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YAESU

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160 - 6m

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FT-DX9000MP
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FT-817ND

YAESU

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

Deal: bhi DSP fitted **£529**

W&S £439 D

TM-V71E NEW

KENWOOD

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50W on 2m & 70cms!

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FTM-10E

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Bluetooth

W&S £249 D

IC-7800

ICOM

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W&S £6599 D

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*100W All-mode
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100W
All-Mode

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ICOM

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All-Mode
Transceiver

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IC-7400 Deal 1

ICOM

HF - 70cms 100W transceiver plus SP-21 spkr and SM-20 mic **£1511 D**

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ICOM

HF/VHF/UHF
100W
Transceiver

Deal: IC-706 + New Power-Mite-NF FREE **W&S £739 D**

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ICOM

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

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For YAESU

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This is a new range of cross-needle meters at a very competitive price!

This new range is available April 2009

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RX-403	125 - 525MHz 200W	**£49.95 B**
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Icom VHF/UHF Mobile/Base

IC-E208

Dual Band FM Mobile
*144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz **£254.95 D**

IC-910H **£1239 D**
2m/70cm 100W Base station all-modes Option for 23cm module (UX-910 £359)

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As Above but with 23cm Module ready fitted and a big saving as well.

IC-2200H **£199.95 D**
2m 55W FM mobile with rugged construction and with digital option.

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Kenwood VHF/UHF Mobiles/Base

TM-271E

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

£165 D

TM-D710E *Low Price* **£429 C**
Dual band APRS 50W FM

Yaesu VHF/UHF Mobiles/Base

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FT-1802E *Low Price!* **£119 D**
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Programming Software For Your Radio

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

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ALL **£41.95** with FREE PC Radio Data Lead.
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IC-E92D NEW

ICOM

2m/70cm Handheld with Built-in DSTAR

* *144-146MHz / 430-440MHz*
* *FM FMN WFM AM (Rx) DV*
* *5W/2.5W/0.5W/0.1W*
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* *CTCSS, DTCS, DTMF*

Includes antenna, and charger.

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

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IC-E91 D-Star Ready

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£269.95 C

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IC-V82	7W 2m Digital	**£172.95 C**
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* 144-146MHz Tx/Rx: FM
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Up to 6W out with Li-ion battery and **"scanner" style coverage from 100kHz to 1300MHz** including SSB on receive!

£229.95 C

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TH-K2ET	2m 5W FM	**£165.95 C**
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Yaesu VHF/UHF Handhelds

VX-7R

Black or Silver Available. Totally waterproof, Wide frequency coverage 500kHz-900MHz AM/FM.

£259 C

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FT-60E	2m/70cm wide rx 5W	**£142.95 C**
VX-3E	2m/70cm	**£139.95 C**
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RADAR-COM-10 Complete Antenna System including all cables with 10m cable **£249.95 A**

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You Just Need A 12V 1 Amp PSU.

Antenna Time - FREE Carriage!

We are offer ***FREE*** carriage to PW readers who order antennas from this advert until 18th May. This applies to UK mainland only.

For full technical information go to www.wsplc.com and key in the antenna product code.

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6-BTV	£255.95 D	RM-10	£20.95 C
5-BTV	£224.95 D	RM-12	£20.95 C
4-BTV	£182.95 D	RM-15	£20.95 C
HF Mobile Lower Mast		RM-17	£25.95 C
MO-1	£36.95 C	RM-20	£25.95 C
MO-2	£34.95 C	RM-30	£28.95 C
MO-3	£28.95 A	RM-40	£29.95 C
MO-4	£24.95 A	RM-80	£30.95 C

Cushcraft - HF Verticals		R-6000	£399.95 D
MA6V	£329.95 D	AR-10	£99.95 D
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MA8040V	£319.95 D	MA5B	£479.95 D
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Voyager-DX 160-40m ~~£409.95~~ £349.95 D

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AV-18AVQ	£269.95 D	TH-2Mk3	£399.95 D
AV-18HT	£1069 D	TH-3JRS	£399.95 D
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AV-640	£429.95 D	TH-11DX	£1239 D

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20804	£59.95 C	20938	£111.95 D
20808	£84.95 D	20921	£89.95 D
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20089	£70.95 D	**Tonna 23cms Yagis**	
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Only £79.95 C

Now In Stock!

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Practical Wireless June 2009

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Rob Mannion's

keylines

Rob looks at the downside of buying on eBay and reveals what the April Spoof was!

Over the past few months a number of – very upset – readers have contacted me regarding what they regard to be poor service or less-than-fair transactions via the on-line eBay auction site from **non-commercial** sellers. Perhaps understandably, the complaints have all come from buyers rather than sellers.

I've tried my best to act in a neutral fashion and attempted to get both parties in the disputes talking to each other – with mixed results! Several aggrieved buyers and sellers have sorted the problems out in an amicable fashion, but unfortunately some of the conflicts have escalated, resulting in raised tempers with lifted safety valves roaring away!

However, at this point I must declare myself as not being neutral regarding the eBay site itself. In fact, I stopped using it sometime ago when (on behalf of my wife) I bid for a special wooden toy piano for her to use in connection with her work with autistic children. When the piano arrived it certainly wasn't in the condition described by the seller – the crude repairs affected with epoxy adhesive clearly told a story!

Although I'd had many successful purchases from eBay, I stopped using the site after being sold incomplete Linguaphone Language Courses by sellers who had cleverly disguised the fact that the courses were minus the all-important course books. The eBay site operators were less than helpful in the situation.

Obviously, it's certainly a case of 'Buyer Beware' with an auction when the goods being auctioned aren't physically within reach. So, I can really only blame myself for purchasing a recorded language course without the essential literature! Despite this, if I was selling such an item I could never sell it without drawing attention to the missing items. Of course, I might not have sold the item – although there are people who have the books and are searching for the recordings – but I would have been satisfied it was an honest attempt.

Discussing the eBay problems readers have experienced, with my friend and valued *PW* colleague, **Tex Swann G1TEX**, his first response was, "Don't throw the baby out with the bathwater". In other words, Tex meant that he didn't agree with my total boycott of eBay. Instead, he wisely recommends that the intending purchaser should take every precaution possible and adopt the 'Buyer Beware' axiom whenever this on-line service is used.

Prejudice Demonstrated

One of the disputes I was drawn into – trying to be fair to both parties – had become very unpleasant indeed and the angry eBay seller involved in the dispute clearly demonstrated his prejudices. The last advice I received from him before I broke off correspondence included suggestions on how I could improve *PW* (as far as he was concerned) and why I shouldn't get involved in buyer-seller disputes. Incidentally, I have suggested that he contact me separately to discus editorial improvements as feedback is always welcome!

However, even though the dispute between the two Radio Amateurs was bad enough, during the exchange of E-mails some appalling prejudice (regarding lack of technical knowledge) against the Intermediate Licence from the seller (A Full Licence holder) came to the fore (the buyer was an Intermediate Licensee). This prejudice was, in fact, unjustified because the Intermediate Licence holder is a highly qualified electrical and electronic Engineer although relatively new to Amateur Radio.

Inevitably, whenever any form of buying and selling is involved there's a possibility of a dispute when either party isn't satisfied for some reason. This is human nature. Despite this I'm sure that there's no need whatsoever to belittle another Amateur because of the type of licence they hold – just because of a dispute.

April Spoof

A number of readers spotted – and enjoyed – *The CQ Parrot* April spoof this year! It seemed an ideal leg-pull to place in the news! Several readers spotted that there were no official credits to the (imaginary) newspaper and one reader (his wife is Portuguese!) used her specialist language skills to see through the joke! (I can't confirm the news that a Portuguese Amateur has tried to buy Orador the parrot!).

The *PW* team are delighted that so many readers enjoyed the spoof. Here's to next year!

Rob Mannion G3XFD/EI5IW

Practical Wireless
PW Publishing Limited
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Station Approach
BROADSTONE
Dorset BH18 8PW

Tel: 0845 803 1979
Fax: 01202 659950

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

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

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

Advertising Typesetting/Admin
Peter Eldrett
peter@pwpublishing.ltd.uk

Advertisement Sales
Roger Hall G4TNT
roger@pwpublishing.ltd.uk

Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Book Orders
bookstore@pwpublishing.ltd.uk

PW Publishing Website
www.pwpublishing.ltd.uk

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Directors: Stephen Hunt & Roger Hall

Subscription Administration
Webscribe
Practical Wireless Subscriptions
PO Box 464
Berkhamsted
Hertfordshire HP4 2UR, UK
pw@webscribe.co.uk
www.mysubcare.com
☎ 01442 879097
Fax: 01442 872279

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Subscriptions are available at £38 per annum to UK addresses, £47 Europe Airmail and £57 RoW Airmail. See the Subscriptions page for full details.

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

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

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

Practical Wireless

readers' letters

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

Street Lighting Photocells

Dear Rob,
Being a Principal Lighting Engineer by profession, I was extremely interested to read about **Roger Bunny's** problems with defective street lighting photocells. From the information contained in Roger's letter I was able to identify the company involved and contacted them about the problem. I enclose their reply. At the company's request I have omitted their name from their reply.

"The problem mentioned surfaced because of EMC radiation in a very high band. The photocell as you will read below, was designed and tested for full compliance with the EMC harmonised standard EN55015: 2001 for different types of equipment including outdoor switches.

EN 55015: 2001 "Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment (CISPR15:2000)" appears to be the relevant standard chosen by the test house as there is no other standard for electronic equipment fitted to outdoor lighting equipment. All controls are tested by the test house to this EN standard and have been certified as complying fully.

Standards are usually updated by amendments every so often and after a number of years a revised standard is published. When this happens a date is given beyond which application of the previous revision of the standard plus amendments can no longer be used to assume compliance with the essential requirements of the EMC directive.

Due for release in September 2009, the revised EN 55015 amended Standard, published for discussion in 2006, included tests for radiated emissions from 30 to 300MHz. The present standard does not check for radiated emissions above 30MHz. On the 1.9.2009 the EMC directive including the new revised EN 55015 becomes law. The photocells that caused the radiated emissions problem were forwarded to the test house and again they fully complied with the legal requirement of no radiated emissions up to 30MHz. However when we carried out tests in the lab we noticed bursts of interference up close to 200MHz and this was caused by a capacitor. When we checked this capacitor we discovered that the capacitance tolerance had changed.

This was an alternative capacitor we had to source from a catalogue due to a late delivery, lucky for us we only used them for one day's production. The normal capacitor has not and may never have a tolerance problem, once we changed the capacitor to the normal capacitor the radiated bursts of emissions

Star Letter

Ideal For The Hard Of Hearing

Dear Rob,
It wasn't until my cousin, **John Price G4OIK**, gave me a complete set of volume 83 of *PW* that I realised what a wonderful publication it has developed into! You may remember my article – A Phased Gamma Match Vertical Antenna – arranged on a triangular base, way back in the 1980s? I had not seen *PW* since then until John G4OIK gave me the magazines. However, now I've got the latest issue I'm going to be a regular reader from now on!

Now – as we used to say in the RAF – it's time for 'a line shoot' ! and I'm looking back to before the Second World War, when I was a member of the RAF Civilian Wireless Reserve (RAFCWR) on fitting parties specialising on the technical side – rather than operating. During the war I eventually rose up through the rank to the giddy heights of a Flight Lieutenant in a Staff Signals capacity in a Group HQ in Naples. The HQ had the luxury of a roof garden flat flat overlooking Capri and Sorrento. The equipment used included high power transmitters and we worked all over Europe and into North Africa. Mind you, the receiving stations had huge antenna farms, often using rhombic antennas – but it was still a fascinating time in my radio career!

Unfortunately, nowadays – as I'm 91 – my 'audio department' doesn't work too well but the vision department is still working well. That's why I now work using the PSK31 and RTTY modes using my Icom IC-7800, a Mazzoni Magnetic loop for 7 and 10MHz and a long wire for 1.8 to 28MHz. A Rigblaster Pro takes care of the interface.

I think that PSK31 and RTTY is a blessing for Radio Amateurs who are hard of hearing and – certainly in my case – the modes have opened up a wide field of activity. In fact, since the loss of my dear wife a few years ago – I was determined to get back into the hobby to keep my mind active and operating the keyboard modes has worked wonders! Best wishes and kind regards to everyone on *PW*.

Frank Wyer G8RY
Burrough Green
Newmarket
Suffolk

Editor's comment: *A wonderfully inspiring letter Frank – thank you for writing. Please join me on the* Topical Talk *pages for more comment on this topic.* ***Rob G3XFD****.*

disappeared. For quality control in the factory, we use the present legal required emissions checks up to 30MHz and will do until September of this year, to carry out the test. However, since that incident we are now checking all our photocells to 300MHz and beyond and all photocells perform perfectly.

Only a small number of those photocells found their way into the market. The positive aspect of this problem is long before September 2009 we fully comply with the new directive.

We can only design products that comply with the standards, we do our best to design beyond that as laid down in the standards. We see standards as the minimum requirement. If it was not for that alternative capacitor which stated in its data sheet that it was to a defined tolerance we would comply not just to 30MHz but better than the new EN in September beyond 300MHz.

Standards need to be revised on a annual basis to keep up with the demand of new emerging technologies, the BS Standard for photocells or the draft EN for photocells has not been given any attention over the last decade."

An interesting reply! Whilst it's reassuring to hear that both the local lighting department and the manufacturer moved quickly to resolve the problem, it cannot be ruled out that similar problems exist elsewhere. Modern street lighting predominately uses electronic control gear and whilst these normally do not cause major radio frequency (r.f.) interference problems – they can do so under fault conditions.

Unfortunately, most lighting engineers have little or no knowledge of Amateur Radio and are unlikely to have the skills or the equipment to locate the source of radio interference. This is where the Amateur Radio community can help to help themselves. If you are able to locate the exact lighting column(s) causing the problem using our knowledge of direction finding (DF) techniques and pass this information to the lighting department, you are more likely to have the problem solved quickly. Stating that it's the council's problem and it's their responsibility to fix it may be factually correct –but is likely to prolong the time taken to cure the problem.

Len Paget GM0ONX I Eng MILE
Kilmarnock
Ayrshire
Scotland
Website **www.users.icscotland.net/~len.paget/qrz.htm**

Editor's comment: *Thank you for your response Len! I thoroughly recommend that readers visit his website. Please join me on the Topical Talk page for further comment.* ***Rob G3XFD.***

The CQ Parrot April Spoof!

Dear Rob,
Congratulations! – you really fooled both myself and my wife **Maria Fernanda** on the *CQ Parrot* news story in the April *PW*, and she's Portuguese! Not only, that but **Fonseca** produce my favourite port! Actually, I got Maria Fernanda to check the translation, because my Portuguese is rubbish and as a result – she now she thinks Radio Amateurs are even more barking mad than she thought before! Incidentally, I actually have to improve my Portuguese, because we are moving there when we retire, and for the first time in my life I'll have room for decent antennas together with a shack.

Actually, I was going to write anyway – even without the April spoof story, because of the letters from **Tony Tuite GW0NSR** and **John Harrison**. Having started out with a.m. on 2 metres using valves, I totally agree with both of their comments.

I have just obtained a Codar AT5 and a CR70A. The transmitter is certainly okay on c.w. (not that I'm going to actually use a key because it would be an awful pain to listeners). When I can locate a crystal microphone then hopefully I'll try it on a.m. The rig has been modified, with the microphone gain control brought to the front panel, and the switching of the p.a. tank coil has been changed to improve 80 metre performance. Everything checks out so far, although the p.s.u. is not the original. As for the CR70A, I've re-strung the tuning and checked the alignment, it does seem a little deaf, but I've heard quite a few Gs on 3.5MHz. Now I need to fit a new volume pot because the switch on the original is faulty. So, hopefully, I will be on the air shortly with AM on 80! The Codar T28 would of course be more suited for the receive side, but then the potential problems with all those germanium transistors might be an issue.

Oh and by the way the "Ham" in the address is not my April Fool! Indeed, at one time there were three or four Amateurs all living within the village. 73 to everyone at *PW* and Cheerio para agora!

Steve Cook G8CYE
Ham
Richmond
Surrey

Editor's reply: *We're deleitado (delighted) that you – and the many other readers who've contacted us – enjoyed the April spoof Steve! However, it's important that your wife should be informed that* PW *readers* ***are sane*** *– it's just the Editor who has a zany sense of humour! Incidentally, we can't confirm the rumours that* Orador *the parrot is up for sale on the Brazillian equivalent of eBay!* ***Rob G3XFD***

Louis Varney G5RV – Memory Lapse?

Dear Rob,
Regarding your comments featuring the late **Louis Varney G5RV**, in the April *PW*'s *Topical Talk* – when Louis said "No such thing Rob", I think he was either joking or had a memory lapse.

I suggest this because, in his article *The G5RV Multiband Antenna Up-to-Date*, published in Radcom July 1984 he says, *"For installation in very limited space, the dimensions of both the "flat top" and the matching section can be divided by a factor of two to make the half-size G5RV, which*

Hill Topping In Scotland – Thanks To *PW*!

Dear Rob,
I read with great interest of your own v.h.f QSOs from the high ground in the Clent Hills in north Worcestershire (*Keylines* Editorial April *PW*. I live in the county of Northumberland and recently I went up to Aberdeenshire, visiting my family – my Scottish roots are the reason for my callsign **2E0SCO**.

Operating as **2M0SCO** and at one point operating as **2M0SCO/M** I called "QRZ two metres" from the Cairn O'Mount in the Grampian Highlands. It's truly beautiful countryside and ideal for 144MHz operating.

Using only a Yaseu FT-60e hand-held running at 5W and using the supplied the rubber duck antenna, I had a long QSO with **Dave 2MODDS** and several other stations in the Aberdeen and the north east of Scotland. I also I had some QSOs on my way down the A90, the A1 and also on the Perth / Midlothian and Berwick repeaters. I thank all the stations who replied to my mobile calls. For anyone interested, my personal and station information is on QRZ.com So, thanks to you *PW* and yourself Rob – I was inspired me to operate SOTA!
John Hepburn 2E0SCO
Ashington, Northumberland

is a very efficient antenna from 7 to 28MHz." Louis also mentioned the 'half size' again later in the article.

The article is quite comprehensive in that it gives performance detail for each band and in my opinion deserves re-publishing, even if it's only to absolve Louis G5RV of the many myths which have been wrongly attributed to the G5RV. I use the G5RV here at G3NHR and I think it's an excellent antenna! Best wishes.
Harry Rogers G3NHR
Legbourne
Louth
Lincolnshire

Editor's comment: *Thanks for your feedback Harry. However, even though Louis G5RV had an impish sense of humour – I'm sure he meant what he said regarding his dislike of the half-sized G5RV! Perhaps he was suggesting the full size version was the best option? However, whatever was meant at the time of our last little chat, I'll always have very fond memories of G5RV.* ***Rob G3XFD****.*

Ancient Modulation & Equipment?

Dear Rob,
I'm writing to say how much I agree with the comments made by **Tony Tuite GW0NSR** and **John Harrison** in the April issue of *PW*. As a teenager in the mid 1950s I spent many happy hours listening on 160, 80 and 40 metres on an ex-army R109 backpack receiver, and later on, 20, 15 and 10m on an R208. Signals were strong and nearly always clean and "nice sounding" on amplitude modulation (a.m.). Most operators used home-brewed gear, usually with the ubiquitous 807 or 813 as the power amplifier (p.a). stage.

Then, equipment was simple and totally devoid of that wretched "digital speech processing", and as also with the then available commercial gear, 'did what it said on the tin.' Present-day gear seems to be loaded with all manner of (that I regard as generally useless) bells and whistles, much of which is pure marketing hype aimed at the "average buyer's" vanity in order to sell more boxes. These products seem to try to cater for every taste, doing all things reasonably but nothing particularly well.

I also have reservations about power output claims and I suspect some of these could be rather 'elastic'! How often have you seen some new audio amp in your local 'Audiomart' with a big promo-board proclaiming, "Massive 200 Watts* per channel", then spotted a tiny asterisk right at the bottom, saying, in minuscule text, "Peak music Power...20W RMS"?

Some while ago, listening on 80 metres one evening, I heard two Amateurs, one in Scotland and the other near Southampton, both using quite up-market rigs and antennas, having no end of difficulty getting through to each other, yet both were 'armchair copy' here. My receiver? It was an elderly Racal RA17 with a few feet of hookup wire dangled out of the shed window for the antenna! Later the same evening I heard another operator in Southampton working DX like a good'un. His rig? A (valved) KW 2000!

I really think that the present-day gear is far too complicated for the average user, who has no experience of design, construction or maintenance, and probably fails to understand the thinking behind speech processing and other modern facilities, so ends up putting out a grossly sub-standard signal. One only has to listen to one of these interminable weekend contests on 20 metres to hear speech tortured almost beyond recognition in the hope of working that extra bit of DX to see what I mean!

On another tack, I'm clearing out my shed to make room for the long-delayed construction work and have a load of 'junk' both vintage and modern – including a bucket-full of Second World War vintage 'dogbone' type resistors, relays, meters, abandoned projects, etc., and all are going free to a good home. Collection is essential as I no longer have a car. If you know of a 'deserving cause' or recipient, I would be most grateful to hear, as otherwise the whole lot is going to the tip. I need the room and I'm not going to fill the loft again! Oh, there's also a vintage Labgear "test-set", which incorporates an a.f./r.f. signal generator/tracer and RC bridge all in one unit. It looks in great condition but I've not tried it out. It needs a loving home!
Chris Atkins G8AFA
2 Eastlands
Yetminster
Sherborne, Dorset DT9 6NQ
E-mail bonniedog22@yahoo.co.uk

Send your letters to:

Rob Mannion
PW Publishing Ltd.,
Arrowsmith Court,
Station Approach,
Broadstone,
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E-mail: pwletters@pwpublishing.ltd.uk

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

news & products

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

Stop Press News!

Leicester Show On In September!

As *PW* went to press the Leicester Amateur Radio Show Committee announced that the 2009 Leicester Amateur Radio Show will take place on **Friday and Saturday September 4th and 5th** at the Donington Park Venue in north west Leicestershire. The earlier date is due to the building work associated with the Grand Prix, as the Exhibition Hall will be closing from October 12th.

Important note: The Show Committee have been assured by the Donington Management that no major motor racing event is taking place on the Friday or Saturday, so there should be no traffic problems. Further details from **Geoff Dover G4AFJ** via E-mail **Geoffg4afj@aol.com**

Vulcan To The Sky Trust GB0VUL On The Air

The **Newbury & District Amateur Radio Society** (N&DARS) will be running a station for the **Vulcan to the Sky Trust** to celebrate the Vulcan Bomber. Running on May 16th and 17th the callsign **GB0VUL** will be run on as many bands as possible. The event will be held at the **New Greenham Arts, 113 Lindenmuth Way**, **New Greenham Park**, **Newbury**, **Berkshire RG19 6HN**. The N&DARS will welcome any visitors and would appreciate as many contacts as possible. Further details from:
Richard Jolliffe G3ZGC, Paging & Paknet Technical Specialist, SO - Radio Paknet and Paging, Vodafone Technology.
Tel:(01635) 672373 E-mail: **richard.jolliffe@vodafone.com**

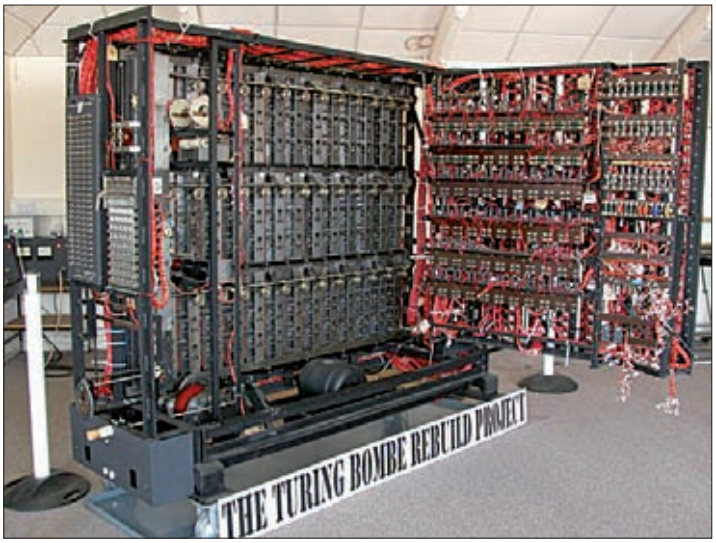
More Foundation Success For Wakefield!

The **North Wakefield Radio Club** has achieved more successful Foundation Course examination results. A very pleased **Robin Moseley G1MHU** reports, "We held another exam on March 29th 2009 and two candidates passed. **Laura Walker M6LVW** (11 years old) and **Chris Street M6CSY** are shown proudly displaying their certificates."
Robin Moseley G1MHU, **Publicity Officer,**
North Wakefield Radio Club. E-mail: robin@rmoseley.co.uk
Club website: www.g4nok.org/

War Veterans Reunited With Enigma Code breaker

War heroes were reunited with the engineering masterpiece that played a crucial part in cracking the Nazi Enigma codes and ultimately saved the lives of thousands. They watched the replica Bombe machine at Bletchley Park, Milton Keynes, being granted a special Engineering Heritage Award on Tuesday March 24th at the park in Milton Keynes.

All 210 original machines, built by engineering masterminds at the British Tabulator Machine Company at Letchworth, were destroyed after the war, but blueprints found at Bletchley back in 1970s started a mammoth mission to recreate a replica Bombe. It took a staggering 13 years, and funding from a host of groups such as the British Computer Society, to finish the project. Volunteer **John Harper**, led the rebuild team. The electro-mechanical devices were deployed across a handful of secret army establishments in Britain where scores of mostly young women would work on cracking and deciphering cryptic messages sent by the Germans.



It's now widely acknowledged that the Bombe did indeed cut the War short by two years and thus saved the lives of thousands. **Simon Greenish**, CEO of the Bletchley Park Trust, said: "*The Bombe is just one of a number of incredible historic pieces we are proud to hold. Unfortunately, many of our iconic buildings at the park are now so dilapidated that within two years they could be lost. By raising awareness of projects like the Bombe we are highlighting how important the Park is and remembering just how indebted we are to the brilliant minds of the men and women who worked here. We are delighted that we can reunite some of those people with the Bombe.*"

The Park will need a further £4million to renovate its buildings and donations are urgently being sought. More details from their website at **www.bletchleypark.org.uk/**
Bletchley Park Ltd.
The Mansion
Bletchley Park
Milton Keynes MK3 6EB

70 YEARS HOME OF THE CODEBREAKERS BLETCHLEY PARK 1939-2009

Ray Oliver G3NDS/MM Sailing Around the UK For Charity

Keen sailor and *PW* reader **Ray Oliver G3NDS** provides an update from Scotland: *"Hi everyone This message is to update you on my progress to sail round the UK in my yacht Christine Marie. Since leaving Lymington in April last year I have travelled a total of 1000 miles visiting 37 ports on passage. It's been a fantastic adventure so far… you can read all about it on my web site. I have a new web site that has photos and outline of all the passages so far, please use the link below to visit the site and follow my progress. I reached Oban on the west coast of Scotland and I set sail again from there on April 9th this year, first cruising the Scottish Highlands to visit the Orkney Islands, before commencing my homeward passage to arrive back in Lymington by the autumn. My thanks to everyone – especially* PW *readers – who have supported me and the charities. I have now raised £1500 for the three charities I am supporting, half way to my goal of £3000.*

I need the support of everyone if I am to succeed. Please help by sponsoring me and promoting my trip to others on the air. There's a poster on my website that can be downloaded and printed to display or used to sponsor me. It can also be emailed to others you feel might be interested.

Time is running short for me so this email is being sent to my contact list. Please excuse me for not writing to you personally or if you receive more than one copy. Thank you all! ***Ray G3NDS***.

Readers can visit Ray's on-line web site to see how he's progressing on the Sail Round the UK Cruise for Charity and to check the latest operating frequencies. *www.roundukcruise.org.uk*

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Martin Lynch Announces The New SB-2000 Radio Interface

Martin Lynch & Son announce a very important new product from CG – the new SB-2000 Radio interface. The company claim that the small self contained beautifully styled box – weighing only 400 grams – "really is a one stop solution to your data and radio control." It employs a CAT/CIV interface as standard and supports CAT with RS232 protocol.

The MyDEL CG SB-2000 Interface connects to a PC via USB and soundcard and connects to thee radios via custom leads. Once connected and configured it will provide computer control via USB and decoding via the soundcard using *HamRadio Deluxe* or other packages. A full set of Radio leads (Yaesu/Icom/Kenwood etc) are available from the launch and are all at one price, £18.99. For those without a soundcard in their PC the SB-2000-USB-SOUND At £19.99 will be required.

Owners of the FT-2000 can do firmware updates via the SB-2000, for which the will need the MyDEL FT-2000 Prog Plug.

Video: ML&S have also uploaded a video featuring the SB-200 in action, including installation of the product. This can be viewed via **http://www.youtube.com/user/MLandSshop**
The price of the new MyDEL CG SB-2000 is £99.95 including VAT.
Martin Lynch & Sons Ltd., **Outline House**, **73 Guildford Street**, **Chertsey**, **Surrey KT16 9AS**, E-mail: **sales@hamradio.co.uk** website: **www.hamradio.co.uk/**

The Bill Windle G8VG QSO Party

Colin Turner G3VTT, President of the FOC writes: "The **First Class CW Operators' Club** has a regular QSO party celebrating the memory of our **Chairman Bill Windle G8VG** who steered the Club through difficult times in the 1950s and 1960s. The event takes place twice a year in May and November and FOC in 2009 is once again inviting participants from any other c.w. club who may be interested to join us. Over the last few years we have been joined by many non-members some of whom have since joined our ranks.

The event is run on a Saturday for a 24 hour period from 0000z to 2359z on all bands excluding the WARC bands. Activity takes place around 25kHz up from the band edges.

Non-members should send as a minimum RST and name and send the total number of FOC stations worked to **K5ZD@aol.com** along with any comments not later than a week after each event. This year's dates are **May 23rd** and **November 14th** and FOC is actively welcoming anybody at any speed to enter the event to promote the use of c.w. on the Amateur bands."

Contact details: E-mail via **G3vtt@aol.com**, and the Club website: **www.fists.co.uk/**

Police Fight Back On Laser Threat

As the number of incidents of aircraft targeted by hand-held lasers rises, so does the devices police have to fight the crime. See the BBC video report **http://news.bbc.co.uk/go/em/fr/-/1/hi/technology/7990013.stm**

More Essex Morse Classes

A new Morse class will be starting soon in Essex and bookings are now being taken. The Morse classes, run by **Andrew Kersey G0IBN**, have proved very popular. Foundation Licence holders have been keen to find out more about this mode which enables DX working using very low power levels.

The classes are held on Thursday evenings in the *Hawkins* room at the **Danbury Village Hall**. The *Chelmsford Amateur Radio Society* (CARS) also run Foundation, Intermediate and Advanced Amateur Radio courses at the same venue in a separate room. Those interested in joining the class should contact the CARS training organiser **Clive Ward G1EUC** on Tel: (**01245**) **224577**. Mobile (**07860**) **418835**, E-mail: **training2009@g0mwt.org.uk** and Website : **http://www.g0mwt.org.uk/training/**

Andrew Kersey G0IBN, also operates Slow Morse transmissions at 5, 7 and 10w.p.m. on 3.555-3.560MHz ±QRM at 2015 every Wednesday evening.

See the Chelmsford Amateur Radio Society main website **www.g0mwt.org.uk/**

New Programme For The *Reading Rattle* Audio Collection

After providing recorded audio magazines for the visually impaired for over 30 years, the *Reading Rattle* coverage and circulation continues to grow. April 2009 saw the welcome return of *BB*. Originally known as *Brian's Broadcasting Bits*, the new *BB* is now read by **Ron Price GW4EVX** and his wife, **Sue**. It's a digest of items that are of sure-fire interest to Radio Amateurs, s.w.l.s and the general population too! The first edition of the new show includes items on radio in the international news, a fascinating piece on jamming, a track entitled "A Hobby for the Blind" and coverage of captioned radio and its benefits for deaf listeners. It's a half-hour recording filled with interesting and important pieces.

Another recent addition to the *RR* catalogue is *Keynote*, the quarterly magazine of **FISTS CW** club.

The *Reading Rattle*, born in Reading, Berkshire in 1978, is the audio magazine service run by the **Radio Amateurs Invalid Blind Club** (RAIBC). Created by **Graham Bedwell G3XYX**, radio-related magazines are available to qualifying visually-impaired Radio Amateurs and s.w.l.s.

In the early days the magazine recordings were distributed as tapes and cassettes by post. Listeners now receive programmes either by download from the members-only area of the website **raibc.org.uk** or on a monthly CD, distributed to subscribers. Incidentally, the FISTS' *Keynote* newsletter, is available to non-members, so sighted listeners can download a copy to listen on an MP3 player while walking the dog or travelling to work!

The *Reading Rattle* catalogue currently includes *PW*, *RadCom*, *RadioUser*, *Practical Wireless*, *Keynote*, *BB* and, of course, the RAIBC's own *Radial* journal!

As well as recordings of periodicals, *RR* also includes audio copies of essential radio books like *Foundation Licence Now!* plus intermediate and advanced course manuals. Readers can find out more about RAIBC, the charity working for blind and disabled amateurs and s.w.l.s, at **www.raibc.org.uk** or by calling the RAIBC Helpline (free) on **08000 141 743 or contact Chris Pearson M0JRQ** and **Graham Bedwell G3XYX** via E-mail **grahamandjbedwell@tesco.net**

Colin Thomas G3PSM RSGB President Visits Chelmsford

Myra Davis M0MYR, Publicity Manager, Chelmsford Amateur Radio Society (CARS) reports that, in starting his Presentation *What has the RSGB done for me?* on April 6th 2009, **Colin Thomas G3PSM** took a straw poll which showed that most were members of the RSGB and re-enforced his opening statement that "I am preaching to the converted."

Colin travelled to Chelmsford on one of the windiest and wildest nights for a long time, to talk about the RSGB. Colin asked the qestion "What services do the RSGB provide?" and then answered his own question by saying that top of the list must be *Radcom* followed by the QSL bureau. The bureau is now outsourced and hopefully previous problems have now been overcome.

Colin went on to talk about help with planning applications, EMC, PLT problems and TVI issues – the latter normally being attributed to Radio Amateurs (but often caused by wideband TV preamplifiers).

Colin covered the subjects of Repeater abuse, the Intruder Watch and then the importance of liasion with Ofcom. The Ministry of Defence (MOD) and European liasion is also an important aspect of the RSGB thanks to CARS member Murray G6JYB for his work on this task. Through CEPT the RSGB has arranged Reciprocal Licences – British Amateurs can now operate in many countries without having to apply for a special licence. Responding to a question from the floor regarding the RSGB and Bletchley, Colin reported that the RSGB proposed to remove an old hut and replace it with a transportable building. This would allow for the building to be moved if Betchley Park wished in the future to change their facilities around, the RSGB building could then be moved accordingly. The GB2RS station is expected to be on the air soon from Bletchley Park.

Another questioner wondered whether the RSGB were pushing the usefulness of Amateurs in the case of emergencies. Colin replied that not all County Emergency Planning Officers are aware what Radio Amateurs can provide. After the refreshment break a lively debate ensued as to the possibility that some time in the future Amateur licence holders may only be permitted to hold one licence (that is to say the highest level they are qualified for). It's interesting to note that Ofcom do not record licence holders by callsigns. And in conclusion Colin stated that Ofcom do take the RSGB seriously and this is rewarding.

The evening finished with Colin presenting the **CARS Constructors Competition Winner Shield** to **Ron Keefe G4SIS** for his beautifully handcrafted Capacitor which covers 50-250pf, followed by a presentation of the last of the two **Chelmsford Awards** to **Colin Page G0TRM**. Finally, CARS Chairman **John Bowen G8DET** thanked Colin for coming and the audience showed their appreciation in the usual way. Altogether it was a most enjoyable evening!

Further details from **Myra Davis M0MYR** via **g3svi@yahoo.com** Website **www.g0mwt.org.uk/**

Tennamast (Scotland) Ltd is Changing!

With effect from May 2009 **Tennamast (Scotland) Ltd.**, will operate under a new Managing Director. There will be a continuous and seamless change of ownership with **Norrie Brown GM4VHZ** (ably backed by wife **Rose GM0ONH**) handing over gradually to **Calum Mackie**. Tennamast, who are members of the BMF, TYHA and the Forum of Private Business, have been making various masts for communication, security, surveillance and windsocks since 1985. They have also manufactured a full range of boat cradles, props and trailers since early 1990.

Calum will assume all responsibility for running the company, backed up by the present owner until hand over is complete. The company will continue to operate from their premises in Beith, Ayrshire and the current complete workforce will remain unchanged. This will allow Tennamast's service and quality of products to be uninterrupted and of the usual high standard. It is intended to offer improved service and further enhancements to the existing range of masts, mobile masts, cradles and other goods.

The web site **www.tennamast.com** will also eventually change in the coming months, with increasing and more diverse goods on offer. The website will show and give information on the full range of products in the Tennamast range from

New IC-E80D & ID-E880 Dual-band D-STAR Transceivers

Icom (UK) Ltd, based in Herne Bay Kent, have announced details of two new dual-band D-STAR transceivers – the IC-E80D and ID-880H. The company state that both transceivers have been designed with ease of use in mind with large l.c.d. displays and straightforward controls. As such, Icom regard that they are, "the ideal starter radios for any Amateur or D-STAR operator." Both models include a new user interface called 'D-STAR repeater mode' (DR mode), which allows the user to access a D-Star repeater in just two steps! The CS-80/880 configuration software is free to download from the website **www.icom.co.jp/world** This means a range of settings, including memory data, can be configured from a PC. Both radios share the same set-up procedure so they can share memory data with each other via the cloning software.

The IC-E80D has an optional HM-189GPS GPS microphone available, which expands the potential for position reporting applications. When connected, the IC-E80D can show position data and even the direction to another suitable equipped D-Star station on screen. The radio is rugged, splash and water jet resistant (IPX-4) making it ideal for outdoor operation. It has 5W r.f. output power on both v.h.f./u.h.f. bands and a wide-band receiver range covering 495kHz-999.990MHz. Icom state that not only is this a D-Star radio but it also retains, together with the IC-E880, compatibility with all normal f.m. analogue channels. The compact, IC-E880 has a large, easy-to-read l.c.d. display. The controller is detachable from the main unit and the magnet-mounting feature allows for flexible installation. The radio also provides a powerful 50W of output power in v.h.f. and u.h.f., high speed scanning and the latest in noise filter technology.

Main Features of the IC-E80D and ID-E880

- D-STAR DV (Digital Voice) mode standard
- Wideband receive2
- External GPS connection ready3
- DPRS(R) (Digital Position Reporting System) ready

Note: Currently there is no release date for these models and pricing and type approval are pending.

Further information from **Ian Lockyer**, **Icom (UK)**, **Sea Street**, **Herne Bay**, **Kent CT6 8LD**. Tel (**01227**) **741741**. E-mail **IanL@icomuk.co.uk**
Website **www.icomuk.co.uk/**

Another successful Foundation Course at Lincoln Short Wave Club!

Two new candidates joined the ranks of Amateur Radio; **Don Sobey** and **Mark Fogerty**, who sat and passed the Foundation Course on April 19th 2009 at the **Lincoln Short Wave Club**.

Thanks must go to **Les Clarke G1LQB** who sat down with Don and Mark over the past few weeks on club nights going through the *Foundation Licence Now* book and answering all their questions. He arranged for other members of the club to help with the practical side of the hobby including Morse code, operating procedures on both h.f. and v.h.f. radios and using the radios (under supervision).

Peter Kendall M0EJL conducted the Morse practical. The final two days being taken by **Ian Fulton G4XFC** giving an in depth knowledge on technical basics, transmitters/receivers, feeders antennas and propagation. **Gerry Duffner G6KGG** covered licence conditions, operating practices and safety. Don Sobey is now **M6BIF** and Mark Fogerty is **M6JVW**. Congratulations to both!
Pam Rose G4STO, **Secretary LSWC.**
E-mail via pamgrose@tiscali.co.uk
website **www.g5fz.co.uk/**

The successful candidates and their support team. Left to right, Ian Handley M0RPD, Don Sobey M6BIF, Gerry Duffner G6KGG, Mark Forgety M6JVW and Les Clarke G1LQB.
Photo courteys of Pam Rose G4STO..

the smallest of masts all the way through to the largest mobile mast along with the full range of boat cradles and boat/canoe trailers.

Calum has extensive business interests and has plans for further expansion. The company's windsock masts are almost exclusively used in all UK Airports and Heliports, They have also been exported to Kazakhstan in substantial numbers.

Communication masts have been despatched all over the UK, Australia and to Hawaii with many in use throughout Europe. Some of Tennamast large 20m lattice masts are used by Tyneside Police.

Tennamast have also exported Boat Cradles to Japan, New Zealand, Canada, and the Balearics and beyond.

As well as manufacturing their own products such as masts and cradles, Tennamast also fabricate a number of steel brackets and other bespoke designs such as garden gates, railings, security grilles and just about anything else made out of steel that our customers require. A few of the past bespoke fabrications can be seen on the website with more to come when the website is updated in the coming months.

Whatever the customer needs, whether you're an individual looking for a single mast or a security company looking for a full range of communication, lighting or surveillance masts – you can be sure that Tennamast will have a suitable type of mast to suit your application and if Tennamast don't have anything in our current range we can usually design something to suit customers requierments!

Tennamast (Scotland) Ltd,
81 Mains Road,
Beith,
Ayrshire KA15 2HT
Tel: (**01505**) **503824**,
Fax: (**01505**) **503246**.
E-mail: **nbrown@tennamast.com**

The Tennamast (Scotland) Ltd., team. Left to right Graeme Newton, Peter McGeary, Rose Brown GM0ONH, Norrie Brown GM4VHZ and Calumn Mackie.

rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations. PW Publishing Ltd. is attending at rallies marked *.

Send all your rally info to

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

May 15th – 17th
The Dayton Hamvention
The world's largest radio show, the Dayton Hamvention, will be held in the Hara Arena, Shiloh Springs Road, Dayton Ohio. It will be open from 9.00am to 6.00pm (8.00am to 6.00pm for the flea market) on the Friday, 9.00am to 5.00pm (8.00am to 5.00pm flea market) on the Saturday and 9.00am to 1.00pm (8.00am to 1.00pm flea market) on the Sunday. There will be talk-in on the local repeater on 146.94 and 146.64MHz and frequencies 223.94 and 442.10MHz will also be monitored. Talk-in will start on Wednesday at noon and run through to Sunday at 5.00pm and it will only be off the air nightly between 11.00pm and 5.00am. In addition, travel assistance will be available on 7.258MHz.
http://hamvention.org

May 17th
The Dunstable Bootsale
The Dunstable Downs Radio Club Bootsale will take place at Stockwood Park. This is a few minutes from Junction 10 of the M1, the main Luton Airport exit. The Bootsale will open to the public at 9.00am (7.30am for traders) and the entry and car park fee will be £2.00 per vehicle. More details and directions are available on the website.
www.ddrcbootsale.org

May 24th
The Magnum Rally
The Magnum Rally 2009 will be held in the Magnum Leisure Centre, Harbourside, Irvine, Scotland KA12 8PP. The doors will open at 10.30am and admission will be £3.50. There will be free parking, traders, club stands, a raffle and a Bring & Buy.
Helen MM0HLN
Tel: 07776 385247 (between 9.00am and 9.00pm only)
E-mail: helen@magnumrally.org
www.magnumrally.co.uk

June

June 7th
The Red Rose QRP Festival
The Red Rose QRP Festival will take place at the Formby Hall, Alder Street, Atherton M46 9EY. Doors will open at 10.00am, admission will be £1.50 and there will be talk-in on S22 and V44, free car parking, special interest groups, trade stands and a Bring & Buy.
Les G4HZJ
Tel: 01942 870364
E-mail: g4hzj@ntlworld.com

June 7th
The Spalding & DARS Annual Rally
The Spalding & District Amateur Radio Society will be holding their Annual Rally at the St John Gleed Technology School, Halmer Gardens, Spalding, Lincolnshire PE11 2EF. Doors will open at 10.00am and there will be talk-in on S22 and V44, free car parking, trade stands, catering and a car boot sale.
John G4NBR
Tel: 07946 302815
Graham G8NWC
Tel: 07947 764481
E-mail: rally-secretary@sdars.org.uk
www.sdars.org.uk

June 14th
The Junction 28 QRP Rally
The South Normanton Alfreton and District Amateur Radio Club in association with the G-QRP Club will be holding the eighth Junction 28 QRP Rally at the Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DE55 7AH. This is just ten minutes from Junction 28 on the M1 on the A38. Doors will open at 10.00am and admission will be £2.50. There will be special interest groups, trade stands, catering and a Bring & Buy.
Russell Bradley G0OKD
Tel: 01773 783658
E-mail: russell.bradleyG0OKD@ntlworld.com
www.snadarc.com

June 14th (new date)
The Bangor & DARS Radio & Computer Rally
The Bangor & District Amateur Radio Society will hold a Radio & Computer Rally at the Country Club, Crawfordsburn, Co. Down BT19 1JE. Doors will open at 12 noon and entry will cost £2, which includes two raffle tickets. There will be trade stands, a free Bring & Buy and special interest groups.
Bill GI4AAM
Tel: 02891 816707
E-mail: bill.langtry@btinternet.com
www.bdars.com

June 14th
The Newhaven Fort Rally
The Newhaven Fort Amateur Radio Group will be holding a rally at the Newhaven Fort in East Sussex. Doors will open at 10.30am and entry will cost £2. There will be car parking, a car boot sale, family attractions, special interest groups, a camp site, catering and facilities for the disabled.
Eddie G0ECW
Tel: 01273 300772
E-mail: eddie@zamboodle.demon.co.uk

June 21st
The Newbury Radio Rally
The Newbury Radio Rally & Boot Sale will be held at the Newbury Showground, which is next to Junction 13 of the M4. Doors will open at 9.00am (8.00am for sellers) and the event will close at 3.30pm. Admission will be £2.00 and there will be talk-in on S22 and V44, free car parking, trade stands, special interest groups, catering, family attractions and facilities for the disabled.
E-mail: rally@nadars.org.uk
www.nadars.org.uk

June 26th – 29th
The Hamtronic Show
Europe's largest radio show, the Hamtronic Radio Show, will take place in the new exhibition centre on the edge of Friedrichshafen airport. Halls B1 and B2 will house the main show and there will be a large flea market in hall B3. The show will be open on Friday and Saturday from 9am to 6pm and on Sunday from 9am to 3pm.
www.hamradio-friedrichshafen.de

June 28th
The West of England Radio Rally
The West of England Radio Rally will be held at the Cheese & Grain Venue, Bridge Street, Frome, Somerset BA11 1BE. The doors will open at 10.00am and close at 3.00pm. Adult tickets will cost £2.00 and accompanied under 14s will be admitted free. There will be inside and outside trade stands, catering, free car parking and facilities for the disabled.
Shaun G8VPG
Tel: 01225 873098
E-mail: rallymanager@westrally.org.uk
www.westrally.org.uk

July

July 4th
The Reddish Rally
The Reddish Rally will be held at St Mary's Parish Church Hall, St Mary's Drive (off Reddish Road), Stockport, Cheshire SK5 7AX. Doors will open at 10.30am, admission will be £1 and there will be trade stands, parking and talk-in on S22 and V44.
Bernard G3SHF
Tel: 01625 850088 (day)
Nigel G0RXA
Tel: 0161 4288413 (evenings/weekends)
E-mail: info@reddishrally.co.uk
www.reddishrally.co.uk

July 5th
The York Radio Rally
The York Radio Rally will take place at the York Racecourse in Knavesmire. Doors will open at 10.30am (10.15 for the disabled) and there will be trade stands, free parking, a Bring & Buy, catering and talk-in on S22.
Arthur G8IMZ
Tel: 07841 120738
E-mail: apalg8aol.com

July 12th
The Cornish Mobile Rally
The Cornish Radio Amateur Club will hold their 46th Mobile Rally at Penair School, Truro, Cornwall TR1 1TN. Doors will open at 10.30am (10.15am for disabled) and there will be parking, trade stands, a Bring & Buy, catering and talk-in.
Ken G0FIC
Tel: 01209 821073
E-mail: ken@jtarry.freeserve.co.uk
www.cornishamateurradioclub.org.uk

July 12th
The McMichael Rally & Boot Sale
The McMichael Rally & Boot Sale will be held at the Reading Rugby Club, Holme Park Farm Lane (SU 753 747 for GPS users), Sonning Lane (the B4446), Sonning on Thames, Reading RG4 6ST, just off the A4, east of Reading. Doors will open at 9.30am (8.30am for traders), admission will be £2.00 and there will be talk-in, car parking, special interest groups, trade stands, a licensed bar, catering, a raffle, a car boot sale and a Bring & Buy.
Min G0JMS
Tel: 01189 723504
E-mail: g0jms@radarc.org
www.McMichaelRally.org.uk

July 19th
The MacMillan (Northampton) Rally
The MacMillan (Northampton) Rally will be held in Roade Village, Northants. There is no entry fee for visitors or traders but all donations offered will go to MacMillan, as will all refreshment monies.
G6NYH
Tel: 01604 243333
www.tetra2000.com

July 26th
The Horncastle Summer Rally
The Horncastle Summer Rally will be held at the Horncastle Youth Centre, Horncastle, Lincolnshire LN9 6DZ. Admission will be £1. Facilities for the disabled and catering.
Tony G3ZPU
Tel: 01507 527835.
E-mail: G3ZPU@yahoo.co.uk

August

August 2nd
The King's Lynn Rally
The King's Lynn Amateur Radio Club Rally and Car Boot Sale will be held at the King's Gaywood Community Centre PE30 4DZ. The doors will open at 10.00am and admission will be £1.50. There will be trade stands, catering, a car boot sale and a campsite (by prior arrangement).
Ray G3RSV
Tel: 0155 367 1307
E-mail: ray-g3rsvsupanet.com
www.klarc.org.uk

August 9th
The Flight Refuelling ARS Rally*
Mike M0MJS
Tel: 01202 883479
E-mail: hamfest@frars.org.uk
www.frars.org.uk

August 30th
The Milton Keynes Rally & Boot Sale
The Milton Keynes Annual Rally & Boot Sale will be held at Holne Chase School, Buckingham Road, Bletchley MK3 5HP.
www.mkars.org.uk/rally.html

August 31st
The Huntingdonshire Rally
The Huntingdonshire Amateur Radio Society Bank Holiday Monday Rally will be held in St Neots Community College, Barford Rd, St Neots PE19 2SH. Doors will open at 10.00am, admission will be £2.00 and there will be talk-in, car parking, a car boot sale, trade stands, catering and a Bring & Buy.
Julie M1JUL
Tel: 07905 052127
E-mail: hunts-hams@yahoo.co.uk
www.hunts-hams.co.uk

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Peter hart said in May issue of RadCom "The changes introduced by this latest firmware are particularly significant and well worth having, with the overall receiver & transmitter sounding cleaner & improves the operating experience.

In fact it's so impressive, even Mr Henry Lewis G3GIQ uses one. And we all know how demanding the big signal from Ealing West London is.

For more information on what the PEP upgrade delivers see:
www.hamradio.co.uk/pdf/Yaesu_PEP_Enhanced_Version.pdf

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Yaesu FT-8800. ML&S £269.95 Similar to the FT-7800 but can receive on 2 & 70 simultaneously.

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Only £1099

Yaesu's "Midship Radio"

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All FT-950s supplied by ML&S are latest PEP factory versions!

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

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IC-7200	Mr T's choice for tough HF/6M Operation	£779.95
IC-7000	Full DSP, TFT Screen, 100W HF/6m + 2/70	£939.95
IC-7400	100W HF/6M/2M Base, full DSP, Auto ATU	£1199.95
IC-756Pro111	Run out of this excellent HF Transceiver	£Call!!
IC-7600	100W, Twin RX, Huge Display. No psu	£3369.95
IC-7700	Superb 200W HF/6M Base, PSU/ATU	£Call!!
IC-7800	Icom's Flagship radio has gone up again	£Call!!
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Icom V/U Products

IC-E91	Full Dual Band 2/70 with D-Star as option	£249.95
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IC-E208E	Brilliantly easy to use 2/70 remote-head	£269.95
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Special introductory offer: £3369.95 (RRP: £3895.95)

The successor to the IC-7565Pro111, the eagerly awaited new mid-range HF/6M Transceiver will try and set another bench mark like that of its predecessor.

See our website for first full detailed review by Adam Farson VA70J

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Only £939.95

Whilst the price has gone up it's actually cheaper now than it was when first introduced!

The only full feature all-mode, all band Mobile/ Base Transceiver with full colour TFT display.

NEW PRODUCT

MyDEL

CG SB-2000 USB Radio Interface

ML&S are pleased to announce a very important new product from CG – the new SB-2000 Radio interface.

This small self contained beautifully styled box weighing only 400 grams really is a one stop solution to your data and radio control. It employs a CAT/CIV interface as standard and supports CAT with RS232 protocol.

The MyDEL CG SB-2000 Interface connects to your PC via USB and Sound Card and connects to your radio via Custom leads.

Once connected and configured you have Computer Control via USB and decoding via your soundcard using HamRadio Deluxe or other packages.

Intro price of only £99.95

High quality ready-made leads for most rigs available at only £18.95.

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

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Having many years of experience offering specific finance packages for our customers, we can now offer various options on payment, including 36 and 60 months on selected products. Please note that interest is calculated from the date of the original agreement at 19.9% APR. Minimum purchase available for finance is £350.

Finance Example IC-E2820 with UT-123. Discounted price of £519, £52 deposit, then 36 x £16.86p/m. TAP £658.96, APR 19.9%. E&OE.

Palstar See Web for the LOWEST prices!

PALSTAR AT-500
600 Watt PEP Antenna Tuner

Palstar introduces the **AT-500** 600 Watt PEP antenna tuner. An ideal entry-lever antenna tuner.

Covering 160 to 6 Meters, the AT-500 features a differential tuning capacitor with 2 stators and 1 rotor, a precision ceramic body roller inductor, and a 4:1 ferrite current balun for balanced line feeds.

The AT-500 utilises only 2 controls to operate for tuning, providing maximum ease of use in a manual tuner. A small-sized roller inductor operates all the way up to 6 Meters, while a relay-switched add-on inductor allows 160 Meter operation. The AT-500 also features Pastar's active Peak and Peak Hold dual cross-needle metering, chem-film treated aluminum metalwork and durable powder coated finish on the front panel and top cover. You'll have a tuner that will grace your shack for years to come.

INTRODUCTORY PRICE: £365.94

Full range of Palstar now in stock.
See www.hamradio.co.uk for lowest prices!

AT-Auto	Automatic 1500 Watt ATU
AT-1KP	1200W Antenna Tuner
AT-1500DT	1500W Differential Antenna Tuner
AT-2K (2000W)	Antenna Tuner
AT-4K (2.5kW)	Antenna Tuner
AT-5K (3.5kW)	Antenna Tuner
BT-1500A	Balanced Antenna Tuner
ZM-30	Antenna Analyser
PM-2000AM	Power/SWR Meter

Palstar Dummy Loads

DL-1500 (1.5KW). **DL-2K** (2kW). **DL-5K** (5kW)

Palstar Receiver

R30A Receiver	Palstar R30A, fitted Collins filters for SSB & AM
MW550P	Active preselector & ATU for AM & 160M reception
SP30	Matching Desk Speaker
AA30	Active Antenna Matcher 300kHz-30MHz

LDG Electronics

AT-100pro	Desktop tuner covering all frequencies from 1.8-54 MHz	**£189.95**
AT-200pro	Designed for new generation of rigs	**£119.95**
AT-1000Pro	1kw 160m-6m (1.8-54MHz) High speed Auto ATU, tuning range 6-1000Ohms	**£499.95**
AT-897	Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!	**£179.95**
IT-100	New version of the AT-7000	**£149.95**
Z-817	Ultimate autotuner for QRP radios, including the Yaesu FT-817D	**£119.95**
Z-100Plus	Ultimate autotuner for Yaesu FT-817D	**£139.95**
Z-11Pro	Portable compact & tunes 100mW to 125W	**£154.95**
RCA-14	4-way DC Breakout Box	**£49.95**
KT-100	Dedicated tuner for Kenwood radios	**£169.95**
RBA-1:1	Probably the best 1:1balun out there	**£34.95**
RBA 4:1	Probably the best 4:1 balun out there	**£34.95**
TW-1 & TW-2	Talking Wattmeters! TW-1 HF 0-2kW TW-2 6/2/70 250W	**£129.95** each
DTS-4 + 4R & DTS-6 + 6R	Remote Antenna Switchers. 1.5kW 1-54MHz. Either 4 or 6 way	**£69.95 + £34.95 / £87.95 + £43.95**
FT Meter	External meter Add-on analogue meter for the FT-857 and FT-897. Just plug & go! Enables you to read signal strength. Discriminator, power output, s.w.r., ALC etc.	**£42.95**

MyDel Power Supplies

SPS-8250	25A continuous, fully metered power supply	**£79.95**
MP-9626	120A, 13.8V DC power supply	**£299.95**
MP-8230	13.8V DC, 25A power supply	**£69.95**
MP-925	Linear 25-30A, 13.8V DC power supply	**£99.95**
MP-9600	60A switch mode power supply	**£179.95**
MP-6A	13.8V DC, 6A power supply	**£29.95**

Perseus VLF-LF-HF Receiver

PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture.

Unlike lower class direct sampling receivers, the PERSEUS RF analog front-end has been carefully designed for the most demanding users. PERSEUS can also be operated in a wide band mode as a 10KHz - 40MHz spectrum analyzer with more than 100dB dynamic range in a 10KHz resolution bandwidth. PERSEUS is a Software Defined Radio and relies on PC software applications to carry out the demodulation process.

ML&S are Sole Distributors for Perseus in the UK and Ireland

MyDEL CG-3000

ML&S: £279.95

With 200W and 200 memory channels.

- Tunable frequency: 1.8 - 30 Mhz with long wire antenna from 8 meters
- Input impendence: 50 ohms
- Input power: 10 - 200W PEP
- SWR: <2:1
- Power supply voltage: 12V +/- 10%
- Current consumption: <0.8A
- Auto tuning time: Approx. 2 seconds (first time tuning)
  Less than 1 second (return to memory frequency)
- Memory channels: 200
- Weight: 1.8 KG
- Size: 310 x 240 x 72mm (L - W - H)

CG-3000 shown with optional remote switch.

NEW! Remote control for the CG-3000 and CG-5000. £39.95

As reviewed by Steve White in Radcom
"A real bargain when compared to its obvious USA competitor" "Well built & performs impressively"
Steve White, Radcom November.

MyDEL CG-5000MkII

NEW MkII Plus

At last! 600W PEP High Speed Remote Tuner from MyDEL

Specifications:

- Tuneable frequency:
  1.8 - 30Mhz with long wire antenna from 8 meters
- Input impendence: 45-55 ohms
- Input power: 10 - 600W PEP
- SWR: <2:1
- Power supply voltage: DC 13.8V
- Current consumption: <1.5A
- Memory channels: 800
- Auto tuning time: 0.5-6 seconds (first time tuning), less than 0.2 second (return to memory frequency)
- Weight: 3 Kg.
- Size: 385mm x 280mm x 110mm (L - W - H)

ML&S: £549.95

Real Time Virtual Radar

NEW MODEL NOW INCLUDES AIRBAND and FM Receiver!

SBS-1*ei* Portable Low-cost Mode-S/ADS-B receiver..... **Available June 2009**

For full details see our website: www.virtualradar.com

ML&S are appointed distributors for the SBS-1*ei* and associated products.

The SBS-1*ei* Pocket Radar is the latest version of the original SBS-1 launched in 2005. The SBS-1*ei* Pocket Radar now includes an Airband and FM receiver and is a portable cost effective Mode-S / ADS-B Receiving Instrument designed for commercial, training and aviation enthusiasts. Supplied complete with antenna and BaseStation Virtual Radar software. The SBS-1*ei* Pocket Radar allows you to track ADS-B aircraft on a PC- simulated radar screen and identifies and displays Mode-S equipped aircraft.

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

Feature

The 26th Annual Practical Wireless 144MHz QRP Contest

Editor's thanks: *Colin G6MXL has worked hard to 'fine tune' our popular contest on behalf of regular entrants. So, let's now repay all his efforts by joining in the fun. Good luck everyone and let's hope for some good propagation conditions on Sunday June 14th!* ***Rob Mannion G3XFD.***

The 2009 Contest Introduction

Colin G6MXL writes: The 26th Annual *Practical Wireless* 144 MHz QRP contest takes place on Sunday June 14th 2009 from 0900 to 1600 UTC. This is the day after the new *PW* 70MHz Low Power Contest. The format of the 144MHz contest is simple, designed to maximise participation from newcomers and keen contesters alike, whilst keeping it a friendly and 'fun event' to take part in.

For those new to Amateur Radio contests, the *Practical Wireless* 144MHz QRP contest is a perfect introduction. Every year Amateurs new to contests try their hands for the first time. In fact, some radio clubs use it as an opportunity to introduce their members to the joys of amateur radio contests. Even if you are limited to operating from home for just a short time, please join in all the fun of the contest.

So, on Sunday June 14th 2009, why not find yourself a location with a good take-off, operate for a few hours with no more than 3W on the 144 MHz band? June is a time of the year when hopefully the weather might be reasonably kind, when we might be lucky with some good propagation on the 144MHz band. And there'll certainly be plenty of other *PW* readers on the air, eagerly wanting to work you!

Contest Equipment

In terms of equipment, all you need is a 144MHz transceiver and an antenna. Whilst most activity will take place on upper side band (u.s.b.), there will also be some contacts on c.w. and f.m. If you haven't tried operating from a local hill-top, you may be surprised just how far 3W can go! Sometimes, the contest is blessed with some Sporadic-E propagation, when just about anywhere in Europe might be worked, with just the low power on the 144MHz band!

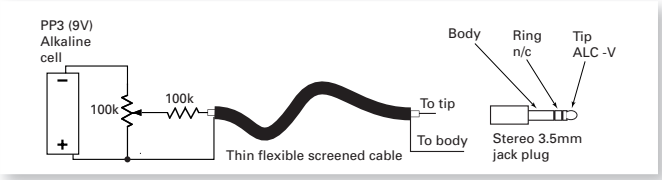
Horizontal Polarisation

For operation on u.s.b. and c.w., you'll find that most stations use a horizontally polarised antenna. Indeed, you will almost certainly work longer distances if you also use a horizontally polarised antenna.

Reducing Power

If you have a transceiver with an output power of greater than 3W, you'll need to reduce the power to 3W or below. With a number of modern transceivers, such as the popular Yaesu FT-817ND for example, power can be reduced by using a menu setting. If this is an adjustment that you don't normally perform, you may

Contest Adjudicator Colin Redwood G6MXL, introduces the annual fun contest where we can all enjoy a day out on 144MHz!



want to refer to the operating manual in advance of the contest.

An alternative method of getting the output power down to 3W is to use a technique that has been successfully employed by a number of stations over the years. This involves applying a d.c. voltage to the ALC socket of the transceiver, see **Fig. 1** above.

Whilst measuring the power out, adjust the variable resistor and the ALC voltage is applied to the transmitter, thereby reducing the power to the level required. This technique has been used for example with the popular Yaesu FT-897 and some high frequency (h.f.) transceivers when driving 144MHz transverters.

Hints & Tips

Now for some hints and tips! To start, I would certainly recommend re-reading the results article of last year's contest in the November 2008 issue of *PW*. It contains many suggestions for improving your overall score in 2009.

I also really urge stations to point their beams towards the outlying squares! Not only can this give some really valuable multipliers, it also encourages stations in South West England, Northern Ireland, the Republic of Ireland and Scotland to participate.

After the contest please submit an entry, thereby joining the thousands of radio amateurs who have participated over the years in this popular contest. Although electronic entries via E-mail are preferred, the computer phobics will no doubt be pleased to know that you can easily submit an entry without going anywhere near a computer if you wish!

Logging Records

Over the last couple of years – in the UK – we've not been required by our licence conditions to keep a log of our contacts. However, the wording on the paperwork and web site has also been revised to remind entrants that the time must be logged in UTC (not BST) and that callsign suffices (e.g. /P) must be correctly logged for the contest. The preferred form of a log is a computer file sent by E-mail. This may be a file generated by logging software such as SDV which can be downloaded from **http://www.ei5di.com** provided it contains all the information listed above.

New for this year is a spreadsheet, which can be used for the contest logs. It can be downloaded from the *PW* Contest web site at **http://www.pwcontest.org.uk** Submitting logs using the spreadsheet will really assist the adjudicator.

Files in any other suitable format (plain text is fine provided each of the items required is separated by a separating character such as a comma or tab) can also be accepted. However, no matter how you enter the contest, **please clearly mark your entry for the 144MHz contest**.

Rules Change?

When I was approached by *PW* Editor **Rob Mannion G3XFD**, to take over the adjudication of the contest, I did so knowing how much I have enjoyed taking part over the years myself. "If it ain't broke, don't fix it" was the principle applied in 2008 and again in 2009. Nevertheless, I have received a request for a change to the scoring for future years – although any changes that may be considered, will be down to those who enter the contest this year.

For 2009, the scoring remains the same as in previous years, namely one point per QSO, and each Square a Multiplier. This simple scoring enables entrants without access to computer scoring software to enter the contest and has stood the test of time.

Your Views

As I've already briefly mentioned, I have received calls for a change to the scoring for future years, particularly to try to give stations in Outlying squares a better chance. So I'm asking for the views of those who enter in 2009.

Should we stick with 1 point per QSO, or move to 1 point per kilometre? Should we stick with Squares as multipliers, or should we change to DXCC Country multipliers instead of Squares or in addition to Squares; or perhaps we should drop multipliers altogether?

Changes will only be made **if there is a clear majority** in favour of change from all geographic areas. Entrants who decide not to vote will be assumed to favour 'no change'.

Please Note!

All entrants should please note that the contest web site is at **www.pwcontest.org.uk** E-mailed entries should be sent to **contest@pwpublishing.ltd.uk** Postal entries should be sent to **Colin Redwood G6MXL, 53 Woodpecker Drive, Poole BH17 7SB**. No matter how you submit your entry, please note that it must be **received by Tuesday 7th July 2009. Late entries will not be accepted.** If you are entering by post, you are recommended to use first class post. **Please clearly mark your entry for the 144MHz contest** Even if you are a regular participant, please take the time to read the rules thoroughly!

Entering From Abroad

If you are entering from abroad, please note that in order for your entry to be tabulated in the main adjudicated results table – at least one of your of contacts must be with a station located in the United Kingdom (including the Channel Islands, Isle of Man) or the Republic of Ireland. Other overseas entries are welcome. A separate certificate will be provided to the overseas station with the highest score.

Let's hope for some good propagation on the day so that we can all have a really enjoyable time. Make a note in your diary now, the 26th Annual *Practical Wireless* 144MHz QRP contest takes place on Sunday June 14th 2009. Don't forget to charge your batteries a day or two before, and also make a note to remind yourself to submit your entry on time! Good DXing to you all! ●

Sunday June 14th 2009 from 0900 to 1600 UTC.

The 26th Annual Practical Wireless 144MHz QRP Contest Rules

The 2009 Rules

1. General: The contest is open to all licensed Radio Amateurs, fixed stations or portable, using s.s.b., c.w., a.m. or f.m. in the 144MHz (2m) band. Entries may be from individuals or from groups, clubs, etc. The duration will be from 0900 to 1600 UTC on Sunday June 14th 2009.

All stations must operate within the terms of their licence. Entrants must observe the band plan and must keep clear of normal calling frequencies (144.300MHz and 145.500) even for "CQ" calls. Avoid frequencies used by GB2RS during the morning (144.250MHz and 145.525MHz) and any other frequency that is obviously in use for non-contest purposes. **Contest stations must allow other users of the band to carry out their activities without hindrance.**

The station must use the same callsign throughout the contest and may not change its location. Special event callsigns may not be used.

2. Contacts: Contacts will consist of the exchange of the following minimum information:

(i) callsigns of both stations (**including any /P suffices**)
(ii) signal report, standard RS(T) system
(iii) serial number: a 3-digit number incremented by one for each contact starting at 001 for the first contact.
(iv) locator (i.e. full 6-character IARU Universal Location for the location of the station.

Information must be sent to, and received from, each station individually, and contacts may not be established with more than one station at a time. Simultaneous operation on more than one frequency is not permitted.

If a non-competing station is worked and is unable to send their full universal locator, their location may be logged instead. However, for a square to count as a multiplier (see Rule 4), a full 6-character locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites or using digital modes (including DSTAR) are not permitted.

Power: The output power of the transmitter final stage shall not exceed 3W p.e.p. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line reached via the accessory socket (see Fig.1 page 19). With a number of modern transceivers such as the popular FT-817ND for example, power can be reduced by using a menu setting.

The output power can be accurately measured using the simple circuit of **Fig.1** (page 21). Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a 'good whistle' into the microphone.

4. Scoring: Each contact will score one point. The total number of points gained in the seven-hour period will then be multiplied by the number of different locator squares in which contacts were made (a 'square' here is the area defined by the first four characters of the universal locator).

Example: 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares;
final score = 52 x 5 = 260.

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log, and clearly marked as a duplicate (not necessary in computer logs submitted by E-mail).

5. The Log: Logs may be submitted by E-mail or by post. In either case the log must contain the following information for each contact:
(i) time (**UTC** - **NOT BST**)
(ii) callsign of the station worked (**including any /P suffix**)
(iii) report sent
(iv) serial number sent
(v) report received
(vi) serial number received
(vii) locator received (or location)

The preferred form of a log is a computer file sent by E-mail. This may be a file generated by logging software, provided it contains all the information listed above, or a file in any other suitable format (plain text is fine) provided each of the items above are separated by a separating character such as a comma or tab. Give the file a name including the station call sign (e.g. g6mxl-p.log), and send as a standard E-mail attachment to **contest@pwpublishing.ltd.uk**

Most formats of log are acceptable – if there is any problem with your entry, you will be contacted by E-mail.

If a computer log file is not available, a paper log may be sent by post. This must be clearly written on one side of A4 sized paper only, ruled into columns for each of the items listed above. Underline or highlight the first contact of the locator squares worked. At the top of each sheet, write;

a) you callsign **(including /P suffix)** of your station
b) your locator as sent
c) sheet number and total number of sheets (e.g. "Sheet no. 3 of 5")
d) 144MHz Contest

Log sheets and covering information sheets, which may be used for paper-based entries, are available for downloading from the contest Web site **www.pwcontest.org.uk**

6. Entries: The covering information listed below must be provided with each entry. The preferred method of submitting this is by the use of the online facility on the web site **www.pwcontest.org.uk**

Alternatively, the information may be written in the E-mail message to which the log file is attached. For entries sent by post, it should be written on a separate sheet of A4-sized paper.

The information required for every entry is:

a) name of the entrant (or of a club etc. in a group entry as it is to appear in the results table and on the certificate
b) callsign used during the contest **including any /P suffix** (e.g. G6MXL/P)
c) name and address for correspondence
d) location of the station during the contest
e) full 6-character locator as sent during the contest
f) whether single or multi-operator (a single-operator is an individual who received no assistance from any person in operating the stations, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator include a list of operators' names callsigns
g) total number of contacts and locator squares worked (not required for a log sent as a computer file)
h) list of locator squares worked (not required for a log sent as a computer file)
i) a full description of the equipment used including transmitted p.e.p. output power
j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used (i) to reduce and (ii) measure the output power
k) antenna used and the approximate station height in metres above sea level (a.s.l.).

Failure to supply the required information may lead to loss of points or disqualification.

The following declaration must be included in the E-mail text or written and signed by the entrant: "I confirm that the station was operated within the rules and spirit of the event, and that the information provided is correct."

Entries & Other Information

Entries by E-mail must be sent to **contest@pwpublishing.ltd.uk**
Paper entries should be sent to: ***Practical Wireless*** **Contest, c/o Colin Redwood G6MXL, 53 Woodpecker Drive, Poole, Dorset BH17 7SB.**
Entries must be received not later than Tuesday July 7th 2009. Please clearly mark your entry for the 144MHz contest. Late entries will be disallowed.

Any other general comments about the station, the contest and conditions during it are welcome, (written in a separate sheet of paper in the case of entries sent by post). Photographs of the station are also invited. Please note photographs cannot be returned and may be used for publication in *Practical Wireless* or on the **www.pwcontest.org.uk** website. If these are not available by the time the entry is submitted, they may be sent later, by E-mail or post, **to arrive by August 11th 2009**.
A summary of the results will be published later this year in *PW*.

7. Miscellaneous: When operating portable, obtain permission from the owner of the land before using the site. In particular observe any restrictions on access associated with Bird Flu', Blue Tongue, Foot & Mouth, etc. Always leave the site clean and tidy, removing all litter. Observe the Country Code.

Take reasonable precautions to avoid choosing a site, which another group is also planning to use. It's wise to have an alternative site available in case this problem does arise.

Make sure that your transmitter is properly adjusted and is not radiating a broad or poor quality signal, e.g. by over-driving or excessive speech compression. On the other hand, be aware that your receiver may experience problems due to the numerous strong signals it will have to handle, and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the received input. The use of a high-gain r.f. pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it is best to be able to switch it off when necessary.

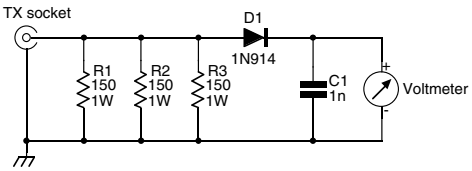


Fig.1 : A small power meter, to verify the power output, a 16.7V level indicates 3W output.

8) Adjudication: Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts in paper-based logs will carry a heavy points penalty. Failure to supply the complete information required in rule 6 may also lead to deduction of points. A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.

Practical Wireless G4HLX 144MHz QRP Contest 2009

Date: 14th June 2009	Callsign:	Locator:	Sheet No. of

Time UTC	Callsign	Report & Serial Number		Locator *
		Sent	Received	

*** Highlight the first contact in each locator square**

Tony Nailer's

technical for the terrified

This time around Tony Nailer G4CFY looks at f.e.t.–based radio frequency amplifiers.

In general, the *npn* transistors, often found in many stages in receivers and transceivers, are chosen because they're cheap and have quite high gain. Their input–output (i/o) relationship though, is not very linear as the gain varies with collector current. It increases with collector current up to a certain point, beyond which the gain rapidly falls off again.

Unless some form of negative feedback is used to maintain more nearly-constant gain, the device distorts the incoming signal. The effect on a sinusoidal signal is a stretching of the rising and falling slopes and compression at the peaks.

The output waveform of a simple *npn* transistor amplifier, when analysed, shows that it is now made up of a fundamental and several odd and even multiples of the original frequency. Also, if multiple signals were being amplified, a measure of mixing would have taken place, producing numerous mixer products, as well as the wanted signal.

Field Effect Transistor

The field effect transistor, (f.e.t.) operates in a completely different mode to the bipolar transistor. As its name implies it's controlled by an electrical field. Actually it's an electrostatic field, operating over a minute distance. Generally f.e.t.s are made like a sandwich, with a gate on top, the channel in the middle, and a supporting substrate underneath. One end of the channel is defined as the source and the other end the drain.

The gate is directly connected to the channel and operated like a bit like a reverse biased diode, having an incredibly high resistance, and exceedingly low leakage current. For this reason the device is called a junction f.e.t. (j.f.e.t.).

When the voltage on the gate is made progressively lower with respect to the source and substrate, an electrostatic field is created (in the reverse-biased diode junction), which restricts the flow of current along the channel. There is a value of gate voltage specific to each f.e.t when it will cut off the current flow completely. This is termed pinch-off.

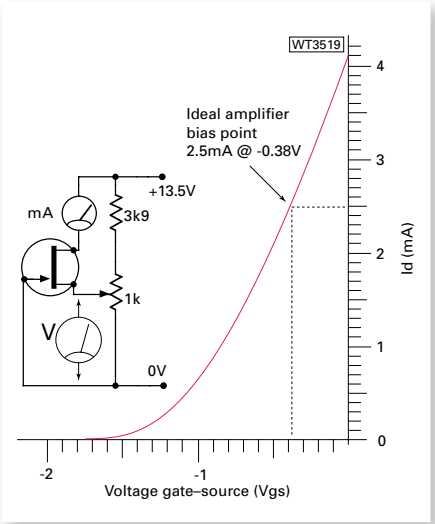


Fig. 1: The test circuit and results of plotting the gate's voltage control of the drain current of a j.f.e.t.

Characteristics Of FETs

The relationship of gate voltage to drain current of an f.e.t. shows that it is nearly linear over the major part of the characteristic. It's only near the pinch-off point that it becomes distinctly non-linear.

A test circuit was built using a BF256A, as shown in **Fig. 1**. The resultant characteristic is shown in the accompanying table and the characteristic curve displays the results graphically. A close look at the characteristic reveals that it is almost a straight line between 1–4.1mA drain current, corresponding to a gate voltage of –0.83 to 0V (with respect to the source). The mid-point of the response is with a drain current of 2.5mA and a gate/source voltage of –0.38V, which could be produced using a resistor in the source that will drop about 0.38 volts when passing 2.5mA. That's 0.38/0.0025 = 152Ω (you could use 150Ω).

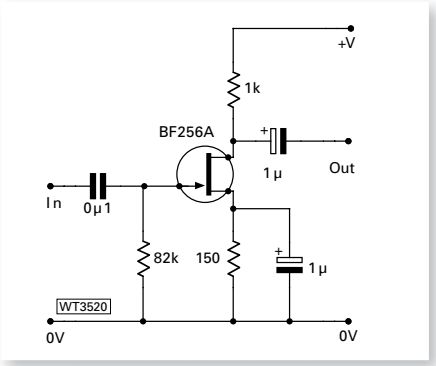


Fig. 2: A simple wide-band amplifier to verify the gain value of a common-source connected j.f.e.t. device.

Device Gain

To determine the actual device gain, requires an audio signal generator and an oscilloscope. I built the circuit shown in **Fig. 2**, with a 150Ω resistor in the source, decoupled using a 1µF capacitor. An 82kΩ resistor was used between gate and ground, with an input capacitor of 100nF (0µ1). The drain load was a 1kΩ resistor and a 1µF capacitor for output coupling.

I then applied a signal of 200mV p-p at 3kHz to the gate, and the output voltage was measured as 680mV p-p. The voltage gain then is 3.4 times, just

Changes to the *PW* E-mail system means that the G4CFY 'noticeboard' has changed to a new system too as the older one is no longer operating. All members need to make changes and to note the new list address, as there have been some distinct changes. Users can subscribe to the 'new' list by sending an E-mail to: **pw_g4cfy-subscribe@pwpublishing.ltd.uk** with the word 'subscribe' in the subject box. When you receive confirmation of joining the list from the server, you can send an E-mail to the list itself as: **pw_g4cfy@pwpublishing.ltd.uk** and your comments will be answered by the *PW* team or by myself. I will also still respond to a private E-mail directed to **tony@pwpublishing.ltd.uk**

Note that there's an underscore (underline) character between 'pw' and the 'g4..' parts!

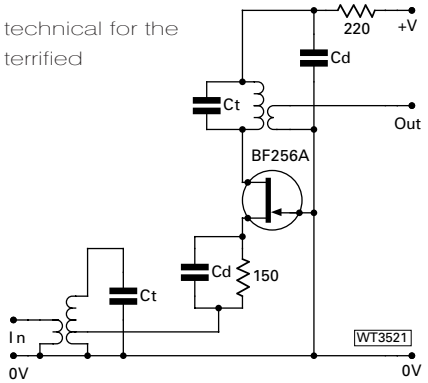


Fig. 3: Both overall gain and noise figures can suffer when operated in the common-gate mode as shown here.

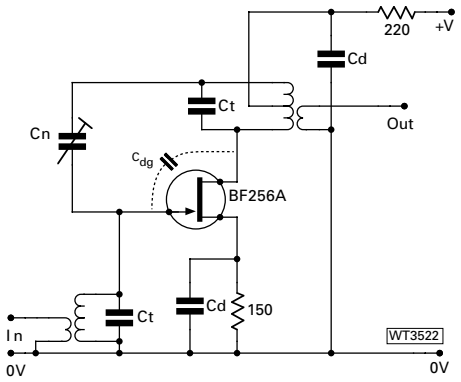


Fig. 4: The neutralising capacitor Cn can counteract the effects of the drain to gate feedback capacitor of a simple j.f.e.t.

under 11dB. The same test was done at 100kHz and the gain there found to be 3.6 times, just over 11dB.

As the gain of the circuit was measured across a 1kΩ resistor, the gain, referred to as 'forward admittance' (or the inverse of resistance), is 3.6milli-mhos, or 3.6 mA/V. This implies that if the load was 10kΩ the gain would be 36 times, or 31dB.

Practical RF Amplifiers

When designing practical r.f. amplifiers, it's quite easy to have drain loads with a dynamic resistance of tens of thousands of ohms. So, provided the stage can be kept stable it's quite easy to achieve usable gains. Unfortunately, the junction f.e.t has quite a high drain to gate capacitance, and this in series with any input inductance will make the device unstable.

One solution to the device instability, is to use it in common-gate mode but the penalty is a further restriction of the already low forward gain. There's also a sacrifice of an increase of the noise figure. Typically, a j.f.e.t. used as a common-gate r.f. stage can achieve about 15dB (5x) of gain, **Fig. 3**. Capacitors marked Ct are calculated to resonate with the inductors. Capacitors marked Cd are for decoupling and are calculated to be about 1Ω at the operating frequency.

One other technique to increase stability of the common-source amplifier, is to apply neutralisation as show in **Fig. 4**. The dotted capacitance is the internal feedback from one side of the output tuned circuit. The capacitor Cn is chosen to be equal value and apply the opposite phase feedback signal to cancel any tendency to oscillate. It is best achieved using a low value trimmer, usually under 10pF.

Another really good solution is to use a common-source stage directly driving a common-gate stage, referred to as a cascode arrangement and

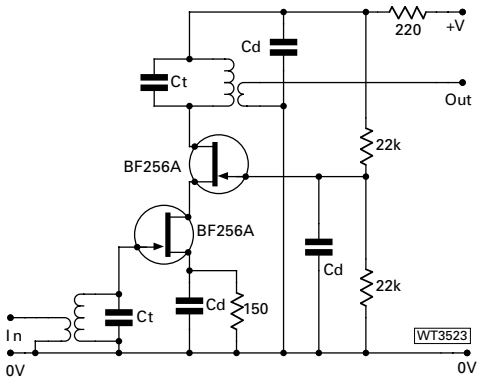


Fig. 5: Two j.f.e.t.s set up as a cascode amplifier, that has the advantages of both modes of operating of the j.f.e.t.

shown in **Fig. 5**. Here the first stage acts as a common-source amplifier and exhibits an excellent input noise performance. The drain load of the first device is the source of the second j.f.e.t., which is really low impedance, so the voltage gain is virtually non-existent.

The second stage has its gate biased at about half supply rail to ensure both devices share the available supply equally. It uses the current drive of the first stage, which in this instance appears as a low impedance source. The upper device then 'looks' into a high impedance drain load and achieves the same gain and noise levels of common-source mode but with the stability of common-gate mode.

Using cascode stages completely overcomes the problem of drain to source feedback, as it now acts like two low value capacitors in series. Readily available and low cost devices like the BF256A in a cascode arrangement, can achieve voltage gains of 20dB up to 100MHz with an input noise figure around 1dB.

Dual Gate Device

The dual-gate metal oxide semiconductor field effect transistor (m.o.s.f.e.t.) is in effect a cascode pair of f.e.t.s but in a single device. In this case though the gate has been additionally insulated from the channel by a layer of silicon oxide, so that it no longer exhibits the diode action, and so achieves an even higher input resistance. This lowering of the input leakage current, also achieves low-noise figures right up into the u.h.f. region.

The first generation of m.o.s.f.e.t.s appeared in the early 1970s with the numbered series 40600 to 40602 for v.h.f. TV tuners. Types 40603 & 40604 were designed for v.h.f. f.m. tuners. Manufacturers RCA and TI claimed that the dual gate m.o.s.f.e.t.s also had better cross modulation performance than junction f.e.t.s. It was quickly discovered that they were susceptible to destruction of the oxide insulating layer, by static pick-up during handling and in use. Hence they had poor reliability.

The American RCA company then introduced the 40673 type and its companions, which included protective zener diodes connected from each gate to ground. Similar devices, with the designations 3N201, 3N202, & 3N203, were introduced by Texas Instruments and Motorola for v.h.f. tuners.

The bias setting on gate-2 (g2) allowed the current in both devices to be adjusted, thereby providing a really convenient gain control. Alternatively the gate-2 could be fed with a second signal to modulate the current flow,

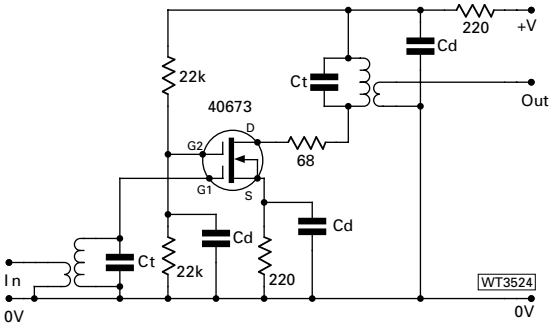


Fig. 6: The biasing set-up of the first generation m.o.s.f.e.t.s, which were, in effect, single-device cascode amplifiers. Note the drain-stopper resistor to improve stability and the source biassing components.

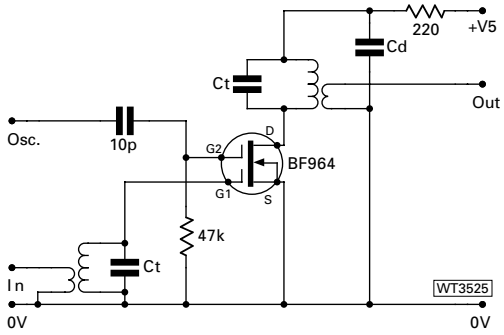


Fig. 7: With third-generation m.o.s.f.e.t.s the source biassing components are not needed. Neither is the drain-stopper resistor when operated as a mixer as shown here.

and hence make the device function as an excellent mixer.

Input and output capacitances of these devices is of the order of 4pF, but the feedback capacitance from drain to gate-1 (g1) is 0.05pF or less.

As mentioned earlier the BF256A had a measured forward admittance of 3.6milli-mho 3.6mA/V). Devices such as the 40673 and 3N201, and from the Far East the 3SK45 and 3SK51 all had admittances of about 12 milli-mhos (12mA/V). Texas Instruments also introduced high gain versions with the 3N211, 3N212, 3N213 with forward admittances of 30 milli-mhos (30mA/V) for use at v.h.f.

The devices such as 40673 with high gain and operating up to around 450MHz, would readily oscillate at u.h.f unless some precautions were taken. One method of preventing this was to fit a ferrite bead over the gate or the drain lead. The other method was to use a drain-stopper resistor, just like the anode-stopper used with some high power valve amplifiers. A typical amplifier circuit is shown in **Fig. 6**.

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Arrowsmith Court,
Station Approach,
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Third generation

A third generation of m.o.f.e.t. devices was then developed which did not require the bottom device to work with a negative gate voltage, and so could be used with a direct source to ground connection. The effect of the improvements was gain of around 24milli-mhos (24mA/V), also improved performance up to around 900MHz. Such devices were produced in small 'black pill' form with 'helicopter blade' leads, a style defined as SOT103. The popular types produced were BF960, BF961, BF964 and BF981.

Some devices, branded as MFE201 and in a metal can (like the original 3N201), were created using this new die, but were NOT direct plug-in replacements for the 3N201. To work properly, the source resistor and decoupling capacitor had to be shorted out.

The latest devices make excellent mixers with the minimum of components, provided a large voltage swing is available from the local oscillator, **Fig. 7**. You'll probably note that in the diagram that there's no oscillation stopper resistor. This is no longer required because input and output frequencies are different.

Conclusions

Now to look at my conclusions, I am now finding that third generation devices have **too much gain**, and a BF964 r.f stage followed by a BF964 mixer, as used in my transverters from 70 to 28MHz now have a combined gain in excess of 36dB. I've taken the step to reduce this by damping the tuned circuits, so that generally overall gain doesn't exceed 20dB.

There's now a good argument to use cascaded f.e.ts like the BF256As as both r.f. amplifier and mixer, especially as they're still readily available as leaded components, whilst the traditional m.o.s.f.e.t.s are now difficult to obtain. Used together with a modern transceiver, a receive converter or receive part of a transverter would still provide more than adequate gain, and with a noise figure well below the man-made and Galactic noise floor figure.

Devices such as the 3N201 are ideally suited to tuned r.f. amplifiers, ranging in frequency from intermediate frequencies and up to about 50MHz. The Poundbury transceiver, and receiver projects use two devices as gain controlled i.f. stages at 9MHz. Interestingly, I found that two stages did not give quite enough gain, but three m.o.s.f.e.t. stages would have been too much.

To achieve slightly higher gain, I preceded the two m.o.s.f.e.t.s with a low-gain and low-noise j.f.e.t. stage. The circuit for the receiver appeared in the March 2009 issue *PW*, and the circuit shows the j.f.e.t. as BF258A, which should actually read BF256A.

Since the introduction of the dual gate m.o.s.f.e.t. in the early 1970s they have been very popular in so many home construction projects. At Spectrum Communications I still find them invaluable components, and have secured sufficient quantities to be able to supply them as required to resurrect past projects, and to use them in new projects for years to come.

Printed circuit boards (p.c.b.s) for two junction f.e.t.s in cascode, and for third generation m.o.s.f.e.t.s for h.f. and v.h.f.gain stages were developed for the *Doing it by Design* series in March 2005 *PW*. These are still available through the *PW* PCB Service at £4.00 each plus £1.00 P&P. ●

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Amateur

radio personality

The Rev. George Dobbs G3RJV

Rob Mannion G3XFD chats to G3RJV and helps explore the the fascinating life story of a very special *PW* author! !

Rob G3XFD: Thank you for accepting the invitation to feature as a *PW* Amateur Radio Personality George! However, although you worked in Rochdale, Greater Manchester for many years, I think you originated from the other side of the Penine Mountains?

George G3RJV: It's my pleasure Rob! Yes, you're correct – I was actually born in 1943 in Cleethorpes – actually Grimsby – where the local maternity hospital was located. I'm married to **Jo-Anna**, a teacher who now works part-time at a local resource centre and holds the callsign **G0OWH**. We have two sons, **Stephen** and **Ben**. The son of a Baker, I was raised at the back of a Baker's shop – Father working in the bak-house, mother serving in the shop. I woke every morning to the smell of fresh bread!

Rob G3XFD: Was your family from Lincolnshire?

George G3RJV: Yes, my family, up to my father, were all from Lincolnshire farming stock. Farm labourers, not farmer owners. In my childhood I spent many weekends with my maternal grandparents in the village of North Thoresby and these weekends were the time when my interest in radio began. I usually shared those weekends with my cousin, **Peter**, and together we developed an interest in radio building and short wave listening. In the 1950s a lot of war-time surplus equipment and components were available and we were able to buy radio surplus items at a local shop and on a local market stall.

Rob G3XFD: When did you really get into the hobby?

George G3RJV: Naturally the first radio projects were crystal sets, followed by one and two valve receivers. I also began to read the *Practical Wireless* and seek out library books on radio, usually by F J Camm who was then the *PW* Editor. The learning process was helped by reading technical books that – then – I couldn't quite understand and building things that sometimes worked and sometimes didn't work! One early project that I still recall well was an 0-V-1 shortwave receiver build into a discarded small desk drawer. The radio was fastened by the drawer handle to the cross bar of my bicycle and became my first portable receiver. A surplus tank whip antenna was mounted behind the saddle and the batteries were in my saddle bag! The *Eagle* comic printed a letter I sent to them about the radio and that was first writing on radio!

Rob G3XFD: When did Amateur Radio attract your interest George?

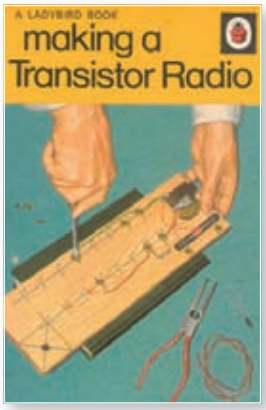
George G3RJV: My interest in the Amateur Radio bands really began when I met **Peter Linsley G3PDL**, shortly after I left school. He'd just received his licence and was an active member of the local radio club. I joined the club and decide to seek a licence. Peter assisted me in preparing for the old style Radio Amateur's Examination and practiced Morse code with me.

I received the callsign G3RJV in 1962. My first station was a three valve transmitter for Top Band. The line up was an EF51 oscillator, followed by an EF51 buffer amplifier, feeding a 6V6 as a power amplifier. The transmitter was used in conjunction with a BC348Q surplus Canadian war-time receiver. My first radio contact was achieved using a light bulb as an antenna! On the day I received the licence, I was testing the transmitter output using the bulb and Peter G3PJD, about a mile from me, heard it and called me!

Rob G3XFD: How did you end up as a Priest in the Anglican Church George?

George G3RJV: I had left school a week before my 16th birthday and got a job as a laboratory assistant with a local chemical company – our family had no history of further education. I wanted to be a physics teacher, so I worked myself back into higher education. But before I achieved that goal my direction changed and through a whole series of events and people (too long to relate) I decided to offer myself for ordination in the Church of England. I was then tied up in student life for the next five years. During this time, living in cramped accommodation and having little free time curtailed my Amateur Radio activity. However, I managed to spend a little time on the air thanks to a kindly local Radio Amateur.

I was ordained in 1968 and became the



Making A Transistor Radio *by G3RJV was published in 1972.*

George speaking in Texas in the early 1980s.

Looking at a fascinating life serving others and Amateur Radio

Journal of the G QRP Club.

curate of North Hykeham – just south of Lincoln.

I married to Jo-Anna, who is a teacher and we had two sons, Stephen and Ben.

Rob G3XFD: What brought you back into the hobby?

George G3RJV: My interest in radio was revived almost by accident through the local grammar school. Following a hint from one of the teachers, I formed an after-school radio club. There were several complete beginners so I devised a progressive radio project as a teaching aid. The project began as a crystal set and ended as a regenerative receiver capable of driving a loudspeaker. Soldering was not a good idea with a group of younger boys so, after trying several methods, I used a wooden board with the component leads trapped under brass screws and screw cups. Several of the radios were completed including one built by a boy whose father worked for Ladybird Books in Loughborough. I was approached with the idea of turning the project into a Ladybird Book. As a result, the Ladybird book *Making a Transistor Radio* was published in 1972. I was amazed at its success!

Some exposure in a children's television programme resulted in large sales and for a short time it actually entered the top ten sales list for children's books! People still write to me about it, some saying it started them off in Amateur Radio and some even saying it led to their career. This year the book re-appeared in the *Vintage Ladybird Box for Boys*.

Leaning on the Hollywood labyrinth stone at Glendalough.

Sharing a speaking platform with Doug DeMaw, W1FB, at the Dayton Hamvention in 1992.

Rob G3XFD: We've got a copy of the original Ladybird book in the *PW* offices George!

George G3RJV: The book also rekindled my interest in Amateur Radio construction. I had given away or sold most of my equipment; much of it rather dated and using valves. At that time the Heathkit company in the USA released their first little QRP transceiver kit; the HW7. With some of the money from Ladybird I bought an HW7 kit. As with all Heathkits, it went together easily and as soon as I had soldered the last joint I wanted to test it on the air. The HW7 is a direct conversion transceiver that covers the 40, 20 and 15 metre bands with a transmitter output of 2 watts (on a good day!). I had serious doubts about it. The receiver looked too simple and 2 watts did not seem enough power.

For my first test, I did not have an antenna but I had some wire, so I cut a dipole for 20 metres and mounted it around the picture frame in a large room in the old house where I then lived. There was no available coaxial cable so the two legs of the dipole were connected to the antenna input and the chassis of the HW7. I was also without a Morse key so I attached a short wire to the key jack socket and tapped the free end on the back of the case. Tuning along the 20 metre band I heard a Swedish station calling "CQ". So using the makeshift key I called him. To my amazement he came back to me, and much to my astonishment he give me a signal report of 569. That was how my interest in QRP began.

The simplicity of the HW7 encouraged me to venture into solid state construction and at about the same time **Doug DeMaw W1FB**, has become the technical editor of the American *QST* magazine and began a long series of articles describing solid state QRP equipment.

Rob G3XFD: How did you get to know Doug DeMaw George?

George G3RJV: I first got to know Doug through his writing in the early 1970s. At that time I was attempting to update from valves to solid state. My local library was generous enough to keep copies of the *QST* and in their pages I found a fellow traveller – Doug, who was then **W1CER**, had just become the Technical Editor of

George and Jo-Anna G0OWH.

The "radio wall" at St. Aidan's Vicarage.

the ARRL. He was shifting the emphasis of their magazine from valve to solid state design. My early introduction to transistor circuit design and the first solid state projects I built came directly from his writing. It was lucid, it was interesting and I understood it! In later years I was to come to know Doug DeMaw personally.

It's not difficult to work out that W1FB was my hero – I've been inspired by his work for many years and he has kept the hobby alive for so many people. It's a lucky man who can come to know a hero as friend and I'm glad to say that happened with Doug! When I began my writing for Amateur Radio magazines, Doug was my model. The ARRL staff used to say of Doug, "he wrote it once and it was done!" In the 1980s I was more than pleased when he subscribed to Sprat the G QRP Club journal and absolutely delighted when he began to write to me about *Sprat* and even about the articles I wrote for UK radio magazines.

Rob G3XFD: When did you get to meet Doug face-to-face?

George G3RJV: We exchanged mail for several years and I first visited Doug at the end of a trip to the Dayton Hamvention in 1992. **Dick Pascoe G0BPS** and I did the day's drive from central Ohio to northern Michigan to visit Doug's Oak Hills Farm. It was a visit to a deity! The farmhouse lies just outside the tiny village of Luther among the lakes and forests of north Michigan. The house is beautifully restored and much of the surrounding land has been left to return to the wild. Here Doug followed his other great loves, black powder shooting, hunting and cooking with natural ingredients. We were served wild deer and onions gathered from the local forest. **Jean DeMaw** was a lovely hostess as well as being a keen shooter with a muzzle loaded rifle!

Rob G3XFD: You have a most unusual trophy at home George – what's the story behind it?

George G3RJV: On my next visit to the Oak Hills Farm, I was presented with a wooden plaque which had my callsign burned on a deer jawbone. It had the inscription, *"Primitive Man Endorsement. In recognition of the accomplishments of Rev. George Dobbs, G3RJV, who has demonstrated at Luther, Michigan, his skill and deadly marksmanship with primitive muzzle-loading weapons, for having eaten wild deer meat and for quaffing native grog at the Luther tavern. Rev. Dobbs has earned the title of Mountain Man and Buckskinner. By the hand of Doug DeMaw, W1FB, 1994"* I also cherish a small cup fashioned from deer horn by Doug and presented to me on condition that it would only ever contain spirits!

Rob G3XFD: You shared a special award with Doug – how did that come to be?

George G3RJV: In 1992, the American QRP ARCI, revived the **QRP Hall of Fame Award** and Doug was the first named recipient. I was also chosen to receive the award at the same time as Doug. My own Amateur Radio writing is modelled on Doug's style and I've always tried to make it as interesting and worthwhile as his work. Doug was presented with his plaque first and after I received mine I joined him, I looked up to him and said, "I don't know why they gave me one of these?" He looked down from his height and in the deep voice, that always reminded me of James Stewart, said, "I reckon for about the same reason they gave me one." Without doubt, that was the nicest thing anyone has ever said to me!

Rob G3XFD: How did the G QRP Club came into existence George?

George G3RJV: Encouraged by the W1FB articles in *QST*, I began building my own QRP equipment and using it on the air. On 80 metres, I met several other people using home built equipment. This inspired me to write a letter to the *Short Wave Magazine* asking QRP enthusiasts to contact me with a view to forming a QRP Club. Just over 30 people wrote to express their interest and the G QRP Club was formed. The first ten members were, in order, **G3RJV**, **G2NJ**, **G3DNF**, **G8PG**, **G2BS**, **G4AL**, **G8KB**, **G2CAS**, **G2FWA** and **G2HKU**. The steady response showed that there was a great latent interest in QRP, that the Club was filling a much wanted need and that it was beginning to attract members from all over the UK as well as overseas countries.

Soon it became obvious that a Club publication was essential to hold together the scattered membership. When the question of the title of such a publication was raised **Gordon Bennett** G3DNF, came up with the name *Sprat* (Small Power Radio Amateur Transmitters). The first issue consisted of eight pages run off on an ancient spirit duplicator, and contained three technical articles plus operating and contest information. *Sprat* is still thriving over 30 years later. The club grew slowly at first but then membership expanded quickly and it currently stands at about 3,500 members.

Left to right – Rick Campbell KK7B, Roy Lewallen W7EL, G3RJV and Bill Kelsey N8ETO.

A group at the G QRP Club booth at Dayton. Roy Lewallen W7EL on the left and behind G3RJV on the right are Tony Fishpool G4WIF and Dick Pascoe, G0BPS.

Left to right – Graham Firth G3MFJ, Glen Reid K5FX, G3RJV and Wes Hayward W7ZOI.

The Abbey of Gethsemani.

The Dobbs' wooden Welsh lodge.

At the Pacificon QRP Convention, California 2003.

Rob G3XFD: Your writing really took off then didn't it George?

George G3RJV: Yes, Rob it really did! In the late 1970s I began sharing my QRP construction work with the readers of the *Short Wave Magazine*. There followed a series of articles, some in conjunction with **Ian Keyser G3ROO**. In early 1980s I was approached by **Geoff Arnold G3GSR**, the then editor of *PW* to do some writing for the magazine. My first *PW* article was the *PW Severn*; a QRP transceiver for the 7MHz band. The first part appeared in *PW* in May 1983. The *PW Dart*, a 160 metre a.m. transmitter, written in conjunction with **Colin Turner G3VTT**, appeared later that year. These were followed by the *PW Teme*, a modulator transceiver described over three monthly parts beginning in November 1984.

Since that time, I have had the pleasure of sharing my QRP construction experiences. My current regular feature *Carrying on the Practical Way* began in August 1996 although the origins of this series goes back to 1991. Incidentally Rob, I'm always wary of making any claims for my *PW* submissions. I'm not a technical author – I don't know enough for that – instead I'm just a Vicar who enjoys building radio projects and happy to share them with other people!

Rob G3XFD: You really seemed to have enjoyed travelling and making new friends over the years George!

George G3RJV: Yes indeed, a great source of pleasure for me has been making links with QRP enthusiasts overseas. In 1982, I was invited to speak at a radio convention in Houston, Texas and that began a long standing link I have made with QRPers in the USA. In 1984 I first visited the Dayton Hamvention, in Dayton, Ohio, to speak and to run, with other club members, a small stand to promote the G QRP Club. Since that time I have been at the Dayton Hamvention every year, with the exception of two years when I visited HamCom in Texas instead.

For the last 14 years, the American QRP ARCI have hosted the Four Days in May Seminar and I have had the honour of being a guest speaker every year it has run. This has brought me into personal contact with many fine American Radio Amateurs including outstanding amateur radio writers like Doug W1FB, **Rick Campbell KK7B**, **Roy Lewallen W7EL**, and **Wes Hayward W7ZOI**. I have also been a guest speaker at QRP events several times in Texas, twice in California and once in Arkansas. Since 1999 I have linked my visits to the Dayton Hamvention with a week of retreat at the Trappist Abbey of Gethsemani (they do spell it that way) in Kentucky. This was the home of **Thomas Merton**, the great monk, writer, poet and peace campaigner who was a hero of mine in my student days.

It has also been a great honour to have been invited further afield as a QRP speaker. In November 1994, I was invited, with **Rick Campbell KK7B**, to be a speaker at the first Asia-Pacific QRP Convention in Kuching, Sarawak. In 1999, the JA QRP Club invited me as a speaker, to the annual Ham Fair in Tokyo. This was an interesting experience with a real-time live simultaneous translation. My host in Japan was **Tadashi Okubo JH1FCZ**, who for many years ran a *Sprat*-like QRP magazine called *Fancy Crazy Zippy*. Tadashi is the co-designer of the 'Super XVO', which I have used several times for projects in *PW*.

Rob G3XFD: George, just how did the famous Rochdale QRP rallies start?

George G3RJV: In 1984 I was appointed as the Vicar of *St. Aidan's* Church in Sudden, Rochdale and it was an appointment I held until my retirement in 2008. From 1989, the G QRP Club ran a "QRP Mini-Convention" in the church hall at Sudden. The convention still continues in an alternative location. Over the years, this humble event has attracted QRP fans from all over the world. Visitors come from the USA every year as well as Europe and further DX locations. During my time at *St. Aidan's* church I had the advantage of a large Edwardian vicarage and my wife Jo-Anna and I have entertained many QRPers from around the world. The large house also resulted in a large radio shack and workbench. It formed one wall of my study and was once called "the G3RJV Wall of Radio". My retirement house is very modest by comparison and I've been challenged to fit in as much radio space as possible!

Rob G3XFD: I know you've also got many other interests to keep you busy George!

George G3RJV: My other interests include Celtic Studies, derived from St. Aidan being a Celtic saint. For several years I have led pilgrimages to Celtic Christian sites in Ireland and Wales and have written for the (now defunct) magazine *Celtic Connections*. We have a family owned wooden lodge in Wales from which Jo-Anna, who now works part-time at a local resource centre and I seek out local Celtic sites, especially holy wells. In more recent times I have taken up water colour sketching, more in terms of recording places in a journal than painting pictures.

Rob G3XFD: Thank you for sharing a few highlights from your wonderful achievements George!

George G3RJV: My pleasure Rob! Amateur Radio has provided me with countless hours of pleasure, friendships all over the world and that unique satisfaction of using things that I've built with my own hands. I also enjoy sharing it through my writing and hope to continue to do so for many more years!

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The Microwave Bands

This somewhat larger article on the microwave bandplans, finishes off the series of Datacards covering the 50, 70, 144 and 430MHz bands that have been published in *PW* over the last few months. With this issue of *PW*, David finalises the series with details of all the microwave bands.

Take a look at the table, **Fig. 1**, as it shows the most popular microwave bands available in the UK. Of these the most popular are the 1.3GHz and 10GHz bands and I'll be looking at those two in more detail. There are five other bands, as shown in the table, **Fig. 2**, but these really are the domain of the experts who have access to specialist devices and sophisticated and expensive laboratory test equipment. If you add up the total bandwidth of all the microwave bands it comes to a whopping 27,700MHz and I'm now going to explain every single Hertz of them!

Freddy de Guchteneire ON6UG with his 2.4GHz satellite dish.

The 1.3GHz Band

The 1.3GHz band is one of the most popular microwave bands and is often referred to as 23-centimetres. With 85MHz of bandwidth there's more than enough for everyone as you can see from the band plan, shown in **Fig. 3**.

If you just want to chat using f.m. telephony or perhaps digital voice (d.v.) you should use the simplex telephony channels SM20 to SM30. These are situated between 1297.500 - 1297.750MHz, each spaced 25kHz apart. Incidentally, a new d.v. calling channel has recently been allocated on 1297.725MHz.

The repeater network contains a series of 1.3GHz telephony units in place throughout the UK. Traditionally these are for f.m. use but in years to come they may move gradually to digital voice (d.v.). Repeater input channels RM0 to RM15 are located between 1291.000-1291.375MHz with the outputs some 6MHz higher between 1297.000-1297.375MHz.

Just like all the v.h.f. bands there's also an area where narrow-band modes such as c.w. and s.s.b. may be used. This is where all the terrestrial DXers and moonbounce (e.m.e.) operators hang out to make long-distance contacts. The segment 1296.000-1296.800MHz is allocated for these weak-signal modes, with c.w. (and m.g.m.) exclusively in the lower 150kHz and those two modes plus s.s.b. in the upper 650kHz segment. Stations looking for terrestrial QSOs will call CQ on 1296.200MHz and then move to another frequency to complete the contact.

The sub-band 1296.800 - 126.994MHz is allocated exclusively for propagation beacons with a maximum transmission bandwidth of 500Hz. The primary purpose of beacons is the checking of propagation conditions both for every day amateur use and for special propagation research projects.

The Amateur Satellite Service has been allocated the band 1260.000-1270.000MHz but this area is only authorised for uplinks, ground to space. There are a currently a number of low-earth orbiting satellites that receive signals on 1.3GHz and re-transmit them on a downlink in the 430MHz and other bands.

Although there is a small amount of Amateur Television (ATV) on the 430MHz band the 1.3GHz band is effectively the lowest frequency where you will find colour fast-scan television enthusiasts. However at this frequency the distances that may be achieved under normal conditions is fairly limited. To overcome this limitation a number of repeaters have been installed at elevated locations throughout the country. The sub-band between 1243.250-1260.000MHz is allocated to the ATV repeater input channels. The principal is the same as the voice repeaters that you find on the 144MHz band with the exception that instead of a 600kHz repeater shift it can be up to 65MHz. The output channels can be found between 1300.000-1325.000MHz.

David Butler G4ASR dishes up everything you need to know for operating on the microwave bands – in one article!

Microwave Bands

Frequency (GHz)	Wavelength	Band Limits (MHz)	Width of Band (MHz)
1.3	23cm	1240 - 1325	85
2.3	13cm	2310 - 2450	140
3.4	9cm	3400 - 3475	75
5.7	6cm	5650 - 5850	200
10	3cm	10000 - 10500	500
24	12mm	24000 - 24250	250
47	6mm	47000 - 47200	200
76	4mm	71500 - 81000	9500

Fig. 1: The popular microwave bands.

Even higher frequency bands

Frequency (GHz)	Band Limits (MHz)	Width of Band (MHz)
122	122250 - 123000	750
134	134000 - 136000	2000
136	136000 - 141000	5000
241	241000 - 248000	7000
248	248000 - 250000	2000

Fig. 2: The higher (unattainable) microwave bands.

2.3GHz (13cm) Bandplan

2310.000-2320.000	All Modes
2320.000-2320.800	Narrowband CW and SSB
2320.800-2321.000	Propagation Beacons Exclusive
2321.000-2322.000	Simplex and Repeater Channels
2322.000-2400.000	All Modes
2400.000-2450.000	Amateur Satellite Service

3.4GHz (9cm) Bandplan

3400.000-3402.000	Narrowband CW and SSB
3400.000-3400.995	Propagation Beacons Exclusive
3402.000-3475.000	All Modes

5.7GHz (6cm) Bandplan

5650.000-5668.000	Amateur Satellite Service - Uplinks only
5670.000-5760.000	All Modes
5760.000-5760.800	Narrowband CW and SSB
5760.800-5760.995	Propagation Beacons Exclusive
5762.000-5830.000	All Modes
5830.000-5850.000	Amateur Satellite Service - Downlinks only

Fig. 4: The 2.3GHz, 3.4GHz & 5.7GHz Band Plans.

1.2GHz Band Bandplan

Frequency (MHz)	UK Usage	Maximum Bandwidth
1240.000 - 1243.250	All Modes	150kHz
1240.150 - 1240.975	Packet Radio	
1243.250 - 1260.000	Amateur Television Repeater Inputs	150kHz
1260.000 - 1270.000	Amateur Satellite Service	150kHz
1270.000 - 1272.000	All Modes	20kHz
1270.025 - 1270.700	Repeater Inputs	
1270.725 - 1271.250	Packet Radio	
1272.000 - 1290.994	Amateur Television - Analogue / Digital (ATV / DATV)	
1290.994 - 1291.481	Repeater Inputs (FM / DV)	25kHz
1291.000 - 1291.375	RM0 - RM15 25kHz spacing	
1291.494 - 1296.000	All Modes	25kHz
1293.150 - 1294.350	Repeater Inputs	
1296.000 - 1296.150	Telegraphy (CW) and Machine Generated Modes (MGM)	500Hz
1296.000 - 1296.025	Moonbounce	
1296.138	PSK31	
1296.150 - 1296.800	CW, SSB and MGM	2700Hz
1296.200	CW / SSB narrowband centre of activity	
1296.370	FSK441	
1296.500	SSTV	
1296.600	RTTY	
1296.700	FAX	
1296.800 - 1296.994	Propagation Beacons Exclusive	500Hz
1296.994 - 1297.481	Repeater Outputs (FM / DV)	25kHz
1297.000 - 1297.375	RM0 - RM15 25kHz spacing	
1297.494 - 1297.981	Simplex (FM / DV)	25kHz
1297.500 - 1297.750	SM20 - SM30 25kHz spacing	
1297.725	Digital Voice (DV) calling	
1297.900 - 1297.975	FM Internet Voice Gateways	
1298.000 - 1300.000	All Modes	150kHz
1298.025 - 1298.500	Repeater Outputs	25kHz
1298.500 - 1300.000	Digital Communications - Packet Radio	150kHz
1300.000 - 1325.000	Amateur Television Repeater Outputs	150kHz

Fig. 3: The 1.2GHz Band Plan.

The 2.3, 3.4 & 5.7GHz Bands

I've grouped these band together and shown the band plans for the 2.3, 3.4 and 5.7GHz bands in the table, **Fig. 4**. The plans are relatively simplistic as these are the 'forgotten bands' and although activity is relatively low there are now a number of UK Amateurs developing equipment for both terrestrial and satellite communications. The All Modes section of the 2.3GHz band is fairly well utilised with repeater linking, wide-band packet radio, high speed data links, remote control systems, amateur television and ATV repeaters.

The 10GHz Band

The 10GHz band is probably the most popular of all the microwave bands. Take a look at the table, **Fig. 5**, and you can see that with 500MHz of bandwidth there really is enough room for a multitude of wide-band systems, narrow-band modes, voice repeaters, colour television and satellites.

From a simplistic point of view the band plan may be divided into four main areas. The segment between 10000-10368MHz generally consists of wide-band systems such as transponders, (some used for Amateur TV) and packet links. Stations using wide-band f.m. telephony can also be found here.

The area between 10368-10369MHz is allocated for narrow-band c.w. and s.s.b. modes. This is where long-distance terrestrial and e.m.e. contacts are made and it is also where propagation beacons are to be found. Between 10370-10475MHz is an All Modes section that consists mainly of wide-band modes such as transponders, voice repeaters and f.m. telephony. Right at the top of the band between 10475-10500MHz is an allocation for the Amateur Satellite Service.

Microwave Equipment

During the 1990s there was a tremendous growth in commercial satellite and microwave equipment that enabled radio amateurs to reap the benefits of new devices and surplus modules. Satellite television technology in particular has opened up another method of receiving signals on the 1.3 and 10GHz bands. A low-noise block down-converter (l.n.b.) consisting of a feed horn, local oscillator source (a dielectric resonator, called a d.r.o.); mixer and associated r.f. components can be easily modified to cover the 10GHz band.

It's also possible to use the d.r.o. as a reasonably stable, low power transmitter in its own right. The indoor set-top satellite receiver usually covers the band 750-1900MHz and can provide a ready made receiver for television, data or f.m. telephony modes on the 1.3GHz band.

Dave Hall G8VZT using his 10GHz portable station.

10GHz (3cm) Bandplan

Frequency (MHz)	UK Usage
10000.000 - 10125.000	Digital Modes
10002.500 - 10027.500	Wideband Transponder Channel '015' Output
10027.500 - 10052.500	Wideband Transponder Channel '040' Output
10052.500 - 10077.500	Wideband Transponder Channel '065' Output
10080.000 - 10090.000	Packet Links
10080.000 - 10110.000	Wideband Beacons and FM Operating
10110.000 - 10120.000	Voice Repeater Outputs
10225.000 - 10250.000	All Modes
10227.500 - 10302.500	Wideband Transponder Channel '425' Output
10252.500 - 10227.500	Wideband Simplex Channels
10250.000 - 10350.000	Digital Modes
10227.500 - 10302.500	Wideband Transponder Channel '015' Input
10302.500 - 10327.500	Wideband Transponder Channel '040' Input
10350.000 - 10368.000	All Modes
10327.500 - 10352.500	Wideband Transponder Channel '065' Input
10352.500 - 10368.000	Wideband Modes
10368.000 - 10370.000	Narrowband Modes CW, SSB & EME
10368.100	Centre of CW / SSB activity
10368.750 - 10368.800	Local Beacons - 10W e.r.p.
10368.800 - 10.368.995	Propagation Beacons Exclusive
10370.000 - 10450.000	All Modes
10370.000 - 10390.000	Wideband Modes
10390.000 - 10410.000	Wideband Beacons and FM Operating
10412.500 - 10437.500	Wideband Transponder Channel '425' Input
10440.000 - 10450.000	Voice Repeater Inputs
10450.000 - 10475.000	All Modes
10450.000 - 10452.000	Alternative Narrowband Modes CW, SSB & EME
10452.000 - 10475.000	Unattended Operation
10475.000 - 10500.000	Amateur Satellite Service

Fig. 5: The 10GHz Band Plan.

It's also now possible to buy off-the-shelf systems, either ready made, or in kit form for all amateur bands from 1.3 through to 75GHz. The availability of low-noise amplifiers, transverters, high power amplifiers, antennas and specialist feeder cables has revolutionised microwave activity.

Many stations now have a system capability which allows operation from home instead of going out portable on the hill tops. Noise figures of 1dB and solid-state powers of around 5W on the 10GHz band are now easily attainable. Surplus travelling wave tube (t.w.t.) amplifiers have been available for a number of years enabling stations to run many tens of watts on this popular microwave band.

Even moonbounce contacts have been made on the 10GHz band by a few UK stations. And it doesn't stop there. The 24GHz band has also seen a dramatic change from wide-band to narrow-band modes with the introduction of surplus equipment and commercial kits. The 47GHz band has seen a shift to narrow-band operation although wide-band systems still predominate. On lower frequencies surplus C-band satellite and terrestrial communication equipment is being pressed into service on the 3.4 and 5.7GHz bands.

A number of stations have solid-state f.e.t. amplifiers

Beacons

Call Sign	Frequency (MHz)	County	Locator
GB3MHL	1296.830	Suffolk	JO02PB
GB3MCB	1296.860	Cornwall	IO70OJ
GB3USK	1296.875	Avon	IO81QJ
GB3IOW	1296.900	Isle of Wight	IO90IP
GB3CLE	1296.910	Shropshire	IO82RL
GB3CFG	1296.905	County Antrim	IO74CR
GB3ANG	1296.965	Tayside	IO86MN
GB3EDN	1296.990	Lothian	IO85JW
GB3MHS	2320.830	Suffolk	JO02PB
GB3ANT	2320.890	Norfolk	JO02PP
GB3SCS	2320.905	Dorset	IO80UU
GB3LES	2320.955	Leicestershire	IO92IQ
GB3MHS	3400.830	Suffolk	JO02PB
GB3OHM	3400.900	West Midlands	IO92AJ
GB3SCF	3400.905	Dorset	IO80UU
GB3ZME	3400.910	Shropshire	IO82RP
GB3LEF	3400.955	Leicestershire	IO92IQ
GB3MHC	5760.830	Suffolk	JO02PB
GB3OHM	5760.900	West Midlands	IO92AJ
GB3SCC	5760.905	Dorset	IO80UU
GB3ZME	5760.910	Shropshire	IO82RP
GB3FNM	5760.920	Surrey	IO91OF
GB3KEU	5760.925	South Yorkshire	IO93GH
GB3CAM	10368.755	Cambridgeshire	IO92WI
GB3XGH	10368.810	Lancashire	IO83WO
GB3MHX	10368.830	Suffolk	JO02PB
GB3SEE	10368.850	Surrey	IO91VG
GB3KBQ	10368.870	Somerset	IO80LX
GB3CEM	10368.880	West Midlands	IO82WO
GB3SCX	10368.905	Dorset	IO80UU
GB3CCX	10368.940	Gloucestershire	IO81XW
GB3LEX	10368.955	Leicestershire	IO92IQ
GB3CAM	24048.870	Cambridgeshire	IO92WI
GB3FNM	24048.911	Surrey	IO91OF
GB3SCK	24048.905	Dorset	IO80UU
GB3ZME	24048.910	Shropshire	IO82RP
GB3AMU	24048.940	Glamorganshire	IO81JN
GB3FNM	47088.920	Surrey	IO91OF

Table 1: UK Microwave Beacons.

on the latter band running 10W output and a few operators have been lucky enough to procure 100W units! At the bottom end of the microwave spectrum, 1.3 and 2.3GHz, even more power is readily obtained nowadays from solid-state devices.

Antennas for Microvaves

For the lower microwave bands, 1.3 and 2.3GHz, a directional antenna such as a Yagi is most acceptable. These can either be with straight elements or a loop Yagi with circular elements. If an omni-directional antenna is required this could be a simple whip for vertical polarisation or an Alford Slot for horizontal polarisation. On higher frequencies, from 3.4GHz and up, a dish antenna becomes more practical. This can be a conventional centre-fed (prime focus) parabolic dish or an off-set fed satellite dish.

As you move up in frequency for any given size of dish the beamwidth progressively becomes narrower. If you

Sam Jewell G4DDK's 2.4GHz EME dish antenna.

choose too large a dish it may become impractical to line up on other stations. For use on the 10GHz band a dish of between 300 to 600mm in diameter will be easy to manage, 450mm being a good compromise. At 24 and 47GHz you may only need a dish around 300mm in diameter.

Propagation Characteristics

Unlike frequencies below 1GHz (1000MHz) the microwave bands are unaffected by ionospheric conditions. Propagation on the microwave bands is largely determined by what occurs in the troposphere. This normally restricts contacts to line-of-sight paths. However, just as you observe 'lift' conditions on the 144MHz band so the microwave bands are similarly affected extending the range well beyond the visible horizon. To aid identifying signals that you may hear on the microwave bands, I've included **Table 1** the microwave beacons, their frequencies, and locations.

Contacts via tropo enhancements can then be made up to 1000km and sometimes further. Sea paths, such as between Cornwall and Scotland or across the North Sea or English Channel are very conducive to marine ducting. Super-refractive ducts can form over the sea creating an almost loss-less 'virtual' waveguide enabling contacts to be over the horizon for considerable distances. Interestingly although rain will cause attenuation (just like on the v.h.f. bands) it can also allow contacts, on bands such as 5.7 and 10GHz, to be made via rain scatter with stations up to 500 kilometres or sometimes even further away.

During intense rain storms the clouds act like metal reflectors in the sky from which you bounce your microwave signals. Another type of scatter which works well at microwave frequencies is aircraft scatter. It's a weak signal mode more suited to c.w. or s.s.b. transmissions.

Although not a propagation mode the use of satellites at microwave frequencies has opened up the bands for world-wide communications. And the satellites don't all have to be man-made. Some really dedicated microwave operators have bounced their signals off the Moon to the other side of the world. ●

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Petrborough & DARC, G4EHW.
www.radioclubs.net/padarc
Meets on 4th Wednesday of the month at Southfields Community Centre, Stanground, Peterborough. PE2 8RZ. Directions and full details on website.

CHESHIRE

Chester & DRS
Barbara Green Tel: 07957 870770
E-mail: barbara@rutland.go-plus.net
www.chesterdars.org.uk
The Chester & District Radio Society meets on Tuesday evenings at the Burley Memorial Hall, Common Lane, Waverton, Chester CH3 7QN.

Halton RC
Sam. Tel: (01928) 714231
http://g7wfs.sytes.net/hrc/index.htm
The Halton Radio Club meets in The Play Centre, Norton Hill, Windmill Hill, Runcorne WA7 6LJ every Thursday from 7.30 to 9.30pm. There's plenty of parking and full disabled access.

Macclesfield & DRS
Adie Dodd. Tel: 0795 7765511
www.gx4mws.com
The Macclesfield & District Radio Society meets every Monday at the Pack Horse Bowling Club, Westminster Road, Macclesfield SK10 3AT at 8pm. Licence courses are run year round and visitors are always welcome.

Stockport RS
David Simcock. Tel: 0161 456 7832
E-mail: secretary@gx4mws.com
www.stockportradiosociety.co.uk
The Stockport Radio Society meets on the first and third Tuesdays at the Bramhall Air Scouts HQ, Leewood Hall, Benja Fold off Ack Lane East, Bramhall, Stockport SK7 2BX.

Warrington Amateur Radio Club
Paul Carter. E-mail: g7odj@warc.org.uk
www.warc.org.uk
The Warrington Amateur Radio Club meets every Tuesday at 8pm at the Grappenhall Youth and Community Centre, Bellhouse Lane, Grappenhall, Warrington WA4 2SG.

CORNWALL

Cornish RAC
Contact: Steven G7VOH, Tel: (01209)844939
E-mail: g7voh@btinternet.com
www.cornishradioamateurclub.org.uk
The Cornish Radio Amateur Club meets at the Church Hall, Church Road, Perranarworthal, Truro TR3 7QE on the first Wednesday of every month at 7.30pm. There is also a Computer Section that meets at the same venue and time on the second Monday of every month, except December.

Newquay and District ARS
Joe Bell. Tel: 01726 891557
E-mail: joe_bell@btinternet.com
www.btinternet.com/~kevin.francks/index.html
The Newquay and District ARS meets every other Thursday at Treviglas Community College, Bradley Road, Newquay. TR7 3JA with either arranged talks on the evening or just a general chit chat amongst members. Also the club offers training towards the Foundation Exam on club nights and then the opportunity to take the Foundation Exam.

Poldhu ARC
Keith Matthew. Tel: (01326) 574441
E-mail: g0wys@yahoo.co.uk
www.gb2gm.org
The Poldhu Amateur Radio Club meets at The Marconi Centre, Poldhu Cove, Nr Mullion, Cornwall TR12 7JB. Tel: 01326 241656.

COUNTY DOWN

Bangor and District ARS
Mike. Tel: 028 4277 2383
http://www.bdars.com
The Bangor and District Amateur Radio Society meets on the first Thursday of every month in 'The Boathouse', Harbour Car Park, Groomsport BT19 6JP at 8pm. Our 2009 rally is to be held on Sunday June 14th (a new date, we have had to move it from 21st), At 12 Noon In "The Country Club", Crawfordsburn. Admission £2 lincluding two raffle tickets! Trade Stands, Bring and Buy, Ballot and a good selection of radio and computer traders will be in attendance. Special interest groups will have their own stands. The ever popular FREE bring and buy will be running as normal

COUNTY DURHAM

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

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

DERBYSHIRE

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

DEVON

Exemouth ARS
Mike G1GZG, Tel: 01395 274172
E-mail: micael.newport1@btinternet.com
The club meets on the 1st and 3rd Wednesdays of each month at 'The Scout Hut', Marpool Hill, Exmouth Devon EX8 1TD.

Exeter ARS
Contact: Phil 2E0PCJ
Tel: (01392) 877413
E-mail: philcjays@aol.com
The Exeter Amateur Radio Society meets on the 2nd and the 4th Monday at 7.30pm in the Moose Centre, Spinning Path Lane, Blackboy Road, Exeter EX2 5RP. Tuition for Foundation, Intermediate and Advanced licence is available. The club is registered as an RSGB examination centre.

Torbay ARS
Dave Helliwell.
E-mail: g6fsp@tars.org.uk
www.tars.org.uk
The Torbay Amateur Radio Society meets Fridays at 7.30pm in the Teignbridge District Scout Headquarters, Wolborough Street, Newton Abbot, Devon TQ12 1JR. June 12th Operating Night, 19th Natter Night, 26th Monthly Meeting - A talk on the Internet Radio Linking Project.

DORSET

Blackmore Vale ARS (BVARS)
Nick Perrin Tel: (01747) 838936
E-Mail: bnperrin@theiet.org
www.radioclubs.net/bvars/
BVARS meets in The Youth Club, Coppice Street, Shaftesbury Dorset SP7-8PF each Tuesday evening at 7.30pm. The Club callsign is G4RBV. The main meeting is the second Tuesday of the month and details of events and full details of the Club can be found on the website.

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

Poole Radio Society G4PRS
'Tex' G1TEX Tel: 07966 460 552
www.g4prs.org.uk
Meetings are every Friday at 19:30 for 20:00 at the The Old Chapel Hall, Cabot Lane, Creekmoor, Poole BH17 7BX, the second meeting of each month is the formal evening, all others are basically shack and Natter nights. After the recent successful Intermediate course, training begins again in September.

DUMFRIES & GALLOWAY (Scotland)

The Wigtownshire Amateur Radio Club
Ellis Gaston Tel: 01776 820413
Web: www.gm4riv.co.uk
The club meets every Thursday from 19:00 Hrs at the The Aird Unit, Stranraer Academy, Stranraer, DG9 8BQ, South West Scotland.

EAST SUSSEX

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

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

ESSEX

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

Colchester RA
www.g3co.ccom.co.uk
The Colchester Radio Amateurs meets at 7.30pm on alternate Thursdays at St Helena School and The Colchester Institute, Sheepen Road, Colchester, Essex CO3 3LE. Members and non-members welcome.

Chelmsford ARS
Martyn Medcalf. Tel: (01245) 469008
E-mail: info2007@g0mwt.org.uk
www.g0mwt.org.uk
The Chelmsford Amateur Radio Society meets on the first Tuesday of each month in the Marconi Sports & Social Centre, Beehive Lane, Great Baddow, Chelmsford, Essex CM2 9RX at 7.30pm. - All welcome. July 7th Constructors Competition" by Carl Thomson G3PEM. Aug. 4th "Where do our wavelengths come from?" - The work of the IARU by Peter Chadwick G3RZP. Sep. 1st "D Star" by Murray Niman G6JYB and Clive Ward G1EUC.

Loughton & Epping Forest ARS
Marc Litchman. Tel: 020 8502 1645
E-mail: info@lefars.org.uk
www.lefars.org.uk
The Loughton & Epping Forest ARS meet Friday fortnightly at All Saints House, Romford Road, Chigwell Row, Essex IG7 4QD between 7.45 and 10pm. All visitors will be made most welcome.

South Essex Amateur Radio Society
Contact: Dave (G4UVJ) 01268 697978
E-mail: southessex.ars@btinternet.com
www.southessex.ars.btinternet.co.uk
Local Network: 145.225MHz
Meets: Meet at 8pm on the second wednesdays of each month at South Benfleet Primary School, High Rd, South Benfleet, Essex SS7 5HA. (Entrance: 51°33'10.45N 0°33'39.65E), (Opp. Smiths Wood Yard). All welcome. Meetings are: June 10th,Talk by Peter G4OAD on the Palestine Police, 21st Castle Point Show GB2CIS Special Event Station. And on July 8th we're having a Workshop Evening, 11th we're at the Canvey Island Yacht Club, 26th we're holding the Waterside Farm Railway Special Event Station.

FIFE (Scotland)

Glenrothes&DARS GM4GRC
D Francis MM0DYX Tel: 01383 823878
Meet Wednesdays at the Football Pavillion, Station Rd. Thornton Fife. Club Chairman Ken GM3YBQ runs course at all licence levels.

GLOUSCESTERSHIRE

Cheltenham ARC G5BK (CARA)
Derek G3NKS 01242 241 099
E-mail: g3nks@blueyonder.co.uk
www.caranet.co.uk
The club meetings are held on the first Friday of each month, starting at 8p.m. at Prestbury Library, The Burgage, Cheltenham, Gloucestershire, GL52 3DN.

Gloucester Amateur Radio and Electronics Society
Anne 2E1GKY/M3GKY 01452 548478 (After 10am)
E-mail: hamreed@blueyonder.co.uk
www.g4aym.org.uk
Meet at Churchdown School, Winston Road, Glos. GL3 2RB, every monday evening at 7-30pm until 10pm except for Bank Holidays when we operate from a local escarpment.

GWNEDD (Mid-Wales)

Merion ARS
Tel: John 07824 562656
Email : tawelfan@talk21.com
http://meirionars.multiply.com/
Meirion amateur radio society meet on the first Thursday of each month at The Royal Ship Hotel in Dolgellau Gwynedd LL40 1AR at 19.30. Visitors

Continued on page 42 ☛

KITS, MODULES & AERIALS

NEW TWIN FEEDER Low impedance, 2kW rated, two cores each 24/0.2mm, polyethylene double insulated, loss 0.04dB/m @ 10MHz. **75p/metre plus postage at cost, or £70 for a 100 metre reel inclusive of postage**

TRANSVERTERS for 2 or 4 or 6 metres from a 10 metre rig, or 4 or 6 metre from a 2 metre rig. Includes new overtone local oscillator, and integral interface unit. 20dB receive gain, 25W transmit power. Low level drive dual IF versions **TRC2-10dL, TRC4-10dL & TRC6-10dL**, high level drive single IF versions **TRC2-10sL**, **TRC4-10sL**, **TRC6-10sL, TRC4-2sL, TRC6-2sL**, Complete kit **£179.00**. **Built £266.00**

STATION PREAMPS for 2 or 4 or 6metres. RF & DC switched. Adjustable 0-20dB gain. 100W power handling. **RP2S, RP4S, RP6S, PCB & Hardware kit £35.00, Ready Built £57.00**.

MASTHEAD PREAMPS, for 2 or 4 or 6meters. 20dB gain 1dB NF. 100W through handling. RF switched & DC fed via the coax. Heavy duty waterproof masthead box, and a DC to RF station box with SO239 connectors. **RP2SM, RP4SM, RP6SM, PCB & hardware kit £41.00, Ready Built £65.00**. **Masthead fitting kit £6.00**.

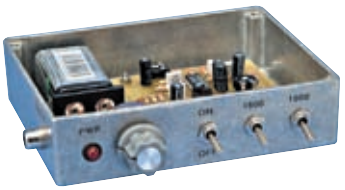
MASTHEAD PREAMPS 400W rated, for 2 or 4 or 6metres. RF switched. DC fed via a separate wire. 20dB gain 1dB NF. Heavy duty waterproof masthead box with SO239 connector. **RP2SH, RP4SH, RP6SH. PCB & hardware kit £42.50, Ready Built £65.00**. **Masthead fitting kit £6.00**.

SPEECH PROCESSOR increases the average sideband power of SSB transmitters without driving the PA into clipping. Includes filtering to enhance the higher voice tones to increase intelligibility, and it sounds nice too. Panel control for clip and output level. Supplied with plugs & sockets to suit most popular rigs. Type **SP1000, PCB & Hardware kit £39.50, Ready built £57.00**.

PSK31 INTERFACE KIT As featured in February 2009 issue *Practical Wireless*. **PCB on its own £5.00. PCB and components £21.00. Complete kit with box and hardware cables and jack plugs £35.50.**

LCR BRIDGE with 5 resistance ranges 100, 1K, 10K, 100K & 1M. 3 capacitance ranges, 100pF, 1nF, 10nF and 3 inductance ranges, 1mH, 10mH & 100mH, plus external reference. Scale calibrated 0.01 to 10 times reference value. Optional drilled and labelled plastic or painted diecast box. **PCB & parts with pot and switch £26.00. With plastic box £39.00, with diecast box £44.00.**

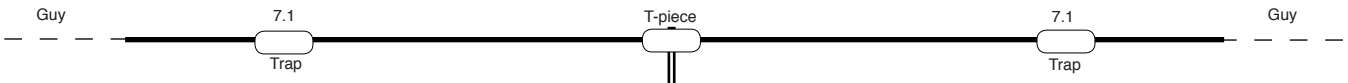
OFF-AIR FREQUENCY STANDARD, crystal calibrator unit phase locked to Radio 4 using a two-loop system. Includes a monitor receiver to ensure Radio 4 is being heard loud and clear. Fixed outputs 10MHz at 2V p-p, and 1KHz at 1V p-p as oscilloscope CAL signal. Switched outputs 1MHz, 100KHz, 10KHz, and 1KHz at 6V p-p, into 500 Ohms. Single board design as featured in July & Sept 2008 PW. Background heterodyne whistle at 2KHz confirms lock condition. 12/13.5V DC operation at 65mA. **PCB kit with ferrite rod £50.00, PCB kit + drilled box and hardware complete £86.00. Ready built £131.50.**



TWO TONE OSCILLATOR as featured in *PW* March 2005. A vital piece of test equipment used together with an oscilloscope for setting up AM, DSB, & SSB transmitters. **PCB & hardware kit £28.00. Ready Built £52.50**.

3N201 MOSFET equiv. 40673 £2.25 each, P&P £1.00 any quantity.

G2DYM / G4CFY AERIALS



Trap dipole for 80/40/20/15/&10m. 106 feet overall length. Supplied with 70 feet 75 ohm twin feeder. Low TVI, and low noise, 2 S points quieter than a G5RV with same feeder length. All wires properly terminated with lugs and heatshrink. 150W rated £152.00, 600W rated £165.00, carriage £20.00.

1:1 Balun 160-10m, suits the trap dipole, £43.00 inc P&P.

Trapped inverted L aerial. 80/40/20/15 & 10m for a small garden. Coax driven from far end of garden and tuned against ground. A good all round aerial with 6dB more gain than a 24 foot trapped HF vertical. That's 4 times power on TX and one S point extra on RX. £64.00, plus £10.00 carriage.

Wire dipoles, with insulators and centre piece. Call for price.

SPECTRUM COMMUNICATIONS

12 WEATHERBURY WAY, DORCHESTER, DORSET, DT1 2EF. Tel & Fax 01305 262250.

E-mail tony@spectrumcomms.co.uk

Web site www.spectrumcomms.co.uk

Prices inclusive of postage unless stated. Payment by Credit/Debit card, Cheque or Postal Order. Cheques or Postal Orders payable to Spectrum Communications.

and new members are very welcome. Regular talks, all the details for meetings and special events can be seen on the club website. 12th BUNKERS on the AIR – Meriden, Bulkington & Wolvey. 19th 2nd Round G4ZMC Trophy – Hatton Locks.. 26th Radio Workshop VHF/UHF Operating 6m, 4m, satellites. 8.30 p.m. for 8.45 p.m. start . JULY 3rd WEATHER SATELLITES – Adrian Chamberlain G4ROA, 10th BUNKERS on the AIR –Meriden, Haseley Knob & Church Lawford, 17th 3rd Round G2FDC Trophy 24th VIDEO NIGHT. 31st RADIO WORKSHOP VHF/UHF Operating 6m, 4m, satellites. 8.30 p.m. for 8.45 p.m. start

HAMPSHIRE

Andover Radio Amateur Club.
Martin M0MWS. Tel: 01980 612070
E-mail:- martinsmith@kukltd.co.uk
www.arac.co.uk
The Andover Radio Amateur Club meets on the first and third Tuesdays in the month at the Club venue in The Village Hall at Wildhern, SP11 0JE. Map Ref SU350510 at 19:30 hours.

Fareham & District ARC
Alastair Sinclair Tel: 01329 235397
E-mail: secretary@fareham-darc.co.uk
www.fareham-darc.co.uk/
The Fareham & District Amateur Radio Club meets on Wednesdays evenings from 7.30pm in the Fareham Sailing & Motor Boat Club, The Boathouse, Lower Quay, Fareham. PO16 0RA

Farnborough & District Radio Society (FDRS)
Derek G3OFA E-mail: mail@fdrs.org.uk
www.fdrs.org.uk
Meets every 2nd and 4th Wednesday in the month at 7:30 for 8:00 pm in the Farnborough Community Centre, Meudon Avenue, Farnborough, Hampshire, GU14 7LE Visitors and new members are always most welcome. Meetings are: June 10th The shipping forecast Julian 2E0XPJ, 24th Computing by Surf-IT - Garry, July 8th EMC Aspects of Power Line Networking Adaptors Kevin G7BCS, 22nd Construction Contest and Junk Sale.

Horndean & District ARC
Stuart Swain. Tel: (02392) 472846
E-mail: g0fyx@msn.com www.hdarc.co.uk
The Horndean & District Amateur Radio Club meets on the first and fourth Tuesdays each month in the Lovedean Village Hall, 160 Lovedean Lane, Lovedean, Hants PO8 9SF at 7.30pm. Visitors are always very welcome.

Isle Of Wight Radio Society
Tony Pegg Tel: 01983 868 978
E-mail tony.pegg1@btinternet.com
www.g3sky
The IWRS meets every Friday evening 7.00pm-10.pm at Haylands Farm,Salters Rd. Ryde PO33 3HU. Visitors very welcome.The club runs courses for Foundation, Intermediate and advanced licenses. The club is registered as an RSGB exam centre.

Itchen Valley ARC
Contact: Charlie M0WYM
Tel: 02380 439560
E-mail: secretary@ivarc.org.uk
www.ivarc.org.uk
The Itchen Valley ARC meets on the second and fourth Friday of each month at The Scout Hut, Brickfield Lane, Chandlers Ford, SO53 4DP, doors open 7.30pm. See website for our programme, visitors welcome. Join our club net on 145.550, Thursday evenings at 8.30pm. The club is a registered as an RSGB examination centre.

Lymington Community Association Radio Club
Keith G8MZF Tel:(01590) 672337 (work)
(02380) 849395 (evenings)
Email: lymcomass@aol.com
The club meets at Lymington Community Centre, New Street/Cannon Street, Lymington SO41 9BQ, on friday nights. Talk-in on the night on or near 145.550 club call M0LCC. All are welcome. Start time hopefully 7.30pm bar open from 7.00pm. Plenty of free parking nearby.

HERTFORDSHIRE

Verulam Amateur Radio Club (St Albans)
Norman. Tel: 07773 628912
E-mail: g1bsz@aol.com (sec)
www.radioclubs.net/verulam
The club normally meets every 3rd Tuesday of the month 800pm at Aboyne Lodge School.Etna Road, St Albans, AL3 5NL. New members and visitors are always very welcome. Regular talks, events, Foundation, Intermediate courses exams are held. Club nets also take place every Sunday 12.00noon 40m (7.150MHz), then 14.00pm 2m (145.375) and on Tuesday 19.45pm 160m (1.975) then 20.00pm 2m (145.375). For further information about the club and events please see the website.

Stevanage & District ARS
John. Tel: 01462 459254
E-mail: jmccutcheon@freeuk.com (Sec.)
www.sadars.org/
The Stevenage and District Amateur Radio Society meet every Tuesday 7.30pm, at the Stevenage Resource Centre, Chells Way, Stevenage, SG2 0LT. Regular talks and demonstrations. Registered centre for Foundation/Intermediate/Advanced exam courses (40+ passes last year). Club Net last Friday of month 7.30pm on 145.450MHz. All welcome, see website for further details.

HUMBERSIDE

Hull & District Amateur Radio Society
Contact: Keith Shaw Tel: 01482 217776
E-mail m3shw@yahoo.co.uk
raymond penny Tel: 01482 376835
E-mail penibs@penibs.karoo.co.uk
Hull & DARS meet every friday night at 1930 – 2200 at the walton street leisure centre, goathland close, walton street hull, East Yorks HU3 6NG.

JERSEY

Jersey Amateur Radio Society - GJ3DVC
Rob Luscombe (secretary) 2J0RZD
Tel: 07797 923916
E-mail: gj3dvc@gj3dvc.org.je
http://www.radioclubs.net/gj3dvc/
The Jersey Amateur Radio Society meets every Friday at 7.30pm at The German Signal Station, Rue Baal, La Moye, St. Brelade, Jersey, JE3 8HQ, also on a Wednesday evening from time to time to maintain, alter and improve the shack, antennas etc. and also for club training. Coffee and car parking available, visitors are always welcome, shack rental available. See our website for further information.

KENT

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

Hilderstone Radio & Electronics Club
Mike Howland E-mail: g4mix@waitrose.com
www.g0hrs.org.uk
Meetings now at The Science Block, Chatham House School, Chatham Street, Ramsgate, CT11 7PP on 2nd and 4th Friday of the month at 7-30pm.

Bromley & DARS
Graham
E-mail: bdars@grahamc.net
www.bdars.org
The Bromley & District Amateur Radio Society meets in The Victory Social Club, Kechill Gardens, Hayes, Kent BR2 7NH (off B265, Hayes Lane, Bromley) on the third Tuesday of the month at 7.30pm.

LANARKSHIRE (Scotland)

Mid-Lanark ARS
Dennis: Tel 07505529335
Email: mm0dnx@yahoo.co.uk
www.mlars.org.uk/
The Mid-Lanark ARS meets on Friday evenings at the Newarthill Community Education Centre, 288 High Street, Newarthill, Motherwell ML1 5JU. Visitors and new members are very welcome. The club has HF and VHF shacks for use on club evenings. Courses for foundation, intermediate and full licences are also run at the club. See web site for details of our upcoming meetings.

LANCASHIRE

Oldham RC
Christopher Cunliffe. Tel: 07749347142
E-mail: secretaryoarc@btinternet.com
www.oarc.org.uk
The Oldham Radio Club meets on Thursdays at Royton Air Training Corps, Hillside Avenue, Royton, Oldham OL2 6RF at 7:30pm.

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

Morecambe Bay ARS
Martin Hazel Tel: 01524 848193
Email: martin@mbars.internationalham.com
http://mbars.internationalham.com
Morecambe Bay Amateur Radio Society meet at the Trimpell Sports and Leisure Club, Out Moss Lane Morecambe, every Tuesday evening from 1930. They also have a new website at all of their events calendar for the next year is to be found there.

Thornton Cleveleys ARS (G4ATH, & G6GMW)
John Tel: 01253/399377,
E-mail: m3waz@hotmail.co.uk
www.tcars.org.uk
Meet monday evenings at the Frank Townend Center, Kensington road, Cleveleys, Lancashire FY5 1ER. June 8th Tech Talk, Peter, 15th Quiz, Ted G3WBB, June 22nd Show&Tell/Radio Night, 29th V/UHF Field day prep. July 6th Natter Night, 13th Auction, Mick G4EZM, 27th Tech Night, TBA. August 3rd Natter Nigh, 10th Wrestling madness, John M3WAZ.

LEICESTERSHIRE

Loughborough & District ARC
Chris Walker. Tel: 01509 504319
Email g1etz@aol.com
www.radioclubs.net/ladarc
Loughborough & District Amateur Radio Club meets at the Glenmore Community Centre, Thorpe Road, Shepshed, LE12 9LU on a Tuesday evening from 7.30pm. The clubs programme of events can be found on our websites. Visitors and new members most welcome.

LINCOLNSHIRE

Franklin ARC
Contact: Brendan Tel: (01754) 820204
E-mail: bren.sykes@btinternet.com
The Franklin Amateur Radio Club meets the last Wednesday of every month at the Victoria Inn Wainfleet Road Skegness Lincolnshire PE25 3RG. @19:30hrs. all visitors to the area and residence are welcome to join us. We also have regular nets, on the first and third Tuesday of every month on 145.550± @20:00hrs. once again come and join us. The club is registered as an RSGB examination center for Foundation, Intermediate Advanced licenses, run by G0OTH Robert. The club has recently moved from its home of conception, Spilsby to Skegness, and this has proven to be a positive re-location for the members. We are organizing special events, field days and our own rally (See Rallies Section) this year so listen out for us, our call sign is M0FRC.

Spalding & DARS
Graham Boor. Tel: 07947764481
E-mail: secretary@sdars.org.uk
www.sdars.org.uk
The Spalding & District Amateur Radio Society meets at the Castle Sports Swimming Complex, Spalding PE11 1QF on Fridays at 7.30pm.

Stenigot "Chainhome" Amateur Radio Club
Steve Burke M5ZZZ Tel: 01507 600202
E-mail m5zzz@btinternet.com
www.stenigotchainhomearc.co.uk
Meetings are held on the third Friday of the month commencing 19.30 at Gayton le Marsh Village Hall, Gayton le Marsh, Lincolnshire. LN130NW.

LONDON

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

Edgware & District Radio Society
Michael G4RNW Tel: 020 8950 0658
E-mail: michael.stewart5@ntlworld.com
Edgeware &District radio Society meet at the Watling Community Centre, 145 Orange Hill Road, Burnt oak, Edgware HA8 0TR.

Radio Society Harrow
Linda Casey Tel: 020 8386 8586
Email: lcasey@imperial.ac.uk
www.g3efx.org.uk
The Society meets on friday at 20.00 on the 2nd and 4th weeks of every month, at The Elsie Fisher Room, St Lawrence Centre, St. Lawrence Church, 2, Bridle Road, Eastcote, Pinner HA5 2SJ. All welcome! We also run exam courses - see website for details

Southgate ARC
David Sharp. Tel: 01992 422622
E-mail: david.sharp1@tesco.net
The Southgate Amateur Radio Club meets on the second Wednesday of the month at Hazelwood Lawn Tennis and Squash Club, Ridge Avenue, Winchmore Hill, London N21 2AJ at 7.30 for 8 pm.

Wimbledon and District ARS
Jim Bell M0CON
Tel: 020 8874 7456
E-Mail: jamesm0con@o2.co.uk
http://www.gx3wim.org.uk
The Wimbledon & District Amateur Radio Society welcomes new comers to our meetings whether they are licensed or not. We hold our meetings the second and last Friday of each month at Martin Way Methodist Church, Buckleigh Avenue, Merton Park, London SW19 9JZ. The church is on the corner of Martin Way and Buckleigh Avenue.

THE LOTHIANS (Scotland)

Cockenzie & Port Seton ARC
Bob Glasgow. Tel: (01875) 811723
E-mail: gm4uyz@cpsarc.com
www.cpsarc.com/news.php
The Cockenzie & Port Seton Amateur Radio Club meets in the Thorntree Inn (Lounge Bar), High Street, Cockenzie, East Lothian EH32 0HP from 7pm till late. Organised talks are held in the Port Seton Community Centre, South Seton Park, Port Seton, East Lothian EH32 0EE. Timings 18:30 to 21:30hrs.

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

MERSEYSIDE

Wirral & District ARC
Tom. Tel: 07050 291850
E-mail: secretary@wadrac.com
www.wadarc.com
The Wirral & District Amateur Radio Club meets at the Irby Cricket Club, Mill Lane, Irby CH61 4XQ on the second and fourth Wednesdays of each month. Other Wednesdays are informal (D&W) meetings at a local hostelry.

NORFOLK

King's Lynn ARC Ray Dowsett, MBE.
Tel: (01553) 671307
E-mail: ray-g3rsv@supanet.com http://www.

klarc.org.uk
King's Lynn Amateur Radio Club meets every Thursday at the Scout HQ, Chequers Lane, West Winch, King's Lynn, PE33 0NY off the A10 at West Winch at 7.30pm.

Norfolk ARC
Mark Taylor. Tel: (01362) 691099
E-mail: narc@g0lgj.co.uk
www.norfolkamateurradio.org
The Norfolk Amateur Radio Club meets every Wednesday at the Eaton CNS School, Eaton Road, Norwich, NR4 6PP, where it meets weekly,from 7-10pm, usually in 6th form centre at front of school, every Wednesday from 7-10pm. June 6/7th National Field Day 1.8-28MHz, RST+Serial, 10th Informal / Construction / Workshop (RSGB CC), 17th Friendly Fox Hunt, 24th Informal/Construction / Workshop 5 / Bright Sparks. From June 26th-28th it's the Friedrichshafen Radio Rally run.

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

NORTHAMPTONSHIRE

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

SHROPSHIRE

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

Telford & District ARS
Mike Street. Tel: (01952) 299677
E-mail: mjstreetg3jkx@blueyonder.co.uk
www.tdars.org
The Telford & District Amateur Radio Society meets on Wednesdays at the Little Wenlock Village Hall, Malthouse Bank, Little Wenlock. Telford TF6 5BG at 8pm. June 03 HQ closed. Committee meeting, 10th Enigma/Cryptology. Illustrated talk by G7GCK, 17th AR licencing–then and now. G3UKV, G3JKX, G8UGL, 24th Pre VHF NFD planning. July 1st Open House/On the air and Committee meeting, 4th/5th VHF NFD on Long Mynd. Set up Saturday 10 a.m. All welcome.

NOTINGHAMSHIRE

Worksop Amateur Radio Society (W.A.R.S.)
'Daz' Spence 01623 747314
Email- g3rcw@qsl.net
www.qsl.net/g3rcw/
Meets every Tuesday at 7:00 pm. Our cubhouse is located at 59 - 61 west street, Worksop, Nottinghamshire. S80 1JP. Exams and courses run frequently for all licence levels. Licensed bar & hot food available on club meet nights. Membership fee for the year is £10.

SOMERSET

North Bristol ARC
Dick Elford Tel:(01454) 218362
E-mail: g0xay@aol.com
www.nbarc.org.uk
North Bristol ARC meet Fridays at 7.30pm at SHE7, Braemar Crescent, Northville, Filton Bristol BS7 0TD. We carry out training for all the Radio Amateurs examination, and our next training course is to be for Intermediate exams.

South Bristol ARC
Len Baker. Tel: (01275) 834282
E-mail: g4rzy@msn.com
www.sbarc.co.uk
The South Bristol Amateur Radio Club meets every Wednesday evening at the Whitchurch Folkhouse Association, Bridge Farm House, East Dundry Road, Whitchurch, Bristol BS14 0LN.

Yeovil ARC
Gary.
E-mail: g.swain@tesco.net
www.yeovil-arc.com/
The Yeovil Amateur Radio Club meets at the Red Cross Centre, Grove Avenue, Yeovil BA20 2BE (on the corner where Grove Avenue meets Preston Road).

SOUTH GLOUCESTERSHIRE

Thornbury and South Gloucestershire ARC
Tony. Tel: (01454) 417048
E-mail: tonytsgarc@sky.com
The Thornbury and South Gloucestershire Amateur Radio Club meets in the United Reformed Church Hall, on the corner of Chapel Street and Rock Street, Thornbury BS35 2BA at 7.30 - 9.30pm.

SOUTH WALES

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

SOUTH YORKSHIRE

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

Sheffield ARC
Trevor Wood. Tel: 0114 2216947
E-mail: trevorwood6@yahoo.co.uk
www.sheffieldarc.org.uk
The Sheffield Amateur Radio Club meets at the SYPTE Social Club, Greenhill Main Road, Sheffield S8 7RH every Monday at 7.15pm. All three types of classes are held for the Foundation, Intermediate and Advance levels of licensing.

STAFFORDSHIRE

Tamworth Amateur Radio Society
Colin Marks. Tel: (01827) 700893
E-mail: colin.marks2@ntlworld.com
The Tamworth Amateur Radio Society meets every Thursday at 7.30pm at St Francis Church, Masefield Road, Leyfields, Tamworth B77 8JB.

SUFFOLK

Bury St Edmund's ARS
George Woods G3LPT Tel:01359 259518
Darren Coe G7SDC Tel:01284 701732
storno@yahoo.co.uk
www.radioclubs.net/bsears/
The Club meets on the third Wednesday of the month (except August and December) at the Culford school, Culford, Bury St. Edmunds, Suffolk IP28 6TX at 7.30PM. Visitors are welcome. Please see our web site for further details.

SURREY

Coulsden Amateur Transmitting Society
Steve Conway, G7SYO 01737 353517
E-mail: steve.conway@landg.com
www.sthost.co.uk/webspace/cats/
Regular meetings are held on the second Monday in each month at-: St. Swithun's Church Hall, Grovelands Road, Purley, Surrey CR8 4LA at 20:00 to 22:00hrs. On the first Saturday of month at 1715 Crescenta Valley / CATS Net on Echolink Normally via MB7IPL node on 145.2875 MHz.

Sutton & Cheam RS
John Puttock. Tel: 020 8644 9945
E-mail: info@scrs.org.uk
www.scrs.org.uk
The Sutton & Cheam Radio Society meets on the third Thursday of the month at 7.30pm in Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey SM1 2EY. In addition to monthly meetings, licence training courses are held at regular intervals in Banstead Surrey.

TYNE & WEAR

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

Tynemouth ARC
Tony Regnart G8YFA. Tel: 0191 280 1981
E-mail: mail@g0nwm.com
www.g0nwm.co.uk
The Tynemouth Amateur Radio Club meets each Friday from 7 to 9pm at St. Hilda's Church, Stanton Rd, North Shields, Tyne & Wear NE29 9QB. It's known locally as 'the church near the fire station'. April meetings include: 17th Satellite Imaging G8YFA. And on the 24th Operating Night & Morse

WARWICKSHIRE

Coventry Amateur Radio Society
Contact: John Beech – G8SEQ
Tel: 079 58777 363
www.coventryradio.org.uk
Coventry Amateur Radio Society meets most Fridays at 2030hrs in St Bartholomew's Church Hall, Brinklow Road, Binley, Coventry CV3 2DT. Further details on CARS activities can be obtained from the Secretary – John G8SEQ

WEST MIDLANDS

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

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

South Midlands RS
Don Tel: (0121 458 1603)
South Midlands RS meet in the West Heath Community Centre, Condover Rd., West Heath Birmingham B31 3QY. macrh 13th and 20th are construction evenings. 223rd is a 'ragchewing' evening.

Stourbridge and District ARS
John. Tel: (01562 700513)
www.g6oi.org.uk
The Stourbridge and District Amateur Radio Society meets on Monday evenings, except for Bank Holidays at The Radio Shack, Old Swinford Hospital School, Heath Lane, Stourbridge, West Midlands DY8 1QX at 8pm. We have Open Shack Nights - Tea/Coffee always available, along with an opportunity to get on the air or just a natter with whoever attends

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

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

WEST SUSSEX

Horsham ARC
Andrew Vine. Tel: (01483) 272456
http://www.harc.org.uk/
The Horsham Amateur Radio Club meets on the first Thursday of the month at The Guide Hall, Denne Road, Horsham, West Sussex.

Worthing & DARC
Roy or Joyce. Tel: (01903) 753893
www.wadarc.org.uk
The Worthing & District Amateur Radio Club meets every Wednesday at 8pm in the Lancing Parish Hall, South Street, Lancing, BN15 8AJ. There's a free car park at the rear and full disabled access. Visitors are always welcome.

WEST YORKSHIRE

Denby Dale Amateur Radio Club
Gerald, G3SDY.
Tel: 01484 602905.
www.g4cdd.net/
The Denby Dale club meat at Pie Hall, Denby Dale, Huddersfield HD8 8RX. On Wednesday April 1st the club holds its spring mini-rally and grand auction of surplus items. Doors open at 7pm.

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

WIGTOWNSHIRE (s.w. Scotland)

Ellis Gaston 01776 820413
www.gm4riv.co.uk
Wigtownshire ARC meet weekly at The Aird Unit, Stranraer Academy, Stranraer DG9 8BQ. Visitors always most welcome

WILTSHIRE

Trowbridge & District AR
Ian Carter. Tel: (01225) 864698
E-mail: ian.l.carter@btinternet.com
http://uk.geocities.com/tdarc@btinternet.com
The Trowbridge & District Amateur Radio Club meets at Southwick Village Hall, Southwick (nearest postcode is BA14 9QN).

WORCESTERSHIRE

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

Club Secretaries

Please remember to include full details of your club, E-mail and telephone contact details and the postcode of your meeting venue – it helps potential visitors to find you!

Peter Dodd G3LDO's

antenna workshop

Peter Dodd G3LDO looks at the G5RV antenna and its relevance on the modern Amateur Radio bands.

An Analysis Of The G5RV Antenna

Newcomers (and some old-timers) often regard the G5RV antenna as a panacea to the multi-band antenna problem. However, this antenna was not designed for multi-band operation as we understand multi-band today.

Originally, the late **Louis Varney G5RV** designed his antenna over 50 years ago, primarily to give a clover-leaf pattern and a low feed impedance on 14MHz. Those were the days long before the WARC bands, the 21MHz band had not been allocated and 28MHz was mostly dead – rather like today. The main DX band was 14MHz, with 3.6MHz being used mainly for local chatting, again a bit like today. Since then the G5RV antenna has been the focus of many articles over the years.

The G5RV Antenna

The G5RV antenna, which is fed in the centre, comprises a horizontal section of 31.27m (102ft), making a total of three half wavelengths on 14MHz. The impedance on 14MHz is low because the feedpoint is at the centre of the central half-wave section. The midband resonant feed impedance at that point is around 100Ω and a 10.36m (34ft) matching section of open-wire feeder is used as a 1:1 transformer, repeating the feed impedance at the other end, as shown in **Fig. 1**.

With the reflected low impedance, it was reasoned that a length of 75Ω impedance coaxial cable could be connected to the lower end of the matching section. This would have been a convenient way of connecting the antenna to the transmitter in the shack, **Fig. 2**.

In addition, on the 7MHz band, the antenna presents an impedance, which was within the impedance range of earlier Amateur Radio transmitters with pi-output variable tuning and loading. So, the antenna could again be connected directly to the transmitter without an a.t.u. This represented quite an advantage over routing open line feeder into the shack.

However, for the G5RV to present the appropriate impedances at the point where the coaxial cable is connected to the matching section, the dimensions are critical. The top section must be 31.27m (102ft) and the matching section must be 10.36m (34ft) long. Note that this matching section length is only true for open wire feeder. If 300Ω ribbon or slotted line is used then the length must be adjusted to take account of the velocity factor. (For example, if you use slotted line with a velocity factor of 0.9 then the matching section would be 10.36 x 0.9 = 9.325m).

Also the G5RV geometry cannot be altered by, for example, converting it into an inverted-V or bending the ends to fit into a small available space without modification to the length. Even if all these criteria are met it's still difficult to adjust so that the s.w.r is low on all the Amateur bands.

The calculated impedance and s.w.r plots in **Fig. 3** illustrates the problem; the low s.w.r points are not the correct length apart. In Fig. 3 the antenna is adjusted for a low s.w.r. on 14MHz but the s.w.r. points lower down the band are too low for 3.6MHz and too high for 7MHz. So, is there a way of getting around this?

The ZS6BKW Version

Brian Austin G0GSF (formerly ZS6BKW) developed a computer program to determine the most advantageous length and impedance of the matching section and the top length of a G5RV-type antenna. He arranged that his antenna should match as closely as possible into standard 50Ω coaxial cable and so

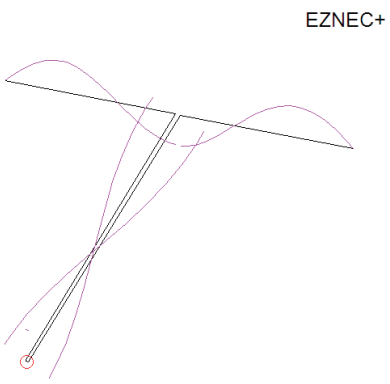


Fig. 1: Computer model of the G5RV, showing the current distribution on 14MHz.

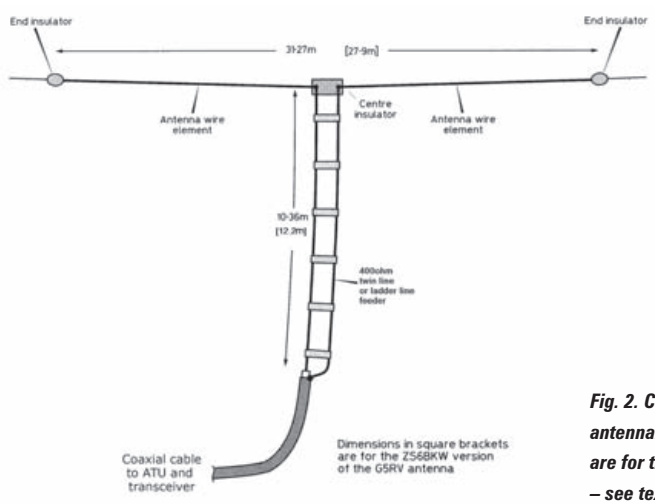


Fig. 2. Construction of the G5RV antenna. The dimensions shown are for the ZS6BKW version – see text.

Peter Dodd G3LDO
PW Publishing Ltd.,
Arrowsmith Court,
Station Approach,
Broadstone,
Dorset BH18 8PW
E-mail: antennas@pwpublishing.ltd.uk

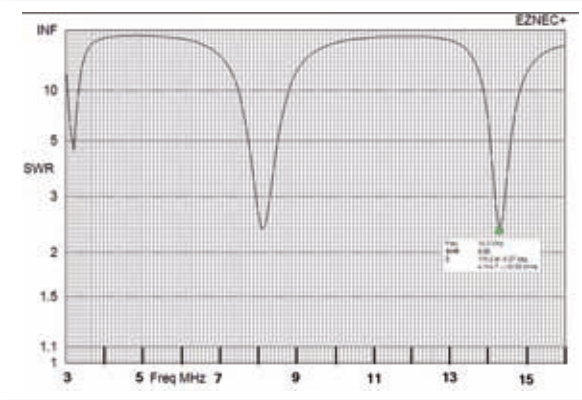


Fig. 3: The s.w.r plot for the lower h.f. bands obtained using a EZNEC computer model of the G5RV.

be more useful to the user of modem equipment.

The G5RV antenna total top length of 31m was reduced to 27.9m, and the matching section was increased from 10.37m to 12.2m (ignoring the velocity factor). It was recommended that the matching section should have a characteristic impedance of 400Ω, which can be made up from two 1.2mm (l8s.w.g.) wires spaced 50mm (2 in) apart or by using commercial 400Ω ladder line.

With this in mind, I constructed a G5RV to the ZS6BKW dimensions shown in Fig. 2. The characteristics of the antenna were then measured using a computer and an AIM-4170 Vector Network Analyser as shown in **Fig. 4**. The results of this analysis are shown in **Fig. 5**. To my surprise I found that the nearest low s.w.r point to 14MHz was 15.2MHz. By extending the matching section by 0.76m the afore mentioned s.w.r point was reduced to 14.89MHz as shown in **Fig. 6**.

My analysis implies that this low s.w.r point could have been extended to the 14MHz band by further extending the matching section. But it would still be difficult or impossible to feed this antenna on other bands without a.t.u when using modern solid-state p.a. transmitters.

Modern all-solid state Amateur band transceivers have transmitter output stages that are easily damaged when operated with high s.w.r on the feed cable to the antenna, or they have an ALC circuit that reduces power in some proportion to s.w.r. It's obvious that an a.t.u between the low-impedance feeder and the transceiver is required when using the G5RV as a multi-band antenna.

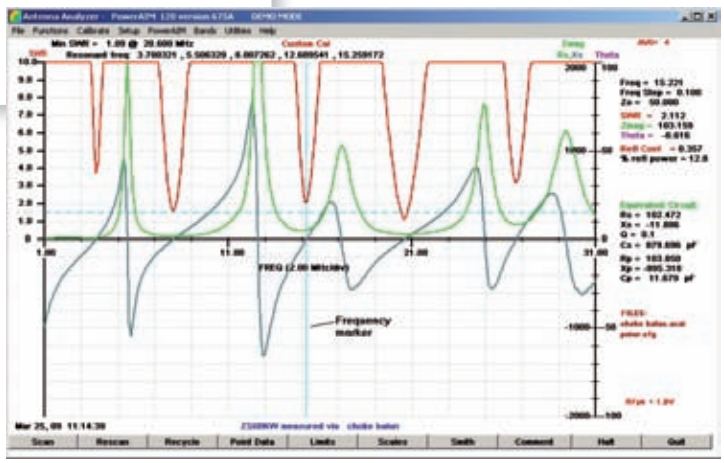


Fig. 5: Analysis of the ZS6BKW version of the G5RV using the AIM-4170. The red graph represents s.w.r. Normally this instrument displays impedance in polar form but in this case it has been configured to display impedance in the more familiar R±j format. R is displayed in green while X (reactance) is displayed in blue. The frequency marker is placed over 15.2MHz and all the relevant data at that frequency is shown on the right.

Losses & The G5RV

There is another consideration and that's losses incurred for the G5RV antenna, which uses a section of twin line transmission line as tuned line. Most versions use a length of coaxial cable from the bottom of the transmission line to the shack. So, how efficient is this arrangement?

Calculations, shown in **Table 1** (on the following page) indicate losses can be quite high on some bands. The second column in Table 1 is the calculated impedance at the point where the coaxial feeder is connected to the balanced tuned line and at the a.t.u respectively. The third column shows the s.w.r figures for RG213 coaxial and the fourth column the resultant losses in dB.

Note that the figures for thin RG58 cable, in columns 5 and 6 indicate higher losses. The lower s.w.r at the a.t.u might give the impression that the antenna is performing well. If you do have a nice low s.w.r measured in the shack on all bands, there might be something seriously wrong with the coaxial between the radio and the antenna!

The losses on some of the bands seem quite unacceptable. In fact G5RV himself mentioned that the most efficient feeder to use is the open-wire variety, all the way down from the centre of the antenna to the equipment, in conjunction with a suitable a.t.u for matching. In which case the antenna is not a G5RV but something else.

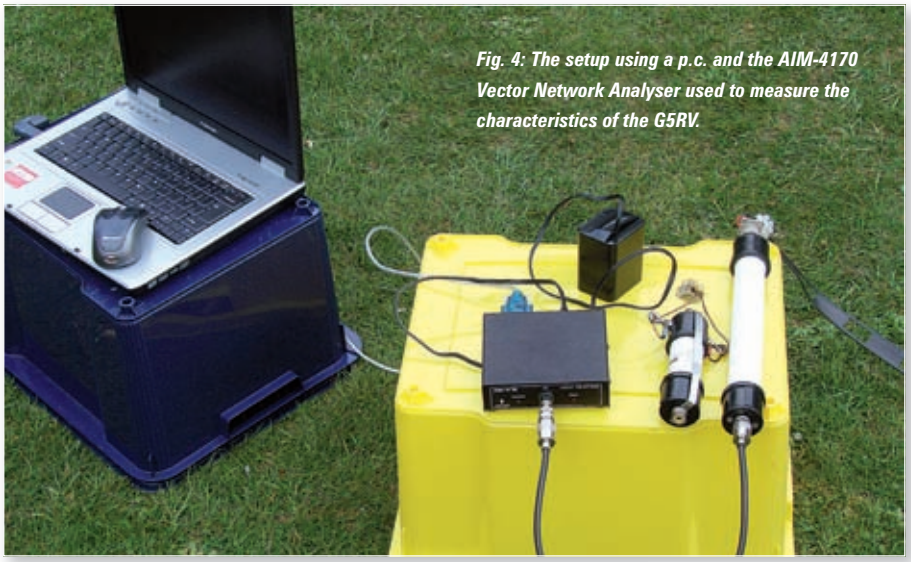


Fig. 4: The setup using a p.c. and the AIM-4170 Vector Network Analyser used to measure the characteristics of the G5RV.

A Better Solution

A more practical solution for a general purpose multi-band antenna is the simple Tuned Doublet. It comprises a horizontal length of wire fed in the centre with open wire tuned feeders and uses an a.t.u as shown in **Fig. 7**.

The G5RV antenna should be at least a quarter wavelength long at the lowest frequency of operation (although 3λ/8 is preferable) where it radiates with an effectiveness of approximately 95% relative to a half-wave dipole. The dimensions are not at all critical and it can be configured as a bent or inverted-V dipole.

The computed losses of an inverted-V dipole 22m long, at 12m high in the centre and 6m high at the ends are shown in **Table 2**. Column 2 shows the approximate impedances encountered on the different bands, columns 3 and 4 show the losses if RG213 coaxial were to be used and columns 5 and 6 show how much the losses can be reduced by using 450Ω feeder all the way to the a.t.u. This antenna is far smaller than the G5RV and a far more practical solution to most antenna problems. True the losses for this small antenna on 3.5MHz are above 2dB but it is still an improvement on the G5RV.

The main problem with balanced feeder can be routing it into the shack as mentioned at the start of this article. Twin feeder must not be allowed to come in close contact with metal objects or bundled together with other feeders or conductors. A solution was described by **PA0SE** in which a balun, normally located inside the a.t.u, is placed in such a position where there is a r.f. obstacle-free path between it and the antenna. The a.t.u is connected to the balun with a short length of coaxial cable as shown in Fig. 7. This feed arrangement was described by PA0SE as 'Comudipole'.

Devoted Effort

It is curious that so much effort by Radio Amateurs has been devoted to devising a multi-band antenna that is resonant in bands of interest. A more important characteristic for a simple wire antenna is that the radiation pattern is not too directive. Long wires have unpredictable directive properties on the upper h.f. bands, a factor that wasn't a consideration when Louis Varney first designed the G5RV. ●

Band MHz	(R±j)Ω [Tuned Line end]	RG 213 s.w.r.s	RG58 Loss dB	s.w.r.s	Loss dB
3.6	25+j260	64/27	3.1	64/21	3.4
7.0	202-j444	24/14	2.3	24/10.8	3.7
10.1	337-j966	65/19	5.2	65/13	6.2
14.2	104-j4	2.1/1.9	0.6	2.1/1.8	0.8
18.1	322-j706	37/12.8	4.8	37/9.5	5.8
21.2	235 -j684	44/12.8	5.3	44/9.3	6.9
25.0	177 -j131	5.5/4.2	1.4	5.5/3.7	1.9
28.5	1233 -j1215	49/11.6	6.1	49/8.5	7.6

Table 1: Calculated losses on 15m of RG213 and RG58 coaxial feed to a G5RV antenna using the ARRL's* TLW *computer program.

Band MHz	Centre Z (R± j)	RG 213 s.w.r.s	450Ω Slotted Line Loss dB	s.w.rs	Loss dB
3.6	12-j810	600/44	14	148/106	2.1
7.0	101+j205	11/8	1.2	5.1/5.0	0.065
10.1	700 +j365	68/19	5.5	8.8/8.4	0.162
14.2	828 -j1820	95/18	7.0	12/11.5	0.324
18.1	107 -j264	15/8	2.7	4.46/5.28	0.155
21.2	200 +j488	28/11	4.0	5.28/5.1	0.15
25.0	3829 +j688	79/13	7.8	9.77/7.88	0.34
28.5	298 -j880	72/12	6.7	8.3/7.8	0.30

Table 2: The calculated losses on 15m of transmission line feeding a 22m long inverted V, comparing RG213 with 450Ω slotted line.

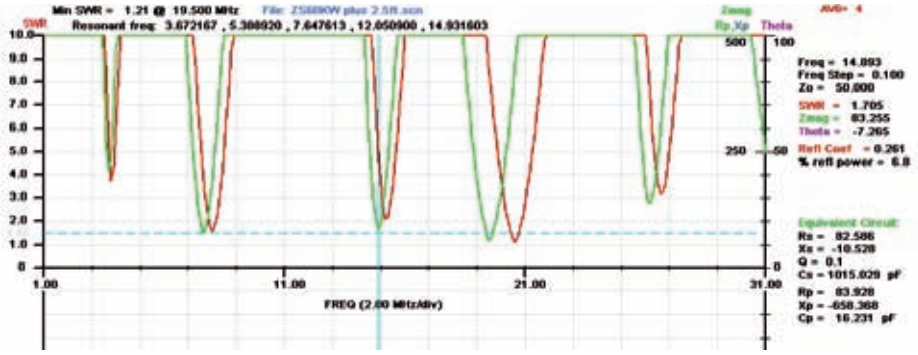


Fig. 6: Plots of s.w.r of the ZS6BKW antenna. The red graph shows the s.w.r of the antenna as measured in Fig. 5 but with the impedance graphs are switched off for clarity. The green graph shows the effect increasing the length of the matching section by 0.76m.

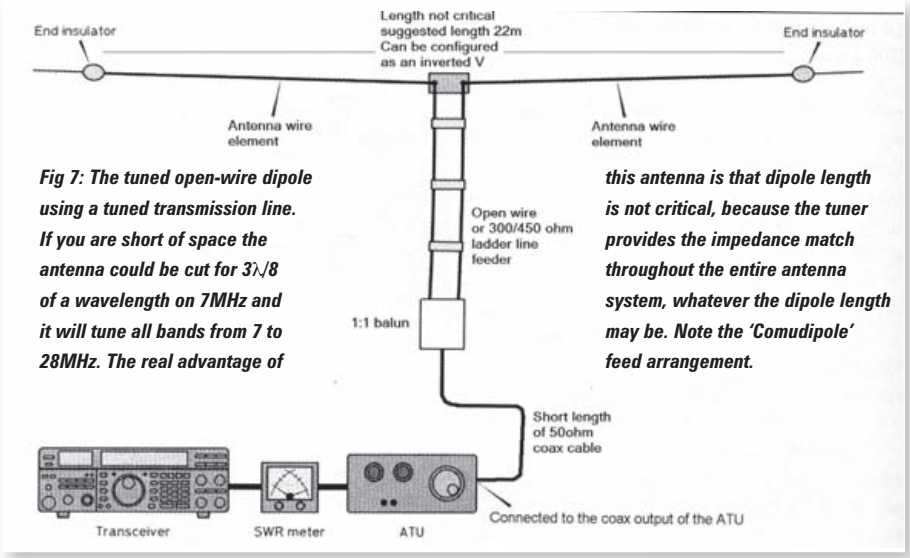


Fig 7: The tuned open-wire dipole using a tuned transmission line. If you are short of space the antenna could be cut for 3λ/8 of a wavelength on 7MHz and it will tune all bands from 7 to 28MHz. The real advantage of this antenna is that dipole length is not critical, because the tuner provides the impedance match throughout the entire antenna system, whatever the dipole length may be. Note the 'Comudipole' feed arrangement.

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3: *The ARRL Antenna Book*, Eleventh Edition, 1968, pp 186-188
4: *HF Antennas for all Locations*, 1984 edition, Page 54, LA Moxon, G6XN.
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The Rev. George Dobbs'

carrying on the practical way

The Rev. George Dobbs G3RJV describes some simple audio amplifiers from Sweden and a very appropriate quotation!

"If you do the little jobs well, the big ones tend to take care of themselves."
Dale Carnegie (1888 – 1955)

From time to time in this column I've mentioned **Johnny Apell SM7UCZ**. For many years Johnny was a visitor to the QRP Mini-Convention in Rochdale and I have come to know Johnny and his charming wife, **Birgitta** very well. Three years ago my wife, **Jo-Anna**, and I visited Johnny and Birgitta in their home near the Baltic coast in Sweden. They were excellent hosts and for part of the visit they were kind enough to offer us the use of their camper van to explore their part of Sweden.

For me, the highlight of the trip was a chance to see Johnny's radio workshop and a selection of his home-built projects. Two of Johnny's main interests are building vintage style valved equipment and designing simple and novel QRP transmitters and transceivers. He showed me several replicas of early Amateur Radio transmitters built bread-board style on wooden bases. In more recent times he's built some excellent, and very accurate, replicas of the Second World War 'Paraset' transmitter and receiver.

However, I was especially interested in the SM7UCZ collection of simple transmitters and transceivers, some of which are built on a printed circuit board shaped to also act as a Morse key. Examples of his work can be seen at **www.sm7ucz.se/Hamradio.htm**

Generous in his Amateur Radio work, I often receive E-mails from Johnny's about his latest circuit ideas with pictures to show their implementation. Recently, with his friend **Leif Nilsson SM7MCD**, Johnny has been working on a design for a challenge to build a six transistor transceiver for 3.5MHz (80 metres). Of special interest to me, was the work he had been doing on simple high gain audio amplifiers using the Sziklai pair configuration.

Low Component Amplifier

The aim was to make a low component count audio amplifier with enough gain to be used in a direct conversion (DC) receiver with a diode ring mixer. Using a double-balanced diode ring mixer is not only desirable in performance but it's also economical in the use of active devices. So, I scratched my head, muttering, "What on earth is a Sziklai pair?" and decided I'd better research it and take a look at more famililar 'pair' configurations.

Many *PW* readers will probably be familiar with the Darlington pair and this is shown this arrangement in **Fig. 1a**. It is two transistors connected together so that the current amplified by the first transistor is further amplified by the second transistor. The total current gain is equal to the two individual transistor gains multiplied together. So, the Darlington pair acts like one very high current gain transistor. Notice that I've marked **B**, **C** and **E** in Fig. 1, to designate the base, collector and emitter for the high gain transistor formed by the Darlington pair.

In fact it's possible to obtain Darlington pairs in one complete package that looks like a single transistor. The second transistor handles more power than the first transistor and this must be borne in mind when making up a Darlington pair from individual transistors.

Next, we'll look at the the Sziklai pair, which is shown in Fig.1**b**. This is sometimes known as a 'compound transistor' and is a configuration of two bipolar transistors, rather like the Darlington pair. But the Sziklai pair has one *npn* and one *pnp* transistor, and could be described as a 'complementary Darlington'. The current gain is similar to that of a Darlington pair; the product of the gains of the two transistors.

The main advantage of the Sziklai pair over the Darlington pair is the low turn on voltage. The Darlington pair will turn on when there is about 0.6V across each base-emitter junctions in the pair; it therefore it requires at least 1.2V. The arrangement of the Sziklai pair is such that the base-emitter turn on voltage is only about 0.6V or half of the Darlington's 1.2 volt nominal turn-on voltage. So the Sziklai pair has high gain with high sensitivity, making it idea as an audio pre-amplifier or audio

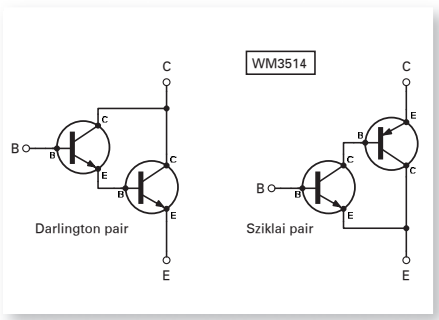
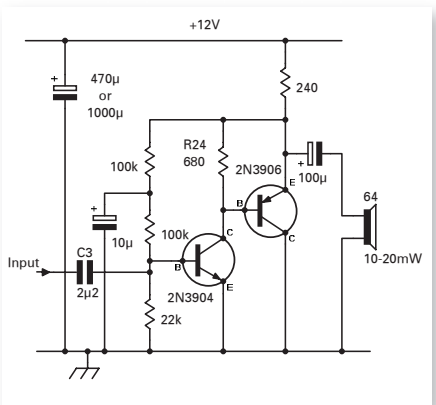


Fig. 1: The 'normal' Darlington pair uses either npn or pnp transistor pairs (a:left). The Sziklai pair – sometimes known as a 'compound transistor' uses an npn/pnp pair (1b:right).



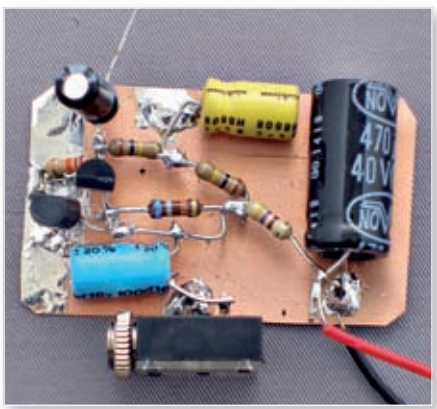


Fig. 2: A two transistor audio amplifier designed by SM7UCZ, based on the Sziklai pair.

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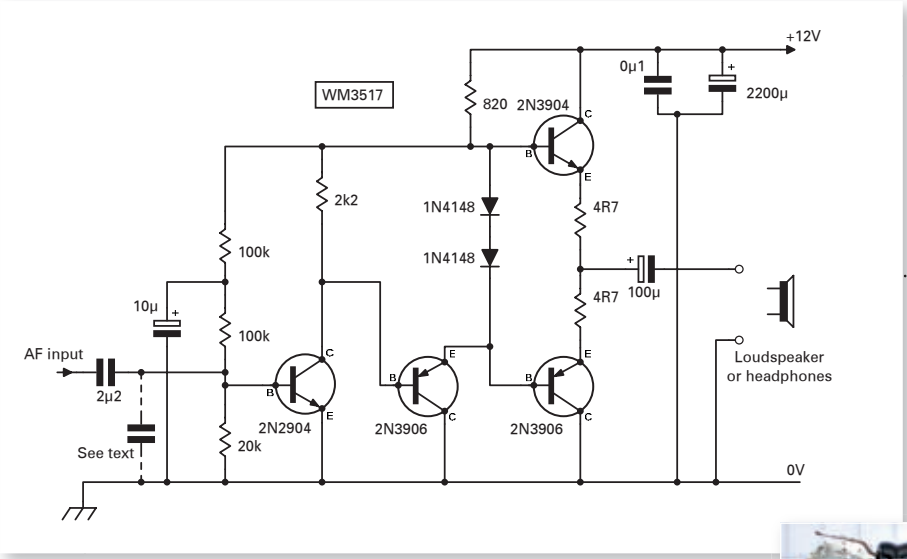


Fig. 3: A further development, which uses a Sziklai pair for pre-amplification to drive a Class A-B complimentary pair of output transistors using 2N3904 and 2N3906 devices.

amplifier in a simple direct conversion receiver

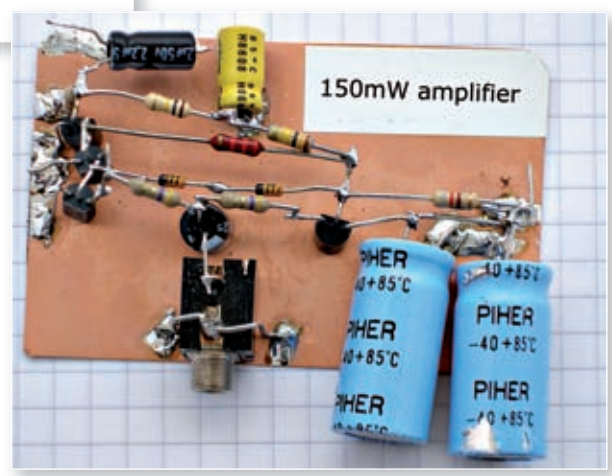
The Sziklai pair is named after its inventor **George C. Sziklai**. George Clifford Sziklai (1909 – 1998) was educated at the University of Budapest and the Technical Institute of Munich. He eventually emigrated to New York in the 1930s and his long career included work at The Radio Corporation of America (RCA) and the Westinghouse Electric Corporation before he joined Lockheed's Palo Alto Research Laboratory in 1967. Sziklai, who held some 200 patents, is also credited with constructing the first Image Orthicon television camera. Incidentally, 'Sziklai' is pronounced '*Sick-lie'.*

Two Transistor Amplifier

The diagram, **Fig. 2**, shows a little two transistor audio amplifier designed by SM7UCZ and based on the Sziklai pair. It could use almost any complimentary pair of *npn* and *pnp* transistors, but here I use the commonly available 2N3904 (*npn*) and 2N3906 (*pnp*) devices. It should be capable of up to 60dB of gain making it suitable for many applications. Although the output is only in the order of 10 to 20 milliwatts (20mW), it can drive a 64Ω small loudspeaker in a quiet location.

Although small 64Ω loudspeakers can be culled from a variety of domestic equipment, they aren't easy to obtain. I used the pair of stereo headphones from my Ipod – a Christmas gift from my sons in their vain efforts to drag me into 21st century respectability! Wiring a 3.5mm stereo jack socket, so as to connect the earpieces in series and makes the headset very useable for the little amplifier.

I very quickly built the little Sziklai amplifier mounting the component parts 'ugly-style' over a small piece of copper clad board. A few tests, using a PP3 9V battery as the power supply, showed that in spite of its simplicity, it's a very useful little amplifier.



One of the tests was connecting the amplifier up to the Sudden receiver described in the April edition of this column. It proved to have enough gain to allow me to hear many stations on the 7MHz (40 metre) band version of a Sudden. So, if you're looking for a small, high gain, audio amplifier built from discrete components – this circuit should suit your needs.

Having suggested the little Sziklai amplifier, Johnny SM7UCZ sent me a further development shown in **Fig. 3**. This amplifier uses a Sziklai pair for pre-amplification to drive a Class A-B complementary pair of output transistors. Again 2N3904 and 2N3906 devices are used in the output stage. The diodes provide bias for the complementary pair and the two 4.7Ω emitter resistors help to stablise the output stage. This amplifier has a gain of some 50dB and is capable of 150mW of audio output – so it can drive a 'real' loudspeaker. A 1mV input signal should achieve 150mW of audio output. So, this is a very viable little discrete audio amplifier.

Just like the Sziklai amplifier, the 150mW amplifier was simple to build using 'ugly' construction techniques. When it was completed and powered up, a wet finger on the input lead produced enough hum in the loudspeaker to show it to be a more than useful amplifier! The amplifier drove a 127mm (5in) communications loudspeaker and generated relatively little background noise. The next task was to see if it was capable of use in a DC receiver with a passive diode ring mixer.

The passive diode ring mixer actually attenuate the signal in the mixing process, so plenty of audio gain is required to produce a reasonable output signal. Note that an additional capacitor can be added at the base of the input transistor to provide a rudimentary c.w. (Morse) input filter.

Receiver Mixer

The diagram, **Fig. 4**, shows a receiver mixer using a diode ring double balanced mixer. The circle represents the function of the mixer. There are three ports; the **Input**, the **Local Oscillator** and the **Audio Output**. The input frequency (F1) is introduced at one port and the local oscillator (F2) is introduced at the second port. These frequencies are then mixed with the result that F1 + F2 and F2 - F1 plus F1

Continued on page 52 ☛

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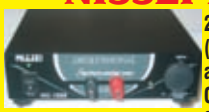
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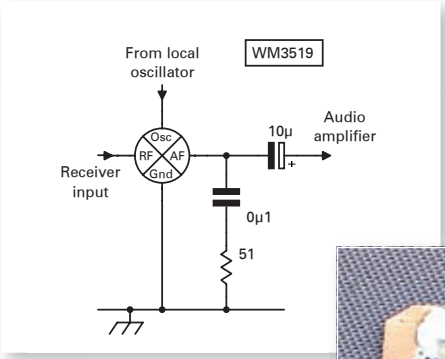
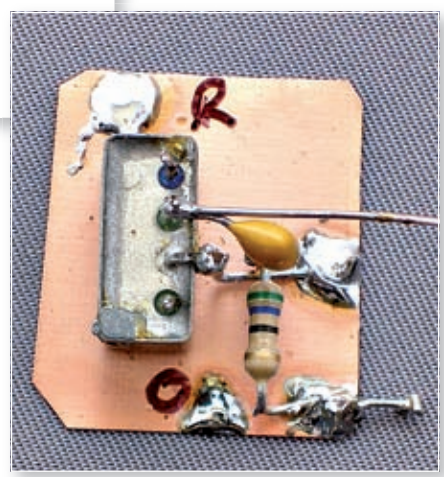


Fig. 4: A receiver mixer using a diode ring double balanced mixer. There are three ports; the Input, the Local Oscillator and the Audio Output.



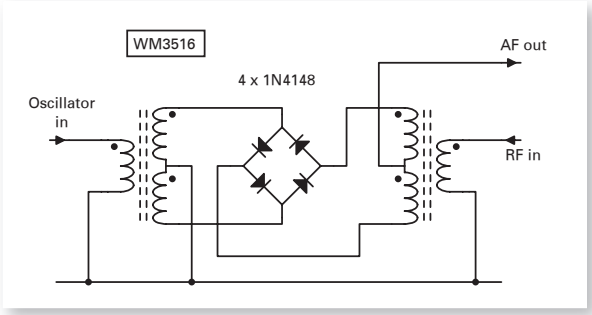


Fig. 5: A circuit for a home-made diode ring mixer.

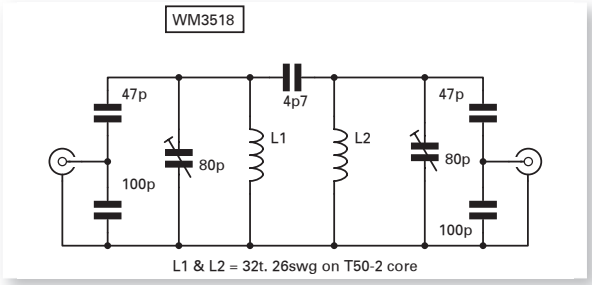


Fig. 6: A suitable band-pass filter for the 7MHz band. The capacitance is varied in conjunction with home-wound fixed frequency inductors.

and F2 appear at the output port. The desired frequency is usually selected for amplification.

When used in a simple DC receiver design – only F1 and 2 are eliminated with a radio frequency filter. Both mixed signals are amplified with the result that the upper and lower sideband signals can both be heard.

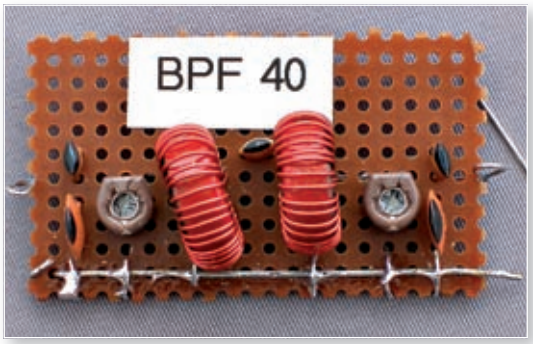
Note: An important feature is that the mixer, because of the balance of hot carrier diodes and transmission line transformers, cancels even harmonics of both the input and local oscillator frequencies and provides isolation between the ports.

Diode ring double balanced mixers can be bought in a packaged form. Perhaps the commonest example is the SBL-1 d.b.m. (double balanced mixer). These aren't cheap but they certainly perform very well! I did my tests with the smaller (and cheaper) TUF-3, although the even cheaper TUF-1 would have served the purpose. The d.b.m. mixer packages are made by Mini Circuits in the USA but are available from many UK radio component specialists.

A circuit for a home-made diode ring mixer is shown in **Fig. 5**, and I've described the making of such a mixer in previous editions of this column. However, it's worth mentioning that that experienced constructors won't find them difficult to make, except that they do require the winding of two trifiliar-wound transformers.

In practice I've have found that six trifiliar turns wound on an FT37-43 core has worked well for me. A problem for a novice could be sorting out the correct phasing for the windings and to help, these should be as indicated by the dots in the diagram.

Using my TUF-3 mixer, I built up the little circuit shown in Fig. 4, and attached it to the amplifier. It used an existing 7MHz variable frequency oscillator to feed the oscillator port and I simply connected an antenna to the input port. The arrangement certainly functioned as a 7MHz band receiver. I heard plenty of stations but the lack of input tuning also gave me some broadcast station break-through. However, the test was enough to prove that the 150mW amplifier could provide enough amplification following a diode ring mixer.



The next obvious step was to provide some input tuning to obtain better selectivity. Gone are the days of those delightful Toko 10K short wave coils in a can that made the building of band-pass filters so easy. The inductance of the 10k series could be altered using a variable dust iron core. As an alternative the circuit, **Fig. 6**, shows a suitable band-pass filter for the 7MHz (40 metre) band in which the capacitance is varied in conjunction with home-wound inductors of fixed frequency.

The diagram in Fig. 6 shows two tuned circuits for the required frequency loosely top-coupled with a 4p7 capacitor. I've illustrated it show that the tuned circuits are symmetrically arranged for a low impedance input and output, as the input to the mixer is 50Ω and the common standard impedance for Amateur Radio antenna input is also 50Ω.

The 47pF and 100pF capacitors form a capacitive divider network to give low impedance input and output to and from the filter. Two trimmer capacitors adjust the frequency and L1 and L2 provide the inductance of the tuned circuits. Adjusting the filter is a compromise job. I usually do it by ear; adjusting the trimmers for the best signal reception on the band. A good approach is to adjust both trimmers for the best results at the low end of the band, and then repeat the operation for the high end of the band.

I usually go back and re-adjust the settings again for the low end of the band. The addition of the filter certainly made a lot of difference – and I found myself using a rather good 40 metre receiver. The Sziklai based 150mW amplifier can certainly cope with a diode ring mixer and even trying the very simple Sziklai pair amplifier in Fig. 2 gave reasonable results using headphones. Mitt tak ('My thanks') go to to Johnny SM7UCZ for a very useful idea! ●

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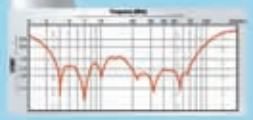

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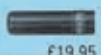

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David Butler's

vhf dxer

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

This month david butler g4asr has suggestions of how to work with weak signals and details of how to make a satellite contact.

As expected, there was very little in the way of significant propagation to report during March. Stations active on the 50MHz band did notice some form of E-layer enhancement between 1100-1200UTC on March 27th with the stations of EA3LL (Spain JN01), EA3TI (JN11) and EA6SA (Balearic Islands JM19) being contacted by UK operators. The 70MHz band was fairly quiet during the period although there were some RSGB activity contests that livened up the band on a few occasions.

Surprisingly there was one report of an auroral opening that reached the 144MHz band. It was caused by a coronal hole, not to be confused with a sun spot, and it occurred around 0230UTC on March 13. The only station to report the brief opening was GM4IPD (Scotland IO87) who heard the Swedish beacon SK4MPI (144.412MHz) peaking 52A. So apart from those transitory events that was nothing else to report but at least we have the Sporadic-E season to look forward to!

Band Activity On 70MHz

During January, February and March the RSGB v.h.f. contest committee (**www.vhfcc.org**) organised a series of five cumulative 70MHz contests. Each was of 2-hour duration held between 1000-1200UTC on a Sunday morning. It certainly created much wanted activity with many stations active from all areas of the UK. Amongst the s.s.b. stations active were GD0EMG (IO74), GD3UMW (IO74), GD4GNH (IO74), GI4KSO (IO64), MI0AYR (IO64), MI0RSN (IO74), GW3TKH (IO81), GW3XJQ (IO71) and GW8ASD (IO83). There was a reasonable amount of activity from Scotland with stations that included GM0USI/P (IO76), GM4AFF (IO86), GM4DIJ (IO85), GM4JR (IO85), GM4VVX (IO78), GM6VXB (IO97) and GM8BBA (IO75).

Many of the tropo paths were quite long around 400-600 kilometres, indeed one of the longest distance contacts made during the cumulative contests was between the stations of G4RFR (IO90) and GM4AFF (IO86) at 673 kilometres. Normally there's not much of an issue making contacts over these distances, especially at 144MHz, but tropospheric propagation on the 70MHz band is particularly difficult at times. On paths of only a few hundred kilometres and sometimes much less the received signals will often possess considerable fading. It's certainly nothing like that experienced on the 144MHz or 430MHz bands where the fading (QSB) may only last a few minutes or so.

Down on the 70MHz band the QSB is very deep and often lasts five or more minutes at a time. On many occasions you can hear a signal pop out of the noise to remain audible for a few minutes before promptly disappearing never to be heard again. Most operators would then move on to find another station to work but there one way of dropping into a more structured approach of making the contact.

Weak Signal Procedure

Now to look at weak-signal procedure when attempting v.h.f. contacts. Imagine that two stations can hear each other but signals are very weak and suffering from considerable fading. Ordinarily both stations start shouting at each other, often at the same time.

Somehow you need to be able to drop into a timed period mode to enhance the chance of making a QSO. But which station starts the first timed period? This may simply be achieved from the way you are beaming your directional antenna.

So, for example, if you hear a station when you are beaming west (or north) and **hopefully** the other station is beaming east (or south) then both stations can drop into a timed sequence because they will know roughly where the other station is located. Indeed if you've identified the call sign of the other station you can often find out exactly where they are located from numerous Internet web pages.

A calling sequence of alternate 15 seconds periods should be used by the operators. Stations located in the north or west of the path starts the first 15-second period. Each operator then calls each other alternately until contact is established. So for example, if the station of MI0AYR answers my 'CQ' and promptly disappears into the noise (as has happened previously in RSGB 70MHz contests) I could drop into the weak-signal procedure.

The station of MI0AYR is located north-west of my QTH and therefore he uses the first 15-second calling period. Incidentally this could either be first quarter of 0-15 seconds past the minute or the second quarter (30-45 seconds past the minute). I would reply in the second and fourth periods, 15-30 seconds and 45-60 seconds of the minute. This process may be continued until a complete contact is established. This procedure may not work in all circumstances but at least it is worth giving it a try. From my QTH in Herefordshire a contest QSO with MI0AYR is worth 370 points (1-point per kilometre) – so to me it's clearly worth while!

Maybe you could try this procedure during the 70MHz PW contest that is being held between 1100-1700UTC on Saturday 13th June. With a 10W output limit there will be a considerable number of stations with signals right down in the noise! It's going to be tortuous especially as it is 6-hours in duration. Hopefully there will be some Sporadic-E propagation to liven things up – but if not you'll just have to practice listening for the weaker signals.

Satellite Operation

I've recently noticed that a number of stations, particularly novices, are

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

The 144MHz / 430MHz satellite antennas at the QTH of Greek station SW1JGW

now using low-earth orbiting satellites such FO-29, SO-50 and even the International Space Station (ISS). The three Oscar satellites however, that appear to get the most usage, are AO-7, AO-51 and VO-52.

Surprisingly **Oscar-7** was launched in November 1974, making its 35-years in orbit not bad for a satellite with a 3-year anticipated lifetime! Even more surprising is that AO-7 actually suffered a catastrophic battery failure in 1981 and became completely non-operational. But in 2002 it had sprung back into life when one of the shorted batteries became open circuit and the satellite was able to run off its solar panels. The only problem is that AO-7 becomes unusable when it is in eclipse as there's often insufficient power supplied to the transmitter and this causes severe frequency modulation of the narrowband signals.

It appears however, that for the foreseeable future the satellite is usable between late autumn and well into the spring period. The satellite currently alternates between two different operating bands, Mode-A and Mode-B, both using a linear transponder for c.w. and s.s.b. operation. Mode-A receives an uplink between 145.850-145.950MHz and retransmits the downlink between 29.400-29.500MHz.

To help identify the satellite there's a c.w. beacon operating on 29.502MHz. Mode-B has an inverting transponder that receives an uplink between 432.125-432.175MHz and retransmits the downlink between 145.972-145.925MHz. There's also a c.w. beacon operating on 145.9775MHz.

In March 2009 the station of **G1WPR** reported making Mode-B QSOs with G7BTA, MW0BBU, 2E1EUB, 2M1EUB/P, AJ9K, DJ3AK, DH5MK, DO8CW, EA3LW, EC4CLR, F1UGK, F2IL, F5APQ, IK1RAN, K1VZI, K2BMI, K3SZH, OH8MBN, PA1TNO, PE1BVQ, PH7PCF, SV1EEX, UA9CS, UA9FDZ, UR5BFX, WB2OQQ, YT3N, 9A2SB and 9A2TK. The station of **G7BTA** reported making very similar contacts during March but also managed to find the stations of AA9LC, CU2JX, IW5EMJ, KC9ELU, SP6DCO and SP9FPP.

On-Board Transponders

The **VO-52** satellite was launched in May 2005 and has two on-board transponders. One is Indian and to identify when it's operational it transmits an un-modulated carrier on 145.936MHz. The other linear transponder is Dutch and when that's operating, it transmits a c.w. beacon on 145.860MHz. The Indian Mode-B inverting transponder receives an uplink between 435.220-435.280MHz and transmits the c.w. and s.s.b. downlink between145.870-145.930MHz. The Dutch Mode-B transponder is fairly similar, receiving an uplink between 435.225-435.275MHz and transmitting the downlink between145.925-145.875MHz.

Among the UK operators using this satellite are the stations of G0FGX, G0PQO, G1IVG, G4DPZ, G4UNX, G7LJA, G7SVF, M0CBG, GM0ICF and MW0BBU. Their recent contacts have included the c.w. and s.s.b. stations of DO1SAJ, EA2CNC, EA3LX, EA8TJ, EB8BRZ, F6EWB, IZ5FSO, I/SP6HFT, LY3UE, OH3DP, OK2FR, OM3WAN, PA3EAQ, RW3ADB and S53CC.

The **AO-51** satellite was launched in 2004 and is quite a complex spacecraft. It contains four v.h.f. receivers, two u.h.f. transmitters, six modems, 56 channels of telemetry and various other subsystems. The two u.h.f. downlink transmitters are connected to two antenna

arrays, one in the right-hand circular polarisation (r.h.c.p.) and one in the left-hand circular polarisation (l.h.c.p.). Transmitter-A (435.150MH) is connected to the l.h.c.p. antennas and is often used for digital modes.

On AO-51, transmitter-B (435.300) is often used for analogue communication and is connected to the r.h.c.p. antenna. The most interesting aspect of AO-51 is that it contains two f.m. voice repeaters. A low power (QRP) repeater operates with an uplink on 145.880MHz and a downlink on 435.150MHz. The other f.m. voice repeater has an uplink frequency of 145.920MHz and a downlink on 435.300MHz.

Angus Young M0IKB mentions that he has got his tiny Yaesu VX-2R 144MHz/430MHz handheld transceiver programmed with all the f.m. Oscar satellite frequencies and can at times hear the downlinks with little difficulty. Recently there was a good high pass of AO-51 so he thought he would have a listen with the VX-2R handheld in the back garden. Just to make sure he heard something he arranged for his 11-year old son **Cameron 2E0BAU** to be in the shack using the main station Yaesu FT-817 transceiver running 5W output.

The VX-2R, incidentally, only runs 1.5W output on 144MHz and 1W output on 430MHz. As the satellite came up over the horizon the f.m. downlink was immediately heard, although Angus had to keep turning the handheld around for best reception. He heard Cameron calling and eventually managed to get a 33 signal report back from him. (Angus reckons that Cameron should have given his dad a better report than that!) It was hard work but great fun and although only about 30m apart the f.m. contact via AO-51 was actually around 1550 kilometres.

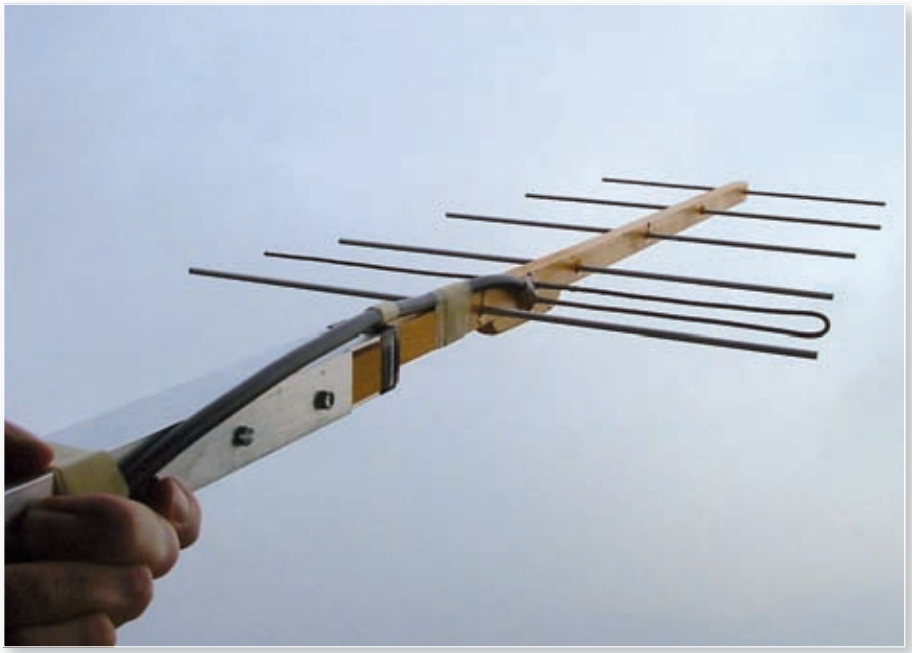


Fig 1: Handheld 6-element Yagi for the 430MHz band.

Feet In The Water

If you fancy dabbling your feet in the water here's a few tips that you may find useful when using f.m. satellite repeaters. **Rule one**: turn your receiver squelch off completely. Working f.m. satellites starts off as a process of finding weak signals – so don't expect the satellite to be strong enough to break the squelch like your local repeater would. Yes it's noisy – but that's all part of the process. Noise can also be an aid in locating the satellite because when the frequency starts to exhibit quieting, that's a good indicator that you're hearing the satellite and you should get ready.

Don't hold the whip antenna upright as the satellite is not on the ground ahead of you. It's up in the sky so, tilt the handheld around for maximum signal strength. You'll be surprised at the difference. Of course you have to try to maintain the same posture whilst transmitting! A whip antenna might give you a partial QSO but you should really use a good antenna with your handheld radio. Using a simple handheld 6-element Yagi, as shown in the photograph, **Fig. 1**, will be considerably better.

The summer Sporadic-E season should now be under way with daily openings on the 50MHz band to all parts of Europe and beyond. In 2008 there were also transatlantic openings during the last two weeks of May to stations in Barbados (8P), Dominican Republic (HI), French Guiana (FY), Puerto Rico (KP4), St. Barthelemy (J5), St. Kitts & Nevis (V4), Trinidad & Tobago (9Y), Venezuela (YV) and Virgin Islands (KP2).

The 70MHz band will of course be open to many European countries and if you're lucky you might catch that elusive opening on the 144MHz band. When you do hear or work any DX stations on the v.h.f., u.h.f. or microwave bands then please send me your reports - or any other news - to reach me before the last Saturday of the month. Of course – don't forget the *PW* QRP contests on 70 and 144MHz in June!

73 David G4ASR

The *Practical Wireless* VHF Contests – A Reminder!

The first *PW* 70MHz Low Power Contest takes place on Saturday June 13th 2009 between 1100 - 1700 hours UTC. The contest introduction by the Contest Adjudicator **Colin Redwood G6MXL** and the full rules were published in the May 2009 issue of the magazine. See the website **www.pwcontest.org.uk/** for full details.

The 26th *PW* 144MHz QRP Contest takes place on Sunday June 14th between 0900 - 1600 hours UTC. The full contest introduction and rules by the Contest Adjudicator **Colin Redwood G6MXL** are published in this issue. See the website **www.pwcontest.org.uk/** for more details.

Colin Redwood's

what next?

This month Colin Redwood G6MXL encourages everyone to try entering two friendly contests.

Colin Redwood G6MXL
PW Publishing Ltd.,
Arrowsmith Court,
Station Approach,
Broadstone,
Dorset BH18 8PW
E-mail: what.next@pwpublishing.ltd.uk

This month I'm going to look at two topical subjects. First, to help readers prepare for the *Practical Wireless* 70MHz Low Power Contest on Saturday June 13th 2009, I'm going to summarise the various ways of getting on the 70MHz (4 metre) band. Secondly, I'm also looking at changes to the syllabus for the Foundation and Intermediate licence exams that become effective for exams taken after June 1st 2009.

Four Metre Band Introduction

For many years the 4m band (around 70MHz) was only available to Amateurs in the UK, the Republic of Ireland, Gibraltar and the UK Sovereign bases on Cyprus. However, in recent years Radio Amateurs in many other European countries, together with South Africa and Somalia, have obtained allocations around 70MHz.

Typically, following pressure from a country's Amateur Radio population via their national societies, the band is released by the regulatory authority in the country to a small number of nationals for a period of a year or so. And, if there are no problems the 70MHz allocation is extended to a wider Amateur population with time.

At the time of writing, some Radio Amateurs have, or have had, allocations around 70MHz in Denmark, Slovenia, Croatia, Faeroe Islands, Greenland, Italy, Germany, Greece, Luxembourg, Monaco, Somalia, South Africa, Portugal, Hungary, Czech, Estonia, Poland and Norway. Unfortunately, some of the allocations are very limited in terms of the number of Amateurs permitted to operate on frequency allocations, some of which are outside the UK allocation. Power limits vary from 10W effective radiated power (e.r.p.) to 3kW!

There's still an official broadcast band allocation using wide-band frequency modulation (w.b.f.m.) around 70MHz in many parts of Eastern Europe. When propagation is good stations operating here can make it a bit of a challenge to hear weak narrow band amateur signals!

The 70MHz Band Plan

If you are not familiar with the 70MHz bandplan, I suggest that you take a look at the *PW* 70MHz Datacard that was presented free with the November 2008 issue of *Practical Wireless*. (Available from the PW Publishing Ltd. Book Store).

Four Metre Equipment

Over the years, the 4m band – with few exceptions – has not been well served with Amateur equipment from the Japanese manufacturers. However, there has been a lot of private mobile radio (PMR) gear produced by a number of manufacturers that can be used, either as supplied or, following conversion to 70MHz.

Converting ex-PMR transceivers on to the Amateur bands is not just confined to the 70MHz band. It's also a common technique for getting on to the 144MHz (2m) and 430MHz (70cm) bands. If you decide to have a go, make sure that you check the polarity of older equipment – some may have the chassis connected to the **positive**, rather than the more common and more recent negative earth standard.

Yaesu Transceivers

Some versions of the (now discontinued) Yaesu FT-847 **(Fig 1)** high frequency (h.f.) , 50MHz (6m), 144MHz and 430MHz multi-mode transceiver have enabled operation on 70MHz. However, when operating on 4m, there were reports of a lack of sensitivity on receive, with some inefficiency on transmit, only giving in the region of 10 to 20W output when drawing up to 20A

Nevertheless, using Yaesu equipment has been a popular way of getting on to the 4m band and it was by using (an unmodified) Yaesu FT-847 that **Andy Kissack GD0TEP** in making what he's claiming as the first moon-bounce contact on 70MHz with Willems Badenhorst ZS6WAB in South Africa. Perhaps the limitations have been overstated a bit!

The 70MHz web site at **www.70mhz.org**/ has a detailed description by

Fig. 1: The Yaesu FT-847, some versions of this now discontinued transceiver can operate on 70MHz.

Fig. 2: The Icom IC-E90, this popular hand-held transceiver can be purchased equipped for 70MHz.

Fig. 5: The 144 to 70MHz Microwave Modules transverter, can still occasionally be picked up second-hand. There's also a 28 to 70MHz version.

Keith Naylor G4FUF, of some modifications that can be made to increase FT-847's transmitter output power to 75W. **Note:** A couple of receive pre-amplifier are also available from Keith.

The Icom IC-E90, **Fig 2**, hand-held 50, 144 and 430MHz f.m. transceiver is available in a special version also covering 70MHz, from **Martin Lynch and Sons**. **Note:** A favourable review of its capabilities on 70MHz is included on the Four Metre web site.

Garex Electronics, who advertise in the Classified Adverts in the back of *Practical Wireless*, are now producing the AKD 4001 f.m. transceiver, **Fig. 3**.

Fig. 3: The Garex AK4001, a 25W 70MHz f.m. transceiver.

Using Transverters

Another way of getting on to 4m is to use a transverter. A transverter is a item of equipment that allows you to use a transceiver designed to operate on one band to transmit and receive on another band. On transmit, the transverter takes a low-level output from the transmitter (often in the 28MHz band) and mixes it with another signal (42MHz) to arrive at 70MHz in our case. On receive, the transverter converts the 70MHz signal down to 28MHz where the receiver section of the transceiver working on that band is actually used as a tuneable intermediate frequency (i.f.), see **Fig. 4**.

When operating, the display of the transceiver shows the low-level output frequency from the transmitter, but you are actually transmitting on another band. So for example, when the transmitter is showing 28.200MHz, the transverter is actually transmitting on 70.200MHz.

Over the years there have been several manufacturers of transverters including Microwave Modules, **Fig 5**, BNOS and RN Electronics. Today in the UK the only supplier seems to be *PW* advertiser Spectrum Communications in Dorchester who offer kits and ready-made transverters. Have a look at **www.spectrumcomms.co.uk**/

Two Warnings

Two warnings need to accompany the use of transverters. Because the user isn't 'seeing' the actual frequency, it's easy to transmit out of band. For example when the transmitter is showing 28.600MHz, the transverter would actually be transmitting on 70.600MHz, which of course is above the UK 70MHz band. (Our 70MHz band is from 70 to 70.500MHz). To overcome this, the Kenwood TS-2000 even has a special transverter setting to enable the display to show the correct frequency, **Fig 6**.

The second warning concerns the power delivered from the transmitter to the transverter. Most transverters are expecting a few milliwatts (exceptionally up to 10W) of drive. Putting 100W into a transverter is likely to produce smoke and a failed unit! **Note:** Some transceivers have auxiliary outputs designed to give much lower power for use with transverters.

Kits For 70MHz

Spectrum Communications also produce kits for several 70MHz projects. These include *The*

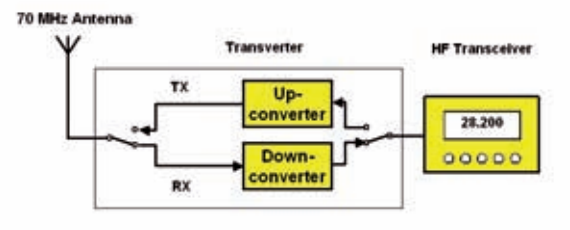


Fig. 4: A block diagram of a transverter.

Fig. 6: The Kenwood TS2000 can configured to display the correct 70MHz frequency when used with a transverter

Fig. 7: A Tonna 50MHz antenna 'pruned' for 70MHz operation, by reducing all dimensions to 5/7ths of the original size.

Fig. 8: The latest edition of the Intermediate Book incorporating the new syllabus for exams taken from June 1st 2009.

Poundbury, a complete 4m s.s.b. transceiver which was described by **Tony Nailer G4CFY**, in the *PW* June 2006 issue and The *Mellstock*, a 4m amplitude modulated (a.m.) transceiver featured in the *PW* September to November issues in 2005, and receive converters to enable 70MHz signals to be heard on 144MHz or 28MHz receivers.

Incidentally, breakthrough can occur on occasions. For example, when I was using an old Microwave Modules transverter, I used to suffer breakthrough from UK broadcast stations in the Band II 88 to 108MHz band. I found that taking the band-pass filter out of a 'dead' ex-PMR transceiver and installing it between the 70MHz antenna and the transverter was an effective solution.

Antenna Designs

There are a number of designs for 70MHz antennas. A wire dipole can easily be made, but for something with a little more gain, my own favourite is to 'prune' a 50MHz (6m) 5-element yagi antenna from Tonna to 5/7ths of all of its dimensions, **Fig 7**. I described this in *PW* way back in September 1994, and it was also re-printed in *PW*'s *More Out of Thin Air* book. This makes an excellent yagi for the band. For feeder, UR67 or RG213 is ideal for the band, although RG58 is starting to get a bit lossy at these frequencies, especially for longer runs.

If readers are looking for a ready built antenna, then *PW* advertisers Moonraker supply halo, half-wave vertical, dipole, HB9CV and Yagi antennas for the 70MHz band. Specialist antenna supplier Sandpiper also list 4m dipoles, the HB9CV and Yagi antennas amongst their range. **Note:** There are a number of other antenna suppliers listed on the 4m web site at **www.70mhz.org**/ and has plenty of information about the band, together with the latest news of new allocations.

Calling CQ Contest!

Finally, I'll provide a quick reminder that the rules for the first *Practical Wireless* 70MHz Low Power Contest appeared in the May 2009 issue of *PW*. The contest takes place on **Saturday June 13th**.

Foundation & Intermediate Syllabus

For examinations taken after June 1st 2009, there are changes to the examination syllabus affecting the Foundation and Intermediate Exams. Candidates and their Tutors need to make sure that they are working to the correct syllabus. The current syllabus applies to exams up to June 1st 2009.

Foundation Licence

For the Foundation Licence, there's one quite small change to introduce the concept of conductors and insulators. Candidates will need to know that only certain materials, such as most metals, conduct electricity and many other materials such as plastics, glass and ceramics don't conduct electricity and are termed insulators.

Intermediate Examination

For the Intermediate exam, the changes are mainly aimed at improving the understanding of candidates in the 'Technical Basics' part of the syllabus. This is so that they have a better grasp of topics such as alternating voltage and currents, reactance and impedance before progressing to the Advanced Licence. There are also minor changes in several other parts of the syllabus.

So, what do these changes mean to course Tutors? Without doubt those giving the technical basics part of the Intermediate Course will be most affected. In reality, the changes aren't major but each will need to be considered to ensure that candidates are well prepared for the exams after June 1st 2009.

There's an updated edition of **Steve Hartley G0FUW**'s, *Intermediate Licence* book, which will include coverage of the revised syllabus, **Fig 8**.

Whilst on the subject of training courses, Steve G0FUW, **Alan Betts G0HIQ** and **Brian Reay G8OSN**, have produced a maths primer that may help candidates that are struggling with the necessary mathematics and manipulation of formulae for the Advanced examination. This can be downloaded from the RSGB web site at **www.rsgb.org/tutors/advanced/mathshelp.php**

Data Interface

Fred Houghton G3VZM has written in to suggest a precautionary improvement to the circuit of the data interface published in the February 2009 issue of *PW*. Fred suggests the provision of an on-off switch in the USB supply and points out that – potentially – the transceiver could start transmitting as a result of other sounds such as those that Windows produces.

Cutting the d.c. supply wouldn't resolve the problem totally, as just the presence of the audio could trigger a transmitter if it was set to VOX operation. I've disabled all the miscellaneous sounds produced by Windows and other applications running on my computer. Another option is simply to unplug the interface from the transceiver or computer when not using it for data modes. I'll leave readers to decide which approach they prefer to adopt. ●

Phil Cadman's

valve & vintage

Valve characteristics needn't be considered a 'black–art'!

It's Phil Cadman G4JCP's turn to man the V&V shop this month so, it's over to him as he explains some valve characteristics.

Hello and welcome to a nice warm Valve and Vintage 'shop'. Indeed now the weather is a good deal more temperate than of late, I no longer need to wear two pullovers under my brown dust coat. What a relief!

Last time I made a plea – on behalf of the **Black Country Living Museum** here in Dudley – for photographs, documents and anecdotes relating to radio shops of the mid–1930s. Sad to say, I've received no response to my request. Please, if you have anything relating to radio shops from around the 1930s, do get in touch. Don't think what you have is unimportant or of no interest.

Tempus Fugit

The sad fact is, we're all getting older, and we who have more a few 'turns on the coil' find time passes at an ever increasing rate – tempus fugit! I was recently talking to a 'G3' friend of mine (who I shall not name, so not to cause him embarrassment, or myself any subsequent actual bodily harm) about this very subject. During our conversation he lamented that he no longer felt happy about 'playing' with valved equipment because of the high voltages involved.

I can appreciate what he meant. While I have never had any serious mishaps with high voltages (well, except once, and we won't go into that) I do find I have to be more careful these days. Less than steady hands, and eyesight, which isn't what it used to be, makes messing around with high voltages that little bit more tricky. But as long–time readers of this column will know, valves don't necessarily need high voltages.

In my June 1999 column (was it really 10 years ago!) I mentioned a range of valves which could operate from a 12V supply. Made for use in car radios, these valves were used in all stages of a superhet radio save for the audio output. While American low–voltage valves were specifically designed for that purpose, European versions appear – with maybe one or two exceptions – to have been selected mains voltage types.

There's always been anecdotal evidence of this variation, and it appeared to be confirmed when I bought an ECH83 and an EBF83, both '12V' valves. Yet they had manufacturers' codes for their 'normal' counterparts – the ECH81 and EBF89. Some enthusiasts have examined the ECH83 in detail and have come to the same conclusion: **www.radiomuseum.org/forum/ech83_qru.html**

Uncanny Resemblance

Even the ECC86, a v.h.f. double–triode made specifically for use in v.h.f. f.m. car radios, bears an uncanny resemblance to some examples of the mains voltage PCC189. Could it be, that simply using 'mains' valves at low voltages be the answer to my friend's predicament?

Furthermore, using valves at low voltages would allow people who didn't grow up with valves – and who may not be comfortable with high voltages – to build valved receivers and other valved equipment. That would also apply to youngsters, who could be safely introduced to valves without the hazard of high voltages.

While mains valves consume very little anode current at these low voltages, their heaters still need considerable power. That makes battery operation unattractive, so unless portable operation is essential, using the mains supply is far better. There's then no compelling reason to stick with a supply voltage of just 12V. For example, a 12V a.c. plugtop adaptor solves any power supply safety issues, and can be voltage doubled to give an anode supply of 24V or so. A supply voltage of 50V – easily obtained from a 24–0–24V transformer – would be even better,

Fig. 1: PL509 and EF80 TV valves. The PL509 could be used for audio output.

and allow some mains valves to produce sufficient audio power to drive a loudspeaker.

In fact, years ago, when American farms had 32V d.c. supplies, several manufacturers made radios which operated directly from this low voltage. Called (you guessed it!) **farm radios**, they often used a pair of RCA **Type–48** valves in the audio output stage. Although the 48 was intended for use in sets which ran from 115V d.c. mains, a pair could (just about) drive a loudspeaker with a mere 30V on their anodes. So why not spend a few idle moments this summer thinking about adapting an existing valved design for operation at 24V or 50V.

There's scope for new circuits too. Getting sufficient audio power (and r.f. power) is a problem at low anode voltages. But we can be a little 'creative' here. Curves for the **PL509** TV line output valve when triode connected predict that over 1W of

Phil Cadman G4CJP
21 Scotts Green Close,
Scotts Green,
Dudley,
West Midlands DY1 2DX
E-mail: phil@g4cjp.freeserve.co.uk

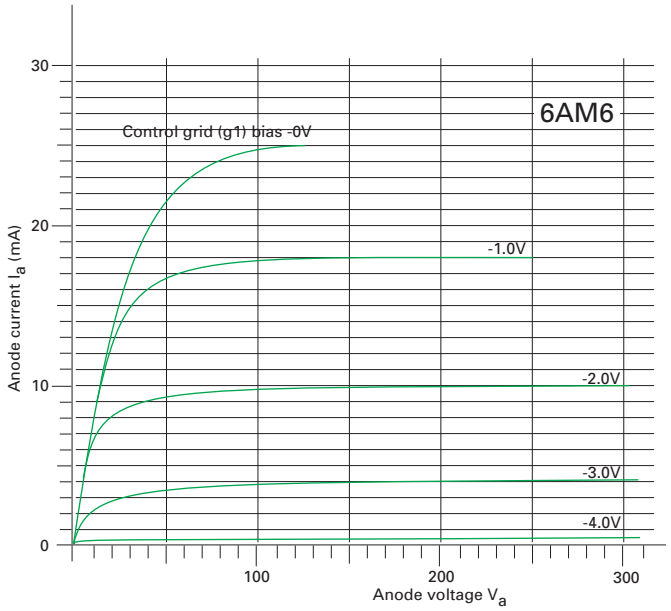


Fig. 2: A sharp cut–off pentode – 6AM6/EF91, showing anode current against anode voltage.

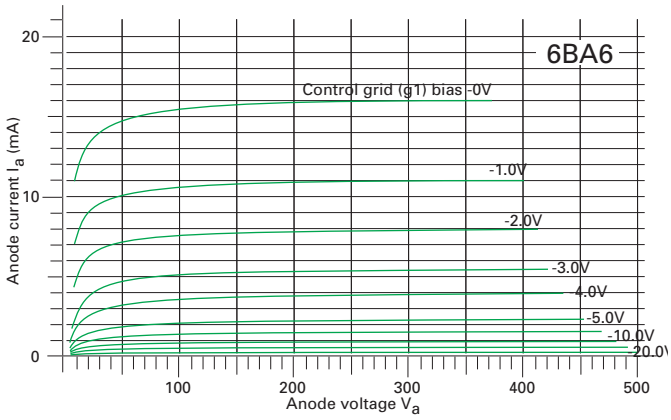


Fig. 3: A remote cut–off pentode – a 6BA6/EF93, showing anode current against anode voltage.

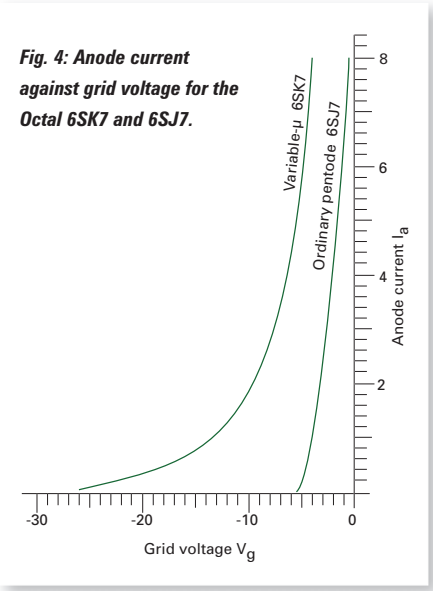


Fig. 4: Anode current against grid voltage for the Octal 6SK7 and 6SJ7.

audio could be generated with a 50V supply. That should increase to around 2W when pentode connected, and there's a chance a pair in pushpull might produce an earsplitting 5W! A pair of PL509s, **Fig. 1**, would sound quite impressive too!

Other valves designed for use in television sets are also likely to work well at low voltages, for example, the high–gain (high–μ) triodes used in r.f. tuners. Then there are video, frame and audio output valves, and i.f. amplifier valves like the **EF80**, which was extensively used in v.h.f. TV sets – see Fig. 1 again. Interestingly, a graph in a 1951 Philips EF80 data sheet shows curves for anode voltages between 10V and 50V. So it seems the manufacturers themselves considered the valve suitable for use at low voltages.

Happy Coincidence

By a happy coincidence, the Spring 2009 edition of *SPRAT* (the journal of the **G QRP Club**) has an extremely interesting article by **Duncan Telfer G8ATH** about running valves at low voltages. Duncan has built a (rather cunning) valve tester specifically for producing the characteristic curves of valves operating at low voltages. His findings confirm the potential of the EF80, and also of the ECC189 (the 6.3V heater version of the PCC189). His results also indicate the 6AK5, ECC82, ECC84, ECC85 and ECC91 types should be good performers too.

Both the ECH83 and EBF83, which I mentioned earlier, are variable–gain (vari–μ) valves. I've occasionally used this term before and it occurred to me that I've never explained what it means. So here goes!

Valves have three primary parameters. These are: **anode resistance** (ra), **mutual conductance** (or transconductance – gm), and **μ** – also known as voltage gain. I won't define the terms here as any reasonable valve book will tell you all about them. All we need to know is that both μ and gm are indicative of the gain of a valve.

The 'classic' pentode curves of the **6AM6/EF91**, an r.f. pentode often to be found in Amateur Radio design books. The data–sheet describes the valve as a 'sharpcutoff' type. You'll see from the curves that as the control grid is made more negative (with respect to the cathode), anode current falls. The anode current is largely independent of anode voltage because in a pentode, it's the combination of screen grid (g2) and the control grid (g1) which have the greatest effect on the cathode current. The important thing to note is the wide separation of the curves, which indicates high–gain.

With a g1 voltage of –5V, the anode current is very small. And there's no curve for when g1 = -6V, because at some voltage between -5V and -6V, the valve is effectively cut off, where. the anode (and cathode) current falls to zero. The corresponding curves for the vari–μ type **6BA6/EF93** – shown in **Fig. 3** – are quite similar when g1 is only slightly negative.

But by the time g1 curve reaches –3V, there's a clear difference. Notice that the curves get progressively closer together (which means lower gain), and that there's still anode current flowing, even when g1 is at –20V.

Plotting Currents

Plotting anode current against control grid voltage gives curves similar to those shown in **Fig. 4**. Here the two valves are the **6SJ7** ordinary pentode and the vari–μ **6SK7**. Both are Octal types often found in old receivers. The curve of the 6SJ7 cuts the X–axis quite sharply, hence the description 'sharp cut–off'.

As much of the curve is substantially a straight line, the term '**straight**' is sometimes used. By contrast, the curve of the vari–μ 6SK7, although initially steep, soon begins to flatten and the grid has to be well beyond –40V before the valve finally cuts off. This is the remote cut–off or **variable–μ** characteristic; the gain of the valve progressively reducing as the grid becomes more negative. So, you may ask, how is this achieved?

In a sharp cut–off valve the winding pitch of the control grid (in its simplest form just a helix of very fine wire) is constant. The electric field produced by the grid is uniform over the whole of the active length of the cathode, and as a consequence, the valve cuts off at the same grid voltage over the entire cathode. However, in a remote cut–off valve, the pitch of the grid wire varies.

At each end of the cathode the pitch is very fine, but becomes much coarser towards the centre of the cathode. The important thing to remember is the finer the pitch, the greater the gain, and the valve will cut off when the grid is less negative.

A remote cut–off valve can be thought of as many tiny sharp cut–off valves all wired in parallel, each tiny valve having a different grid pitch, different gain and different cut–off voltages. As the grid(s) becomes more negative, the high–gain, fine pitch 'valves' cut off first, followed by the increasingly lower gain, coarse pitch types.

Considerable Variation

The variation in gain this technique can produce is considerable. For instance, in the case of the PCC189 v.h.f. double triode, a change in grid voltage from –1V to –12V causes a 1000:1 reduction in mutual conductance, from 10mA/V to 10uA/V. In fact, over much of this range the valve will behave as an attenuator rather than as an amplifier!

So what's the point? Well, radio receivers have to handle a huge range of signal strengths. Simply designing a circuit for maximum gain would produce a receiver which would overload very easily, and would be quite useless when tuned nearby to a strong station. By using vari–μ valves in the r.f. and i.f. amplifier stages and varying their negative grid bias, the gain of the receive circuitry can be varied.

The variation of gain allows the r.f. amplifier and frequency changer to handle very strong signals without overloading, and ensures the demodulator is always working within its optimum range. If the demodulator is arranged so as to produce a steady d.c. voltage dependant on the strength of the received signal, the gain adjustment can be made to occur automatically.

I'm sure you've all come across **automatic volume control** (a.v.c.) – often known as **automatic gain control** (**a.g.c.**) – in radio sets. Look at the circuit of a typical domestic valved superhet radio and you'll find a couple of diodes. One diode produces an audio output which is subsequently fed to the set's audio stages, while the other diode generates a negative a.v.c./a.g.c. voltage for the front–end and i.f. stages.

Sometimes there may be just one diode doing both jobs, usually to save money by acting as both demodulator and a.g.c. generator. The result is that except for the very weakest stations, the audio volume changes little regardless of the strength of the received signal.

Communications receivers need to deal with large changes in signal levels, but to accommodate those signals that don't have a steady carrier – such as c.w. and s.s.b. – the control circuitry is a little more involved, and often incorporates a manual control as well. But vari–μ valves are not restricted to superhet receivers; using one as an r.f. amplifier in a t.r.f. receiver can have benefits too.

By simply putting a variable resistor in the cathode of the r.f. amplifier (so giving adjustable bias), the signal level fed to the detector can be kept within reasonable limits. This has advantages for regenerative detectors as they can be held close to oscillation even on strong signals, and thus maintain good selectivity.

Not Restricted

Finally, vari–μ valves are not restricted to radio frequencies; they work just as well at audio frequencies too. For instance, the **EF83** is a remote cut–off pentode which was specifically designed for gain control in audio equipment, and there's at least one modern (and very expensive) audio compressor that uses the PCC189 valve's characteristics!

Well, tempus has indeed 'fugited', and just to illustrate the point, **Fig. 5** shows a wonderful photograph of **Roy Harry M0NET** (who I mentioned last December) working on his home–brew TV receiver over 50 years ago (when Health and Safety was unheard of). Just look at all those EF50s!

Thanks very much for the photo, Roy. I wonder, does anybody still have a home–brew TV set in their loft? Do let me know. Please send your comments and letters to me. My details are at the head of the column.

73, Phil G4JCP

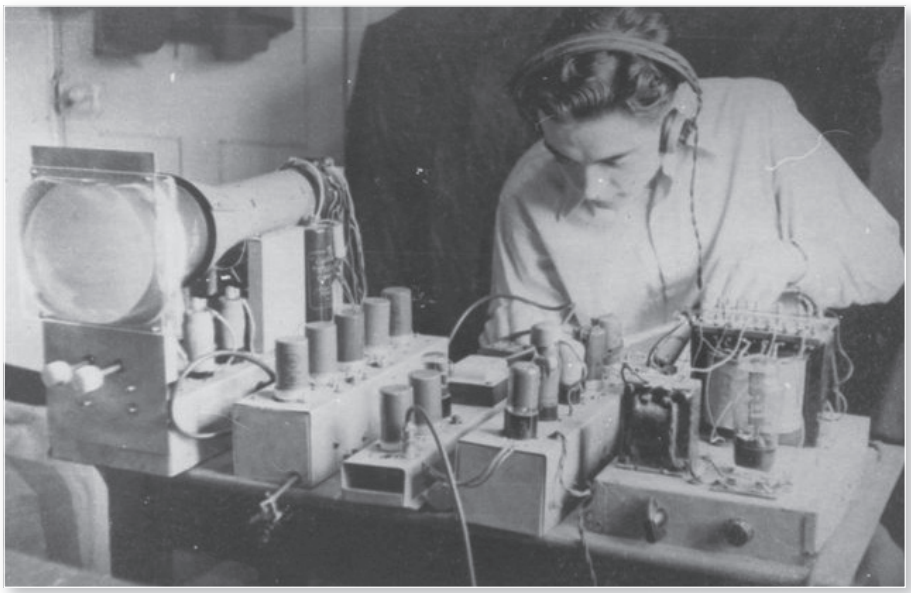


Fig. 5: Roy Harry M0NET with his home-brew TV.

Carl Mason's

hf highlights

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

Following the mention of the Canadian Forces Station 'Alert' in Decembers readers reports **Andre Ravery M0RAV** (VE1OV, VE1RAV/4U, VP9CB) who moved to Littlehampton, West Sussex in 2002 decided to drop me a line. Andre joined the Canadian Forces back in 1975 and specialized in communications which meant he was required to go to CFS Alert for a six month 'visit' every three years or so enduring the flight by C-130 Hercules aircraft. There were numerous 'off duty' activities available to those stationed there and one of these was Amateur Radio which at the time was the only voice link to the south.

Andre did not have an Amateur call at the time but was allowed to operate under the licence of a club member. Both he and several other operators went on to get their own individual licences. These operators ran countless phone patches on 14.165MHz starting at 0700 hours with Newfoundland moving slowly west throughout the day ending with British Columbia in the late evening. A Collins TX/RX was used with a Heathkit Linear amplifier and as you can imagine the operators were always busy.

Contact schedules ('skeds') were posted on a large transparent board and around 70 phone patches, which normally lasted about five minutes depending on the waiting list, would be taken in a small soundproof box in a corner of the shack. Once a sked was completed it was up to the operator to call up one of the waiting stations or use one of the countless Amateurs in various cities or provinces to offer their services to anyone that needed them.

As you can imagine, these phone patches could be very humorous at times though a finger was always kept on the microphone switch just in case the language or information got a little sensitive! On several occasions the station medical staff would consult with doctors in Ottawa when they needed advice treating patients. The worst case scenario would be a medical evacuation by aircraft to Thule in Greenland.

Antennas at the station included several Cushcraft A3S Yagis covering the 14, 21 and 28MHz Bands and a dipole 'of sorts' for 3.5MHz. The antenna rotators were wrapped in battery warmers to prevent them freezing in the sub-zero temperatures which could be as low as -45°C (-50°F). Two towers were maintained in case the taller of the two snapped off with the high winds experienced on the island and there was a reminder on the shack wall to ensure the beams were always pointing south at the end of the day, just in case the rotators froze up.

On his second tour to the station in 1980 the equipment had been updated to include a Yaesu FT-901DM with an Alpha 374A linear and a microwave phone link installed to Ottawa. Any phone patches would now be at a more leisurely pace and that meant more time for Amateur Radio activities. This changed half way through the tour as the microwave link failed and

Carl Mason GW0VSW
2, Golwg-y-Bryn,
Woodland Road,
Skewen,
Neath Port Talbot,
SA10 6SP
Tel: 01792 501176
E-Mail: gw0vsw@btinternet.com

h.f. became the main means of communication so, once again it was back to the 'skeds', board and finger on the switch. Andre's third and final tour was in 1984 where he was to hold the position of Radio Club President, the club became very active on the Bands and participated in many contests.

The days of staff bringing the operators, cakes, sandwiches, home-made sweets and even flowers (by one of their regulars) as a 'thank you' had gone but they could now enjoy Amateur Radio as it should be.

Thanks to Andre for all the information and I am sure that the next time we work that rare or unusual call we can show a little patience and spare a thought for the operator who may not be used to using the Amateur Bands or is working under some rather unusual or extreme conditions!

The DX News

On to some DX news now and over to Malaysia, where **Richard Smeets PA0RRS** will be active permanently as **9M2MRS** from Penang Island AS-015. Initial activity will be on 14MHz using a dipole and though Richard prefers c.w. he will use s.s.b. on request. The QSL route is via the bureau or direct to Reef Apartment Building, 54-7-12 Jalan Low Yat, 11100 Batu Ferringhi, Penang Island, Malaysia.

Closer to home, two special event callsigns from the Training Wing of 21 Signal Regiment (AS) Colerne, near Bath, Wiltshire will be aired between June 1st and 7th. They mark the 65th Anniversary of Operation *Market Garden* when allied airborne and ground forces landed at Arnhem and Nijmegan, in what was then German occupied Netherlands, becoming the largest airborne operation of all time. The operation was initially successful with the capture of the Waal bridge at Nijmegen on September 20th 1944. But failure to secure the bridge at Arnhem meant the planned Allied advance had to be abandoned.

Now known as 'The Bridge Too Far' the event will be commemorated

with the call **GB65BTF** together with **GB2ASU** marking the contribution of 'Air Support Units' of the RAF and Royal Army Service Corps (RASC). Activity can be expected on all Bands and QSLs will be via the bureau.

Your Reports

Turning to your reports now and the first of these is from **Eric Masters G0KRT** in Worcester Park, Surrey who was pleased to make his first c.w. QRP contact Stateside with K1KI in West Suffield, Connecticut at 2304UTC using a Kenwood TS-570D at 5W to a modified W3EDP antenna tuned fed from his SGC-230 Smartuner.

The 7MHz Band

Owen Williams G0PHY in Biggleswade, Bedfordshire operated on 7MHz using his Yaesu FT-747 and 100W to a quarter-wave inverted 'L' antenna. Owen lists s.s.b. contacts with 5D0IPHY (Morocco) 2025, WE3C (U.S.A.) in Fleetwood, Pennsylvania at 2223 and VC3A (Canada) the contest call for VE3AT in Ontario at 2330UTC.

Welcome now to new reporter **Marek Krol M/SP2EGV** who is currently living in Newent, Gloucestershire and has been a regular *PW* reader since moving to the UK. Marek has been trying out a home-made 3.5/7MHz transceiver made by SP3ABG with a simple half size dipole cut for the band. 10W is normally the output of the transceiver but as Marek's power supply was left in Poland he has been using a lead-acid battery which allows him to run a maximum of threeW only.

With his low power, Marek's log shows QRP contacts with CN8SG (Morocco) 0036, SP9HFW (Poland) 0850, OZ5BF (Finland) 0913, PA6FUN/LH (Netherlands) 1205 on Schiermonnikoog Island EU-038. The smallest of a group of five islands in the northern Dutch island group called the 'Wadden Eilanden' QSL via PE1GUR. This was followed by DL1YUS (Germany) at 1241 and 4O3A (Montenegro) at 1308UTC QSL via YU1FW. It just goes to show that low power and a simple dipole do not mean an empty logbook!

The c.w. of **Tony Tuite GW0NSR** in Morfa, near Conwy found RZ3DWK (European Russia) 1637, LY2PX (Lithuania) 1942, KZ1H (U.S.A.) in Beverley, Massachusetts at 1955 and OH3LB (Finland) at 1956UTC running 50W to a centre-fed Zepp antenna just 4m above ground. Tony commented "Most of us aspire to working lots of DX every time we switch on our rigs but most would agree that that is an unrealistic aim. We are told that to work DX we must have a 'big' signal, usually the result of lots of power and antennas way above our house-tops. Most of us have to do with so much less. In my case, the antenna is a 'Zepp' mounted just above the ground and then 'bent' in several places to fit into the available space. These limitations do not stop me enjoying

the hobby and when a DX station does make it into my logbook I enjoy the moment even more".

I am sure that many of us would agree with Tony and indeed, some of our reporters do remarkable things with simple equipment and antennas. Tony also sent a printout from DX Atlas showing that an antenna not much higher than 'long grass', can cover the whole of Europe, chunks of the USA, some Pacific Islands, South America, South Africa and even the North Pole.

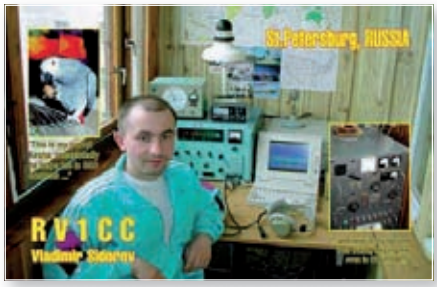
Also active on the 7MHz band, **Ted Trowell G2HKU** on the Isle of Sheppey in Kent sent in his c.w. logbook that shows contacts with 5B4AHJ (Cyprus) AS-004 at 1700, W3LPL (U.S.A.) in Glenwood, Maryland at 2100 and TF3Y (Iceland) EU-021 at 2130. Ted's 'afternoon' 10MHz log included 3B8CF (Mauritius) AF-049, ET3JA (Ethiopia) QSL via OK3AA, VQ9JC (Chagos Islands) AF-006, JW/DJ3KR (Svalbard) EU-026, 4J9M (Azerbaijan) QSL direct only to Alexander Spielmann DL7EDH, POB 400005, 12631 Berlin, Germany and W1EBH (U.S.A.) in Brooklyn, New Hampshire all using a Ten Tec Omni V and 70W to a G5RV

There was also one s.s.b. contact on this band for Eric G0KRT who logged VA3DX (Canada) at 2024UTC.

The 14MHz Band

On the 14MHz band in Chelmsford Essex, **Martyn Medcalf M3VAM** logged LZ131GO (Bulgaria) at 0833. This is a special call run by the Balkan Contest Club LZ1KZA to commemorate the 131st anniversary of the liberation of Bulgaria, IZ6BV (Italy) 1147, EW6GF (Belarus) 1328, RV1CC (European Russia) 1432, EA7MHK (Spain) 1559, 9H1VC/P (Malta) EU-023 at 1652, CT7IOV (Portugal) 1758, and CN8ZG (Morocco) 1813UTC using a Icom IC-746, and 10W s.s.b. to a half size G5RV antenna tuned with a SGC-237 Smartuner.

Back in Worcester Park Eric G0KRT found Canadian stations VO1MP



1605, VY2TT at 1611 and VY2ZM QSL via K1ZM at 1642 using s.s.b before switching to c.w. and logging a string of U.S. calls including K3CR the Penn State ARC in University Park, Pennsylvania at 1636, N8AA in Hamilton, Ohio at 1703 and N4EEB in Ormond Beach, Florida at 1718UTC.

On to **Martin Addison 2E0MCA** in East Finchley, North London to whom I owe an apology, as Martin seemed to be quoted as having problems working the TS7C DXpedition in April's column. I made the comment and unfortunately editorial gremlins crept in and the sentence,a s printed, didn't quite read as I'd intended it. Also, his transceiver having the

software upgrade should have course have been a 'Yaesu FT-2000' and not a 'Kenwood TS-2000' as printed.

Martin's s.s.b. log this month shows voice contacts with LY1000W (Lithuania) at 1044, a special call to mark the 'Millennium of Lithuania Society (LRMD)) QSL via LY3W, 5D0IPY (Morocco) 1107, CT7IOV (Portugal) 1112, YL2TW (Latvia) 1202, 4L4WW (Georgia) 1202 QSL via EA7FTR, YU7ZEX (Serbia) 1233, YO3FRI (Romania) 1243, 9A3MN (Croatia) 1246, UT5FC (Ukraine) 1326, VA2TG (Canada) 1452, IU8ANT (Italy) 1507 a special call operated by Giuseppe D'avanzo I8QJU to mark Antartic Activity Week (A.A.W) 2009, K2MO (U.S.A.) 2148 in Kings Park, New York and a 'new one' CO6LC (Cuba) NA-015 at 2200UTC using a Yaesu FT-2000 and 50W to a G5RV antenna.

Now **Tom Hutton G0HUT** in Farnborough, Hampshire has been using PSK31 again and his large log included S57NCP (Slovenia) 1105, ES3RM (Estonia) 1110, HA6ZX (Hungary) 1205, RW3DQC (European Russia) 1220, EU2MM (Belarus) 1355, YU7NW (Serbia) 1407UTC using a Tigertronics modem, Digipan2 and a Yaesu FT-450AT at 25W .

The c.w. of Ted G2HKU found VQ9LA (Chagos Islands) AF-006 QSL direct only to Larry Arneson, PSC 466 Box 24 (DG-21 Annex 30), FPO AP 96595-0024, USA. followed by 7X4AN (Algeria), TA3AX (Turkey), 3B8CF (Mauritius) AF-049, C56ETF (Gambia) QSL via GW0ETF, J7N (Dominica) NA-101 QSL direct only to John Bednar K3TEJ, 340 Mac Arthur Drive, Orwigsburg, PA 17961, USA and A61Q (United Arab Emirates) QSL via EA7FTR between 1700 and 1800UTC.

Paul Morrison G0VHT in Siverstone, Northamptonshire has been working on his 'Phoenix' d.s.b./ s.s.b. transceiver that was featured in last month's column and has uploaded a short film clip of the rig in action to his website **www.stealth-antennas.co.uk/phoenix.htm** and it's well worth a look.

The 18 & 21MHz Bands

Finally, on 18MHz s.s.b. Martin 2E0MCA worked UT7EC (Ukraine) at 1134 while Ted G2HKU used c.w. again logging CO8LY (Cuba) and EA8CN (Canary Islands) AF-004 around 1500UTC before moving to the 21MHz Band finding ET8TT (Canary Islands) at 0900, ET3JA (Ethiopia) later at 1110 and LU3VO (Argentina) around 1500UTC. Calls on the bands higher than 18MHz haven't been logged this month again.

Signing Off

That's it for again another month and as you can see there was plenty to work on the h.f. bands again even if they were not at their best. Thanks to all our reporters for their logbooks and to **Mauro Pregliasco I1JQJ/KB2TJM** editor of the *425 DX Newsletter* for all the DX information. Until next time I wish you all good DX.

73, Carl GW0VSW

As usual, information, reports and photographs to me please by the 15th of each month please.

Graham Hankin's

in vision

Graham Hankins G8EMX
84 Shirley Road
Acocks Green
Birmingham B27 7NA
E-mail: g8emx@tiscali.co.uk

The BATC is now 60 years old and Graham Hankins G8EMX brings news of the upcoming Biennial General Meeting.

We normally mark birthdays with candles inserted into the top of a large cake. But to mark the 60th birthday of the **British Amateur Television Club** maybe a circle of old-style camera vidicon pick-up tubes mounted on a reel of video tape would be more appropriate?

In 1949, Amateur TV began with dedicated enthusiasts building everything; 'flying spot scanners' to generate video for a test card and callsign, pulse generators to produce the 'train' of timing signals that are needed and valved transmitters. The antenna might have been be just a coil of wire around a wooden frame.

There were no forms of domestic video camera, so the absolutely dedicated managed to construct even the cameras. And much skill was needed not just for the electronics but also winding the scan coil to give a more or (usually) less linear display. Activity was quite plentiful on 435MHz, later moving to the microwave bands for colour and repeaters.

For its members, the BATC produced its magazine *CQ-TV* and held regular rallies at popular venues. Come forward 60 years and domestic video cameras are in widespread use. Pressure on spectrum use has moved ATV firmly onto 1.3GHz and above. Some ATV repeaters struggle to stay on-air due to lack of finances or reduced interest within the clubs that licenced them.

Biennial General Meeting

The BATC did manage to find a village hall for its Biennial General Meeting last year and put together an interesting lecture stream, which was 'broadcast' over the internet via its new 'batc.tv' streaming service. But already there were mutterings that the next meeting must be at a better venue and has to be more central to avoid accusations of a 'London bias'.

So, for 2009 the BATC has decided to be bold and think big for its 60th year Convention! So, Hellidon Lakes Hotel, near Daventry, Northamptonshire has been booked for the event. Perhaps the most significant, it's fairly central in the country. It's also close to transport links and obviously has overnight accommodation. On the BATC's website: **www.batc.org.uk** organisers of this year's event, **Paul** and **Jill Marshall**, call it: "this prestigious venue, the perfect place".

Paul looks after the BATC publications library and his wife Jill is the Events Co-ordinator. Paul comments that the venue has "plenty of space for displays and lectures...all that we would need for a successful event". Well not quite, we also needs plenty of members to be at the anniversary event. We're hoping that loads of enthusiastic members will come along.

Paul is also looking for subjects for the lecture streams. Okay, that's easy – for starters invite **John Banks** from the Civil Aviation Authority again (if available). At the last Convention John illustrated how the CAA 'vets' new ATV repeater applications. We need the same lecture only longer and more in depth. Another stream might be 'Modern studio cameras' – specifications and capabilities?

But above all, persuade, bribe or whatever and get a few repeater groups to present lectures or have displays? There are over 40 ATV groups that have done fantastic work with their repeater – let's hear about it.

The Convention is also hoping to 'look forward' and the BATC has often claimed to be at the forefront of television technology. Well, in my opinion it isn't at the moment. Broadcast digital television is now so widespread that complete closure of the analogue service is only a few years away. In the broadcast world 16:9 and high-definition are rapidly becoming the norm – ATVers still tend to use a 625 lines 4:3 picture, apart from a few isolated experiments. Of course, bandwidth and cost limit some of this for the Amateur, but there we are.

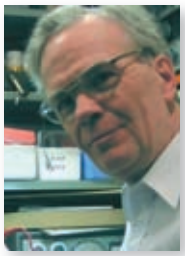
The Anniversary Convention will be on Saturday 13th and Sunday 14th June 2009 and will include a three-course dinner on the Saturday evening, so it'll be a social weekend too, particularly if some previous members to come along. Contact Jill or Paul Marshall, Tel. **(01522) 703348**, E-mail: **publications@batc.org.uk**

The latest edition of the BATC's magazine *CQ-TV* includes a fascinating article on television audio, written by BATC Chairman **Trevor Brown G8CJS**. In the early days of TV, the sound was often dubbed 'the poor relation' and remained a mono signal until the arrival of near instantaneous companded audio multiplex stereo (NICAM). Trevor includes the Peak Programme Meter, the Mini Disc (remember that?) and the many types of microphone – including things not to do with a microphone. One of these is not to unplug a microphone before muting the speakers, thus deafening the listener!

Finally, **Pat Fitzpatrick EI2HX** read April's edition and says: "I read your article and I see that you are looking for a Test Card generator. The unit I use, generate colour bars with your callsign in a space in the middle and there's scrolling text along the bottom. The units are about 95x48x15mm and were bought from **PE1ACB** at the German rally for €48 each. E-mail: **info@pa1acb.nl** or **www.pa1acb.nl**. He removed the chips at the rally, programmed them with my callsign and locator then sent them to me a few days later!"

Pat also said that he'd used one Stuart Marshall's slot antennas at 70mph! And finished up by saying "keep up the good work in *Practical Wireless*!" Best 5&9s de Pat EI2HX."

Thanks for this, Pat, I'll try! ●



Harry Leeming's

in the shop

Harry G3LLL continues his discussion of expected signal levels, earthing, valved amplifiers, then remembers old customers!

Harry Leeming G3LLL
The Cedars
3a Wilson Grove
Heysham
Morecambe LA3 2PQ
Tel: (07901) 932763
E-mail: G3LLL@talktalk.net

Welcome to the shop where I'm carrying on to with the signals levels discussion from last month's column. Over the years I tried to make my own level charts for equipment that I very frequently serviced, but the problem was that I was usually too busy wanting to get on to the next job, and I did not have time to drag out an audio generator, wire up a microphone plug, and make accurate measurements using a wide-band 'scope before reassembling equipment after I had repaired it. As a compromise, I started making quick tests using a diode probe and my own built in audio generator, i.e. I whistled into the microphone.

A Few Readings

Next I'll outline a few radio frequency voltage readings from my notebooks. These are the actual readings taken using the simple diode probe, (which reads about 100mV low as explained previously). All with a loud whistle, with maximum microphone gain, speech processor off, this should give about 5V drive to 12BY7A with valve unplugged. Whilst the readings are by no means comprehensive, they give an idea as to what levels to expect.

FT-101E
Output of 3.18 MHz i.f. unit at pin 10, 25mV.
Input of mixer unit PB1082B at pin 5 about 250mV.
Output of mixer unit at pin 16, 1.5V.

FT-101ZDMk3 IF unit
Input of s.s.b. filter 700mV at Test point 2.
Output of s.s.b filter 200mV at Test point 3.
Input to Q05 250mV at Test point 4.
i.f. panel output with leads unplugged from r.f. unit 400mV at Test point 12.

FT-901
Output of carrier unit 100mV at Pin 4.
Output of speech processor unit, (processor switched off) 400mV at Pin 17.
r.f. unit input 400mV at J103 lead unplugged.

To Earth Or Not?

When I was writing about earth loops a few months back I mentioned the 'Double Insulation Standard', and so perhaps it's time to clarify as to what this is all about. Quite apart from its use from an r.f. point of view, an earth connection is normally used on mains operated equipment for safety reasons. This is especially important when electronic equipment is housed in a metal case, as this can be potentially dangerous; it only needs a capacitor to fail, a strand of wire to move a fraction, or some insulation to break down, and the case can become directly connected to the mains supply.

If however the equipment is fitted with a three-core mains lead, and this is correctly earthed, the result of a short to the case is the fuse 'blowing', or tripping an earth leakage cutout to protect the user.

The problems start when separate items are both earthed to the same supply as this can cause 'earth loops'. To get over this problem many items of new equipment now have the double insulated sign on them, see **Fig 1**. Items so marked do not need a safety earth, as they are so constructed (or certainly should be) so

Fig. 1: The symbol of a double-insulated electrical item.

that the failure of one part, or one bit of insulation, cannot make an external part become live. Remember, if you ever carry out any repairs on such equipment, that it's essential that you do not do anything to compromise the double insulation status.

The FT-102

A reader, I'll call him **Charley**, sent me an E-mail about his FT-102 which had suddenly stopped operating. On some bands he could tune into weak none Amateur signals, on others he received nothing, and the rig would not transmit at all, had I any ideas? Quite a few faults on the FT-102 seem odd, and potentially difficult to trace, but fortunately this one is simple.

The band switch on the FT-102 consists of three separate switches that are tied together with spindle couplers. These couplers aren't terribly reliable, and sometimes slip. This results in part of the switch being on one amateur band, and the rest either on another or somewhere between bands. If the slip has occurred between the front two sections the receiver and transmitter will fail, whereas the rear section slipping results in the rig operating satisfactorily on receive, but refusing to tune up on transmit.

The later fault has the potential to cause considerable damage if the user is not careful, as full drive is delivered to the output bottles making them take a lot of current. If the valves are operated in this way for more than a few seconds, all the power instead of going out of the antenna socket goes to the the anodes up, heating them up and the valves will be quickly destroyed. I have seen 6146s that have got so hot that the glass has melted, and collapsed inwards, making them look rather like squashed bananas. Valves so treated tend to go dead short and can cause so much damage that the rig ends up as a 'write off'.

The cure for the switch fault is to switch off the power for a few minutes, discharge the high voltage capacitors, then to look very carefully at the switch, and trace out as to

which band each section has selected, **Fig. 2**. Note that due to the slack in the spindle couplers, **band changing on the FT-102 should always be done in a clockwise direction**, and so when adjusting the couplers this must be taken into consideration.

Do take notice of the point about discharging the capacitors, by shorting the top caps of the valves to chassis. I was working on an FT-102, unplugged it from the mains, and went on a week's holiday. When I returned I carried on from where I was up to, put my hand in the p.a. cage, and nearly hit the roof as the capacitors were still charged. Perhaps Japanese capacitors are too good! Yes the FT-102 does have high value resistors in the p.s.u. to discharge the h.t. voltage, but they can go open circuit. Those on the rig in question had, and the burn on my fingers reminded me not to do that again!

Valved Audio Stages

When renovating old equipment, even experienced electronic technicians can be thrown because of their lack of familiarity with valves and of common faults in this kind of equipment. The diagram, **Fig 3**, shows a typical audio output and driver stage in which several very common faults can develop.

Distortion. The bias on the valves is created by the cathode current flowing through R275 and R272, this causes the cathodes to become a few volts positive. Having the cathodes positive with respect to chassis makes the control grids, pins 3 and 1, negative with respect to them, and so controls the amount of current flowing. If the coupling capacitor C269 should become very slightly leaky, some of the positive voltage on pin 9 will be fed to the control grid, will make the valve flow too much current, and will result in distorted audio. This is a very common fault in capacitor coupled audio stages and should be the first thing checked.

Checking the capacitor on the ohms range of a meter is not a conclusive test, as the capacitor needs to have a resistance of several hundred meg Ohms if it is to be good enough for use in this position. The best way to check the capacitor is to remove the valve, and then to measure the voltage on pin-3. If there is a steady d.c. voltage at this point, then the capacitor needs replacing.

Another common cause of distortion and low gain is that the anode resistor, R273 in this circuit, has gone high in resistance. When I was servicing valved Hi-Fi equipment, after checking coupling capacitors one of the first thing I looked at when a stage was faulty was any 220kΩ anode resistors. For some odd reason this particular value seems prone to failure.

Low Gain

I have had quite a few valve receivers and transceivers bought to me where the audio is just a little on the low side. One where this is quite common is the Yaesu FR-400 receiver, which uses a similar circuit to the Other Yaesu receive sections. All the voltages might be okay, the sound quality is good, but to get any volume one has to operate the set with the volume control flat out, what could cause this trouble?

The trouble seems to be related to the cathode decoupling capacitors, C270 and 268 on the circuit shown. They're electrolytic types and over the years the capcitors dry out, especially if they are in a spot that gets warm. When they lose their capacity the valve cathodes are no longer decoupled at audio, and the resulting negative feedback reduces the gain. Replacing these capacitors, or even connecting replacements temporally in parallel with them, brings the gain way up.

Transmitter microphone input and amplifier stages are also subject to similar faults; anode resistors go high, and coupling capacitors become leaky. Some rigs, such as the KW units, which to be fair are now over 30 years old, seem to have quite a bit of trouble in this department. When overhauling units such as these it's probably a good idea to swap all these parts without even bothering testing them.

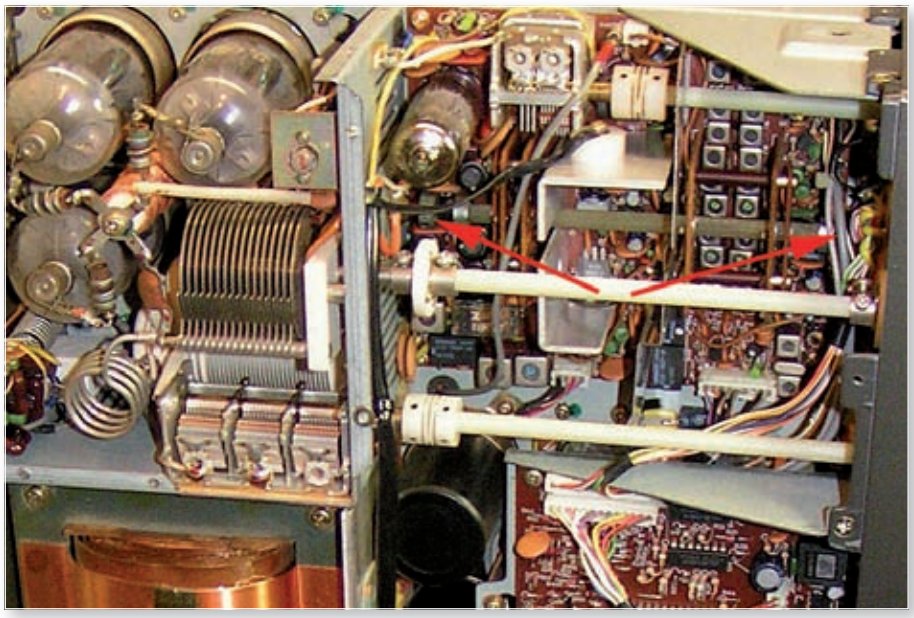


Fig. 2: The shaft controlling the band-selector switches on an FT-102. Other Yaesu rigs are similar.

Customer Ghosts

It is now over 10 years since we retired, and at Christmas **Brenda** and I were doing a bit of reminiscing. When we were children in the days before TV, (yes we are that old) a highlight of the year at the mission hall we attended was the Christmas Eve social, and then, on several occasions, the film based on Charles Dickens' book *Scrooge* was shown. The character 'Ghost of Christmass past' in this film made us start thinking about the many customers that had visited us in the shop (With apologies to Charles Dickens).

Over the years thousands of customers must have passed through our door, but of course a few stand out. Some became personal friends, and still send us Christmas cards, one or two are best forgotten – and then of course there were those who stood out for other reasons.

One of our customers we labelled 'Mr. Pieman', who lived a distance away from the shop, and would regularly appear just before or just after lunch. Before discussing what he wanted, he would sit down in the

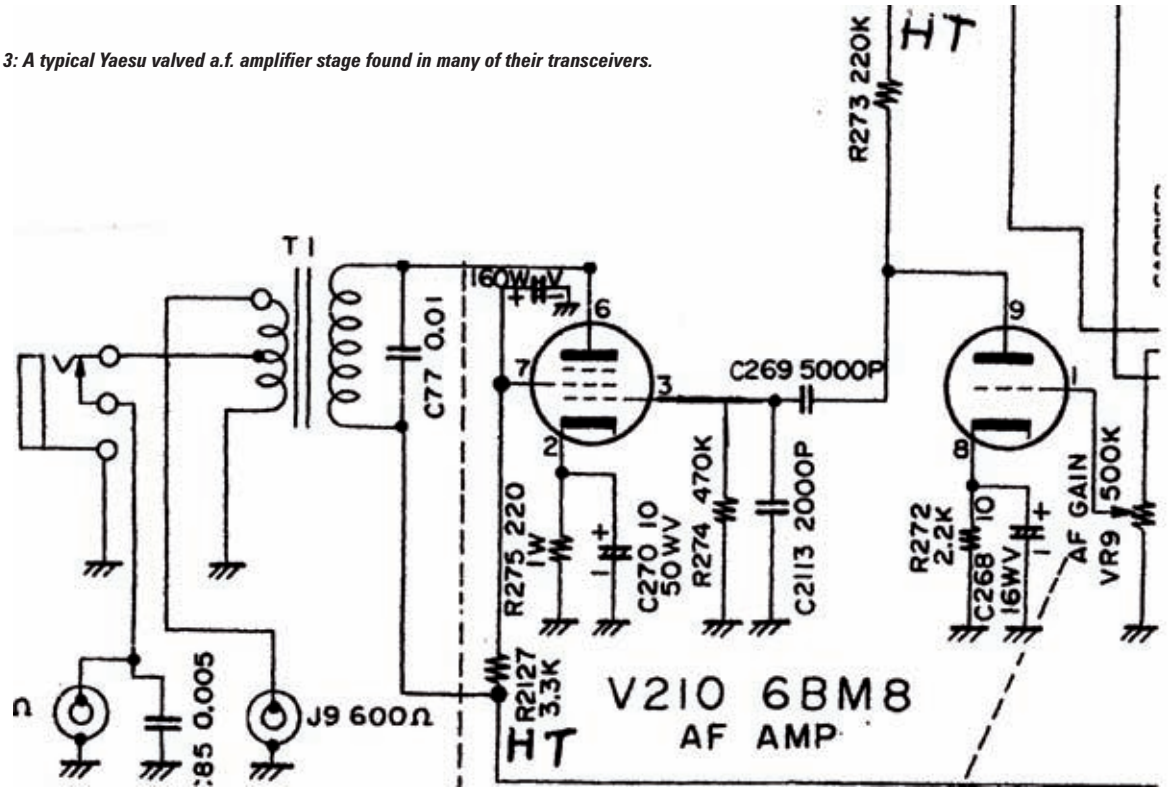


Fig. 3: A typical Yaesu valved a.f. amplifier stage found in many of their transceivers.

only chair we had on the customer's side of the counter, produce a meat and potato pie and a flask of coffee and tuck in. It put us right off meat and potato pies!

Another customer went under the soubriquet of 'MI5' and if ever I put a piece of interesting and complicated looking second-hand test equipment in the window, or a computer, he would be in and more than likely would purchase it, 'for his project'. As he didn't have a car I was asked to drop off his purchases on the way home, and could not help noticing storage oscilloscopes, spectrum analysers, elaborate signal generators and other complicated equipment, which I would have struggled to find the on/off switch on, let alone operate.

My friend **Eion** ran a radio and TV repair shop across the road from from our shop – he'd also had several visits from MI5. Eion had aslo tried to find out as to what MI5 wanted such equipment for. He didn't get any further than us, as MI5 would still only drop hints like 'its for my project', 'can't be too careful' 'you never know who is listening', etc.

Some time before, MI5 had purchased a second hand computer from us with a 12 inch monitor, and about six months later he spotted a rather nice 15in computer monitor in our window. He came in and purchased it, "It will be better for my project'. He asked me to deliver it, and so I went round on my way home, took it into his house, plugged it into his computer and switched on. The *Windows* screen came on and announced that it was up-dating its clock for summer time.

As it was then September and the clocks went forward in the spring, this meant that he had hardly ever switched the computer on since he bought it. I began to wonder if the signal generators, spectrum analyser, and other test equipment he'd acquired were likewise never switched on. Was it just that he liked to be surrounded by HI-Tech equipment? We never did find out!

Sometimes, the 'phone would ring, Brenda would take it, and a voice would say "Its me, is he in". The gentleman concerned frequently 'phoned, and seemed totally oblivious to the fact that we had other customers, and that Brenda could not be expected to know as to who 'me' was. After a while she just started to pass the phone, and say that 'Mr Me' wanted to have a word. We have long since forgotten his real name, that is if we ever knew it, he is just down on our records and memories as 'Mr Me'!

'Mr Smelly' was another one! Quite a few of our customers would have done well to care more for personal hygiene, but Mr Smelly really stood out! I'll leave the details to your imagination, but every visit called for doors to be opened front and back, and Brenda to dash round with a can of air freshener. It's strange what we would put up with just to make money!

Ah well, they were happy days! ●

Problems

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

TRADERS TABLE

The equipment for sale on this page is secondhand or ex-demonstration

Disclaimer

Advertisements from traders for equipment that is illegal to possess, use or which cannot be licensed in the U.K, will not be accepted. While the publishers will give whatever assistance they can to readers or buyers having complaints, under no circumstance will the magazine accept liability for non-receipt of goods ordered, late delivery or faults in manufacture.

SHORTWAVE SHOP LTD

01202 490099

TRANCEIVERS

ICOM IC718 Ex Demo.....£399
ICOM T8 TriBand.....£100
ICOM IC-701 inc Matching PSU.....£295
YAESU FT 730R.....£95
YAESU FT 225.....£210
ALINCO DJ-V5.....£200
ALINCO DJ-195.....£100
ALINCO DJ-S11.....£75
ICOM M11 Marine H/H.....£75
ICOM PMR 446x2Water Resist/ w.charg.....£200
STANDARD HX260E Marine H/Hnew.....£99

RECEIVERS

ICOM IC-R10 with ACC.....£190
ICOM IC-R20 Ex Demo.....£275
YAESU FRG7700M.....£225
YAESU VR500.....£145
YAESU VR5000.....£395
AOR AR8600 Mk II INC EM8200.....£495
BEARCAT UBC 278 BASE EX DEM.....£139
UNIDEN 180XLT.....£99
AMI DIGI SAT RX ASR WS201.....£129
SANGEAN AT818.....£85
GRE PSR 225.....£159
GRE PSR 216.....£75
ALINCO DJX3.....£70

ACCESSORIES

ICOM AH7000 DISCONE.....£85
GLOBAL AT1000 ATU.....£60
KPC-2 TNC.....£85
PACCOMM TINY-2.....£85
TNC 320.....£POA
AEA PK-88 PACKET CONTROLLER.....£35
MFJ 1278B DATA CONTROLLER.....£55
WATSON W25SM PSU.....£59
DATONG ANF NOTCH FILTER.....£55
DAIWA CN620A 1kw POWER/SWR.....£65
MFJ 948 TUNER.....£75
MFJ 1020C ACTIVE ANT.....£69
KENWOOD MB11 MOUNT.....£POA
MFJ 986 3k TUNER.....£185
WELZ SP-220 SWR/PWR METER.....£65
SAKA 8" TFT LCD TV EX DEM.....£85
KENWOOD LF 30A LOW PASS FILTER.....£30
ICOM BC133 (2 of) Drop In Charger inc PSU. £OFFERS
YAESU FP757 PSU.....£POA

NEVADA

023-9231 3090

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ALINCO DJC7 HANDY TRANSCEIVER.....£149
ICOM 706MkII GI HF/6M /2/70.....£450
ICOM 746 HF/6/2 100W BASE WITH ATU£699
ICOM 756PROIII HF & 6 BASE.....£1499
YAESU FTM10E DUAL BAND TRANS.....£229

HANDHELD SCANNERS

ALINCO DJX2 AM/FM/WFM RADIO.....£79
ALINCO DJX3 ALL MODE SCANNER.....£85
BEARCAT 120XLT 100MEM AM/FM.....£79
BEARCAT 860XLT SCANNER.....£99
ICOM RX7 SCANNING RECEIVER.....£179
YUPITERU MVT7000 ALL MODE RX.....£99.00

BASE SCANNERS

BEARCAT 785XLT BASE SCANNER.....£149
YAESU FRG9600 BASE SCANNER.....£199

RECEIVERS

AOR AR3030 HF RECEIVER.....£299
JRC NRD525 HF RECEIVER.....£399
LOWE HF150 HF RECEIVER & KEYPAD....£199
PALSTAR R30CC HF RECEIVER.....£399
SANYO WS1000 WORLDSPACE RADIO....£85
YAESU FRG7000 HF RECEIVER.....£199

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NEVADA ND01 PORTABLE DAB.....£25
PANASONIC RFD3 DAB RADIO.....£29
ROBERTS R861 WORLD RADIO.....£99
ROBERTS R876 SHORTWAVE RADIO.....£70

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AMDAT ADC60 FREQ. STD CLOCK.....£99
BENCHER KEYER.....£59
DIAMOND CX210 2WAY ANT SWITCH.....£15
DIAMOND CX401 4WAY ANT SWITCH.....£32
ERA MICROREADER.....£50
ERA MICROREADER DISPLAY.....£50
GLOBAL AT2000 RX ATU.....£79
KENWOOD PS30M 20A POWER SUPPLY£110
JIM M75 SCANNER PREAMPLIFIER.....£54
PALSTAR PS15 12-15A POWER SUPPLY...£40
TIMEWAVE 59+ DIGITAL NOISE FILTER..£159
TOYO SA450 ANTENNA SWITCH.....£17
UNIROSS CHARGER & BATTERIES.....£12
VCI PM30 2KW POWER METER.....£69
WATSON SP180A POWERED SPEAKER...£15
WATSON W10-AM POWER SUPPLY.....£45
YAESU MH35A2B SPEAKER MIC.....£19

B-GRADE ITEMS

ALINCO DJX30 HANDHELD SCANNER.....£99
BEARCAT 92XLT HANDHELD SCANNER...£89
BPL CELESTE WORLDSPACE/FM RADIO..£29
ETON SOUND 102 DAB/FM W/iPod DOCK..... £99
GENUS GEO DAB/ALARM RADIO.....£29
ICOM R5 HANDHELD SCANNER.....£165
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MIDLAND 98PLUS CB RADIO.....£59
NEVADA SINFONIE DAB (WHITE).....£49
NEVADA SINFONIE DAB (BLUE).....£49
PURE EVOKE 1XT DAB RADIO.....£75
PURE TEMPUS 1XT DAB RADIO.....£49
ROBERTS RD41 DAB RADIO.....£99
TEAM ROADCOM CB RADIO.....£89

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01702 206835

Uniden UBC-60XLT 66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells.....£55

Revex P-300E 12V 30A (max) Over Volts/Current Protected PSU.....£79

WinRadio WR-G313i 9kHz-30MHz All Mode PCI Internal Computer Controlled Communications Receiver.....£479

Kenwood IF-232C RS 232 Interface for Kenwoodtransceivers.....£59

Microset PT-1012 13.5V 10A (12A max) Stabilized PSU with Cigar Lighter Socket.....£49

Yaesu FP-700 13.5V Matching PSU with Extension Speaker.....£89

West Mountain Radio RB/M8/C RigBlaster 8pin Cable Sound Card Data Interface £49

Yaesu FT-726R 2m,70cm + 10m All Mode Base Transceiver 10W Mains.....£399

Yaesu CT-58 Quadra Lead interface cable for FT-100.....£19

Icom IC-A22E Airband H/Held + NAV/COM £199

Timewave DSP-599 Audio Noise Reduction Unit.....£149

Alinco EDX-1 1.8-30MHz Manual ATU for DX-70, DX-77.....£115

Uniden UBC-120XLT 66-512MHz (with gaps) AM, FM Hand Held Receiver 100Ch. + NiCad £65

Icom IC-A3E Airband H/Held + NAV/COM 50ch Alphanumeric & Headset Adapter £180

Diamond SX-100 1.6-60MHZ SWR,PWR meter 3kW.£69

Aiwa WR-A100 Analogue FM,MW & 7-band SW Portable Radio.....£29

Eton Mini-300 AM, FM-stereo and 6 shortwave bands (49, 41, 31, 25, 19 and 16 meters) £35

Roberts R-862 HF/VHF receiver AM/WFM 0.15-0.281/0.522-1.62 / 4.6-21.95 / 87.5-108 MHz 3 VDC (2*R6 / AA).....£49

AOR AR-3000A 100kHz-2036MHz All Mode Communications Receiver 400Ch. 12V + psu.....£499

Kenwood SP-23 Matching Extension Speaker.....£85

Maycom AR-108 108-180MHz AM,FM 99Ch. Mini Hand Held Receiver 2 x AA or 3V DC.....£49

Watson W-20SM 12V 20A (max) Switch Mode PSU £49

Yaesu MH-31 Dynamic Microphone For FT-897 .....£21

WinRadio WR-G313i 9kHz-30MHz All Mode PCI Internal Computer Controlled Communications Receiver.....£479

Watson CX-201 0-1GHz 2-Way Coax Switch with SO-239 1kW.....£10

MFJ MFJ-903 6m ATU 200W SSB (100W FM) £49

Ameritron ARB-704 Universal Transceiver to Linear Amplifier Interface Unit £45

Watson W-620 1.6-200, 118-530MHz SWR/PWR meter 200W.....£69

Optoelectronics Optolinx TTL to RS-232 Interface (supports 4 devices).....£65

Yaesu FT-8500 2m,70cm FM Mobile Transceiver 50W,35W,Remote Head,Full Duplex.....£149

Kenwood MB-11 Mounting Brackets for the TM-731E AS NEW.....£15

Kenwood MB-11 Mounting Brackets for the TM-731E AS NEW.....£15

Yaesu FL-2025 2m clip-on 25W Linear (for FT-290R II) £99

Icom MB-58 Mounting bracket for the IC-207.....£10

Yaesu FC-20 1.8-30,50-54MHz Auto ATU 100W 50ohm.....£149

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Icom IC-R2500 10kHz-3300MHz All Mode PC Controlled Dualwatch Receiver with Control Head USB 12V + psu £349

AOR AR-8200 III 530kHz-3GHz All Mode Hand Held Receiver 1000Ch. Alphanumeric £259

Bhi NES10-2 Noise Eliminating Extension Speaker with Audio Out 12V.....£69

AOR AR-8200 II 530kHz-2040MHz All Mode Hand Held Receiver 1000Ch. Alphanumeric £229

Realistic DX-394 150kHz-30MHz AM,CW,SSB Receiver 160Ch. Mains/12V.....£99

Yaesu FC-20 1.8-30,50-54MHz Auto ATU 100W 50ohm.....£149

Yaesu FT-897D HF,6m,2m,70cm All Mode Transceiver + DSP & Gen.Cov.RX + Optional TCXO-9 12V.....£435

Yaesu FP-30U 13.5V 22A (max) Internal PSU for FT-897 110-240V AC.....£139

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01922 414796

MC-90 Desk Mic for DSP.....£149

Daiwa CNA-1001 .....£149

Trio R-1000.....£149

FT-290RMKI 2m Multi mode £150

MFJ-969 ATU.....£159

Yaesu FC-902 - HF Antenna Tuner.....£159

Icom IC-T8E.....£159

PS-33T Kenwood 13.8V 20.5A PSU £159

Yupiteru MVT-225.....£159

Yaesu FT-790 .....£159

Kenwood TS-271E.....£165

Yaesu FC-30 Antenna Tuner Unit.....£169

Trio R-1000 HF RX.....£170

Kenwood VC-20 VHF Converter.....£175

ICOM IC-2200H 144–146.....£175

Icom IC-R10 Hand held Scanner.....£179

AOR AR-8000.....£189

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FT-90R - Transceiver.....£199

AOR 8200 Mk I £220

Kenwood TR-9000 2m Multi mode £220

Yaesu FT-480R 2m Transceiver £220

ICOM IC-290D - 2M MULTIMODE TRANSCEIVER..£220

Yaesu FT-8900 Quad Band Mobile Transceiver £229

Alinco DJ-X2000 Intelligent Receiver.....£230

Kenwood TH-D7E Dual Band Handheld.....£240

Icom IC-R3 Hand held Scanner.....£250

Icom IC-490E 70cms Mobile.....£250

Yaesu FT-290MkII 2m Multi-mode transceiver £250

PT-50A Microset 50A 13.5V PSU £272.13

Yaesu FT-757GX MkI.....£275

Kenwood TR-751E 2m Multi-mode transceiver £275

Yaesu FT-690R II 6m transceiver £275

Kenwood TR-751E VHF Transceiver £275

Icom IC-735 HF all mode transceiver £299

AOR SDU-5000 Spectrum Display Unit.....£299

Yaesu FRG-100 HF Receiver.....£299

TM-D710A - VHF/UHF Dual Band Mobile Transceiver.. £319

Kenwood TM-255E 2m Mobile.....£329

Palstar AT-1KP Antenna Tuner £339

Icom IC-718 HF Transceiver £359

Alinco DX-77E HF Transceiver.....£379

Alinco DX-77E HF Transceiver.....£379

Icom IC-718 HF All Band Transceiver.....£389

Yaesu VR-5000 Scanning Receiver.....£389

Kenwood TS-440SAT HF Transceiver.....£399

Icom IC-R72 Receiver.....£399

Yaesu FT-857D.....£419

Yaesu FT-100D Multiband Transceiver.....£425

Kenwood TS-450S /AT HF Transceiver.....£425

Kenwood TS-690S HF -6m Transceiver.....£449

AOR AR-3000A Wideband Receiver £450

Yaesu FTV-1000 200 W Transverter.....£450

Yaesu FT-900/AT HF Transceiver £475

AOR AR-8600MkII £499

Kenwood TS-570DG/E £549

AOR AR-3000A+ Wide Band Receiver £549

Rode Classic 1 studio condenser microphone.....£550

Kenwood TS-570DG/E £575

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Yaesu FT-736R 2m/70cm Base Multimode.....£599

Kenwood TS-850S /AT.....£699

Kenwood TS-850S /AT.....£699

Yaesu FT-920 .....£799

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Yaesu FT-736R 6m, 2m & 70cm Base.....£799

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Yaesu FT-920AF HF / 6M Base £899

Icom IC-756Pro HF / 6m Transceiver £899

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Yaesu FT-847 HF-6-2-70 Base.....£899

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www.spectrumcomms.co.uk

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E-Mail: helikites@yahoo.com
www.helikites.com
www.allsopphelikites.com

THE DMV PRO ANTENNA 80m to 6m, Choice of Delta loop, M dipole, Vertical dipole. Practical Wireless review Feb 09, " A remarkable portable antenna."
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Tel: 01489 789960

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Qtz x-tals 455kHz to 150MHz Std 10.106, 10.245, 10.7, 11.155MHz £1.00/unit. Callg 3.56, 7.030, 21.06, 28.06 £1.00/unit. 1.4MHz fltrs £14.00. 10.7MHz 10kHz fltrs £3.25 P&P £1.00 + VAT. IQ Electo 0208 391 0545. vincent@jakomin.fsnet.co.uk

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REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Kent Rigs, 52 Salisbury Road, Chatham, Kent ME4 5NN. Tel: 07903 023437.

RELIABLE REPAIRS for all amateur and vintage equipment. Professional service, reasonable rates. Tel: 01807 580376.
E-mail: radiorepairs@btconnect.com

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The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 15% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979, Fax: 01202 659950.

Please insert this advertisement in the ..... **issue of** *Practical Wireless* (if you do not specify an issue we will insert it in the next available issue of *PW*) for ..... insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 15% VAT to total).

Name: .....

Address:.....

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Telephone No.:.....

Box Number @ 70p: Tick if appropriate ☐

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Please photocopy this form or write on a separate sheet if you prefer

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For your advert in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry.

BARGAIN BASEMENT RULES - £4 per advert

Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words f**or your contact details on the form provided and send -it together with the dated corner flash and your **payment of £4 (subscribers** can place their advert **free of charge** as long as they provide their **subs number and corner flash),** cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0845 803 1979**.

Please help us to help you by preparing your advert carefully. Any advert which contains **??** marks indicates that the advertiseing dept. could not read/interpret the wording.

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.**

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

ALTRON SM-30 MAST in excellent condition. Painted brown, complete with cables, extra top mast and just needs ground tube. Buyer must collect from Snodland, North Kent, £100. Tel: 01634 250427 (Kent).

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ICOM IC-756 HF/50MHz, 100W. TX model for 40m. Excellent condition, full working order. Hardly used since 1999. Prefer buyer collects, £550. Tel: Les M0ARM QTHR 07894 711421 (Dorset). E-mail les@mklep.co.uk

KENWOOD TM-D710 new, £330. Icom E-92D D-Star, new, £230. Yaesu FT-1000MP Mk5, mint, £1400 o.n.o. MD-200 mic, new, £150. Yaesu FT-817 + M. whip, £220. DX-394 receiver, £130. Buyer collects, cash only. Tel: Geff 01373 858765 (Westbury, Wilts).

MFJ-212 indoor active antenna. MF, HF, VHF. 9V battery, £30 postage included. Tel: 0207 536 0466. E-mail: jonathan.kempster@bbc.co.uk

REGULATED DC POWER SUPPLY model 2512M Zurich. Maximum 30A, 10A, 6A metered variable volts. As new, £50. Pair of speakers, Watson SP-2B 8Ω, 3 watt. 7 x 5 x 4" depth. Black cabinets, please collect. Tel: Alan G3MBL 01284 827379 (Bury St. Edmunds).

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YAESU FRG-7 communications receiver. 0.5-29.9MHz. Good ext. condition, original handbook, requires alignment. SAE for photo has external digital display. Price, £100 includes delivery. Tel: Peter Chapman G3JSR 0208 599 8393 (Romford, Essex).

WANTED

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DAIWA DC-7011 round controller for manual type rotator. Tel: Ian 01452 411502 (Gloucester). E-mail: ian.hollingsbee@blueyonder.co.uk

GOOD CONDITION *Regen Receiver*. T. J Linsay. *Secrets of Home Build Regen. Receivers* C. F. Rockley. Magnetic headphones, crystal earpiece, 28s.w.g. enamel copper wire. Tel: E Wolf 01787 468643. 1 Orchard Place, Church Street, Sudbury, Suffolk CO10 2BW.

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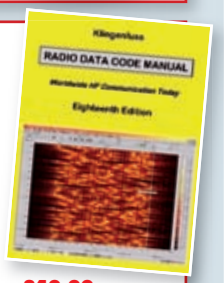

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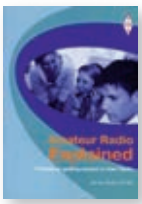

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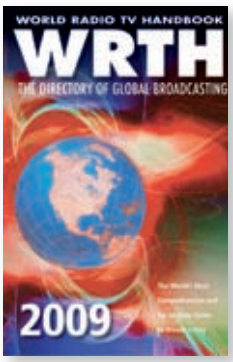

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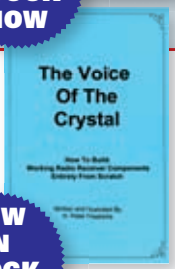

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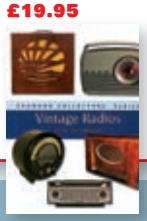

This book tells the collector and the armchair wireless enthusiast everything there is to know about classic radios from the 1920s to the end of the 1960s. All the important makes and models are discussed and the author also covers buying and selling, care and restoration and many other topics, including foreign radios and radio-related ephemera. Illustrated with many colour photographs, this is the perfect collector's companion to the fascinating hobby.
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Rob Mannion's

topical talk

Rob Mannion G3XFD comments on two interesting letters dealing with PSK31 and interference issues.

The letter from **Frank Wyer G8RY** (Letters this month) truly delighted me because, by using PSK31 and RTTY, Frank had been able to overcome the deafness that had badly effected his Amateur Radio activities. This remarkable Amateur – in the tenth decade of a wonderful life – is now getting the most out of the two modes.

In fact, since I mentioned my own PSK31 activities – I've had much feedback from readers who've also enjoyed what they often refer to as the 'keyboard modes'. Not surprisingly, other Amateurs who have problems using ordinary speech modes have told me of their own activities on the keyboard. One friend, who I've actually worked on PSK31, said he took up the mode to supplement his c.w. work after suffering from throat cancer.

Another keen keyboard operator who wrote to me had suffered a stroke that had effected his speech and paralysed him down one side. He found that the operating on PSK31 helped his recovery – so keyboard modes can be therapeutic as well as enjoyable!

From my own point of view, I've found that operating using the keyboard can give my voice a rest! Indeed, when I'm at show meeting readers I'm using my voice a great deal! It's the same in the office, chatting is done on the telephone. However, as time passes E-mail messages are replacing many Editorial office 'phone conversations.

Oddly perhaps, there's a special advantage to handling correspondence via E-mails at the *PW* offices – because work doesn't have to stop immediately to deal with them! Even though I try to answer E-mails by replying immediately – to stop them piling up – I often select a period during the working day when I can devote enough time to do my replies. Yes, keyboard communication modes really can be enjoyable and helpful!

Radio Amateurs Everywhere!

The letter from **Len Paget GM0ONX** – a *PW* author – in the letters pages this month prove an important point – that there are Radio Amateurs in every walk of life! In fact, readers may remember that Len has been my volunteer 'chauffer' whenever I've visited Scotland in recent years. Indeed, if it hadn't been for Len's assistance, running the PW 75th anniversary station GB75PW from the **Kilmarnock & Loudon Club** would have entailed me driving my especially adapted car all the way to Scotland, taking the IC-756PROII loaned by Icom with me.

During my frequent *PW* trips to Scotland where Len has kindly driven me about, he's shown me some of the innovations in street lighting introduced by local authorities. I'm afraid that until then my knowledge of street lightning was very limited. However, Len's fund of knowledge, gathered over many years, has certainly improved my own understanding of something that many of us take for granted – but nowadays I appreciate the complex engineering behind the night time glow of street lightning.

However, as I intimated in the heading paragraph – I think the most import point to make regarding Len GM0ONX's detailed and very informed reply is that Radio Amateurs are to be found literally everywhere, in any vocation, profession, trade, or everyday working skill. This valuable asset os special knowledge is already vitally important as the hobby of Amateur Radio comes under an ever intensifying onslaught from interference sources.

Once upon a time Radio Amateurs were looked on very suspiciously by neighbours – and even nowadays this can be a problem as soon as any form 'different' looking antenna appears. However, in reality I'm of the opinion that we – as practicioners of a legitimate licenced pastime – are more likely to suffer from interference rather being the cause problems!

The only way we can overcome the growing EMC menace is with the help of GM0ONX and many others like him who pool their knowledge and work on our behalf – many of them doing so here in the UK via the **Radio Society of Great Britain** (RSGB). So, wherever we are in the world, I think it's vital that we should support our own national societies. Without their 'clout' we wouldn't stand a chance! As the trade union TV adverts have audibly demonstrated, individuals like myself can shout loudly, but a large group working together shouts much more effectively!

Rob Mannion G3XFD/EI5IW

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