitive, *DigiPan* includes the ability to create macros containing common phrases. These can be assigned to the soft keys (F1 - F12), which are mirrored on the toolbar should you be a 'mouse person'.

For example, the **F2** key contains the CQ macro which sends 'CQ CQ CQ de <Your callsign> <Your callsign> <Your callsign> pse K'. Where '<Your callsign>' is your own callsign, one of the settings you must add in before beginning to use the software.

There are six text boxes on the screen: Call, Name, QTH, Received (RST), Sent (RST) and Notes. You can type the appropriate information in these boxes, or highlight text in the receive window and drag it with the mouse. The content can be used for logging, but more importantly it can be inserted into the macros.

The content of the **F3** key Macro, called 'Reply 1st' contains the following text:

<CALL> DE <MYCALL> My name is <MYNAME> <MYNAME> <MYNAME> and my QTH is <MYQTH>. Your PSK is <RST> HW copy?<CALL>de<MYCALL> pse KN

The text <CALL> is replaced by the content of the 'call' textbox, the <RST> by the content of the sent box and <MYNAME><MYCALL> and <MYQTH> are configured using the 'Personal Data' menu item. When you install *DigiPan*, these macros are pre-defined, however you can edit them to include additional information or even completely change their use.

There are many other functions available, such as a tune menu that allows you to set up your transmitter tuning, logging, automatic frequency control, snap to signal, scan for signal, even dual channel receive. My best advice is to download the software and have a look.

Other Possibilities

When I built my first interface, I did so because I wanted to have a look at PSK31. Once I had this much up and running, a little time spent looking on the web opened up many other possibilities. I found software for Slow Scan Television: *MSCAN* and *JV-Com*; software for RTTY: *MMTTY, Hellschreiber* and software for emulating a packet radio modem (TNC). The one thing all of this software has in common, is that it uses the little interface and the computer soundcard.

So, if you're a newly qualified M3 and want to extend your QRP possibilities or even a venerable older hand with a desire to use your computer for something other than keeping your contest log, then this is the project for you. Spend an hour with the soldering iron and a few minutes downloading and installing *DigiPan* to start with. Then branch out and look out for the other software. **PW**

Web sites to look at:
www.psk31.com/
www.qsl.net/wm2u/interface.html
www.digipan.net

Working the DX

Keen DXer Patrick Allely GW3KJW passes on some advice for anyone aiming to work the longer distance contacts. Pat also passes on tips regarding the best times and the band you should choose.

One evening I was chatting to a Foundation Licence holder about this and that, when he asked; "How is it that I can hear New Zealand and Australian stations but not Americans"? It was a reasonable question and one that started me asking questions.

I asked; "What band are we talking about and what time of day"?

It turned out that my friend was talking about 18MHz (17 metres) and was listening around about 0730hours local time in May. He added that he left for work around 0800 and was not obviously listening later on in the day.

The answer to his question is not straightforward and can be a source of confusion to many Radio Amateurs no matter how long they have been licensed. There are so many variables to be taken into consideration. So, let's take a look at some of the background.

Sun Main Culprit!

Generally speaking the sun is the main culprit. Additionally, the spinning of the earth itself and its wobble doesn't help matters much. Also, the time of day at both ends of a proposed contact is a very important factor. Let's be honest, it's not much help if you're trying to work a particular country in the middle of their night as most of them will be fast asleep!

To return to the particular situation, at 0730hours (0630UTC) in the UK it's daylight in May. In New Zealand however, it's 1930hours and dark, remember it's their winter!

In Australia the local time varies between 1530 to 1930hours dependent on their time zone and if it's dark or getting dark.

Incidentally, the transition between light and darkness is known as the grey line and this is a great time to make contact by radio. If you are in the grey line, or the contact at the other end is, signals are enhanced for a period of time.

In this particular scenario the signals are not travelling the shortest way but over what is known as the **long path**, i.e., from the UK south-west over the Atlantic, South America and into the Pacific, the path being mainly in the dark.

In the USA, the local time is, dependent on their time zone, anything from 0330 back to 2330hours (yesterday) and the grey line is some way off for them. **Note:** I know that US stations can and are worked at these times, some by their **long path** and some by pure high power. Generally, these signals are very low compared to the Oceanic stations and of course, the majority of the US citizens are in bed! But later on that morning if my friend had been at home, he would have heard the US stations coming in as the day progressed.

Band Characteristics

Every one of the Amateur bands has its own characteristics and to work long distance contacts (DX) takes some worthwhile study. And very often a lot of luck!

For instance, let's look at working Australia on 14MHz (20 metres) in the month of March. I picked March because the days and nights are roughly equal and conditions on both ends are similar.

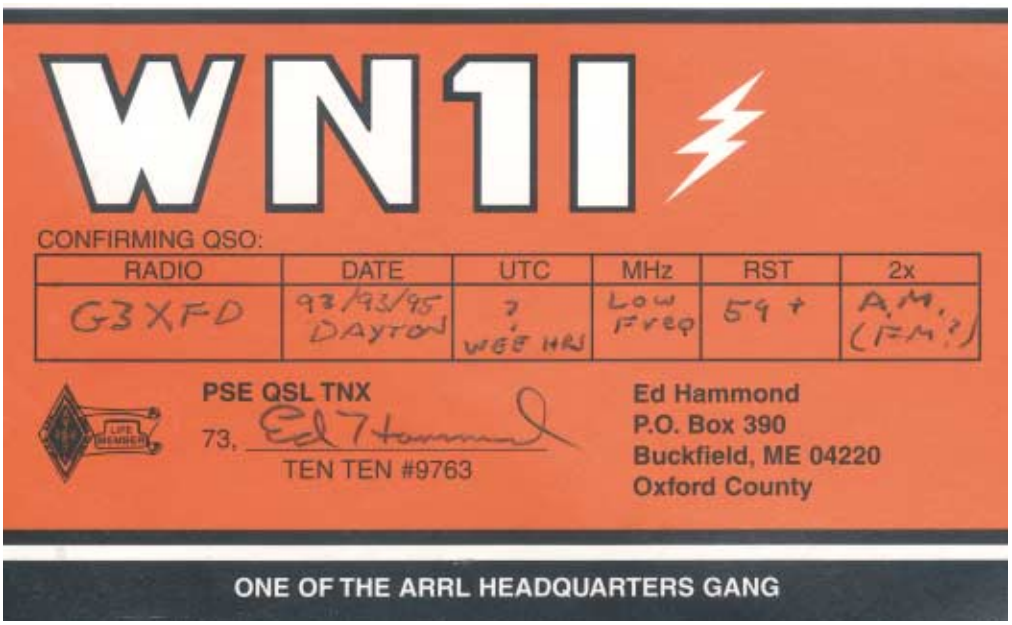


Fig. 1: It's not difficult working across the Atlantic if you follow Pat GW3KJW's advice. Band conditions can often be evaluated on the International Beacon Project frequencies. The 14.1MHz IBP frequency is well worth checking even if you cannot read Morse (c.w.) at speed. The 4U1UN beacon in New York conveniently starts the cycle on the hour and every three minutes until the next hour. If you can hear all its ten second transmission - you stand a good chance of working to the USA (see *PW* January 1999, further reading: The International Beacon Project by G3USF, Radio Basics August and September 2001 and the IBP Electronic Timer by G4JCP in Dec 2001/Jan 2002. The American based MFJ company also make an electronic IBP timer (see Waters & Stanton catalogue and adverts). Editor.

Again the grey line factor is important and at about 0600 in the UK it's just about daylight and getting towards dusk in Australia. This means that for approximately two hours conditions should be at their optimum. If you fail to make your contact, try again some 12 hours later, at 1800hours, which corresponds to 0600hours (tomorrow) in Australia. Again with the transition between sunlight and darkness, conditions should be favourable.

Listening On The Band

There are long distance stations on one or other of the amateur bands at various times of the day, and the only way to find out is to listen and see what is happening. You might come across some rare DX station calling CQ. If you do and it occasionally happens that you are the first to do so, the chances are that you'll make the contact.

However, if it's become generally known that such a rare station is active you'll find a pile-up of excitable people all trying to attract the operator's attention. My advice is don't, at first, join in. Instead, try to find out who the station is trying to work.

The DX station might be calling for a particular continent, or working the stations by numbers, i.e. calling for stations with say 3 in their callsign, then after a while working the 4s and so on. Wait your turn and try.

Again the DX station might announce that they are listening "5 to 10 up", which means that although they are transmitting on (let's say 21.245MHz) they're actually tuning the receiver between 21.250 and 21.255MHz. You will not become popular by calling on their transmitting frequency and will quickly be informed of your transgressions.

Band Dead?

Don't assume that a band is dead simply because you can't hear any stations, especially on the v.h.f. bands. Try listening for the beacons* and judge their relative strength.

The chances are that somewhere else there's someone doing the same as you. So, if you call CQ you'll often find that a supposedly dead band is actually very much alive. You only have to listen when a contest is running to realise that there's no such thing as a dead band!

** See references to the h.f. International Beacon Project (IBP) in the extended caption provided with illustration,* ***Fig. 1****.* ***Editor****.*

A Challenge!

Now working DX on the higher h.f. frequencies is relatively easy, although low power and low or no gain antenna systems make it a bit more of a challenge. However, working other continents on, let's say, 3.5 or 7MHz, is a bit more demanding and takes a little more cunning to achieve results.

Looking at 3.5MHz (80 metres): This is a local chat band in the mornings, a bit dead in the afternoons especially between March and September, but in mid-winter it comes into its own.

Unfortunately, convention has decreed that the DX portion of 80 metres in Europe is between 3.790 and 3.8MHz. This results in a small number of high powered stations with good gain antennas tending to 'sit' on the top end of the band working the same DX every day. They can get upset if you go on **their** frequency when they are just listening.

My advice is don't be shy! We all have a right to use the frequencies, so call for DX and see what happens.

In the early winter evenings you'll hear Oceanic stations, and if you get up early the following morning, before the sun rises you will be able to work stations in the United States. As the US frequency allocation is up to 4MHz, try listening (but not transmitting) above 3.8MHz. I think you'll be surprised how often the US stations are audible, thereby giving you an indication of the band conditions.

Incidentally, if you're competent with c.w., try calling between 3.5 and 3.520MHz. Again the DX may be there and listening, and very often will be using low power.

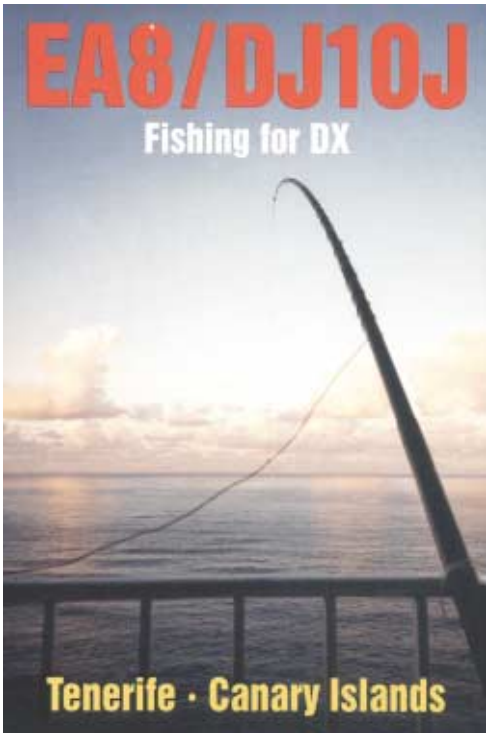


Fig. 2: Working down to the Canary Islands, located off the west coast of Africa, is achievable with extremely low power at the right time of the day. (QSL card courtesy of G4AKR).

Best DX Bands?

If you come across any pre-Second World War or immediate post-war Amateur Radio publications you will see that the best DX bands were always considered to be 7 and 14MHz, with 7MHz being the better bands. This seems a strange concept now, but remember that UK Amateurs then had a frequency allocation of 7 to 7.3MHz. This was before European broadcast stations firstly pirated, and were then granted the spectrum allocation of 7.1 to 7.3MHz.

The US Amateur allocation of 7 to 7.3MHz was retained, and again listening in between the broadcast stations you should be able to hear Amateurs in other continents. Remember, they'll be using lower side band (l.s.b.) signals in amongst the amplitude modulated (a.m.) broadcast stations.

In the summer months, DX stations can be worked during the hours of darkness. But in the winter months, strange and wonderful happenings occur on the 7MHz band.

The DX is actually there during the day and not many Amateurs seem to realise this! This is because we're getting back to the grey line situation.

For example, at 1100hours in the UK I've worked many a US station from the East Coast and right across to California. Japan and the Far East are also workable in the afternoons and Africa is workable around mid-day.

I well remember listening on 7MHz one morning around 1100hours and hearing a ZL7 station from Chatham Island (South Pacific, nearest mainland is New Zealand) calling CQ. I called and worked the station and it made my day! And when the QSL card arrived some months later I was doubly delighted.

What Is DX?

Finally, you might ask the question - what is DX? The answer is not what you might at first expect to be simply a long distance contact! We Amateurs are a funny lot and the term DX has become more intricate.

For example, I don't consider Germany to be DX on 7MHz, but I do on 144MHz. Similarly, the US East Coast is not DX on 14MHz but is on 3.5MHz. So DX can be construed as a rarity factor, i.e. the number of Amateur stations in any particular DXCC entity (country).

Monaco is DX, southern France is not (but is on v.h.f.!), and the rarity factor causes the pile-ups. There are thousands of Amateurs in California but very few in North Dakota so the distance factor is secondary to rarity.

Keep interested, listen around the bands and see what is happening and call CQ. You never know who might respond.

PW

Antenna Workshop

Peter Dodd G3LDO dips into his store of knowledge to show you how to get the best use of your dip oscillator during antenna related tests.

One item of test equipment that used to be very popular in the past was the Dip Oscillator. Often known by the abbreviation g.d.o. (grid dip oscillator), it's used to measure the resonant frequency of a tuned circuit or antenna element and it has the advantage that a direct connection with the tuned circuit or antenna element being measured is unnecessary.

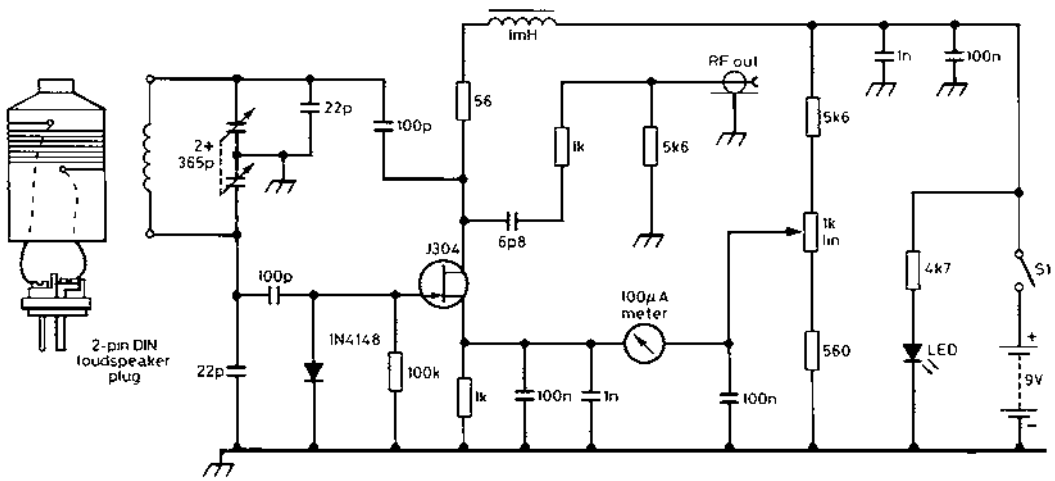
The instrument became commonly known as the g.d.o. in the time when a valve was the active element used for the oscillator. A meter indicates the oscillation activity by monitoring the grid current level at the valve and for this reason the instrument was called a grid dip oscillator. Although these days they almost invariably use a bipolar or an f.e.t. device as the active element of the oscillator.

In practice, the dip oscillator instrument is essentially a calibrated tuneable oscillator with an oscillation level meter. In use, the meter that indicates the level of absorption of r.f. energy by any resonant circuit that's placed near to the oscillator coil. This article isn't a complete description of how to make the instrument, but rather a few notes to emphasise the important aspects of their construction and practical application.

● Two f.e.t. g.d.o.s with coils. On the left is a comprehensive instrument for 1.6-215MHz designed by G3WPO. Right; home-made f.e.t. dip oscillator built in the case of a Japanese LDM-810 Nuvistor triode g.d.o.

Solid State

Some of the most effective and simple solid state g.d.o.s discovered so far, were derived from two very similar designs published in *QST* in the Technical Correspondence column‡. The circuit of my variation of these two designs, plus improvements incorporated by **G3ZOM**, is shown in **Fig. 1**.



● Fig 1. Circuit of a f.e.t. g.d.o. It measures source current, which in turn is controlled by the gate bias whose level is determined by the r.f. oscillation amplitude. The 1kΩ potentiometer adjusts the offset voltage so that the meter reads approximately 75% of full-scale when the oscillator is on.

The circuit of Fig. 1 shows that the current through the f.e.t. that in turn is controlled by the gate bias, is monitored. The meter reading shows a reading that's determined by a variable resistor and the r.f. oscillation amplitude. The variation of current through resonance is only a small part of the total current through the f.e.t. The reading dip is enhanced by offsetting the meter reading using a potentiometer in a bridging network. It's best when the meter reads about 75% full-scale without the instrument coupled to a loading tuned circuit.

This design performs very well on the h.f. bands with the circuit values shown, although the dip tends to reverse if the coupling is too tight. The performance falls off at v.h.f. frequencies, though this could probably be improved by reducing the 100pF capacitors in the tuned circuit to a smaller value. As a design piece the simple g.d.o. shown in Fig. 1 is easy to construct and provided you have the necessary components, is a project that can be completed in an evening.

The most important part of a dip oscillator is the tuning capacitor and frequency read-out dial. Sometimes a whole assembly can be obtained from an old transistor radio. The coil socket should be located as close to the tuning capacitor as possible so that the coil leads can be kept short. The rest of the circuit can be wired around

these main components. Choose a coil plug and socket arrangement that is practical.

No Centre-Taps

The circuit in Fig. 1 uses a simple coil with no centre-taps, which means that simple arrangements using crystal holders or 'phono' plugs and sockets can be used for plug-in coil formers for the various frequency ranges. The G3ZOM design uses a speaker DIN socket as a plug-in coil with the coil actually wound on the plug plastic cover. With a two-gang 365pF variable capacitor the windings and approximate ranges are as follows:

Range 1 1.6 to 4MHz
55 turns of 30s.w.g. wire, pile-wound.

Range 2 3.3 to 7.9MHz
27 turns of 30s.w.g. wire, pile-wound.

Range 3 6.3 to 15.7MHz
14 turns of 26s.w.g. wire, pile-wound.

Range 4 11.9 to 35.2MHz
7 turns of 24s.w.g. wire, close-wound.

A frequency counter is the most convenient instrument for calibrating the dial, although a receiver can also be used for this purpose. If you have a frequency counter then it can be used in conjunction with an uncalibrated g.d.o., which means that you don't have to worry about obtaining a suitable frequency dial.

A stand-alone frequency counter is a worthwhile investment anyhow and has many other uses in home construction projects. Flea markets and rallies are a useful source of material for making g.d.o.s. I located a Japanese LDM-810 dipper whose Nuvistor triode had died. The chassis, calibrated tuning mechanism and coils made it a suitable candidate for an experimental solid state g.d.o. (see the heading photograph).

Antenna Resonance

Antenna element resonance may be measured by coupling the coil to the current point of the element and varying the frequency of the g.d.o. until a dip is seen in the meter reading. Measuring the resonance of wire elements shouldn't provide too many difficulties, provided a reasonably sensitive instrument is used.

If your g.d.o. lacks sensitivity, additional coupling to a wire element can be achieved by forming a small loop in the wire and taping it in place near, or over the oscillator coil. Incidentally, none of the g.d.o.s that I've tested failed to couple into the element modified in this way.

Parasitic elements and driven element resonance can be measured. However, be aware that if the driven element being measured is connected to a length of unterminated coaxial cable, then the measured resonance frequency will include this length of cable. If you want to measure a driven element resonance, then disconnect the coaxial feeder from and short the feed-point of the driven element.

Coupling to tubular or rod elements is more difficult because the coupling between a small diameter coil and a long wire or tubular element is very loose. If a dip cannot be obtained in the normal way then a different type of coil may be required to improve coupling. I tried using a g.d.o. with a large diameter single-turn delta loop coil (coat hanger shaped) proposed by the late **Les Moxon G6XN** in his book *HF Antennas for all Locations*.

The method suggested by G6XN really does work. My home-brew g.d.o. uses an FT283 crystal socket for the coils. The coil was replaced by a wire coat hanger (the diameter of the wire fitted the coil socket). With this modification the increase in coupling was dramatic and I was able to measure the resonant frequency of any lengths of tubing from my antenna store, provided it was within the frequency range of the coat-hanger coil.

Coat Hanger Coil

The calibration of the coat-hanger coil was a bit arbitrary but this did not matter because the g.d.o. was being used in conjunction with a small frequency counter. And although the coat hanger shaped coil worked very well on the higher h.f. and lower v.h.f. frequencies, a coil design for the lower frequencies posed a problem. How was I to wind a suitable coil?

In the end, I tried various formers ranging from large diameter plastic tube to plastic flowerpots to create a multi-turn on a large diameter former. All the various coil formers gave good results, with the larger diameter coils giving the best coupling to antenna elements. However, they all suffered from the practical mechanical problem of how to support the large diameter coil, the g.d.o. and make the measurement at the same time.

The final design was so simple that I wondered why I didn't think of it in the first place. The coil is wound on a short board, 100mm wide and 12.5mm thick, **Fig. 2**. The size of this coil shown in Fig. 2 was a bit arbitrary; and it shows four turns, that allows tuning from 12-28MHz. Essentially, it covered the 14MHz band that I was principally interested in at the time.

● Fig 2. The G3LDO MK4 antenna element resonance measuring kit being used to measure a length of aluminium tube, which gave a half-wavelength of 23.144MHz. The coil is wound directly onto the supporting board above the dial. The G3ZOM circuit has a facility for direct connection to a frequency counter.

The circuit suggested by G3ZOM, has a facility for direct connection to a frequency counter as shown in Fig 1. Alternatively, if you are using a g.d.o. without this facility, a single-turn pick-up coil can be added to couple to the frequency counter. This winding is then adjusted with respect to the main winding until just enough energy is available to operate the frequency counter.

The board provides a platform for the g.d.o., frequency counter and even a note pad. The flat-sided coil couples into any antenna element, with the board providing a stable point to rest the measuring kit against the element while measurements are being made. Further information on the use of g.d.o.s can be found in my book *The Antenna Experimenter's Guide.* **PW**

‡Other information may be found at: Technical Correspondence by **Peter Lumb G3IRM** *QST* June 1972 and from **W1CER** in *QST* November 1971. You'll find information in A f.e.t. Dip Oscillator for 1.6-215MHz with Tone Dip Feature by **A.L. Bailey G3WPO**. *RadCom* November 1981. An update was in The G3WPO f.e.t. Dip Oscillator Mk2, by A.L. Bailey G3WPO *RadCom* April 1987.

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The unique 700E is not only a dual-band FM rig but has APRS and TNC built-in.

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- Solid 25.4mm traps
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* Weight: 670g

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* Power rating: 200W (140 - 525MHz)
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* Input/Output impedance: 50 ohm
* Input/Output connectors: N type (N)
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* Weight: 670g

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* Frequency range: 1.8 - 200MHz
* Power range: 20/200/2000W
* SWR Detection sensitivity: 5W minimum
* Input/Output impedance: 50 ohm
* Input/Output connectors: SO239 (M)
* Size: 109H x 155W x 120Dmm
* Weight: 1000g

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* Frequency range: 140 - 525MHz
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* Input/Output impedance: 50 ohm
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* Input/Output connectors: N Type Connector
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FJ, Miracle Antenna, Oregon Scientic, Revex, Tokyo-Hypower, Watson, Diamond, Yaesu and many more!

Equivalence And The L-Match

Martti Nissinen OH4NV from his home in Finland, shows you that a series combination of resistance and reactance can look just like a parallel combination. The hidden combination may make matching easier too.

I'm sure that you're all familiar with the various antenna matching circuits and have read a number of articles about this sector of radio technology*. Surely most of us are using some kind of a.t.u. (antenna tuning unit) from the many exotic antenna tuners designs that are available in today's market. However, except in the rare case, the books don't tell you anything about the fundamental idea of 'matching: the equivalence'. Don't be put off, please read on as this article fills this gap. * A good start point is *The ARRL Antenna Manual*. **Ed**.

This story isn't merely a theoretical one. I've met all the described circuits and alternatives in everyday practice and I've found their behaviour delightful, **after I understood** the equivalence. As a practical Amateur, I ask that you don't shy away and go off without reading this article. I hope you will be as delighted as I am when you come to the end and understand.

From textbooks we can learn that every series circuit has its equivalent parallel circuit. And that every parallel circuit also has its equivalent series circuit. To explain - these equivalent circuits are physically separate circuits values and layouts (equivalencies), that when connected to an a.c. voltage source, will both provide equal current and phase situations.

In this article, I'm going to assume that you'll look up how to change from one form to another. That's an article in itself so, let's go on.

Having stated the equivalence between the two separate circuits, remember it will prove useful in many practical applications. However, if one goes through the mathematical proceeding (inferring) of the equivalence equations (see Appendix 1) it becomes clear that every single circuit, (series or parallel) should have its internal equivalent companion. The two forms should be considered as tied together, one real and one hidden, but both forms are always present.

May Be Dominant

The existing physical form (series or parallel) may be dominant, but the mathematics predicts that we can call forth the hidden form if we need it. This sounds very interesting. Can we change a circuit's form (series or parallel) without changing it physically? The question is worth the experiment to try it out. So, let's see.

Consider a simple series circuit with series resistance R_s = 10Ω with its series reactance, X_s as +j20Ω (the '+j' signifying that it's an inductance) as shown in **Fig. 1a**. By using the equivalence equations (see Appendix) we can calculate and build its equivalent parallel circuit with parallel resistance R_p = 50Ω and parallel reactance X_p = +25Ω, **Fig. 1b**. These separate circuits are equivalent, i.e. a generator 'sees' both circuits as being the same. With the currents $I_s = I_p$ equal in both value and phase angle (θ).

The next step is interesting, because, we need only to construct the single series circuit Fig. 1a to replace a circuit that would seem to need the circuit of Fig. 1b. If the mathematical prediction is correct, this series circuit has its hidden parallel companion (Fig. 1b) hidden inside it.

If the equivalence statement is true, we should be able to call forth the pure 50Ω resistance from the series circuit of Fig. 1b. Physically we can start from the single series

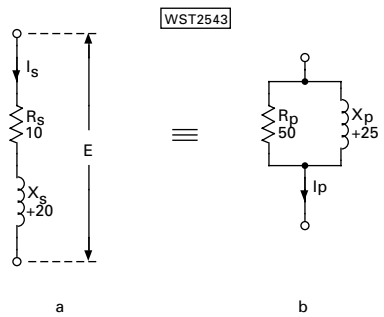


Fig. 1: Different layouts, but they look the same to an outside circuit.

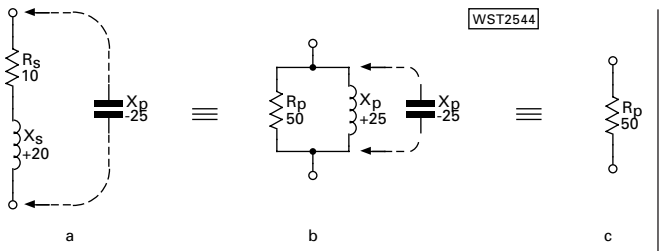


Fig. 2: Transformations. See text for an explanation.

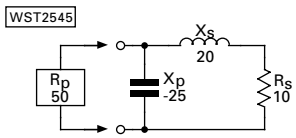


Fig. 3: Transformation complete. The two halves appear to be identical, see text for more detail.

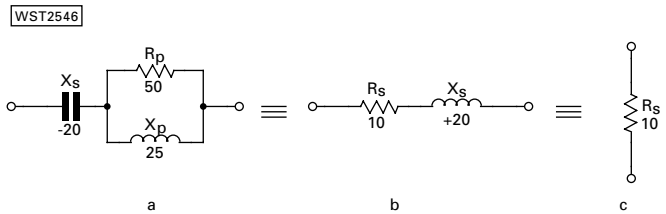


Fig. 4: Another transformation that is explained in the text.

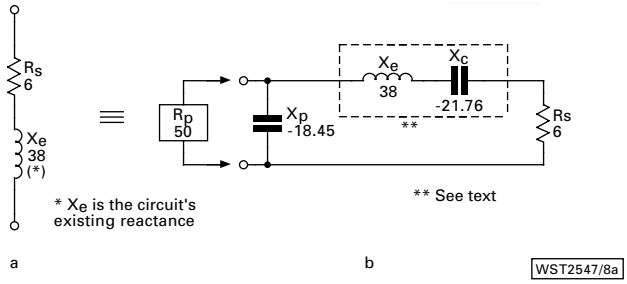


Fig. 5: Matching a (6+j38)Ω circuit to 50Ω resistive can be achieved with two capacitors. See text for more detail.

circuit Fig. 1a, but now imagine it to be the hidden parallel companion Fig. 1b.

Cancel The Imagined

To change the circuit of Fig. 1b to be 50Ω resistive, we must cancel the 'imagined' parallel reactance of +25Ω (inductive) by connecting a capacitor with a reactance of 25Ω, across the circuit. And so, from equivalence, we can do the same with the series circuit of Fig. 1a, the result of this transformation is shown in the circuits in **Fig. 2**.

After the addition of the new impedance, measurements show that the original circuit R_S of 10Ω in series with X_S of +20Ω (usually written as (10+j20)Ω), now seems to be a pure 50Ω resistance without reactance at all. We have, in fact, matched the original (10+j20)Ω resistance to the 50Ω impedance of a signal source (or reflected feed-point impedance in coaxial cable).

The 'miracle' happened, just by imagining the original series circuit to be its equivalent parallel form and then finding a cancelling (but imagined) parallel reactance. Then we applied the same cancelling impedance across the original series circuit! It really works!

This is, indeed, the distinctive and defining quality of equivalence. It's the basis of all kinds of reactance matching, generally called the L-match. Note: we didn't make any operation outside the equivalence law. We only forced ourselves to 'see' the parallel equivalent circuit (50//+j25)Ω in the place of the real existing series circuit (10+j20)Ω.

Result Important

The result above is so important that we have to go through the procedure once again. We have the original single series circuit with R_S = 10Ω and X_S = +20Ω (Fig. 1a). Then calculate its equivalent parallel circuit and get the parallel component values as R_p = 50Ω and X_p = +j25Ω (Fig. 1b).

The mathematics predicts that the original series circuit has the parallel form with it, as the hidden parallel companion. To prove this, we imagine the series circuit as its parallel companion (Fig. 1b) and cancel the imagined parallel reactance +j25Ω by a -j25Ω parallel reactance.

The result is a pure 50Ω resistance, as the mathematics has predicted. We changed the existing series circuit to its equivalent parallel circuit. The original series circuit as if disappeared electrically and the existing single circuit is not the parallel equivalent circuit (50//+j25)Ω. Where I've used the '//' form to show that it's a parallel combination.

So, equivalence is like magic If we now draw the procedure (Fig. 2) into the form shown in **Fig. 3** we find the familiar L-match circuit, i.e. the load R_S = 10Ω is matched into R_p = 50Ω by the X_S = +20Ω and X_p = -j25Ω.

Very seldom do the books tell the fundamental idea of the matching, the equivalence procedure we've just gone through above. But understanding of that gives some extra freedom and makes match an interesting task. Understanding liberates us from the load of different (often complicated) formulas. The equivalence change works in the opposite direction as well.

If the original existing circuit is the parallel circuit with R_p = 50Ω and X_p is +25Ω {or (50//+j25)Ω} and we want to change it to its equivalent series circuit, we first solve the equipment component values (see Appendix) and get R_S = 10Ω and X_S = +j20Ω.

To get the circuit shown as the 10Ω resistance, we cancel the imagined X_S = +j20Ω by -j20Ω in series with the existing parallel circuit, **Fig. 4**. It works to this direction as well. In fact, we can write a general rule for these equivalence changes.

Changing Rule

If you want to call forth a single circuit's resistance-value in hidden equivalent form, cancel the wanted form's reactance (in wanted form) in existing circuit. This may sound complicated, perhaps, but re-reading the procedure above helps.

In everyday matching problems, the equivalent parallel (or series) resistance value is mostly far from the value wanted, often a 50Ω in matching terms. But the equivalence matching works in those situations too. We put the powerful mathematics into work and force the reactances X_S and X_P to fulfil our requirements.

Example:

As an example, the series circuit's resistance R_S = 6Ω must be matched to 50Ω coaxial cable. The series circuit's reactance X_c = +38Ω as shown in **Fig. 5a**. From Appendix 1, we can solve:

$$X_S = \sqrt{(R_p * r_s) - r_s^2} = \sqrt{(50 * 6) - 6^2}$$

$$X_S = \sqrt{(50 * 6) - 6^2} = \sqrt{264} = 16.24\Omega$$

The circuit's original inductive reactance X_c is +38Ω so we have to cancel off 38-16.24 = +21.76Ω. We can do that by adding a capacitor C1, with an impedance of -j21.76Ω in series with the original X_c. Then we can calculate the needed $-X_p$.

$$\frac{(6^2 + 16.242)}{16.24} = 18.45\Omega$$

The tunable equivalence is the basis of all kinds of reactance matching. The fundamental idea is that we force the equivalence to fulfil our requirements, such as the needed resistance ratio. In antenna tuners, the components are adjustable, so the equivalence tuning covers a wide resistance ratio range. In spite of the exoticness of circuits of the tuners, they are all based on the tunable equivalence.

Derived Equivalence

The derived equivalence equations (Appendix 1) are independent, so the *Q* of each match must be calculated separately. Commonly, the matching *Q* should be in the range 1-10. For calculation the *Q* = Rp/Xp or x_S/r_S. In the example (**Fig. 5b**) the matched *Q* = 50/18.45 or 2.7 and is a figure well within the acceptable range.

Varying the magnitude of this imagined resistance one can vary the *Q* over the whole circuit and so vary the harmonic attenuation too. Of course, the calculation rules obey the equivalence equations given in Appendix 1. The total *Q* is now *Q1* + *Q2*.

If the matched *Q* remains out of the suggested range 1 -10, or if the harmonic attenuation remains too low (not considered in this article), then the multi section L-match can be used.

Multi Section L-Match

If we define the Pi-network as two L-sections connected face-to-face, then the T-network can be defined as two L-sections connected back-to-back. The common Pi-network consists of two separate L-sections connected face-to-face. Both networks are matched internally to a common (imagined) resistance.

If we want to understand the matching principle, we have to understand the equivalence and accept it. To determine the components values, you should follow the same equivalence rules and formulas given in the Appendix 1.

The series circuit (10+j20)Ω of Fig. 1 is an impedance I've found at the rig end of a 50Ω coaxial cable. By imagining this circuit as its parallel equivalent (50 // +j25)Ω and then cancelling the imagined parallel reactance +j25Ω by a parallel -j25Ω capacitance I was able to calculate a complete match with the s.w.r. 1:1 ratio. This was a very interesting experiment.

This article has been a quick overview to show that the reactance matching is based on the equivalence of circuits. If you understand it, matching can become an easier task! But should you chose to ignore the maths of equivalence, the matching will still work - after all it must be based on equivalence anyhow! PW

A Note from The Editor: Martti's article has been published as part of our well publicised intention to include more thought-provoking technical articles in *PW*. Obviously, such an articles as this demands a really good understanding of electronic theory and we hope that if your own maths aren't up to the level required - you'll enjoy reading up on the subject.

Further articles of this nature will be published in the future and we're hoping that the various subjects covered will both stimulate our brains and feedback from readers. Any queries or comments will be passed directly to Martti, this will not be a problem because his spoken and written English are excellent, and we correspond on a regular basis. Enjoy the read and I hope you'll be mentally stimulated!

Rob Mannion G3XFD

Appendix
Series to parallel equivalence transformations are to be found in Keith Henney's *Radio Engineering Handbook, 5th Edition* (Design chart for optimum component values for L, T, pi and pi-L networks and basic formulas).

Maritime Radio usi

Edward Brown looks back at the early days of post war radio-telephones – particularly the ex-military ZC1. From his home in New Zealand Edward saw the rapid change in technology develop from a trot into a gallop!

● Despite their limitations, ZC1s figured in the search for the New Zealand registered yacht *Argo*, lost with a crew of six in January 1951. The Wellington-Lyttleton yacht race of that year started from Clyde Quay at 1000 on 23 January and was expected to take about 26 hours - but ended dramatically, with tragic loss of life.

In New Zealand over 50 years ago, operating a ZC1 radio-telephone meant twiddling with the three antenna tuning knobs, trying to make the meter rise to a peak and so showing that the maximum power was going up the spout. Then you had to try calling the Post & Telegraph Department's Auckland Radio because that was the only shore station, they had a monopoly on ship-shore communications.

Rocking the receiver dial, you would be trying to find if the operator was answering on a slightly different frequency. Then there were the clumsy headphones which concentrated and impinged the received signal on the ear drums.

It was necessary to shout into the ZC1's microphone with it's curved rubber attachment, looking like a small hearing aid trumpet, or similar to medical apparatus of unknown application! This was required to getting the speech to the carbon granules that converted speech to electrical impulses to modulate the transceiver's weak carrier wave. And all the while the boat rolled and pitched. This was communication on 2.182MHz, back in the 'old days'.

Boats Today

Most boats today are equipped with v.h.f. equipment, either fixed or hand-held. These sets are synthesised with many frequencies to give instant, static-free communication ship-to-ship, ship-to shore and also calls into the land telephone system and enable talk-through via repeaters. They are cheap to buy and as easy to use as a landline telephone.

Before the v.h.f. marine band became the 'standard', there was also medium frequency (m.f.), operating using amplitude modulation (a.m.) on 2.182MHz and other complementary frequencies in the same band. With amplitude modulated medium frequency you had to be an operator. It needed skill to work through static, listening to weak signals with the harsh sharp crack of violent static, rain sizzles and the inevitable fading.

The original New Zealand pleasure, or recreational boat radio-telephone, which was then widely used was the Second World War type ZC1. It was designed for the battlefield and built like a battleship, to be used by military men with some training.

When built, sets were finished in a khaki paint and had a multiplicity of black knobs. They were available from the War Assets Realisation Board after 1945 for £20 ($40NZ). Thousands were sold - literally enough to equip an army! They were brand new, no soldiers had breathed into their rubber microphone surrounds or pounded the black-knobbed Morse keys.

The sets were sold complete with a copper 4.8m (16ft) antenna, which broke easily, but replacements were available at 12/6d each in 1951. Also included was a copper-plated steel and wire antenna, a mast, the necessary guys, microphones, headphones, a box of spare valves, a Morse key and a remote control unit.

There was also a copper-plated steel cover, which clipped in place and made the set waterproof. It weighed more than enough to ensure that if it wasn't mounted centrally amid ships in the boat it could act like a top-side ballast!

Inside the ZC1, all soldered connections were sealed with a dab of paint. This was long before transistors and integrated circuits. It was of course late 1930s technology, beautifully hand-wired, with Bakelite anchor points for components, rubber and fabric covered hook up wire. The plugs and sockets were of solid brass.

In practice, ZC1s in private hands were modified extensively by various experts. As

ng the ZC1

manufactured, they had variable tuning so it was possible to transmit on any frequency between 2 and 8MHz. For marine use that had to be modified to fixed crystal control, with a switch to change the channel. Valves in the receivers were changed for increased sensitivity and sometimes the transmitter valves were also changed.

Of course there was no whine of a solid state power supply from a ZC1. The original vibrator power supply was always a limiting factor for increased output power.

The vibrator was an electro-mechanical device for 'chopping' 12V d.c. into very rough alternating voltage, stepping it up through a suitable transformer and it did that with a loud buzz. With the high voltage and damp conditions if you contacted it accidentally, you'd certainly receive a tingle.

Flea Power!

The ZC1s had a maximum flea power output of 3W if all circuits were in tune with the antenna! The circuits all had to be re-tuned after a change of channel. Indeed, the rig certainly lacked any real punch. The 3W combined with a relatively inefficient antenna would sometimes give a false sense of security.

In use the copper whip antenna was set in a solid rubber mounting block. However, in its original form the whip was not bottom loaded and it was difficult to get the 3W power up the spout.

Yacht Search

However, despite their limitations, ZC1s figured in the search for the yacht *Argo*, lost with a crew of six in January 1951. The Wellington-Lyttleton yacht race of that year started from Clyde Quay at 1000 on 23 January and was expected to take about 26 hours.

A southerly storm soon scattered entrants. The yacht *Restless* snapped her mast 40 minutes after the start. Three yachts returned to Wellington that night and the *Argo* disappeared.

But on 2 February, faint radio signals, believed to be from the *Argo* were received by several Amateur Radio stations. It was also received by Auckland Radio ZLD, at Musick Point.

It was a mystery, maybe the *Argo* was afloat, driven off shore, perhaps she was trying to communicate?

The carrier signal was too weak to hear any voice and a code of dots and dashes were devised to enable the *Argo* - if indeed it was the yacht - to answer. Auckland Radio asked; "Are you drifting. Are you sailing? Are you ashore"? The yacht was asked to respond with dots or dashes if it heard the broadcasts.

Remember that in those days, Morse code was a much more reliable mode of communications. Morse would always get through as long as the carrier wave could be heard. Don't forget, it takes a lot more power to hear voices on a carrier wave and that's why QRP c.w. does so well even nowadays.

One of the *Argo* crew was **Bob Fielding**, a P&T radio technician, who while not a professional Morse operator, would have had a working knowledge of the Morse code in his job of attending to communication transmitters.

Bob was a technician at Auckland Radio and a keen yachtsman. He even built a yacht himself on the beach below the staff houses at Bucklands Beach.

One summer evening in 1950 I had voyaged with him on a trip from Musick Point to St. Heliers Bay. We sailed briskly to the bay, then the wind died and we ghosted along in the moonlight back to our quarters in the Musick Point single men's hostel.

Signals Heard

Signals were heard in response to Auckland Radio's questions, but it's doubtful if the *Argo* was in fact still afloat. Those apparent replying radio signals have never been explained and no trace of the yacht was ever found. The loss of the yacht was a major newspaper story of the time with a Tasman Empire Airways flying boat, and other aircraft, searching.

Such was the novelty of radio-telephones on small boats that it was reported in the *NZ Herald* of 5 February 1951, that two Auckland launches equipped with ZC1 radio sets had heard signals, believed to be from the *Argo,* during the Saturday night of the 3rd. All details were given.

The vessels were the 12m (40ft) *Makura* owned by Mr C.H. Leighton of Epsom NZ and the 9.4m (31ft) *Lady Diana* owned by Mr P. Seabrook of Omana Avenue, Epsom, NZ. Both were lying in anchor in Patio Bay, Waiheke Island.

In the late 1940s, various other wartime radio sets were available from the War Assets Realisation Board, but generally they were not suitable for small pleasure boats. Such radiotelephones were made by the Auckland company, Radio 1936 Ltd. Their 4125 set was a 25W version made in 1941 for military use and they were sometimes installed on fishing boats after the war.

There was no type approval of radiotelephone sets by the New Zealand P&T in those times. Even home-made radio-telephones, one-offs that had no trade name, built by backyard enterprises, were used on some boats.

The home-made sets often had cannibalised ZC1 parts. The large black microphones with big grasping handles appeared on various sets. Sometimes a heavy black P&T telephone handset was used and I often wondered if a public telephone box had been vandalised!

The ZC1 was ubiquitous. Years after the war ended, spare valves for sets could still be bought for sixpence each. There had never been such readily available transmitters, and they stayed in service for decades, corroding, the paint flaking from the front panel, the rotary switches rusted in a fixed position. There were some sets where the crystal frequency change switch had to be turned with pliers.

Were They Loved?

Were the ZC1s loved? - I don't think so! They were physically heavy, ugly and a drain on batteries. But they did fulfil a need as pleasure boating became increasingly popular in the 1950s and 1960s. In fact they were still seen into the 1970s, only disappearing when s.s.b. became compulsory.

Local commercial radiotelephone manufacturing had started after the end of the Second World War by the company Electronic Navigation. Their Skipper 10 set was of that time. The Union Steam Ship Company fitted many of its commercial cargo ships with the large model Mate radiotelephone, constructed largely of ex-military radio parts.

The Mate was powered by a 'genemotor', sometimes called a dynamotor. This was a single unit having a double armature winding, one served for driving the motor while the high voltage output for the transmitter was taken from the other.

Import restrictions on radiotelephones were tough around 1960. One importer said to me; "I can't get an Import Licence". This was because the transmitter came under the heading of category 'C' in the customs schedule of that time, which mean that applications would only be granted in exceptional circumstances.

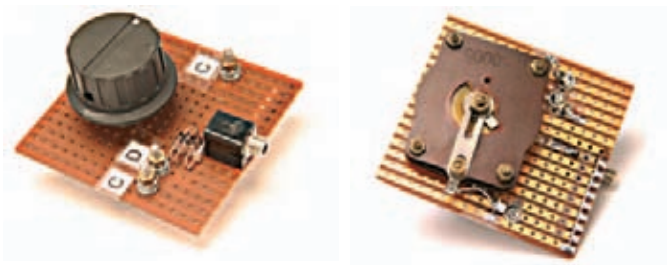
But at that time, AWA had the locally made *Teleradio 64* sets for £98, plus £2 each per crystal (prices mentioned as those before NZ went over to the Dollar). Marlin had the *Oscar* for £74-50. The bigger Marlin *Tiros* was a 100W set for £165. Electronic Navigation also had the *Transette* for £69-10s and the *Transair 25* for £84-15s, plus 15s for each crystal, and also a bigger transistorised 50W set, the *Transair 50*. Boating radio was about to boom!

PW

practical way

"Light be the earth upon you, lightly rest".
Euripides (484 – 406 BC)

"It's Christmas time in the workshop" announces the Rev. George Dobbs G3RJV. As usual in the December issue - George has an amusing project to help instil an interest from the family in what we do!



This month's project can be used as a radio receiver or Christmas tree decoration! Intrigued? - Read on and join in the festive radio fun!

Over the years I've been writing Carrying On the Practical Way (COTPW) it has become a tradition that the December edition of the column takes on a Christmas in the workshop flavour. Except for cooks and children soothers, the Christmas holiday is often seen as an opportunity for taking a rest and relaxing.

However, for many of us the best way of relaxing is not 'doing nothing' but instead 'doing something different'. So, my Christmas in the workshop columns have been mainly about building simple projects often to amuse children and always just for the fun of it.

There's delight is showing young people what can be done with just a few electronic parts. The 'Hey – come and look at this'! - approach also provides a good reason to go to the workbench and escape the soporific powers of oft-repeated classic films on the household screen.

In previous years I've described varieties of the Crystal Radio (Crystal Set), a very basic electronic phenomenon that can amuse young (and older) people. A working radio from so few parts and without batteries or power supply!

I hadn't intended to return to the Crystal Radio again this year, until Dutch reader **Geert Paulides PA7ZEE** sent me a suggestion for the December column. Geert sent me details of his 'KISS Short Wave Loop Crystal Radio'. Long time readers of this column may remember KISS as Keep It Simple Stupid, an adage for many QRP radio constructors. And this radio is certainly simple!

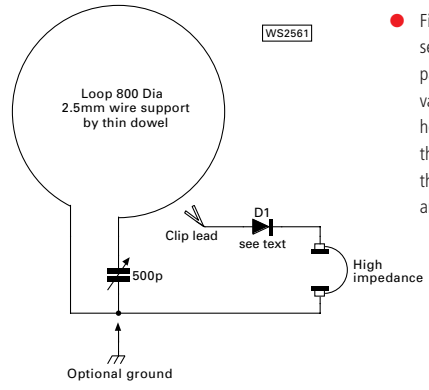


Fig. 1: Geert's Loop Crystal set circuit. It has all the basic parts for a crystal radio; coil, variable capacitor, diode and headphones. The unusual thing about this radio is that the tuning coil and antenna are one unit!

Geert's Loop Circuit

The circuit for Geert's Loop Crystal set is shown in **Fig. 1**. It has all the basic parts for a crystal radio; coil, variable capacitor, diode and headphones. The unusual thing about this radio is that the tuning coil and antenna are one unit!

The inductance for the tuned circuit, which selects the required radio signals, is a large single loop. In Geert's example, the loop is made from 2.5mm copper wire formed in a loop of 0.8 metres diameter.

The loop is supported and maintained in shape by thin wooden dowels. A variable (tuning) capacitor is connected across the loop to provide the tuned circuit.

The variable capacitor can be a tuning capacitor culled from a surplus long and medium wave a.m. radio. Very often these are of the Polyvaricon type but they will work well in this circuit.

I managed to find a vintage solid dielectric type of the sort used in crystal sets of yesteryear. Geert's version tuned from about 6 to 16MHz. The diode (detector) is connected to the loop via a clip lead. This enables the connection point on the loop to be moved for the best impedance match and loudest signals.

The radio may be connected to earth at the optional ground point. **Note:** An earth will probably not increase signal strength considerably at short waves and it will change the tuning.

Germanium Diodes

Geert's circuit specified using four Germanium diodes connected in parallel. I followed his instructions and used four OA47 diodes. Incidentally, some crystal set builders like to use a group of diodes connected in parallel but opinion varies as to the efficacy of the idea.

Multiple similar diodes may be paralleled to increase the saturation current (Is). This current is increased proportionally to the number of diodes in parallel. Four identical diodes in parallel will give a saturation current four times the I_S of one alone.

The individual reader may just want to use one diode in the circuit. But whatever arrangement is used the diodes should be **germanium** rather than the more common silicon types. Germanium diodes work better than their silicon equivalents due to the lower 'knee point' on the conduction curve.

Any germanium diode would be suitable for the radio. Should the constructor have any in stock, hot carrier or Schottky diodes are also suitable.

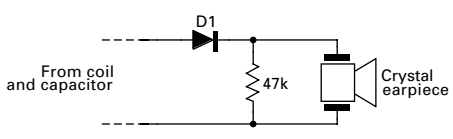


Fig. 2: Crystal set builders who use piezo-electric earpieces often add a resistive load to the output and connect the earpiece across the resistance. The arrangement shown here uses a 47kΩ resistor (see text).

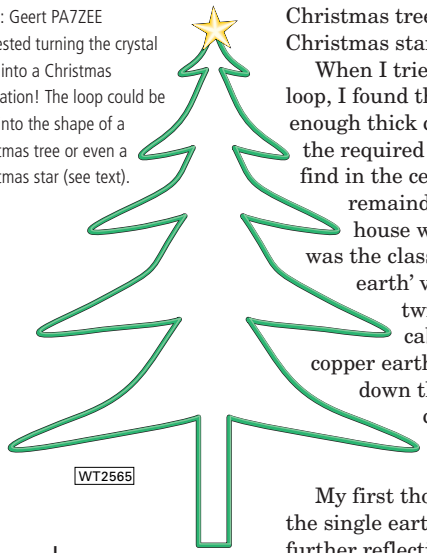


Fig. 3: Geert PA7ZEE suggested turning the crystal radio into a Christmas decoration! The loop could be bent into the shape of a Christmas tree or even a Christmas star (see text).

High Impedance

Like all crystal sets, the design requires the use of high impedance headphones. These are hard to come by these days unless you have an old pair tucked inside your junk box.

However, if you do have some old headphones and you are not sure about their suitability, the test (suggested by **Charles Wenzel**) is helpful. To test - hold one headphone wire between the fingers while scraping the other lead across a large metal object. If static is heard in the earphone it will probably work well with the crystal radio.

An alternative to high impedance headphones* is to use a cheap crystal earpiece and I had good results from the radio using such an earpiece. These are very high impedance and some crystal set builders who use them add a resistive load to the output and connect the earpiece across the resistance. The arrangement is shown in **Fig. 2**. Here a 47kΩ, (or thereabouts), resistor is about right for this circuit.

* *The Radio Basics i.c. headphone amplifier will also prove useful here as it can either drive a small loudspeaker or low impedance modern miniature headphones. It was fully featured in the March 2004 issue of PW (This issue is sold out but photocopies of the article are available from the Book Store).* ***Editor***.

Christmas Decoration

Geert further suggested turning the crystal radio into a Christmas decoration! The loop need not be a circle. It could be bent into the shape of a Christmas tree or even a Christmas star (see **Fig. 3**).

When I tried making the loop, I found that I didn't have enough thick copper wire for the required size. What I did find in the cellar was the remainder of a reel of house wiring cable. This was the classic 'twin and earth' variety and had twin insulated cables and a single copper earth wire running down the centre, all covered with the common oval pvc sheath.

My first thought was to use the single earth wire but upon further reflection, I used all three cables; the two insulated wires and the earth wire. I formed them into a loop of about the right dimensions and soldered all three wires together at each end. This made an almost self-supporting loop.

Flexible Project

The little circuit in Fig. 1 forms a flexible project and could be used to connect a crystal radio to a variety of loops or antennas. I decided to build it in a form that might be used for experimentation.

The diagram, **Fig. 4**, shows how I laid out the circuit. This may also be seen in the heading photograph. It could be built in any simple construction format. I found an off-cut of wide spaced (0.15in) Veroboard. Note: 'ugly' type construction on a piece of copper clad board or point-to-point wiring on a wood or stiff card front plate would also work.

There are three terminations, I used 6BA nuts and bolts, marked '**C**', '**D**' and '**C**' to correspond to Fig. 4. The rotor connection on the variable capacitor (the one connected to the knob shaft) should to be connected to the outer shield of the headphone socket.

The two 'C' connections go to the loop and the tapped coil input for the diodes goes to 'D'. I peeled back a little of the plastic sheath and wire insulation on the mains cable to expose an area of bare wires to that a tapping point could be made. In practice I found that only about 100 to 150mm of the loop was required for a suitable tap for best signal results.

Board Experimentation

The board lends itself to experimentation with a variety of coils and loops. I suggest that you make some for yourself and see how they work!

My first thoughts were to make use of the three wires in the mains cable I had used. The three wires all go around the loop and if they are connected, as in **Fig. 5**, this will form a three-turn loop. To do this all three wires are separated at each end of the loop and wiring them 'alternately' as shown in Fig. 5 makes the three-turn loop.

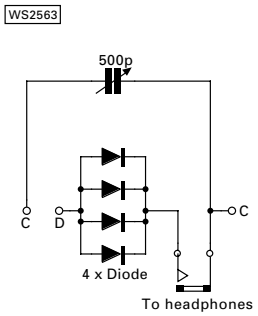


Fig. 4: Illustrating G3RJV's version of the circuit (see text).

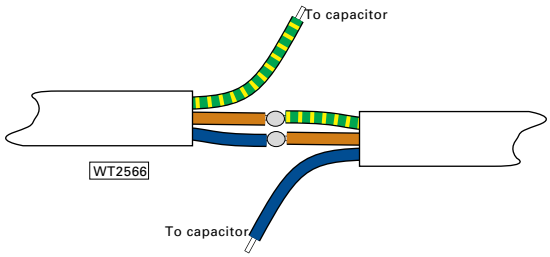


Fig. 5: The three wires in the 'twin plus earth' mains cable G3RJV used all go around the loop. If they are connected, as shown here they will form a three-turn loop (see text).

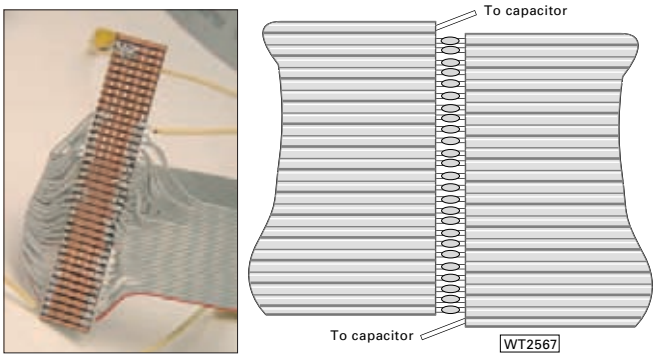


Fig. 6: Using 24-way ribbon cable (see text).

If the bare earth wire is used as the bottom section of the loop, some of the plastic sheath can be cut away for the diode tapping point. My version did not have a tapping point; I simply connected the loop to the 'C' terminals and shorted out the terminals between 'D' and the nearest 'C' terminal. This produced several quite loud stations.

Of course, the board can be used with any coil. Join the ends of the coil to the 'C' connections. Then connect the 'D' terminal to the nearest 'C' terminal and connect an antenna to this same point.

Following on from the three-turn mains cable loop, readers might like to try a ribbon cable loop. This idea has appeared in many crystal set books. The commonest version uses a 24 wire ribbon cable and you should connect the wires alternately as shown in **Fig. 6**.

I tried the ribbon inductor idea with about a metre of 24-way ribbon cable. To make the connections I used a strip of Veroboard, connecting the wires across the strip. This is rather tedious but a reliable way to join the ends without risk of adjacent turns touching. In my location several signals were received without the need of an antenna wire!

So, build the little board, enjoy yourself and try all sorts of configurations to see how they work. A fine diversion for a happy Christmas afternoon or evening!

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What's going on here? Phil Cadman G4JCP is hanging a picture in the 'wireless shop'! Actually, he's taking the opportunity to commemorate a very famous valve pioneer - Sir John Fleming.

A very warm welcome to my final column of 2004. I've just finished hanging a picture of **Sir John Ambrose Fleming** behind the counter here in the Valve and Vintage 'shop'. This is because on the 16 November 1904, to be exact, Fleming filed his famous patent on the electronic detection of radio waves. The patent described how a thermionic diode - known for many years afterwards as a Fleming Diode or Fleming Valve - could be used to rectify and so detect, radio waves.

While working as an electrical advisor to the Marconi Wireless Telegraph Company, Fleming had become acquainted with the coherer as a detector of radio waves. Seeking a more efficient detector, he began experimenting with chemical rectifiers but with little success. Then one day, he thought of using an electric lamp.

The idea to use a 'lamp' was not as strange as it sounds. In the early 1880s, Fleming had investigated the Edison Effect, the name given to the blackening of the glass bulbs of early electric lamps. He deduced that the blackening was due to carbon molecules, ejected from the white-hot filament, accumulating on the inside of the glass. His hypothesis was verified soon after by **Sir William Preece** and that was that!

However, in 1888 Fleming again turned his attention to the Edison Effect and discovered that the hot filament emitted more than just carbon molecules. He found that a galvanometer connected between a metal plate (positioned close to the filament) and the filament indicated a flow of current. The galvanometer produced the greatest deflection when the flat plate was replaced by a metal cylinder enclosing the filament.

Further studies showed that the arrangement only allowed current to flow in one direction and so could rectify alternating current. It wasn't surprising, therefore, that in 1904 Fleming had the idea of using one of his special lamps to rectify radio waves. Fleming's 1904 patent marked the true beginning of modern radio and, it could be said, of the entire electronics industry.

Make A Fleming Diode?

So why not make a radio with a Fleming Diode for Christmas? Modified Edison lamps are rare, but perhaps an EB91 diode would do? Or what about a DL92/3S4 or DL96 wired as a diode? Just tie all the grids to the anode and if you try anything, please let me know how you get on.

Everyone on *PW* encourages budding radio enthusiasts to build simple test gear and you can't get much simpler than the valve voltmeter I came across in the August 1965 issue of *PW*. The author - **G. H. Meeton** - described it as an anode bend or Moullin voltmeter. I'd not come across the name Moullin before, at least not in connection with valve voltmeters.

A quick Google search on the Internet for Moullin voltmeters didn't produce many hits. But I did discover that commercial instruments based on the anode-bend voltmeter were produced many years ago. One website described such a meter - made around 1925 by The Cambridge Instrument Company - as a very early form of vacuum tube voltmeter.

The instrument had a non-linear scale calibrated to read from 0.5 to 1.5V and required a 6V d.c supply. The valve's anode current was measured on a Cambridge Unipivot galvanometer. The identification plate on this particular instrument included the following: *Moullin Patent No.105403, Cambridge, England*.

I thought that was all I was going to discover about Moullin voltmeter! But then I exchanged E-mails (on a totally different subject) with **David Pratt G4DMP**. David then kindly looked through his books and found the following description in his 1950 copy of the Odhams *Encyclopaedia of Radio and Television*: "Valve voltmeter operating on the anode-bend principle. The anode is connected to one end of the filament, the potential difference (p.d.) across which provides the h.t. supply".

David also found a reference in the *Principles of Electrical Measurements* by Buckingham and Price. In part, the entry states that E.B. Moullin was the first to produce successful valve voltmeters in commercial form.

By using a Unipivot galvanometer Moullin was able to dispense with the anode battery and obtain the filament and grid bias supply from a 6V battery, the anode voltage being the voltage drop across the filament. The mention of a 6V battery clearly ties in with the description of the commercial instrument I found on the web.

Thank you, David, for all your help. Now I wonder if anyone has first-hand experience of Moullin voltmeters. Maybe someone even has one?

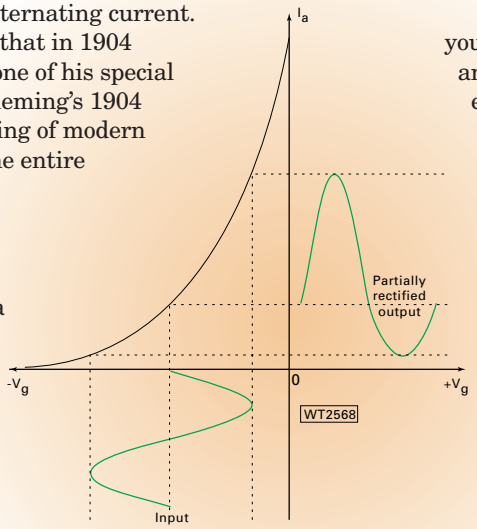

Fig. 1: When a triode operates close to cut-off, partial rectification of the input signal takes place, as shown. The resulting increase in anode current is proportional to the square of the peak e.m.f. applied to the grid (see text).

Moullin Operation

The actual operation of an anode-bend/Moullin voltmeter is simple enough to understand. When a triode operates close to cut-off, partial rectification

of the input signal takes place, as shown in **Fig. 1**.

The resulting increase in anode current is proportional to the square of the peak e.m.f. applied to the grid. This means that a suitably calibrated meter wired in the anode circuit will indicate the true root mean square (r.m.s.) value of an input waveform.

The circuit will operate up to radio frequencies, but does have one major limitation: the practical measurement range spans little more than 1V. This explains the 0.5 to 1.5V scale of the commercial voltmeter. Fortunately, this is not such a great limitation when measuring r.f. signals as they're often no more than a few volts, and a capacitive or resistive attenuator can easily bring them into the range of the voltmeter.

The circuit of Meeten's voltmeter is shown in **Fig. 2** and as you can see, it's very simple and is featured here as an experimental circuit. The valve is a 3S4 (DL92 or equivalent) strapped as a triode. The 3S4 has a centre-tapped 2.8V filament but only half of this is used, hence the 1.5V cell for filament power.

The other 1.5V cell is used to provide a negative grid voltage sufficient to bias the valve almost to cut-off. In practice, the 'high tension' (h.t.) is provided by a 9V battery, a PP3 or similar.

The useful measurement range is quoted as 0.1 to 1V peak. That's about 70 to 700mV r.m.s. The input impedance is very high as there's no grid resistor. In fact, the only current, which flows in the grid circuit, within the quoted measurement range, is the tiniest amount of grid current.

Actually, the omission of a grid resistor means that the voltage source being measured must not be capacitively coupled. In other words, there must be a d.c. path between the grid and the negative end of the bias cell. This rather limits the usefulness of the voltmeter as it stands. So, to allow capacitively-coupled e.m.f.s to be measured, simply add a resistor from the control grid to the negative end of the 1.5V bias cell.

The author recommended 5MΩ in the original article, so a 4.7MΩ 0.25W resistor should prove perfectly satisfactory. But do remember to take the loading effect of this resistor into account when measuring high impedance circuits.

The Calibration

The original article doesn't describe the calibration of the instrument to any degree. But I'd guess the easiest way is to use a variable 50Hz supply, adjustable over the range zero to 10V, and an accurate multimeter.

It's best to feed the Moullin meter through a 10:1 attenuator, as most moving coil - and digital - meters lose accuracy at low 'a.c.' voltages. The attenuator allows your modern multimeter to (accurately) measure ten times the voltage at the Moullin meter's input terminals.

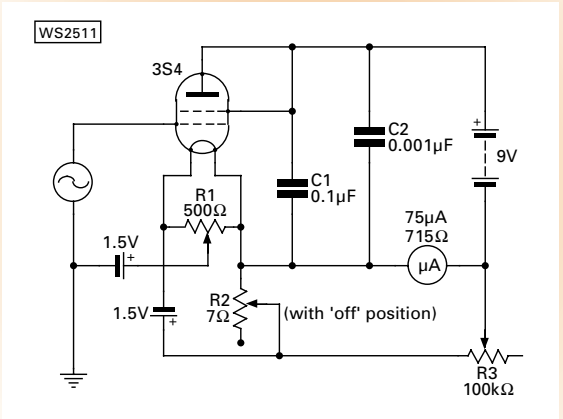

Fig. 2: The circuit of Meeten's simple voltmeter. The valve is a 3S4 (DL92 or equivalent) strapped as a triode. The 3S4 has a centre-tapped 2.8V filament (see text).

The potentiometer across the filament is, there, I believe to provide a centre tap. It could be replaced by two equal resistors, say 270Ω each. The function of R2 isn't made clear, I'd imagine it's there to compensate for the reduction of filament voltage as the filament cell discharges.

A better solution would be to power the filament from a 1.3V stabilised supply. A suitable regulator was described in 'Power That Valved Portable' in the December 2002 issue of *PW*. A stabilised h.t. supply is also highly recommended.

Practical Points

Let's now look at a few practical points and to start, even with the input shorted, the meter will show some residual current. To force a zero reading with no input, a current equal to the residual current is fed backwards through the meter. This is done using the filament cell as a voltage source with R3 in series to adjust the reverse current.

When using the voltmeter, begin with R3 at maximum resistance and when the indicated current stabilises, simply decrease R3 until the meter reads zero.

A 75µA f.s.d. meter, as used in the original circuit, may be difficult to find. New 50µA and 100µA meters are far more common, if expensive! A surplus meter will work fine as you'll need to calibrate the scale anyway, remembering that the deflection is proportional to the square of the applied e.m.f. at the control grid.

The voltmeter seems to have two main uses. First, it can measure - with reasonable accuracy - the true r.m.s. value of an a.c. signal. Most meters either read peak or average, depending on their internal circuitry. The Moullin voltmeter can also be used to indicate resonance in r.f. tuned circuits. And this is what makes it useful to us.

Meeten, in the original *PW* article, said that he'd used the meter successfully at frequencies between 25Hz and 25MHz. He also stated that the Moullin instrument of the 1920s was useful up to 30MHz.

Because the deflection is proportional to the square of the input e.m.f., when 'peaking' an r.f. tuned circuit, the 'peak' is exaggerated. For example, increase the input e.m.f. by 10% and the deflection will increase by 21% (1.1 squared = 1.21). Very useful!

PW

Finally For The Year

There's just time to mention a couple of points arising from my September column. First, the picture of the 833A on page 39 (**Fig. 2**) should have shown a nicely glowing anode. Seems the wrong picture got used*. Oops! (Honest, 833A anodes do glow).

I hope you all have a good Christmas and New Year and maybe we could all make a New Year's resolution to do a bit more home construction than we've done in previous years?

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**.

* *My apologies Phil!* ***Editor***.

Practical Wireless

Volume 80 January to December 2004

Index 2004

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Don't forget we still have stocks of *PW* back issues for 2004 (except March & April), as well as 2003, 2002, 2001 and 2000 available. But hurry as stocks are limited. To order back issues either use the **Order Form** on **page 73** of this issue or telephone the **Credit Card Hotline on 0870 224 7830**. Back Issues are available for **£4.70 each inc. P&P UK, £5.70 each inc. P&P overseas.**

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

Last time I mentioned that August was generally regarded as the month when a change in propagation occurs on the v.h.f. bands. That is the period when the summer Sporadic-E (Sp-E) season comes to an end. It also marks the decline in sporadic meteors following the peak in daily input, which occurs between May and August.

During much of August there is normally little in the way of ionospheric propagation on the 50 and 70MHz bands and tropospheric openings on the 144MHz and higher frequency bands are generally quite poor. From September though, other propagation modes come to the fore, which hopefully spring the v.h.f. and u.h.f. bands back into life again.

Trans-equatorial propagation (t.e.p.), which involves reflection from the ionospheric F-layer, is particularly interesting for the 50MHz DX operator. It enables contacts to be made on a north-south path from the UK with stations up to 10,000km away in South Africa (ZS), Malawi (7Q), Namibia (V5), Zimbabwe (Z2) and surrounding areas.

The greatest effect is around the time of the equinoxes (September and March) when the two belts of ionisation north and south of the geomagnetic equator are equally illuminated. However, I've noticed that it takes a few weeks before the effects of the F-layer ionisation is observed in the UK. Therefore t.e.p. openings in the UK are normally recorded during the months of October and April. The openings don't last long though and by November (and May) this mode has effectively disappeared.

Another mode that is greatest around the time of the equinoxes is auroral backscatter propagation. Auroras can occur at any time of the year but peak during the months September-November and February-April. They occur frequently on the 50, 70 and 144MHz bands and occasionally on the 430MHz band. During good events it's possible to make contacts with stations up to 2000km away on the 144MHz band.

One mode that often lasts for days at a time is extended tropospheric propagation. Although tropo openings can and do occur on the v.h.f. and u.h.f. bands at any time throughout the year, some of the more extensive events take place during the autumn months. It is during this period that temperature inversions often give rise to surface and elevated ducts. Inversions occur under still clear conditions when the land cools rapidly thus cooling the air close to the surface but leaving the higher levels relatively unaffected.

These conditions occur often in anticyclonic weather systems, which are most common in late summer and early autumn. A major opening affecting the UK generally involves an extensive area of high pressure to the east giving similar weather over much of western Europe. Ducts extending 1000km or more can then appear for several days at a time with the direction of best propagation changing as the anticyclone drifts across the continent.

THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF TROPOSPHERIC OPENINGS ON THE VHF, UHF AND MICROWAVE BANDS

BAND CONDITIONS

Band conditions during September would have been quite poor if it hadn't been for one excellent period of extended tropo propagation at the beginning of the month. Sporadic-E propagation on the 50MHz band was virtually non-existent with only two openings on 10 September between 1640-1730UTC to Poland (SP) and Romania (YO) and on 27 September between 1345-1400UTC to Portugal (CT) and Spain (EH). Scottish stations on 13-14 September reported auroral propagation but the events were rather weak and didn't extend south of the border!

Fortunately, the extensive period of tropo propagation between 1-9 September really saved the day with stations reporting activity on all bands from 50MHz through to 10GHz. The lift in conditions commenced around 1 September with reports of stations in southern England making occasional 144MHz contacts into the Czech Republic (OK) and Switzerland (HB9). Over the following days the tropo opening intensified, coinciding with the IARU Region 1 144MHz contest held on 4-5 September.

Contacts made from central England during the contest included the stations of EA2CN/P (Spain), HA5KDQ (Hungary), LX/PA2CHR/P (Luxembourg), OL4W (Czech Republic), SK7JM (Sweden), SN7V (Poland) and TM8MB (France). After the contest had finished it got better!

From 2000UTC on 5 September operators in East Anglia (JO01, JO02) reported making 144MHz contacts with the stations of ES5PC, ES5QA and ES6RQ (Estonia) over paths of around 1700km. In the following days the opening spread over the entire UK with the best propagation paths being towards northern Germany, Denmark, Sweden and Norway. The event peaked on Tuesday 7 September, coinciding with the 144MHz Nordic Activity Contest (NAC).

Activity on the 144MHz band was tremendous with both the c.w. and s.s.b. segments packed full with DX stations. Operators on the 430MHz band also reported excellent propagation with c.w. and s.s.b. contacts being made with stations deep into Germany, Czech Republic, Switzerland, Denmark and Sweden.

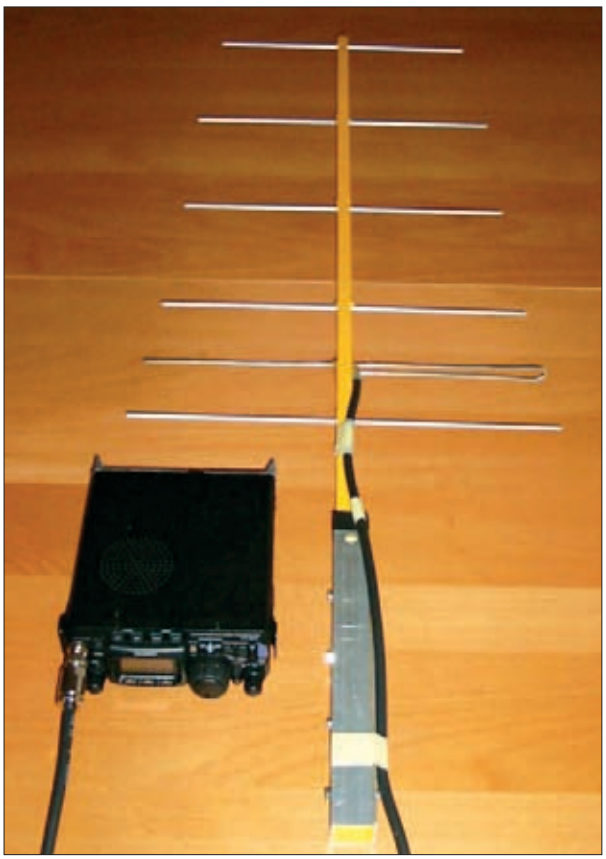
The tropo lift was also very good on the microwave bands with many QSOs being reported. Such contacts included G3FYX (IO81) to OZ1FF (JO45) at 910km and GM6VXB (IO97) to DL3YEE (JO42) at 850km on the 1.3GHz band, G3XDY (JO02) to DB5KN (JO31) at 425km and OZ1CTZ (JO46) hearing the GB3OHM (IO92) beacon at 728km on the 3.4GHz band and G4PBP (IO82) working DL3YEE (JO42) over a 724km path on the 5.7GHz band.

It was just as good on the 10GHz band with the stations of G4BRK (IO91) reporting contacts with DF9QX (JO42) at 740km and DJ8ES (JO43) at 755km and the microwave station of G4DDK (JO02) making a 700km contact with HB9AMH/P (JN37) in the Swiss mountains. The ducting also spread down to the 70 and 50MHz band with contacts over 1000km being made. This is quite unusual, as extended tropo doesn't get reported very much on these lower v.h.f. bands.

I was active on 7 September from my QTH (Herefordshire IO81) on the 50, 70 and 144MHz bands. I only made one contact on the 50MHz band, DF9OX (JO53) at 926km, but it was interesting to see tropo at this distance on the Six Metre band. I've never really been a firm believer of extended tropo on the 70MHz band but this opening was quite extensive although activity on Four Metres was relatively low.

The GB3ANG beacon (70.020MHz) at 510km was peaking 599 for many hours

● Fig. 1: The v.h.f. and u.h.f. antennas at the SK7MW club station.



● Fig. 2: The WA5VJB 430MHz Yagi constructed by Paul Webster PE7B.

during the evening. At 1755UTC I contacted the station of OZ3ZW (JO54) over a 1002km path followed at 2118UTC by a c.w. contact with OZ2LD (JO54) at 1015km, my best tropo DX on the 70MHz band in over 25 years.

Later in the evening at 2205UTC an s.s.b. contact was completed with the station of GM4AFF (IO86) at 538km. Conditions were tremendous on the 144MHz band with 30 s.s.b. contacts completed over the magic 1000km mark. Running a Trio TS-790E transceiver, 400W and a 5.2 wavelength long 18-element DL6WU Yagi my 144MHz QSOs included the s.s.b. stations of LA2PHA (JO38), OE2CAL (JN67), OZ1IEP (JO55) and club station SK7MW (JO65) shown in **Fig. 1**.

Between 2155-2200UTC I made my best DX contacts by working the stations of SP1FPG (JO73) 1186km, SP3MGM (JO73) 1241km, SP3NEN (JO73) 1241km and SP1FJZ (JO84) at 1309km. **Andy M1IFT** (IO93) reports that he made his first ever 144MHz contacts with stations in Sweden and Switzerland during the opening on 6 September. Running an Icom IC-910X transceiver, 100W amplifier and a 17-element F9FT Yagi he contacted the stations of HB9FAB (JN46) at 978km, SM7FMX (JO65) at 915km, OZ1IIL (JO47), OZ2PJ (JO65), OZ3TT (JO66), OZ4VW (JO45) and OZ8FR (JO55). Conditions were even better at his QTH during the morning of 7 September with many Dutch, French and German beacons heard on the 430MHz band.

John Rodger 2M0FYG (Aberdeen IO87) mentions that he had great fun during the lift on the 144, 430MHz and 1.3GHz bands. He uses an Icom IC-910X transceiver, which runs 50W output on v.h.f. and u.h.f. and 10W on the 1.3GHz band. On that band he uses a 23-element F9FT Yagi located in the loft space and as a consequence it suffers a lot of attenuation to received and transmitted signals. John heard the beacon stations LA4SHF (1296.890MHz), OZ1UHF (1296.955MHz) and SK6MHI (1296.800MHz) and also made his first DX contacts outside of the UK when he made s.s.b. QSOs with OZ1HDA (JO47) at 720km and SM6HYG (JO58) at 814km.

Paul Webster PE7B (ex-G7KVE) reports that although he has been active on 144MHz s.s.b. for some years he is somewhat of a newcomer to 430MHz s.s.b. usage. In order to become QRV on that band and as he prefers portable operation he recently constructed a simple 6-element Yagi antenna, shown in **Fig. 2**. Based on the WA5VJB design (**Reference 1**) it was ready for use during the tropo opening.

During the evening of 8 September, Paul was active from a local hilltop site (JO30) running 5W from a Yaesu FT-817 transceiver into either a 2-element 144MHz HB9CV antenna or the 6-element 430MHz WA5VJB Yagi. Having worked a few stations on the 144MHz band (his best DX being the station of G1JKX at 677km) he moved up to the s.s.b. section of the 430MHz band. A few G-stations were worked but most exhibited deep and slow fading on their signals.

Pointing the small Yagi towards Scotland he then heard the station of GM4ZUK/P (IO83) who was worked with reports of 53 being exchanged in both directions over an 880km path. This just goes to show that interesting results can be achieved on the v.h.f./u.h.f. bands even with relatively simple QRP equipment by choosing a good operating location and following the propagation forecasts. Paul hopes that more Amateurs will discover the WA5VJB Yagi designs and spend an evening or two making a cheap but effective antenna.

DEADLINES

That's it again for another month. Good luck with your DX contacts and please let me know what you managed to hear and work on the v.h.f. and u.h.f. bands. Send your reports or news, preferably by E-mail, to reach me by the last weekend of the month.

Reference 1: WA5VJB Yagi - **www.clarc.org/Articles/uhf.htm** and **www.fredspinner.com/W0FMS/CheapYagi/vjbcy.html**

73 David G4ASR

HF HIGHLIGHTS

CARL MASON GW0VSW
12 LLWYN-Y-BRYN
CRYMLYN PARC
SKEWEN
WEST GLAMORGAN
SA10 6DZ
Tel: (01792) 817321
E-MAIL: carl@gw0vsw.freeserve.co.uk

REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

I begin this month's column with news of a test that took place in September with the help of *PW* reader **Tony Dolby F5VBY/G3TZH** whose location is Tarn-et-Garonne in South West France. Tony has known Australian DXer **Ian Williams VK3MO** in Kyneton, Victoria for sometime and was more than keen to help Ian with a test to check just how well his stacked 4x Tele mono band quads erected 73m (240ft) above ground were working. Tony also wanted to see how low his power could be dropped and still put out a readable signal!

Tony used his Ten-Tec Jupiter transceiver, which has a very accurate 'software based' S-Meter and a KLM KT34XA 6-element tri-bander at 49m (160ft) above a ground system, that just happens to be water, for the tests. Ian had arranged to use a calibrated attenuator for checking his antennas performance on 14MHz and started testing at just 100mW on the 13 September at 0625UTC dropping his power down in 10dB steps with Tony noting the received signal strengths. His final step was to **100 microwatts** and the reading was still 5/4 on Tony's S-meter.

The tests were also witnessed by **Frank Clerk VK7CK** in Deleraine, Tasmania, **Neville Newham VK6VU** in Byford, Western Australia and here in the UK by **Norman Fitch G3FPK** in Purley, Surrey who was also able to make a note of Ian's signal strengths. Now, I know that many of us have to make do with very simple antennas for our h.f. activities, but the tests show what can be achieved with a good antenna system and very low power. It would be interesting to know how many miles-per-watt were achieved here! Next time you operate, try dropping the power a little and see what difference it makes to your received reports. You may just be surprised at the results!

DX NEWS

On to some DX news now and to Trinidad IOTA SA-011 where **Bernd 'Ben' Och DL6FBL** will operate as **9Y4ZC** during the **CQ WW DX CW Contest** on 27-28 November as a Single-Op/All-Band/High-Power entry using two Tri-banders, a 2-element 7MHz beam and verticals for 1.8 and 3.5MHz. You can get a QSL direct via **Bernd Och, Hammelburger Str. 10, D-36039 Fulda, Germany**. For the latest updates, watch his web page at **www.dl6fbl.de/9y4zc**

Over in India **Binu VU2NGB** will be active as **AT0B** from his QTH on Vypin Island 3km west of the city of Cochin, Kerala State in the southern part of the country during the same contest as a Single-Op/Low-Power entry. You will find him on the key around 7009/14019kHz and you can QSL direct to: **PO Box 2235, Sydney, NSW 2001, Australia**.

Presently Binu, who is a very keen DXer, is using a QRP transmitter (a.m./c.w.) with an analogue BC receiver and an inverted 'V' antenna fixed between two coconut trees. On 7MHz he currently has more than 65 DXCCs entities in his QRP Log and 25 countries confirmed so far. He does operate on 14/21MHz when conditions allow.

In Australia on Christmas Island OC-002 will be **Charlie W0YG** and **Dr Burt Myers W0MY** (ex-W0RLX) who will be active using the call **VK9XG** from 22 November until the 9 December. Burt will return to the States on 2 December, but Charlie will carry on a solo operation until 9 December. They will also be active in the CQ Contest and probably be on one of the low bands with a single band entry. Outside the contest they will concentrate on the lower bands and RTTY but there will be some activity on other bands when they are open and possibly using s.s.b. as well. They will have two stations running while they are there and you can only QSL direct to: **Charles Summers Jr W0YG, 6746 N Yucca Trail, Parker, CO 80138, USA**.

YOUR REPORTS

On to your reports now and the first one is from **Ted Trowell G2FRY** on the Isle of Sheppey in Kent who tried the lower bands as conditions "seem to have improved" this month. His 1.8MHz contacts included OY1CT (Faroe Islands) EU-018 at 2110 and slightly later OY/DL2RMC at 2122UTC. Moving to 3.5MHz Ted found OY/DL2RMC once again adding him to his log around 2130UTC 'on the key' using an Icom IC-723 with a G5RV antenna.

In Scotland **Jim Pedley GM7TUD** in Dumfries has been hearing plenty of good DX on 7MHz this month. He says "Around 0430UTC I have been hearing plenty of Australian (VK) and New Zealand (ZL) stations operating with good signal strengths though my XYL would kill me if I started calling to them at that time in the morning. A new double garage may have to be modified to accommodate my shack in the near future so I can begin to operate in the early hours"!

Missing the early morning DX Jim tuned up on 10MHz later in the evening and worked all c.w. stations 4U1ITU (ITU Geneva) 1946, YU8/DL2JRM (Yugoslavia) 1949, UT7FA/P (Ukraine) on EU-182 at 2000 followed later by F5JOT/P (France) on EU-159 2221 and GM4RQI/P (Scotland) at 2247UTC.

The 10MHz band was also worked by Ted G2FRY whose logbook lists contacts with 8Q7GA (Maldives) AS-013, QSL via DL3GA, ZA/Z35M (Albania), JA1MRM (Japan) in near Tokyo AS-007 and UA0SR (Asiatic Russia) between 1099 and 2100 followed by 5W QRP contacts with UA2FX (Kaliningradsk), OY/DL1RTL (Faroe Islands) and ZB2FX (Gibraltar) around 2110UTC.

THIS MONTH THERE'S A READER TEST AND PLENTY MORE DX NEWS FROM CARL

THE 14MHz BAND

In Northern Ireland **Peter Lowrie MI5JYK** from Newtonabbey used his Roach Pole vertical antenna in his parent's garden connected to a MFJ-9420 QRP s.s.b. transceiver to work PJ2P (Netherland Antilles) SA-006 for a new country at 1120, RA9CCW (Asiatic Russia) 1448, 9K2HN (Kuwait) 1533, UN7QF (Kazakhstan) 1543, a large number of American calls including W0YR (USA) in Round Hill, Virginia at 1617 and EX2M (Kyrgyzstan) 1658UTC.

Peter said "I used my **GI7JYK** call for a change, which I still keep active for my v.h.f. contesting! Conditions seem pretty average when I operated with some strong signals coming from Europe and Asiatic Russia in particular. It was good to hear Japanese stations calling on the band with signals peaking S7 at times though they all had large pile-ups, which were hard to crack with such low power! That aside, I was very pleased with my log using such a simple station".

New reporters **Paul Western 2W1AED** and **Russell Hark 2W1RSS** operated /Portable from Clocaenog Forest at 500m above sea level near their home town of Ruthin in North Wales. Their equipment consisted of an Icom 706 MkI and 50W to a quarter-wave whip fixed to their car with a mag mount. This set-up certainly worked well as T98LBC (Bosnia-Herzegovina), 4B4B (Yugoslavia), R8SRR (European Russia) and OE/DL4NN (Austria) all made their log between 1600 and 1900UTC.

THE 18 & 21MHz BANDS

On the 18MHz band 2W1AED and 2W1RSS reached further afield logging NL7KF (Alaska), K6SMF (USA) in Canoga Park, California, KB1EEQ/M (USA) in Plantsville, Connecticut and 9V1RH (Singapore) AS-019 with a 5/3 report between 1630 and 1800UTC. Very good going with just a small mobile antenna!

The 18MHz band also had a good deal of attention from another keen mobile operator **Mark Taylor G0LGJ** in Dereham. Using his Yaesu FT-100 at 100W and Outbacker antenna Mark had voice contacts with F8DNX (France) 0836, 9H3BW (Malta) EU-023 1300, UN8GF (Kazakhstan) 1608, WA2UGT (USA) in Park Ridge, New Jersey at 1722, EA/G0WHX (Spain) 1755, CU7DC (Azores) EU-003 1837, RA3AL (European Russia) 1846, SV1EIA (Greece) 1851 and YO4QZ (Romania) at 1853UTC.

In Nuneaton **Chris Colclough G1VDP** used a Yaesu FT-897 and Cushcraft MA5B beam to log daytime contacts with 5N9NDP (Nigeria), VR2XMT (Hong Kong) AS-006, OX3HX (Greenland) NA-018 and IF9/I5RFD (Italy) on Maritimo Island EU-054. Chris said in his report, "I have found the bands to be quiet, and when the good DX is on the multi kW stations are all over them like a rash. Probably the best DX for me this month would be the VR2 as it is the first time I have worked Hong Kong"!

On to 21MHz now and to Chelmsford in Essex where **Rob Hastings M3AHH** also found conditions 'much better' this month as CT3MD (Madeira Island) AF-014 and R6SRR (European Russia) made it into his log around 1520 followed by VU2SWS (India) in Bombay at 1630UTC.

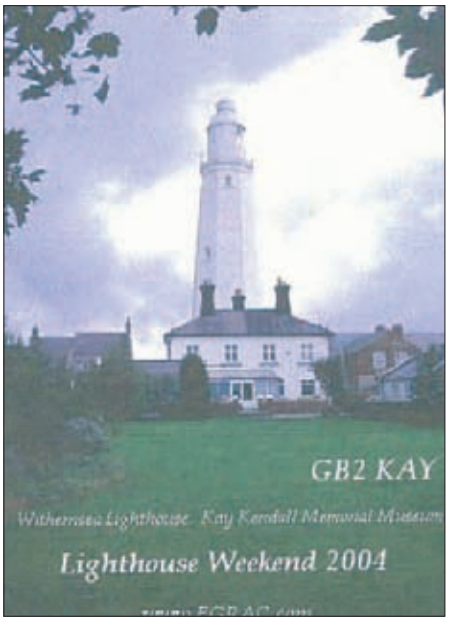
Meanwhile, **David Cowie GM8KSJ** in Kelty, Fife used a Icom IC-730 at 60W to a home-brew vertical to work s.s.b. stations VR6MX (Pitcairn Island) OC-044 at 1235 followed slightly later by 9H3YM (Malta) EU-023 at 1445UTC.

Also on the 21MHz band was **Martyn Medcalf M3VAM** in Chelmsford who used his Icom IC-746 at 10W and a long wire antenna to reach ST2T (Sudan) 1031, ZX2B (Brazil) 1043, JA2ZJW (Japan) at 1357, KQ2M (USA) in Newtown, Connecticut at 1417, UU7J (Ukraine) 1431, VE3AT (Canada) in Islington, Ontario at 1514 and LY7Z (Lithuania) at 1611UTC. Martyn says "I was so pleased to contact the JA station. He was calling CQ for a long time without success so I gave him a call and he came straight back to me with a received 5/8 report. It just goes to show being in the right place at the right time helps"!

Jim GM7TUD also found plenty of good s.s.b. DX throughout the day including V55O/P (Namibia) 0815, 6M0MM (South Korea) 1020, 8Q7JF (Maldives) AS-013 1036, OD5UH (Lebanon) 1104, 3B8/G4FKH (Mauritius) AF-049 1118, A92GR (Bahrain) AS-002 1347, V8ASV (Brunei) 1436, EM1HO (Ukraine) 1441, TU2MP (Ivory Coast), YB9BU (Indonesia) on OC-022 1444, 4E72BP (Philippines) 1538, VP8LGT (Falkland Islands) SA-002 1700 and S79OA (Seychelles) AF-024 at 1724UTC.

Tony Dolby F5VBY/G3TZH's shack in Tarn-et-Garonne in South West France.

Tony Dolby F5VBY/G3TZH's antenna.



GB2KAY QSL card from Mario Brashill M5EXY, Chairman of the East Greenwich Radio Amateur Club, which had a very successful International Lighthouse/Lightship weekend in August, making over 600 contacts arond the world in two days, plus 57 lighthouses or lightships themselves.

THE 24MHz BAND

With a switch to 24MHz Rob M3AHH found SP5HRX (Poland) calling CQ at 1515 and later 4X4FR (Israel) at 1550UTC and there was a brief visit here for both Ted G2FRY who had a short c.w. QSO with 5U7JB (Niger) at 1900UTC and Jim GM7TUD who worked EA8/IK1JPV (Canary Island) AF-004 on s.s.b. at 1540UTC.

SIGNING OFF

Band conditions have improved somewhat this month, though at the times I was able to listen the openings were very sporadic. When these openings did occur I heard strong signals from all parts of the globe, particularly Asia and South America, which is not so normal for me at my QTH! This month's reports show just a small selection of the countries that were active according to the DX Clusters here in the UK. It is particularly nice to see those of you using simple antennas and transceivers working some of this DX. Keep up the good work!

As usual my thanks go to all our reporters for their logs and to **Tedd Mirgliotta KB8NW**, Editor of the *OPDX Bulletin,* for all the DX information. Until next time have a good DX-filled month.

73, Carl GW0VSW

Ian Williams VK3MO's rotator.

Australian DXer Ian Williams VK3MO's antenna.

AS USUAL, INFORMATION, REPORTS AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

DATA BURST

ROGER COOKE G3LDI
THE OLD NURSERY
THE DRIFT
SWARDESTON
NORWICH
NORFOLK NR14 8LQ
TEL: (01508) 570278
E-MAIL: rcooke@g3ldi.freeserve.co.uk PACKET: G3LDI @ GB7LDI

ROGER G3LDI LOOKS AT RTTY CONTESTING AND TWO NEW INTERFACES

The practice of RTTY contesting is becoming more popular than ever now that the mode is so easy to operate. Prior to the PC era, RTTY enthusiasts had to find a teleprinter and make a Terminal Unit (TU or Modem) and then modify the transmitter to enable frequency shift keying (f.s.k.) of the v.f.o. The teleprinter had to be set-up, all the adjustments made, cleaned and oiled ready for the contest.

Lots of paper was used in the contest and all the contacts had to be transposed to the contest log and the station log. All this was a very laborious and time-consuming task, but was undertaken as a matter of course. One contact could take up to five minutes to complete, depending on readability and skill of the typist operating the teleprinter!

Now, the mode consists of a PC, a simple interface (or a complex interface if all modes are catered for) and a suite of software. The most popular of these is the *MMTTY* and *Writelog* combination. Using these two programs, it's quite possible to make four or five contacts per minute under pile-up conditions if the operator is in 'run' mode.

A click on the first character of the call puts it into the log, the serial number is already in there for the transmitting station of course. Then another click on the received serial number and one key on the keyboard enters the QSO into the log and automatically sends a TU and a QRZ. I can even eat breakfast while running a pile-up like this! Not only that, but the call is highlighted in yellow for a new multiplier, green for a new station or brown for a previous QSO.

Using the combination described I have sent entries for several contests in 2004 and have done quite well so far, considering I haven't entered a major RTTY contest for years. It really is good fun and it's surprising what can be worked.

For example, in the CQWW contest I ran a 3.5MHz only entry as I didn't have much time. I still made 341 contacts including VK6HD, HC8A in Galapagos and a few other nice ones, plus about ten American states!

If you consider entering make sure you set-up the gear correctly. Using f.s.k. is the way to go, as this enables the transceiver to utilise the narrow filters. I use the 250Hz filters and also have a W9GR DSP 3 for that little extra selectivity. It's difficult to get used to tuning the band with this amount of selectivity but it pays.

If you use audio frequency shift keying (a.f.s.k.) please make sure that this is set up correctly. There are some horrendous signals around using a.f.s.k. and an overdriven signal is really dreadful.

However, it is a great way of gaining contest experience, having a lot of fun and also grabbing some new countries, so have a go, I can guarantee you will enjoy it.

MICRO KEYER

Jozef OM7ZZ is the designer of the new USB Micro Keyer - the microHAM. This is a keyer designed for c.w., f.s.k. and radio control over a single USB connection to a computer. It also has mic/soundcard/radio audio switching capabilities for s.s.b. (plus PSK31 too and an abundance of other features as well).

It's important to note that the *microHAM USB Device Router* software must be running at all times when using the keyer. The drivers must also be installed before the software that runs the keyer. The Micro keyer comes with a CD with all the necessary software and drivers, together with a set of set-up instructions. Once this is done, the keyer can be plugged into 12V, possibly on the transceiver as a source for such devices and also the radio's RS-232 port, the f.s.k. connection and also c.w. and mic connections too if needed.

Setting the keyer up for all-mode operation can be time-consuming but is not too difficult and there is plenty of help around. There is not enough room in my column to cover this unfortunately! See **Fig. 1** for a picture.

ANOTHER INTERFACE

The EZ-Master is a more sophisticated and hence more expensive type of interface than the Micro Keyer. Looking at **Fig. 2** you can see that it's larger, approximately the same width as the Icom IC-756PRO.

Featuring a CMOS microprocessor and a non-volatile RAM chip for a full featured, all mode, multi-purpose interface the EZMaster is a complete device. It's ideal for DXers, contesters, DXpeditioners and casual operators, reducing the required amount of wiring and cabling while contributing to clean up the shack desk.

EZMaster includes an unnumbered list of features, combining Voice Keyer, c.w. Keyer, Band Decoding devices, Radio Interfaces, all-mode SO2R switching, USB interface and three operation modes all managed with a simple command protocol.

SOME OF THE EZMASTER FEATURES ARE:

* Single USB port for PC connection (RS-232 ports are also available for older PC)
* Comprehensive SO2R, Two Radio Switching
* Hi-Quality, 75 sec. Digital Voice Recorder/Player, with static Memories.
* *WINKEY*® c.w. keyer included
* External Keyer Port
* Two radio TTL level control interface CI-V – IF232, compatible with all major radio manufacturers (Icom, Yaesu, Kenwood and electrically compatible with most of the others)
* Twin Headphone, two radio, two headphone feature, allowing two operators simultaneous RX, for multiplier hunting or split operation
* Two microphone insulated output ports
* Audio insulated interface for a.f.s.k., RTTY, PSK31 or any audio digital mode, with two-radio support
* 3-way RS232 c.w. interface
* Parallel Port interface for c.w., Band Map, SO2R and p.t.t. line
* Two, 16 lines Band Map Port, allowing a programmable output for both radios simultaneously with the flexibility to define any configuration for both radios and RX-TX status
* 32 relays add-on card for high current Band Map Port output (Optional)
* RTTY f.s.k. RS-232 interface with 2-radio support
* Two Generic RS-232c port for TNC, Rotor or Radio connection
* Four, independent, p.t.t. Output lines
* Two f.s.k./a.f.s.k./p.t.t./RTTY insulated output ports
* External, user configurable, 32-keys keypad (optional)
* Three operation mode, allowing full backward compatibility with legacy application
* 8-bit Microprocessor c.p.u.
* Two power sources available, external or USB with power down feature.

The EZMaster has a centre display and two

● Fig. 1: The Micro Keyer (see text).

● Fig. 2: The EZMaster is larger than the Micro Keyer at approximately the same width as an IC-756PRO (see text).

SOME FEATURES OF MICRO KEYER

COM nor LPT port necessary, just one USB port and soundcard

Complete "Computer <-> Radio" electrical isolation
- bi-directional transformer isolation of soundcard and rig-optical isolation of ALL digital signals -> Radio Control, c.w., 2 x p.t.t., f.s.k., PA from USB port

Compatible with most standard MS *Windows* based logging or control software
- special *microHAM USB Device Router* program creates as many virtual COM: ports as needed for full functionality with your favourite programs
- customisable presets to instantly change Micro Keyer parameters for the various requirements of different programs

Integrated computer control port for all radios CI-V, FIF-232, IF-232, RS-232
- fully supported Icom, Kenwood, Ten-Tec, Yaesu and other radios

Integrated superior K1EL *WinKey*™ chip with extended capabilities for superior c.w.
- front panel speed knob
- nine (9) user programmable memories
- PS/2 keyboard/keypad support for direct c.w. sending
- PS/2 keyboard/keypad support for instant c.w. message playback and function handling PS/2 keyboard/keypad c.w. works without computer connection
- auto p.t.t
- selectable side-tone
- all parameters are stored inside the *Micro Keyer* memory and reloaded after power up

FSK keying output
- capable of sending 5/6/7/8 bits and 1/1.5/2 stop bits
- support for PS/2 keyboard for direct RTTY typing without computer connection

Unique Mic/Soundcard/Radio audio switching
- configurable audio priority microphone routing for s.s.b./Contest/SSTV
- two audio outputs, one for radio front MIC IN and second for rear LINE IN
- front panel audio level control knobs for setting both the computer and radio levels

Independent keying buffer for Power Amplifier
- extended range solid state output for modern PA or QSK
- relay isolated output capable to key vintage PA with negative keying

Footswitch input with programmable functions
- programmable p.t.t. assertion delay in 1ms steps
- selectable muting of c.w. and/or f.s.k. when footswitch is closed

Second programmable p.t.t. output for extended keying capabilities
- PTT2 output for digital modes with muted mic

Hot Switch protection with user defined timing
- T/R sequencer for p.t.t. keying outputs

No external power adapter
- Computer part is powered from USB.
- Radio part is powered from transceiver or transceiver power supply

Strong RFI immunity
- integrated chokes and filters for best r.f.i. immunity
- advanced shielding and circuit design for r.f.i. product suppression

Quick change connectors
- Computer USB., Soundcard 3 x 3.5mm (1/8") RJ45 microphone, Radio DB37
- Radio DB37, Microphone RJ45
- Paddle - 1/4in, PS/2 - MiniDIN6, Footswitch - RCA, Amplifier keying - RCA

Dual-colour l.e.d.s for easy visual feedback of c.w./f.s.k. and PTT1/PTT2

l.e.d. sections for various status indications, two microphone and headphone connections and is comprehensively menu driven.

The back panel of the EZMaster is daunting! There are 28 connectors for various installations and this enables the operator to keep the desk free of wires! The unit comes with a 45-page manual and a CDROM with all relevant software for installation. However, a cursory glance at the book tells me that it is not a unit to be used by the faint-hearted and very strict RTFM (Read The Flippin' Manual) techniques should be adopted prior to use!

The main feature of EZMaster is an 8-bit c.p.u. processor managing the data flow from six serial port and several external devices. Data received from the USB, COM and LPT Port or the external keypad, are processed and executed in parallel tasks, driving the requested function, as DVK Processor, Winkey, Radio Interface, p.t.t./p.t.t. Delayed line, c.w. interface, f.s.k. interface, A/B line and the Antenna Matrix Data Processor.

The basic operations of EZMaster are defined within each operation mode: standard, extended and advanced. In the standard mode, a full compatibility with the old fashioned communication way is maintained. Data coming from parallel port USB or RS-232 port are managed to take advantage of EZMaster interface capabilities, as 4 DVK message play, c.w., p.t.t., A/B, Antenna Matrix Data interface and radio interface routing.

The Extended mode of operation shares the same input ports, while the user can configure the DVK message to play, the delay between both Radio PTT, and the Antenna Matrix Profile to associate with the Antenna Matrix Data input.

The Advanced Mode takes advantage of the c.p.u. command mode interface, that allows, through the usage of the USB port, to take full control over EZMaster, thus cancelling the need of extra add-on ports/boards, while allowing a full and complete access to the EZMaster functionality at the deepest level. The sort of sophistication offered by the EZMaster really justifies a full review but I don't think either the Micro Keyer or the EZMaster are available in the UK as yet. However, I can see both finding a market.

That's all for this month. Don't forget to keep your news and views coming.

Roger G3LDI

IN VISION

GRAHAM HANKINS G8EMX
17 COTTESBROOK ROAD
ACOCKS GREEN
BIRMINGHAM
B27 6LE
E-MAIL: g8emx@tiscali.co.uk

GRAHAM G8EMX REPORTS ON THE RECENT LEICESTER SHOW, INTERNATIONAL ATV AND REPEATER NEWS

I am writing this months's ATV column 'portable', as it were, at the British Amateur TV Club (BATC) table at the Leicester Amateur Radio Show, Donington Park. **Donna Vincent G7TZB**, my sub-editor, is only a few wavelengths away helping to staff the *Practical Wireless* display further down the hall!

During a busy two days BATC members came to renew their membership - one choosing to take the four year option – thanks! Other visitors expressed their views on ATV and the club, some passed on ATV news items – I'll mention those later. An amusing exchange occurred during the Friday – a visitor asked about the 24cm (1270MHz) antenna adorning the table: "Is it for sale?", "No" I replied. "What's it here for then?" – "Well, it's a Show, so I'm showing it".

INTERNATIONAL ATV CONTEST

But enough of 'portable news gathering', how about some portable ATV? The International Amateur Television contest took place during the weekend Saturday 11 to Sunday 12th September and I was determined to be on-air for this, even if only to get a perception of what activity was about. But first, a free-standing STABLE mast structure was needed.

Supporting a portable antenna can be a problem. The station is usually set-up in a field, or a hilltop, and for ATV at least two antennas are required. A 2m (144MHz) one for initial contact and a 24cm or higher for the actual pictures, plus a rotator (sorry, I don't consider the 'armstrong' method to be reliable **or** convenient!).

But this all means weight and wind resistance. Tripods, guyropes, I've tried them all! Then a triangular lattice tower was cut in half, down to about two metres, three extending wooden feet ensure freestanding stability, the tower is manually liftable, fits into the car, easily carries the rotator and as many antennas as needed!

At 226m above sea level, Barr Beacon is the highest assessible point near to Birmingham, with clear views in most directions but no overnight camping is allowed, so I arrived with caravan, kit all around at 0700 hours on the Sunday. For a contest you really do need to be able to rotate that antenna, often. The 'armstrong' method is very inconvenient, but a rotator needs 240V mains.

I had bought a new Telford rotator, I also had an inverter and a fully-charged caravan leisure battery. Antenna mast, rotator and 2m plus 24cm beams were assembled, mounted and rotated.

The first thing was to listen on the 2m ATV calling channel, 144.750MHz. Nothing.

Eventually, I heard **Vivian Green G1IXE** and the Severnside ATV Group operating from the Mendips. The contact and chat on 144MHz was okay but when I tried to receive pictures, nothing was seen.

During the rest of the morning I frequently rotated the antennas, listening on and around 144.750MHz - no other contest stations were heard. I did manage to hear and send pictures to some familiar calls in Wolverhampton and Telford, then, disaster struck! The receiver's tuner started to feel warm and there was no tuning voltage (always take a multimeter with you).

● A visitor to the the BATC table at Donington finds his Icoal ATV repeater on the big map.

● The 'Keylite' computer to TV video converter available from Maplin stores.

So, even from a good high clear Midlands location, I only heard one contest station. **Richard Parkes G7MFO** the BATC Contest Manager later told me that he had received a few contest logs so there evidently were some other ATV stations about!

The contest timing was between 0700 GMT on the Saturday to 1300 hours, on the Sunday and has been for many years. Now, this may have been fine when there were many ATV stations on 70cm (430MHz) and able to achieve good contacts from their homes, but with activity now substantially migrated to the microwave bands this drives keen ATV contest stations up to hilltops – a significant undertaking, particularly if operating overnight.

● Graham's shortened lattice tower with bolt-on wooden extension feet, assembled on-site.

Maybe it's time that the timing was reviewed, perhaps midday to midday or to include the Sunday evening? Richard explained that any requested changes would have to be addressed to the International Contest Managers.

COMPUTER TV

Watching TV on the computer is becoming popular, with TV tuner cards and the like, but of course I wanted to do it the other way round – watch my computer on the TV! I needed a composite PAL version of whatever was on my monitor, to feed to an ATV transmitter of course, or record onto a VCR.

There are video cards with 'TV Out' but the latest Maplin catalogue shows a vga-to-composite video converter, which is powered from one of the PC's u.s.b. ports. The computer vga signals plug-in, the 'AverMedia Keylite' produces composite PAL and s-video out while glowing a delicate shade of red! Not a lot more to say really, it 'does what it says on the box', the Keylite is absolutely 'Plug and Play'.

The computer image appears on the monitor and TV simultaneously. There are now three Maplin stores in my locality; the new branches in central Birmingham and Solihull are only a cycle ride away, eliminating the torturous drive to Erdington.

NEWS ROUND-UP

Some short items of ATV news now. Southampton repeater **GB3AT** is due to move to the Isle of Wight early in 2005, to be co-sited with **GB3IW** (70cm voice) and **GB7IW** (packet node). For more information contact **Simon G1VGM** on **0983 811 766**.

A new 10GHz ATV repeater (**GB3VL**) is expected to be operational in Lincoln very soon. Northampton ARC, the third oldest radio club in the UK, is planning an ATV news transmission from its club premises through the local repeater **GB3MV**. The club has three cameras available for the vision and a PC ready to provide graphics.

Finally, the Fens ATV Group, formed by Radio Amateurs in Lincolnshire, Norfolk and Cambridgeshire, has put cross-band ATV repeater **GB3FV** on air. Sited near Wisbech, 'FV receives on 2390MHz (13cm) and outputs on 1312MHz (24cm).

See you next time, please send any ATV news, especially repeater changes or developments, to me at **g8emx@tiscali.co.uk**

Graham G8EMX

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HMM-K HC4/5 Ken hand mic	£74.95
HMM-Y HC4/5 Yae hand mic	£74.95
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Adonis FX-10	£59.95

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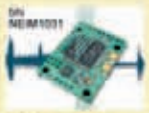

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NES1061 817 brd inc fitting	£115.95
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0-15VDC
30/35A Peak
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13.8VDC
25A Switchmode
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W-25AM 25A Supply	£89.95
W-10AM 10A Supply	£59.95
W-5A 5A Supply	£29.95
W-3A 3A Supply	£22.95
W-25SM 25A Supply	£79.95
W-10SM 10A Supply	£49.95

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GZV-6000 60A Supply NEW	£299.95
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* Imp - 50 Ohms
* LCD readout
* 10-Digit display

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Bands 6m/2m/70cm
Gain 2.15/6.2/8.4dB
Power 200/W (50W 6m)
Type 1/2 .2x8/8, 4x8/8
Length 2.5m
£69.95

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W-300 2/70 Base	£64.95
W-2000 G/2/70 Base	£69.95
WBV-70 4m 1/2 Wave Base	£39.95

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Butternut HF-6V
Bands: 80/40/30/20/15/10
Height (Ad): 26 ft (7.9 m)
Weight: 12 lbs (5.4 kg)
Impedance: Nom 50 ohms
VSWR: 1.5:1 or less
£299.95

Butternut HF-2V 40/80m	£229.95
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Butternut HF-9V 80-6m	£349.95
Butternut HF-5B 20-10m	£319.95
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A-17-12 17&12 ad for HF6V	£49.95
A-6 6m ad for HF6V-X	£14.95
TBR-160S 160m HF2/6/9V	£114.95

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Hustler 5-BTV
5 Bands - 80-10m
Height 7.64m - Weight 7.7kg
SWR 1.15:1 - Power 1kW
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Hustler 4-BTV 4 Band Vert	£149.95
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HF20FX 20m Mobile	£39.95
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X200 Base 2/70	£84.95
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X510 Base 2/70	£124.95
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A4S - 20/15/10 Yagi	£569.95
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M-285 5/8 2m Mobile	£13.95
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SG-7900 2&70 Mobile	£31.95
CR-627 6&2&70 Mobile	£33.95
X-200 2&70 Base	£58.95
X-300 2&70 Base	£63.95
X-510 2&70 Base	£98.95
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LA-STNM Bal Super Tuner	£345.00
LA-STWM Bal Super Tuner	£395.00

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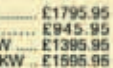

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Icom IC-271E 2m multimode £299.00
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Icom IC-728 Mobile/Base £400.00
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The Secret of Learning Morse Code costs **£6.95 plus £1.75 P&P UK**, **£2.75 P&P overseas**. To order call **0870 224 7830** or post your order using the order form on **page 73** to: **Book Store, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**. Remember to include your payment (in Sterling, cash not accepted), name, address and telephone number with your order.

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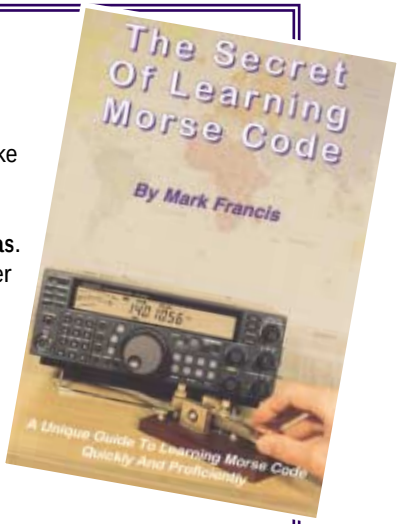

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topical talk

The letter from Andrew Buxton in this month's letters pages has stirred Rob Mannion G3XFD into action. He's aiming to recruit readers to help those who lack the traditional radio junk!

Mining for goodies in Mayo! This photograph was taken at the Mayo rally in Knock, Ireland during Rob EI5IW/G3XFD's visit in 2003. Join him there this year and bring your Euros and a large empty car boot.

The term Junk Box is rather unfortunate when you consider what's to be found in most of them! In fact, although the term junk has become the traditional way of describing recovered components, useful bits-in-waiting and those odd items we've purchased at rallies, in reality the better term would perhaps be stock. However, that's not very romantic is it? Junk box seems much more suitable and I'll stick to that!

I met **Andrew Buxton** at the **Hillcrest Amateur Radio Society**, at Dudley in the West Midlands, when I visited them on the evening before the **Leicester Amateur Radio Show** (LARS). During the very successful evening at the Society, where I was made very welcome, I invited questions and Andrew responded! In fact, the Question & Answer session was very lively and it was here that he raised the topic, which now features on the letters pages.

Interestingly, at the LARS the next day, which incidentally was one of the busiest I've ever experienced, the question was raised by other new entrants (and those rejoining after a break) into our hobby. Without exception everyone who raised the point expressed their dismay at the difficulties in getting suitable stock for their proposed constructional projects.

It's difficult to describe just how busy I was at the LARS, and at one point I had half a dozen or so keen prospective constructors offering each other advice and discussing the problem between ourselves. It seems that along with bringing a host of new, very keen, operators on to the bands we've also got an increasing number of new entrants who now wish to explore the more technical side of the hobby and also to start building equipment. Obviously, *PW* has to do its bit to encourage any keen constructor.

I resolved to help in every way possible and at the same time to recruit readers to assist other keen radio types to stock and store essential items. This includes traditonal lead-based solder which is due to be phased out in the next few years as its considered dangerous. And, unfortunately for us, the replacement lead-less substitute does not yet seem to have a good reputation.

Radio Basics

To help the many readers who need help in filling their junk boxes I'm planning to devote the entire February (published in January) edition of Radio Basics to the subject. The ideas will be to point you in the direction where essential radio bits and pieces can be purchased. Obviously, I'll be providing advice on rallies and the specialist advertisers we know of, but there'll be a special place for all the information that you, the keen reader, can provide.

So, I'm asking for your feedback (as soon as possible please) as many of you will know of sources that we don't down here in Dorset. How about that corner shop in your town? It's packed with difficult-to-find bits, so why not share the information? And how about that small metal works, which has a lot of off-cuts of aluminium - perhaps they might sell the scrap to constructors?

Many of the smaller traders don't advertise at all, they're quite content to only attend rallies and shows. But we need their services! We all see them but where are they based? Perhaps you know of some who might be prepared to offer a mail order service. Let's make the RB Constructors Junk Guide an essential service. So get busy, write or E-mail me and together we'll help everyone, including ourselves, to maintain the essential supply of components, chassis metalwork, spare, semiconductors, p.c.b. material and recoverable equipment. Over to you readers!

Finally, I should mention that the Knock rally in County Mayo last year provided me with a surprise. I managed to buy an international octal valve base chassis cutter. So, many years after losing my original Q-Max cutter I've got a complete set again. You never know what you'll find. Perhaps I might see you there again on Sunday 21 November? I hope so. **PW**

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