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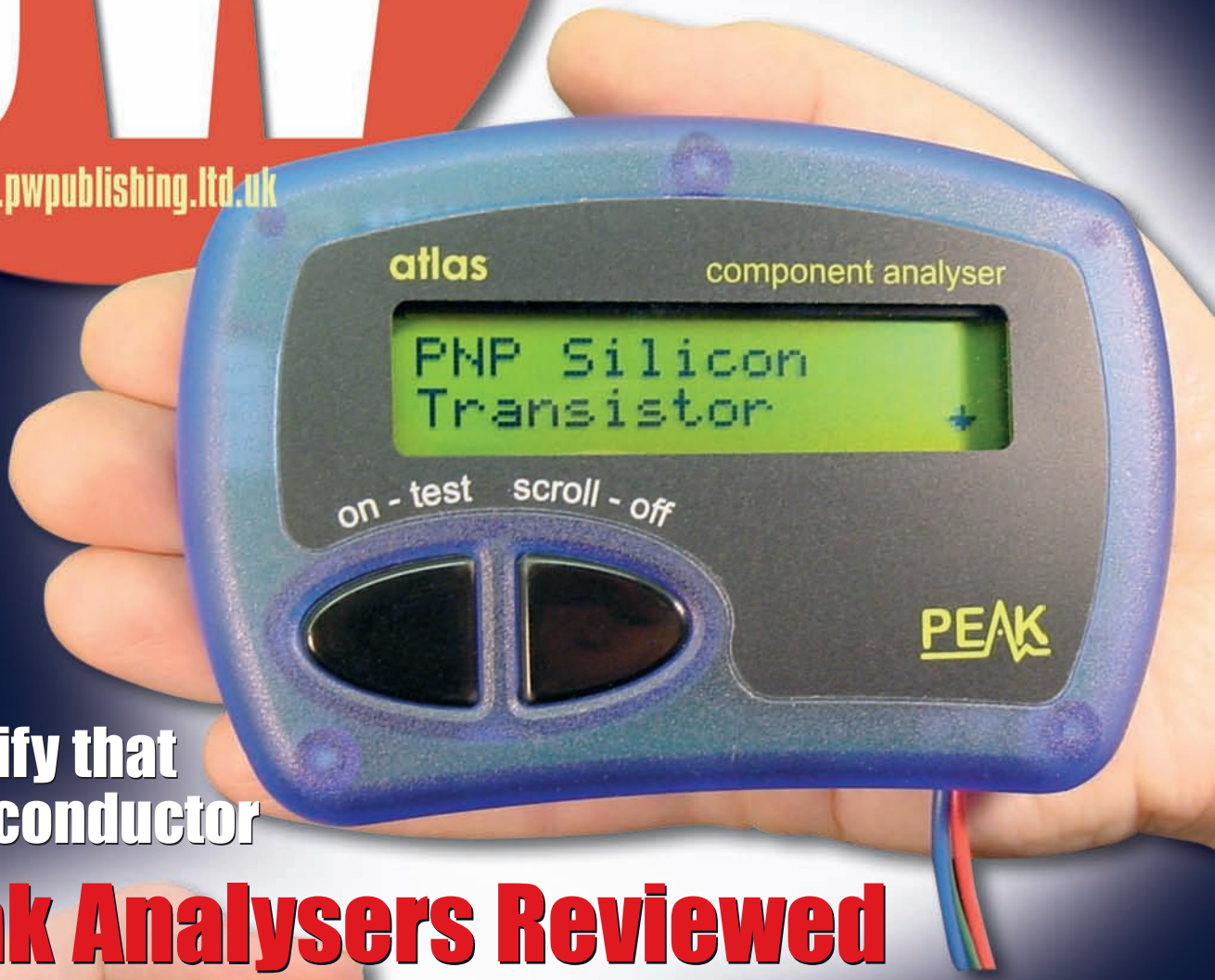
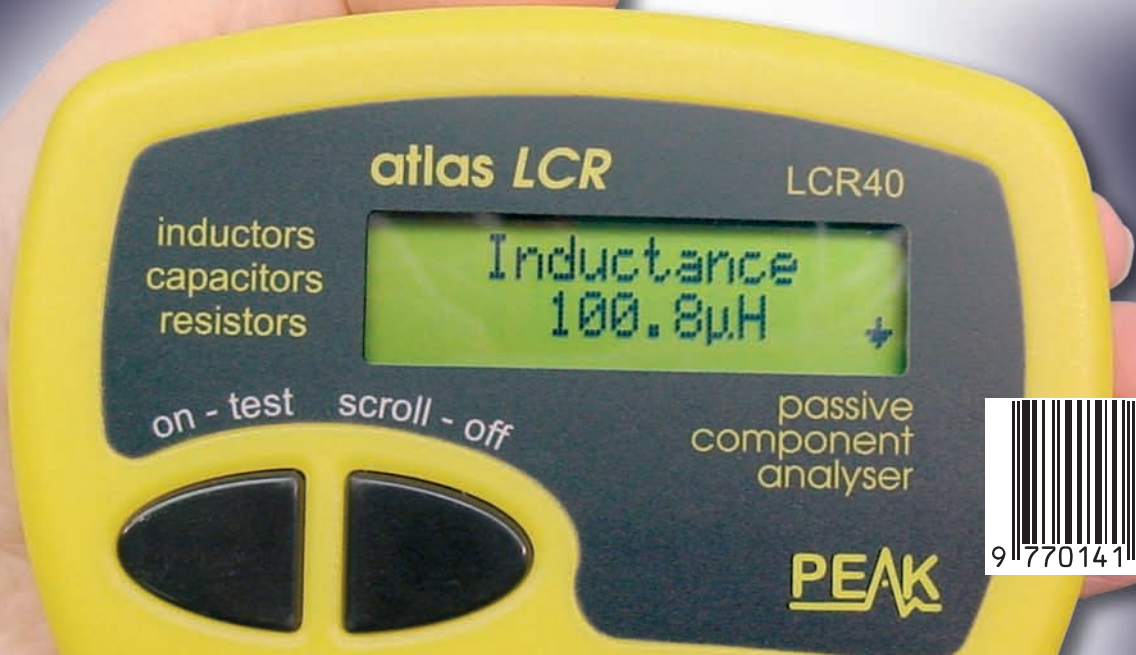


- Identify that Semiconductor

Peak Analysers Reviewed



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YAESU FT-60E NEW — B — save £10

RRP £189
NOW £179

The FT-60E is a new dual-band FM handheld transceiver from Yaesu. It provides versatile 2-way comms with unmatched monitoring.

**Wide band Reception 108- 520MHz & 700-999.990MHz (Cellular blocked)*
**New Emergency Automatic ID System*
**Huge LCD*
**High 5W Power Output*
**Ni-MH Long-Life Battery FNB-83 (7.2V, 1400mAh)*
**Overnight Charger*
**Programmable Keys for user convenience*
**Split CTCSS/DCS and DCS Encode-Only Capability.*

ICOM IC-756 PRO III NEW — C — save £396

RRP £2495
NOW £2099

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 — C — save £270

RRP £1569.95
NOW £1299

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 — C — save £170

RRP £939.95
NOW £769

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.

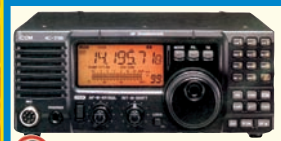
ICOM IC-703 SPECIAL OFFER — C — save £10

RRP £549
NOW £539

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)

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

ICOM IC-718 — C — save £200



RRP £649.95 **NOW £449**

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.

ICOM IC-910X with 23cm — C — save £349

RRP £1598
NOW £1249

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 — C — save £510

RRP £1899
NOW £1389

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 £1799

KENWOOD TS-870S DSP — C — save £349

RRP £1599
NOW £1249.95

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 — C — save £160

RRP £999.95
NOW £839

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 — C — save £550

RRP £2899
NOW £2349

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 — C — save £550

RRP £2299
NOW £1749

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 — C — save £200

RRP £1099
NOW £899

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 — C — save £150

RRP £849.95
NOW £699

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 — C — save £421

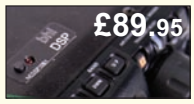
RRP £1420
NOW £999

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 — C — save £200

RRP £689
NOW £489

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



bhi DSP Module now available!
£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 *In Tune with MFJ...*

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 — C — save £10

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

RRP £239

NOW £229

YAESU FT-8900R NEW — C — save £90

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.

RRP £429

NOW £339

YAESU FT-2800M — C — save £20

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

RRP £179

NOW £159

ICOM IC-2200H NEW — B — save £34

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

RRP £233

NOW £199

KENWOOD TMD-700E — C — save £80

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.

RRP £519

NOW £439

OTHER MODELS...

ICOM			
IC-2725E	Dual Band FM Transceiver	£269	C
IC-2100H	2m 55W FM Mobile	£189	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 — B — save £25

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.

RRP £119

NOW £94

ICOM IC-E90 — B — save £40

RRP £309

NOW £269

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 — B — save £35

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.

RRP £164

NOW £129

KENWOOD TH-D7E — B — save £60

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.

RRP £359

NOW £299

KENWOOD TH-F7E — B — save £50

WITH EXTRA WIDE RX COVERAGE

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

RRP £289

NOW £239

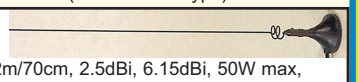
Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

OTHER MODELS...

ICOM			
IC-E208	Dual Band FM Mobile	£219	B
YAESU			
VX-7R	6m/2m/70cm Handheld	£299	B
VX-2E	Dual Band FM Handheld	£119	B
KENWOOD			
TH-G71E	2m/70cm Handheld	£179	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

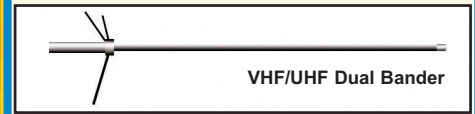
WATSON

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

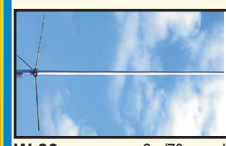


VHF/UHF Dual Bander

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

CHECK OUR WEBSITE WWW.WSPLC.COM FOR MORE DETAILS OF THESE PRODUCTS

WATERS & STANTON

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PRICE MATCH

MFJ-269 ANTENNA ANALYSER

Nothing Else Matches It!

1.8 - 170MHz
410 - 470MHz

* VSWR * Impedance
* Resonance * Reactance
* Coax loss * Distance to coax fault and more!

Operates from AA cells (not supplied) it is totally portable. Connect direct to antenna or to coax. Fault-find in seconds, adjust resonance, create your own design and see the results on the LCD screen. It even tells you how far away any coax short or open circuit is!! Solve your antenna problems in minutes rather than hours.

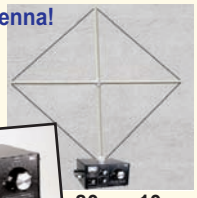
£349.95 C

MFJ-935 LOOP TUNER NEW

At Last - A DX Indoor Antenna!

Can you work VK, ZL and W from indoors?

We did and You can!!



Using a wire loop less than 4ft square!!

80m - 10m
100 Watts

This is the most amazing antenna we have seen in years. Fot optimum results take a wire around 1/5th wave long, bend into square loop (14ft on 20m = 3.5ft square) and attach to MFJ 935. Result: Ultra low indoor noise and VK, ZL & W all on SSB! That's what we achieved in one day's operation! 20m loop works on 15m as well. We hung an 8ft loop over a curtain rail and worked all over Europe on 40m & 30m with S9 reports. And reception is better than most outdoor dipoles. Available around March. Great for QRP and portable as well.

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 circum stances.

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*

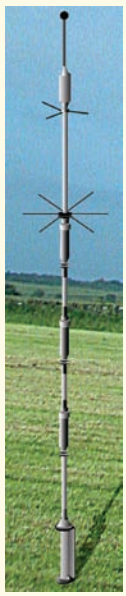
The MFJ-971 is the ideal QRP ATU to have on hand. It incorporates a cross needle SWR meter and displays forward or reflected power and SWR simultaneously.

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. **£169.95 C**

5BTV
80-40-20-15-10m. 7.64m high. **£199.95 C**

6BTV
80-40-30-20-15-10m. 7.3m. **£229.95 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.

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Cover subject

Cover Subject
Something to keep your hands busy! George G3RJV enjoyed using the Peak Analyser - see page 19 to find out why!
Design: Steve Hunt
Photograph: Courtesy of Peak Electronics.

march features

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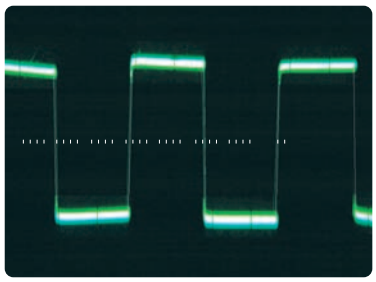

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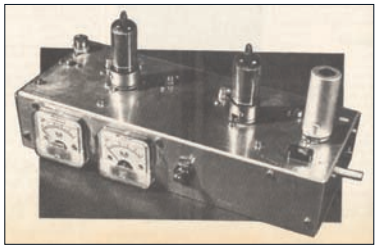

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practical wireless services

Just some of the services *Practical Wireless* offers to readers...

Subscriptions

Subscriptions are available at £32 per annum to UK addresses, £40 Europe Airmail and £49 RoW Airmail. Joint subscriptions to both *Practical Wireless* and *Short Wave Magazine* are available at £61 (UK) £75 Europe Airmail and £92 RoW Airmail.

Components For *PW* Projects

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

Photocopies & Back Issues

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

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **0870 224 7830**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **0870 224 7850**. The E-mail address is **clive@pwpublishing.ltd.uk**

Technical Help

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

rob mannion's keylines

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

As I write this edition of Keylines the year, although young, already seems to be flying by. I really don't know where January has got to! In fact, it seems as though the club visit and rally season is coming up fast.

The first major event I'm planning to attend is the **Junction 28 QRP Rally** on Saturday 19 March 2005. Organised by the **South Normanton, Alfreton & District Amateur Radio Club**, this friendly event is now really establishing itself.

I'll be at the Junction 28 event (so called because you leave the M1 at Junction 28 and head towards nearby South Normanton!) throughout the day. It will be a real pleasure to meet readers, chat about *PW* and to hear your comments, ideas and opinions.

There'll be two people on the *PW* stand at the rally. This is because **Ian Brothwell G4EAN**, from nearby Nottingham, insists on giving up most of his day to help. Thanks for your support Ian! I'm always grateful for Ian's help on the day especially as the support allows me to spend more time meeting readers who may only have the one chance to chat with us once a year. I hope you can make it to the rally, as I'm looking forward to meeting readers in north Derbyshire on 19 March.

Club Spotlight Decision

Working on a magazine such as *PW* requires intensive, sustained effort to meet publishing deadlines. My work as Editor, although thoroughly enjoyable and completely satisfying (thanks mainly to the ever-loyal readers) over the 16 years I've occupied the Editorial chair, is truly demanding. This means as I get older (and slower!) it's becoming obvious that I've come to the stage where some of my work/organising tasks have to be passed on or shared with other people.

One example where I've recently passed on most of the responsibility of organising, relates to the *PW* 144MHz QRP Contest. Here, with his unstinting co-operation, **Dr. Neill Taylor G4HLX**, now has complete administrative control of this popular contest. Neill does a truly splendid job and it seems fitting that the contest he originated is now under his full care.

However, I've now run into other difficulties, entirely due to the lack of hours in the day, trying to organise the *PW* & Kenwood Electronics (UK) Club Magazine Competition. Last year it proved impossible to spare the time to organise the annual competition effectively. This is, despite my support for the competition, due to the fact I must never forget that producing *PW* comes first!

Reluctantly I had to make the decision that the Club Spotlight competition would have to be cancelled for 2004. But as the subject and the reasons for the competition are vitally important, I've decided to run it every two years rather than annually.

Hopefully, those of you who enjoy the ethos of the competition will support my decision. Your support is vital, and I'm always open to suggestions and ideas on this topic. If you think you could help in any way please let me know!

In closing with the news that we'll be promoting the 2005 competition from the June issue, I thank everyone who entered in 2004 and hope that you'll re-enter this year. Thanks also to Kenwood UK for their continuing support, and to the understanding family of the late **Bert Newman G2FIX** who wish to continue supporting the Bert's Bell (G2FIX) trophy. Perhaps it will be soon ringing in your club headquarters? Thank you for your understanding and I wish everyone good luck with the 2005 competition.

Paper Change

You may have noticed that the text paper we've used this month is slightly different. On my travels, and mentioned increasingly in correspondence from our older readers, more and more of you seem to have had difficulty with our glossy paper whilst reading under artificial light. The glare reflected from the paper made reading difficult at times so we've decided to take action and change to matt paper (which is actually slightly more expensive per issue...sorry Publishers).

So, at the same time, we've had a slight re-design too, which should make the whole magazine easier to read. There's always a problem making a technical subject, such as ours, look interesting on the page and we strive to obtain a reasonable balance. I hope you like the results - please let me know.

I look forward to chatting to you all again next month. Cheerio for now.

Rob G3XFD

amateur radio waves

VHF Wavemeters & Reflectometers

● **Dear Sir**

Yes, it's me again, the ever loyal *PW* reader! My attention has been caught by the VHF Wavemeter article on pages 36/37 in the November issue of *PW*. More particularly, I have taken a special interest in how the coaxial line is made and the way the 'sampling line' is arranged.

Going back to the late 1960s, I remember making a v.h.f. 'reflectometer' as it was called then, which a sampling system in the coaxial cable very similar to that shown in the article. However, I recall from somewhere now forgotten, that the idea of feeding the enamelled copper wire sampling line immediately under the braiding was not recommended because of the risk of shorting, should the enamel be flawed.

In those days of black and white TV, you will remember we used a smaller diameter coaxial cable and there was a type available in which the insulation between inner and outer was of a low loss, honeycomb construction, (**photograph 1**). This providing a ring of empty air spaces around the inner through, which it is possible to thread a 'sampling wire', which is then fully insulated and is capable of carrying out the sampling function without fear of any shorting, **photograph 2**. This is much better than having to strip off the outer sheathing and 'bunching up' the copper braid as described in the article.

I have made up a sample for you to examine for yourself and it is herewith enclosed. You may perhaps feel that you would like to publish a short note about this in a future *PW* for the benefit of anyone undertaking the construction of this wavemeter. I don't know if you can still buy this kind of coaxial, but I have plenty here and would be happy to supply anyone with a suitable length on receipt of a s.a.e.

John Hoban G3EGC
13 Druids Close
Egerton
Bolton
Lancashire BL7 9RF

Editor's comments: John kindly suggested this letter and offer of the cable to readers in October, but due to the lack of space (as I wanted to publish the letter with the necessary photographs) publication was delayed. My apologies for the delay. Thanks for your help John, and I have no doubt s.a.e.s (I suggest a 50p stamp to cover the weight of the cable) will be on their way to your letterbox.

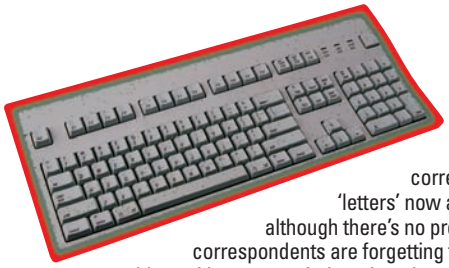
Photo 1: The older type of air spaced honeycombed coaxial cable referred to in G3EGC's letter.

Photo 2: Close up view of the modified cable, showing the sensor wire inserted (solid copper wire shown curving into the air space).

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

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**

Impressed With Moonraker

● **Dear Sir**

Moonraker (UK) Ltd.

I have, over the years, purchased equipment and components from the various advertisers in both *Practical Wireless* and *Short Wave Magazine* and have never experienced any problems. I can recommend most highly the service from a specific aerial company - that being Moonraker (UK) Ltd. of Woburn Sands.

On a previous occasion some years ago I purchased an aerial, which arrived within three days of posting the order to them, so much was I impressed that I rang and thanked them. But they have now beaten their own record!

At 1500 on 22 December I rang Moonraker and queried if they could supply a specific cable length with a different type of plug rewired on each end, which they confirmed, though they noted the Christmas post problems, delivery delays, etc. The order and cheque was posted at 1615 from the Romsey Post Office, the pre-made cable arrived at 0930 on 24 December via Business post. A remarkable turn-around and delivery feat for the busiest time of the postal year.

My thanks to Moonraker for once again providing an impressive service, a service which I can recommend to your readers.

Roger Bunney
Romsey
Hampshire

Antenna Information Discrepancy?

● **Dear Sir**

With reference to the article 'Adding Top Band to the inverted L antenna' published in the January 2005 edition of *Practical Wireless*, I would be grateful if you could clarify for me an

apparent discrepancy between the antenna dimensions shown in that article and those shown in a related article (An inverted L for small gardens), that was published in the February 2004 edition.

The discrepancy relates to that section of the antenna shown (in the line drawing) as being 6.55 metres in length in the February 2004 published article, but shown as 8.55 metres (in the line drawing) in the January 2005 published article. The January 2005 article written text also states 'I elected to leave the original design of my inverted-L antenna featured in the February 2004 *Practical Wireless* virtually untouched'.

My question therefore is which (6.55m or 8.55m) is the correct measurement for this section of the antenna or were the respective measurements (6.55 and 8.55m) shown as intended.

May I take this opportunity to thank you for the excellent content of *Practical Wireless*, which I have been reading since the 1950s.

Geoff Knock G4FTX
Ledbury
Herefordshire

Editor's comment: Our apologies for the error Geoff. A number of readers and the author Len Paget drew our attention to the problem. To help settle the confusion I've asked Tex Swann G1TEX/M3NGS to provide the following Errors & Updates

Errors & Updates:

In **Len Pagets GM0ONX**'s article that appeared in the January 2005 issue of *PW* a dimension was misread when re-drawing the overall diagram of **Fig. 3** (p 39 *PW* Jan. 2005) and the middle section of the antenna should be 6.55m long rather than the 8.55m as shown. Another problem surfaced in the photograph on p38 of the article.

In trying to enhance the original photograph so that you would 'see' the antenna element against the sky, we inadvertently added another trap. Please ignore the trap nearest the support pole towards the right hand side of the antenna - it's an electronic 'ghost' and doesn't exist in reality.

Again, apologies for these errors from myself and Rob G3XFD.

Tex Swann G1TEX/M3NGS.

Enjoying The CQ2

● **Dear Sir**

I much enjoyed the CQ2 reprint a few months back in the November 2004 *PW*. This little circuit formed the heart of several of my 144MHz rigs in the late 1960s and early 1970s, culminating in the 'Fredbox' transceiver which I designed in 1973. This was a 10mW - yes just ten milliwatts - transmitter and the CQ2 detector preceded by an r.f. amp all packaged in a tiny hand-held box not much larger than a Swan Vesta matchbox (see the photo).

This amazing little rig was used for lots of local QSOs around Cambridge on the mobile calling channel (145MHz then) but the best results were from the wife's original QTH in Yorkshire (25 miles) and in Devon when I managed to work the path from Start Point to Portland Bill many times with it hand-held (60 miles).

Then one holiday I managed to get a 51 report from Brittany in France from Bolberry Down near Salcombe at just on 100 miles - all hand-held with a small whip and 10mW of a.m. signal! It made my summer and still ranks as one of my all time best ever QSOs.

The Fredbox was netted by tuning the detector coil slug to the same frequency as the TX through as small hole in the case with a trimmer stick - it worked, even if it was a bit crude. It also meant you could listen to stations on other frequencies in the band. In all, four of these rigs were made without problems so I submitted it to the RSGB in 1974 for publication, but it was rejected. The article sat in a drawer until recently when I put it on my website.

Various other derivatives were made later (but not written up) with more channels and with a better tuning arrangement (varicap tuned). The full original article is reproduced on my website as a .pdf file (see the page called Fredbox) at **http://www.g3xbm.co.uk**

I think a 50 or 70MHz version, with more power and a tuneable superegen receiver would be quite a practical rig for local QSOs - and great fun. The assembled Fredbox p.c.b. is still in my possession and one of these days I'll have to put it back in the box with the PP3 battery, crystal earpiece and microphone and try it out again for old times sakes.

Incidentally, you may be interested in the new Yahoo Group that I've just started called VHF AM'. To subscribe go to: **VHFam-subscribe @yahoogroups.com**

The group is to allow v.h.f. circuit ideas, skeds, news, history, etc. to be exchanged. A particular aim to encourage simple QRP v.h.f. a.m. home-brewing. Also included on the group webpage are tables for v.h.f. a.m. squares worked. I hope to publish a list of recommended a.m. frequencies and polarisations for each v.h.f. band shortly.

Good luck with *PW* in 2005 Rob and everyone in the office - I always enjoy reading it. Best 73s and a happy New Year to you all.

Roger Lapthorn G3XBM
GQRP-1678
http://www.g3xbm.co.uk
Cambridge

The small size of Roger's QRP 144MHz rig is demonstrated by the size of the accompanying matchbox.

Editor's comment: Thank you for the information Roger. The VHF Classics series has generated much interest from readers. Radio Basics will feature my own a.m. projects later in 2005, including a simple rig for 70MHz using a.m. We (the Editorial staff) would also be very pleased to hear from other readers on this subject, particularly if you have a suggestion for any particular project. My own favourite is a simple 70MHz a.m. designed presented by John Hey G3TDZ design, originally published in *Short Wave Magazine* in 1968. More of this later...as my new workshop is now fully operational. G3XFD.

Stan Brown Versus Gus Malcolm

(Round Two continued from February *PW* - Seconds Out!)

● **Dear Sir**

Well I'm truly sorry if I have caused **Gus Malcolm G8DEC** (February *PW*) to have remorse over his negative attitude, but I can assure him that when I retired 21 years ago the five transmitting stations for which I was responsible were all up and running and there was no question then of closure for any of them. In any case, it would not have been in my province to have done anything if the decision had been made to scrap them.

All I can say in atonement for my alleged sins is that before I retired and was asked by a friend if I could provide material for the gallery at the South. Kensington Science Museum, I did so without involving our circumlocution offices. It does seem that the heritage left for future generations will be umpteen ruins of Norman castles, a few medieval half timbered houses removed out from their context to places like Avoncroft, a smattering of windmills and watermills and a few steam engines. What will they have to see for over a century of radio engineering except two latter day pieces. Goonhilly I aerial and the BT Tower, both of which have been Grade II listed? If one were being cynical one might say that there is little chance of BT wanting to alter them, for which permission would be needed, and they might get a quick buck from English Heritage/local authority towards their maintenance!

It is easy to sneer at the architecture of the P.O. radio stations, and admittedly, apart from one or two of the more recent ones and one early one in Marconi style, they were built in traditional Ministry of Works brick suitably amended for their technical role. I understand, on very good authority, that English Heritage are surveying war-time buildings on airfields, etc., with a view to retaining some. The v.l.f. building at Criggion surely comes within that category being erected to house important equipment and also to withstand what an enemy could foreseeably throw against it whilst fulfilling its technical role. The only difference is that it now belongs to a private company and is not in the public domain.

Of course, it does cost money to preserve these important monuments to a hundred years of radio communication and I don't need to be told how to suck eggs. But let us see how English Heritage disburses Lottery Money. Two examples from this locality: A few years ago Oswestry Town Council were awarded a quarter

of a million pounds to restore their Guildhall, a Grade II listed building of the 1890s, which was full of dry rot; and why, because the town council had not maintained it! For almost 20 years they never raised a rate/council tax, which would have paid for the repairs!

Recently, a similar amount was given for reparations to an ancient castle in the village of Whittington. They also have the chargeship of the iron age hill fort, Old Oswestry, but the one in my parish, much larger and now believed to be the place of resistance by Caractacus against the Romans (our first piece of recorded history) is used by a golf club! The EH organisation seems to be populated with antiquarians who aren't aware of more recent industrial history.

Yes, I am aware of the Connected Earth - project which has dissipated BTs artefacts around the country. A much publicised (and lauded by them) piece of hypocrisy if ever there was one! It was done at the expense of their dedicated museum at Blackfriars, which cost money to run, but how much in terms of their global earnings? If you don't believe me and think they are really interested in feeding the selected museums why did the wreckers move in on almost the next day to dismantle the equipment and shred all the documents at Criggion. True one of the ATI spiders - from Rugby GBR - has gone to South Kensington but the Criggion ones were larger. If there is a chance of making money they take it. Try to get a photograph from their document archives, and see how much it costs.

There is enough Lottery Money sloshing around. I question seriously whether it is being spent wisely on heritage projects and if the gift is in the hands of people who have no interest in our more recent and rapidly disappearing past.

Stan Brown G4LU
Oswestry
Shropshire

Noise Problems? - Try DSP!

● **Dear Sir**

I have, still working, the Murphy A50 on which I first heard short wave, including amateur, transmissions in 1938. In those days one could hear barring heterodynes, transmissions right down until they disappeared into the set noise, and things were almost as good in the fifties, on the B28 even with just one of these ex-service steel whips.

Since then things have steadily deteriorated until now my neighbours in the terrace, even without help from further afield, can produce anything up to S9 hash on my Icom Pro II, or the bedside NRD-15, due I suppose to the summation of noise from all sorts of electrical/electronic devices with switch mode supplies and the like. It is now at the point where quite strong radio signals can be hard to read and the weaker impossible.

I have recently found a device which has immediately made itself indispensable, showing a remarkable ability to cut down noise with no harm to speech quality. This is the bhi ltd d.s.p. noise cancelling module NEIM 1031, which simply connects between the rig and speaker or 'phones. It is not particularly cheap, but excellent value for money, and I beg to recommend it to anyone with similar problems. It really can make unreadable signals readable. Making clear that I have no connection whatsoever with this firm other than as a user of this device, I quote their website **www.bhi-ltd.co.uk**

Sandy GM6KKP/GM0IRZ
Dundee
Scotland

Editor's comment: There's no doubt about it Sandy - even without an increased level of data signals on the mains, some form of digital signal processing is a great help. Even the simplest d.s.p. unit can reduce the noise from the ever present switched mode power supplies which can be such a nuisance.

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.

February 13
Harwell & Computing Rally
Contact: Ann
Tel: (01235) 816379
Website: www.hamradio.harwell.com
The rally takes place from 1030 till 1530 at the Didcot Leisure Centre, Didcot, Oxfordshire (come off the A34 at Milton Interchange midway between Oxford and Newbury). Talk-in on 145.550MHz, Bring & Buy, junk stalls, trade stands, craft stalls, special interest groups, home-made refreshments, bar, full disabled visitors and good free parking. Admission £1.50 (children under 12 free).

February 20
Southgate ARC's Stevenage Radio & Electronics Show
Website: www.stevenageshow.dsl.pipez.com
To be held at the Stevenage Arts & Leisure Centre, Lytton Way, Stevenage. There is easy access by road and rail as well as plenty of parking. Doors open 1000 to 1600, admission £3, under 5s free. There are a variety of restaurants nearby, a 16 screen cinema, ten pin bowling and many national retailers.

March 12
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Tel: 02892 601941
E-Mail: ronald@mccaughey6088.fsworld.co.uk
To be held at the Lagan Valley Hospital Recreation Hall. Doors open 1100. There will be the usual stalls, a Bring & Buy, talk-in on S22 and refreshments. Ample car parking too.

March 13
The Wythall Radio Club's 20th Annual Radio & Computer Rally
Contact: Chris G0EYO
Tel: (07710) 412819
E-mail: g0eyo@blueyonder.co.uk
The 20th Annual Radio & Computer Rally is to be held at the Woodrush Sports Centre, Shawhurst Lane, Hollywood, near Wythall, Birmingham. Book early as this is a popular rally.

March 19
The South Normanton Alfreton & District Amateur Radio Club (SNADARC) in association with the G-QRP Club's 5th Junction 28 QRP Rally
Contact: Russell Bradley G0OK
Tel: (01773) 783394
To be held at the Village Hall Community Centre, Market Street, South Normanton, Nr. Alfreton, Derbyshire, fully signposted. Open from 1000, there will be Amateur Radio, Bring & Buy and special interest group stalls, outdoor flea market and refreshments.

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 (concessions 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 145.550MHz.

April 3
The Northern Mobile Rally (Harrogate Rally)
Contact: Gerald Brady G0UFI
Tel: (07734) 478080
Website: www.harrogaterally.co.uk
To be held at the Harrogate Ladies College, Clarence Drive, Harrogate, North Yorkshire. There will be all the usual facilities plus a Bring & Buy, catering and transport for any disabled visitors, etc.

April 10
The Yeovil ARC's 21st QRP Convention
E-mail: george@mudford.fsnet.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 car parks, 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 14-18 March, 1900-2100. (Rules available from G3ICO).

April 10
Cambridgeshire Repeater Group's Annual Rally
Contact: Paul Dyke G0LUC
Tel: (01462) 683574
To be held at the Bottisham Village College, Bottisham, which is six miles east of Cambridge. Access is via A14 and A1303. There will be a large hall, car boot sale and a Bring & Buy. Doors open at 1000 and admission is £1.50. Refreshments will be available, along with a talk-in on 145.550MHz.

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.

amateur radio news & products

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

Wrexham At Scientriffic Event!

The Wrexham ARS will be at the Wrexham Science Festival's 'Scientriffic' Event this year.

This year the Scientriffic event coincides with National Science Week. The event will be held on **19 March 2005** - from NEWI's (North East Wales Institute) Plas Coch site, on the outskirts of Wrexham. The Wrexham ARS intend to run with the callsign **GB2WSF** - from about 1000 until 1700 on the Saturday, h.f./v.h.f. and h.f. data. The club also hope for SOTA (Summits On The Air) to be in attendance.

'Scientriffic' is just a small part of Wrexham's annual Science Festival - It is a day of hands-on exhibits and demonstrations, and so there is something for the non-amateur! Visit the Wrexham Science Festival's website at: **www.wrexhamsf.com** for more information.

New Club Details

The former Oulder Hill ARS (OHARS) in Rochdale now has a new name, new venue, new meeting night and a new website address.

From January 2005 the OHARS became known as the **Shawclough Amateur Radio Club**, Rochdale, and they meet on Wednesdays at 1900 at the Rochdale City Learning Centre on Falinge Road, Rochdale. Visit **www.sharc.org.uk** or contact **Alan G4TMV** on **(01706) 344186**, E-mail: **secretary@sharc.org.uk** for more details.

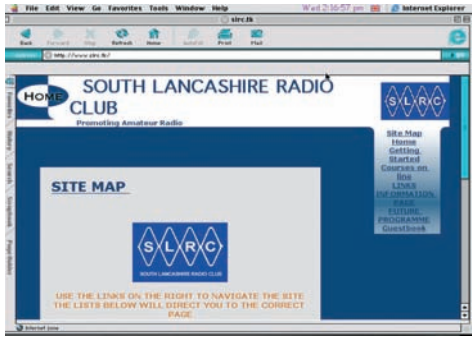
Two New Look Websites

PW has news of two new websites for you to check out...

The **Nunsfield House Amateur Radio Group** in Derbyshire is pleased to announce a new look to their club website. The 'new look' site contains lost of information about the club and its activities and includes links to other sites of interest. A lot of hard work has been done by webmaster **Kevin Davison M0BJT** to ensure that the website is fully functional and that the links work correctly. The website can be found at **www.nharg.org.uk**

Also, the **Elvaston Castle National Radio Rally**, also in Derbyshire, has also a new look to its website. The website now carries full details about the forthcoming Elvaston Castle National Radio Rally. The site will be continually updated and will include a downloadable Rally Programme, which will be available during the week prior to the event. The new website also includes and booking enquiry page to enable prospective traders to request booking forms on-line. The website can be found at **www.elvastonrally.co.uk**

New Radio Club



PW has news of a new radio club that's been formed in the Wigan/Leigh area of Lancashire.

The new club, the **South Lancashire Radio Club**, meet every Tuesday from 1930 in the Bickershaw Colliery Recreation Club, Bolton House Road, Bickershaw, Wigan WN2 4AB. Talk-in on S22 (144.550MHz) till 2000. Further information at **www.slrc.tk** or by E-mail: **info@slrc.tk** *Practical Wireless* wishes the new club good luck!

Services To The Community Award

Steven Bradley M3CND who is 12 years old, was presented with a special award for his services to the community, which includes caring for his mother who suffers a long term illness.

Steven, who lives in South Normanton, near Alfreton, North Derbyshire was presented with the award for his services to the community, which include caring for his mother who suffers with a long term illness and his achievements at school and in the community. Steven has chronic asthma himself, which is proving very difficult to treat, this resulted in him being admitted to hospital twice last year. However, despite this, he has managed many achievements, which now also include studying for his 2E0 licence at South Normanton Alfreton & DARC, where he is a member and stalwart helper at many events.

Steven is a student at Frederick Gent School South Normanton , the school which as just had a major rebuild has been designated a specialist learning centre for Maths and IT.

(L to R) Councillor Margaret Treweek, Deputy Leader of Derbyshire County Council, Steven Bradley M3CND and Gareth Jones. Gareth is a former presenter on *Tomorrows World* and now presenter of the Children's ITV *How2* programme who presented the awards at an awards ceremony at Matlock, Derbyshire, on 17 December 2004.

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

Well Done Worthing!

Worthing Radio Club raised £2700 for Children In Need.

Thanks to **Chris G3NDJ** and his wife **Vicky** who masterminded the project with support from members of The **Worthing and District Amateur Radio Club** and the amazing generosity of Sussex shoppers **GB2KIN** (Kids In Need) went on the air once again in November raising a record £2700.

Operating on the 80m band with a simple wire dipole antenna from the Holmbush Centre in Shoreham by Sea with the blessing of Marks and Spencer, Tesco and McDonalds the station made hundreds of contacts around Europe over two days. Showing the caring, friendly face of Amateur Radio inspired the public to donate so generously.

A contributing factor to the record amount raised was due to **Geoff 2E0EKB** persuaded BBC TV to attend and film the station which was shown on a number of occasions during the Children In Need weekend. By pure coincidence the cameraman, **Andy**, turned out to also be a licensed Radio Amateur, **G8WDR.**

Vicky Delhaye said "One of my roles was to ensure security of the cash. After the event I counted and banked well over £1000 in one pound coins!" Her husband Chris G3NDJ added "There are a lot of people to thank, not least the generous local shoppers and those who pledged money, but also Club Members, the Holmbush Centre, Amateurs we spoke to on the air and the BBC. It takes a while to collect all the sponsorship, but £2700 has now been passed to Children In Need".

Construction Cup Winner 2004

The Havering & DRC held its 2004 Constructors Cup back in December, but who won?

The **Havering & DRC** held its 2004 Constructors Cup competition on Wed 15 December. The club evening was well attended, but sadly there were only a few entries into the competition this year.

After being put to the vote, the club members decided that the winning entry was a QRP linear amplifier, which was designed and built by **Chris M0JKA**. The linear was built to be operated in conjunction with his 14MHz 1W QRP PSK31 transceiver (also home-brew), taking the final power up to 5W. A single stage MRF510 m.o.s.f.e.t. was used, and whilst not ideal at 14MHz, it still gave the required power output.

If the supply voltage is increased to 18V then 9W output is obtainable, but Chris runs the linear between 4 to 5W to remain true to QRP operation. A mosfet was chosen so the linear runs fairly cool, and does not draw an excessive supply current (800mA @ 13.8V for 4W output). The output is fed via a 5-element low pass filter. A relay is used to switch the r.f. to the input of the amplifier when in transmit, and bypassed when the unit is on receive or switched off. This means it does not have to be unplugged when not in use. The linear, although being a simple project, is well built, and housed in an attractive case so hopefully it will inspire future constructors of the club.

On the left, Jim M0MAC, Chairman of the Havering & DRC, handing over the cup to Chris M0JKA (and the newly appointed club treasurer) to the right who was the winner of the construction cup, (pic by G3VOF).

The Constructors Cup and certificate was handed over at the club's AGM by the chairman **Jim M0MAC**, in January 2005. This is the first time Chris has won the cup, it was relinquished from last year's cup winner **Fred G3MOB.**

New Secretary and Treasurer

At the recent AGM of the Southport & DARC, the following changes were made...

The **Southport & District Amateur Radio Club** recently held their annual AGM and the following club changes were made and agreed by members.

The Hon. Sec. is now **Mark Haworth G4EID** (succeeding Don Atkins M1BUL), **26 Willowhey, Marshside, Southport, Merseyside PR9 9TW** and the new Treasurer is now **Stuart Cartlidge G0MJG** (succeeding Hearly Charlesworth G4FMQ), **19 Thornfield Road, Thornton, Crosby, Liverpool L23 9XY**. Hearly retires after eighteen years as Hon. Treasurer and was presented at the AGM with a small gift of RSGB book tokens.

Farnborough's Foundation Course

The Farnborough and District Radio Society have news of their Foundation course.

The course is to he held at the Community Centre on Thursday evenings between 19 May and 9 June. The Chief Instructor for the course is **John Hardy G3KND**, who during the 23 years he taught the old RAE in Farnborough had more than **500** people pass the examination!

The cost for the four sessions has not been finalised, but should not be more than about £30, including the RSGB examination fee, a copy of the RSGB Foundation Course Manual and all materials. For an application form and to reserve a place please contact **Paul Whatton G4DCV** on **(01252) 892804** (please leave a message) or E-mail: **paul.whatton@ntlworld.com**

Angus McKenzie MBE G3OSS - A Tribute

Amateur Radio lost one of its true stalwarts on 14th January 2005 when Angus McKenzie MBE, G3OSS died. His was a remarkable story because despite total blindness, he carved an illustrious career. Rob Mannion G3XFD pays tribute.

I was fortunate to have met Angus G3OSS on a number of occasions. However, the first time I met him, bearing in mind his output in Amateur Radio journalism together with his other activities, I was rather taken aback to discover he was blind. No mention of his disability had been mentioned over the air, the first inkling of his blindness came when I met and befriended his guide dog!

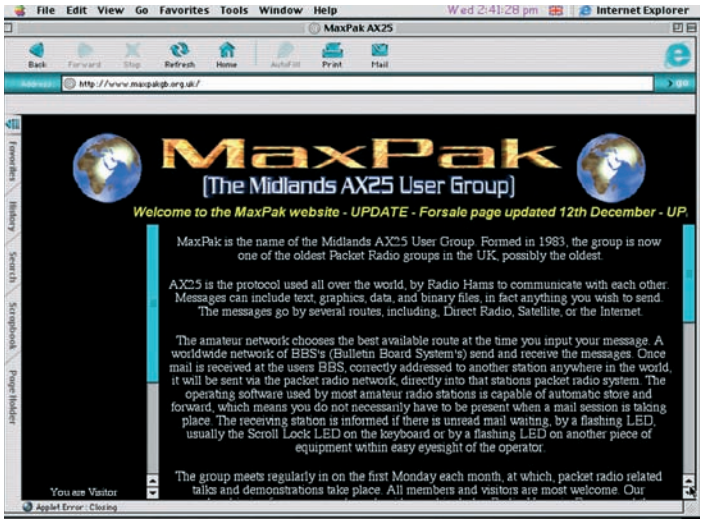
Born in 1933 Angus attended school in London and became very keen on astronomy. Unfortunately his failing eyesight led to complete blindness during his second year at University, while studying electronic engineering and acoustics. Despite this he carved a very successful career in audio and radio becoming a busy consultant. Keenly sought after for his writing on radio, classical music astronomy and Amateur Radio he was a frequent broadcaster and author, writing many books. Angus was eventually awarded the MBE for his audio achievements and sustained charity work for the blind in 1979.

I feel honoured to write this short tribute to Angus G3OSS. I do so in the realisation knowing that I could never achieve half as much as Angus did in his 72 years. I offer my condolences and admiration to his family. **Rob Mannion G3XFD**.

Maxpak Meeting

A date for your diary, make a note now...

The Maxpak Midland AX25 Users Group's AGM is to be held on **Wednesday 6 April 2005** at 2000 at the Sir Robert Peel Public House, Bloxwich. More information from **Miles G4GSB**, QTHR, Tel: **(01952) 585447** or visit the Group's website at **www.maxpakgb.org.uk**



Nevada Wins Business Excellence Award

Nevada has recently been presented with the highly commended 'Business of the Year' Award at The News Business Excellence Ceremony in the Guildhall Portsmouth.

Nevada won the award for recognition of outstanding performance, excellent service and achievement of a strong and growing market share in DAB Digital Radio. At the end of 2002 Nevada saw an opportunity to distribute DAB Digital Radios for the very first manufacturers in the market. Nevada worked closely with the Digital Radio Development Bureau (funded by the BBC and other large radio networks) who promote and publicise DAB Radio.

Nevada promoted and introduced many new models during those early days of DAB Digital Radio. The company established over 500 independent dealers and opened accounts with high street retailers such as John Lewis and Dixons Stores. Mike Spencer of the Digital Radio Development Bureau said, "Nevada, due to their vision and unique core skills in customer services and distribution, have made a massive contribution in developing the DAB market".

Looking for new opportunities and technologies has helped the company double it's turnover in the past three years. Nevada Managing Director, Mike Devereux said, "We are thrilled to win this award against tough competition. It's real recognition for the enthusiasm and talent of the Nevada team".

Mike Devereux receiving the award from Derek Beaves of George Gales & Co. the sponsors.

International Marconi Day

This year the 18th International Marconi Day (IMD)will take place on the 23 April 2005.

Although the IMD is not a contest, awards can be obtained and full details can be found at **www.gb4imd.co.uk** For a station to be counted towards an award by applicants, that station must be registered by contacting the webmaster (**webmaster@gb4imd.co.uk**) prior to the event, with full details of the station. In order to qualify as an 'Award Station', operations should take place from a site which either used Marconi equipment prior to his death in 1937 or from which **Gugliemo Marconi** carried out experiments during the same period.

Radio Link With Twin Town

Twin town radio contact - bringing many new and old friends together in the spirit of Amateur Radio

Hans Steinort DF3OS, Heinrich Hennies DL9OAQ and Uwe Mikloweit DL5UMD.

Steve Cole G3YOL, Phil Carter G3XUL and Hans Steinort DF3OS.

For about 20 years there have been regular contacts between Radio Amateurs of **Weston-Super-Mare Radio Society** and the **Hildesheim** branch of **DARC** in Germany, these being twin towns. It all started when Phil Carter G3XUL saw the 'twinning' sign while cycling to work in Weston-Super-Mare one morning and realised he had recently received a QSL card from Heinrich Hennies (now DL9OAQ) in Hildesheim.

From the original contact, regular skeds were arranged, which are nowadays still maintained by Phil and **Steve Cole G3YOL** at this end and Heinrich, also **Hans Steinort DF3OS** and **Uwe Mikloweit DL5UMD** in Germany. Although Heinrich now lives with his partner in Hannover, he still joins in the skeds, sometimes from his flat in Hannover, but also occasionally from his mother's home in Hildesheim where he still maintains a 'shack'.

Heinrich has visited Weston a number of times now, the first time in 1985, which coincided with the Society operating a special event station at the railway station to celebrate the 150th anniversary of the beginning of the GWR (God's Wonderful Railway!). He enjoyed assisting at the station and was most impressed by the steam locomotives he saw. Hans has also visited Weston, the first time a very brief visit when he had been attending at the Birmingham Exhibition Centre with his firm. Later, in 2002, he and his wife Lieselspent a week visiting gardens in the Weston area.

Hans had brought his home-brew portable magnetic loop antenna and it was most interesting to see this in operation at Steve's QTH. In 1999, the two clubs arranged a special activity period with a certificate for those taking part. This brought together many new and old friends in both areas and was most enjoyable.

New Regional 12 Manager

The RSGB Regional 12 Manager, Malcolm G3XVV decided to retire last year, read on to see who has taken his place...

The RSGB Regional 12 Manager **Malcolm G3XVV** decided to retire last year having given many years of outstanding service to the Society, he'll be greatly missed. Fortunately **Phillip G4NZQ**, previously Deputy Regional Manager with responsibility for Norfolk and Suffolk, agreed to take over the post. Region 12 comprises Cambridgeshire, Norfolk, Suffolk, Essex and Kent, so Phillip will be doing a lot of travelling in his new role.

Both Phillip and Malcolm attended the Chelmsford Amateur Radio Society Christmas Social Evening where the picture was taken. Phillip G4NZQ and the Deputy Regional Manager **Trevor M5AKA** will be visiting the following Essex clubs during March to show the new video about the RSGB and answer members questions.

Phillip can be contacted on **(01603) 250639** or via E-mail: **phillip.brooks @btinternet.com** and Trevor can be reached on **(0794) 103 9832**, E-mail: **m5aka @amsat.org**

amateur radio clubs

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

DORSET
South Dorset Radio Society
Contact: **Carol Hodges 2E1RBH**
Tel: **(01305) 820400**
Members meet every second Tuesday of the Month at Chickerell Church Hall, Chickerell, Weymouth, Dorset. Meetings commence at 1900 for a 1930 start. A guest speaker is usually invited to talk on a subject of interest to the Club Members. Membership is open to all who are interested in all facets of Amateur Radio, the numerous activities are not just limited to those who hold transmitting licenses. Club members range from youngsters to Senior Citizens. All visitors are made most welcome and on Club Nights will receive a cup of tea or coffee and cake for just 50p! The Society also has a Training Shack, with facilities for all kinds of radio oriented work and, of course, study and exam facilities are also available on request. The Training Shack is also open for all enthusiasts on Wednesday and Sunday Nights and is a must for up and coming Radio Amateurs or for those who just want to know what the hobby is all about.

NORTHERN IRELAND
Bangor & District Amateur Radio Society
Contact: **Mike GI4XSF**
Tel: **0284-277 2383**
Website: **www.bdars.com**
Meetings take place on the 1st Wednesday of every month in 'The Stables', Groomsport, at 2000. New members and visitors are always made most welcome, so if you are not already a member, check out the website address given above and go along to the next meeting.

ROCHDALE
Shawclough Amateur Radio Club
Contact: **Alan G4TMV**
Tel: **(01706) 344186**
Website: **www.sharc.org.uk**
Formerly the Oulder Hill ARS in Rochdale, the club now has a new name, new venue, new meeting night and a new website address. The club is now known as the Shawclough Amateur Radio Club, Rochdale. Meetings take place at 1900 at the Rochdale City Learning Centre, Falinge Road, Rochdale. Visit the above website for more information.

SCOTLAND
Wigtownshire Amateur Radio Club
Contact: **Ellis Gaston**
Tel: **(01776) 820413**
The club meets every Thursday evening in the Aird Building at Stranraer Academy. Encouraged by the success of their Foundation courses over the last two years, the club is now running an Intermediate course. On the third Thursday of the month, they have a talk or demonstration by a member or guest speaker. The club website is well worth a visit.

SHROPSHIRE
Telford & District Amateur Radio Society
Contact: **Mike Street G3JKX**
Tel: **(01952) 299677**
Website: **www.tdars.org.uk**
The Telford & District Amateur Radio Society meet at 2000 every Wednesday evening at the Dawley Bank Community Centre, Bank Road, Telford. Lots of events are planned throughout the coming year, so log onto the website listed above and see what's happening in 2005!

See us at Stevenage Rally 20 February 2005

The Peak Electronic Design Passive & Active Component Analysers

George G3RJV discovered that with the handy Peak Electronic Design analysers in the workshop, identifying components is made much easier. Read on to share the experience!

The Rev. George Dobbs G3RJV received a message from *PW* pre-empting the arrival of Father Christmas! He was being asked to review two extremely useful components analysers that some readers have already discovered for themselves.

Fig. 1: The first unit reviewed by G3RJV is the Peak LCR40, which analyses passive components (see text).

Fig. 2: The second unit to be reviewed is the Peak Component Analyser DCA55, which identifies and analyses active devices (see text).

"What a coincidence", I thought when *PW* Editor, **Rob Mannion G3XFD** contacted me with the invitation to review the Peak Electronic Design company's passive and active component analysers. The coincidence being that my wife had just ordered, and received, the passive component version as a Christmas gift!

Although I had one of the two analysers, Rob asked Peak Electronics to send me both versions on loan as asking my wife, **Joanna G0OWH**, to un-gift wrap is a request too far!

Throughout my history as an electronic constructor I have always been interested in test equipment to check the values and operation of components, especially those which measure capacitance and inductance. I have made many tuned circuits with home wound inductors and variable capacitors of uncertain value.

In the past, inductance has not been an easy parameter to measure nor has the capacitance of junk box variable capacitors. This is to say nothing of the stock of active devices, many with in-house markings or no markings at all, they can be bits of black plastic with three indeterminable legs.

Classic Bridge

My very first component tester was the classic AVO Test Bridge; a traditional Wheatstone bridge with a single valve and a notoriously difficult to read logarithmic scale. It did give indistinct readings of resistance and capacitance, but usually failed to give any reliable readings for air-spaced variable capacitors and had no facilities for inductance.

Later I coveted the Marconi Instruments Universal Bridge that one of my Radio Amateur friends owned. It measured resistance, capacitance and inductance over a wide range but was not exactly simple to use, involving skilful manipulation of controls and reading null points on a meter. This was emphasised by the makers including an engraved plate of instructions of the top of the instrument. It also weighed in the order of 10kg!

So, the chance to try instruments that would fit in a shirt pocket and tell me what I wanted to know on a digital display seemed too good to turn down. It was a pleasure to accept Rob's review commission.

Two Products Reviewed

The two products produced by Peak Electronic Designs are the **Peak Atlas DCA55 Component Analyser** and the **Peak Atlas LCR40 Component Analyser**. The former is for active components and the latter for passive components.

Although the active analyser was the first of the products to come from Peak Electronics, I'll deal with the passive analyser first. It was the first I was able to test and it was the same model as my Christmas gift.

Passive Component Analyser

The Atlas LCR Component Analyser arrived in a small cardboard box with a simple manual. In fact it's really so simple; two push buttons, two hook-on probes and an l.c.d. display, that it's tempting just to go ahead and use it. Despite this I recommend that a new owner reads the Introduction and the Warning page. Sensibly, this warns against connecting the probes to powered equipment or components with stored energy such as charged electrolytic capacitors.

An extra sheet with the manual describes how to perform a probe compensation routine for the unit. This ensures that the readings take the probe characteristics into account when making measurements. This will happen for the new user anyway, because on initial switch-on the probe compensation routine comes up on the display.

The compensation procedure is extremely simple involving the shorting and opening of the two probes. The probe compensation can be repeated at any time. I must confess though, that the compensation was not quite the first thing I did with the Atlas LCR!

Instead, I had my usual look inside the box of something new. The inside revealed a single printed circuit board (p.c.b.) with a high component density. As might be expected the circuitry is based around a PIC processor with an 8MHz crystal signal source.

The unit is powered by a single 12V alkaline battery of the type often used in automotive remote key fobs. The battery life is long, although Peak Electronics advise replacement every 12 months to prevent leakage damage. Spare batteries are easy to obtain from motor spares outlets, or can be bought directly from Peak Electronic Design.

So, what does the passive component analyser do? The answer is simple - a lot! The unit tells the user the component type, resistor, capacitor or inductor, automatically selects the best signal level and frequency (d.c., 1, 15 or 200kHz) to test the component and then provides component value data. The range of measurement and technical specifications are impressive.

In The Workshop

I like simple-to-use equipment in my workshop. Unfortunately, too many items of equipment in my workshop, station and even around the house are just not easy-to-use. Useful functions lurk a layer or two down in the bowels of their software. But I don't have the memory of a younger person nor the cavalier 'poke and try' attitude so I'm constantly reverting to the manuals, assuming I can find them!

There's no problem with the Atlas LCR Analyser though. It really is child's play to use. (What I really mean to say is that it's a 'mature person's play' as children seem to have no problems whatsoever operating menu-led equipment!).

The operation of the Atlas LCR is self evident. Pushing the left (**on – test**) button switches the unit on. The display gives a quick indication of when the next factory calibration is required. This is followed by a five second countdown to the readings. The count down is to allow time to attach the

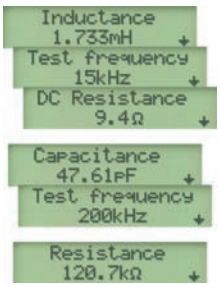


Fig. 3: Sample displays as provided by the Peak LCR40 on its built-in l.c.d. display (see text).

Fig. 4: The probes used on both units are of the wire-ended hook on type. (See text for comments).

Fig. 5: The Active Component Analyser, the DCA55, uses three colour coded hook-on probes for testing (see text).

Fig. 6: A handy carry-case with room for both analysers, instructions and spare batteries is available from the manufacturers. Contact Peak Electronic Design directly for further details on a full range of accessories and other units.

probes to the component. If this has already been done, another press of the button will cancel the five second delay.

The two line, 16 character l.c.d. display will then come up with the type of component and the value. Pressing the right button (**scroll – off**) will scroll through the test frequency used and, in the case of an inductor, the d.c. resistance of the component (some sample displays are shown in **Fig. 3**). The unit can then be switched off by holding down the right button, although it shuts down automatically after a few seconds.

Some Simple Tests

I decided to try something simple as a first test and chose a 1kΩ resistor, which was then connected across the probes and the unit switched on. After displaying the calibration date briefly, it timed down to give a reading of '1.001kΩ'.

The resistance test was fine but the real test, for me, was to be with capacitors and inductors. The lower and higher values appeared to give good results some of the higher values were expressed in **millifarads** (mF); a 2200µF electrolytic capacitor read as '2.282mF'. Incidentally, the probes may be connected either way round to read electrolytic capacitors as the test voltage is no more than 1V.

The tests with variable capacitors were even more fun and I've quite a large collection of air-spaced variable capacitors. Such components are expensive to buy as new items, so over the years I have gathered them whenever the opportunity arose.

Most of my stock variables bear no outward markings as to their value. Now, however, I was able to sort some of them out! So, armed with a spirit based felt tipped pen and the Atlas LCR, I set about sorting out and labelling my entire collection.

The Atlas LCR didn't fail me. It gave values for every capacitor I offered to its probes, ranging from some huge transmitter type variable capacitors to some tiny solid dielectric trimmers.

I also tried some unusual capacitance measurements. For example, the capacitance between two adjacent tracks on a piece of Veroboard 650mm long is 7pF!

By this time I was really enjoying myself, and as I have some very thin doubled sided p.c.b. material, I soldered short lengths of wire to each side of a small piece 350 x 250mm and this formed a capacitor with a value of 188.3pF. This could be useful for making small custom value capacitors or measuring capacitance on double-sided p.c.b.s in r.f. applications.

Hook-On Probes

At this point I ought to add a word of caution about the probes. They are of the small hook-on type, **Fig. 4**, which grasps the component with a little wire hook. I have similar probes on other items of test equipment and experience has taught that the hooks are only really designed to clip onto wire leads of a modest diameter. Attempting to clip them on to large chunks of metal will bend the hooks out of shape or even break them.

Several different types of probes are available from Peak Electronics for use with the analyser including tweezer probes for measuring surface mount devices (SMD) components. Whenever I measured components with large terminations, I soldered a small length of wire on each terminal to enable me to use the hook-on probes.

Measuring Inductance

As I'd had no problems measuring capacitance, I progressed on to inductance. A small moulded axial choke colour-coded at 100µH was reassuringly measured as being 95.2µH, having a resistance of 3.0Ω which was measured at 200kHz.

An unknown pile-wound r.f. choke came up as 261.6µH with a resistance of 3.4Ω. I then tried a whole range of junk box inductors and each one produced a reading, which, as far as I could tell, seemed appropriate. Several little impromptu inductors were wound using insulated stiff wire and all but the smallest gave viable inductance readings.

Finding a T37-2 core with seven turns of thick wire, I applied it to the unit which told me it was "low resistance and inductance", scrolled to 0.0Ω, and then scrolled on to 0.2µH. My little program which tells me the number of turns to wind on Micrometals toroids told me that to obtain 0.2µH, I would have to use 7.1 turns. So my software was accurate, or at least agreed with the Atlas LCR.

I'm very pleased with the Atlas LCR and hope I can find my wife a gift nearly as useful when her next birthday comes around. The analyser will remain with easy reach on my workbench.

Semiconductor Analyser

Now to the semiconductor analyser. In outward appearance the Atlas DCA55 is like the Atlas LCR with a different coloured case, (see Fig. 2), and three colour coded leads, **Fig. 5**. It has the same two buttons (**on-test** and **scroll-off**) and two line, 16 character, l.c.d. display.

What the manufacturers claim for this version is very impressive. Peak Electronics say; "It doesn't matter how you connect the test clips to the component, the Atlas can analyse a vast number of different component types including bipolar transistors, enhancement mode m.o.s.f.e.t.s, depletion mode m.o.s.f.e.t.s, junction f.e.t.s., low power thyristors and triacs (less than 5mA trigger and hold), diodes, multiple diode networks, l.e.d.s, bi-colour and tri-colour l.e.d.s. The analyser will even identify special component features such as diode protection and shunt resistors in transistors. For two-leaded components such as diodes and l.e.d.s, any pair of test clips can be applied to the component any way round, the Atlas sorts it all out for you".

Impressive! This is a far cry from my first home-built transistor tester with a few resistors, a couple of switches and a surplus meter. The DCA55's specification looks good.

For a first check I connected the three hook-on probes randomly to the leads of a 2N2222A transistor; and as readers will know from Carrying On The Practical Way I have lots of those! After a few seconds it told me "***npn bipolar transistor***".

With the first push of the scroll button it indicated "***RED : emit, GREEN : base, BLUE ; coll***" the next scroll "***Current gain H_{FE} = 175***" the next scroll "***Test current Ic = 2.50mA***", next "***B-E voltage V_{BE} = 0.74V***" next "***Test current I_B = 4.54mA***" next "***Leakage current I_C = 0.00mA***". The analyser certainly delivers a lot of information very quickly.

I was impressed by the automatic identification of the leads. All other active device testers I've used have required the user to know the identification of the leads and connect them to the appropriate terminals. As a result I have wasted too much of my life finding the appropriate data book, thumbing through too much information, and straining over small print to find out device connections I had forgotten or did not know.

Although I didn't test the facility, the analyser will also indicate the presence of diode protection or resistor shunts in bipolar devices.

Diode Testing

So what about diode testing? I randomly connected a 1N914 (the cockroach of silicon diodes) to the unit and went through the test routine. It told me "***Diode or diode junction[s]"***, "***RED : Cath, BLUE Anod***", "***Forward voltage V_F = 0.71V***", "***Test current 4.58mA***".

A red l.e.d. connected to the probes read "***LED or diode junction[s]***", the connections, "***Forward voltage V_F = 1.84V***", "***Test current I_F = 3.37mA***".

The Atlas DCA55 will recognise an l.e.d. if the forward voltage is greater than 1.5V. It can also recognise bicolour l.e.d packages. Germanium diodes may be recognised by their low forward voltage (0.37V for the OA47 I tried) and Schottky diodes should have an even lower forward voltage (0.3V for the BAT85 I tested). The DCA55 will also recognise popular types of three terminal diode networks.

Another Favourite

Next I pulled out an IRF510, another favourite device I have used in r.f. power amplifiers. The DCA55 told me I had an "***Enhancement mode N-Ch MOSFET***", it gave the lead connections, the Gate Threshold and the Test Current.

Next, a J310 came up as an "***N-Channel Junction FET***", then it indicated "***Drain and Source not identified***" because the internal structure of j.f.e.t.s. is symmetrical about the gate terminal, but it did indicate the Gate lead.

Like the LCR analyser, the use of the DCA55 is simple and self evident. It's simply a clever little unit which took me far beyond what I have been able to measure for active devices. I have added it to my next gift list but I may not be able to wait that long and it might become a gift to myself!

Both analysers supplied by Peak Electronics did exactly what they claimed, which is a lot from small and simple to use pieces of equipment. I expect to have them both on my workbench, near at hand for frequent use. They are worthy additions to any amateur constructor's bench at an affordable price. Well done Peak Electronics! **PW**

Products

The Peak Electonic Design Ltd's LCR40 Passive Component Analyser and the DCA55 Active Component Analyser.

Company

Peak Electronic Designs Ltd (Manufacturer).

Contact

Peak Sales on Tel: (01298) 70012,
FAX: (01298) 70046 or via secure website **www.peakelec.co.uk** and by post.

Pros & Cons

Pros: Both analysers did exactly what they claimed, which is a lot from small and simple to use pieces of equipment. They are worthy additions to any amateur constructor's bench at an affordable price. Well done Peak Electronics!

Cons: probe hooks only suitable for small diameter leads (see text for suggestions)

Prices

(Direct from Peak) also available from Maplin and Farnell. DCA55 £49, LCR40 £69. Prices include battery, probes (as reviewed) and battery.

Supplier

Peak Electronic Design Ltd., Atlas House, Kiln Lane, Harpur Industrial Estate, Buxton, Derbyshire SK17 9JL.

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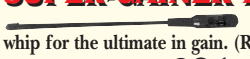

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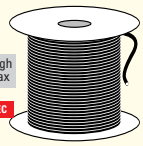

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The Oscilloscope

Part 3 - Controls, synchronisation & triggering

In part three of his major new series on the oscilloscope, Gordon King G4VFV looks at the controls, synchronisation and triggering. Gordon say there's no need to be intimidated by the controls on your 'scope because you're in charge!

I mentioned in the last instalment how the 'scope can easily be arranged to provide a measurement of frequency and amplitude. While becoming conversant with the operation of the 'scope though, you'll soon discover that a sine wave, albeit, significantly lacking in purity, can be resolved on the screen simply by holding a finger on the Y input and suitably adjusting the **volt/div** and the **time/div** controls.

The display results from the human body acting as an antenna picking up the 50Hz radiation from the mains supply wiring and passing it on to the 'scope. Don't worry, it's at a low level, and high impedance, so there's no problem!

In my radio shack environment I can get a display of good amplitude with the Y input set to 1V/div. With a graticule of 10 horizontal divisions, the timebase will need to be set to 2mS/div, giving a full-screen sweep time of 20 milliseconds, which is the time taken by one complete 50Hz cycle (e.g., 1/50=0.02S=20mS).

Incidentally, the calibration of the Y and X deflection on some 'scopes might be given in terms centimetres instead of graticule divisions, such as volt/cm and time (S, mS etc.)/cm.

This, then, neatly brings us to **Fig. 1**, which depicts the amplitude and time aspects of a sinewave that were introduced in the previous instalment. In the case of a sine wave the r.m.s. value works out to 70.7% of the peak amplitude, and since the time period of the complete waveform from start to finish is shown as 0.02-second, we now know that its frequency is equal to the reciprocal of 0.02, or 50Hz.

Integral calculus is required to derive the r.m.s. value of a waveform, but in the case of a sine wave it simply resolves to the peak value divided by the square-root of two ($\sqrt{2} = 1.414$), which you will find is the same as the 70.7% of the peak value in the diagram. Most a.c. voltmeters are scaled in r.m.s. values based on a sine wave, although the movement responds to the average value of the waveform, which in the case of a sine wave is 63.7% of its peak value.

The electric power supply is also r.m.s. rated, meaning that our 240V a.c. mains supply has a peak value of just under 340V and a peak-to-peak value of twice that value! Looked at another way, the r.m.s. value is equivalent to the d.c. value that would dissipate the same power and hence provide the same heating effect. With that little bit of maths, it's time to get back to the 'scope on your workbench.

Main Controls

Seeing a 'scope on offer for a very reasonable price at a rally (and we must keep in mind that it is the aim of this series of articles to consider 'scopes of that category, as distinct from up-market latter-day digital instruments!), you might veer away from the purchase of a good and useful bargain because of the multitude of front (and, perhaps, rear) controls. However, my job with this series of articles is to make sure you're not intimidated. So, let's see now if we can get to grips with some of the main controls.

The two controls associated with Y amplitude and X sweep time have already been investigated in some detail. In practice though, you'll usually discover that each one works in conjunction with a continuously variable 'fine' control, which may or may not be calibrated. In the latter case it's then necessary to set the control to one end of its range for the calibrated positions on the main switched control to hold true.

Brilliance Control

The **Brilliance** is a primary display control which merely adjusts the intensity of the fluorescent spot

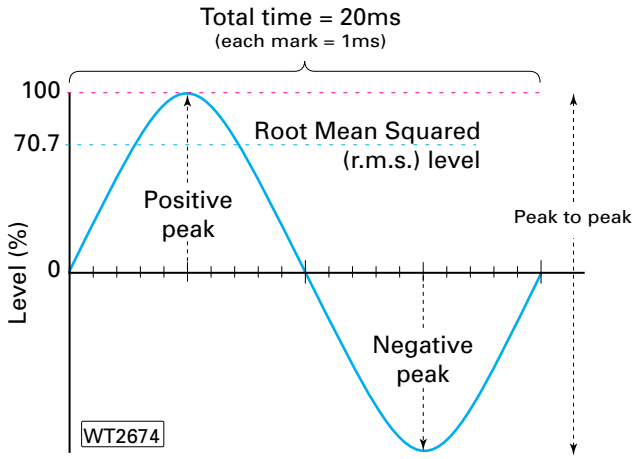


Fig. 1: Sine wave showing the relationship between the peak and root-mean-square values. The average value of a sine wave is 63.7% of its peak value. With a time period of 0.02 second (20mS), the frequency of the wave is 50Hz (e.g. 1/0.02).

Fig. 2a: This example of astigmatism is caused by vertical elongation of the scanning spot, which is largely correctable by the front astig control. The spot is shown statically on the screen. As can be seen the vertical size is larger than the horizontal width. This state would indicate some form of astigmatism control is required (see text).

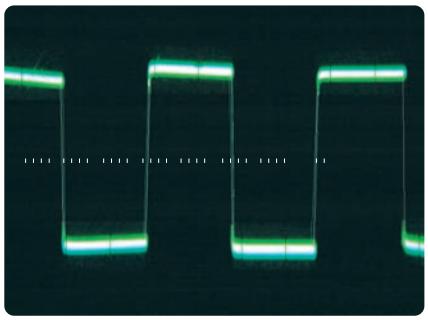


Fig. 2b: With the spot problems exhibited in Fig. 2a, the horizontal areas of signals become difficult to see in detail due to blurring. Note the effect shown on the tops and bottoms of the square wave shown here.

on the screen. It's equivalent to a television receiver's brightness control.

In practice the brilliance control works by way of a potentiometer arranged to provide an adjustment to the voltage applied to the grid electrode of the c.r.t. As the control is retarded ('turned down'), so the grid voltage becomes more negative with respect to the cathode and fewer electrons strike the screen, thereby causing the brightness of the display to diminish.

Conversely, when the grid becomes less negative and the display brighter as the control is advanced ('turned up'). The number of electrons making up the beam is inversely proportional to the grid voltage, the beam being cut off completely when the grid is made strongly negative with respect to the cathode.

So when first trying out a 'bargain 'scope' that seemingly lacks a trace, make sure that the brilliance control is not inadvertently turned down too far. This has happened! The brilliance control provides a voltage swing from zero to about -50V relative to the cathode. The grid can also receives pulses of suitable polarity for 'retrace blanking' and display 'bright-up'.

Focus Control

Now it's on to the focus control. And, as would be expected, the job of this control is to focus the c.r.t. beam so that it impinges upon the screen as a small round dot.

Again, this function most 'scopes is handled by a potentiometer. But this time for adjusting the voltage applied to the tube's focus electrode.

Overcoming Astigmatism

Astigmatism is generally something we might hear about when having our eyes tested! But it can also impair the sharpness of the 'scope display owing to elongation of the spot.

When the elongation lies in the vertical plane as shown at (a) in **Fig. 2a**, a square wave display would be affected after the style of **Fig. 2b**, where the horizontal parts of the waveform are seen to be thickened. Elongation, which could also be in the horizontal plane, results from a degree of electrostatic asymmetry (irregularity) while the beam is being accelerated through the gun.

However, astigmatism can be counteracted by relative adjustment to the c.r.t. electrode potentials. This is achieved by a function provided by a control labelled '**astig',** which is short for astigmatism. In practice, the focus and astig controls are adjusted in turn until the beam achieves its maximum symmetry and the sharpest display is obtained.

Quite a few of the 'scopes that come up for sale at rallies will incorporate a built-in generator providing two 1kHz square wave outputs, one of around 5V and the other of 50mV, so look out for these. Although handy for optimising the astig. setting, these outputs (often found conveniently sited on the front control panel of some 'scopes) have particular applications for checking the calibration of the volt/div and time/div controls.

Vertical & Horizontal Shift

Now we'll move on to the vertical and horizontal shift controls. These are required because it's frequently necessary to move the display so it can be related to the graticule lines when making amplitude and frequency measurements (for example).

All 'scopes are equipped with front controls for shifting the display both vertically and horizontally. These also work from potentiometers that adjust the d.c. potentials across the Y and X deflection plates, so that the deflected electron beam, and hence the whole screen display, can be shifted up, down and sideways as required.

It's possible to shift the spot or trace so much that it goes off-screen. This is an important point to remember if a display fails to appear on the screen, and it seems as though there may be a more serious fault in the instrument! **Note:** To overcome this problem (there surely can't be many 'scope users who haven't been caught out in this way) some instruments are provided with a 'Beam Finding' control. All the operator has to do (when the display seems to have disappeared) is to press the button. The missing spot will then re-appear, no doubt to a sigh of relieved frustration!

A number of additional controls will be found on most 'scopes, depending upon their ages and

levels of sophistication. We shall be looking at these as we wend our way through some of the 'scope's innumerable applications.

Block Diagram

At this point I think it will be as well to take stock of what has so far been discussed, and then to give the timebase, sync and trigger functions a little more attention. With this in mind, I've provided a block diagram, **Fig. 3**, of the basic features of a 'scope, showing just a single Y channel.

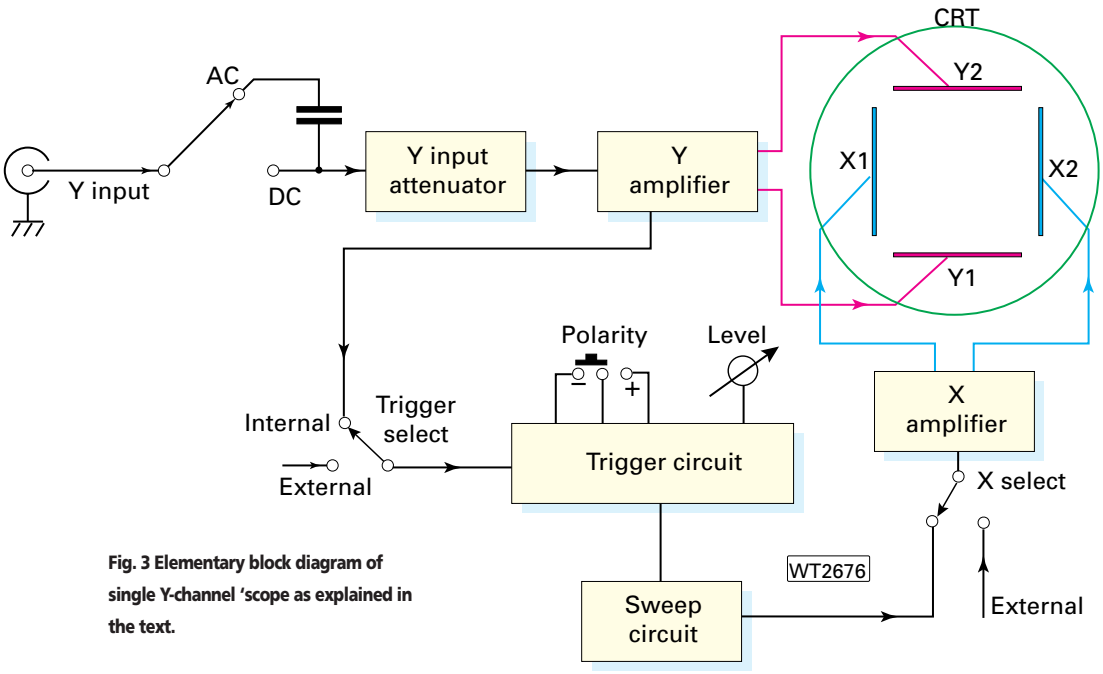


Fig. 3 Elementary block diagram of single Y-channel 'scope as explained in the text.

Starting with the Y channel first, you'll see that the test input can be applied to the Y attenuator either directly or through a capacitor. It then passes through the Y amplifier to the Y plates of the c.r.t. (Most 'scopes are equipped with an a.c./d.c. switch like this).

In the d.c. position the 'scope will respond to inputs right down to d.c. However, d.c. isolation may be desirable when looking for a low level signal (a.c.) 'sitting on' a higher level of d.c. voltage. In which case the input, which would then be of a.c. form, would be passed to the Y attenuator by way of the capacitor.

The deflection sensitivity of a 'scope c.r.t. is pretty low and, as we have already seen, is dependent on the final anode potential. The higher the potential, the lower the sensitivity (this is because the electron beam will then have more energy and will require more energy - a bigger push if you like - to deflect it).

The X-amplification as shown is thus provided between the timebase sweep and the c.r.t. X plates. When the associated internal/external switch is set to the 'ext' position (a position usually located on the time/div control) it then becomes possible to connect an external source in place of the built-in timebase to provide the horizontal deflection.

The timebase is composed of the trigger and sweep circuits shown in the diagram. The sweep (or timebase scan) can be triggered either internally from pulses synthesised from the test signal in the Y amplifier, or from an external source, as determined by the setting of the associated switch. Another switch allows the selection of either positive- or negative-going trigger pulses.

Sweep Linearity Essential

From my earlier description of the formation of a 'scope display, you'll realised that for the least display distortion a high degree of sweep linearity is essential. This is because when the display consists of several cycles of a sine wave (for example) a lack of linearity (e.g. curvature) of the rising ramp waveform will result in different time spans being shown for each of the separate complete waveforms displayed. This will in effect give a sort of compression over the full X scan.

Some very early valved 'scopes tended to suffer from the compression problem; but 'scopes of more recent vintage using transistors suffer far less from this shortfall. However, if your bargain purchase is found to exhibit non-linearity of this kind, there's no need to worry. Instead, time/frequency measurements can often be made with improved accuracy by resolving several complete cycles, and then using the horizontal shift control to align a single cycle for measurement against the graticule to the most linear part of the scan.

Steady Display

Clearly, with a free-running timebase it would be very difficult, if not impossible, to retain a steady display, even by carefully adjusting the timebase frequency. Some sort of relationship must exist between the timebase and the Y input signal. This was accomplished in early 'scopes by a 'sample' of the Y signal being fed back to the timebase by way of a control marked sync (short for synchronisation).

When the level was optimised by the sync control, the retrace would occur at the exactly the right time. The result was that successive cycles of Y signal were then traced from left to right across the screen, one upon the other, to provide a 'locked' or synchronised display.

In the trigger mode, which will be a feature of most rally purchased 'scopes, the timebase remains static until 'triggered'. Here a pulse, tailored from the Y input and adjustable by a front control in terms of level and polarity, is then fed to the timebase in such a way that it initiates, or 'triggers', the start of a scan at the same point on the Y signal for every sweep.

The speed at which the scan occurs is, of course, established by the time/div rotary control switch. A steady display, with more suitable for time measurements than was possible from the early sync-mode 'scopes, results from the use of the precise triggering action.

Okay, then, that just about takes care of the 'scope for this month, there's more than enough for you to read, enjoy and digest! Next time we'll look together some more aspects of this versatile instrument, including things like sweep delay, bandwidth, rise time and so forth.

There's one thing for sure - playing about with the 'scope is certainly a good way of getting to know more about the various kinds of signals that are involved in our hobby! Cheerio for now. **PW**

High Voltages!

When fiddling inside an Oscilioscope beware of high voltages, make sure:

- ***The 'scope is switched off***
- ***Any high voltage capacitors are discharged (including the feed from the high voltage supply)***
- ***The mains supply is disconnected***

You have been warned!

doing it by design

In this month's session, Tony Nailer G4FYC turns to the biasing and design of cascode f.e.t. and m.o.s.f.e.t. amplifiers.

The f.e.t. has a relatively high capacitance between gate and drain which makes operation as a common source tuned amplifier inherently unstable. Though neutralisation can be arranged with anti-phase capacitive feedback, it's critical to set-up. A more stable h.f. amplifier uses two f.e.t.s in a cascode arrangement as shown in **Fig. 1.**

Transformer coupling is used at input and output to suit nominal 50Ω source and load. Device TR1 operates in common source mode providing current gain whilst TR2 operates in common base mode giving voltage gain. This arrangement is a great deal more stable than using a single device, but there is still a significant capacitive coupling back through the devices from output to input. This often allows the arrangement to oscillate in the upper v.h.f region. To overcome this a drain 'stopper' resistor R6 of 68Ω is usually sufficient to keep the amplifier tame.

As the cascode circuit uses two transistors in series between the supply rails it is important that the supply voltage is proportioned wisely by keeping the voltage of the source of TR1 quite low. A value of 1-2V is recommended, let's say 1.5V.

Choose two devices with similar Idss and Vgs. Measure the value of Id at 1.5V. Typically for a BF256A it would be 7mA. Then R7 = Vs/Id. R7 = 1.5V/7mA = 214Ω, 220Ω being the nearest value.

The drain of TR1 ideally will be mid way between the source of TR1 and the top of L2. If the top of L2 is 12V and the source of TR1 is 1.5V then the drain of TR1 will be 5.25V above its source, and 6.75V above ground. To bias TR2 correctly simply choose values of R2 and R3 to be 5.25V above ground, TR2 will then also have gate to source voltage of -1.5V.

If R3 has 5.25V across it then R2 will have 12V - 5.25V = 6.75V across it. Initially you should choose the resistors to be the same proportion as the voltages, let R3 be 52.5kΩ and R2 to be 67.6kΩ. The nearest preferred values are 56 and 68kΩ but they are not quite close enough. By inspection I notice that half the first choice is very close. Let R3 be 27kΩ and R2 be 33kΩ. Then R5 is chosen to drop 1.5V from the supply rail of 13.5V with 7mA flowing through it. In this case it is the same as for R7 and will be 220Ω. (Check the values as shown in the **Part 1** calculations.)

Practical 3.65MHz Amplifier

The circuit of Fig. 1 can be designed to operate over a narrow band in the range 455kHz to 50MHz and will be used here as an single-band amplifier or pre-amplifier for 3.5MHz. A suitable p.c.b. track and parts layout are shown in **Fig. 2**.

I chose a TOKO coil type 3333R with an inductance of 45µH, a *Q* of 60, primary turns of 55 and secondary turns of 4, for use as L1 and L2. The value of capacitors to resonate with 45µH at 3.65MHz, also the reactance of L1 are determined in **Part 2** calculations.

With a *Q* of 60 the circuit would have a bandwidth of 3.65MHz/60 = 0.0608MHz or only 60.8kHz, which would be fine if the tuning capacitors were variables. If we wish to pass the whole band of 300kHz through without significant attenuation, then we need a -3dB bandwidth of say 400kHz. This will correspond to a *Q* of 3.65/0.4 = 9.125.

An operational *Q* of 9.125 requires the parallel resistance of the tuned circuits to be (*Q**XL)Ω = 1032*9.125 or 9417Ω and we'll use 10kΩ. The value of R4 may be lower than this to control the stage gain. Now if the resistance across the main windings of coils L1 and L2 is 10kΩ then the input resistance will be reduced by the square of the turns ratio, where the primary side is T_I and the secondary T_O.

There is a voltage step up at the input transformer which is offset by the same step down at the output transformer. So the stage gain is simply Av = Gfs*R4. Refer to **Part 3** calculations for input and output resistance,

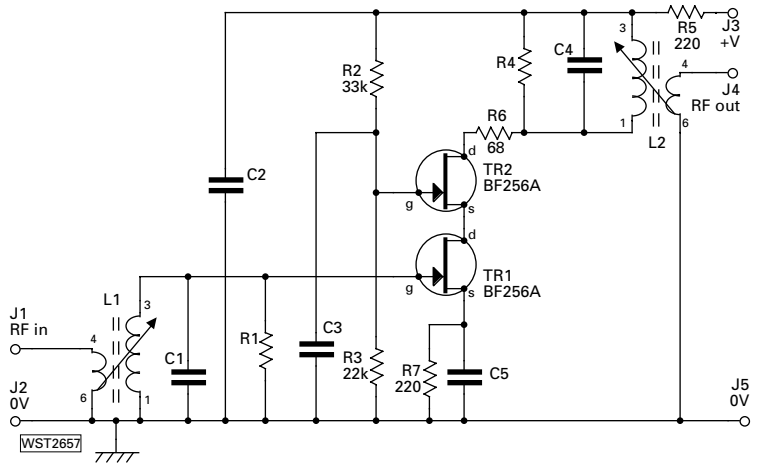


Fig. 1: A cascode h.f. amplifier. See text for more details for each band.

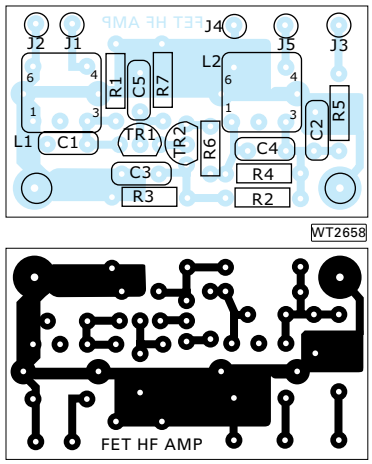


Fig. 2: Pattern and overlay for the amplifier of Fig. 1.

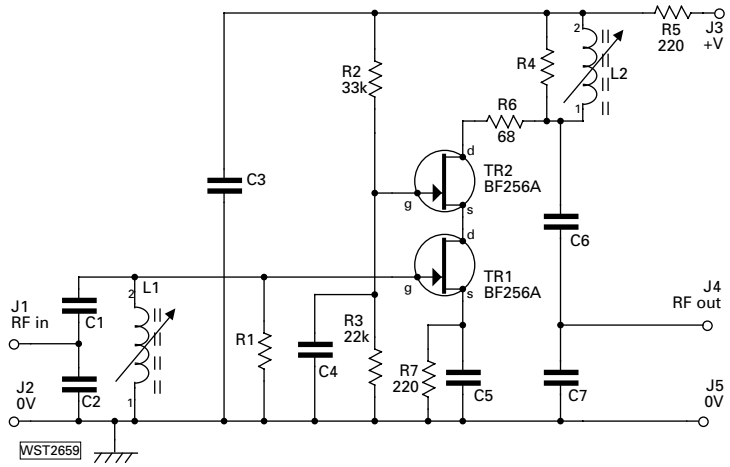


Fig. 3: A cascode v.h.f. amplifier. See text for more details for each band.

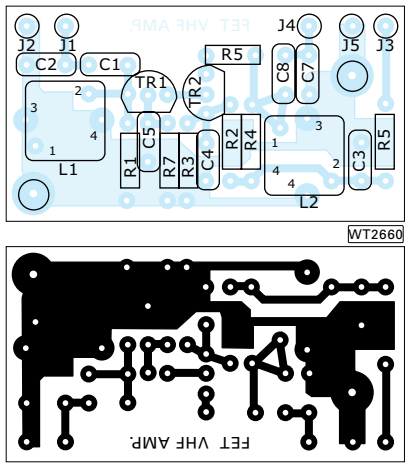


Fig. 4: Pattern and overlay for the amplifier of Fig. 3.

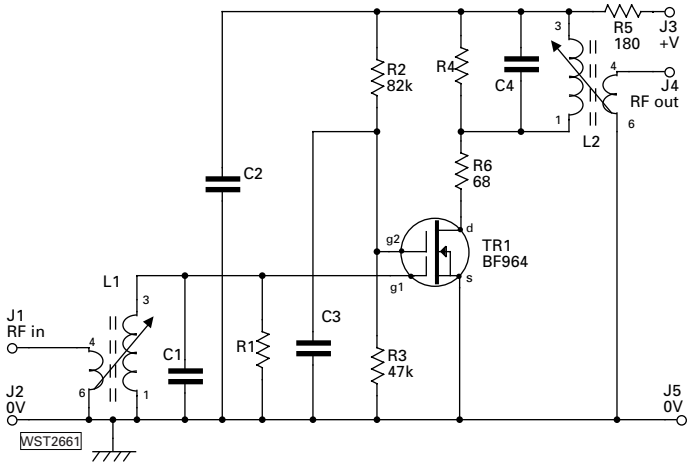


Fig. 5: Using a dual-gate m.o.s.f.e.t. to create an h.f. amplifier. (See text for more details for each band.).

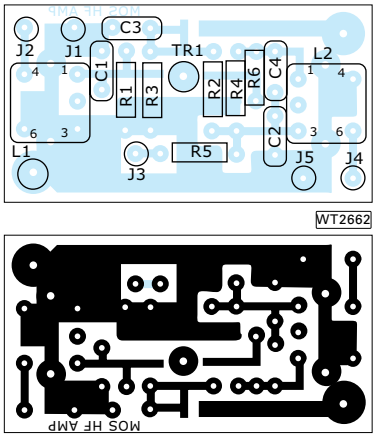


Fig. 7: Pattern and overlay for the amplifier of Fig. 5.

for determination of decoupling capacitor values, and for gain determination.

Similar calculations to those above have been undertaken for the most common h.f. bands and are included in **Table 1**

Practical 51MHz Amplifier

The circuit of a suitable amplifier for frequencies of 50-200MHz is shown in **Fig. 3**. All the d.c. conditions are the same as for the 3.65MHz amplifier. A suitable p.c.b. track and parts layout is shown in **Fig. 4**.

Decoupling capacitors C3, C4, and C5 are chosen to have a reactance of about 1Ω at 51MHz. I chose L1 and L2 to be TOKO coil 100076 with an inductance of 0.21μH and a *Q* of 80. Complete calculations are given in **Part 4.** Damping resistors R1 and R4 were added to achieve the required bandwidths. Calculations as shown in Part 4 have been done for 70MHz and 145MHz and **Table 2** gives practical values.

The Dual Gate MOSFET

The dual insulated gate m.o.s.f.e.t. (to give it a more complete naming) was developed from a single insulated gate f.e.t. whereby an insulating layer of silicon oxide was added

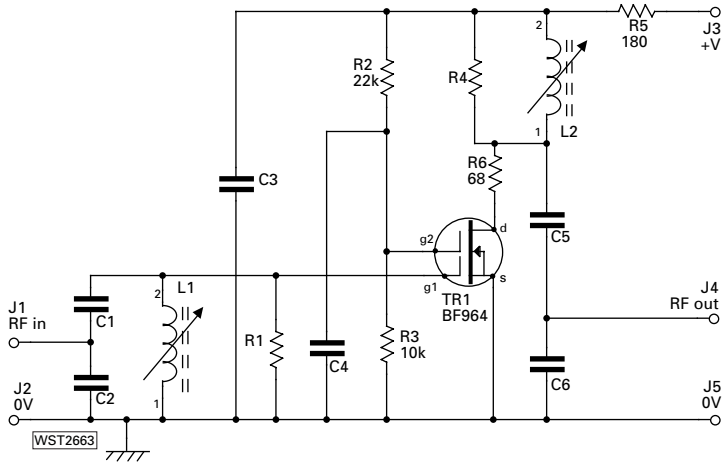


Fig. 6: Using a dual-gate m.o.s.f.e.t. to create a v.h.f. amplifier. (See text for more details for each band.).

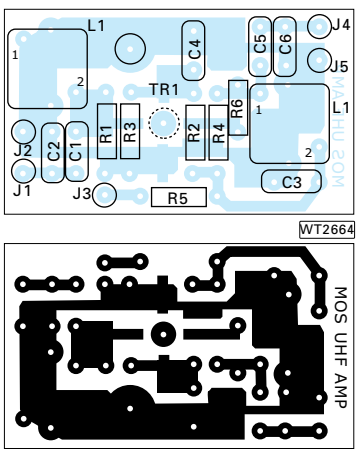


Fig. 8: Pattern and overlay for the amplifier of Fig. 6.

Table 1

Freq. (MHz)	Q	L µH	XL Ω	C1, C4 pF	C2,3, 5 pF	R1 nF	R4 Ω	Gain v/v	(dB)
3.65	9	45	1032	39	47	10k	5k6	21	26.5
7.05	47	5.5	244	100	22	12k	5k6	21	26.5
14.2	29	5.5	490	22	10	15k	5k6	21	26.5
21.2	42	1.2	160	47	10	6k8	5k6	21	26.5
29.0	10	1.2	218	22	10	2k2	2k2	8.25	18

Table 2

Freq. (MHz)	BW (MHz)	Q	L µH	C1, C6 pF	C2, C7 pF	C3-C5 nF	R3, R4 Ω	Gain Av(dB)
51	2	25	0.21	56	330	3.3	2k2	15
70	1.8	39	0.21	27	270	2.2	6k8	22
145	3	48	0.08	15	120	1	6k8	22

between the gate electrode and the source to drain channel. There are two principal benefits to this innovation. Firstly the gate no longer forms a diode with the channel so no current flows through the gate if it is positive with respect to the source. Secondly the capacitance from the channel to the gate is considerably reduced.

By adding a second insulated gate onto the device, similar operating characteristics to the dual f.e.t. cascode circuit are produced. First generation m.o.s.f.e.t.s in the manner of junction f.e.t. needed g1 to be reverse biased with respect to the source, to control the drain current to the correct level. Gate g2 had to be biased 3 or 4V above gate g1.

The first generation devices such as the 40602 by RCA worked exceedingly well as amplifiers up to TV frequencies achieving quite impressive noise figures. But they did suffer problems due to handling and from static and also lightning pulses, which would punch holes through the insulated gates.

The second generation m.o.s.f.e.t.s such as the 40673 and 3N201 included back-to-back Zener diodes from the gates to the source to limit damage from voltage spikes. These devices became the main v.h.f. and u.h.f. amplifier workhorses during the 1970s.

Then, in the early 1980s, a third generation of the device was developed to operate with a gate g1's voltage at the same level as the source. This meant a truly grounded source circuit which was less frequency sensitive and would provide higher gains. First and second generation devices had gain factors (forward conductance) of around 12mA/volt whilst third generation jumped to 18mA/volt and have now climbed as high as 24mA/volt.

The first and second generation devices were used in much the same circuit as the dual f.e.t. cascode but rarely needed the drain stopper resistor. However, with the third generation devices the drain stopper is needed again to prevent oscillation in the u.h.f. region.

Designing circuits for the third generation devices is much the same as for the cascode except that there's now no source resistor and bypass capacitor and g2 is set at about 4V. By arranging for g2 voltage to be adjustable from 0 to 4V the gain can be adjusted over a 20dB range. The circuits of **Fig. 5** and **Fig. 6** shows practical circuit diagrams for h.f. and v.h.f. third generation dual gate m.o.s.f.e.t. amplifiers with **Fig. 7** and **Fig. 8** the corresponding layouts. These circuits use the same tuned circuit values as calculated previously for the cascode circuits.

PW

Part 1 Calculations

The voltage (V3) across R3 has the same relationship as 12V to (R2 + R3).
So V3/12V = R3/(R2 + R3). Then V3 = 12V*R3/(R2 + R3).
V3 = 12*27k/(33k + 27k) V3 = 324k/60k = 5.4V. Probably close enough!

Part 2 Calculations

C = 1/(39.5*f*f*L). C = $1/(39.5*(3.65*3.65)10^{12}*45*10^{-6})$
C = 1/(39.5*3.65*3.65*45)µF. C = 1/ (23680)µF = 0.0000422µF = 42.2pF.
Use 39pF for C1 and C4.
The reactance of L1 is XL = 2*π*f*L1.
XL= 2*π*3.65*106*45*10-6. XL = 2*π*3.65*45 = 1032Ω.

Part 3 Calculations

Rin = R1*Ti2/To2. Rin = 10k *4 *4/(55 *55).
Rin = 160k/3025 = 52.9Ω. Close enough.

The decoupling capacitors C2, C3, and C5 should have a reactance of 1Ω at 3.65MHz.
Xc = 1/(2*π*f*C). Then C = 1/(2*π*f*Xc).
C = $1/(2*\pi*3.65*10^6*1)$ = 1 /(2*π*3.65)µF
C = 1/(22.93)µF = 0.0436µF. Use 0.047µF or 47nF.

Gfs of BF256A = 3.75mA/V. For a gain of about 20 then R4 = Av/Gfs,
R4 = $20/3.75*10^{-3}$ = 5333Ω. Use 5k6.
Av = 3.75mA/V*5K6 = 21x. This is 26.5dB.

Part 4 Calculations

Xc = 1Ω. f = 51MHz. C3, C4, and C5 values are calculated by;
C = 1/ (2*π*51*10^6*1). C = 1 /(2*π*51)µF.
C = 1/320.44µF = 0.00320µF = 3.2nF. Use 3n3.

f = 51MHz, L = 0.21uH, Series value of C1//C2 and C6//C7 = 1/(39.5*f*f*L)
Cs = $1 /(39.5*51*10^6*51*10^6*0.21*10^{-6})$
Cs = 1 /(39.5*51*51*0.21)µF.
Cs = 1 /21575µF = 0.000046µF = 46pF.

The reactance of L1 is Xl = 2*π*f*L1.
X1 = $2*\pi*51*10^6*0.21*10^{-6}$.
X1 = 2*π*51*0.21 = 67.3Ω.

The bandwidth of the 51MHz band is 2MHz. Let *Q* = f/bw = 51/2 = 25.5.
Dynamic resistance Rd = *Q**X1 = 25.5*67.3 = 1716.

Input resistance Rin = 50Ω. Rd = 1716.
Then C2/C1 and C6/C7 = SqRt(Rd/Rin).
C2/C1 = SqRt(1716/50). C2/C1 = SqRt(34.32) = 5.85.

Let C1 be 56pF then C2 = 5.85*56pF = 327.6pF.
Check Cs = 56*330/(56 + 330) = 47.8pF, close enough.
Then C1 and C7 will be 56pF and C2 and C6 will be 330pF.

BF256A Gfs = 3.75mA/V. Av = Gfs*Rd = 3.75mA/V*1716 = 6.4x. (16dB).
Using J309 FETs here would provide a gain of 21x. (26dB).

Parts availability

PCB for h.f cascode f.e.t. amplifier £4.00. PCB and parts to a specified frequency £6.00.
PCB for v.h.f cascode f.e.t. amplifier £4.00. PCB and parts to a specified frequency £6.00.
Please add 50p P&P for each board. **Cheques payable to A.J. and J.R. Nailer, to Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset, DT1 2EF.**

Antenna Workshop

Stefan Niewiadomski shows you how to build a balun-fed lightweight antenna for the 14MHz Amateur band. This antenna has been designed for receiving or low(ish) power transmissions and so should appeal to newly licenced M3s.

A wire dipole antenna is usually the first frequency-specific antenna built by many newcomers to the hobby. But sometimes there is confusion on the best way to connect the antenna dipole elements to the coaxial cable feeder cable at the centre of the antenna. This article describes the construction of a 14MHz dipole antenna, designed to use lightweight coaxial cable, solving the issue of matching the dipole to its coaxial cable feeder, and easing the weather-proofing task.

The classic arrangement of a dipole is shown in **Fig. 1** where one end of the antenna is supported by the house and the other end is supported by a pole, maybe with a pulley at the top to make raising and lowering the antenna easy. The antenna itself is isolated from the support ropes by insulators, either 'egg or 'dogbone' in shape.

One drawback of the dipole can immediately be seen: because it has to be fed in the middle, the antenna wire elements themselves have to carry the weight of the insulator in the middle of the dipole and also the weight of the feeder cable.

Arguably the neatest and most compact form of feeder is coaxial cable, but because it has an outer sheath and an inner conductor it's inherently unbalanced, although the dipole elements are balanced in nature. Connecting the coaxial cable feeder directly to the dipole radiating sections can cause the feeder to radiate power (in the transmit case) and pick-up unwanted signals (in the receive case).

Lightweight Coaxial

The lowest-weight coaxial cable easily available is RG-174 which is commonly used for screened r.f. wiring inside radio equipment. This cable is only just over 2mm in diameter and therefore is very lightweight and flexible. Experimental work[‡1] has shown the attenuation of this coaxial cable to be only about 3.5dB per 30m (100ft) at 15MHz, compared with 2dB for commonly-used RG-58.

In the set-up for my 14MHz dipole, I used only about 10m of feeder so, the losses in the RG-174 would be negligible. From this data it seems completely unnecessary to use heavy RG-58 for receive and low(ish) power transmit (see below) applications. RG-174 is marginally more expensive than RG-58, but in my view this is far outweighed by its advantages.

I do not intend to go into the theory of balanced-to-unbalanced transformers (baluns) here, this being covered in much reference material. A typical balun is shown in **Fig. 2**, illustrating the construction as a trifiliar winding on an FT50-61 ferrite toroid. Note the phasing of the windings, which are wound side-by-side on the toroid. The windings transform a balanced input applied between pins 1 and 5 to an unbalanced (ie one side is grounded) output between pins 2 and 6, while maintaining a 1:1 impedance ratio over a wide frequency range. The terms input and output in this context refer to a receive signal direction: a balun is bidirectional and so the balance-to-unbalanced action is effectively symmetrical.

Calculation Of Size

There are many references to the calculation of the sizes of various antennas. The overall length of a dipole antenna, when corrected for end-effects is given by:

L = 143/f

Where: L is the overall length in metres and f is the mid-band frequency in MHz. Assuming a centre frequency of 14.2MHz, then 10.07m is the overall length for that band. Each run being almost half of that distance. In my design the centre ends of the elements are separated by 25mm on the p.c.b., and so the length of each element is (10070 – 25) / 2 = 5023mm. Other bands can be accommodated with this design, simply re-calculate the overall length and hence the length of each element.

Because the balun transformer T1 contains only nine turns of wire, it's easy to construct even though it is trifilliar wound, see Fig. 2. Cut three 200mm lengths of 0.4mm (actual size is not too critical) enameled copper wire and wind the three wires side-by-side on the toroid, being careful not to cross the wires as you pass the wire though the core. This takes a little time, but is not too difficult to achieve. When the nine turns have been wound, cut the ends to about 25mm and finally cut to length and scrape off the insulation when mounting on the printed circuit board (p.c.b.) (see below).

The balun is mounted on a small p.c.b., **Fig. 3**, which is supported by the dipole element wires, and separates the centre ends of the dipole elements. Terminal pins were used on the prototype to which the toroid wires and feeder coaxial cable were soldered, rather than trying to pass these through the p.c.b. and soldering to the track side. I find this to be an quicker way of making these connections, and easier to ensure good soldered joints.

The p.c.b. also forms the insulation medium between the elements and is strong enough to take the longitudinal strain in the element wires. The feeder coaxial cable also terminates on the p.c.b. and the coaxial cable is secured to the p.c.b. by small loops of insulated wire to relieve the strain of the vertical section of coaxial cable hanging down from the centre of the dipole. Because miniature RG-174 is used in this design the

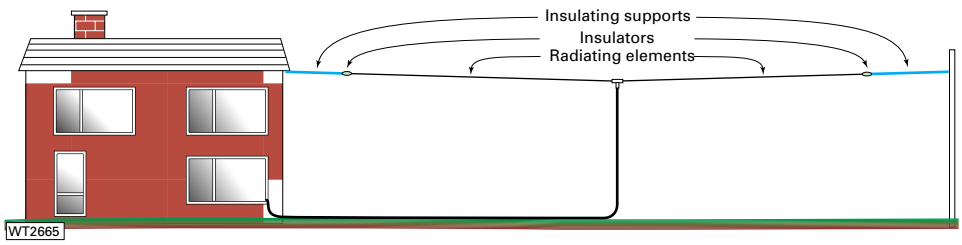


Fig. 1: A typical λ/2 dipole fed with coaxial cable feeder.

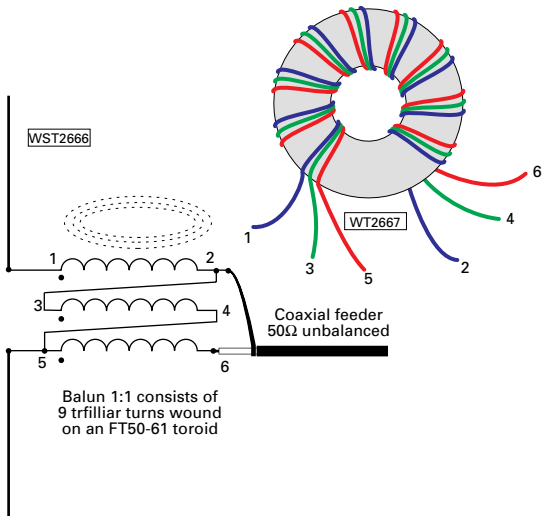


Fig. 2: The electrical and physical diagram of the toroidal transformer. See text for more details.

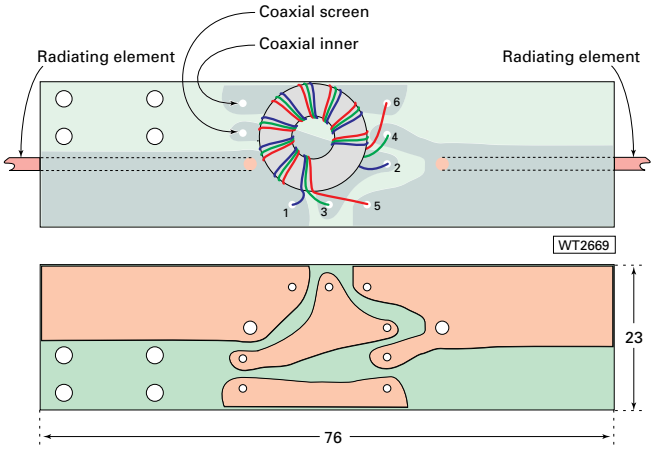
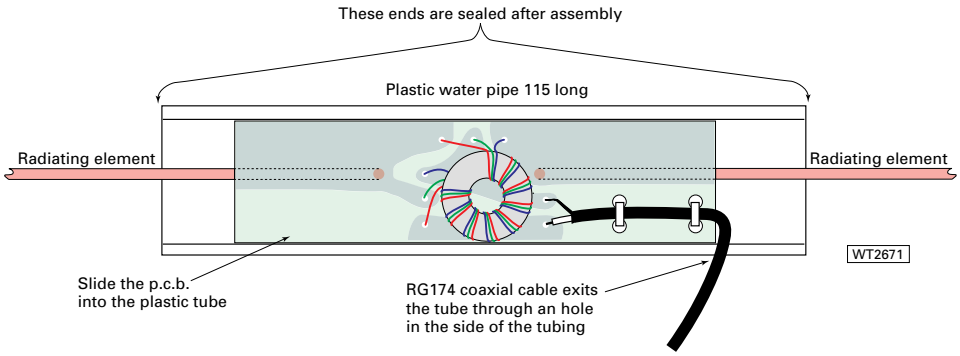


Fig. 3: The p.c.b. and layout for the dipole centre. See text for more details.

Fig. 4: And this is how the dipole centre is fitted into the section of plastic plumbing pipe. When mounted and secure, the ends are sealed against moisture ingress.



weight of feeder supported is minimal, contrasting with RG-58-type feeder which is much heavier.

When cutting the dipole elements to length, first of all, connect the wire to the insulator by passing its end through the insulator and then tightly twisting about 70mm of the wire around itself. Then measure the length needed (5023mm for the 14MHz version) and put a sharp right-angled bend in the wire and leave about 10mm extra beyond the right angle, before cutting it. It's a good idea to measure the wire carefully a couple of times before making any cuts to save possible mistakes and wastage.

The right-angled ends of the elements are pushed through the 1.5mm mounting holes in the p.c.b. from the track side and soldered to the copper. This arrangement transfers the strain in the elements into the p.c.b. insulation material itself.

Not Stretching

I used 1.5mm (16ws.w.g.) hard drawn copper wire, that has the advantage of not stretching over time, for the elements. Normal copper wire stretches over time causing the antenna to sag and change its centre frequency because of the increase in length of its elements. The recommended wire may be replaced if smaller diameter hard drawn wire can be found. By this means the antenna will become lighter overall and make it less visually obtrusive.

The p.c.b. with the balun mounted is illustrated in and the dipole elements and feeder coaxial cable attached, ready to be slid into the 115mm length of 22mm outside diameter polythene tube, **Fig. 4**. (the critical diameter is actually the inside one, which has to allow the assembled p.c.b. to slide into it). The tube needs to be drilled with a 2.5mm hole to allow the coaxial cable to exit the tube.

Don't forget to slide the tube onto one of the wire elements **before** attaching the insulator to the element wire. I didn't and in my case I had to take the insulator off again!

After the p.c.b. and tube arrangement have been assembled, it's a good idea to cut the coaxial cable feeder to length, solder an appropriate plug to suit the antenna socket on your receiver, and temporarily erect the antenna and test it. Compared to an long-wire antenna the dipole should produce signals at least a couple of S-points stronger. If the system works well, then take it down, weatherproof the assembly by sealing the ends of the tube and the coaxial cable entry point with silicone (bathroom) sealant and re-erect the antenna.

Excellent Results

The antenna has been in use for several months and at my station has produced excellent results, band conditions permitting. Signals from the east and west coast of the USA, Canada, Oceania, Africa and of course from all over Europe have been heard. It also seems to work well on 7MHz (40m).

As previously mentioned, this design was intended for receive use only, but is also suitable for low power transmissions up to about 10W. I've seen an Internet-discussion of the power handling capability of miniature RG-174 cable[‡2], and 100W seems to be the accepted figure. I think I'd limit the power to something less than this, maybe 20W, depending on the length of feeder used.

The FT50-61 toroid should be capable of handling 10W, but if more power is used, try an FT68-51 core, though still with the same number of turns. It may be necessary to use a larger diameter tube to accommodate the bigger toroid.

There you have it, a simple, but effective balun-fed dipole antenna for the 14MHz band. **PW**

Shopping List

T1 balun wound on FT50-61 toroid.
0.4 mm enamelled copper wire for T1.
1.5mm hard-drawn copper wire for dipole elements.
a short (115mm) length of 22mm outside diameter polythene tube (plumbing pipe), silicone sealer, printed circuit board, terminal pins, RG-174 miniature screened cable, plug to suit the rig, two-off 'egg' or 'dogbone' insulators, nylon support rope.

The toroid, copper wire, RG-174 and insulators may all be obtained from **Sycom** (tel 01372 372587, E-mail: **robin@sycomcomp.co.uk**, or see **www.sycomcomp.co.uk)**

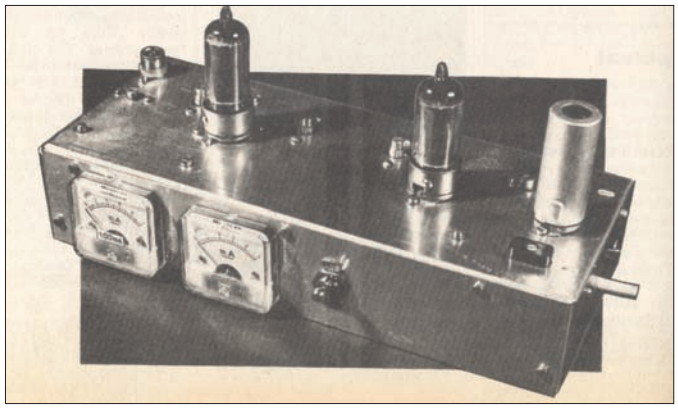
References (‡)

1) Notes on using RG-174 coaxial cable at medium and lower h.f. frequencies: **www.dxing.info/equipment/rg_174_coax_bryant.dx**

2) [Amps] RG-174 power handling capacity: **http://lists.contesting.com/archives/html/Amps/2002-04/msg00156.html**

A Simple Four Metre Transmitter

Continuing the republishing of *PW* v.h.f. and u.h.f. classic projects Rob Mannion G3XFD introduces a simple, extremely practical 70MHz transmitter by the well known regular author Frank Rayer G3OGR.



Original Photograph of G3OGR's 70MHz transmitter (see text).

Introduction: This project first appeared in the March 1973 issue of *PW*. Although the late **Frank Rayer G3OGR** was better known for his h.f. based designs, he also encouraged constructors to venture on to v.h.f. I built this circuit and modified it to my own needs. I used clamp and choke modulators in the different versions I built over a two year period. It's also suitable for narrow band frequency modulation use, but although used with this mode, I preferred the excellent quality a.m. which could be produced. The project is not republished as a truly vintage circuit, instead I've chosen it because it's entirely practical and easy to work on as commonly available valves and components are used. I'm actually building a new version of the transmitter using a p.c.b. style 'chassis' instead of aluminium. It's easier to build and operate and when combined with a simple receiver and 'one box' station can be made. There's an idea for you readers, it could catch on, a complete station in one box! Have fun. **Rob G3XFD.**

The 1973 article

Due to the fact that the limitations of crystal control are quite acceptable on the four metre band, a transmitter running some 10 to 15W on 70MHz can be a very straightforward piece of equipment. The transmitter shown here consists of the r.f. section only, as an existing power supply and modulator was used in conjunction with it.

Maximum input to the p.a. is 50mA at 300V, or 15W, but the power actually run may depend somewhat on the available h.t. supply and modulator. It would be in order to operate the r.f. section from its own h.t. pack, but this is scarcely necessary with low power, though it can be a solution if current cannot be drawn from existing equipment.

The high tension (h.t.) requirements are up to a maximum of about 90mA at 300V for the whole r.f. section. Additionally, 1.8A at 6.3V is required for the for the heaters.

Editorial note: *This project will work successfully with a wide range of valves, and it's possible to reduce the heater current significantly, allowing the use of a standard filament transformer. My original projects used surplus p.m.r. equipment 12V d.c. to 250V d.c. inverter units for portable operation.* ***G3XFD***.

Adequate grid drive was obtained with a 250V supply for the crystal oscillator and doubler, but efficiency begins to fall off if less than 300V is provided for the p.a. It's also useful to have a combined modulator/power pack incorporating at least a 150mA 300V h.t. supply. This is so that some 70 to 80mA will be available for the modulator itself and a similar current for an r.f. unit, or other equipment, which may be plugged in.

The Circuit

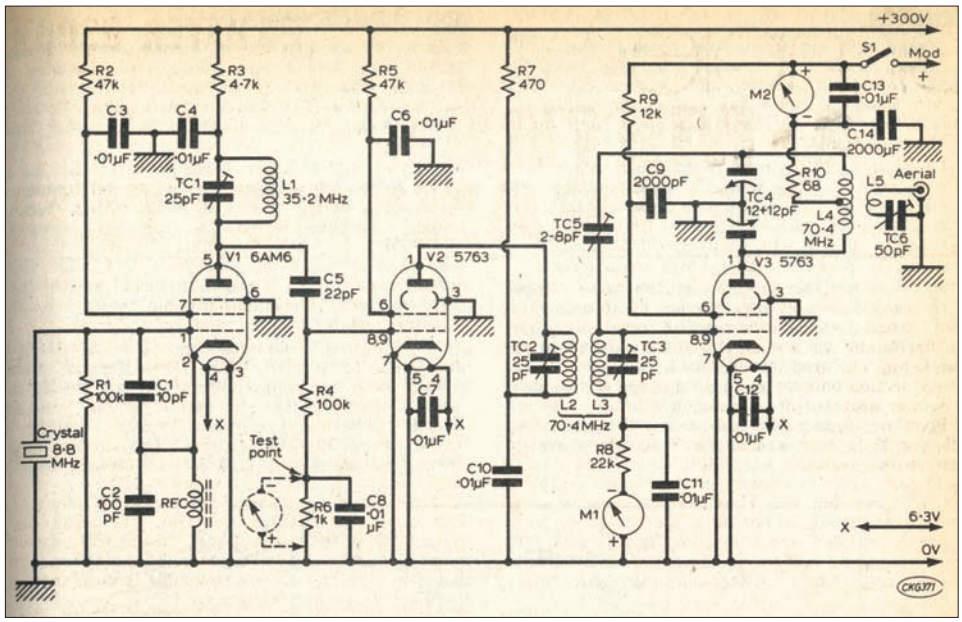
This is shown in **Fig. 1** and uses a 6AM6 B7G based valve as the crystal oscillator. This type of circuit does not depend on the tuning of L1 for oscillation, and L1 is actually tuned to select the wanted harmonic.

Crystals are chosen so that multiplication by eight gives a frequency in the 70MHz band. They will thus be in the vicinity of 8.8MHz (this is quoted only as an example, and actually comes out at 8.8 x 8 = 70.4MHz).

The inductor, L1, is tuned to the fourth harmonic, or approximately 35.2MHz, with the following 5763 B9A based valve acting as a frequency doubler. When first testing the circuit, it can be useful to check the doubler grid current, and to enable this a meter can be clipped across R6 for this purpose.

The inductors L2 and L3 are both tuned to the output frequency. Grid current in the p.a. develops across R8 which is 22kΩ, so 2 to 3mA grid current will provide some 44 to 66V bias.

Fig. 1: Circuit of the 70MHz transmitter (see text).



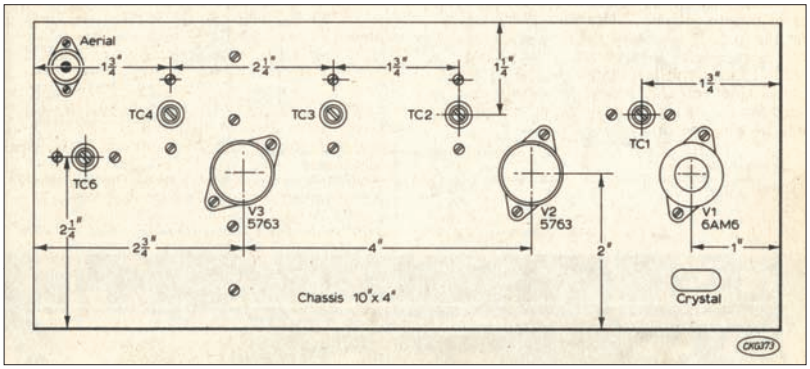


Fig. 2: Author's original chassis layout (see text for suggestions).

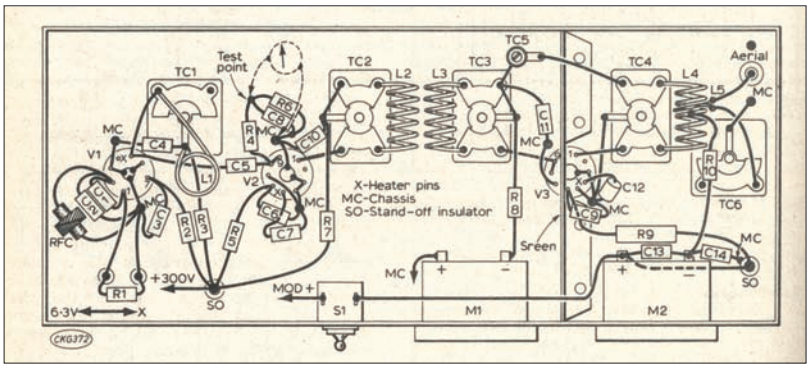


Fig. 3: Diagrammatic view of the author's original under-chassis lay-out (see text).

For ease in setting up and checking operation, a 5mA meter M1 can be permanently connected to show grid current.

The 5763 p.a. is listed as suitable for use up to 175MHz and was found to give very good efficiency. Meter M2 indicates anode current. A 1mA meter, shunted to read 0-100mA, was used here.

Editorial note: *Meter units may not be so common nowadays. However, you can maximise the use of a single movement by arranging suitable switching to enable each parameter to be monitored. By using an older, larger scale movement, the scale can then be re-marked to indicate what's required.*

The trimmer capacitor, TC4, and L4 combination is a balanced centre-tapped arrangement so that TC5 can be employed for neutralising. It was found that the p.a. was stable without neutralising but tuning TC4 brought about quite noticeable changes in grid current, shown by M1. With neutralising this effect is almost absent and better efficiency is obtained.

Editorial note: *Butterfly are still available from dealers, especially those who handle surplus material. However, if a suitable capacitor cannot be found, the circuit can re-arranged for parallel tuning, or even using a pi-tank circuit.*

The switch, S1, removes h.t. from the p.a. mainly for tune-up purposes which checking grid current shown by M1. It also allows the transmitter frequency to be located on the receiver system being used.

Transmitter Construction

The diagram, **Fig. 2**, shows dimensions on top of the chassis for which 10 x 4in (254 x 102mm) flanged 'universal chassis' member was used with flanged 4 x 2in (102 x 51mm) ends and 10 x 2in (254 x 51mm) plates for the front and back. It's convenient to leave off these side plates until most of the wiring is completed.

All the trimmers TC1-TC4 are of the type having isolated bushes for 6BA bolts so that the rotors are insulated from the chassis. TC1 could be a small air-spaced variable capacitor of the usual type with its bush insulated from the chassis with washers. TC2 and TC3 are not used in a balanced circuit, but are 'butterfly' types, mainly to provide an easy means of mounting L2 and L3. Trimmer TC4 must be a butterfly type. Ensure that there is ample clearance for the spindles of TC1-TC3 to avoid h.t. or p.a. bias shorts.

Editorial note: *Nowadays, especially if the 'open style' p.c.b. material chassis lay-out is used, the constructor will not need to use the stated trimmer capacitors. Standard types will do, and they can be easily mounted for adjustment, incorporated in the inductor assembly, or mounted on plastic pillars (I used short lengths of plastic rod or tubes).* ***G3XFD****.*

The fixing holes for the p.a. valve holder are left until a check has been made that the pins will come in such a position that pins 7, 8 and 9 are on one side of the screen below the chassis and the remaining pins on the other side.

A 4 x 2in (102 x 51mm) flanged member forms the screen which is filed or cut away to give only essential clearance to the valve holder. A hole is drilled in advance for the heater lead. Only two other leads pass through here and these use the holes already punched in the member near the flanges. The latter have to be cut away for about 1/2in (13mm) so that the member fits inside the 10 x 4in (250 x 102mm) part. These are bolted together as in **Fig. 3**. To obtain enough clearance for pins 1, 6 and 9, pin 7 may be in contact with the screen.

Components & Wiring

Components and wiring are shown in **Fig. 3**. All leads are as short as reasonably possible, especially those for earth returns and by-pass capacitors. Heater leads to pins X run against the chassis. Insulated stand-offs are used to support some points in the h.t. circuit.

The inductor L1 stands vertically near TC1, L2 and L3 are about 1/8in (3mm) apart, but can be moved to obtain suitable grid current. If these are wound with bare wire, take care that they do not touch each other. The inductor L4 is centre tapped for supply resistor R10. The inductor L5 is of well insulated wire (a sleeve of insulation can be used) and it can be moved into L4 to increase coupling.

A four core flexible cord is made up and equipped with a multi-pin plug or other means of connecting to the modulator/power supply. A screen is placed on the 6AM6 but not on the 5763s, in view of the heat produced here.

A reduced h.t. supply could be used for a first test, though no damage will be done provided grid current is obtained in the way described. But failing this, the cathode current in the 5763 stages may be high and anode dissipation above the rated maximum.

Oscillator Adjustment

To begin the crystal oscillator adjustment the Resistors R5 and R7 can be temporarily disconnected from the h.t. line and S1 should be open. A meter is clipped across R6 (positive to chassis). Next, L1 is then tuned by TC1 to secure maximum grid current in this stage, which is likely to be around 0.2mA (200µA) or more.

It's as well to make a check to see that L1 is tuned to the fourth harmonic. If the crystal frequency is about 8.8MHz, this will be 35.2MHz. Wrong tuning positions would be the third harmonic (26.4MHz) and fifth harmonic (44MHz). Due to variations in the exact dimensions of L1 and stray circuit

capacitances it might in some cases be possible to reach the third or fifth harmonics near the extreme settings of TC1.

Note: *I strongly advise that constructors use an absorption wave meter or a sensitive calibrated r.f. 'sniffer' when the oscillator chain is being set up. The v.h.f. absorption wavemeter featured in the November 2004 PW will be ideal for the job, although the coverage will have to be adjusted downwards. In fact, it's advisable to make two versions, one for low v.h.f. and one for higher v.h.f. These can then be used in conjunction with an h.f. absorption wavemeter to aid correct setting up. And of course, if you have one a direct reading frequency will also be extremely helpful. Editor.*

When output is obtained from L1 on 35MHz it's impossible to tune L2, L3 or L4 to the wrong harmonic. So incorrect operation of the p.a. should not arise. Once L1 is tuned to 4x the crystal frequency this is followed by 2x in the doubler, resulting in 8x or around 70.4MHz from a crystal with a fundamental frequency of about 8.8MHz. I've mentioned this in detail to point out that if L1 is tuned to the third harmonic or 26.4MHz, the following stage might also, in error, be used as a tripler resulting in 3x3 or 9x resulting in an output of 79.2MHz.

With variations in home-made coils, it might be possible to tune L4 to the 79.2MHz frequency. But this will be avoided by a wavemeter check of L1, or by noting that the doubler gives an output at the expected frequency on the receiver.

Doubler Adjustment

The doubler stage adjustment is carried out when TC2 and TC3 are tuned for maximum grid current on M1 with S1 open, but R5 and R7 connected normally. If either trimmer is seen to be fully open for maximum grid current, stretch the associated coil a little. Conversely, should either trimmer be fully closed, the associated coil should be compressed.

With a 300V supply well over 4mA was obtained on M1, but the p.a. is normally operated with around 3mA. Should less than 2mA be obtained, moved L2 and L3 closer together. Insufficient grid current will considerably reduce r.f. output.

Ancient or defective crystals cannot be expected to have the necessary activity and a crystal of the type listed is recommended. The exact frequency in this range being a personal choice of course.

Excess grid current can be avoided by slightly staggering the tuning of TC2 and TC3 or by moving L2 and L3 apart, or by increasing the value of R5 to reduce the h.t. on V2.

Power Amplifier Tuning

An initial test for power amplifier (p.a.) stage tuning can be made using a 12V bulb as an r.f. load connected to the antenna outlet, or alternatively to a one or two turn loop placed over L4. The trimmer TC5 is initially fully unscrewed. If necessary, stretch or compress L4 to bring tuning within the range of TC4.

With S1 open, grid current shown by M1 will dip slightly as TC4 is tuned through resonance. Screw down TC5 slightly, checking meanwhile until no change in grid current can be observed when TC4 is tuned through resonance. If TC5 is screwed down too far, changes in grid current will again become apparent as TC4 is adjusted.

Neutralising is not touchy or difficult. It's correct when, with S1 closed, resonance obtained with TC4 coincides with maximum lamp brilliance, and minimum current on M2 and adjusting TC4 causes no significant change in grid current.

Considering Antennas

When considering antennas, it's likely that the enthusiastic 70MHz operator will end up with some multi-element array. These can be purchased from adverts in *PW*, or constructed from information in the various handbooks and also from designs published in the magazine.

Here, I'd like point out that you can get started on 4m with nothing more than a dipole around 79.5in (2.19m) overall length. This is conveniently made from 1/4in (6.3mm) or 3/8in (9.5mm) alloy tubing, the inner ends being secured in a TV type junction box, or in an electrician's insulated junction box or bolted to a piece of insulating material.

A 75Ω coaxial feeder is connected to the inner ends and the whole unit raised on a light pole or situated as circumstances allow. A little directivity will be found, but there's no real need to make provision to rotate the antenna.

Trimmer TC6 gives some control over loading without moving L5, and allows adjustment to compensate for the reactance of L5, if necessary. There should be little difficulty in finding a setting for TC6 and a position for L5, which results in M2 showing the wanted input current, when TC4 is tuned to the dip, in the usual way.

If a test is made with a lamp load or some form of r.f. indicator, it will be seen that a worthwhile increase in output power may be achieved by very slight adjustments of TC4 and that the dip on M2 has its limitations as an indication of the exact tuning position for TC4. For this reason, it's a good plan to use some form of r.f. output indicator.

One such indicator is a loop, crystal diode and sensitive d.c. meter (say 100µA to 1mA full scale). The loop is put in position to pick up some of the r.f. in L4/L5, taking care to avoid having it too near, until it is seen what meter reading is likely. Tuning is then directed towards obtaining the best reading on the meter, corresponding to maximum r.f. in L4.

Other means, such as the use of an s.w.r. meter showing forward power in the antenna feeder, would be just as suitable, or even better if the unit is suitable for the frequency.

PW

Components List

Resistors

R1	100kΩ 0.25W	R5	47kΩ 1W	R9	12kΩ 1W
R2	47kΩ 0.5W	R6	1kΩ 0.25W	R10	68Ω 0.5W
R3	4.7kΩ 0.5W	R7	470Ω 0.5W		
R4	100kΩ 0.25W	R8	22kΩ 0.5W		

Capacitors

C1	10pF SM	C8	0.01µF disc cer
C2	100pF SM	C9	2000pF 600VW
C3	0.01µF disc cer	C10	0.01µF disc cer
C4	0.01µF disc cer	C11	0.01µF disc cer
C5	22pF SM	C12	0.01µF disc cer
C6	0.01µF disc cer	C13	0.01µF disc cer
C7	0.01µF disc cer	C14	2000pF 600VW

TC1 25pF air spaced trimmer (Jackson C801)
TC2/3 25pF + 25pF butterfly trimmer (Jackson C713)
TC4 12pF + 12pF butterfly trimmer (Jackson C713)
TC5 2-8pF tubular trimmer
TC6 50pF air spaced trimmer (Jackson C801)

Valves

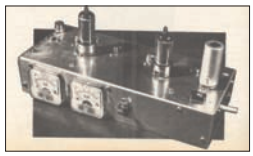
V1	6AM6	V2	5763	V3	5763

Inductors

L1 10 turns 18s.w.g. 1/2in i.d. spaced to 3/4in long
L2 7 turns 20s.w.g. 3/8in i.d. spaced to 7/8in long
L3 As L2
L4 9 turns 18s.w.g. 1/2in i.d. spaced to 3/4in long
L5 1 turn insulated wire in centre of L4

Miscellaneous

M1, 5mA miniature meter, M2, 100mA miniature meter, S1, on-off, toggle switch. Valve holders, B7G with screen (1), B9A (2) chassis, universal chassis flanged members, 10 x 4in, 4 x 2in (3 off), flat sheet 10 x 2in (2 off), coaxial socket, RFC, dust-cored choke, stand-offs. crystal 8.8MHz (see text), type HC6U and holder.



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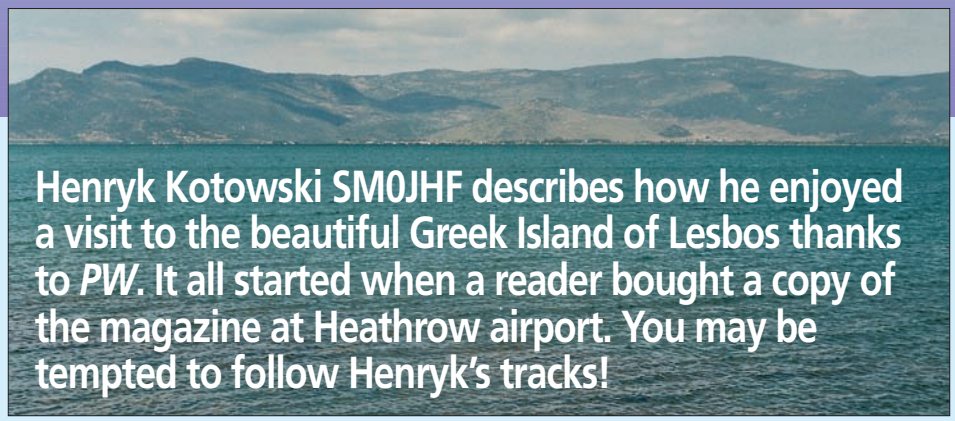


Henryk Kotowski SM0JHF describes how he enjoyed a visit to the beautiful Greek Island of Lesbos thanks to *PW*. It all started when a reader bought a copy of the magazine at Heathrow airport. You may be tempted to follow Henryk's tracks!

The beatiful Island of Lesbos. A view of the bay of Kalloni, on the other side of the small village of Skala Kallonis.

Lesbos, the third largest Greek island, green and unexploited, surprised me radio-wise. The island is sometimes referred to as Mytilini and has a reputation for local olive oil and *ouzo*. This article is aimed at proving that Amateur Radio is just one more of the Island's local specialities.

My visit to Lesbos was entirely unplanned and *Practical Wireless* played a role in the plot! It all began when **Panos SV8CRI**, an active Amateur Radio operator living on Lesbos, was changing flights at Heathrow Airport. He bought a copy of the April 2003 *PW* there and in it he found my story about the small African island Sao Tomé.

Panos had been to Sao Tomé a couple of years ago and used the callsign S92SV. Sometime in May 2003 he sent an E-mail message to me asking if I was planning to go to Sao Tomé again as he wanted to re-visit Africa. My prompt reply brought no response, so I searched the web and found out that he lived on Lesbos.

I also discovered that there were other active Amateur Radio enthusiasts on the Island, and I could fly there direct from Stockholm where I live. I also managed to learn that Panos was running a filling and car-service station in the very middle of the island.

Before heading to Greece I packed a small radio transceiver, an automatic antenna tuner (a.a.t.u.) and a 7m telescopic fishing rod. The CEPT agreement allows using an Amateur Radio transmitter without any additional formalities for Radio Amateurs visiting from other European countries signed up to the agreement.

The trip went well, except for the airport security screening system An antenna tuner with wires, inside a suitcase, looks very suspicious on the X-ray monitor!

Fig. 1: Alex SV8QG on the terrace with some of his antennas.

Landed After Sunset

My flight from Stockholm landed at Mytilini airport after sunset. I rented a car and went looking for a suitable hotel. 'Suitable' means far away from the never sleeping city, not expensive and with provisions for setting up my fishing rod antenna. In the end I stayed for one night in Mytilini.

Next morning I drove towards the middle of the Island and easily found the filling station in the outskirt of Kalloni. Panos was tired and not expecting me. I took him completely aback when I introduced myself: "I'm SM0JHF, why don't you answer my E-mails". Poor Panos, he was so surprised! He'd been working almost 24 hours a day, seven days a week for the past several days because his brother, whom he shares this service station with, was travelling.

Recovering from my suprise arrival, Panos recommended a small fishing village Skala Kallonis on the Bay of Kalloni. Nowadays more people live on tourism than fishing in this village, so I quickly found a quiet guest house where I could tie the fishing pole to the balustrade of the terrace to check the propagation. I soon found out that I could tune the random wire supported by the fishing pole on all h.f. bands, including 50MHz. The wire was too short for l.f. bands, which didn't matter much as they're actually are not my favourites.

Later I went to the village and the picturesque port in Skala Kanonis. Next to the port I saw a tower with a set of Amateur Radio antennas. Knocking on the door, the woman who opened up knew only one English word - "tomorrow" before closing it again. The next day she also said "tomorrow", so I left my card with the name of the guest house I was staying at!

Swedish Broadcast DX!

One day I was on the northern tip of the Island, parked the car and was admiring the landscape. Turkey is just 5km (three miles) away at this point. I was looking for some music on the car's Band II v.h.f. f.m. radio when I suddenly heard the news in Swedish on 92MHz! From then on I was checking 6m band first every time I was on the air as it turned out that this band is open quite often in Sporadic-E propagation mode.

Staying in the middle of the Island, it was easy to make day trips to its different corners. The westernmost strip of land is a narrow islet called Megalonisi in grid square KM29, with the overwhelming part of the island being in KM39. A lighthouse on this islet was the target of a DXpedition in September 2002

The Greek Island of Lesbos

Fig 2: Alex SV8QG (left) with Periklis SV8DTD (right) in the radio room.

using the callsign SZ8LH and I had the pleasure of meeting a few members of this DXpedition team during my one week stay on Lesbos.

Panos SV8CRI, **Fig. 1**, eventually managed to join me as his brother returned, so he could devote some time to showing me his radio room. Entering his shack, I was completely surprised because had at least 10 different transceivers and receivers at his disposal!

One transceiver is always in stand-by mode on 50.110MHz and while I was sipping home-made *cipuro*, we heard someone calling CQ on this frequency. It was **Peter PY5CC** from Brazil who was very loud, and nothing else on the entire band.

Later we went downstairs to the basement where I saw a large number of all kinds of radio test equipment and some home-brewed projects. Panos is a car mechanic, but with a real passion for radio!

Active Amateurs

Back in the main town, Mytilini, I easily found **Periklis SV8DTD,** pictured on the righ in the photograph **Fig. 2**. You just take the route 73 from town to the airport and a kilometre or so out of town turn right. Then you can see his antennas so it's easy to find.

Periklis told me he was part of the team at Megalonisi on the SZ8LH DXpedition and he's very active from home. To emphasis this he pointed out a brand new 6m antenna recently found its way to the top of the tower on the roof.

While I was taking some pictures outside, a friend, another Amateur Radio operator, joined us. It was **Alex SV8QG**, on the left in Fig. 2, probably the most experienced Radio Amateur on the island. He got his Licence and the original callsign **SV1QG** in the late 1970s. Incidentally, the different prefixes were introduced in Greece much later; SV8 designates islands of Aegean Sea and Ionian Sea (these are west and east of the Greek peninsula).

Alex SV8QG invited me to visit his radio emporium and foolishly I thought it would be just another shack with some equipment. Instead I found that his two-level apartment is filled with radio gear. Alex has a corner for h.f., another one for v.h.f., a room for l.f. including v.l.f. No, I'm not kidding you readers!

Alex is quite advanced and for example, his monitoring of v.l.f. transmissions is done by a computer. He proudly showed the Rugby 16kHz QSL card, among others. And although Alex doesn't transmit very often he is listening everywhere. This includes marine band (160MHz), the 144MHz local repeater connected to EchoLink and specialised marine transmissions.

Fig. 3: Hristoforos SV8DTQ in his tiny radio shack.

Another Shack Tour

On the day before I was about to leave I heard someone knock on the door while I was busy working a pile up on 10MHz. "Oh, well" - I thought - "someone is bothered by TVI here". Thankfully though, it wasn't a TVI complaint, instead it was **Hristoforos SV8DTQ** who lives near the fishing harbour who had come to invite to his home.

Visiting SV8DTQ's home I saw a real radio shack. It was literally of no more than a large telephone kiosk size, **Fig. 3**, with a modest station inside. Hristofors had just received a new antenna from Athens and we made arrangement to assemble it next morning. But the next morning it was raining, and the arrival of rain changed the plans.

Fig. 4: More friends in the radio room of SV8CRI - from left - Pantelis SV8DCY, Panos SV8CRI and a s.w.l. friend.

The truly beautiful rural Island of Lesbos has many antique artefacts and natural wonders which I already knew of. But I did not know that there are so many Radio Amateurs and enthusiasm. Neither did I think there would be so much equipment!

Sometimes I feel that Amateur Radio today has more dedicated followers in small, isolated and relatively poor, places than in industrialised countries. Lesbos certainly has it share of keen, welcoming Radio Amateurs and I'll be sure to return after such a great welcome. **PW**

Radio Basics

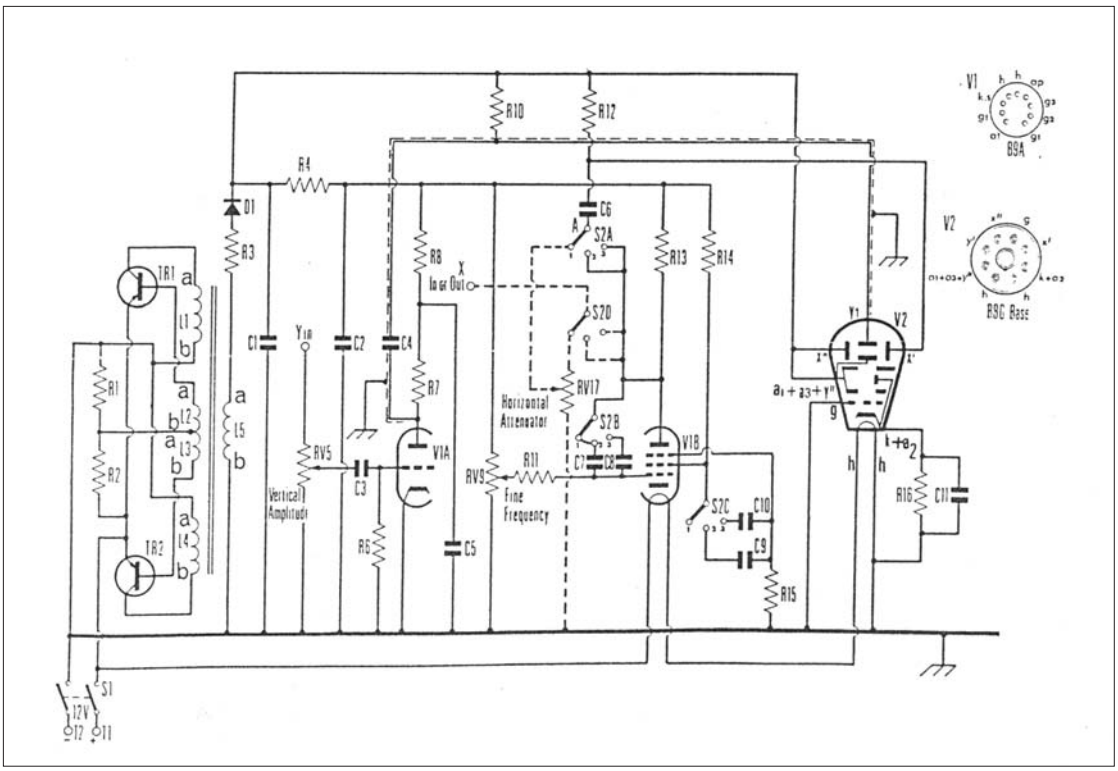
This month Rob Mannion G3XFD brings news of the Radio Basics miniature oscilloscope project. Rob's eventual choice on behalf of readers was originally from Mullard and uses the 1CP1 tube.

Now that my new workshop is up and running (it was completed during the Christmas holiday period) I don't have any excuses whatsoever for not getting down to the various projects in the pipeline. The only thing which spoilt the inauguration of my workshop was the dreaded 'flu which meant that for the first week in the year I didn't do much, but you can be sure that I'll now make up for lost time.

I've already started work on a small v.h.f. project using amplitude modulation, but the 1CP1 one inch oscilloscope takes priority. However, as there were a number of choices available, some suggested by readers who sent ideas and circuits in to the office, I had a difficult choice to make.

In the end, I chose a design which I'd built myself many years ago. There's nothing like re-visiting an old friend is there? But before describing the circuit to be used, it's worthwhile looking at one design in particular I was tempted to use. It's also one which I'd built many years ago, proving very successful but with one two little quirks, which I feel make it a non-runner for the Radio Basics (RB) 'scope project.

Fig. 1: Original Mullard circuit for the Pupil's Oscilloscope, incorporating a 12V d.c to 230V d.c. transistorised inverter (see text). Circuit and design reproduced by kind permission Philips Electronics UK.



Radio Constructor

One of the most successful 'scope projects I've ever built was the design published in the now defunct *Radio Constructor* magazine (*RC*), published by Radio Data Publications. Many hobbyists were saddened when the *RC* ceased publication, including myself.

We'll not see the like of the *RC* magazine again, and as far as I've been able to discover, the last of the publishers died in the last five years or so. Because of this I'm unable to confirm who owns the copyright of the various articles published in *RC*. However, if any reader can provide information regarding the copyright owners, I would be most grateful. Until then, I'm unable to publish any circuits of the *RC* project I'm about to describe.

The project of interest for RB readers was published in the August 1969 issue of *Radio Constructor* under the title Miniature Oscilloscope. The author was **R. Starksfield** who was obviously a member of the Shefford Radio Club in Bedfordshire. I have written to the club, which I'm pleased to say is still active as the **Shefford & District Amateur Radio Society**, hoping to make contact with the author.

Using the 1CP1 one inch cathode ray tube (c.r.t.) the *RC* project proved to be a very successful design with a somewhat unusual timebase. In fact, it was so unusual it couldn't have been much simpler as it used a Neon indicator bulb as a relaxation oscillator.

The term relaxation oscillator may not mean much to modern readers, but it was a very useful inherent effect demonstrated by a simple Neon device (in practice these were evacuated tubular glass bulbs with two electrodes. The evacuated air was replaced with a gas - commonly the rare element Neon, hence the name). The relaxation term comes from the fact that even though a Neon device would not 'strike' (illuminate) until the voltage passed a certain point, it would actually (once working) carry on doing so until the voltage was much lower than the original 'striking' (sometime called the 'trigger' point) voltage point.

The relaxation effect was useful as it could be used to form a simple circuit offering a saw-tooth wave form. These circuits were used for repetitive work, such as 'steering' (scanning) the electron beams of oscilloscope and television c.r.t.s via internal deflection plates (when electrostatically controlled) and via scanning coils in an electromagnetically controlled c.r.t. (please see **Gordon King G4VFV's** series The Oscilloscope for further reading on this subject).

In fact, Neon relaxation devices were commonly used for early television timebases, and I remember

one pre-Second World War 9in screen receiver I owned (it used a CRM92 2V heater tube) used a variation of the Neon called a thyratron. The thyratron, still in use today and often seen in the form of the ubiquitous 6K25, octal based valve, is very reliable. Perhaps that's one of the reasons why it was still being used in the aircraft I helped to main for the Fleet Air Arm in the early 1960s. I'm a firm believer of the adage If it isn't broken, don't fix it' myself!

Although the simple timebase on R J Starkfield's oscilloscope project worked well, I had to (as the author suggested) take some time and care in choosing a suitable Neon indicator. Although conveniently manufactured in miniature Edison screw (m.e.s.) format we're familiar with as it's also used for torch bulbs, the devices weren't manufactured for use in a timebase. This meant that a selection of the Neon indicators had to be tried in the circuit to establish which would work most reliably as a relaxation oscillator (the larger the difference between 'striking' and extinguishing the better it would operate).

In the early 1970s selection of a suitable m.e.s. Neon bulb wasn't a problem because I used them in my shack as r.f. indicators, etc., and always had one or two lying about as they were really useful. I even used them on the bases of my h.f. mobile antenna systems as r.f. indicators. One half of the bulb was painted matt black, allowing me to observe the faint pink glow in daylight when the rig was transmitting.

One particular bulb, held to the G-Whip antenna by a simple wire clip, lasted until several years ago when it slipped out, fell on the to my driveway and I trod on it. Mind you, it had done well as I'd had it for over 30 years!

It was with some regret that I decided that the *RC* project would not be the ideal design to use in *PW* this time round. However, my decision not to use it is only because I have to make whatever is published in RB to be as easily repeatable (by the reader) as possible. Despite this, if you're keen to have a go using a relaxation oscillator timebase I suggest you contact me at the *PW* offices and I'll be pleased to provide details.

Mullard Pupil's Oscilloscope

During my research for a suitable design to use with the 1CP1 c.r.t. I had temporarily forgotten about the useful circuitry provided by Mullard in their Pupil's Oscilloscope. The original design appeared in one of the famous Mullard circuits books in the early 1960s.

Thanks to *PW* reader **Tony Woodward**, from Worcester, who sent me copies of the Mullard circuitry and design, I was reminded of what was a very good, simple 'scope. Thanks Tony, your help is much appreciated!

Once I'd received the details and circuit from Tony I then contacted Philips Intellectual Property & Standards Department at their UK headquarters at Redhill in Surrey. Fortunately, their Senior Patent Attorney **Paul Williamson** is one of the few senior members of the staff nowadays who remembers the Mullard designs and he kindly gave permission for the use of the circuit in **Fig. 1**. Thank you Paul, and *PW* is indebted to the kindness and courtesy shown by Philips Electronics UK who of course now hold all proprietary rights to the former Mullard Company published material.

The design shown in Fig 1 is very interesting indeed as it incorporates a transistorised inverter power supply. The aim of this (at the time quite remarkable innovation was of course to make the 'scope portable. I used the 'scope circuitry but for some reason I never bothered with the d.c. to d.c. inverter. Instead, I used a normal h.t. power supply.

Looking back at my circuit scrapbook which I kept in the late 1960s and 1970s I saw from my hand-written notes I had intended to use a surplus 12V d.c. to 230V d.c. rotary converter for portable power. Further notes in the book mentioned the ripple and motor hash which would require extensive filtering to provide 'clean' h.t. But I didn't record whether or not the converter was used, and I'm afraid that almost 40 years later on, I can't remember what I did!

Components List

R1	1.5kΩ		
R2	390Ω 1/2W		
R3	10kΩ		
R4	33Ω		
RV5	500kΩ linear potentiometer		
R6	8.2MΩ		
R7	220kΩ		
R8	47kΩ		
RV9	2MΩ logarithmic potentiometer		
R10	2.2MΩ	R14	100kΩ
R11	220kΩ	R15	1MΩ
R12	2.2MΩ	R16	1MΩ
R13	47kΩ		
RV17	(if required - see text)		500kΩ Linear potentiometer

All resistors are 0.25W, 10% unless otherwise stated

C1	0.47µF	400V min. wkg.
C2	1µF	400V min. wkg.
C3	0.22µF	150V min. wkg.
C4	0.1µF	500V min. wkg.
C5	0.1µF	150V min. wkg.
C6	0.1µF	400V non-inductive
C7	0.015µF	150V non-inductive
C8	1000pF	150V non-inductive
C9	0.015µF	150V non-inductive
C10	1000pF	150V non-inductive
C11	0.22µF	miniature

Different Approach

To build my latest version of the Mullard Pupil's Oscilloscope I'm adopting a different approach to the reproduced illustration in **Fig. 2**. I apologise for the less than perfect reproduction quality of the illustration, but it's been scanned in electronically directly from the Mullard Application sheet which of course, is not in pristine condition after 40 years or so. (Thanks, Art Editor!).

As can be seen from Fig. 2, the original Mullard design had the 1CP1 (under their own designation DH3-91) projecting from the chassis case, protected within a copper tube. However, I'll not use this idea for my own version. Instead I'm using p.c.b. material to provide the main chassis itself, using p.c.b. valve holder bases. (These are actually still quite easy to buy).

Even though my constructional work on the project is at a very early stage as I write, I've decided that the tube may actually be used to best advantage by being mounted so that it's raised to an angle of 45° or so, pointing upwards. A sloping front panel (also made from p.c.b. material) will be used to achieve this, and all the controls will be mounted on the sloping front panel.

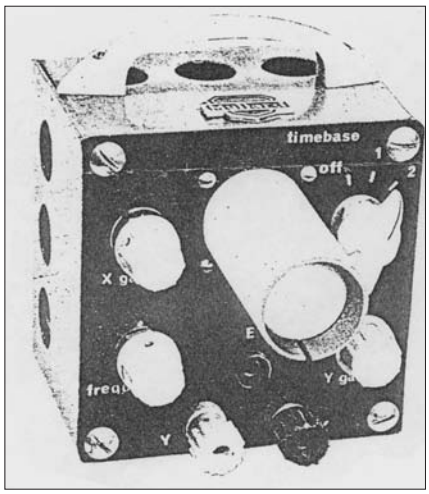


Fig. 2: The original Mullard design showed the once inch 1CP1 c.r.t. tube mounted inside a copper tube and projecting from the main chassis (see text).

I've provided the circuit this month and the component list so that those RB readers who feel confident enough to work straight from the circuit can do so. Additionally, if anyone is keen enough to build the transistorised d.c. to d.c. 12V to h.t. inverter, all the information required is provided in the original Mullard text. Please contact me at the *PW* offices if you're brave enough to make your own transformer from the information provided!

Next time I discuss the RB 'scope project I'll have some photographs featuring my own version to show you. It might be an expensive way (timewise at least) to get a 'scope but the learning process and constructional experience will be priceless! Thanks again to Tony Woodward for his initial reminder, and to Paul Williamson of Philips for his helpful assistance.

PW

Unravelling the mystery of all those wires!

Rob Mannion G3XFD, quickly realised that his planned article on finding all the necessary 'junk' for our hobby had outgrown the original planned two pages. As a result, in the first article Rob looks at sources of wire.

Due to the support and interest from readers the planned single article in the Radio Basics series, aimed at sourcing suitable 'junk' (all those necessary bits and pieces, which although essential for our hobby are considered by non-devotees to be junk') has outgrown my original plans because I've realised there's so much information to pass on. So, instead of appearing in Radio Basics, the articles will appear separately as stand-alone features.

In fact, I'm planning to make the 'junk' topic an occasional feature after I've completed the planned two main articles. In this way I hope to be able to pass on information on suppliers that readers have written in to tell me about. The updates will be included in the special information panels on the RB pages

...if you hear of any disposal sales, make sure you let PW know. You could be assisting keen radio enthusiasts to stock up for years to come with those essential components...

Perhaps we'll also be fortunate enough to hear of a factory closure (there's enough of that happening isn't there?), or maybe another huge sale of surplus components such as came our way when **R A Kent (Engineers)** in, Tarleton, Preston in Lancashire (**Kent Morse Keys**) purchased several shipping containers full of resistors and capacitors. That source kept *PW* readers from all over Europe supplied for a long time. Some readers even found it worthwhile making the trip from Holland via the ferry to fill their cars with bulk components! From all accounts there were some very puzzled Customs Officers wondering what was being smuggled!

So, if you hear of any disposal sales, make sure you let *PW* know. You could be assisting keen radio enthusiasts to stock up for years to come with those essential components, especially as industry is increasingly using surface mount components, rather than discrete wire-ended types.

If there's enough interest from readers I'll keep an E-mail address list and send out the occasional bulletin to you all. So, please keep the proverbial ear to the ground on our behalf.

Wire & Windings

The first problem for the keen novice constructor wishing to start off, is just where can you buy the wire needed for hobby radio and for winding coils? Firstly, the various specialist component and 'bits and pieces' advertisers in *PW* keep a good stock of wire. So, take a look at the adverts (they rarely have space to mention all their stock) and contact them to see just what they have available, and you'll mostly likely end up with a selection of small reels of wire with gauges between 22 and 30s.w.g.

I thoroughly recommend that you stock up with wire, buying the largest reels you can afford as it's cheaper that way. But please bear in mind the dreaded postal charges! If you're not careful, all the advantages achieved by buying in bulk, can be lost to help the Royal Mail reduce their overdraft!

I've always recommended to readers that they join a local radio club. More experienced radio hobbyists often enjoy sharing their deeply filled junk boxes with those just starting off in construction, and I often got part used reels of wire in this way.

Incidentally, I mentioned hobbyist rather than Radio Amateur because in common with many other enthusiasts I was initially helped by one of those kind, usually anonymous types who had enjoyed radio for 50 years or so without ever getting on the air. Often referred to as 'Elmers' in the USA, such a friend is priceless.

My own radio 'Elmer' was a British Railways Electrician who had the delightful nickname of 'Ding' Coombes. He specialised in installing electricity at remote country railway stations. When he arrived Botley station in Hampshire in the mid 1950s to bring it into the 20th century, he discovered a keen type (me) who was sent home from his train-spotting school holidays with chassis, boxes of valves and myriads of salvaged components. In that way, those vital radio bits and pieces made their way by train, and eventually on my bike, from Fort Brockhurst near Fareham, to Sholing in Southampton.

Perhaps you too may be helped by a 'Ding' Coombes? Conversely, you may be able to share some of your radio 'junk' with a keen beginner? Please think about it!

Your local club may also have junk sales and these are some of the best sources of bits and pieces. Make sure you don't miss a sale.

I also thoroughly recommend attending radio rallies, radio car boot sales (even the general, non-specialised boot sale can be a source of useful radio bits for cheap prices) and other events likely to have stalls selling components, and radio scrap.

If you have a Maplin shop in your area they too stock wire. And although their shops are increasingly dominated by electronics, rather than radio, they often have at least one member of staff who can advise on components. You'll usually find them right at the back of the store, and it's well worthwhile asking for advice. It's practical advice because the in-store 'Technical Buff' at the Bournemouth branch is ever helpful to me. So, try your local branch for advice on wires, gauges, and type of wire they have in stock.

Recycling Source

Another source of wire nowadays is the ever growing recycling industry. Gone are the days when schoolboys like myself cycled to the local dump to recover transformers and chokes from

scrap chassis to breakdown for wire. Nowadays it's done for you! It always a good idea to look first at your local recycling depot to see if you can buy wire from them. The heavier gauges will not be in long lengths, but even short lengths of several metres will help wind small coils (inductors) for radio projects.

Incidentally, one useful source of wire suitable for winding air spaced coils comes from the commonly used 'twin and earth' domestic cable used to wire houses. The earth wire is non insulated as is ideal (around 18s.w.g.) for self-supporting inductors. Off-cuts of this wire abound when houses are being re-wired or built.

However, although I've traditionally (with permission) removed useful material from builder's skips, nowadays it's always best to ensure you have formal permission before removing such material from a waste skip. Even if it's in the road and obviously waiting to be dumped. I suggest this because even though the police have extreme difficulty in apprehending burglars and other thieving types - it's very easy to catch an otherwise innocent 'recycler' taking material from a road side skip. **Always ask permission, don't give opportunity to the local constabulary to make you a welcome addition to their crimes-solved statistics!**

Local scrap merchants may often be able to sell you copper wire and sometimes you can even buy off-cuts of aluminium (for chassis use). But be prepared, whereas they are keen to purchase by weight of the material sold to them, they're even more keen to re-sell it by length or whatever method will make them the most profit. Be prepared to haggle!

Winding Problems

From my experience in preparing, writing and then corresponding with readers of the Radio Basics (RB) series I know that wires and windings cause the most problems for the novice constructor. However, the difficulties aren't new, because I can assure you I had just the same problems almost 50 years ago.

The first problem I came across as a schoolboy constructor involved the use of enamelled copper wire. In those days (you can still come across the same wire in older transformers, etc.) most enamelled wire was coated with shellac.

Originally, shellac was made from a natural resin obtained from secretions in the outer casing of a beetle, but demand very soon outstripped the supply of beetles! This then led to various commercial attempts at synthetic resins, some of which were extremely successful in adhering to the wire and providing flexible insulation. It could also be very difficult to remove for soldering purposes.

The problems for the radio constructor often involved the removal of the shellac (I'll refer to it as enamel or enamelling for here onwards), to enable a solder connection to be made. Unfortunately, it could be very difficult to scrape it from the copper to make a good electrical connection. An added problem was that the enamel coating could sometimes look like the copper, and care was needed to ensure that an electrical connection was actually made.

My lack of experience as an eight year-old led me to try burning the enamel off by passing it through a candle flame. Sometimes, the candle flame worked and I was left with a dull copper wire. However, the combustion products (various oxides and by-products) often prevented a good solder connection. Looking back I feel that most of my projects that failed in those days, did so due to poor soldered connections, especially to home wound inductors using enamelled wire.

Rob's 'Ruff Guide' to wire sizes.

Standard wire guage (s.w.g.)	Diameter (mm) Approx.	Standard wire guage (s.w.g.)	Diameter (mm) Approx.
40	0.125	22	0.71
38	0.15	20	0.92
36	0.178	18	1.22
34	0.229	16	1.63
32	0.27	14	2.03
30	0.305	12	2.64
28	0.38	10	3.25
26	0.46	8	4.06
24	0.56	6	4.88

Table 1: Chart providing practical comparison between commonly used wire gauges and wire diameter in millimetres.

Experience has taught me that the best way to clean the insulation layer off the wire is to fold a piece of fine glass paper and pull the end of the wire through several times. The abrasive material on the paper will clean the insulation off, leaving bright copper, ready to solder. When using the glass paper technique with very fine wire (34s.w.g. and thinner) care has to be taken because the wire can break easily.

Another technique can provide better results, but requires a little care, a candle and a small amount of methylated spirits (meths). Obviously, I have to be extremely careful indeed when advising readers to use a naked flame near a highly inflammable fluid such as methylated spirits. Despite this, the technique I'm to describe has been used safely for many years.

Only a very small amount of meths is required. Traditionally I use a small jar, previously occupied by fish paste, etc., to hold enough meths to dip a hot wire into. In this way it's very easy to avoid the spirit igniting when the hot wire end is placed into the jar.

Firstly, you should heat the enamelled wire in a candle flame until you see that it's very hot (make sure the room is well ventilated as the fumes from modern insulation* can be unpleasant). Then plunge it into the meths. The result will be a bright copper wire ready to solder.

***Note:** Some modern wire coatings can be removed by the iron as the solder is applied, although efficient ventilation is a necessity.

Final warning: Obviously, you should not have the naked flame close enough to ignite the meths spirit vapours. It should be at least a hand's breadth way, just close enough for the hot wire to lose its shellac/varnish coating before cooling too much before being placed in the meths. If the meths do ignite, replacing the jar top will extinguish it immediately. Use as little meths as possible, even a thimble-full will do the trick. Be wise, be safe!

Gauge Confusion

Next, I'm now aiming to help those readers who have written in to me after they've been confused by the wire gauges we refer to for use in *PW* projects. This one factor seems to cause many problems, so with the kind assistance of **Tex Swann G1TEX/M3NGS**, we're presenting the chart in **Table 1**.

The chart provides approximate, practical working comparison between s.w.g. and outside wire diameters in millimetres. It's aimed at helping to reduce the confusion caused by the various numbers and variety of wire available. Just use a ruler (better still, invest in a pair of outside and internal measurement callipers (available from toolshops, hardware suppliers, etc.) as they're extremely useful) and you'll be in no doubt what size wire you're dealing with.

More on bits and pieces next time! Cheerio for now. **PW**

...even though the police have extreme difficulty in apprehending burglars and other thieving types - it's very easy to catch an otherwise innocent 'recycler' taking material from a road side skip. Always ask permission, don't give opportunity to the local constabulary to make you a welcome addition to their crimes-solved statistics...

Practical Way

There's an intriguing musical theme to the column this month! The Rev. George Dobbs G3RJV remembers when his church organ received some heavy maintenance and provided some ideas for loudspeakers tuned for c.w. use.

Fig. 1: Using a drinking chocolate or 'fizzy drinks' container to provide a resonant speaker cavity suitable for c.w. reception (see text).

"He seems determined to make a trumpet sound like a tin whistle".
Aneurin Bevan (1897 - 1960)

About ten years ago we had the St. Aidan's church organ rebuilt. It's a large specimen; a Father Willis three manual organ from 1884. Originally it was a concert organ at the now demolished Park Hall in Cardiff, it was installed at the instigation of a music loving vicar in the early 1950s.

During the rebuilding process I watched with amazement as the 2,626 pipes were removed, cleaned and re-voiced. Each day I went down to church to watch **Michael**, the organ builder, and his staff at their craft. They boiled fish glue, cut strips of calf skin and lubricated moving parts with graphite.

In fact, the team only succumbed to modern technology when they replaced the ancient 24V relays (the organ action had been electrified in the 1920s) with a board of 1N4007 diodes. As ever, it was a delight to watch craftsmen at work.

Occasionally I shared their lunches from the local fish and chip shop and learned a little about organs and what makes them work. Organ flue pipes have no moving parts. The sound is made as the wind enters the foot of the pipe and is directed against the lip of the pipe mouth. This lowers the air pressure in the pipe and the wind is sucked back in, then the cycle begins again.

The column of air in the pipe then vibrates. The number of vibrations per second, the pitch, is determined by the dimensions of the pipe and whether it's open at the top or closed by a stopper. Stopped pipes sound an octave lower than open pipes of the same size. It's a lovely way to produce a sound.

Naturally, when considering the high cost of restoring a pipe organ, there were those who suggested replacing it with an electronic organ. My simple reaction was to wonder how a bass loudspeaker could emulate the sound of a column of air vibrating in a 5m (16ft) pipe and wonder why our insurers appeared to value the organ at over half a million pounds.

What has all of this to do with Amateur Radio? Well – recently out of curiosity I decided to look again at the subject of resonant loudspeakers for the reception of c.w. (Morse code) signals.

One of the advantages of the c.w. mode is its limited audio bandwidth. All that the receiver has to deliver is a single audio tone, or frequency.

The mode is simplicity itself; the transmitter is simply switched on and off in a sequence to comply with the on and off patterns of the Morse code. It's the original digital communications mode!

The receiver used for reception of c.w. only has to indicate when the transmission is on or off. To do this it compares the signal with another signal, produced by the receiver itself, at the input frequency in the case of a direct conversion receiver or at a lower, intermediate frequency, in the case of a superhet receiver. The difference between the two is called the 'beat note' which is what the listener hears.

Best Note?

There's keen debate about what the best audio beat note is for c.w. reception. The common beat note used in most Amateur Radio communications receivers is 800 Hertz (800Hz) but there are those who suggest that this tone is a little high for comfort when listening to c.w. signals for any length of time.

Those who don't agree on 800Hz cite the old sea-going operators who used receivers with variable beat frequency oscillators (b.f.o.), where the beat note could be varied. Most of them set the beat frequency somewhat lower for c.w. reception. Remember - they earned their living by listening to radio signals and most of them listened to c.w. for long periods of time.

In the past I've enjoyed using receivers with a variable beat frequency oscillator; being able to vary the pitch of the c.w. signal is a great aid against listener fatigue. Some operators given the choice, go for a much lower pitched note; perhaps as low as 440Hz. This is the note, known as "concert A" you hear from the oboe when the orchestra is tuning up. Interestingly, I gather that it was also the note most commonly used to intone plainsong in the monastic tradition. Perhaps we do have a more natural affinity with notes much lower than 800Hz?

Because the c.w. operator is only listening for one pitched note, it's easy to enhance the readability of the signal by

selecting that pitch at the expense of others. To help, there are many designs for electronic, analogue and digital, filters to produce a narrow audio bandwidth. Such filters add the selectivity that is so desirable on crowded Amateur bands.

It's also possible to add selectivity by mechanical means. Most manufacturers of loudspeakers and headphones make proud claims about the wide audio bandwidth of their products. However, what the c.w. operator requires is the very reverse; a loudspeaker with a limited audio response centred on the c.w. listening note.

Resonant Loudspeakers

Some years ago I played about with making resonant loudspeakers. The idea was to place the loudspeaker in a resonant pipe or enclosed space which would enhance the required pitch. So we're back to the organ pipes territory again!

The obvious choice is to look at a closed pipe resonator as it will be half the length of an open pipe system. The objective is to mount a loudspeaker in a closed pipe that will resonate at the usual pitch for c.w. operation. With that in mind, and being an idle person without great mechanical skills (**see note below. Ed**) I decided to look for a ready-made resonator.

An un-mounted loudspeaker will have a natural resonance depending upon its physical size. In the case of a small loudspeaker this will probably be below our required frequency.

Incidentally, a loudspeaker is an inefficient transducer; the electrical power delivered to the loudspeaker is much larger that the audio power delivered as sound. The efficiency can be as little as 1%. The task is to increase the efficiency at the desired frequency.

There are several formulae for working out the dimensions of a resonant closed end pipe. Here I'm indebted to **Ed Loranger WE6W**, for a formula which includes the speed of sound waves at an average temperature as constants. It comes out as:

F = 122.4/(L + (0.3 * D)) where

F = a quarter wave audio frequency in Hertz

L = length in metres

D = diameter in metres

(A reasonable formula for a few pokes at a pocket calculator!).

Armed with the information I set about finding household cylindrical containers, measuring them and trying the formula. With luck, the second thing I tried turned out to be suitable for the job. This was a 500gm Cadbury Drinking Chocolate container, **Fig. 1**, with a diameter of 95mm (0.095m) and a length of 130mm (0.13m).

So, applying the formula we have:

F = 122.4/(0.13 + {0.3 * 0.095])

(0.285 + 0.13 = 0.1585)

122.4 ÷ 0.1585 = 772Hz

An interesting result! The 500g Cadbury Drinking Chocolate container resonates at 772Hz, near enough to 800Hz to be very useful!

Editorial Note: What an inaccurate statement eh readers? George is naturally modest about his skills and keen interest but what he typed isn't acceptable. I've only published it so I could put the record straight. Please continue to be 'idle' George - we need your example and inspiration! ***G3XFD****.*

Mechanics Simple

The mechanics of my resonant loudspeaker are very simple. Conveniently, the lid of the drinking chocolate container is made from a plastic capable of being cut by a sharp modelling knife. I found a 63.5mm (2.5in) diameter loudspeaker which fitted nicely into the recessed top of the lid.

Next, I ran a narrow felt tipped pen around the circumference of the loudspeaker and cut out another circle inside the felt pen circle. The loudspeaker is secured to the lid using hot melt glue.

The drinking chocolate loudspeaker proved to be surprisingly effective. I tried it with a variety of receivers including a simple direct conversion design. In every case I could detect a distinct peak at the resonant frequency which was a useful aid to receiving c.w. signals.

The drinking chocolate container appears to be made from some sort of compressed cardboard. Ideally a resonant tube ought to be made from a non-flexible material to reduce losses. A more diligent reader might like to make their own resonant loudspeaker from a metal container.

Some articles on resonant closed pipe loudspeakers suggest that a few small holes near the speaker end of the tube can be helpful. Since mine was working fine as it was, I didn't add any holes. Some constructors might even like to spray the container with paint to disguise its humble origins.

A Tesco Tip!

In previous experiments with resonant loudspeakers I discovered an article that suggested a large Coca-Cola cup of the sort use in drink dispensers, **Fig. 2**, is about right for an open-ended resonant loudspeaker for c.w. work. The cup in question is the larger of the two types of cup with the Coca-Cola legend offered for dispensing machines (I think the 8oz size?).

So I called into my local Tesco store, conveniently just across the road from the church, and visited the café. I asked one of the assistants for two of the cups. To my surprise, she said; "I know what you want it for, you're making a speaker".

I looked at her with surprise and she went on to say; "We used to do that when we were young. Two of these cups with a bit of tight string make a lovely telephone"!

I smiled, and thanked her and left it there. Back in the workshop I found a little 50mm (2 inch) diameter loudspeaker which fitted into the end of the Coca-Cola cup using hot melt glue. Cutting the hole in the end is very simple with these cups. It did work, and it does help, but it is not as effective as the closed tube loudspeaker. But it looks good - try it out yourself!

PW

Fig. 2: Open ended and closed containers give different resonant frequencies. See text for more details.

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100W Base HF. 1.8-30MHz. DSP

VS-2 Voice Unit £45.95
SP-31 Ext Speaker . £82.95
MC-60 Desk Mic £117.95
LF-30A LP Filter £45.95
PS-52T 23A PSU .. £229.95
SO-2 TCXO £122.95

1 YEAR WARRANTY **£1,295.00**

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MC-60 Desk Mic £117.95
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PS-53T 23A PSU .. £229.95
SO-2 TCXO £122.95

1 YEAR WARRANTY **£795.00**

KENWOOD TS-50S

100W Moble HF. 1.8-30MHz.

AT-50 TS-50 ATU . £319.95
SP-23 Ext Speaker . £68.95
MC-60 Desk Mic £117.95
MB-13 Bracket £39.95
HS-5 Del Phones £52.95
SO-2 TCXO £122.95

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2m & 70cms. Dual Band. APRS. TNC

SP-50B Speaker £27.95
PS-33T DC PSU £199.95
MC-58DM DTMF £44.95
PG-4X Ext Cable £61.95
PS-53T 23A PSU .. £229.95
VS-3 Voice Unit £45.95

1 YEAR WARRANTY **£425.00**

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SP-50B Speaker £27.95
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MB-12 Mount £14.95
MB-201 Mount £14.95

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TH-D7E 2&70 .... £298.00
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TXCO-6 TXCO £124.95
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FH-1 Keypad £33.95
E-DC-20 DC Cable . £11.95

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HF 6m 2m 70cm. DSP. ATU Option

ATAS-120 Act ant . £259.95
ATAS-25 Man ant . £189.00
FC-20 ATU £249.95
FVS-1A Voice Unit £199.95
MH-36D8 DTMF £54.95
MMB-66 Bracket £32.95

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HF 6m 2m 70cm.100W Transportable

FP-30U AC supply £199.95
FNB-78 Batt pack £99.95
FC-30 Ext ATU £249.95
FVS-1A Voice Unit £199.95
TCXO-9 TXCO £69.95
MMB-80 Bracket £15.95

2 YEAR WARRANTY **£759.00**

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HF 6m 2m 70cm.100W. Mobile

ATAS-120 Act ant . £259.95
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MH-36E8J DTMF £57.95
CT-39 Packet cab £14.95
TCXO-9 TXCO £69.95
YSK-857 Sep kit £45.95

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HF 6m 2m 70cm. Portable / Mobile

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FNB-78 Batt pack £99.95
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MMB-80 Bracket £15.95

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Lower than the rest
Quad Band Mobile. 10/6/2/70 **FT-8900**

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HF+6m Flagship 200W. 32Bit DSP. ATU. LCD Scope.

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AH-4 100W ATU ... £359.95
SM-20 Base Mic ... £144.99
SP-20 Ext Spkr £164.99
PS-125 25A PSU .. £295.95
CT-17 CI-V Conv £99.95
UT-102 Voice unit ... £32.99

2 YEAR WARRANTY **£2099.00**

ICOM IC-7400

HF 6m 2m 100W ATU. 32 Bit DSP.

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SM-20 Base Mic ... £144.99
SP-20 Ext Spkr £164.99
PS-125 25A PSU .. £295.95
CT-17 CI-V Conv £99.95
CR-338 TXCO £43.48

2 YEAR WARRANTY **£1,299.00**
Inc. SP-21 & SM20

ICOM IC-706 MkII G

HF 6m 2m 70cm 100W DSP Mobile.

AT-180 ATU £329.95
MB-62 Bracket M £17.99
MB-63 Bracket F £9.99
MB-72 Handle £9.95
OPC-581 Sep Cab . £32.99
UT-86 Voice unit £41.13

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ICOM IC-703

HF+6m Portable. 10W. DSP. ATU.

BP-228 Batt Pack £71.76
MB-62 Bracket M £17.99
MB-63 Bracket F £9.99
MB-72 Handle £9.95
OPC-581 Sep Cab . £32.99
LC-156 Carry case . £62.06

2 YEAR WARRANTY **£539.00**

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HF 100W TX. Dual VFO. Auto Notch.

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MB-5 Bracket £35.25
MB-23 Carry strap £9.99
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2 YEAR WARRANTY **£449.00**

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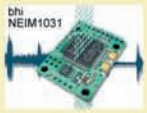

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Bands 6m/2m/70cm
Gain 2.15/6.2/8.4dB
Power 200W (50W 6m)
Type 1/2, 2x5/8, 4x5/8
Length 2.5m
£69.95

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Bands: 80/40/30/20/15/10
Height (Adj): 26 ft (7.9 m)
Weight: 12 lbs (5.4 kg)
Impedance: Nom 50 ohms
VSWR: 1.5:1 or less
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23cms (1296 Mhz) 55 element 21.5 dbi gain "N" 4.64m long

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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
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1KW Auto ATU - 1.8-54MHz - 1-8 secs Tune - Approx SWR Rating of 10:1

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100w Auto ATU - 1.8-54MHz - 0.5 - 6 secs

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100w Auto ATU - Covers 1.8-54MHz
1-5 secs Tune - Cross needle meters

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100w Auto ATU - 1.8-54MHz
1-5 seconds Tune - 2 Pos Ant switch

£169.95 ***New***

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1:1 or 4:1 Balun - Covers 1.8 - 30Mhz
Power rating 200w

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Accessories:

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One-Plug Power is the internal FT-817 battery solution you have been waiting for until now.

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£54.95
NEW! 2300 mAh Large Capacity FT-817 Internal Battary Solution Still use Internal 817 Charger

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One BIG Punch (OBP) is a custom add-on accessory for the Yaesu MH-31 microphone commonly used with many Yaesu amateur radios

OBP
£49.95
Speech Compressor for the Yaesu MH-31 mic and FT817, FT857, FT897. Improve the TALK POWER.

Hand Mike
£57.95
W4RT Electronics Microphone with One BIG Punch Speech Compressor included.

The One BIG Punch is an AF-based speech compressor specifically configured to provide remarkable increase in talk power while maintaining good audio quality. The OBP is NOT a clipper, but a compressor providing great voice compression, high-level limiting, and noise gating. The unit can be mounted inside the MH-31, requires no additional electrical power, and can be turned on or off by using the MH-31's TONE switch.

One-Board-Filter

The One-Board Filter (OBF) affords you the opportunity to have both the Collins CW and SSB mechanical filters available in your FT-817 together!

OBF
£229.95
Replace two filters in the space of one. OBF includes the two optional filters and fitting.

Collins Mechanical Filters
for the Yaesu FT-817, 857 & 897.

500 Hz CW - £94.95 ***2.3kHz SSB - £94.95***

This is the option that many, many FT-817 owners have requested. The OBF utilizes Collins Mechanical Filters that are the same as used in the optional Yaesu filters for the FT-817. The bandwidth of the 7-pole CW filter is 500 Hz and the 10-pole SSB filter is 2.3 kHz. The One-Board Filter is NOT available for installation by FT-817 owners. This is not a "do-it-yourself" option. The One-Board Filter must be installed by RADIOWORLD, or a competent engineer . If in doubt please call for details.

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£54.95
It requires no external power and works with both manual and automatic tuners.

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Simply snaps into position. Adjust for desired height. Complete with non slip feet and allen wrench.

Professional-Grade FT-817 Stand

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ATX Walk--about PL-259

£47.95

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ATX Walkabout PL259	£47.95
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RX - 0.6 to 460 Mhz
TX - 40,30,20,17,15,12, 10, 6, 2m & 70cm

Power Limits 25W PEP 10W Cont.

£127.95

In Stock*

* The Miracle Whip will transmit on almost any frequency you are licensed to use including WARC, MARS/CAP, Alaska Emergency, Citizens Band, Marine, and most commercial HF SSB and VHF/UHF channels

** The Miracle Whip is optimized for for best receive rather than lowest swr on 80 and 160, as no short antenna will present good transmitting opportunities at these frequencies

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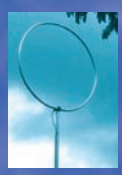

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YOUR REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH PLEASE.

Propagation during the first two weeks of December was dominated by a lengthy period of enhanced tropospheric conditions that led to some spectacular contacts being made on the v.h.f., u.h.f. and microwave bands. Under normal conditions, radio waves do not travel in straight lines through the Earth's atmosphere. They are actually bent or refracted slightly downward so the horizon for radio waves is about a third farther away than for light.

Some unusual weather conditions can refract radio waves even more, extending the effective radio line of sight much further. Ducted signals can be amazingly strong over distances of 1000km or more and often very little power is required to make DX contacts.

During the evening of 5 December operators in southern England and Wales reported making 144MHz contacts with stations in Austria (OE), Germany (DL) and Switzerland (HB9). One of the strongest signals came from the c.w. station of OE5MPL (JN78) who was heard working many UK stations up to 1300km away.

Over the next few days the propagation intensified with contacts being made into similar areas on the u.h.f. and microwave bands. The tropo propagation spread over quite a wide area with 430MHz contacts for example, being made to stations in southern France such as F5VHX (JN04) and F5XAZ (JN06), deep into Germany with DF9IC (JN48), DL7QY (JN59), DL6NAA (JO50) and over to the Czech Republic, Austria and Switzerland.

On 6 December the Austrian station OE5VRL/5 (JN78) contacted the station of G3XDY (Suffolk JO02) on the 430MHz band with 59 reports being exchanged both ways. They also made contact on the 1.3GHz band with similar reports being exchanged. Not satisfied with this the pair also made contact on the 5.7GHz (6cm) band with a 539 report being received at the QTH of G3XDY. Spurred on by this success the stations of OE5VRL/5 and G3XDY attempted a c.w. contact on the 10GHz (3cm) band with 529 reports being exchanged over the 1012km path.

The multi-band Swiss station HB9AMH/P (JN37) was active during the evening of 8 December and worked many UK stations on the 144, 430MHz, 1.3 and 5.7GHz bands. Other DX worked from the UK during this period included the 144MHz stations of EB2CBZ (Spain), HB9MEY (Switzerland), IK2MKL and IW2NOR (Italy), OE2LCM and OE3JPC (Austria), OK1FFD and OK1UND (Czech Republic) and 9A2AE (Croatia).

There was much activity on the 1.3GHz band especially to stations in central and eastern Germany such as DH9NBU (JO40), DL3YEE (JO42), DB6NT (JO50), DK6AS (JO52), DL1SUN (JO53) and DL7YC (JO62). Other contacts made from the UK on the 1.3GHz band included F1BZG (JN07), F6FHP (IN94), F8ALX (JN06) and LX1DB (Luxembourg).

Conditions peaked on 9 December with the best daytime paths being to stations located in central and northern Germany and Poland (SP). Most traffic was to be found on the 144MHz band although activity on the 430MHz band came a very close second. There were large numbers of Polish stations active from all over the country such as SP6FCQ (JO70), SP1CGT (JO73), SP6OPW (JO80), SP2IJ (JO82), SP3BDR (JO83), SP1NQN (JO84), SQ7DQX (JO91), SP2JYR (JO92), SP2MKO (JO93), SP7OGP (KO01), SP4MPB (KO03) and SP5WCK (KO12).

But there was even better DX to be worked on the 144MHz band with the station of US5WU (Ukraine KO20) contacting G4CBW (IO83) over a path of 1843km. On the 5.7GHz band stations in central and eastern England reported s.s.b. QSOs with DL1SUN (JO52), DL3YEE (JO42), F1XAO, PA0BAT and PA5DD. At the QTH of G3XDY (JO02) the Swiss beacon station HB9G operating on 5760.905MHz was peaking 529 but no other DX stations were heard at the time.

There's not much activity on the 3.4GHz band, but the station of G4BRK (IO91) did manage to hear DH9NBU (JO40), DL3YEE (JO42) and the Dutch beacon PI7CKK (3400.163MHz), all peaking around 559. There was a little more activity on the 2.3GHz band, but unfortunately a number of European countries still don't have access to this interesting frequency band. Those that do and who managed to work into the UK on 9 December included DL3YEE (JO42), DK6AS (JO52), DL1SUN (JO53), DL7VTX (JO62), OZ1CTZ, OZ1FF, SK7MW and SM7ECM.

From around 1800UTC on 9 December the propagation started to move towards Denmark (OZ), Norway (LA) and Sweden (SM) with contacts being made in this direction on all bands from 144MHz through to 10GHz. Activity on the 1.3GHz band was fairly brisk with UK operators reporting c.w. and s.s.b. contacts with stations such as OZ1FF (JO45), OZ3ZW (JO54), OZ6OL (JO65), SP7OGS (JO91), SM6CEN (JO57), SM7ECM (JO65), SM7FMX (JO65) and SK7MW (JO65).

Both 144 and 430MHz bands were very busy and at times it was difficult to find a clear frequency. Some of the Scandinavian DX stations known to have worked into the UK during the evening included LA3BO, LA9PMA, OZ0JD, OZ1BNN, OZ2M, OZ3K, OZ4VV, OZ5NM, OZ6HQ, OZ7IS, OZ8ZS, SM7GEP and SM7WT.

Tropo conditions were still very good on 10 December with many long distance contacts being made on the v.h.f. and u.h.f. bands with Scandinavian stations. The microwave station of SK7MW operating on 10368.210MHz was heard at the QTH of G3XDY peaking 519 over an 860km path and the Danish station OZ1FF (JO45) made a number of c.w. and s.s.b. contacts into the UK on both the 2.3GHz and 1.3GHz bands.

Activity was particularly good on the 1.3GHz band especially during the evening period with stations such as SK0UX (JO99), SM0DFP (JO89), SM0SBI (JO99), SM6EAN (JO57), SM6HYG (JO58), SM7GEP (JO77) and SM7LCM (JO86) working many UK operators.

The period of enhanced propagation deteriorated on 11 December but perked up again during the evening of 12 December with many DX contacts again being reported on the v.h.f. and u.h.f. bands. On the 144MHz band a number of operators worked the s.s.b. stations of HB9RDE, HB9TQV/P, OE5MPL and OE5XBL.

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

The stations of HB9AMH/P, OE5MPL, OE5VRL/5 were still much in demand on the 430MHz band and at times it seemed like there were hundreds of German station active as well. It was really good to see so much activity on the v.h.f., u.h.f. and microwave bands during this eight-day period. Long may it last!

STATION REPORTS

I didn't receive any reports of tropo DX contacts being made on the 50MHz band and only two on the 70MHz band. These were reported on 9 December between the stations of G3YPZ (JO02) and OZ2LD (JO54) over a 749km path and between G4DEZ (JO03) and OZ3ZW (JO54) over a 765km path.

The lack of DX contacts being reported at the lower end of the v.h.f. spectrum doesn't surprise me, as the minimum duct thickness to support these frequencies will be around 400m which is unusually large. During this period of tropospheric enhancement the duct was much narrower and therefore only able to support frequencies higher up in the v.h.f. and u.h.f region.

Reg Woolley G8VHI (Warwickshire IO92) starts his report with contacts made on 430MHz as he found this band to be the most productive. Running a Yaesu FT-847 transceiver, 100W and two 23-element CueDee Yagis his s.s.b. contacts included the stations of F1GPL (JN05), F8ALX (JN06), DF2VJ (JN39), DF5GZ/P (JN47), DK2GR (JN59), DJ7GK (JN69), DH3NBU (JO40), DL3YEE (JO42), DD9LW (JO44), DG5AAG (JO51), DK8XK (JO53), DG0VCG/P (JO60), DL7APV (JO62), DJ4JC (JO63), DG0KW (J064), DK3WG (JO72), OE5MPL (Austria JN78) for a new DXCC country at 1201km, OZ4VV (JO46), OZ3ZW (JO54), OZ1SK (JO56), SM6CEN (JO57) and SP5TEE (KO01).

As if that spread of DX wasn't enough, G8VHI also reports working the station of US5WU (Ukraine KO20) at 2350UTC on 9 December. He sent a 53 report and received 55 from the Ukrainian station over a path of 1795km. Reg was also active on the 1.3GHz band with a Kenwood TS2000 transceiver running 10W into a 67-element Yagi. His s.s.b. contacts made on 9 December were with the stations of DB5KN (JO31), DL3YEE (JO42), DL7YC (JO62), F1GPL (JN05) and SK7MW (JO65).

The Swiss station HB9AMH/P was also copied very well but Reg couldn't break the 1.3GHz pile-up! A quick foray was also made onto the 144MHz band, contacts being made with DL6DAF (JO52), DG0KW (JO64), DD3SP (JO72), SP5TEE (KO01), SP7HKK (JO91) and SQ7DQX (JO91).

At my QTH (Herefordshire IO81) on 9 December a total of 86 DX contacts were made on the 144MHz band with stations in Denmark, Germany, Poland and Sweden. What I found interesting in this opening was the large number of Polish stations that were active. Normally I'd work a handful of the top DXers but this time around I contacted 24 SP stations, many of them running less than 50W output.

Fig. 1: The antennas at the QTH of Hagen Schumann DG4GAN.

My best DX contacts included the s.s.b. stations of SP2OFW (JO93) at 1420km, SP2MKO (JO92) 1442km, SP3BEK (JO92) 1445km, SP2JYR (JO92) 1456km, SP2MSL (JO92) 1500km, SP7OGP (KO01) 1576km and SP5WCK (KO12) at 1707km.

Ron Price GW4EVX (IO83) mentions that as he only has vertical antennas at home he decided to operate a portable 144MHz station during the evening of 9 December from a local high spot in northeast Wales. Running 25W from an Icom IC-290D transceiver into a 5-element ZL-special beam he contacted 38 stations in Belgium, France, Germany and Holland, the furthest being a German operator located a few kilometers from the Polish border. Many of the stations contacted were running high power and big antennas but quite a few were very good signals with modest power and some with indoor antennas. Just shows how good the conditions were!

Steve Bunting M0BPQ is another operator who decided that it would be far more productive to operate from a clear portable location. He was active from his car running a Yaesu FT-847 transceiver, 180W amplifier and a 5-element DK7ZB Yagi on the 144MHz band and an 80W amplifier and 13-element Yagi on the 430MHz band. Steve reports that he only worked four stations on the 144MHz band from his portable QTH (IO91) as he was really concentrating in working new locator squares on the 430MHz and 1.3GHz bands.

On 430MHz Steve made 26 c.w. and s.s.b. contacts with stations in Austria, Belgium, Denmark, England, France, Holland, Germany and Sweden. His best DX contacts were made with the stations of OZ3ZW (844km), DL7APV (887km), OZ8ZS (890km), OZ4QA (926km), DJ4TC (929km), SM7ECM (979km), OE5MPL (1083km) for a new DXCC country and OE5VRL/5 for his longest distance contact ever on the 430MHz band at 1087km.

The 1.3GHz station at M0BPQ/P consisted of the FT-847 transceiver driving a transverter producing 8W output into a 23-element Yagi. A total of eight contacts were made on this band and included the stations of DJ5BV (510km), DC8UG (568km), DL6NAQ/P (719km), HB9AMH/P (725km) a new DXCC country, DK6AS (751km), F6FHP (769km), DH9NBU (719km) and SK7MW (963km) also a new DXCC country and best distance ever on the 1.3GHz band.

The stations of DB6NT (JO50) and DF6NA (JN59) were both heard but not worked. Steve reckons he needs more power on 23cm and is now looking for a complete power amplifier (or parts to build a p.a.) with a minimum of 100W output. Contact him at **steve@mobpq.com** if you can help. Steve makes the point that many of his contacts on both the 430MHz and 1.3GHz bands would have been impossible without the use of Morse code. Regardless of what some operators think, c.w. is a valuable and fun mode!

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.

73 David G4ASR

HF HIGHLIGHTS

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

CROATIAN AWARDS, SPECIAL EVENTS AND LOTS MORE FROM CARL GW0VSW THIS MONTH

I had a letter from *PW* reader **Charles Wilmot M3ZYZ** who lives in Barnsley, South Yorkshire and acts as the UK checkpoint for several Croatian awards. Charles says "These attractive awards may be of interest to h.f. operators and listeners and were set up by members of the **Croatian Amateur Radio Association** which formed the 'All Croatian Islands Award Group' (ACIAG) at the beginning of October 2004".

The ACIAG is open to all Radio Amateurs who enjoy island chasing and the group does not require a membership fee. Once you work the required number of stations you submit your application and if it is successful you will receive a membership award which has on it your membership number. The ACIA Group issues several awards and includes The All Croatian Islands Award which has six levels, The Croatian Lighthouse Award, Worked 9A Members and The Pope John Paul II in Croatia Award. Further details can be found at **www.9a7k.com/** or contact Charles at **m3zyz@tw1hf.com**

SPECIAL EVENTS

John-Ivar Winbladh SM7CRW, will be using the special callsign **SF50A** until 31 December 2005, celebrating his 50th year of Amateur Radio. He has promised an exclusive QSL card for everyone who works him and requests it via the bureau or direct to **Strandvägen 2, SE-386 31 Farjestaden, Sweden**.

Another special event station **SQ75FMU** is due to be active between 15 February and 15 March. This call is to celebrate the 75th anniversary of Polish Amateur Radio Union 'PZK'. You can QSL via SQ9FMU by the bureau or direct to **Robert Prorok, PO Box 113, 41-800 Zabrze.**

Listen out for the special event station **VE3TMG** to be active to celebrate the 40th anniversary of the Canadian Flag (the Maple Leaf) between 19 February and 20th. Operating times for both days will be from 1600-2200UTC and activity will be on 7.268 and 14.268MHz (±QRM). QSL via VE3TMG and a certificate is being offered for any stations who work VE3TMG. Just send a 9 x 12in s.a.e. to **Terry Greenwood, 2210 Janette Avenue, Windsor, ON N8X 1Z8, Canada.**

CQ MAGAZINE CELEBRATION

The *CQ* Amateur Radio magazine, first published in January 1945, is inviting Amateur Radio operators around the world to join in its 60th anniversary by taking part in an on-air celebration during the first 60 days of 2005. During this activity, which runs until 1 March, any Amateur who has ever had an association with *CQ* magazine as a staff member, contributing editor, author as well as current subscribers to *CQ*, *CQ VHF* and *Popular Communications* magazines may sign /60 after his or her callsign.

Certificates will be issued for contacts with enough "/60" stations and require a minimum of 60 contact points which are based on number of contacts times, the number of different position multipliers e.g., editor, columnist, etc. worked. Short wave listeners may also qualify by monitoring enough stations and awards will have endorsements issued for scores up to 600 points.

In addition to this, the *CQ* club station **WW2CQ** will be activated from various parts of the United States during the event period. A separate certificate will be available for working WW2CQ in all call areas from which it is active. Complete rules for the *CQ* Gang 60th Anniversary activity are available at the magazine's website **www.cq-amateur-radio.com/**

DX NEWS

Monk Apollo SV2ASP/A has been quite active lately from Mount Athos with operations on 3.5, 7 and 14MHz s.s.b. Listen for him around 1730-1830 and 14MHz between 0830-0930UTC.

Pedro Orozco HK1XX has announced that the **DX Colombia Group** are making plans for a possible Malpelo DXpedition prefix HK0 between June 2005 and March 2006. They are looking to put together a team of operators who will include 13 from Colombian and seven international guest operators.

Suggested modes of operation will be c.w., s.s.b., Satellite, p.s.k., RTTY, 6m and possibly EME. The DX Colombia Group is looking for possible operators, sponsors and equipment and E-mails with further information will be sent out to any interested parties and they invite everyone to visit their web page at **www.dxcolumbia.com**

In Belize **Arthur 'Art' Phillips NN7A** will operate as V31JZ/P from South Water Caye, IOTA NA-180 from 10 February to the 14th. This will be a one person operation with 100W, a vertical and some wire antennas. Operation will be c.w. on 7-28MHz including the WARC bands and some operating on 1.8 and 3.5MHz may be possible.

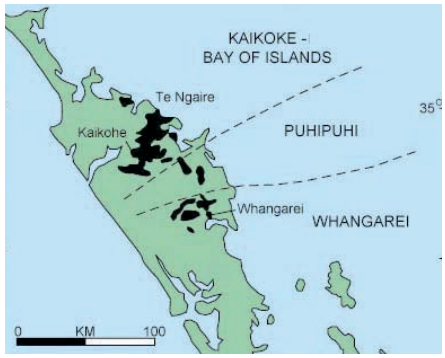
If conditions allow, Art will use s.s.b. on both 14 and 21MHz around the IOTA calling frequencies. NA-180 was opened as a new IOTA by Art and **Mike Sharp NG7S/V31RL** in February 1993. This will be Art's fifth operation from South Water Caye and his eleventh trip to Belize since 1988. QSL is good via NN7A by the Bureau or direct to **Art Phillips, PO Box 201, Flagstaff, AZ 86002, USA**.

YOUR REPORTS

Starting your reports this month is **Ted Trowel G2HKU** who lives on the Isle of Sheppey in Kent and uses a Ten-Tec Omni V and Butternut HF-6 vertical for his c.w. contacts. Making the logbook this month on the lower bands were EA6AFF (Balearic Islands) EU-004, CN2R (Morocco) and TF3CW (Iceland) EU-021 late evening around 2200UTC on 3.5MHz. A switch to 7MHz found EA8AHB (Canary Islands) AF-004, V2BK (Antigua) NA-100, OD5NJ (Lebanon), FM5CW (Martinique) NA-107, ZA1FD (Albania), 7X4AN (Algeria), 3V8BB (Tunisia), A45XR (Oman) and one 5W QRP contact with SU8BHI (Egypt) between 2100 and 2200UTC.

Also on 7MHz was **Chris Colclough G1VDP** in Nuneaton who uses a Yaesu FT-897 and Cushcraft MA5B beam for his DXing and made just one s.s.b. contact with S52BT (Slovenia) at 2234UTC. Chris says "Not much to report this month, which is a bit of a disaster really. I decided to put some new coax on to the beam and in doing so the mast slipped and

Jon Bare ZL1JON in his shack - showing his main transceiver and equipment.



Map of the volcanic centre around ZL1JON's home.

The S9BB operators - OH2PM, OH2TA and OH2BH left to right.

fell on to the garden wall which put a bend in it! The beam is now pointing at a 45° angle to the ground and needs to be replaced and hopefully by the time you read this will have arrived. I have also decided to change my equipment and will be looking to get the Yaesu FT-1000 MkV Field reviewed in *PW* in November 2002 along with the matching speaker and base microphone ready for the new DX season if it ever arrives! I hope to be on the digital modes before too long with the FT-897 and will be looking forward to some nice RTTY contacts".

THE 14MHz BAND

Martyn Medcalf M3VAM in Chelmsford, Essex spent a short time on 14MHz working IT9RYH (Italy) 1025, HG4T (Hungary) 1109, UT0AZA (Ukraine) 1115, S50G (Slovenia) 1349, EA3BFX (Spain) 1533 followed by LZ2SSB (Bulgaria) at 1545UTC. Martyn used his Icom IC-746 and Buddipole antenna for these s.s.b. contacts.

In Liverpool **Billy Clayton 2E1WHC** made a few QSOs between 1100 and 1315UTC with A61AS (United Arab Emirates) QSL via YO3FRI, VU2DSI (India), BA4CH (China), JR1AIB (Japan) in Tokyo, CN2KM (Morocco) and finally ZL1JON (New Zealand) OC-036 in Whangarei. Now when I looked up this callsign to see where exactly the operator **Jon Bare** lived, I discovered that Whangarei, Maori translation for 'Bountiful Land' is a two hour drive north of Auckland at the top of North Island. It sits on a volcanic area that consists of vents southeast of the town, scoria cones, the most common type of volcano that lie just north of town and lava flows east of the city. There have not been any eruptions at Whangarei for a long time though the volcanic field is suspected to have been active in the last 10,000 years! I find it really interesting to learn more about the countries and areas that Amateur operators live and work in so if you are want to know more take a look at **www.newzealandnz.co.nz/whangarei/** for more information.

In Scotland now and Gauldry, Newport On Tay where **Colin Topping GM6HGW** thought there was something wrong with his G5RV until one morning at 1004UTC he worked VK7GK (Australia) OC-001'Long Path' in Granton, Tasmania for his first contact with the island and reports of 5/7 were exchanged both ways. Colin has also got hold of a 'new' Morse key though he has yet to use it in anger.

THE 18 & 21MHz BANDS

The 18MHz band was where **Owen Williams G0PHY** in Biggleswade, Bedfordshire used his Yaesu FT-747 and dipole antenna to work just one station S9BB (Sao Tome & Principe) AF-023 at 1213UTC using 100W s.s.b. Owen says "**Martti Laine OH2BH** was the operator and he did a superb job of pulling my signal out of the crowd. Conditions had deteriorated after I first heard him at 0900UTC. I had to go out and when I switched on the rig again at 1200UTC he was still there with his signal strength down and the noise level much higher. I was very pleased to work him as my antenna is cut for 14MHz"!

Three operators **Pekka OH2TA**, **Pertti OH2PM** and Martti, were active from the Democratic Republic of Sao Tome and Principe between 20 November and 3 December last year and this included operation by Pertti as **S9A** in the **CQWW DX CW Contest**. They had two stations covering all bands on both c.w. and s.s.b. The QSL information for both S9BB and S9A is via OH2TA through the bureau or direct to **Pekka Holstila, Linnaistentie 7, 01640 Vantaa, Finland.**

On to the 21MHz band where **Gary Macleod MM3SCO** in Tongue, Sutherland made a huge number of s.s.b. contacts including 9G5OO (Ghana) 0944, 7P8NK (Lesotho) 1144, C56ACA (Gambia) 1202, 9K2YM (Kuwait)1315, HF0QF (Antarctica) AN-016 at 1342, P40L (Aruba) SA-036 at 1336, EA8/DK2BR (Canary Islands) 1359, FG/K9NW (Guadeloupe) NA-102 at 1530, 5N6EAM (Nigeria) 1617, YV5OHM (Venezuela) 1654, TR8CA (Gabon) 1709, 7Q7MM (Malawi) 1655, CP6XE (Bolivia) 1507, HI3NR (Dominican Republic) NA-096 at 1907, PJ2/K2SS (Netherland Antilles) SA-006 at 1931 and HK5CPH (Colombia) at 2157UTC using a Kenwood TS-50, MFJ-948 tuner and converted CB antenna.

THE 24 & 28MHz BANDS

For his 24MHz operating **Jim Pedley GM7TUD** in Dumfries used a Kenwood TS-450S and TGM MQ4 beam logging S9BB (Sao Tome & Principe) on s.s.b. at 0943, ZC4LI (UK Sovereign bases on Cyprus) AS-004 at 1224 on c.w. and VP2ENK (Anguilla) NA-022 at 1310UTC again using s.s.b. QSL via **W5AJ Robert A.Wood (ex-WB5CRG), 1013 Lewis Drive, Kemah, TX 77565, USA.**

On to the 28MHz band and welcome to new reporter **Tony Sneath G8YMW** in Lincoln who worked UA3LHC (European Russia) at 1130UTC while operating mobile on his way to work. Tony uses a Icom IC-706Mk2G at 50W to a DX27 5l8 mobile whip mounted on the roof of his car.

Also on the band was **Rob Hastings 2E0BOB** in Chelmsford, Essex who uses a Kenwood TS-50S, MFJ-945E tuner and inverted Carolina Windom 80 Special. Contacts here include WP4BL (Puerto Rico) NA-099 at 1246, CX2FJ (Uruguay) 1255, W3WTJ (USA) in Pittsburgh, Pennsylvania 1412 followed by KE8HE in Southgate, Missouri at 1430 and a single f.m. contact with DL1KSB at 1519UTC.

Finally, Jim GM7TUD worked c.w. stations J75KG (Dominica) NA-101, A45XR (Oman), 3V8SQ (Tunisia), 5B/AA1TN (Cyprus), OD5/DJ5CC (Lebanon) and 5U5Z (Niger) between 1018 and 1427UTC.

Croatian awards.

SIGNING OFF

There was a lot to fit in from our reporters this month and I do hope I have not missed anyone out? The bands have been good at times but completely dead at others so it is nice to see some good DX being worked again. 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

Valve & Vintage

This month Phil Cadman G4JCP chats about loudspeakers, light dependent resistors and the expansion of the 7MHz band. Phil - along with many others - has already heard Amateur a.m. transmitters between the high power broadcasting stations!

Warmest greetings, vintage radio enthusiasts! Welcome to the Valve & Vintage 'shop' and my first column of 2005. I hope you all had an enjoyable Christmas and New Year. And I trust everyone has resolved to do more radio constructing this year.

Before moving on, I must cover a few items left over from last year. First, my grateful thanks to **Arthur** "artknopp" who E-mailed to tell me that the loudspeaker enclosure I described in my September 2004 column, was featured in the November and December 1950 issues of *Wireless World*. The enclosure is quite unusual in design, yet it performs extremely well (if my tired old memory serves). It's definitely worth investigating if you're into novel d.i.y. loudspeaker enclosures.

Fig. 1: A version of the Voigt HC Corner Horn which incorporated a bass chamber to give an extended low-frequency response. Reader Ken Whitfield from Wiltshire has two of these horns and they both require a really big room (see text).

Valved Diode Receiver

Last time I suggested that it might be appropriate, given November was the Centenary of Fleming's Diode Patent, to maybe build a valve 'crystal' set over the Christmas period. This reminded **Chris Atkins G8AFA** that he did just that, only back in the 1950s.

Chris used an EA50 single diode - found in abundance in war-surplus navigation gear, so he tells me - and an 18.3m (60ft) long-wire. The set was used for late-night listening to the old BBC Light Programme which was then on 200kHz, and worked very well indeed when feeding a pair of CHR high-resistance headphones. A 6V motorcycle battery provided power for the EA50's heater. A lovely story, Chris. Thank you.

I had just one reply to my question regarding the whereabouts of a Moullin Voltmeter, so I suspect there aren't many of them still around. Yet all is not lost, **Rod Burman G4RSN** tells me he has two! Rod's voltmeters are marked: Cambridge Thermionic Voltmeter, Moullin Pattern 'D', Patent No. 24512. Both have two ranges - 4V and 20V - and are a.c.-coupled; the instructions stating that a metallic circuit is not necessary.

I'd still like to hear from anyone who has built - or intends to build - a modern version using a 1.4V-filament valve. It may be that here is one circumstance where good-old thermionic technology can provide a much simpler and cheaper alternative to a comparable modern r.f. voltmeter.

The ACE Enclosure

Going back to the loudspeaker enclosure I mentioned earlier, it reminded **Ken Whitfield** of Westbury, Wiltshire of a similar design from around 1970. The enclosure - designed by Edward Michelson - was called the ACE, and it too had the drive unit mounted in the top of the enclosure.

However, in the ACE the drive unit points directly up, the sound being directed horizontally by a special diffuser fitted to a Lowther PM6. drive unit. Construction details were published in the October 1970 issue of *Hi-Fi News*. (Oh dear, I really must stop 'plugging' other magazines else the Editor might get upset).

Ken also sent me a copy of a short article (from 1939) about a version of Paul Voigt's HC Corner Horn now Lowther which incorporated a bass chamber to give an extended low-frequency response. Okay, so what? Well, Ken has two of these horns! As you'll see from the photograph, **Fig. 1**, we are talking serious music reproduction here (needing an equally seriously big room). These enclosures are a world away from the dreadful 'shoe-box' loudspeakers that are so often found in (so-called) hi-fi systems today.

The O Debate

You may recall that last March I mentioned the debate about whether the 'O' in OA81, OC71, etc., should really be the figure zero. Well, the first character is most definitely the letter 'O'. As I said back then, Mullard used a leading letter 'O' solely for their early semiconductors.

The O category clearly includes photo-transistors, for example, the OCP71. But it also appears to include cadmium-sulphide photo-conductive cells, commonly known as light-dependent resistors (l.d.r.). I'm sure everyone has come across the ORP12 at some time; I still have the one out of the Philips Electronic Engineer set I received as a Christmas present some 35 years ago!

By the way, while on the subject of light-effected devices does anyone else remember scraping the black paint off OC70s and OC71s to make 'unofficial' photo-transistors? Some had clear 'goo' inside while others were filled with a milky-white substance. Either would work to a greater or lesser extent.

In the end, it was pure luck as to whether you got a good one or not. Rejects were put back into normal service by wrapping them in black insulation tape!

Where was I? Ah, light-dependent resistors. While the ORP12 is by far the best known, there have been many other cadmium-sulphide photocells produced over the years. Some were mounted in glass envelopes and look rather like valves (maybe adding to the figure-zero/letter-O confusion). And here I'm indebted to **David Pratt G4DMP**, for the photograph of a Mullard ORP11 cadmium-sulphide photo-conductive cell, see **Fig. 2**. It looks quite different to the ORP12, you'll agree!

The light-sensitive area is at the top, and the device plugs into a B3A valve base. The data sheet in the *Mullard Technical Handbook* describes the ORP11 as being: "Intended for flame failure, smoke detection and general industrial applications".

Different Valve Bases

Other cells used different valve bases. For example, the ORP31 had an International Octal base, but was otherwise similar to the ORP11. The ORP90 had, as you might expect, a miniature 7-pin (B7G) base. Here the active area was positioned along the length of the envelope.

David remarks that: "The 'R' in ORP31, etc., is a bit of a mystery and I can't lay my hands on any more information. I can only assume that 'O' meant no heater, 'R' meant conductive, 'P' meant photo and '3' meant octal base. All the ORP-series would appear to be photo-conductive. There are photo-emissive devices in the *Mullard Handbook* but none use the ORP nomenclature

I tend to agree with David's comments. Although I venture to suggest that Mullard classified cadmium-sulphide devices as semiconductors, rather than as having no heater. Mullard photo-emissive cells have their own nomenclature consisting of two digits followed by two letters. The first digit seems to relate to the base and the second digit is probably just a version number (just as in Mullard valve nomenclature).

As for the letters, Mullard explicitly state the first letter denotes the cell type: 'V' for high vacuum and 'G' for gas filled. The second letter denotes the type of cathode: 'C' for caesium on silver oxide and 'A' for caesium on antimony. The former cathode is most sensitive to incandescent and near-infra-red light, while the latter type is more sensitive to blue light.

Using The ORP12

It's been a (very) long time since I used an ORP12, so I couldn't resist having a play. Dropping it across my digital multimeter was quite enlightening. In darkness, the resistance exceeded 2MΩ. Yet holding the ORP12 about one inch from a normal 60W electric light bulb reduced its resistance to around 100Ω. A startling 20,000:1 change!

While l.d.r.s are not the most stable of devices, they still posses good sensitivity to light. And unlike photo-diodes and photo-transistors, their purely resistive character allows them to be used in place of a normal resistor.

Quite honestly, I think l.d.r.s have been neglected for too long. They're simple yet amazing, and have been around long enough to come under the 'vintage' banner. Anyone got a favourite or unusual circuit?

Extended 7MHz Band

It can hardly have escaped anyone's notice that here in the UK the 7MHz Amateur band was extended to 7.200MHz late last year. The band is now twice the size it was, albeit the top half is shared with broadcasting on a non-interference(!) basis.

Immediately following the release of the 7.100 to 7.200MHz segment, several amateurs appeared on 7.142MHz using amplitude modulation (a.m.). Many of the transmitters I heard were old military types, while all manner of old valve receivers were apparently being used to monitor the transmissions.

For a few days nostalgia reigned on 7.142MHz and I'm sure many Radio Amateurs were reminded of a time before the domination of the short-wave bands by s.s.b. Alas, the frequency seems quiet now - broadcast stations excepted.

I hope the transmitters have simply been switched off, and nothing more serious has happened. I say this because I heard one Amateur discussing a QSO which had ended abruptly when one station said: "I must go QRT, the shack is filling with smoke"!

There are a couple of serious points here. Before s.s.b. became dominant, many would-be radio enthusiasts got their first taste of Amateur Radio by hearing local amateurs on domestic receivers. The 7MHz band was a favourite for this due to its proximity to the 41m and 49m broadcast bands. This could happen again if regular a.m. transmissions were made in the 7MHz band. Anyone agree?

Fig. 2: The Mullard ORP11 and associated 3-pin base.

Secondly, the release of 7.100 to 7.200MHz may (hopefully) be a portent of things to come. Prior to 1938, all Amateurs enjoyed the use of 7.000 to 7.300MHz. At the Cairo Radio Conference of that year, it was decreed that in Europe 7.200 to 7.300MHz would become shared with broadcasting. Even worse, at the Atlantic City Conference in 1947, 7.150 to 7.300MHz was completely lost to broadcasting, while 7.100 to 7.150MHz became shared. Finally, the top 50kHz was lost at the 1959 Geneva Conference.

Waxed & Waned

Pressure on the h.f. spectrum from commercial, broadcast, navigation and military use has waxed and waned since 1959. Today, pressure from many non-amateur users is reducing and this trend is likely to continue. Commercial and military communications are largely via satellite and cable, satellite navigation dominates, and international broadcasters are toying with the idea of the Internet being the new international broadcast medium.

I wonder, will Amateur Radio gain significant amounts of the h.f. radio spectrum in years to come? It's unlikely in the extreme that amateurs will ever again be allowed all wavelengths '200m and down', but who knows just how much spectrum we may gain in the future.

The release of new frequencies would allow the use of wider-bandwidth modes, and many old a.m. transmitters - particularly homebrew - could then be brought into regular service. This also has ramifications for constructors as a 'junk-box' a.m. transmitter is a much easier proposition than a comparable s.s.b. transmitter.

So, how about something on low-power a.m. transmitters for my next Valve & Vintage column? After all, you can't beat the sound of a good-quality a.m. transmission, can you?

So, 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**.

PW

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Icom 718, six months old, mint condition, dealer mod for 40m (7.1-7.2MHz) extension and 5MHz, £300. SEM Z-Match, 10-80m and 160m mod kit, others or exchange for table mic., MC60. G3NQX, Lancs. Tel: (01772) 703957.

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Still lots of radios and related unusual Silent Key items not sold, as for the lists, we will send them, magazines, HRO coil, books, manuals, etc., valves are not listed yet. R. Birkett. Tel: (01872) 862575.

Still many radios left, Bush VHF61, £18 plus P&P. Just found small working complete Baker BBC camera (German) in case, very nice, make me an offer, also nice polyphone. R. Birkett. Tel: (01872) 862575 or www.rabeng.co.uk

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Blind M3 seeks Kenwood TS-50, also c.w. filter for same, can anyone help? Replies pleased to John G3EGC, QTHR. Tel: Bolton (01204) 301502.

Codar AT5 TX with power supply, also wanted carbon mic. Tel: Lancs (01254) 831510.

Denco dual purpose and transistor coils, in particular range 1 and electroniques coils, particularly type 8 and 15, for valve circuits. Tony, Worcester. Tel: (01905) 641759 after 1800 please.

Eddystone receivers, 880, 830, 940, 680X, 930/4, other models considered, working or not. Stewart, Glos. Tel: (01453) 840429.

Grundig Yacht Boy radio, must be model 210 from between 1970 and 1972. Must be in mint condition, will pay very good money for one in mint condition. Peter Tankard on 0114-231 6321 from 0900 to 2230.

Heathkit circuit for oscilloscope, type 10-18U, all expenses paid. Chris Brown G7GJZ on (01278) 786621.

Manuals or circuits for Marconi receiver type, Guardian 1193A and Mercury 1017, good price paid for any information on these sets. Tel: 0161-723 3452 anytime.

Matching speaker for an IC-720, also a desk mic., same age, must be in good condition or any matching bits for a rig, must be working. Nick, Croydon. Tel: 0208-689 2145.

Valve tester still wanted (I can't keep borrowing my friends!), would prefer model by AVO. Tel: (01482) 887938.

XY configured, H/V combined 10-elements, 2m (144MHz) Yagi antenna, e.g. Cushcraft-Hygain-Sandpiper-MFJ (w.h.y.?), d.i.y., seller should have full documentation, re: spec and assembly, please state age, make and condition. Important: this buyer cannot collect, so P&P needs to be considered both ends. Write: M3EMB, 85 Hillside Road West, Bungay, Suffolk NR35 1RH, E-mail: m.evans@mtxnet.co.uk with pictorial details.

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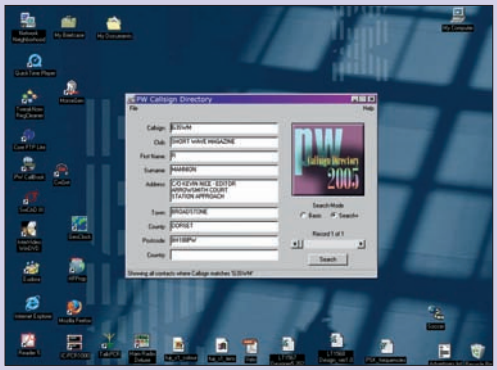

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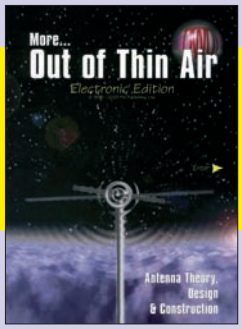

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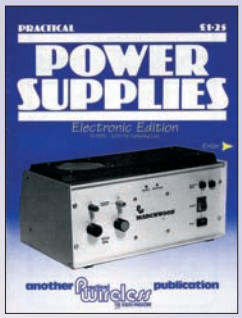

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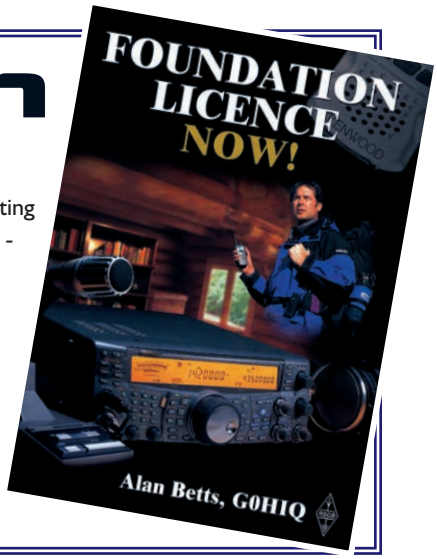

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rob mannion's topical talk

Rob Mannion G3XFD comments on the growing interest in v.h.f. projects in *PW*, particularly the type of rig discussed by Roger Lapthorne G3XBM in his letter published in this issue.

Fig. 1: Kevin Nice G7TZC enjoying a relaxing cuppa during the 2003 *PW* 144MHz QRP Contest. Tea never tasted better!

I found **Roger Lapthorne G3XBM**'s letter, together with the accompanying photograph featuring his QRP home-brewed 144MHz rig, to be fascinating. It's not often we have photographs on the letters pages and I'm delighted to be able to (unusually) publish two letters and photos with a v.h.f. constructional theme this month.

Roger's obvious extensive experience with 10mW of r.f. adequately proves to me what can be done. The DX was remarkable - well done G3XBM!

The successful QRP rig built by Roger proves to me just how much fun, and sense of achievement, can be gained from such a project. In fact, Roger's obvious pleasure looking back at what he did is almost tangible. It also provides me with even more ideas for low power projects using simple technology and amplitude modulation.

As I write this issue of Topical Talk in damp, dull and cold late January I'm looking at a photograph of **Kevin Nice G7TZC**, Editor of *Short Wave Magazine*. Kevin, **Fig. 1**, is pictured at my favourite portable operations site high on the Dorset downs between Blandford and Shaftesbury. The photo was taken as Kevin enjoyed a hot cuppa in the brilliant sunshine during the 2003 *PW* 144MHz QRP Contest. Personally I think the photograph sums up /P operation very well indeed - helped by Kevin's relaxed attitude and excellent hat to keep the sun off!

It seems to me that the best time to come on the air with the low powered a.m. rigs, such as G3XBM's (and those I have under construction or planned) would be just after the *PW* QRP contest has finished on 144MHz. We could also encourage the use of the equipment during the 70MHz 'Activity Afternnoons' which I'm planning to organise again very soon.

While on the subject of Activity Afternoons, readers may know that 2004 was a difficult year for me personally. But that's in the past now and I'm hoping to run the first 70MHz activity day sometime in the spring.

So that I can advise interested readers, I would be grateful if those of you who have E-mail facilities to contact me at the office so I can keep you updated. If you don't have E-mail, perhaps you would send me a stamped and addressed postcard that I can return to you with the latest information. And of course, whenever possible, if time permits, I'll also mention the dates in *PW*.

Let's hope a significant number of like-minded operators can meet up on air using a.m and relatively simple equipment. In doing so I'm sure we'll all re-awaken the sense of achievement that awaits anyone who has taken the time and trouble to build their own equipment.

Favourite Band?

At the moment I'm concentrating on building a QRP hand-held a.m. rig for 70MHz as this is my favourite v.h.f. band. However, I would very much like to hear from readers what they are interested in regarding v.h.f. band a.m. projects. (I think 4m is a good one to start with as there are very few commercial rigs to choose from).

Incidentally, I should mention that listeners haven't been forgotten! Indeed no, I fully realise there are readers who, although they're very keen constructors, have enjoyed the hobby for many years without feeling the need to become a licensed Radio Amateur. If you're in this category - why not join in with a simple home-brewed a.m. receiver? Let us know who you heard during the various activity afternoons, and I'm sure we'll all enjoy the experience

Finally, I must again thank Roger G3XBM for the encouragement he's offered via his letter and photograph. Maybe I'll also work across to France using 10mW of a.m. on v.h.f. I'm certainly going to try!

PW

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