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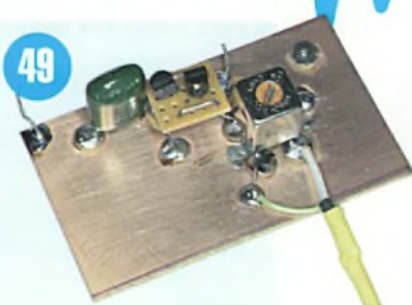
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Don reflects on a busy month and has plenty to say about computers in the shack.

I've had a busy month, what with the National Hamfest, the RSGB Convention and a trip to Norwich to speak at their very active radio club. Congratulations are due to the Norwich club, of course, for winning the prestigious RSGB/W&S National Club of the Year award. It was a pleasure meeting so many PW readers at these various events.

Length of 40m Rotary Dipole

At Newark a friend who considers himself something of an unpaid proofreader of *PW* took great pleasure in pointing out to me that my review of the InnovAntennas Delta C-140 40m rotary dipole (October) omitted one crucial piece of information, its length. He was right, of course. Anyway, to put the record straight, the overall length is 12m or 39ft in old money. This compares with a full size half-wave dipole for 40m, which would be near enough 20m in length, or about 65ft.

Computer Challenges

Last month I mentioned the time it had taken to set up the logging and data mode interfaces for our ZL7G expedition. I have since received a letter regarding transceivers and computers generally and at the National Hamfest was, as usual, faced with a few requests for help in this area.

It's been many years now since our transceivers started to have computer interfaces. In my case, my first was a Kenwood TS-940S in the late 1980s. It required an external level converter to enable an RS232 connection but my PC was then able to read frequency and other data from the transceiver and control it in the reverse direction (by setting its frequency from the logging program).

Move on almost 40 years and, not surprisingly, we've come a very long way. We expect modern transceivers to have a USB interface (I'm astonished that some still use

RS232) and that the latest version of Windows will immediately recognise and set up the appropriate COM port(s). We also expect to be able to upgrade the firmware as new features are added or bugs fixed. This can be a mixed blessing, though. I recall one transceiver released by a US manufacturer where an American friend of mine enthused that he and his contesting colleagues could ask for new features and new firmware would be available in short order. Bug fixes were also appearing almost weekly. He thought this was great but to me it suggested that he and other early buyers were acting as beta testers for the vendor – surely the specification should have been thrashed out and the obvious bugs found and fixed before launch!

Then there is the whole area of CAT (computer aided transceiver, I think) commands, which logging and other station control programs need to be able to emulate in order to control the transceiver and read data from it. A couple of the major vendors now seem to have settled on a standard API (application programmers interface) whereas one of the vendors continues to introduce a new API for every transceiver, which is surely nonsense.

Audio Interface

The audio interface is another bone of contention, in my book at least. It's needed for data modes, for recording QSOs and for sending pre-recorded voice messages (such as CQ calls) to the transceiver. A range of ancillary interface boxes has sprung up over the years, mainly to do just one thing, which is to isolate the transceiver from the computer by using an audio transformer or optocoupler to avoid hum and earth loops. Only in the past few years have some transceivers included built-in isolation yet the problem has been there for a decade or more.

But to come back to the original issue, I often see modern transceivers being sold second-hand just months after their launch, usually on the basis that "it's too complicated for me". One friend of mine waxed lyrical to me about how it had taken him two weeks to work his way through all the menu settings on his new rig. I have wondered ever since whether this was a good thing or complete madness. Yes, we like to set up the audio response, keyer characteristics and a few other aspects to our particular liking and these will usually be left alone from then on.

However, I certainly don't want to be changing menu settings while operating – I want things like keying speed and power level to be available directly from a knob on the front panel. And what about those radio amateurs who simply have not grown up with computers and just want to get on and operate their new radio in the way they have always done with their venerable FT-101ZD or similar?

Not An Bad

The good news is that the reputable vendors will always be prepared to upgrade the firmware for free (albeit you have to take the rig back to them to have this done) and that, for day to day ragchewing, you probably won't have to do much more unless you happen to have bought an SDR transceiver of the sort that demands to be driven from a PC.

Is all this a concern or, 16 years into the 21st century and over 30 years since the arrival of the IBM PC, simply a non-issue?

Finally, my apologies that the promised Screwdriver Antenna project has had to be held over until next month due to lack of space. However, I'm sure you will find plenty of interest in this issue.

Don Field
G3XTT



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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.



A Date for your Diary

Martin Lynch's Annual Hog Roast & Open Day is on Saturday December 3rd. Sponsored by Yaesu, Icom & Kenwood the store will have its usual extra-low prices, lecture streams and manufacturers on site. Bacon butties for the early birds and a succulent pig in a bun for lunch! Doors open 8am & close at 4pm. For more details, see hamradio.co.uk/hogroast



New Updated LED Scrolling Message Badges from bhi Ltd

bhi has updated its range of programmable LED Message Badges to include software for Microsoft Win10 as well as XP, Vista, Win 7 and Win 8. Messages are easily loaded into the badge using the software and USB adapter provided or by means of the on-board buttons on the back of the badge.

The LED message badge is retained using a magnetic clip to prevent damaging your clothing and the package includes: LED message badge, spare CR2032 battery, instructions, USB cable & CD software. The badges are available in two colours, red (priced at £12.95) and blue (£14.95). The badges can be purchased direct from bhi on 01444 870333 or via their website www.bhi-ltd.com



New Alinco Products

Nevada Radio are now carrying two new Alinco products. The DJ-MD-40E UHF DMR/Analogue handheld is the first DMR radio from Alinco. This UHF transceiver covers

New SP-38 External Speaker for the IC-7300

Icom have recently launched an external speaker for their IC-7300 SDR transceiver. The SP-38 matches the IC-7300 as well as improving the listening experience with its large diameter speaker. The suggested retail price is £156.00.

A new firmware update (Ver. 1.14) also became available recently for the IC-7300, offering several updates and bug fixes. It can be downloaded from the URL below, www.icom.co.jp/world/support/download/firm



both analogue FM and DMR digital modes and is built to commercial standards, being both rugged, dust and splash proof (to IP54 standard). It uses digital error-correction technology that rejects noise and static in order to improve sound quality. The radio has, among other features, a built in digital recorder, 1,000 memories, four RF output levels, DTMF and various scanning options. The price is £179.95.

The DM-30E 20A is a compact switching power supply delivering 9 to 15V at 20A continuous (30A peak) output. Using the Alinco patented noise offset control, you can move a spur should you be unlucky enough to find one on a frequency of interest. A highly visible digital V/A meter makes monitoring of output voltage and current easy. The unit has both Anderson Powerpole and banana terminals (on the back) for a choice of connections. Weighing just 1.6kg, this is an ideal travel companion

for DXpeditions or holiday operations and sells for £89.95.

Both products are available from Nevada and their dealers. Tel: 02392 313090. www.nevadaradio.co.uk

G Whip News

G Whip have introduced a new page on the website for weekly deals and start off with some storage/carry cases for Rig Expert antenna analysers and the Elecraft KX2/KX3 range.

The antenna analyser cases include a high quality RG58 Mil spec' coax feeder with triple heat-shrunk PTFE PL259 plus, in some cases, a soft protection sleeve for the analyser. These cases are really tough, having been stood on as part of testing.

The KX2/KX3 cases come with a fused cigar lighter plug DC lead and a protective sleeve for the radio. The case will house the radio, microphone or key and the supplied DC lead."

www.gwhip.co.uk



A Day at the Museum for the Bittern DXers

Well, it was two days really, Sunday and Monday at the end of August, when the Bittern DX Group, attended the Village at War Weekend at Gressenhall Farm and Workhouse Museum in Norfolk, activating the GB5GFW special event callsign.

Given the theme of the weekend, the group put a special focus on attracting the interest of young people away from guns and war, to the hobby of amateur radio and in particular, space related operations.

At the beginning of August they e-mailed the FUNcube 1 (AO-73) operations team and asked if a suitable message could be put on board the satellite for the event. The group were 'over the moon' when **Graham G3VZV** said, "No problem". The message read, "This is FUNcube 1 in space calling Gressenhall Farm Workhouse and the Bittern DXers in Norfolk on Planet Earth. Greetings to all earthlings!"

Despite the difficult surroundings resulting from both the very effective RF shielding provided on three sides by the Workhouse and the high levels of local QRM, they were able to receive and decode telemetry and the satellite message on both days 'live' for visitors. This was quite pleasing because on Sundays, FUNcube 1 is in Transponder mode, making the telemetry beacon quite low power.

It was interesting to note that while the reception of the message attracted the attention of the audiences, the message itself always raised a laugh. There was also considerable interest from parents regarding the educational aspects of FUNcube 1 and many young people were able to make good suggestions as to the cause of the varying output of the solar cell voltages. It did seem that it's the 8 to 11 year olds who are most interested, teenagers appearing to be somewhat blasé.

Reinforcing the space theme, the Bittern DXers also caught passes from FOX 1 (AO-85), listening to QSOs over Europe and



Julian, **MONUX** showing a young visitor the AO-73 message. Mum and dad (**WW2** re-enactors) behind her. In the background, Alex **G3YOA** explains data on the Pi to a visitor and Adam **2EDOUX**, behind.

WACRAL Fellowship Weekend

WACRAL (the World Association of Christian Radio Amateurs and Listeners) held their annual fellowship weekend and AGM on Friday September 23rd to Sunday 25th. Members were treated to a variety of guest speakers with **Anita Edgar** speaking on her work with the El Shaddai trust in Goa, India with responsibility for 4,000 children in a number of homes. **Don G3XTT** spoke about his various experiences working with and organising numerous DXpeditions around the world. **Brad Turkington 2IOWBF** talked about MegaVoice, an organisation producing robust, solar powered audio devices that have the ability to store the whole Bible in over 4300 languages and dialects.

A club station **MX1CRA** was on air over the weekend. It comprised an FT-897D and LDG Autotuner feeding an Off-centre fed dipole (OCFD).



G14FUM presenting a certificate to **Brad Turkington 2IOWBF**.



Trying the tuning on the HF receiver.

also looking at spacecraft telemetry and the ever-popular images from the NOAA weather satellites. Again there was great interest in watching the passes appear on the monitor screen and several times people returned at the right time to watch the whole pass, resulting in some lively discussions about the weather!

Also running and active were an HF data station running on a Raspberry Pi, a 2m station, HF SSB and a receiver on which visitors could listen in and tune to what was going on. At every event they attend, the group has Morse keys with sounders for young people to send their name and everyone takes away a certificate of achievement, which is always extremely popular.

GB4MTR

GB4MTR is a special event station celebrating 60 years (1956-2016) of the 4m band (70MHz) in the United Kingdom. The station will be run by **Selim MOXTA** at the Harlow & District ARS, G6UT. It will run until November 28th on the 80, 60, 40, 20, 17, 15, 12, 10, 6, 4 and 2m bands plus 70cm, mainly on Tuesday and Friday evenings (1930 to 2230UTC), weekends (most of the day or night) and some intermittent weekdays (1930 to 2230).

The 4m band became available on November 9th 1956. It was a replacement after losing the old 5m band (58.5 to 60MHz) on March 31st 1949 to make way for the Band 1 VHF TV frequency extension.

Today, the 4m band, originally a 'British Band', has spread to most European countries and a handful of countries in the Middle East and Africa. The purpose of GB4MTR is to celebrate the anniversary, to raise awareness of this worthwhile band and to help encourage its adoption in countries that do not yet have it.

Over the decades, many UK radio amateurs relied on building their own AM 70MHz equipment, while later on FM started to be used. Many amateurs have converted commercial PMR

equipment in order to get onto the band. Nowadays, though, several commercial transceivers offer 4m as one of the bands covered.



GB4MTR was last activated in 1988.

15 Years of Training

January 2017 sees the 15th anniversary of the first Foundation training course run by volunteers from the Chelmsford Amateur Radio Society (CARS).

People from across Essex came to the first course held at the Danbury Village Hall in January 2002 and since then the





Chrissy Brand, who will take over as editor of **RadioUser**, dived in to help on our busy PW Publishing stand.



PW editor Don G3XTT with **Dennis Anderson G6YBC** of **Kanga Kits**, taking a look at the latest goodies.



The **Norfolk ARC** brought a coachload of members to collect the prestigious **RSGB/W&S National Club of the Year** award.



Jonathan Sawyer M0JSX, a recent addition to the **Martin Lynch** team, busy helping customers.



Sean Burton 2E0ENN, winner of our recent **Yaesu Fusion** competition, receives his prize from **Dean Croome** of **Yaesu UK**.



TX Factor busy filming as a **Russian visitor** from **Expert Electronics** explains the **MB1 SDR** transceiver.

version of the Cobweb antenna, claimed to overcome some of the mechanical difficulties of previous versions. It's always great to see new antenna manufacturers appearing although I often wonder who buys their products – sadly, with small gardens and draconian planning rules, relatively few UK amateurs are able to erect large masts and multiple Yagis and I would have thought the market was already pretty saturated.

Clubs

Many of the usual clubs were in attendance – ISWL, BYLARA, VMARS, British Railways ARS, RAOTA, Royal Signals ARS, WAB and so on.

RSGB Club of the Year

There was quite a turnout for the RSGB Club of the Year presentations, sponsored as always by Waters and Stanton (W&S). Winners in the Large Club section were the Norfolk Amateur Radio Club (NARC). Having given a few talks at NARC, I am aware of how active they are as a club and the award is well deserved. They had brought a coachload of members so there was quite a crowd of them to accept the trophy and a substantial gift voucher to be used at W&S.

PW Yaesu Fusion Competition

We were delighted to have the opportunity of meeting **Sean Burton 2E0ENN**, winner of our recent **Yaesu Fusion** competition, who was there to collect his prize from **Yaesu UK**. Sean assures me the kit will be put to good use!

Finale

All in all the Hamfest was another success, with numbers up on last year as far as I am aware. Chatting with one of the organisers, they tell me that they have a contract with the Newark Showground for another four years – this guarantees a cost base with only modest price increases, allowing them to budget and plan well in advance. The venue is by no means perfect and could do with a bit of investment by the owners but at least there is plenty of parking, the hall seems to be about the right size for the number of vendors and attendees and, as shows like this go, the catering isn't too bad.

It certainly got me thinking back to RSGB shows I have attended over the years. My first, in the mid-1960s, was at

the Royal Horticultural Halls in London in the days when the RSGB representatives and most of the vendors (not to mention the visitors) wore jacket and tie. Then there was Ally Pally (Alexandra Palace) for a few years before a move to the National Exhibition Centre near Birmingham.

However, although a custom-built exhibition and convention centre, the costs proved far too high for a specialist hobby event so that didn't last long. Its place was very much taken by the Leicester Show, in Leicester itself then at Donington Park until the move to Newark. The good news is that the hobby is still strong, there are still plenty of vendors and plenty of interesting products to see. Long may it continue.



The weather was dry and sunny, allowing lots of outside activity

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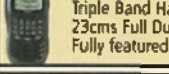
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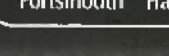
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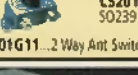


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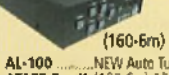
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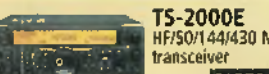
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This month I am pleased to introduce two new items from Alinco Japan. A new DMR Digital handheld transceiver the DJ-MD40 and a quality lightweight 25 Amp power supply the DM-30. From MetroVna we have a new Deluxe version of their popular Network Antenna analyser that covers up to 250MHz. I am always looking for new products so if you see something interesting, let me know, it could be worth your while!

Mike Devereux - G3SED
Managing Director

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G4TPH Loop Antennas

Tony Jones G7ETW takes a look at a couple of loop antennas by G4TPH, an update on previous PW reviews of earlier G4TPH products.



Fig 1: The kit of parts on arrival.



Fig 2: The assembled 10-strut loop.

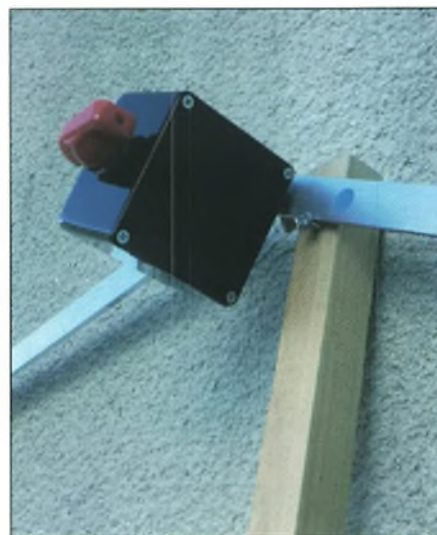


Fig 3: The tuning box.

This review is of a magnetic loop antenna, made and sold by Tom Brockman G4TPH. There are two versions, the ML40-HP Mk2 and the ML40-HP Mk2 Remote. The ML40-HP Mk2 antenna comprises ten aluminium struts (400 by 16mm), a tuning capacitor box and a coupling transformer box with a BNC socket on it, plus nuts, wing-bolts and washers. The ML40-HP Mk2 Remote is the same except that the manual tuning capacitor box is replaced by a motorised one and a separate switch box.

Each antenna comes as a 'flat pack', Fig. 1, with good instructions. Two of the pre-drilled struts have smaller holes to fit the tuning boxes and these are clearly marked with blue spots. The struts need to be bolted together to make the loop. Tightening the wing-bolts by hand to make the loop rigid enough to keep its shape is

very hard work, so I used a screwdriver and a pair of pliers. One of the claimed advantages of using a series of struts rather than a continuous loop is that it's easy to pack down (for portable operation, for example) and can be taken into confined spaces (such as a loft) before assembly.

No setting up is needed other than to decide which set of bands to make it for. With ten struts, the antenna covers the 40, 20 and 15m bands and is 1275mm in diameter. For 12m and 10m, leave three struts out. The diameter is then 900mm. To tune for a band, the procedure is wonderfully 'old-school': choose a quiet frequency close to mid-band and peak up the receive noise by carefully turning the capacitor.

The photograph, Fig. 2, shows the manually tuned antenna with the ten-strut loop. Fig. 3 shows the capacitor box with one of its matching blue-spotted struts.

Testing Testing

Before attempting to transmit, I did a lot of tuning testing and I was impressed by how well this works. Tuning by ear, I consistently got better than 2:1 matches on all bands the antenna is designed for. Using an antenna analyser I got even better results, including a perfect 1.0:1 VSWR on 40m. Once the 'sweet spot' on the capacitor has been found, the VSWR across that whole band stays useably low.

I also checked some bands the antenna is not designed to work on after I was surprised to hear my local 2m repeater when I changed bands inadvertently. If this was the only antenna I had available and I needed to get on air urgently for some

reason, I would certainly consider using it 'off-piste'.

The photograph, Fig. 4, shows the 40m VSWR readings as measured on my MFJ analyser. Table 1 details measurements on several bands, including VSWR readings at the band-edges for 20 and 40m.

Initial testing was done at my flat but that's a poor location for HF and I was delighted when an opportunity arose to give the antenna an outing. On September 4th my local club, the Radio Society of Harrow, attended a public event in conjunction with the Metropolitan Police. Tom Reilly G0NSY, an ex-police officer and the club president, had arranged for the club to put on an HF station to promote the International Police Association (IPA) by using the callsign GB4IPA.

I assembled the antenna for 40m and hung it with nylon fishing line from a small tree, the feeder connecting a couple of

feet off the ground. This may sound like a terrible way to deploy an antenna but it is precisely as per the instructions. With so many people around, we didn't want any more cables than were necessary so we didn't use the remote-tuning option. Instead we relied on two-person tuning, one operator at the antenna and the other at the radio, using hand signals to indicate the noise level on receive. Why hand signals? Because of the noise: not electrical noise – we were in a park, a hundred metres from the nearest building – but acoustic noise. Children were having a grand old time trying out the 'blues and twos' in a nearby police car and there was a public address system playing music as well!



Fig. 4: Measured SWR and impedance on the 40m band.

GB4IPA Activity

We started operating on 40m using a Kenwood TS-570 and 100W of SSB. The 40m band was only in fair shape and there was a contest on. We had a few good QSOs, mainly to Northern Europe. When we were heard, the other station usually replied straightaway, giving us a five and nine signal report (perhaps somewhat meaningless because this is pretty much standard during contests!). Table 2 has a list of some of the stations we worked. To any contest stations we worked I apologise – we didn't enter a log.

There were many stations we heard but could not work, including GB0APS, an all-female special event station operating at the Leicester Pumping Station on 7.130MHz. We tried for a good 20 minutes but couldn't break through the pile-up. If you read this Sandra or Linda, I'd be interested to know if you heard us.

When 40m all but closed, we tried 20 and 15m but had no luck. We had an

Table 1: Some VSWR results achieved using 'by-ear' tuning.

Freq (MHz)	VSWR
6.999	1.4
7.091	1.3 (40m band tuned at this frequency)
7.199	1.4
14.004	1.2
14.110	1.1 (20m tuned at this frequency)
14.353	1.3
50.963	1.7
70.428	1.7
145.000	2.0

Table 2: Stations worked at Metropolitan Police Event

F5KEE, G2XV/P, OR4O/P, ON4EJO, ON6WL/P, ON7TR, RW1F/P



Fig. 5: The 10/12m loop with remote tuning box.

L-shaped vertical up as well, which should have favoured shorter wavelengths but when we switched to that it was no better. So I think the band conditions, not the antennas, were to blame. My fellow club members were amazed that a small loop antenna could do so well on 40m.

I didn't take any 'radio' pictures at the Metropolitan Police Event. I'm sorry but it felt intrusive, with so many members of the police and their families about.

Remote Tuning

Testing the antenna with remote tuning was done at my flat. The manual tuning box is replaced with a much larger motorised capacitor box that has a side-mounted BNC socket. This coaxial connection provides DC (6.0 to 15V) of reversible polarity to a powerful motor. Why coax for a DC connection? Partially to keep RF out of the switch box and motor, Tom told me, but mainly because radio amateurs are more likely to have spare BNC RF leads than lengths of twin-core.

The motor has quite a kick to it and draws 700mA. The gearing ratio is 3000:1 so tuning is smooth and controllable. The instructions recommend the use of a small (ideally linear) mains PSU but I used a 12V 5Ah 'gel cell', which was perfectly



Fig. 6: A close-up of the remote tuning box.

adequate. At a pinch, this could be run off a PP3 battery. Tom can supply a suitable PSU and fly lead if required.

The photo, Fig. 5, shows the 10m loop with the remote tuning capacitor fitted, while Fig. 6 shows the remote tuning box, in two parts. The larger box houses the motor and the smaller box has the tuning capacitor in it. Again the blue spot on the strut can be seen. Fig. 7 shows the switch box, with no DC supply.

Thoughts and Conclusions

The build quality is excellent and the component parts are of good quality. The photo, Fig. 8, shows the boxes with their lids removed. That motor is a monster!

Tom used to sell two band-specific versions: the ML-20, which had eight struts and covered 20 to 10m, and the ML-40 with 12 struts, covering 40 to 20m. These antennas have been reviewed by PW before, first by Tex in 2007 and again by Ben Nock in 2011. Both reviewers liked the antennas, having reasonable success with them, and recommended them for portable operations.

In use, nothing much has changed. The 2016 versions are still well made and come to pieces easily for ease of transportation. The key to this is the



Fig. 7: The switch box as used at the shack end.

coupling unit, which one strut passes through, making the loop the secondary winding of an ingenious toroidal RF transformer. Tex drew our attention to this nearly ten years ago; it was a good idea then and it still is.

These are the obvious improvements in this, the third generation of Tom G4TPH's antennas. These include complete 40 to 10m coverage in one antenna with no need to change tuning capacitors or coupling transformers, a smaller loop (ten struts rather than 12) and 100W power handling (on SSB; the recommended CW limit is 50W). Previous models were QRP only.

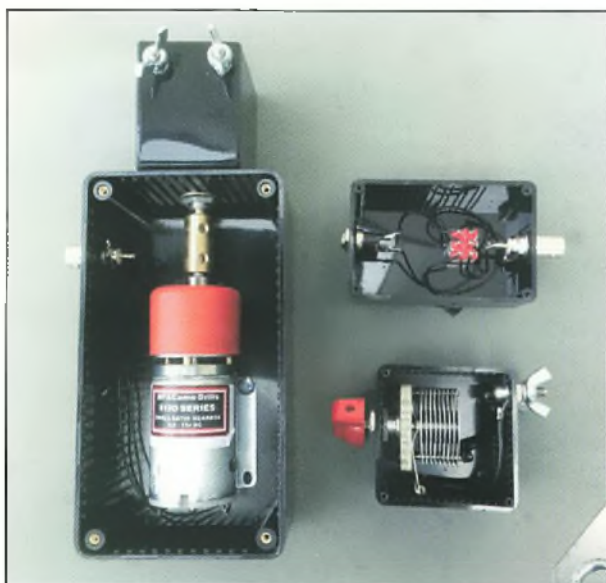


Fig. 8: An internal view of the various components.

The option of remote tuning is also a plus. The antenna could be hung in a loft and be the main station antenna with the switch box in the shack. No ATU would be needed.

I suppose the acid test of a product review is "would I buy one?" Well, let me be absolutely straight about this. I am a QRP operator, partially from circumstances but mainly from preference, so I would never need a 100W antenna. I usually just throw a wire over into a tree for my portable operating.

I like the build quality of Tom's antenna (and yes, he does still drill and trim the struts himself, see **Fig. 9** for a detailed view) and how easy it is to tune. Correct tuning results in an antenna with useable VSWR across the whole of each band. The antenna – manual or remote tuning versions – is very light, and can be hung off anything handy so it is perfect for portable operations. The fact that it breaks down to small pieces means it could be erected in small spaces.

For public events, where safety is always a worry, the antenna has advantages because it only needs one support (and not a high one) and there are no remote ends with high voltages present. It also looks quite 'technical', by the way. At the Police event quite a few people asked what it was, which led to explanations of what amateur radio was and two young men expressing interest in taking a Foundation course.

But would I buy one? I'm thinking about it! Ordering is via Tom's website, below. The manual tune version is £94 and the remote tune version is £159.

www.g4tph.com

My thanks go to Tom Brockman

G4TPH for the loan of his antennas and to **Peter Marcham G3YZB**, **David Tallaber G0CAG**, **Steve O'Riordan 2E0NSY** and **Tom Reilly G0NSY** for their valuable and enthusiastic assistance in doing this review.



Fig. 9: The drilled and finished end of a strut.

Magnetic Loops for Beginners

A magnetic loop antenna, otherwise known as a 'small transmitting loop', is defined as one that has a circumference of less (often a lot less) than one third of a wavelength. About one tenth of a wavelength is a good rule of thumb. The capacitor forms part of the loop and is there to 'counterbalance' the inherent and significant loop inductance.

When the loop is tuned, the antenna becomes a tuned (LC) circuit with very high Q. This is why tuning is sharp and bandwidth generally low. Magnetic loops usually need to be retuned as the operator tunes up and down the band. Single band antennas are easier to implement.

The voltage across the capacitor plates can be very large, even at modest power levels. The capacitors in the review antenna are noticeably heavy-duty.

Unlike a dipole, a magnetic loop couples into an RF wave's magnetic field. This makes it far less sensitive to local electrical interference.

Magnetic loops are directional in the plane of the loop, that is to say 'edge-on'. This is counterintuitive because looking into the 'face' of a magnetic loop, it is easy to imagine RF being 'captured' by it but that is not how magnetic loops work. Mounting a magnetic loop antenna horizontally gives an omnidirectional (horizontal) response.

Efficiency is an issue with magnetic loops. This can be very low (5% or less) although it is possible to design and build them with efficiencies of 80% and more. It depends not just on the size but the thickness of the loop material.

Sometimes an antenna consists of more than one loop, with a smaller loop to energise the main loop. In some designs the feeder connects to the loop directly and there is a delta-type concentric conductor to assist in impedance matching. I could go on; there are many designs of magnetic loop antenna.

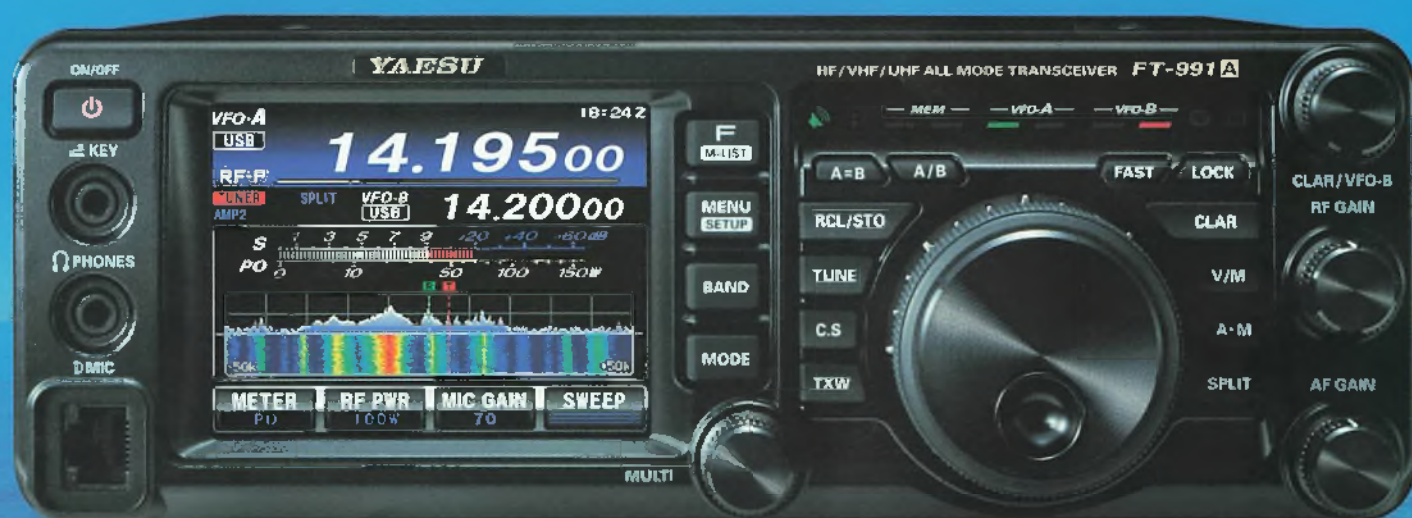
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The Japan Ham Fair

The Japanese Amateur Radio League (JARL) Ham Fair is the largest amateur radio show in the world but little known in the UK. In 2015, the show boasted around 36,000 visitors. Michael Wells G7VJR, founder of Club Log, and Martin Atherton G3ZAY travelled to this year's Japan Ham Fair in August (Michael was due to give a Club Log presentation). Here is a flavour.

Travelling to the Japan Ham Fair for the first time is very different from, say, visiting Friedrichshafen or Dayton. Not only is there an obvious language barrier, there are also very many cultural differences between the UK and Japan that must be respected. Japanese customs and traditions are far more elaborate than might be obvious at first and I found this trip a great chance to understand and observe some of those traditions.

For example, customary exchanges of gifts and business cards can appear quite informal while they are, in fact, very important rituals that must be given proper attention and handled sensitively. A business card must be handed facing the recipient with both hands, will be received with care and interest and put away with respect. Small gifts are given discreetly, usually in a small bag and with a comment that it is "really nothing" – and never in front of others – but such gifts might not be insignificant at all. They should be received with the utmost gratitude and care and should be reciprocated!

I was lucky to be travelling with **Martin G3ZAY**, who has been to Japan many times in the past as part of his professional work. Martin helped out with all of the formalities and also speaks a little Japanese, as well as being able to read *romaji* characters (Japanese phonetics). I should also mention that, although English is not widely spoken among Japanese radio amateurs, plenty of allowance is made for foreign visitors and the chances of causing offence by being disrespectful by accident are carefully taken care of without any drama. On the other hand, properly participating in Japanese customs creates goodwill. It's a very good idea to try and truly goes a long way to forging friendships.

If you travel to the Tokyo Ham Fair in 2017, be prepared for hot weather but also very warm and friendly greetings from our fellow radio amateurs. It is a trip well worth taking and will be a great experience to remember!



We found one of the two remaining ham radio stores in Tokyo and Martin checked out the latest and greatest radios from all of the mainstream manufacturers in Japan.



The GHD stand had some fantastic wooden paddle keys, which were very attractive, too.



After the Club Log talk, I was delighted to meet Zorra, JH1AJT. He is a famous DXer who recently brought Myanmar and Eritrea onto the bands.



Other construction projects caught my attention. This was an immaculate antenna switch box with particular emphasis on grounding using copper strapping, for example.

A photo call of some of the overseas visitors, including a large delegation from Thailand. Bob MDOCC is front right, in the check shirt.



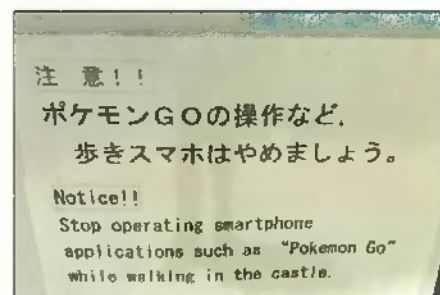
After the JIDXA dinner, Zorra introduced this drumming band. I wish I had taken some more notes because I cannot recall what the style is called but it was great fun and the way the players compete with each other during the performance raised plenty of smiles.



The Tokyo 610 group had a fun dinner in the evening, where we caught up with Jaques F6BEE and his wife Brigitte.



A walk around the fair always leads to something new. These CW touch paddles are made in Korea by a friendly and talented team. You may recall their famous 6M6M callsign, a 50MHz special expedition. The paddles work on capacitance and have no moving parts. The photo shows how popular they are – almost entirely sold out.



After such a great amateur radio experience in Tokyo, Martin and I headed to Kyoto to see some of the more historical sights. Kyoto is the old capital of Japan, and has many shinto temples, which are mostly open to the public. We started at Nijo castle, which is an old shogun residence. On the way in, I noticed this sign. Is nowhere safe from Pokemon?



Some general views of the exhibition halls (Photos courtesy of Champ E21E1C).

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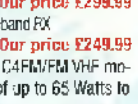
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The Kit Scene

Following the recent correspondence in PW regarding home construction projects, Colin Redwood G6MXL decided it was time to explore the kit market.

The amateur radio kit market has certainly changed over the years since I last built a kit. Many of the suppliers of previous years have dropped out of the market or only supply complete almost ready-to-use equipment. Nevertheless there are still plenty of kit suppliers around.

What is a Kit?

Different suppliers have different ideas of what constitutes a kit. Some offer just a PCB and components, leaving the constructor to provide a box and hardware such as sockets and related items. Others supply everything, including a box and hardware. Some provide pre-built modules that just need to be mechanically assembled and electrically interconnected. Several suppliers offer kits in a number of versions, enabling the constructor to choose which option best matches their construction skills.

Range

Some kit suppliers are very much focused on the amateur radio market, while others also stray well outside of what might be considered 'core' amateur radio into audio and other areas. In my brief survey, I've tried to stick to kits most likely to appeal to radio amateurs. The choice of available kits covers just about the full range of an amateur station from a simple Morse code practice oscillator, through QRP stations to full specification HF transceivers and high-power amplifiers. The VHF/UHF/SHF bands are well provided for with kits for transverters, amplifiers and switching available. I've also included a selection of kits for test equipment in the survey.

What follows is not intended to be a comprehensive overview but more an indication of the wide variety of kits available if you dig around. My apologies to the numerous kit suppliers that I have not included. It simply wasn't possible to include every kit supplier in this survey.

Components

Kit suppliers vary in their attitude to the use of surface mount devices (SMDs). Some avoid using SMDs altogether. Some pre-solder the SMDs, leaving the constructor to solder the remaining, more familiar leaded components. Others expect constructors to be fully competent in soldering SMDs. I would certainly recommend visiting the relevant suppliers' websites because many have construction notes that can be downloaded before buying kits and these give a very good feel as to how well the instructions will help constructors. Some instructions list individual components together with help identifying them (individual resistor colour codes, for example). Others assume that constructors are sufficiently experienced and need only the barest minimum of help. You are expected to have the relevant tools and skills needed to construct the various kits. Because I've not bought kits from most of the suppliers, I cannot assess the level of post-sales support available.

Battery Charging & Power Supplies

Quasar Electronics Limited have a range of kits for building battery charging circuits that suit a variety of battery technologies including NiCad, NiMH and lead acid. They also have a useful range of kits for building what they term 'DC to DC voltage converters', which I think would be better termed 'voltage regulators'. The range includes designs capable of handling between 500mA and 4A. With the addition of a suitable mains transformer, they could form useful low current power supplies. None of the kits from Quasar include mains transformers, but these can be obtained elsewhere.
www.quasarelectronics.co.uk

Morse Code

If you are looking for a Morse code oscillator, then Quasar Electronics (as above) supply a kit based on the NE555 timer IC. Note that the kit does not include

battery, battery clips or speaker but these are available separately from Quasar.

Data Interface

PW advertiser Spectrum Communications (run by regular PW contributor **Tony Nailer G4CFY**) supplies a kit of parts (without box) for the data interface that I described in my February 2009 *What Next* column. The interface is also available as a box kit, including the necessary parts and box, or ready assembled.
www.spectrumcomms.co.uk

CTCSS

Spectrum Communications also supply a CTCSS module that could be really useful for those readers with older VHF or UHF FM equipment, including ex-PMR equipment, who want to use it with modern repeaters that generally require CTCSS tones to access them. It is available as a kit of parts or an assembled module.

HF Bands

The range of HF kits has changed a lot over recent years. There is plenty of choice.

At the budget end of the market, Walford Electronics has a range of kits that will surely appeal to many home constructors. **Tim Walford G3PCJ** described his *Halse* HF SSB receiver kit in the October issue of *PW*, with the accompanying *Hatch* QRP HF transmitter being featured the following month.

The Walford range of kits also features useful items for home constructors, including a pair of lowpass filters for the popular 20 and 80m bands, an automatic gain control (AGC) kit, a linear amplifier giving 10W out for 1.5W input and an antenna matching unit. Keep an eye on Tim's website because his range of kits changes over time.
<http://walfords.net>

Also at the budget end of the market, Kanga supply a useful range of kits for the HF QRP constructor and operator. These include the FOXX-3 CW transceiver, available for the 80, 60, 40, 30 and 20m bands – you'll need to choose which when ordering. Also available from Kanga is a 40m direct conversion receiver with a built-in Morse reader. The frequency and decoded Morse appear on a liquid crystal display that is included in the kit.
www.kanga-products.co.uk

If you are looking for a simple 80m direct conversion receiver, the appropriately named Kit Radio Company has just the kit. It is supplied with an engraved front panel, which can be painted in your choice of colours. The

company also has three other receiver kits.

www.kitradios.co.uk

If you want a kit that includes the hardware as well, then the Chinese-designed KN-Q7A 10W 40m SSB transceiver kit from SDR-Kits might be just what you are looking for. Apart from just one medium-sized SMD transistor, the kit uses conventional leaded components on the PCB. A 20m version is also available. Full, well-illustrated construction manuals can be downloaded before buying so that you can assess whether the kit will suit your construction skills. Unfortunately, these kits have recently been discontinued so I would suggest contacting SDR-Kits to check whether they have any remaining stock before ordering.

www.sdr-kits.net

Another transceiver kit, this time with an optional case, is the MKARS 80m SSB QRP transceiver kit, Fig. 1, from the appropriately named Radio-Kits. The kit contains all PCB mounted components, including display, connectors and a ready-programmed microcontroller. You'll need to provide a loudspeaker (3-32Ω) and an electret microphone. A dynamic type can be used if the bias resistor (R17) is removed or a series capacitor is installed between microphone and transceiver. While knobs are supplied with the boxed kit as standard, they may be ordered as an option for the version of the kit sold without a box. An optional CW add-on board is also available.

www.radio-kits.co.uk

At the other end of the market, Elecraft offer many of their very highly regarded transceivers in kit form. The extent of construction involved varies. Some, such as the K3, Fig. 2, just require what might be termed mechanical assembly of modules with no soldering, while others require soldering of every component (apart from the pre-soldered SMDs). Most of the range is also available assembled and ready-to-use. Whichever option you decide to go with, you'll end up with a finished transceiver that certainly doesn't look homebrewed and which is considered by many amateurs to be among the best available. Elecraft transceivers are available in the UK through Waters & Stanton. You can find further information on the websites below.

www.elecraft.com

hamradiostore.co.uk

James R Klitzing W6PQL supplies a very wide range of kits, including high-power HF amplifiers and lowpass filters. All come with comprehensive instructions.

www.w6pql.com



Fig. 1: The MKARS 80m SSB QRP transceiver kit.



Fig. 2: A top specification Elecraft K3 transceiver can be assembled from pre-soldered PCBs.



Fig. 3: A 70MHz transverter from PW advertiser Spectrum Communications.

6m, 4m, 2m and 70cm Bands

There are plenty of kits to help you get going on the VHF bands. Spectrum Communications in Dorchester, mentioned above, have a range of receive converters, transverters, Fig. 3, preamplifiers and amplifiers for the 6, 4 and 2m bands. Spectrum generally offer PCB kit, PCB plus hardware kit, or ready-built options, although there are some exceptions.

If you are looking for higher power, then James W6PQL, also mentioned above, has a range of high power amplifier kits for the 6m, 2m and 70cm bands.

Microwave

There is a flourishing supply of kits for those with the skills and test equipment for the microwave bands. Two companies used to dominate this market: Kuhne in Germany and Down East Microwave in the USA. Kuhne no longer supply component-level kits although they have a large range of transverters, converters, preamplifiers, power amplifiers and so on for all bands from 6m (50MHz) to 6mm (47GHz). While some of the Kuhne products are fully boxed and ready to use apart from external connections, much of the range

consists of modules that will require connecting together, a relay and an external box. I looked at the 9cm (3.4GHz) Kuhne transverter, Fig. 4, in the November 2012 *What Next* column.

<https://shop.kuhne-electronic.de/kuhne/en>

Down East Microwave have kits for most bands from 6m (50MHz) to 3cm (10GHz), including transverters, preamplifiers and power amplifiers. Many are available as a PCB with components and an optional hardware kit for the case. www.downeastmicrowave.com

James W6PQL supplies a useful range of transverter component-level kits for the 23, 13 and 9cm bands. The range also includes amplifiers for the 23 and 13cm bands, sequencers and relay drivers, including a particularly useful 12V to 28V boost regulator enabling 28V relay coils, most often found on the surplus market, to be used with 12V DC supplies, Fig. 5. Note that most of these W6PQL kits make extensive use of SMDs so are not suited to those constructors new to soldering such devices.

Power Meters

As well as equipment to establish a station, there are a number of kits available for making your own test equipment. Kanga offer the Sandford Power Meter, aimed at QRP operators. It can handle 5W continuous and 20W for short periods.

SWR Meters

Radio-Kits have a couple of SWR meter kits in their range. The Simple SWR Meter project is designed to demonstrate the use of an inexpensive surplus LCD display. The kit contains just a backlit LCD display, programmed PIC16F818 and, if available, a 10MHz crystal. Information is provided on where to source the remaining components. The Digital SWR Meter project is a design for a general-purpose instrument that will read SWR and power simultaneously over the 160 to 10m bands. For input power below about 20W the unit can be powered from a PP3 type battery. When powered from 13.8V, the unit will read beyond 140W. The meter is designed to read peak power. The kit contains all PCB mounted components, including display, connectors and a ready-programmed microcontroller. The builder will need to provide a suitable case. It will also fit the case used by the MKARS80 HF transceiver.

Frequency Counter

The Kit Radio Company produces a five-digit frequency counter kit. The finished

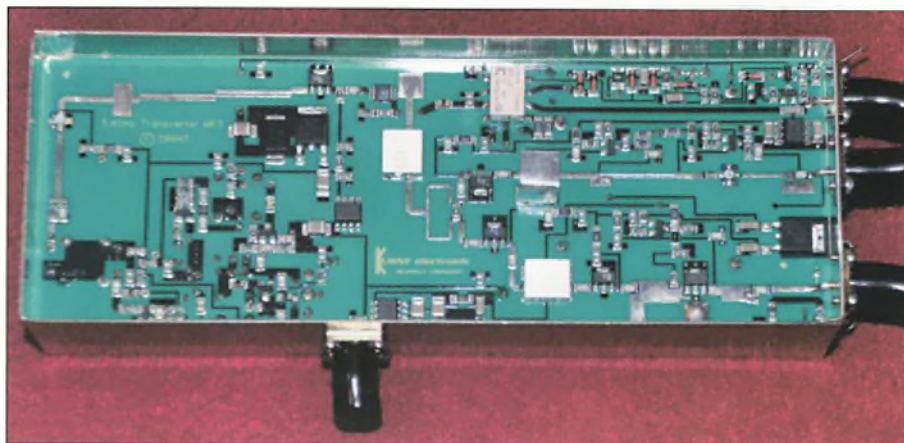


Fig. 4: The Kuhne 9cm (3.4GHz) transverter with its cover removed to show the SMDs.

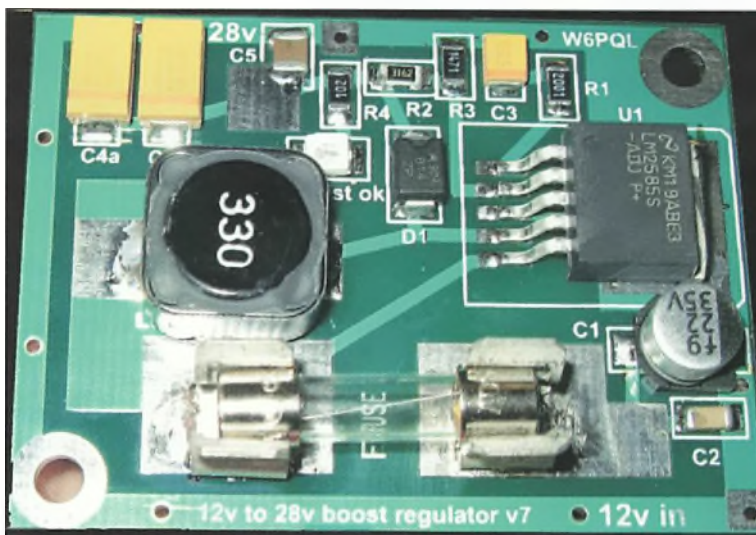


Fig. 5: An assembled 12V to 28V DC converter kit from James W6PQL for driving relays with 28V coils from a 12V supply.

project covers 1kHz to 65MHz, with a choice of either direct reading or four nominated intermediate frequency offsets that must be specified when ordering the kit.

Capacitance Meter

The Chinese company JYE Tech has a range of kits available, including an auto-ranging capacitance meter that received a very favourable review in the August 2016 issue of QST. It covers from 1pF to 500μF and requires a supply of 8 to 16V DC. There are no SMD components. The CPU is inserted into a multi-pin integrated circuit socket. This socket will need careful soldering so as not to bridge the tracks between the pins. This could be a cheap way of measuring capacitance for those with multimeters (including most analogue meters) that don't include this facility.

Digital Oscilloscope

Other kits in the JYE range include a digital oscilloscope kit with the SMDs already soldered onto the PCB, leaving the constructor to deal with the traditional leaded components.

Signal Generator

JYE also have a signal generator kit, termed 'Function Generator', which produces a variety of waveforms up to 200kHz. Like the digital oscilloscope kit, the SMDs are already soldered onto the PCB, leaving the constructor to deal with the traditional leaded components. Details of the JYE kits can be found on their website at: www.jyetechnology.com

Remember that if you buy directly from countries outside the European Union, there may be import duty and VAT plus administrative charges to pay. Readers in Canada can buy through AccuDIY at: <http://accudiy.com>

Conclusion

I must confess to being pleasantly surprised at the wide range of kits on the market. I am sure there are others and would be happy to hear about your recommended kits and/or vendors. Using a variety of the kits I have mentioned, it would be possible to get on the air on just about any amateur band of your choice at power levels up to full legal power.



The 144MHz Transatlantic QSO That Never Was

Tim Kirby G4VXE reports on a transatlantic contact that proved not to be and a balloon carried repeater that proved to be inaccessible. There is plenty of other news too.

A few days before writing the column, there was great excitement when it seemed that the experiments between Pieter Jacobs V51PJ and Marcos Jose PY1MHZ to establish a contact across the South Atlantic Ocean were bearing fruit. The pair, armed with high power stations and good antenna systems from PW advertiser InnovAntennas were using the QRA64 mode within the WSJT-X suite of software.

The excitement came because the pair both seemed to be decoding the other's signals, very occasionally and very weakly, at a signal level of around -36 or -37dB. These are astonishingly low signal levels, of course, compared to a 'usual' JT65 decode for moonbounce of -27 or -28dB but perhaps this was possible with the new mode?

Over a period of 24 hours or so, there were a number of decodes and the QSO seemed to progress.

The pair were keen to establish the veracity of the contact and spoke with the development team behind the WSJT-X software, including Joe Taylor K1JT himself. After some investigation, it turned out that, unfortunately, the pair had been using a copy of the software that had some debugging code in it and that the decodes were not genuine.

Of course, this was hugely disappointing for Pieter and Marcos as well as for the very many enthusiastic onlookers who would love to see such a contact made. Joe Taylor was anxious to

point out that there had been no attempt to deceive and the experiments were being carried out with good intent.

Having spoken briefly to Pieter online, I am certain this was the case and I wish them well for future experiments. Although it didn't work out this time, I am quite certain that such a contact is possible, at the right time.

High Altitude Balloon Experiments

Jef vanRaepenbusch ON8NT wrote to say that on September 15th he had been sat in the sun on his balcony tuning around on his portable, Fig. 1, and heard a computerised voice on 145.200MHz. After a little investigation, it appeared that this was the DL0PTB club station on board a weather balloon from PTB (National Meteorology Institute in Germany). www.ptb.de/cms/en.html

Jef read that the balloon could reach up to 30km in altitude and that there was a crossband repeater on board with an uplink on 433.920MHz and downlink on 145.400MHz. Josef decided to give it a try, called "CQ von ON8NT/P in JO11" and got an answer in German that translated to "Oh, that can't be" after which they ignored him and carried on chatting! What a shame and as Josef points out, such balloon flights with transponders could easily be heard in the UK.

Jef writes, "A balloon was launched again on September 16th between 0800 and 1000UTC. It became audible at my QTH in JO11 at 1043UTC. The crossband repeater was chaos with a lot of (deliberate) QRM and one operator monopolising the repeater. So I was not

able to work through this system but could hear DK2RO (JN59), DJ1LBF (JO54), SP3MCY (JO71), DL2MF (JO52), DG3EAJ (JO31) and many others. I lost the signal at about 1150UTC at my QTH."

Jef was using a Kenwood TH-F7 portable with a vertical dipole for 2m and 70cm.

Thank you for the interesting report Jef and hopefully you will make a contact through the balloon next time. It looks as though it will be well worth keeping an eye on the DL0PTB website for flights because the coverage may very well reach the UK. <http://dl0ptb.de>

The 2m Band

Jef ON8NT was active on the 2m band (144MHz) during the IARU Region 1 contest on September 3rd/4th and worked plenty of stations including M4A (JO02), DO8CW/P (JO40), DA0FF (JO40), DL0LEO (JO30), DJ5KW/P (JO31), F6KUP/P (JN29), DL0GM (JO31), TM9A (JN39), DL0AC (JO30), F4KJP/P (JN29), DP5G (JO30), DF0MU (JO32), DL0VJ/P (JO30), DL0IL (JO31), DK5DQ (JO31), DR9A (JN48), DL0GTH (JO50), TM2T (JN18), G0VHF/P (JO01), G8W (IO90), G2BQY/P (IO81), G8T (JO01), G2XV/P (JO02), F6HPP/P (JN19), PC5T (JO23) and G5RS/P (JO00).

During the RSGB 144MHz Activity Contest on September 6th, Jef found nice conditions with plenty of activity, working M0BRA (IO91), MW0ATI (IO83), G4YPC (IO91), G4FEV (IO92), M0CGL (JO03), DF0MU (JO32), M1GRY (JO02), G4IRC (JO02), G3MEH (IO91), G4NBS (JO02) and G3YGY (JO01). Jef runs 25W from a FT-736R to a 5-element 144/432MHz Elk Yagi.

Roger Daniel G4RUW (Newbury) says that he worked nothing of interest but on the evening of September 29th he heard tropo (tropospheric propagation) to EA8 (Canary Islands). He says that he has been on the band for 33 years and has worked EA8 with a combination of Es and

tropo, but never heard direct tropo. Roger says that his usual 10W was not enough to make a QSO but noted that stations in JO02/03 were giving reports of 59+20dB so it seemed that they had even better propagation (maybe a bit more sea path?).

Jonathan Kempster M5AEO

(Limehouse, London) reports that he used his 2m Moxon antenna, featured in last month's column, during the October RSGB UK Activity Contest for the first time since building it and says it was 'brilliant'. Jonathan says that it doesn't seem to obey any rules on directionality and the SWR is rather high (he wonders whether a balun would sort that out?) but used in combination with his IC-7400 and 50W he worked many new squares, including France. He says he can't wait for the next contest and that he might even start sending in his logs!

Simon Evans G6AHX (Twynning, Gloucestershire) also took part in the October UK Activity Contest and made 32 contacts. His best DX was F8BRK (IN99) who is a very strong signal at Simon's location.

He continues, "During a slight lift I had a chance to check the state of Fusion repeaters in this area. GB3WE was accessible with a collinear on the side of my house, giving access to the Brandmeister room. GB7IS gave access to the Wires-X system. As for GB3AA at Alveston just north of Bristol, I can confirm it is off air."

Paul Bowen M0PNN (Newport, Shropshire) also caught the opening to EA8 on September 27th. He had to wait patiently for a couple of hours for the duct to arrive with him, while listening to M0BUL to the south working the DX. Once it did arrive, Paul worked EA8TX and EA8TJ for his best ever DX on the band via tropo.

The 70cm Band

Jef ON8NT found 70cm (432MHz) conditions good during the RSGB UK Activity contest on September 13th and worked G4RUL/P (JO00), G7LRQ (IO93), M1CJN/P (IO93), G4ZTR (JO01), G4FEV (IO92), PE1EWR (JO11), G3XDY (JO02), G4CLA (IO92) and G3MEH (IO91).

It was good to hear from **Jim Maxwell MW0HLW** (Chester). Jim wrote, "Round about midnight UTC on September 30th, my son-in-law (**Neil MW6NMB**) and I were checking his newly installed IC-7100. Neil found himself listening to two Americans talking on 433.075MHz but no callsigns were heard. I set my Alinco DJ-X11 to the same frequency but heard nothing. We listened around the HF bands then went to bed. In the morning I switched on the

DJ-X11 intending to listen to our local repeaters, when I realised that I could hear American voices and this was on the handheld's own antenna. I was obviously hearing a repeater net but callsigns from all over the USA were copied. I stayed with them from about 0600 until 0800 when the net closed. The same thing happened this morning (Monday) and I have had the lcom on all day and heard several contacts, usually at about S3 but very clear and steady. As I type (1430UTC), two amateurs are in conversation in Pennsylvania, one being a truck driver operating mobile. Our QTHs are about 10 miles west of Chester. I can't believe that this is due to natural, albeit freak propagation and there must be an explanation!"

I strongly suspect that there was some unusual propagation at play here, although sadly not sufficient to duct 70cm signals from North America! I think that Jim and Neil were hearing a repeater at some distance from them, which was fading up and down. I would guess that the repeater was connected to Echolink and traffic from the US was being carried. I could find reference to a couple of Echolink systems that might have been in range of Chester, either in southern Scotland or possibly in Ireland. The other possibility would be a Fusion gateway running in analogue mode but I suspect that Echolink is more likely. A very interesting report, Jim and Neil.

Satellites

Jef ON8NT seems to do very well through AO-85, a satellite I find quite difficult. He notes contacts with SP8CGR (KO10), EA1BYC (IN72), CT1FJC (IM57), F4EJW (IN78), EA1BYC (IN72) and DL4ZAB (JO41). Jef asks about logging satellite contacts and whether he should log the band he was receiving on or transmitting



Fig. 1: Jef ON8NT's balcony antenna, used to listen to high altitude balloon experiments (as well as an excellent choice of reading matter).

on. I've always taken the view that I log the band that I am transmitting on because that would be key to tracking down any potential EMC problems. Some logging programs allow you to log the satellite mode (such as Mode J for 435MHz down/145MHz up).

Graham Jones G3VKV (Cheltenham, Gloucestershire) writes, "I contacted **Dan AL7RS**, located at Teller, Alaska again on September 20th via FQ29 and we exchanged 59 signals on SSB. He is in the far west of Alaska 6918km from my QTH,

looking out over the Bering Strait towards Russia."

Graham describes his station, in the hope of persuading more people with 'terrestrial' antennas to have a go at satellites, rather than feeling they need azimuth/elevation (AZ/EL) antennas. "I am using a 10-element 2m and 9-element 70cm antenna, horizontally polarised. I have no elevation, just a normal terrestrial setup. The transmitter is an IC-910 and the receiver a Microwave Modules 435 to 28MHz converter with a Kuhne low noise preamplifier. This feeds an Elecraft K3, which has a Perseus SDR on the IF for monitoring the transponder output. There are filters on transmitter and receiver to reduce desensing because the antennas are only 1.5m apart on a tower.

"I can only work satellite elevations from 10° to near zero but this is where the DX is found. What is needed is a clear take-off with no hills or buildings in the way. The world record distance of 7599km on FO-29 was achieved using 25W to a handheld Alaskan Arrow antenna by **Dave KG5CCI** in Arkansas USA. The short films on the web of his exploits make interesting viewing. To date I have had over 500 transatlantic QSOs with 29 States, my best DX being **Hector W5CBF** in Texas at 7499km."

It's great to hear that **Mark Marment CT1FJC** (Algarve) is now very active on the satellites and has his antennas controlled by computer through a USB-to-serial converter using an FTDI chip. Mark says it works really well at a baud rate of 57600, as does the CAT control to his TS-2000. Mark says that he has had some nice contacts across the Pond, with K8YSE the best DX so far at 6115km, NS3L at 5640km, KB1RVT at 5349km and NK1K at 5185km. VE2DSK (FN35), R3THA (LO15), NX2X (FN32) and CU2ZG (HM77) were also worthy of note through the FO-29 satellite. To give you some idea of how active Mark has been on the satellites, his log includes 105 contacts.

As ever, the report from **Patrick Stoddard WD9EWK** (Phoenix) has lots of interest, including his first impressions of the new Kenwood TH-D74 handheld rig. Patrick writes, "Last month, I wrote about the upcoming expedition by **Wyatt AC0RA** and **Dave KG5CCI** to Santa Rosa Island in the Channel Islands off the coast of southern California in the rarely-heard grid CM93. Wyatt and Dave made their trip and were successful in activating that island and the grid locator plus, for some passes, the CM93/CM94 grid boundary (34° North) as K6R on September 16-18th. I was able to work K6R on the first SO-50 pass they worked, on the afternoon of September

16th. K6R was on the CM93/CM94 boundary for that pass and KG5CCI later posted a YouTube video showing that pass on the K6R end:

www.youtube.com/watch?v=KW_QjTc6ynY

"Just over a week ago, the Kenwood TH-D74 HT finally reached amateur radio stores in the USA. Over here, the TH-D74A is a tri-band HT that includes the 222MHz band, which is missing from the TH-D74E sold in the UK and Europe. All versions include the 1200/9600bps TNC, GPS, D-STAR and an all-mode receiver. This radio could be considered a combination of the Kenwood TH-D72 and TH-F6A/TH-F7E HTs, with the D-STAR functionality from the Icom ID-51, in one radio. It's not cheap, reaching the US market at US \$649 but would cost less than buying those three other HTs.

"For satellite operating, Fig. 2, the TH-D74 is not capable of working the FM satellites full-duplex. This is a shame, since the TH-D72 had been the only HT currently on the market capable of working all of our FM satellites full duplex. Its memory channels are similar to those in the TH-D72 and many modern Icom HTs, where the memory channel cannot hold receive and transmit frequencies in different bands. This means that working FM satellites with the TH-D74 is done half-duplex, jumping between the two VFOs (Kenwood calls these 'bands' in the manuals) when going from receive to transmit and back.

"The TH-D74's all-mode receiver is a big improvement over the all-mode receiver in the TH-F6A/TH-F7E. It has better sensitivity and selectivity and a slightly smaller tuning step of 20Hz compared with 33Hz on the TH-F6A/TH-F7E. The TH-D74's tuning knob isn't smooth like the big VFO knob on an FT-817 and similar radios but it works. I have used the all-mode receiver on a few of the non-FM satellites (AO-73, FO-29, XW-2A, XW-2F) and could hear



Fig 2: Patrick WD9EWK's new TH-D74 in use as part of his setup for FO-29.

the downlinks basically from horizon to horizon, just as with an FT-817ND or an SDR receiver like a FUNcube Dongle Pro+ or SDRplay in place of the TH-D74.

"Using the TH-D74 on the ISS packet digipeater is similar to using a TH-D72. I have been using mine to make packet QSOs via APRS messages and it does fine on the terrestrial APRS networks based on a quick road trip I took last weekend to western Arizona.

"The TH-D74 includes an audio recorder, which will record the activity on one of the two VFOs when a microSD card is plugged into the radio. This function works very well when I use the all-mode receiver. It gives me a nice record of passes I worked, complete with a file name that includes the date and time the recording starts. When working FM satellites where I have to jump between the VFOs, I can set the recorder to capture audio from the VFO used to receive the downlinks but it stops recording when I transmit from the other VFO.

See You Next Month

Don't forget that December sometimes sees a winter peak in Es activity so it could be worthwhile keeping an eye on 50 or even 70MHz. Thanks for all your input this month – please keep it coming and see you next month.

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More on Red Pitaya

Mike Richards G4WNC continues to work with the Red Pitaya development board, showing how to use it as a multichannel RBN receiver and reporter.

Following on from last month's introduction to the Reverse Beacon Network (RBN), I'm going to conclude with detailed instructions on using the Red Pitaya as a multichannel RBN receiver and reporter. I've also got a couple of news updates.

Red Pitaya Receiver

Regular readers will be aware that I've been experimenting with the Red Pitaya development board over the past few months. Although rather more expensive than more common boards such as the Raspberry Pi, BeagleBone and similar, the Red Pitaya offers a lot more potential for RF applications. This is because the Red Pitaya includes dual-channel ADCs (Analogue to Digital Converters) and DACs

(Digital to Analogue Converters). These are clocked at 125MHz, which means they can both digitise and create analogue signals in the range 0-62.5MHz. In addition to the ADC/DAC combination, the Red Pitaya also boasts a powerful Xilinx FPGA (Field Programmable Gate Array). This is important because the data rate produced at the output of the ADCs is way too fast to send to a PC or any other microcontroller for processing. The only practical way to process this data is to use the parallel processing power of FPGAs. In addition to these key RF components, the Red Pitaya also includes a dual-core ARM Cortex A9 processor that runs at 700MHz and is powerful enough to run a Linux operating system. The net result is a very flexible development board that has all the key components of an SDR transceiver!

As with all development boards,

realising the potential requires the right software and that is usually the sticking point. Fortunately for us, electronics engineer **Pavel Demin** has stepped in and produced a range of excellent radio related applications for the Red Pitaya. These are all available for free download from his Github site and you can see a full list of the applications at this URL: <http://pavel-demin.github.io/red-pitaya-notes>

To use the Red Pitaya as a dedicated receiver for RBN operation, you need the HPSDR compatible receiver code. The instructions and download links for this can be found here:

<http://pavel-demin.github.io/red-pitaya-notes/sdr-receiver-hpsdr>

This receiver can operate with up to six separate receive channels, each of which can be tuned anywhere in its 0Hz to 61.44MHz tuning range. The first task is to download the SD card image from Pavel's site and you should find the download link in the Getting Started section of the receiver page. I've shown the step-by-step process here:

1. Click the SD card image zip file link in the Getting Started section. This link will download a zip file containing the SD image.
2. Once the file has downloaded, unzip it to a directory of your choice.
3. Insert a formatted microSD card of 4GB or more into an SD card adapter on your PC.
4. Drag or copy the unzipped files to the SD card. When complete, the SD card files should look like Fig. 1.
5. Eject the SD card and pop it into the Red Pitaya card slot (contacts facing up).
6. Connect the Red Pitaya to your Ethernet and an antenna to ADC Input 1.

Note that you need to take care with the antenna connection because the Red Pitaya has high impedance oscilloscope type inputs. This is because the Red Pitaya was originally designed to be able to replace laboratory test equipment, so the high impedance inputs were necessary for it to be configured as an oscilloscope. From a radio perspective the high impedance inputs can be a problem if you have an antenna that's not grounded because you may get static build-up. The simplest solution is to use an SMA tee connector along with a 50Ω SMA load as per Fig. 2. This provides a solid 50Ω termination as well as a path to ground for any static build-up. You could also build your own 50Ω termination quite easily. There is some static protection provided in

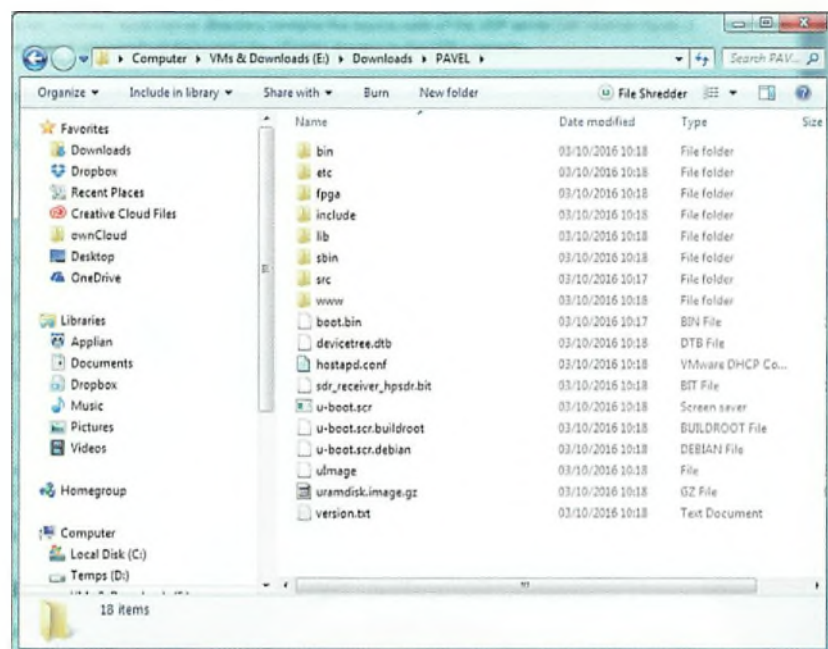


Fig. 1: Red Pitaya microSD card file structure.

the Red Pitaya but if you're worried about this, you could add a small gas discharge device.

At this point you should have the Red Pitaya operational and working as a network connected HPSSDR compatible SDR receiver. The best way to test the setup is to download SDR software to operate Red Pitaya as a receiver. I suggest you start with the version of PowerSDR that's linked from the Software section of Pavel's receiver instructions page. This works very well with the Red Pitaya.

Assuming everything works correctly, that completes the Red Pitaya setup and we can move on to the main PC.

PC Setup

The basic PC setup is the same as I described last month so I won't repeat that here. The main difference is that you have to download the Hermes control file and put it in the SkimServer directory on your PC. Here are the step-by-step instructions:

1. Start with the page where you downloaded the receiver SD card image. Navigate to the section entitled 'Running CW Skimmer Server and Reverse Beacon Network Aggregator'.
2. Click the link highlighted as HermesIntf.dll and download the .zip file.
3. Open the zip file and unzip the contents to your Skim Server program directory. This will probably be C:\Program Files (x86)\Afrete\SkimSrv.
4. Start Skimmer Server.
5. Navigate to the Skimmer tab and use the Receiver drop-down to select your Red Pitaya, Fig. 3. If it's not listed, that probably means the HermesIntf.dll file is missing so double-check that process.
6. Once you've selected the Red Pitaya receiver, you can use the tick boxes on this tab to choose the bands you want to monitor. You can use any combination with a maximum of six separate channels. You also have the option to select the receive bandwidth for the receivers and this can be 48, 96 or 192kHz.
7. Move to the Telnet tab and make sure your station details are correct.
8. Select the Status tab and if all is well, you should see ticks in the Telnet and SDR receiver boxes and you will see a summary of the current decodes in the Activity panel, Fig. 4.

The final step is to start the RBN Aggregator, go to the connections tab and click connect. That should be followed by green text confirming the connection in the Primary Skimmer Connection Status



Fig. 2: SMA tee connector and 50Ω termination.

box, Fig. 5. You can also move on to the Status tab where you'll see a record of all the valid loggings that have been forwarded.

That's all there is to it because you can leave the Red Pitaya running, unattended, on your network with the Skimmer Server running in the background on your PC while you do other things. This is a great way to contribute to the RBN network and is much better than leaving the kit idle. When you want to use the Red Pitaya as a receiver with PowerSDR or other software, you just have to shut down the Skimmer Server and the Aggregator on your PC.

RBN with RTL Dongles

Although I promised last month that I would discuss the use of RTL dongles with the RBN, it's not proving quite as simple as I'd hoped so that is a work in progress and I'll report back on it as soon as I'm happy with the results. If you want to have a play, you can start with a fresh install of Raspbian Jessie and then install rtl_sdr by following the instructions on my blog here: <http://photobyte.org/using-the-raspberry-pi-as-an-rtl-sdr-dongle-server>

Once rtl_sdr is installed and working, you need to install librtlsdr from github at: <https://github.com/n1gp/librtlsdr.git>

This adds an HPSSDR server that makes the RTL dongle respond to HPSSDR commands. Once this is up and running, Skimmer Server thinks the

Select receiver

Select bands

Fig. 3: Skimmer Server receiver selection.

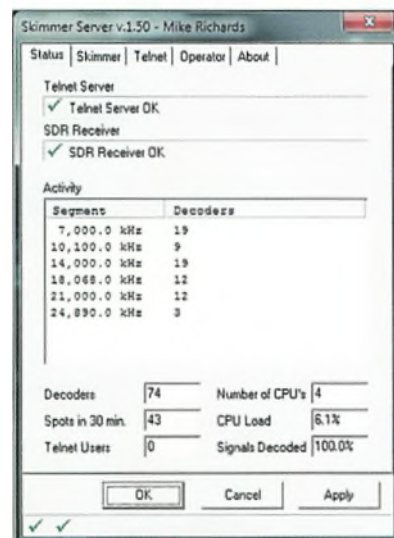
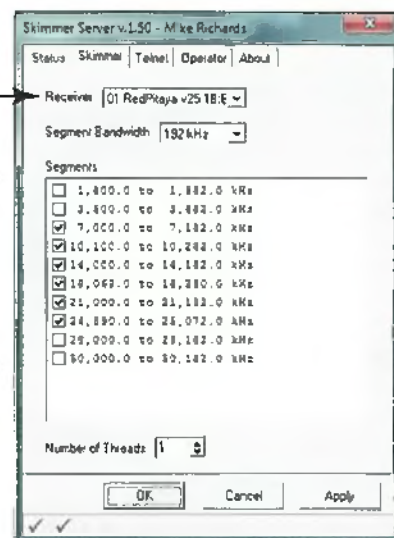


Fig. 4: Skimmer Server status tab.

dongle is an HPSSDR receiver so it can use it for skimming. As I say, this is a work in progress and it will be interesting to see if it's possible to get multiple dongles

running from a Pi. I have some doubts but will give it a go.

Red Pitaya WSPR Update

Similar to its use on the RBN network, the Red Pitaya can also be used as a multi-channel WSPR transceiver. The original software (also produced by Pavel Demin) didn't include any Tx/Rx switching. However, that has now been rectified and the latest code includes timed Tx/Rx switching using pin DIO0_P on connector E2. **Fig. 6.** This pin switches high one second before the start of transmission and switches low one second before the receive phase. One important point to note is that the DIO0_P pin is connected directly to the FPGA and can only handle 3.3V logic. As a result it's important to include a simple PTT buffer, similar to **Fig. 7.** to provide some protection.

Frequency Reference

The latest addition to the shack here has been a new GPS disciplined frequency standard, **Fig. 8.** The Precision GPSDO Reference Oscillator is manufactured by Leo Bodnar Ltd and sold through SDR-Kits. As you can see from the photograph, this is a very compact unit but it offers a frequency accuracy approaching one part per billion. You are probably aware that the GPS navigational system relies on precise timing to be able to calculate distances and thus positions. It does this by measuring the transit time for the radio signal to reach the receiver. Once you know the position of the satellites and the distance the signal has travelled, you can calculate your position on Earth. The level of timing accuracy required is extremely tight and the only way to achieve this is by using accurate rubidium clocks in all the satellites. As a result, the timing signals derived by ground based GPS receivers match rubidium clock standards. This has been used for some time to control critical commercial equipment and, in most cases, a very high quality crystal oscillator has its frequency trimmed or disciplined by the timing output of a GPS receiver.

In my new unit, a high quality, low noise digital synthesiser is locked to an integrated GPS receiver. This digital approach allows the generation of a wide range of output frequencies that are all locked to the GPS reference. In this case, the range extends from 450Hz to 800MHz! The Precision GPSDO Reference Oscillator has two BNC outputs and these can be set to different frequencies. However, the second frequency is mathematically related to the main frequency so the range of frequencies is

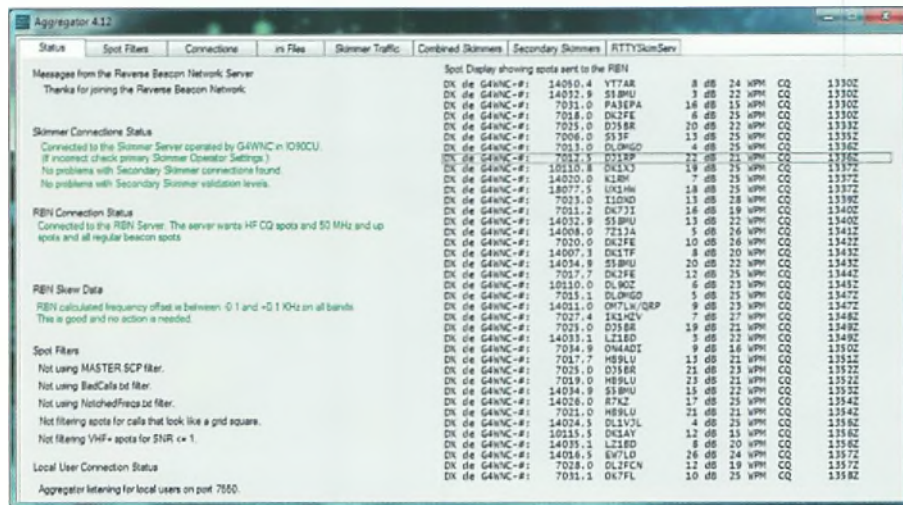


Fig. 5: Aggregator connection.

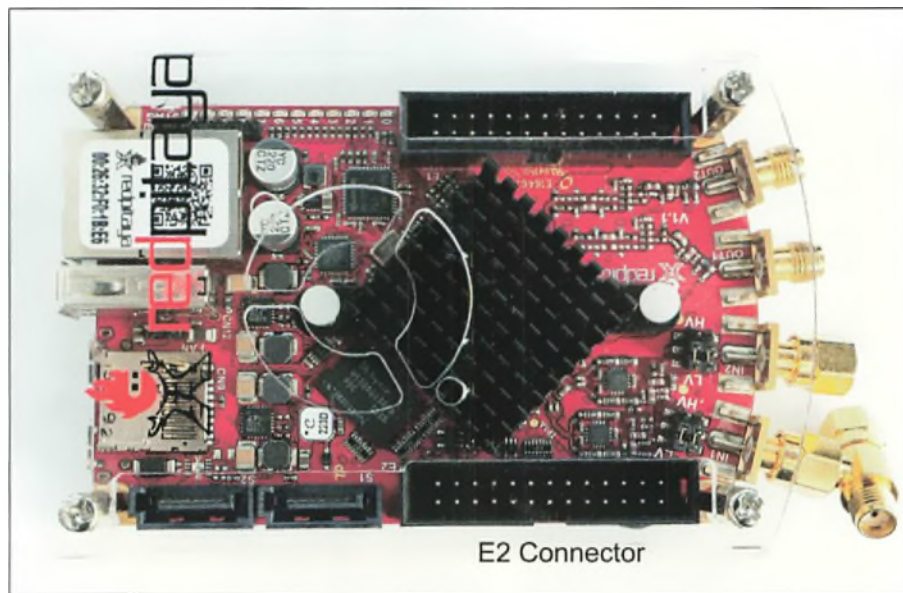


Fig. 6: Red Pitaya showing the E2 connector for PTT switching.

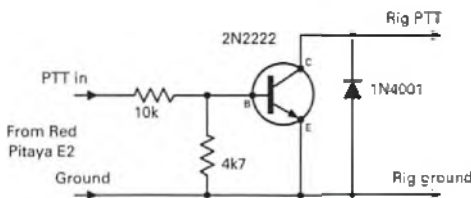


Fig. 7: Example DIY PTT buffer.

limited. When using it as a reference for test equipment or receivers, this is not a problem because 10MHz is the most common reference and both outputs can provide that frequency. The outputs are 3.3V CMOS levels (square wave), which is ideal for most modern equipment, including the excellent DG8SAQ Vector Network Analyser.



Fig. 8: The new Precision GPSDO Reference Oscillator.

The Precision GPSDO Reference Oscillator costs £150 including VAT at 20% plus shipping and is available from SDR-Kits. www.sdr-kits.net

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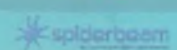
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Straight and Cutie

Roger Cooke G3LDI is thinking about straight and cutie keys (Actually that should read Cootie!). There's news from Down Under too.

Using a straight key was at one time the only way to send Morse, until the semi-automatic bugs came along. The art of using a straight key seems to be abandoned these days by those seeking a higher speed and better-formed Morse. I include myself in that group although I still have a selection of straight keys that I use on straight key nights. They are really good fun and characterised Morse can be heard during these events. The 'Fist' with which the sender can be identified is lost now in the eons of time, which is a shame. I know we should not dwell on the past, the nostalgia and all that goes with it, but upon reaching a certain age, this cannot be helped!

While there is a plethora of paddles to choose from when making a purchase, the same cannot be said about straight

keys. Most people end up, like me, with an ex-RAF or services key of some sort but even these are rare these days. To purchase a commercially made straight key is almost a mortgage job, so it's no wonder there are not many using straight keys.

If you keep a look on eBay, you can stumble across some good bargains. The one in Fig. 1 is an ex-service key and was offered for £19. You won't see much cheaper than that nowadays. I was lucky enough to be offered a Swedish key as in Fig. 2 and bought that for £25. Originally, when new, they were around £200. They are not made any more as far as I know so second-hand is the only way of obtaining one.

Being in the right place at the right time obviously helps. However, if you are buying new, then you have to be prepared to spend upwards of £100 for a decent key.

Cootie keys are side-swipers. That means you form dashes and dots on either side of a pivoted paddle. The single lever paddle I use, a Begali HST, can be switched over to work as a Cootie key. I made one, in my younger days, from a hacksaw blade, as did many other amateurs. It is quite easy to send poor Morse with one of these keys if you are not accomplished at using a Cootie. Take a look at this YouTube video:

www.youtube.com/watch?v=SFsWpz7QZ64

The video shows Sandy G0VQW demonstrating both a straight key and a Cootie. You can always tell when somebody is using a Cootie because there is very little spacing between individual dots or dashes. You can also hear the 'character' that G0VQW inserts when using a straight key, something that is individual and quite nice to hear.

Ladies using Morse

In my experience of teaching Morse, provided that the person being taught really 'wants' to use Morse, females usually make very good operators. I have taught a few in my years and it's a pleasure to hear them using Morse on the air. So, please don't think that Morse is a 'man's thing' only. It's much like learning a musical instrument. Everybody is capable; it is just that some put more practice in than others. Oh dear, I've mentioned that dreadful P word again. Well, I use the old adage here, "Winners never quit, but quitters never win". Without the practice, you will not succeed, simple as that.

One lady featured on the front cover of QST in May 1942, see Fig. 3, obviously left-handed too. One vintage piece of YouTube worth watching is here:

www.youtube.com/watch?v=2a4scmC7tI

The video shows 'DA', also known as Denice Stoops, the first female telegrapher who worked at station KPH until the end of commercial Morse operations and closure of the station in 1998. Note that DA is using a semi-automatic bug key too. DA was a very skilled and experienced operator and it shows.

Note also her hand movements when sending. Every operator has his or her own individual idiosyncrasies when using a key and that is always interesting to observe. There are other videos of DA to watch too if you are interested.

An interesting point about being left-handed surfaced at a recent Morse class at NARC (Norwich club). There are two lefties there and neither of them wanted the paddle reversed. Not only that but one of them could send equally well with either hand with the same paddle configuration. I have not come across that before. Pursuing this anomaly, one said that he could not only write with either hand but could write simultaneously with both hands. He said that this trick came in handy when writing out 100 lines at school! Very weird.

Morse recently made news in the USA. This YouTube recording of an *Open Road* feature from a news programme looks at how Morse still has value in our modern society.

www.wusa9.com/travel/open-road/open-road-morse-code-man-/319577493

News from Down Under

Mike Patterson VK4MIK recently sent the following report from Australia:

"The Tableland Radio Group had a couple of its members, Dennis VK4JDJ



Fig. 1: A typical ex-military Morse key.



Fig. 2: Roger's rather smart Swedish key.



Fig. 3: A lady Morse operator, featured on the cover of the May 1942 issue of QST.

and myself, travel to Cooktown to put on a Morse display on May 27/28th at the Cooktown History Centre, which was the former Cooktown Telegraph Office from 1876. The centre has a great range of historical photographs of the telegraph and other aspects of early history in that area.

"We set up a display of numerous keys/bugs/paddles and telegraph sounders plus an interactive Morse unit that allowed visitors to send Morse code and to see it on a computer screen. We had many visitors and the History Centre members welcomed the opportunity, offering much hospitality and organising the necessary PR prior to the event. It was a win/win opportunity because it gave publicity to the



Fig. 4: The selection of Morse keys shown at the Cooktown History Centre.

Cooktown History Centre and allowed us to give information on Morse and telegraph history and operation plus amateur radio in general.

"Cooktown is around 300km from Cairns and the Atherton Tablelands, the nearest large populated areas, so the community appreciates events being put on. We had quite a selection of keys, as illustrated in Fig. 4."

It's always good to hear from the CW enthusiasts Down Under; I haven't had news from there for a while now.

It just remains for me to wish you all a very Morsey Christmas and a Good New Year with some better propagation please!

73 and may the Morse be with you.
Roger G3LDI.



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Don't forget – all reports to Steve now by the 1st of each month please!

Finally, an Improvement

Steve Telenius-Lowe PJ4DX reports an upturn in HF propagation with the arrival of autumn in the northern hemisphere.



Fig. 1: The centre of Moroni, the capital of the Comoros.

Conditions improved somewhat in September compared with the 'summer doldrums' although I suspect we won't see worldwide openings on 10m

and 12m again before the next solar cycle. However, everything is relative and there has certainly been a lot more to work on HF this month, whether you are a DXer or, for example, enjoy chasing special event stations.

DXpedition planners all seemed to choose September 2016 as the month for their activity, leading to a plethora of activity. I cannot remember a month when there were so many operations taking place. I worked 16 different DXpeditions: A31YM (Tonga), A5A (Bhutan), CE0Y/LU9VEA (Easter I), D66D (Comoros), E51Q (South Cooks), E6AC (Niue), EJ0M (Arranmore, IOTA EU-121), H44GC (Solomon Is), MD/DL7VEE, OY/ON6NB, S9BT/S9WL (Sao Tome), T2R (Tuvalu), TO5FP (St Pierre & Miquelon), VK9NZ (Norfolk I), VP6AH (Pitcairn) and ZA/ZA1P (Albania). Admittedly many of these would not have been that easy to work from the UK but there were yet more that I missed (Mongolia, for example) that appear in our correspondents' band reports.

The highest profile operation during the month was undoubtedly D66D from the Comoros, Fig. 1. The Czech team made over 42,000 contacts in 12 days and provided an 'ATNO' (All-Time New One) or new band-mode slots for many.

QSL Manager **Tim Beaumont M0URX** reported that the OY/ON6NB team had been active from Vágar Island in the Faroes between September 15th and 22nd. They made 12,100 QSOs, including over 600 contacts with the UK, and Tim said, "the team would like to thank everyone for working them." The QSL design, Figs. 2a and 2b, was finished in super-quick time, just three days after the end of the DXpedition!

www.qrz.com/db/oy/on6nb

Cervantes Special Event

If DXing isn't your scene, there was still a huge amount of activity in September generated by an award scheme based on special event stations commemorating the 400th anniversary of the death of Spanish writer Miguel de Cervantes. **Owen Williams G0PHY** explains: "There were 14 stations with the prefix AN400 and a single-letter suffix from his name, for example



Figs. 2a and 2b: The front and reverse of the OY/ON6NB QSL card.



Fig. 3: Your columnist's Cervantes Silver award.

AN400M. I managed contacts with all 14 stations and 26 band-slots. The pile-ups were occasionally huge and unruly but these stations certainly enlivened the bands."

Terry Martin M0CLH was another chasing these stations. He wrote, "Some time was spent 'tilting at windmills' with the Spanish celebrating 400 years since the death of the creator of *Don Quixote*. I just need one more slot to complete the Platinum award and get another bit of wallpaper for the shack." Having read the reports from Owen and Terry, I looked for some AN400 stations on September 30th – and qualified for the basic Silver award. Fig. 3. The Spanish national society URE provided an impressive website with the awards' rules, world and continental rankings, statistics, certificates to download, a shop and much more: <http://cervantes.ure.es>

I was amazed to see that by October 1st (with eight days still to run), over half a million contacts had been made by AN400 stations with 229 DXCC entities and well over 4000 amateurs had qualified for the awards. This just goes to show how much interest there is in such events, particularly when associated with a well-organised award scheme. But I can't help thinking that UK amateurs missed a trick when the 400th anniversary of William Shakespeare's death in April this year passed by with nary a nod to the Bard of Avon on the HF bands.

Correspondence

Owen G0PHY wrote, "Although conditions were still poor during the month, there was plenty of activity with the Worked All Europe (WAE) contest at the beginning of September and the Cervantes special



Fig. 4: Peter PJ4HX discussing the finer points of operating from Bonaire with a thoughtful Wilko PJ4/PA3BWK. Wilko was active from PJ4 on CW and RTTY for three weeks in September.

event stations in Spain at the end of the month. Outside the WAE contest I had contacts with TO5FP and the Belgian DXpedition to the Faroes, OY/ON6NB."

Terry M0CLH wrote, "Although conditions have not been brilliant this month, some fun was had. A few slots were filled and I was glad to get D66D into the log for a new mode – they were pretty weak on my vertical and I could rarely hear them, never mind work them. I have taken delivery of an Icom IC-7300 this month and am putting it through its paces. What a brilliant transceiver this is and it integrates perfectly with the RUMLogNG logging system on the Mac. The author, Tom Lindner, fully supports this rig and connection via the USB port means that you don't even need an external sound card device."

Contrary to Terry's findings, Etienne Vrebos OS8D said, "I sold my new Icom IC-7300 because I didn't like working with touch screens. I prefer a lot of

knobs and not hidden menus you have to handle every second." However, Etienne continued, "my dream was fulfilled last week with the ultimate Icom rig, the IC-7851", although he admits, "I'll need another two to three weeks to read the manual: about 300 pages, well written, understandable and easy to use." He appreciated the "huge" picture of himself activating Lichtenstein in the October PW, commenting that, "meanwhile half of Europe activated HB0 this month!"

I was particularly pleased to receive a report from Victor Brand G3JNB, who missed his usual contribution last month due to a spell in hospital. Now recovering well from cardiac surgery, Victor says he was able to get back into the shack by early September. "Spending just a few minutes a day, watching the DX Cluster and with the 'A' Index peaking at 50, on 20m CW, I found VU2TMP, FM5FJ, PJ4/PA3BWK on Bonaire. Fig. 4. PV8ADI, OX3LX, JT1DBS/3 and also the ARRL's famous W1AW. The 17m band yielded regular contact ZP6CW and, as a nice surprise, TZ4AM. A loud 9M59MP on 30m was for the 59th anniversary of Malaysian independence. Conditions started to lift mid-month and 50W of CW to a 17m vertical yielded PZ5RA, OA1F, V26K, CX2DR, TO5FP and, surprisingly, a very weak and 'lonely' Gabon station, TR8CA. A nice 'multidirectional' trio, worked within just a few minutes, were PV8ADI and TZ4AM on 20m plus TF/OG55W on 30m. Other loggings included the D66D expedition to the Comoros Islands on 30m, CO2AME on 20m plus HT7AAA and FM5FJ on 17m." I'm sure all readers will join me in wishing Victor a continued, and full, recovery. And there is proof positive that Victor does, indeed, also possess a microphone – I was pleased to get a call from him on 20m SSB on the Sunday evening of the Worked All Europe contest!

Mike Clark M0ZDZ/P went out portable a few times during the month but found that "20m was quite tough with heavy QSB and suffered from static crashes from a storm possibly over France. Couldn't beam eastwards as the crashes were S9+. I managed to hear ZS1S off the back of the beam at RS45, turned it to him and he was peaking at 59 but due to the static crashes, hard copy." Nevertheless, Mike worked some good DX – see the band reports.

As usual, Carl Gorse 2E0HPI was out operating iP from several locations around the northeast of England in September. He has bought an Alex Loop antenna, Fig. 5, which he describes as "a perfect portable antenna". Carl says he always wanted to purchase one but the price tag of £400

kept putting him off. Recently, though, he bit the bullet and bought one (with the permission of his wife!). Now he says, "I cannot fault it and have worked contacts on nearly all the bands it operates on from 40 to 10m". However, Carl describes conditions as having "been like a roller coaster – the bands have been there one minute and gone the next". In September Carl operated from Flamborough Head Lighthouse (GFF-0108), Seaham Harbour (GFF-0332), Hartlepool Coastline and Roseberry Topping near Great Ayton in North Yorkshire at 358m ASL and "a good climb to the top. It was a great day out above the mist and the Alex Loop performed brilliantly under not so good conditions." The best of Carl's logs from these locations are shown in the band reports.

A brief note from **Kevin Hewitt ZB2GI** was received to say that he was still in England and unable to operate from his current location. However, he says that, "I have registered with Logbook of The World (LoTW) following a number of requests from operators. I have uploaded 2023 entries so far and 633 have been confirmed." Thanks Kevin; the LoTW uploads will be appreciated by many operators.

Kevin Jackson M0XLT had a "very good day at the National Hamfest, in Newark, Notts, meeting up with other amateurs and putting faces to voices." He also qualified for the Silver Cervantes 400 award, commenting that "these stations were strong and plentiful". However, Kevin noticed an increase in the number of auroras, which has not helped HF propagation.

The occurrence of auroras tends to peak in the two years or so following a solar maximum, so now is the right time for auroras to take place. This is great for VHF DXers or those wishing to see a visual aurora but generally bad news for HF operators because auroras cause high absorption, leading to weaker signals and, sometimes, completely 'dead' bands. An interesting phenomenon, though, is the 'pre-auroral enhancement', with stronger than usual signals on the higher HF bands a day or so before an aurora. I was lucky to catch a pre-auroral enhancement on September 25th, when 15m and 12m opened from the Caribbean to Europe and the Middle East with strong signals. Sure enough, the next day auroras were reported in northern Europe.

Kevin M0XLT continued, "Lots of European special event stations as usual and some DX about, so plenty to work and have fun doing so." Kevin makes an



Fig. 5: Carl 2E0HPI/P using the Alex Loop at Seaham Coast, GFF-0332.

important point by noting, "We need to be tuning and listening, not just checking the DX Cluster because this tells you very little about band conditions." Absolutely, Kevin. If everyone relied exclusively on the Cluster, no station would ever get spotted. It needs people tuning around to find the DX in the first place.

Our 10m man, **Tony Usher G4HZW** said, "10m has been like a treacle pudding during the month with only one or two short-skip contacts with EU stations. There were signs of life towards the end of the period with PY, CX, FR1GZ and FY5KE on WSPR. Hopefully things may improve over the next few weeks. My neighbour has had a conifer removed so I now have the potential for a bigger antenna. I think I'll be going with the DESpole. I'll probably go for the 20, 17, 15m version with the 4-element 10m Sirio on top eventually." Good luck with the antenna plans. Tony.

Band Reports

The log from Owen G0PHY included: 40m SSB: JT5LZ, OY/ON6NB, PW2D. 20m SSB: JT5LZ, OY/ON6NB, PJ4DX, TO5FP, VY0BRR (IOTA NA-156), YB6UAK.

Terry M0CLH reported numerous QSOs with the AN400 special event stations, plus the following highlights. 40m SSB: EJ0M, ZA/ZA1P. 40m PSK63: SN670BY. 20m SSB: 5E3A (Morocco), ZA/ZA1P. 20m CW: 5E3A. 20m RTTY: 5E3A. 20m PSK63: 9H1D. 20m PSK31: EA8/DG6MM. 20m PSK125: EA7/LA9DL. 20m JT65: TF3PKN. 17m SSB: VP8LP. 17m CW: SV8/IZ4JMA. 15m SSB: PW2D. 15m RTTY: D66D.

Etienne OS8D reported 40m SSB: EJ0M, ZA/ZA1P. 20m SSB: BD7BM, HB0/PB4PT, OY/ON6NB, OX3AH, PJ4DX, S9BT, ST26ASC, TC0MI (Marmara Is, AS-201),

TF/M0VFC, TF/OG55W, TO5FP, V85TL. 17m SSB: D66D, KG4SS, OJ0JR, TI2CC, TY2BP. 15m SSB: 3B9FR, CX1AV, FM5AN, PR1T, S9BT, TR8CA, V31MA.

Mike M0ZDZ/P on 20m SSB worked: A41KC, A65DC, AL7KC, C81AK, D66D, EP2LMA, FG5GP, HI7SBR, HS0ZIN, HZ1PS, TO5FP, UK8FAI (Uzbekistan, an ATNO for Mike), V44KBC, V51WW, V85AVE, V6BLT50, YB7GRN, ZS2XD. Unfortunately A5A (Bhutan) was a 'gotaway'.

Carl 2E0HPI/P operated from four locations in the northeast to work: 40m SSB: DL2EF, F5NPS, MI0TMW, PD1RO, YU1AB. 20m SSB: 9A4FM/P (9AFF-0054), CR3W, EG1SDC, IA5C (EU-028), PJ4DX, R2016O. RA1AVP. 17m SSB: LX1CC, OJ0JR.

Martin Burch VK4CG used 100W to a 16m (53ft) wire to work: 40m SSB: A31YM, JR1YRI, V11BLT, YD9SBP. 20m SSB: DL0IL, S57DX.

Kevin M0XLT managed to catch: 40m SSB: OY/ON6NB, UP0L. 20m SSB: 7X3WPL, 3V8SS, 4L1AN, 4Z5LA, 5E3A, 5H3EE, 9K2HN, 9K2WA, A65BP, CR3W, HB0/PB4PT, HS0ZHC, K2C (CT), SU9VB, TA3D, YM2KY, ZA/ZA1P, ZG2TT. 17m SSB: OJ0JR, VP8LP, ZA/ZA1P. 15m SSB: 3DA0NJ, 5T2AI, CN8AM, D66D, TA5FA. 12m SSB: VP8LP.

Signing Off

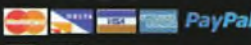
Because this is the December issue, allow me to take this opportunity to wish all readers a very happy Christmas. Please send all input for this column to teleniuslowe@gmail.com by the first of the month (December 1st for the February 2017 issue, January 1st for the March magazine). 73, Steve PJ4DX.

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see www.HamRadio.co.uk/swc-100

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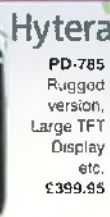
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The WEEE (Waste Electrical and Electronic Equipment) Directive and Disposal of Old Electronic Equipment



The intention of this short article is to bring the attention of readers to regulations regarding the disposal of old equipment and components, some of which contain material that is now classed as 'Hazardous Waste', while most electronic equipment is no longer disposable as 'Household Waste' and therefore should not be put in the dustbin.

The fastest growing area of waste within the EU and possibly in the world, is electronic and electrical waste – old computers, washing machines, refrigerators, freezers, microwave ovens, TV sets, electronic games and radio receivers as well as electronic test equipment and at a lower level, amateur equipment. Some of the, especially older, amateur and surplus equipment is a bigger hazard than might be envisaged because of it containing 'Hazardous Waste'. This includes components and equipment containing carcinogens or potential carcinogenic materials such as polychlorinated or polybrominated biphenyls (PCB and PBB), asbestos and beryllium oxide as well as heavy metals such as lead, mercury, gold and cadmium, which could as salts contaminate the drinking water supply. It is not permissible to dispose of such material as normal household waste.

Although the UK is intending to leave the EU, it is very likely that the regulations will still be applied, especially with the increasing amount of waste equipment being scrapped, in many cases because spare parts are no longer available.

More Modern Equipment

More modern equipment still needs to be disposed of as WEEE, although the definition of EEE is equipment 'with a voltage rating of less than 1000V AC or 1500V DC' – so it could be argued that an amplifier with an operating anode voltage of 2kV is not EEE!

Solid-state transceivers and

transmitters may have RF power transistors containing beryllium oxide, and these should be marked as 'Hazardous – Sealed Parts containing Beryllium Oxide'. Any failed transistors should be placed in doubled sealed plastic bags and marked in the same way.

Disposal of batteries, especially NiCd, is best done at a battery recycling point – these are often to be found in the larger supermarkets. Batteries are not covered by the WEEE Directive but by a separate Battery Directive

Shack Clearance

For those who have collected lots of older equipment over the years, disposal may need to be considered by anyone responsible for clearing out the shack after the operator is no longer able to do so. It is important to ensure that people doing that are aware of the requirements under the WEEE Directive. Waste electrical and electronic equipment can be disposed of at a Household Waste Centre in the area designated for WEEE material but it needs to be made clear at the time that the items may contain Hazardous Waste. Items with CRTs are generally treated separately at a Household Waste site because of the danger of implosions if just 'heaved into a skip' and although an item may not look like a TV set or a computer monitor, it should have a label identifying it as containing a CRT.

Transformers, Chokes and Other Items

Oil filled transformers and chokes, wartime American 'bathtub' metal cased capacitors and metal cased paper capacitors can contain PBBs or PCBs so should be

packaged in some way such that the cans cannot be punctured. Mercury vapour rectifiers, examples being any of the 866 family, 872, 83, RG1-240A, Marconi/Osram GU1, GU5, GU7, GU8, GU11 and GU20/21 should be carefully packed so that they cannot be broken and the package should be marked as containing mercury. Note that the similar 3B28 and GXU1 valves are xenon filled so are not hazardous if broken – provided nobody cuts themselves on the glass!

Other Possible Hazards

Certain military surplus may contain meters that had luminous scales: the dual pointer meter for the WW2 beam approach equipment is an example and although quite safe if the glass is unbroken, these are radioactive and the dust from flaking luminous paint is a hazard. Incidentally, the cross pointer R1155 D/F meter is not in this category. Other military equipment with luminous markings may similarly be a hazard. Also some older voltage regulator valves, radar T/R cells and the like contain small amounts of radioactive material to ensure rapid 'striking' in the dark but they should be marked with the usual radioactive symbol. The website below provides more information. Such items should be identified when taken to a Household Waste Disposal Centre.

www.orau.org/ptp/collection/consumer%20products/electrontubes.htm

It is vaguely possible that some WW2 IFF and radar equipment is still around which, by mistake, did not have the demolition charges disabled before being released onto the surplus market. Some years back, a garden shed in West London was demolished in an explosion caused by the deterioration of such charges. Should it be suspected that one of these equipments is present, do not touch and contact the police as a matter of urgency.

In conclusion, irresponsible disposal of old equipment and components can lead to a number of problems, some of them of a legal nature and should be avoided. WEEE Disposal is required to be free under the terms of the Directive.

The author is grateful to **Phil Williams G6AQP** and **Greg Logelain** of the Chartered Institution of Wastes Management for their technical assistance in the preparation of this article.

(Editor's note: The preceding article has been offered by its author as a public service to the amateur radio community and may also be published elsewhere. It can be circulated freely provided credit is given to the author)



Trap Dipoles and Feeders Revisited

Tony Nailer G4CFY revisits his trap dipole calculations and has some sage advice on choice of feeder.

In *Technical for the Terrified* in June 2016 PW I gave a detailed analysis of wire lengths, wavelengths and impedance for a trap dipole. There was an error in the diagram due to a classic 'lost in translation' effect between myself and Tex Swann G1TEX who did the print perfect version of the hand drawn dipole.

Unfortunately Tex mistook the effective length of the trap clearly shown as 12.6' as being 12ft 6in and depicted it as such, including the metric equivalent. The wire lengths each side were 33ft (10.06m) and 18.4ft (5.61m) plus the trap that was physically 0.3ft (0.09m), giving a total physical length of 51.7ft (15.76m).

The trap containing 15.3μH of inductance was equivalent to rolling up a 12.6ft (3.84m) length of antenna wire. This makes the length from feedpoint to insulator 64ft (19.51m) and corresponding to 86° of the developed quarter wave of an 80m transmitted signal. The remaining 4° is also there beyond the insulator and end of the antenna wire and amounting to 3.4ft (1.04m) in free space (actually in air, but close enough).

A corrected reprint of the diagram is shown in Fig. 1.

Line Impedance

In that earlier article I quoted the formula for a single wire over an infinite ground plane as having an impedance of $Z_0 = 138 \times \log_{10}(h/d)$, where h was the distance of the wire above ground and d was the diameter of the wire. As a ratio it doesn't matter what the units are provided both h and d are in the same ones.

That formula was the only one I found among my numerous

radio books and was in the *Radio Data Reference Book* by Terry Giles G4CDY and George Jessop G6JP, published by the RSGB.

Since that article I have exchanged e-mails with Luiz Lopez CT1EOJ regarding the formula. He quoted *Antennas* by Dr John Kraus W8JK, *Radio Antenna Engineering* by Edmund Laport and *Reference Data for Radio Engineers*, all of which apparently had the formula as:

$$Z_0 = 138 \times \log_{10}(2h/r), \text{ where } r \text{ is the radius of the wire.}$$

I also have a copy of *Reference Data for Radio Engineers* but it doesn't include the single conductor over a ground plane. Searching all my other books again I found the same formula as he quoted in *Radio Engineers Handbook* by Terman published by McGraw-Hill in 1943.

Since then I have also found a supporting formula on the *rfcafe* website (below), which quotes as its source *Reference Data for Engineers* by Sams Publishing 1993. The page on the site shows many versions of single, double and quadruple transmission lines together with the characteristic formulas. It offers them with a formula and invites the reader to pick and paste them into their own work. Consequently I have done that and reproduce it here in Fig. 2.

www.rfcafe.com

Note that the dielectric constant ϵ is included in the formula but air has such a low constant that it is usually considered to be the same as a vacuum (free space) with a value of one. Also note that in this formula they have used the wire diameter instead of the radius so it makes the formula the same as the one that Luiz quoted. I am willing, therefore, to accept this formula because I can find no other sources to support the *Radio Data Reference Book*.

Now I will use this formula to rework the impedances, voltages and currents in the previous article. A wire of diameter 1.78mm suspended 7.92m (7920mm) above ground will have a characteristic impedance $Z_0 = 138 \times \log_{10}(4h/d) = 138 \times \log_{10}(4 \times 7920/1.78) = 586\Omega$.

Applying this as a characteristic impedance of that side of the dipole with a feedpoint impedance R_f of 36Ω (half of 72Ω), we calculate the end impedance R_e with the formula

$$R_e = Z_0^2 / R_f$$

$$R_e = 586^2 / 36 = 9538\Omega$$

Endpoint Voltage

When running 100Ω on the 80m band there should be 50Ω going to each side of the dipole.

As found previously, voltage at the feedpoint with respect to ground would be just over 42V RMS and just under 60V peak.

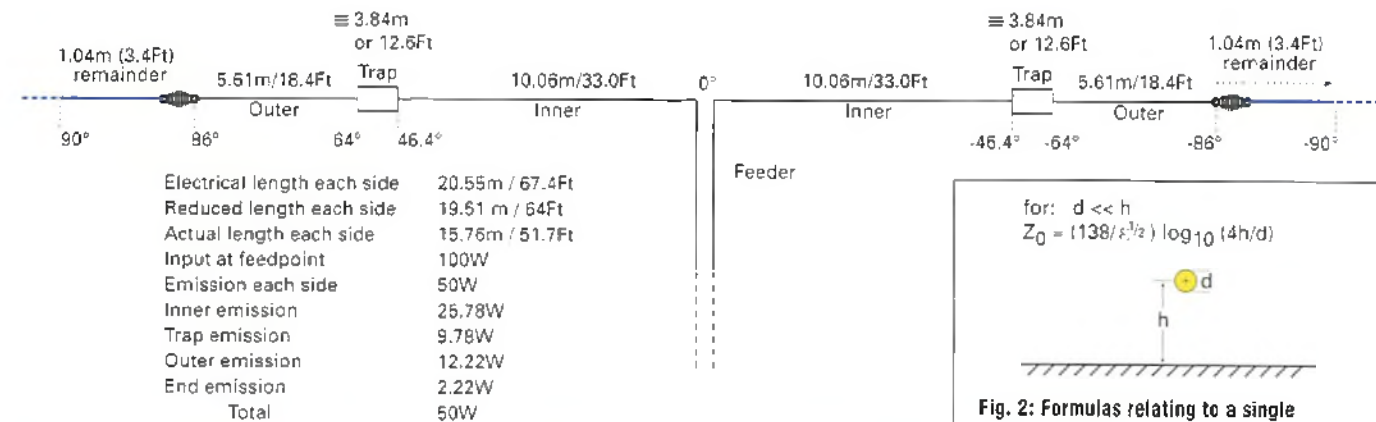


Fig. 1: A revision of the trap dipole dimensions previously featured in Tony's June 2016 column.

Fig. 2: Formulas relating to a single conductor above a ground plane.

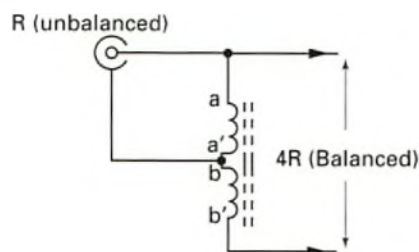


Fig. 3: Circuit of the 4:1 balun described in the text.

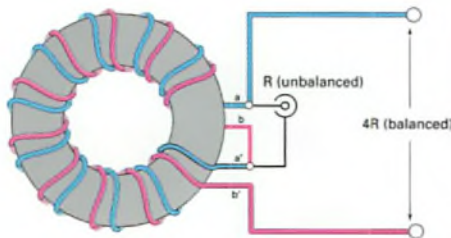


Fig. 4: A photograph of the finished toroidal balun.

At the ends of the dipole with respect to ground it will be $V = \sqrt{P \times R} = \sqrt{50 \times 9538} = 691V$ RMS. $V = 1.4 \times 691 = 977V$ peak.

With 400Ω legal limit and 200Ω each side, the feedpoint voltage will be $\sqrt{(200 \times 36)} = 85V$ RMS. The end voltage will be $\sqrt{200 \times 9538} = 1381V$, which is also $1952V$ peak. This is 16% higher than the value calculated with the previous characteristic formula.

Line Current

The line current will now be the same $1.18A$ RMS at the feedpoint but as a consequence of the higher characteristic impedance, will be $72mA$ RMS at the endpoint. Again note it is not zero but is sufficient to support the remaining 4% of the wave beyond the insulator.

Choice of Feeders

A few weeks ago a client who had bought and used the low impedance twin feeder for his dipole enquired to purchase some more for use with his inverted-L antenna. Unfortunately I had to inform him that the inverted-L was unbalanced so was not cancelling out the noise that would occur with a dipole or doublet.

An inverted-L antenna is fed at ground level so with the coaxial cable running along the ground or buried in a pipe a hands breadth in the ground, there will be little additional noise pickup and neither will the feeder emit a significant field to cause, for example, television interference (TVI).

Conversely, another client was building his own trap dipole and wanted to buy a pair of traps. I mentioned the low impedance twin and he replied that he had to use coaxial cable because a fair amount of the run of the feeder would be through the loft space of his house.

I explained to him that using coaxial cable in that situation was not good because it emits an electromagnetic field that would induce waves into the mains wiring that usually runs around the loft space. This would likely cause TVI in his own house and possibly in neighbouring houses as well. I also mentioned that the mains now carries a great deal of conducted noise from the proliferation of switch mode power supplies for various household gadgets. This noise would be picked up on the outer of the coaxial cable and would produce a very high noise floor on his radio.

This was a perfect opportunity to use the twin feeder that doesn't emit the electromagnetic field and picks up noise equally on both cores, meaning no noise differential at the shack end. With a balanced antenna and balanced feeder in conjunction with a 1:1 balun in the shack, he would achieve a noise floor so low he might initially think the antenna system was faulty.

4:1 Air-Cored Balun

Just last week I was asked if I could manufacture a 4:1 balun. The theory for this is quite straightforward because it is essentially an autotransformer made with two windings side-by-side then coupled in series.

I suggested that I might try a version of an air-cored balun like the ones I make as 1:1 ratio but with one fewer winding. I made two of these balun cores using 13 turns bifilar and coupled the cores back-to-back so that I could test them between a tracking generator and spectrum analyser.

The result was awful with a falling response from LF to about 10dB down by just 20MHz. There was a slight peak then further falls, which I interpreted as insufficient coupling. So the alternative and more common practice is to make a balun using bifilar turns on a toroidal core.

4:1 Toroidal Cored Balun

The only large cores I have are the dust iron T200-2 types. I have no ferrite cores of comparable size. The rule of thumb when winding any transformer is to have the reactance of the winding about four or five times the impedance being transformed (at the lowest frequency of interest). That's where I went wrong with the air-cored balun because there really wasn't sufficient inductive reactance.

Anyway, I worked out that to achieve a reactance of 200Ω on a T200-2 toroid would require 27 turns. This would again need two wires side-by-side and series connected. To accommodate them dictated a wire size of 19SWG. The circuit and practical arrangement are shown in Figs. 3 and 4. I built two baluns and tested one of them using my Yaesu FT-102, an SWR meter and a dummy load of 200Ω made from nine $1800W$ 3Ω resistors.

The result was quite usable for the customer because it gave 1:1 SWR from 3.5 to 10MHz, then rising to 2.5:1 at 21MHz. So I took one turn off one of the baluns and retested it. It was slightly worse at the higher frequencies, which indicated that maybe it could be usable with a few turns more. Otherwise a better choice would be fewer turns on a similar size core made of ferrite.

4:1 Balun Development

Recently I have been having trouble with stability in a 100W linear amplifier for the 6m band. Part of the problem was traced to the 22Ω balancing resistors used between the bases and between the collectors of the pair of amplifier devices.

When tested with two in series across the end of a piece of coaxial cable driven by a rig through an SWR meter, the reflected reading went off the right hand scale. These resistors are obviously more inductive than resistive and of the same type and series as the ones used as a 200Ω load to test the balun.

A new batch of 1800Ω resistors was obtained from Rapid Electronics and, on testing the 27 turn toroidal balun, a much better result as achieved. On 28MHz with 10W and using the Spectrum HF Power Meter, the reflected power was about 1W, which implied that there were too many turns. On 3.5MHz, the reflected power was too low to measure.

I took off five turns to leave 22 and tested it again. With 10W on 3.5MHz there was 5mW reflected. Again with 10W, on 28MHz there was 600mW reflected so still a little too many turns.

From previous work I also had to hand a 4:1 balun with 17

turns and when tested with 10W on 3.5MHz the reflected power was 300mW and on 28MHz was 200mW.

I conclude from this that a T200-2 toroidal core with 18 turns 19SWG bifilar will have an SWR of 1.4:1 at 3.5MHz and 28MHz falling to a flat SWR of 1:1 for the greatest part of the spectrum in between.

Final Remarks

This article corrects a previous mistake and settles the issue of a suspect equation. The reworked impedances, voltage, and currents are not too different

from those previously determined. I am happier that this article can now be combined with the previous one when compiled with other articles to create Book 3 of *Technical for the Terrified* in due course.

The important messages in this article are that our ideas need to be tested and corrected so that the best technology is published. Also that twin feeder (or twisted pair as used by BT) is better than coaxial cable for avoiding TVI and noise pickup when routed through a house. Further, that unbalanced antennas should be fed with

coaxial cable, which is also unbalanced.

Lastly, that the number of turns on a toroidal balun and the inductance factor of the core are important in getting sufficient coupling at low frequencies and keeping losses down at high frequencies. I still need to do more work using ferrite-cored baluns and will present my findings in a future article.

On a personal note, by the time you read this I will have undergone surgery to repair the torn ligament of my shoulder, referred to as a rotator cuff tear repair.

Websites

Check out our own website: pwpublishing.ltd.uk
you'll find a handy list there too!

We regularly mention websites in the course of our various articles. They can be a valuable source of supplementary material, should you want to explore a topic further. However, there are plenty of other websites handy for the radio amateur that don't necessarily get a mention that way. From time to time we will recommend a few. Here's an initial list, some chosen by our editorial team and some recommended by readers (thanks for the suggestions).

Kenwood Mods:

http://pi4oss.ham-radio.ch/Mods/All_KENWOOD_mods_from_mods_dk_in_ONE_file.pdf

Recommended by Bob G4PVB who says it's, "just one massive (more than 600 pages) PDF so if you're on dial-up, go make a cup of tea while it downloads. My favourite general tip: How to remove Display-Scratches with a damp soft cloth and toothpaste, page 27. I've heard it works for CDs too".

Amateur Radio Contest/DX page with lots of links to propagation tools, callbooks and more:
www.ng3k.com

Ian GM3SEK's Amateur Radio Technical Notebook, with lots of helpful advice and circuits, especially for VHF operators:
www.ifwtech.co.uk/g3sek

Wolfram Alpha, a sort of technical Wikipedia but with lots of maths, electronic formulae and similar:
www.wolframalpha.com

VOAcap Online – a propagation tool that you can use without needing to download to your PC:
www.voacap.com/prediction.html

General Radio & Electronics site, edited by Ian Poole G3YWX:
www.radio-electronics.com

Overseas vendors – there are lots of great overseas vendors and it's fun to see what they are selling, even if you are not looking to buy. Here are a couple to get you started, from the USA and Germany respectively:

www.arraysolutions.com
www.wimo.com/main_e.html

Operating Awards – the Gold standard here is Ted K1BV's site, which has both long-term and special event (short term) award information. You may well be surprised at how many there are:
www.dxawards.com

Shack Rental – looking for somewhere with that little extra (a shack to operate from) for your next holiday? Here's a handy list:
www.dxzone.com/catalog/DX_Resources/Shack_Rental

And related to the above, here's one of the better guides on operating from abroad:
www.qsl.net/oh2mcn/license.htm

Second-hand gear for sale (in addition to the usual club, vendor and auction sites):
www.radioclassifieds.co.uk
www.fleamarket.org.uk

We'd love to have more suggestions and will include them as and when space is available. Do bear in mind that sites come and go and we cannot in any way guarantee the content, reliability or whatever of the sites listed. Nor is the list intended to be comprehensive. But, you never know, you might find something new and interesting. Remember, too, that Google is your friend. Google, for example, "HF Radio Propagation" or "Ham Radio Arduino Projects" and you'll get a long list of relevant and fascinating websites to visit.



An Overview of the World of Second-Hand

Chris Lorek G4HCL reiterates some useful advice to beginners and old hands alike on searching for and buying second-hand amateur radio equipment.

Looking back at my notes, it's been over seven years since I started this bi-monthly column, under the Editorship of Rob Mannion G3XFD. Since then I've detailed a range of different types of mobiles, handhelds, fixed stations, antennas and accessories, including specific models of transceivers and receivers. I've received a tremendous amount of positive feedback and requests for further information, for which I sincerely thank readers. Following such feedback I feel it's now the time to update and reiterate my general buying advice for a range of second-hand equipment. I hope this will be of interest to readers and may be of value when searching for and buying such equipment.

When I started this column, I'd not bought any new amateur radio equipment

for my personal hobby use for over 25 years. I still haven't. But I've bought several thousands of pounds worth of second-hand equipment in just the last few years, including some specifically as background for this column. Some of those sets are ones I wished I could have afforded in my younger days. As readers may know, I'm certainly not ignorant of new equipment, having being fortunate in being able to review literally hundreds of the very latest new transceivers, receivers, antennas and radio accessories over the past few decades for amateur radio magazines. So there was certainly some temptation for me to go the new route!

Why buy Second-Hand?

The first question to consider is why you might want to buy second-hand when there is so much excellent new gear available. Probably the most obvious answer here, for many people, is for

economic reasons. But this isn't always so. Some equipment just isn't available new and many 'collectors items' such as classic receivers and transceivers fetch a premium price many times over that of the original selling price. This has certainly been demonstrated in the past few years of this column and is especially the case for mature receivers, transceivers and receiver/transmitter 'separates', the latter of which we rarely if ever come across as new equipment.

I started my amateur radio career in the 1970s and I've been fortunate in eventually obtaining a rather good and very nostalgic line-up of Yaesu, Trio (later Kenwood) and Heathkit equipment, including transceivers and 'separates'. My acquisitions have included an early Sinclair Micromatic radio that I still have and plenty more radio equipment that I'd longed to buy in my teenage years but simply couldn't afford. Ironically, I usually ended up paying a lot more for it second-hand. The collectors market has been the subject of a number of past columns, as have been other specific second-hand buying subjects like knowing how to spot a good deal, how to barter, where to find the best equipment, what to avoid, buying at rallies and lots more. Hopefully, though, this overview article will be a useful 'starter', particularly for those of you who are more recent readers.

What to Buy?

Like cars, some radio amateurs or listeners always like to have the very latest models of equipment, so you'll find good quality recent radio equipment offered for sale by these individuals as they trade up to the latest models. It's perhaps surprising, for example, that even very recent equipment such as the excellent Icom IC-7300 is already appearing on the second-hand market for a variety of reasons that are certainly not a reflection on the set's performance. However, in my experience most enthusiasts will tend to keep their existing radio until their needs change, for example if they want a model with more facilities or maybe for higher power when they upgrade their amateur



The once popular Trio 9R59DE valve receiver.

licence. In some cases, unfortunately, they lose interest and want to dispose of their equipment. A 'silent key' sale is, sadly, usually the entire collection of a late amateur's equipment and can be very useful if you're starting out and want a ready-made station.

Unless you're a collector interested in a particular type of equipment, start by taking a look at what you want to pay and what your interests are. It's little use buying a portable carry-around HF/VHF/UHF multimode radio if your interests lie only in HF operating from home. Your budget could get you a better-performing radio for your particular needs rather than a 'jack of all trades'. One thing I would advise, though (unless you're on a strict budget or a collector of mature equipment), for home-based radio equipment, even if you don't intend to use the facility immediately, is the capability of PC interfacing for extended control. Many hobbyists use their PC alongside their radio equipment and being able to link your PC with the radio for frequency control, uploading/downloading channels, scanning, automatic logging and so on is extremely useful. There's a plethora of freeware, public domain and shareware hobby radio software available and even if you don't have download capabilities, take a look at *PW's* sister magazine *Radio User* where you'll find a massive collection featured each month.

Second-Hand Advertisements

Advertisements of second-hand equipment for sale can be an opportunity to pick up a real bargain or to be landed with something that's not up to your expectations. You've usually just got a small initial description to go on in the advert so you'll naturally need to contact the advertiser for more details. Make sure you ask the right questions, such as the equipment's age, whether it's in perfect working order and whether you'll be able to try it out at their house to ensure it does indeed work. Also ask what physical condition it's in, either 'as new' or worn, battered and scratched, to save you disappointment. If both you and the vendor have e-mail facilities, you could ask the seller to e-mail you a digital photo. Multimedia photos via cellphones are of rather low quality, though, and these could cover up physical blemishes such as light scratches.

You'll see adverts in specialist magazines such as *PW* and *Radio User* as well as on many internet sites run by individuals, clubs and traders but don't neglect your local daily paper – you may



The Yaesu FL-2100B HF linear amplifier, using a pair of 572B valves.



The Kenwood TM-G707E FM dual-bander for the 2m and 70cm bands, from the late 1990s.

be surprised. Often these offer free ads for sales under a given selling price. Of course, if you're a subscriber to *PW*, then adverts are free, including the option of adding a photo. Because it doesn't cost the seller anything to advertise, you may find something you like, often with the benefit of it being near to you. My own local paper, covering the Southampton area, occasionally has radio items in it and with the benefit of these being advertised within a day or so of the seller contacting the paper. So you'll be able to get in there a lot earlier. Again, with the seller being local, you can pop along there one evening and take a look at the equipment. If they're a radio amateur or listener, you'll probably also be able to try it out 'on air' as well as having a good chat. Even in national magazine ads, if you can get along to the seller's house to inspect and collect the equipment, in my opinion it's time and petrol well spent as well as saving carriage costs and potential damage in transit. I've frequently done this myself, travelling up to 50 miles or so to inspect and collect equipment, which I've been very happy to do. On one occasion I even took a ferry journey to pick up a Trio 9A59DS valve receiver, which is still here in my shack.

Dealers

Many people buy new equipment from hobby radio dealers and most if not all of these offer trade-in facilities for the buyer's

earlier equipment when they are trading up to a new radio. Again the buyer may not, and often won't, get the best price for their traded-in equipment (as with car dealers) but it's the convenience aspect here. This is where the canny second-hand purchaser can possibly get a good deal. A low trade-in price often results in a low resale price, as long as there's enough to cover the trader's overheads and allow them to have a modest profit. I once, though, bought an all-singing all-dancing 2m multimode base station transceiver from a dealer at a radio rally and traded in the handheld I was carrying with me. I was surprised to get a rather good price for my trade-in. This was because I'd agreed to buy the new base station at the full advertised price with no discount or haggling.

Just as with car dealers in the past, you either pay full price or get a good trade-in. Or you haggle, or try to. This may have been a viable possibility some years ago but in today's economic climate it usually isn't an option because many dealers are simply trying to out-compete others. This is especially true with competition from internet sales where overheads are very low relative to those of supporting a showroom and sales and demonstration staff. I know of at least one UK radio dealership who had over half a dozen retail amateur radio shops spread around the UK, all with demonstration facilities, that simply closed their entire amateur

radio division because of the competing 'pile them high and sell them cheap' box merchants with lower prices but where you just get a sealed box either in the post or over the counter.

Dealers often list second-hand stock in their adverts and it's really useful to be able to go along to see their selection of second-hand radios 'in the flesh'. Some dealers also have demonstration facilities where you can try the equipment out for yourself on an external antenna system, maybe along with a cup of coffee or three, and they often don't mind if you're there for a few hours so long as you're not holding them up from dealing with other customers or from going home at the end of the business day. Remember that dealers don't usually stay in business by selling shoddy equipment and with our hobby of over-the-air communication where word quickly gets around, most dealers would never want to risk their reputation by selling you something that's overpriced or faulty. The majority of dealers will also offer a warranty of some sort with second-hand equipment.

Rallies and Boot Sales

If you're fortunate in being able to get out to radio rallies and one or more of the increasing number of amateur radio themed boot sales, these are a great place to pick up equipment and maybe get yourself a bargain. At rallies, as well as dealers offering second-hand equipment (always useful because you're dealing with a known firm and you will usually get some form of guarantee), there is often a 'bring and buy' stand run by the rally organisers where visitors' equipment can be displayed and sold on their behalf at an advertised price, typically with around 10% commission to the rally organisers. Like most car boot sales, it's the early bird that catches the worm so if you're looking to buy, get there as early as you can and if you're at a rally, keep checking the bring-and-buy stand regularly for equipment because not all prospective sellers may have got there as soon as the doors opened in the morning.

Bargaining

Most private ad sellers, boot sale vendors and even some rally traders, can be persuaded to accept slightly less than the asking price but do be nice about it. You won't score many points by pointing out what the equipment is lacking or problems with its condition because the seller is, of course, very aware of any of these, which should be reflected in the asking price in the first place. After watching a



The Icom IC-Q7E dual-band handheld, sold from 1998 to 2001.

prospective buyer at a radio rally trying his hardest to get a dramatic cut in the price of a second-hand radio from a dealer, after the dealer had already been prepared to accept around 10% less, the dealer just got fed up and increased the price by 10% above his original asking price instead and wouldn't budge. The exasperated buyer, who really did want the item, eventually had to swallow his pride and pay the extra!

Buying via Online Auction Sites

I've lost count of the times I've heard, "I bought it from eBay" or similar auction sites. You don't buy anything at all from eBay or similar sites. Instead, you buy from an individual or a company who uses this facility to advertise their goods for sale. So do remember you may be dealing with an individual and not with an established and respected dealer. Sites such as this do have benefits, though. As well as giving a wide exposure to the seller, the potential buyer can often find out a bit of past history about the seller, such as whether past purchasers have been satisfied with their dealings. This is usually done through online feedback and you can see a potted history of whether other purchasers have been satisfied with the seller in the past. This will include whether the equipment was described correctly and accurately, whether it was despatched promptly and received in good condition and so on.

Invariably there will also be a photo, or photos, of the equipment for you to look at online. There are disadvantages, though, and you may rarely get a bargain if it's a sought-after piece of second-hand equipment such as a collector's item. This is because others will be bidding on

it in competition with you and if someone particularly wants that very type and model of equipment, you may well end up paying over the odds for it if you keep bidding until the last minute. My advice here is not to get carried away, keep in mind a maximum price that you're willing to pay and stick to it. I recently donated plenty of second-hand equipment to my friend **Andy G4MYS** who placed it on eBay to fund our local repeaters, GB7IV (D-STAR) and GB7SH (analogue FM). It was quite surprising to find how many people paid over the top for some of the equipment. It was good news for the repeater fund though!

Make Sure it's Yours

Finally, if a piece of equipment seems remarkably cheap, then do beware. However, radio dealers and occasionally private sellers may indeed offer old or physically damaged equipment for sale at a knockdown price. I fondly remember going to an amateur radio dealer's open day where I saw a Liner 2 2m SSB transceiver, which I'd been specifically looking for but could never find advertised. It had a slightly damaged front panel and was labelled "heap of junk, make me an offer". Upon enquiring I was told, "Please, just take it, I don't want anything for it". What a bargain! Similarly, at a different dealer's open day was a 2m synthesised FM portable transceiver with a damaged battery cover that I bought for £20, another bargain. All that was needed was some insulating tape to keep the batteries in place. But if it's a private seller, a relatively new model of equipment and very cheap, then insist on also getting, or at least seeing, the original receipt for the radio. If you've a camera phone, just take a photo of the receipt. This shows that they bought it legitimately and, because it's a receipt and not a credit or hire purchase agreement, that it is indeed theirs to sell and the equipment doesn't technically belong to a finance company.

Happy Hunting!

I hope this overview article has been useful, and that it complements the past seven years of *Buying Second-hand* articles. The various illustrations include some of the gear I have covered in past columns and should look familiar. I'll be back next month with the latest on hobby radio *Emerging Technology* and the following month with another *Buying Second-hand* feature, which will detail what to look for and how to make sure you're getting a good buy. See you then!



The Curious Case of Negative Resistance!

A case investigated by our technical editor 'Tex' (Sherlock?) Swann G1TEX.



Two versions put together on small pieces of stripboard.

Although it sounds counterintuitive, it's quite simple and easy to produce a circuit that has negative resistance. In fact, in the past, I've created many of them, some inadvertently and others deliberately. Every oscillator

is, in effect, one particular case of negative resistance. But in this instance, I'd like to show you a circuit with an inherent negative resistance parameter, the Lambda pair.

The circuit action of the two-device circuit is similar to the original 'Tunnelling' or Esaki diode. Leo Esaki invented this

device in 1957 when he was working at what is now known as Sony. At around the same time, Robert Noyce, while working with William Shockley, independently came up with the idea of a 'tunnelling diode' but seems to have been discouraged from pursuing the idea. The illustration, Fig. 1, shows a typical voltage/current plot for such a diode.

Another occurrence of this negative resistance effect is to be found in the Gunn diode, used to create a source of microwave power for burglar alarms and the infamous 'safety-cameras'. The main difference here being the voltage levels involved, 0.3–0.7V for the tunnel diode but around 6–8V for the Gunn diode. In a resonant microwave cavity several milliwatts of power may easily be produced.

(Strictly speaking the Gunn Diode isn't a diode at all. It is a device with varying levels of N-type doping, is unable to rectify AC and doesn't conduct in just one direction. Perhaps the better term is a 'transferred electron device' in spite of the usual name.)

The circuit I'm about to describe is also often called a diode although it too doesn't use a diode at all. But it's similar to the Gunn device, in that it operates at higher voltages than the original tunnel diode. The circuit is a 'totem-pole' combination of two junction FETs (JFET), one an N-type, which, like an NPN transistor, requires a

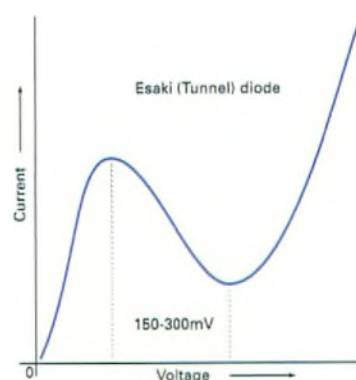


Fig. 1: A typical voltage/current curve for an Esaki or Tunnel diode.

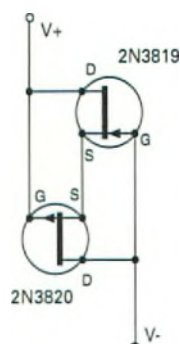


Fig. 2: Combining two FETs of opposite polarity to create a two terminal, negative resistance Lambda device.

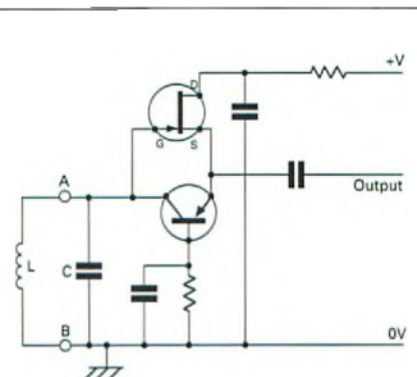


Fig. 3: George Dobbs presented this version of the Lambda circuit in a previous Carrying on The Practical Way.

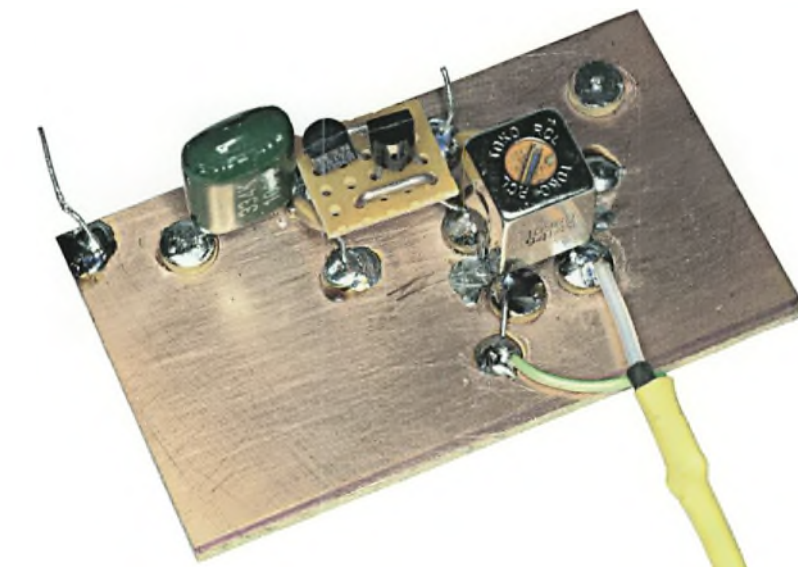
positive supply rail on its drain terminal. The other device is a P-type JFET, which, similar to a PNP transistor, requires a negative rail supplying the drain, Fig. 2. I put together two versions using random pairs of the devices in the form shown in the heading pictures.

Simple and Cheap

The two FETs that I used are the simple and cheap 2N3819 and the rather more unusual 2N3820. If you have problems finding such a device, then a PNP transistor such as a 2N3906, or any other PNP type with a good wide frequency capability may, with circuit modifications, be used, Fig. 3. Note that in this case, it's necessary to add in a limiting resistor to the base-to-collector circuit of the PNP transistor, along with low value bypass capacitor. **George Dobbs G3RJV** dealt with this particular form in his February 2011 *Carrying on The Practical Way* column.

Now to have a look at the action of the two FET version. Two typical voltage and current curves of FET pairs are shown in the diagram, Fig. 4. The actual figures for voltage and current will vary from combination to combination due to the spread of the individual device parameters. So the best way to really understand the combination is to build one for yourself and to take some measurements.

Looking at the two curves in Fig. 4, you will see that the voltage curve initially rises from zero as any purely resistive device would. The current starts to rise almost immediately and in a linear fashion and, in spite of the two 'turnover' points being very different, they match each other rather closely. They both rise fairly linearly until reaching a point at which the current remains relatively constant over a small change of values. As the applied voltage



The initial version of the Lambda device oscillator used an old TOKO 455kHz IF coil.

continues to increase, the current then starts to fall.

The fall in current with increasing voltage is, like the rising portion of the curves, relatively linear until at a higher voltage level the current effectively cuts off all together. There is then no change in the very low level of current until such time as the break over voltage of either device is reached. At the break over point, the current is likely to become rather catastrophic to the devices. This action is very different to either of the Esaki or Gunn devices, where the current continues to rise again in line with applied voltage.

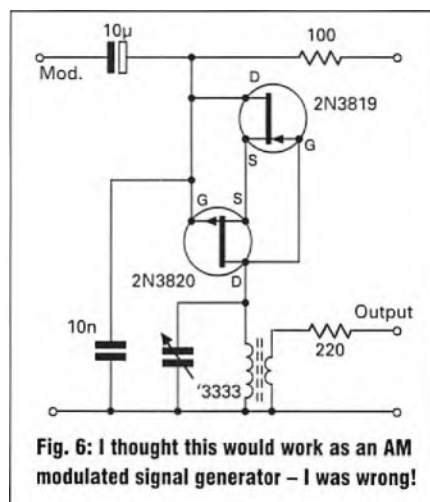
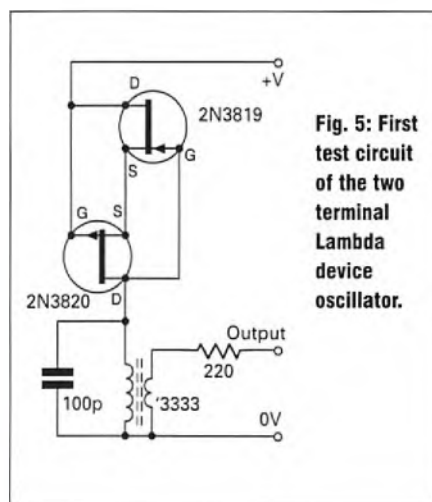
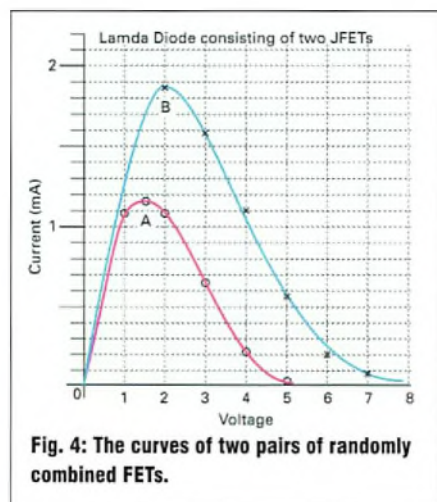
The unusual fall in current with increasing voltage represents a negative resistance portion of the characteristic curve. A figure that, in the case of curve A, is -0.9mA with a 2V rise giving a -450Ω value. In the case of curve B, it is around -466Ω (-1.4mA and 3V). Now to consider what may be done with this peculiar circuit action. The circuit use all depends on bias and signal application levels. As I've mentioned above, the Gunn diode can be used as a source of microwave energy

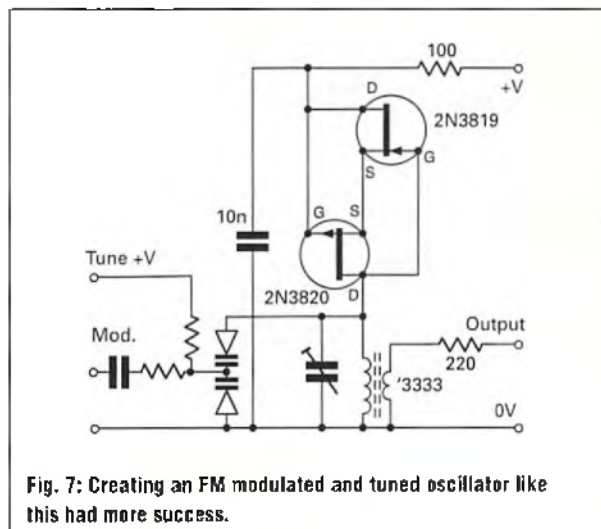
– let's make the Lambda pair that I've described do the same!

I've shown, in Fig. 5, the circuit of a simple RF oscillator initially using an old IF 455kHz Toko coil that I had to hand. To bring the circuit into oscillation, the supply voltage is adjusted to be in the middle of the downwards slope of the pair of FETs so it will vary from pair to pair for maximum output. However, as you can see from the curves of Fig. 4, both pairs are in a negative resistance range from a little over 2V to around 4V applied.

Further Experiments

Experimenting a little further, trying to amplitude modulate the oscillations, I tried the circuit of Fig. 6, adding a low value resistor in the supply line and putting an audio tone onto the supply point. Frankly, this was a failure because a large voltage swing was necessary to change the output significantly and the circuit was very non-linear. I had much more success with frequency modulation along the lines of the circuit of Fig. 7, which was electronically tuned and modulated.





The screen-grab of Fig. 8 shows the output into a 50Ω load of a spectrum analyser of the plain L&C tuning of Fig. 5, with a fundamental output of -14dBm and harmonics of around 40dB less. But when I tried the varicap-tuned circuit, the harmonic content went up, leaving me looking for an explanation. On putting an oscilloscope on the tuned circuit, I could see why. There was a swing of around

15V peak-to-peak across the circuit, Fig. 9, in spite of the supply voltage only being around 4.5V. More experimentation needed!

Conclusions

The Lambda 'diode' pair creates a strongly

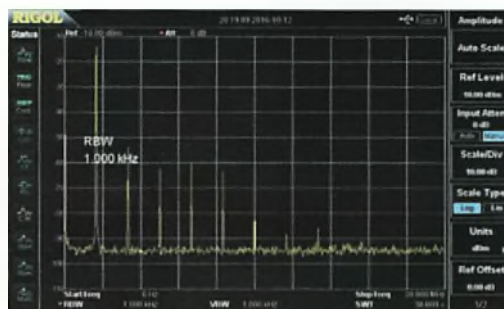


Fig. 8: The fundamental output at -14dBm was accompanied by relatively strong harmonics some 40+dB below.

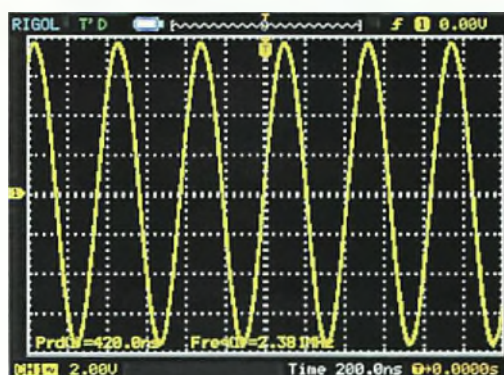


Fig. 9: I was very surprised to see around 15V peak-to-peak swing from a supply voltage of only 4.5V.

oscillating circuit but will need a little more experimenting to create a cleaner signal suitable for my purposes. Anyhow, try a pair for yourself, and let us know when and how you improve the circuit.

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The Early Logbooks of Hiram Percy Maxim

Michael Marinaro WN1M offers a glimpse into the early era of wireless in the United States.



The Maxim residence with a later antenna.

Under the auspices of the Historical Committee, appointed by the ARRL Board of Directors, I, as volunteer Historian and Archivist at ARRL headquarters, have been cataloguing the previously unrecorded assemblage of paper material contained in the League files. This is the material that was not previously catalogued in an earlier effort using Microsoft Word and which occupies more than 40 file drawers.

To continue the project, a new format was developed using the Microsoft Access database program for ease of finding material subsequently. In the past two years 24 file drawers of specifically recorded material and 145 boxes of general and executive correspondence have been catalogued and stored in archival containers.

In the process of cataloguing this material, several discoveries of documents of historical import have been made. These documents had been preserved

but not previously recorded. This article comments on one of these finds – the logbooks of 1ZM and 1AW.

Early Days

The logs are contained in two common ruled school notebooks. The entries are mostly in ink and remarkably clear after almost 100 years of storage – only a few pages are illegible.

The first book, labelled *French Notebook, H H Maxim*, with the first page entered as *Log of 1ZM*, covers the period May 14th 1919 to March 18th 1920. The second book, labelled *Log No. 2, Radio Station 1AW*, covers the entry periods March 2nd 1920 to December 16th 1921 and September 26 to 29th 1922. It contains at the end a number of fragmentary entries and typewritten attachments and insertions.

These post-WWI logs are unlikely to be the very first written logs of ARRL founder Hiram Percy Maxim and his son Hiram

Hamilton Maxim. They began operating in 1911 as SNY and SNW and in 1913 with official licensing as 1WH and 1ZH. They continued actively through the time of the founding of ARRL in 1914 and up to the government radio silence imposed in April 1917. After the war, the station callsign 1AW was issued to Maxim senior.

From its inception the station was a major relay link in the National Traffic System (NTS) that I have described previously in these pages (V&V March 2016). During these early years the station not only handled traffic but also originated and transmitted bulletins and announcements addressed QST, meaning “to all radio amateurs”.

Return to the Air

The US ban on radio operations was not lifted for amateurs until November 1919. In anticipation of an imminent return to the air the first entries in the logbook, from May through August, are concerned with copying the code transmissions of government and permitted commercial stations and preparation of the station. Finally, on November 24th, the first contacts were made with 1FD and 2ZS. Subsequent entries record the



Maxim's spark transmitter, 'Old Betsy'.



The NTS preliminary concept.

re-emergence of the NTS, number of messages handled, band conditions and the maintenance and performance of the station. The individual stations heard and worked were recorded and later transcribed to appear in QST, the League's official journal.

Throughout, the names and signatures of visitors appear. Besides Hiram Percy Maxim, notable and frequent operators were ARRL functionaries General Manager **K B Warner**, Communications Manager **F D Schnell**, Secretary **C D Tuska** and two of the six original Directors, **D L Moore** and **R S Kruse**. This crew engaged in handling traffic and broadcasting announcements of events of interest to the growing member ranks. Each either signed or initialed their individual logbook entries. In addition to those that operated, the station hosted observing visitors too numerous to mention. Accordingly, the book contains the signatures of several early wireless dignitaries.

A typical and significant extract from the first logbook, as entered in pencilled script, reads:

"Dec. 4 (1919) Worked 8DA and took first transcontinental relay since war. Was from 6EA Los Angeles. Read - Hartford, Conn. to Hiram Percy Maxim, via 6EA, 6LF, 9BT, 8JZ, 8DA from Los Angeles Calif. Regards from 6EA sig Seefred."

"Worked 1AP - Manchester - (used entire word each time)."

"Called 1AN, 1AU, 1AS, 1CM but no answer. Impossible to get east."

"10:30 to 11 worked 9ZN. Took message to K.B.W. from R.H.G.M. reading Pse hold date until Check curve will write rush R.H.G.M. HPM"

This extract records the receipt of the first message relayed across the continent since the end of the war. The 10:30pm

entry concerns a message to K B Warner, ARRL General Manager, from R H G Matthews, ARRL Vice President.

Many log entries complain of noisy/static conditions (QRN) and fading signals (QSS). In an effort to understand the nature and cause of fading the ARRL and the U S Bureau of Standards undertook a cooperative programme of study. 243 receiving stations were enlisted to record the simultaneous transmissions of 17 sending stations, including W1AW. The logs indicate that W1AW, with Hiram Percy Maxim operating, made the first

transmission in the test on June 1st 1920 and that the station was a consistent participant in the programme until its conclusion in the spring of 1921. Although the resultant data was inconclusive, it did provide insights into short wave propagation.

The 1920s

The 1920s roared in with a rush of interest in radiophone. Broadcasters appeared, competing with amateurs and commercials for wavelength. This situation was relieved in 1922 when the US Department of Commerce recognised radio amateurs as a distinct entity and imposed precise frequency allocations separating the services. In March 1920 Tuska installed gear and introduced W1AW to the phone mode. The station sporadically used the mode to send announcements but rarely to make contacts.

Two major operating events occupied the staff during 1921. The first of these were the transcontinental tests, which were held between the nights of January 14/15th and 17/18th. The object of the tests was to send a message from one US coast to the other and to receive an answering message in response in the least amount of time. The standing record was one hour and 20 minutes east coast to west coast round trip. The

efficiency of the NTS and the competence of its relay operators were challenged in this event. After several other round trip relays had been completed successfully a new record was established just before the east coast dawn on the last night of the event. 1AW (Hartford) sent a message via 9ZN (Chicago) and 5ZA (Roswell, New Mexico), which was received by 6JD in San Francisco who dispatched a response that travelled back over the same route in a total elapsed round trip time of six and a half minutes. The back of the logbook has a number of typewritten pages stapled in, which is draft of the report of the event that later appeared in QST.

The second operating event was the first



QST trumpets the success of the transatlantic tests.

transatlantic test, which was run the following month during early February. The objective was for pre-qualified US stations to be heard by British amateurs. On February 5/6th, **F S Schnell** had recorded in the log, *"Ran off transatlantic on time – not much hope."* This signified that 1AW had transmitted the signal that had been assigned to the station at the precisely designated time on a wavelength of 200m. The carefully orchestrated event was a failure. Not one of the 25 US stations was heard by the 250 or so listening British. But this was not the last thrust in this effort.

In early August the station was inactive while the staff attended the first ARRL National Convention in Chicago. At this event, the Board of Directors met and considered actions to reverse the failure of the first transatlantic tests. The Board of Directors determined to conduct a second test in early December with an official US listener posted in Britain. The log records the stations heard in the qualification preliminaries in November, the actual tests in December and Schnell engaging the station in the free-for-all finale on December 16/17th. The event was a big success but not for 1AW, which was not among the 30 US and Canadian stations heard. This event also settled a controversy – spark was dethroned and CW was crowned king.

Wrap Up

Hiram Percy Maxim's May 13th log entry states, *"No regular log kept up to here – station not operated regularly because of pressure of other affairs"*. The discipline of the log deteriorates from this point onward with fragmentary and some unintelligible records.

The operations of the station at the Maxim home were gradually assumed by expanding operations from the League's confined Hartford offices using the callsign 1MK. In 1928, these functions were fully assumed by a modern station constructed at the newly created suburban airport, Brainard Field. The most advanced amateur radio station of its time, W1MK became the loud voice of the League. This station was destroyed by flood in 1936 and replaced in 1938 with the now well-known W1AW – The Hiram Percy Maxim Memorial Station in Newington, Connecticut.

Overall the logs provide insights into the operations of a significant wireless era. They fill in a great deal about the nature of this eventful period and provoke questions of detail and background that suggest further research.



The W1MK station at ARRL HQ, mid-period layout.



The Hartford offices of ARRL.



An early W1AW layout.

All images are reproduced courtesy of the ARRL.



Here's Harry

Harry is back with quite a selection of tales and lessons. Take heed, learn and enjoy.

I never stocked much Citizens Band (CB) equipment and, strangely, when it became legal with the introduction of 27MHz FM, the bottom seemed to fall out of the market and a lot of the dealers went to the wall. We did, however, get quite a few CB operators in the shop buying accessories. One item that I did not stock and yet was frequently asked for by 'good buddies' and some radio amateurs was 'a TVI filter for my rig'. Perhaps at this point a quick look at the history of TV in the UK would seem appropriate.

Some TV History

When I entered the TV trade in the early 1950s, the only UK TV transmitters were operated nationwide by the BBC in Band 1, which extended from 40 to 70MHz. Depending on the area you were in, many of these channels were harmonically related to several amateur bands, which spelled trouble with a capital T. There were no alternative channels, most TVs did not even have a channel switch and in Lancashire and Yorkshire we were served by the Holme Moss transmitter located on the Pennines using frequencies around 49MHz. This, of course, was the seventh harmonic of the 40m band and the 14th harmonic of 80m. On the other side of the Atlantic the first television channels were in the same range so a lowpass filter, to remove a transmitter's harmonics or any

other spurious emissions above 30MHz, became standard equipment in most HF amateur stations.

Nowadays, of course, all the TV channels are in the UHF range so unless an HF rig is actually faulty, any harmonics from the HF bands should be so weak that they will not cause any trouble. Despite this, many people still think that their HF station is not complete without a lowpass filter. I advised customers that the money would be far better spent stocking up on ferrite cores and highpass filters for distribution to any complaining neighbours, Fig. 1.

Misusing Equipment

When speaking to the chief engineer of a large importer, I asked him what kind of equipment they had most trouble with. He grinned and said, "the operator". I knew just what he meant.

Peter had a multimode 2m mobile rig, which he used at home, and while it was under the initial 12-month guarantee the power amplifier (PA) module blew. His dealer replaced this free of charge but 12 months later it went again. After a bit of argument it was once more replaced, this time at half price, and Peter was advised to check his SWR and the voltage of his PSU.

Sometime later the replacement failed, and Peter came to see me for a second opinion. I could find nothing wrong with the rig itself but it certainly needed a new module so I quizzed him about the kind

of operating he did. "Nothing unusual" he said, "I only chat locally, run a packet node and broadcast the RSGB news".

Now 'normal use' for a mobile rig could be expected to consist of short transmissions with the rig being in the receive mode well over 50% of the time. While many mobile rigs are used at home and the manufacturers could be expected to anticipate this, even then 'normal use' could not be expected to consist of being left on all day or for long transmissions of 30 minutes or more. If you do perform such a valuable service involving long transmissions, you should ensure that your equipment is well cooled and that the transmitting power is reduced by at the very least 50%. Even better, get hold of some ex-PMR equipment, which will be rated for continuous use.

All At Sea

When I was running the shop, I was frequently asked about using amateur radio rigs on the shipping bands and I often got a request to 'snip a few diodes' so that the owner of a rig such as the FT-757, Fig. 2, could use it on his yacht. This would seem a simple request but using non-approved equipment on the HF commercial shipping bands, except in cases of dire emergency when there was danger to life, was an offence. Anyone of a cynical frame of mind might be tempted to think that this was arranged so that manufacturers could charge considerably more for their type-approved equipment than for standard amateur band equipment but there were solid technical reasons for this requirement.

When amateur radio equipment was being designed, the manufacturers were entitled to presume that the user will have some technical knowledge, that the equipment would be used on a suitable antenna, with a reasonably stable power supply, and that the temperature and humidity will be within the range one would find in a home or car. These conditions were often far from the case when a rig was used at sea. Also, amateur radio equipment was not necessarily designed to have a clean output if used to transmit outside the amateur bands. A quick check on a spectrum analyser demonstrated that if this was done, there was often very considerable harmonic and spurious out-of-band radiation, which could cause significant interference to essential services. Finally, there was the matter of reliability. Some of my amateur radio customers did tend to think that their world had come to a stop if their HF rig at home broke down but in the years before

Fig. 1: A highpass filter and ferrite core for helping to cure TVI.





Fig. 2: The Yaesu FT-757GX – a versatile rig but not intended for life and death applications at sea.

satellite communication, HF equipment was sometimes the sole method of calling for help in an emergency when far away from land. It had to be reliable – maritime radio wasn't just a hobby but potentially a matter of life and death.

Beryllium Oxide

Have you ever been tempted to have a look to see what is inside a PA module or a power transistor? Do not give in to your curiosity.

Many years ago a well-known electronics magazine published a reader's letter that explained how certain expensive output transistors and RF PA modules could sometimes be dismantled and repaired. The next month they had to print a warning advising readers not to even think about trying to do this because certain solid-state devices contain beryllium oxide insulation. Any dust from this can be fatal, as a broadcast engineer unfortunately discovered when he tried to machine some.

Mains Sockets

A few months back I mentioned that the switch on most 13A wall sockets only broke one wire and hence, if wrongly wired, could present a hazard. **John Tyler G4GCL** advises me that it is now possible to purchase sockets fitted with a double-pole switch. It is a pity that fitting these sockets is not compulsory because I am sure they would save lives.

The Japanese Technology Explosion

A recent enquiry about low power operation of early Japanese rigs brought back memories and set me thinking.

In the early 1950s, Japanese equipment was rather looked down on as being 'cheap copies of western technology' and with memories of the

mistreatment of prisoners in WW2, buying it was considered to be somewhat unpatriotic. How on earth, then, did Japan manage to become a world leader in quality electronics?

When I started handling amateur radio equipment in the early 1970s, I enquired as to why there were links on some Japanese HF equipment that could easily be set so as to considerably reduce the transmitted power. I was told that this was to meet the requirements for the Japanese novice licence. The Japanese novice licence, introduced in 1959, allowed operation on restricted HF frequencies after passing a test in laws, regulations, simple theory, operation and maintenance of radio equipment, without any CW requirement.

While this went against the international agreements that were then in force, the power was restricted to 10W and hence there were few complaints.

I can't help wondering whether their government offered this licence as a carrot. Let's face it, at that time Japan was known as rather an isolated inward-looking country, so what better way could young people be enticed to take an interest in electronics, to learn foreign languages and to learn about the countries Japan wanted to export to, than to become radio amateurs?

The take up was tremendous and there ended up being well over a million Japanese novices, many of whom went on to study electronics and to obtain a full licence. If this was deliberate attempt to create an electronically literate population, it certainly seems to have worked. I'm sure the editor would welcome an article on the history of amateur radio in Japan – I suspect it is somewhat different to what we are familiar with here in Europe.

The Morse Requirement

I suffer slightly from dyslexia and have always found Morse very difficult. I do wonder how many people were put off amateur radio and an eventual career in electronics by the Morse requirement at that time in the UK. Quite a few famous people who are thought to have had dyslexia were somewhat 'oddballs' and apart from difficulty with spelling and getting their lefts and rights muddled, they tended to be original thinkers. **Thomas Edison, Albert Einstein and Michael Faraday**, for instance, would probably have had difficulty if they had had to learn Morse and I can't help thinking that not cancelling the Morse requirement and issuing a low power novice licence in the 1950s was a missed opportunity for the UK.

Incidentally, if you want to have a look at some 'cheap Western copies of Japanese technology', just glance at the nearest rooftops and salute **Mr Shintaro Uda** and **Mr Hidetsugu Yagi** who developed and introduced to the West their Yagi parasitic beam antennas.

Oddball Faults

An e-mail from a reader told me how he had obtained an FT-200 at a bargain price on the understanding that it would not receive and needed some attention. After chasing his tail around the receiver IF stages, he finally found the fault. Someone had interchanged two valves and had got them in the wrong holders. This reminded me of an incident during my apprenticeship years.

An engineer was sent to have a look at and, if necessary, collect a 1950s radiogram that was 'low in volume and sensitivity'. He could not spot the fault so he removed the chassis and brought it into the workshop. I measured a few voltages and found that the cathode voltage of the audio output valve and the screen voltage of the IF amplifier valves were both low but at this point I noted something else odd.

In radios of that vintage the valves were normally mounted in a straight line. First came the local oscillator/mixer, next the IF amplifier, followed by the detector, output and then rectifier valves. The first three were normally smaller, lower powered devices, the last two used the same 9-pin bases but were taller because they had larger anodes. In this case the tallest valve was in the IF amplifier position. A quick glance at the valve numbers showed that the output valve was plugged into the IF stage and the IF amplifier valve was being used as the audio output valve. They were both pentodes and by coincidence the pin connections were the same, hence

the set was functioning but rather weakly. Plugging the valves back into their correct sockets restored normal operation. It eventually transpired that the owner had been cleaning the set and had somehow managed to swap the valves around. He was not too pleased at having to pay for collection and delivery plus the normal service charge.

Fred spotted an advert for an FT-101ZD, Fig. 3, phoned the seller and arranged to make a two hundred mile journey and purchase it. The seller was in no rush so he put the rig on the air and had a couple of QSOs, just to prove that everything was fine.

Fred haggled a bit, paid up in cash, brought his new toy home and couldn't wait to fire it up. However hard he tried, though, and he even read the instruction book and phoned the previous owner, he just could not get any PA current.

Eventually he turned up rather downcast in the shop and told me the story. A glance at the back of the rig showed me what was wrong.

Most Yaesu HF rigs with valves in the PA stage, have an 11-pin Aux socket on the back into which can be plugged a Yaesu transverter or linear amplifier. When



Fig. 3: The FT-101ZD is a great rig but needs a rear panel link before the PA will operate.

the Yaesu transverter is switched on, the heater voltage is removed from the HF rig's PA valves by breaking the connection between pins 1 and 2 on the Aux socket, to stop the HF rig 'squirting' 100W of RF into the transverter. When the transverter is off, the on/off switch in it links pin 1 and 2 on the 11-pin socket, to enable HF transmission. When nothing is connected to the Aux socket, a dummy plug with a link in it must be provided to complete the

heater circuit. Obviously the seller had the plug connected to some other equipment and so had removed it.

I sold Fred a plug complete with link and the rig worked perfectly! Quite a few other HF and VHF rigs need to have a dummy plug inserted at the rear before they will function. This is a point to check if you buy something second-hand.

73 and a very Happy Christmas, see you in the new year, Harry.



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The 2016 RSGB Convention



Editor Don Field G3XTT has missed just one RSGB Convention in more than 30 years. Here he reports on the 2016 event.



John G3WGV shows his homebrew front-end (left) for the Flex 6500. A Flex Maestro controller is sitting on top of the 6500.



A crowded room for the prize draw.



Jacques F6BEE presents the FT4JA DXpedition.

The 2016 RSGB Convention was held once again at Kents Hill Conference Centre in Milton Keynes. Word must finally be getting

out because numbers were up by 20% on last year to a record breaking 542, many of whom were there for the weekend but with plenty of day visitors too.

As well as the various lecture streams, as always the major traders were there (with Martin Lynch & Sons once again the main event sponsor). Kenwood not only featured an extensive display but also had a working HF station on their stand. Icom also featured an extensive display of gear. BYLARA held their 2016 Convention over the course of the weekend, the ARRL had a stand selling their publications and signing up memberships, the usual range of other clubs and interest groups, including CDXC, UKSMG, ARDF and the UK Microwave Group, had stands and, of course, the RSGB were there in force.

With five parallel lecture streams running, I certainly couldn't cover them all so what follows is just a flavour. The good news is that many of the presentations were videoed by BATC or the Camb-Hams team and will be available for viewing in

due course, presumably from the RSGB website. I have already, though, seen some presentation uploads, for example by Bob G3PJT of his Commonwealth Contest presentation (URL below) and by the RSGB Contest Committee (on the UK HF Contesting reflector yahoo site).

<https://berucontest.wordpress.com/test/>

Antennas

Antennas are always popular as lecture topics. Justin Johnson G0KSC of InnovAntennas gave an interesting talk about stacking Yagis, showing how the performance of a stack can be improved by adding just a few parasitic elements between existing multi-element Yagis. His work is theoretical so far, albeit the modelling programs nowadays are pretty reliable, but he plans to try out the concepts from his holiday location in Spain.

David Aslin G3WGN gave a fascinating presentation on the use of the HeyWhatsThat website to check out your location for the effect of surrounding hills on your radio horizon. It's an exercise you can easily do yourself, as David explained, and can be quite revealing.

www.heywhatsthat.com

Jeff Briggs VY2ZM talked about Contesting from his Prince Edward Island station but, as you might expect, this again

was primarily about antennas. Jeff has a fantastic array for all the contest bands and it was clear to see why he is invariably one of the loudest signals in Europe. There are several video tours of Jeff's station and antennas available on YouTube. Jeff also mentioned that he has just published a revised and updated version of his book about 160m DXing – *DXing on the Edge* (the original 1997 edition is long out of print). Jeff is self-publishing this time and the book should be available in paper or ebook formats.

Mike Parkin G0JMI showed how a basic two-element Yagi can transform into the popular quad antenna, explaining the basics of modelling, building and matching.

SDR

The organisers had brought over none other than Gerald Youngblood K5SDR of FlexRadio to talk about SDR and the company's products. Additionally, John Linford G3WGV gave a thought provoking presentation about his development of a 'traditional' front panel for the 6500 series of FlexRadio transceivers. In some ways John's front panel replaces the FlexRadio Maestro but is fully configurable to the extent that controls can be redefined in software (for example, between ragchewing and contesting modes or for right- or left-handed users). John's developments might well be a clue as to how our transceivers might look in the future.

Remote Operation

Michael G7VJR and Bob G3PJT reported on the Cambridge Remote Station Project and had a system running live from Kents Hill. John G4SWX spoke on the subject of remote station operation using microwave links. I've noticed that remote operation is also becoming more and more of a topic of conversation in the bar areas and elsewhere, mainly because so many of us nowadays are suffering from increasing levels of local noise and see remote operation as a possible solution.

Operating

As always, there were plenty of operating talks. **Jacques F6BEE** gave two presentations about the FT4JA DXpedition earlier in the year to Juan de Nova Island. In what is an increasing sign of the times, he had some great footage of the island taken by drone – I'm sure we'll see much more of this in DXpedition and contest station videos in the years to come.

Tom GM4FDM gave an entertaining presentation on his TX7EU Marquesas Islands trip. The title *I have a Lizard living in my Wardrobe* perhaps gives a clue as to the talk's general style!

Mike K9AJ presented on what will surely be regarded as the DXpedition of

from home and Dominic on operating QRP from DX locations.

Contest operating featured in various presentations as well as in the VHF and HF Contest Forums. These latter always lead to lively discussions, especially as the RSGB Contest Committee has recently released details of a number of changes they are planning to introduce next year in terms of contests rules and adjudication methods.

Construction

Home construction wasn't ignored.

Bob G3OOU focused on home design, construction and finishing. **Dave G4HUP** explained how to use surface mount devices and conducted workshops on the

and at 5.7GHz and lots more.

I did, though, just want to finish with what a couple of good friends of mine have been doing with Club Log. **Marios G0WWW/5B4WN** reported on the World QSL Archive project that is now part of Club Log, whereby some hundreds of thousands of QSL cards have already been scanned into a database to preserve them for posterity. Because manual effort is required to validate these cards in terms of ensuring that they have been referenced correctly, Club Log users are being encouraged to help with the process. To make the task more interesting, this can be done in what might be described as the 'normal' way, using your PC keyboard or mouse. However, Marios has also



Bob NQ1R mans the ARRL stand.



Ian G4FSU checks out the Expert MB1, reviewed in the July 2016 issue of PW.



The new FT-891, FC-50 ATU and M-1 microphone from Yaesu, on show on the ML&S stand. The M-1 has two independent elements, graphic equaliser, memories for recording and playback and much else.

the year – VP8SGI and VP8STI (South Georgia and South Sandwich Islands). This team endured extreme weather and hardship to put two very rare DXCC entities on the air.

Cezar VE3LYC, an inveterate activator of islands for the RSGB's Islands on the Air (IOTA) programme, talked about some of his island expeditions, including his travels to the High Arctic, again involving extreme weather and living conditions.

Perhaps at the other end of the scale, **Dave G3YMC** and **Dominic M1KTA** focused on QRP operation in their respective talks – Dave on operating QRP

same topic. **Simon GW0NVN**'s topic was *How to get your Homebrew Project up and running using test equipment you didn't know you had*. Our own **Mike Richards G4WNC** had a couple of slots to present on Raspberry Pi and Red Pitaya, one of which was a drop-in workshop. And **Philip G4FCL** showed how to restore old radio sets, most of which, although focused mainly on old broadcast receivers, was equally relevant to restoring old amateur gear. There was also a Convention Buildathon, run by **Steve G0FUW**.

Propagation

Keynote speaker **Professor Cathryn Mitchell** had Space Weather as her topic and also spoke at the evening dinner. **Steve G0KYA** explained the GB2RS propagation reports, **Dr Marcus Walden G0IJZ** looked at findings from the 5MHz NVIS propagation experiments and **Paul G4YQC** took *The Aurora* as his subject.

Club Log

The foregoing gives only a limited overview of the wide range of talks and activities on offer. I haven't had space to mention all the others, including talks on the **Tim Peake** QSOs, various award presentations, FCC and UK licence examinations, talks on operating at 50MHz



Icom had a wide selection of transceivers on show.

developed a voice interface, using voice recognition software, and a CW interface for those who prefer using Morse! This latter requires a small external interface, based on an Arduino. A kit will be made available in due course for around £10 to £15.

All in all it was a great weekend, culminating in the usual grand raffle, with Icom's new and already hugely popular IC-7300 transceiver as the major prize. Feedback on the Convention that I have seen on various internet reflectors has almost all been positive – perhaps it's something to mark in your 2017 diary once dates are announced. Day tickets are very reasonably priced and although the official package for the full weekend (including meals and accommodation) can look quite expensive, alternatives are available. As well as local hotels and B&B, one friend of mine managed to book very cheap accommodation through the Airbnb website, only to find himself staying in a £1m+ mansion less than five minutes from the conference centre that made most hotel rooms appear distinctly down market!



Split-frequency Operating

PW's HF specialist, Steve Telenius-Lowe PJ4DX, explains the principles of split-frequency operation.

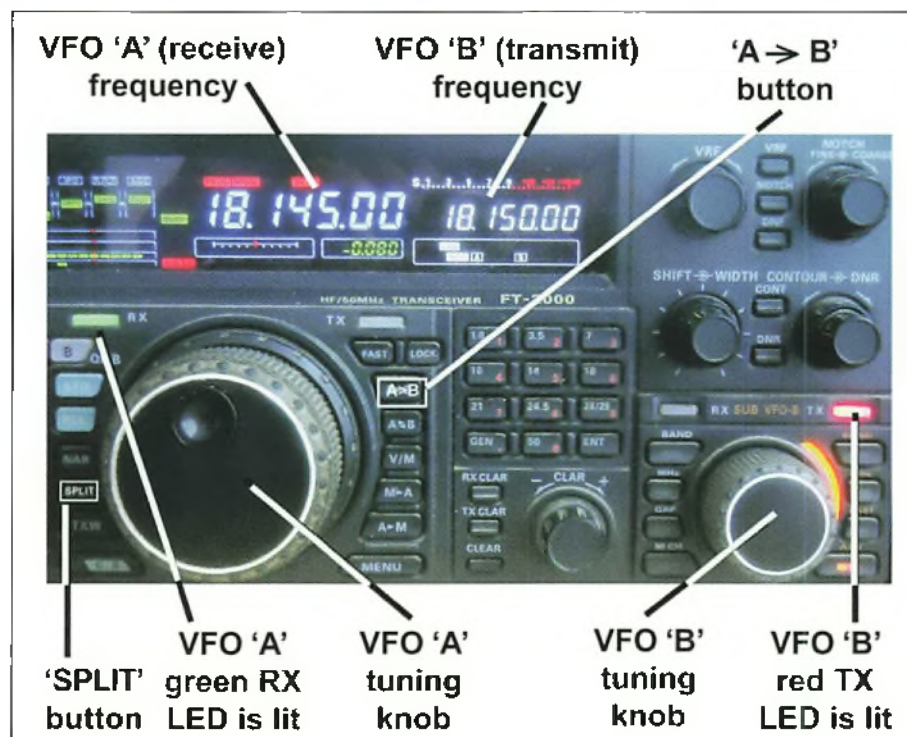


Fig. 1: A transceiver ready to call a DXpedition "5 up".

I have been a DXer for many years but it still surprises me to hear the number of stations – even some operators with many years of experience – calling DXpeditions on the 'wrong' frequency.

Most DXpeditions, as well as many resident DX stations, deliberately transmit and receive on slightly different frequencies. On SSB, DX stations often listen 5kHz higher in frequency, whereas on CW and data modes it is usually 1 to 3kHz higher. If there are many callers, the DX station may well listen over a range of frequencies, such as 5 to 10kHz or perhaps 5 to 15kHz up. Occasionally, a DX station may listen down, rather than up: always listen for instructions from the DX station before calling.

Why Operate Split?

This technique is known as split-frequency operating, or 'working split', but why would a DX station want to transmit and receive on different frequencies when all 'normal' QSOs take place on the same frequency? The reason is two-fold. Firstly, a DX station, for example on a Pacific island, might have a very weak signal in Europe but all the European stations calling the DX have strong signals with each other. If many strong stations all call the weak DX station on his own frequency, the chances are the DX will be 'buried' under interference and won't be heard at all. Secondly, if there are many stations all calling simultaneously, the DX station will have great difficulty in picking out an individual callsign to reply to. With a big pile-up it can sometimes be difficult to receive a single letter, never

mind a complete callsign. If callers are spread out over a range of frequencies, the DX operator will be able to receive more stations – and not only the strongest ones. Operating 'split' therefore has advantages both for the DX station and for the DX chaser, and particularly those who do not necessarily have the strongest of signals.

If you receive a DX station but you cannot hear the station he is working, the chances are it is because the DX station is working split. Tune a few kilohertz away and you may well hear the other side of the QSO, though you will have to be quick because many DX contacts, and nearly all those made by DXpeditions, are rapid-fire and last only a few seconds.

A good DX operator will always announce where he is listening, although not necessarily after each and every contact, so it is important to listen for a while before calling.

How to Work Split

To work a DX station operating split you too will have to operate split. To do so you need to utilise the two VFOs that almost all modern transceivers have. See Fig. 1, which is a close-up of the relevant parts of the front panel of a Yaesu FT-2000. Other transceivers may be different but the technique is similar no matter what the transceiver.

First tune to the DX station as normal and ensure you can hear the station well enough to attempt a contact. Then press the VFO "A → B" button as highlighted in Fig. 1 (or it may be labelled "A = B"); this will put VFO 'B' on the same frequency as VFO 'A'. VFO 'A' is used to receive the DX station and you need to enable VFO 'B' as your TX (transmit) VFO and tune it to the DX station's receive frequency (that is, your transmit frequency). In the example in Fig. 1, the DX station is on 18145kHz and he is listening 5kHz higher, so you would be calling him on 18150kHz.

Some transceivers have a dedicated 'SPLIT' button (as also highlighted in Fig. 1) which, when pressed, enables VFO 'B' as the TX VFO and in some cases also puts it on a frequency exactly 5kHz higher than VFO 'A'. Note that using the 'SPLIT' button in this way will only work if the DX station is actually listening 5kHz higher and not, say, 10kHz up.

Before calling, check again that you will be transmitting on the correct VFO. If you call on the wrong VFO you will cause interference to other amateurs trying to contact the DX station and they won't thank you for this error!

To summarise, when calling a DX station and particularly a DXpedition, first listen to determine whether the station is operating split or not. If he is working split, listen again

to determine precisely on which frequency, or range of frequencies, he is listening. Only when you are certain of where the DX station is listening should you call.

Some Advanced Techniques

If the DX station is listening on a single split frequency such as 5kHz up you have no choice but to call there. But what if he is listening, say, 5 to 15kHz up? Where should you call then? There are those who advocate always calling at the upper end of the split range, the theory being that many tend to call only 5kHz up, even when the DX operator says he is listening 5 to 15kHz higher.

There are others who suggest picking a random frequency within that range of 10kHz and to call there, the theory here being that, sooner or later, the DX station will hit upon that frequency as his receive frequency and he will hear you. This technique may work if you have a particularly strong signal but, if you don't, you can waste a lot of time and energy calling when the DX station is listening elsewhere. Clearly, no matter how strong your signal is, you won't work the DX if he is not listening on the frequency you are transmitting on!

I advocate a third option and that is to attempt to work out the DX station's tuning pattern by listening to the pile-up. This is easier to do if your transceiver has dual (twin) receivers. If so, you can listen to the DX station in one ear and the pile-up in the other (this is not nearly as confusing as it sounds!). If you don't have dual receivers, you can still monitor the pile-up by switching quickly between VFOs 'A' and 'B'.

If you can work out the DX station's tuning pattern, you stand a far better chance of working the DX station more quickly than the operator who just calls continuously on a single frequency. Try to work out if the DX station is tuning from 5 to 15kHz up and then returning to 5kHz up, or is he tuning up and then back down again? Or perhaps he is jumping randomly within that range of 10kHz? Is he taking as many stations as he can on a single frequency before moving his receive frequency or does he tune up (or down) after every contact? Try to put yourself in the DX operator's shoes and work out what he is thinking: what would you do if you were the DX station and you had dozens, perhaps hundreds, of stations calling you?

If you can place your transmit frequency

exactly where the DX station is listening, you obviously stand a lot better chance of working him than if you call elsewhere within his split range but on a frequency where he isn't listening.

Summing Up

This technique of split frequency operation has been around for decades yet it always seems to come as a surprise to some operators who simply do not realise what is going on. They call on the DX station's frequency, causing QRM to their fellow amateurs and incurring their wrath, often leading to name calling and even 'DQRM' (deliberate interference). Don't be a 'lid' and fall into this trap!

Equally importantly, resist the temptation to inform those incorrectly calling on the DX station's frequency that "*he is not listening here*", "*he's listening up*" or "*he is working split*". In fact you should never deliberately transmit on the DX station's frequency because by doing so you would be adding to the interference.

The most important thing to remember is to listen, then listen again, and only when you are certain of where the DX station is listening should you call.



PW PCB SERVICE

Marchwood PSU	WR161	July 1983	£8.50
HF Bands LPF	PW	February 2005	£10.00
Active Audio Filter	WS12902	November 2005	£3.00
Audio Filter & IC Amp	WT2959	March 2006	£5.00
Portland VFO & Buffer 2	G4CFY	March 2006	£5.00
Broadband Amp	WT3086	October 2006	£6.25
Off-air Freq. Stand.	G4CFY	September 2008	£11.50
LCR Bridge	G4CFY	November 2008	£5.00
PSK31 Interface	G4CFY	February 2009	£4.00
PW Trident Transistor Tester	PW	August 2009	£6.00
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Don't forget that recent magazines (dating back a year) are available from the book store and for magazines that have sold out, or very old ones, we can provide a photocopying service because we have a comprehensive archive dating back to 1932.

There are archive CDROMs available - see the Book Store on page 72.

The new 2016 CDROM archive will be available in May 2017.

Binders, which hold a complete volume, are also available from the Book Store.



Ant(enna)s

Dear Tex,
I thought these three pictures (below) might be of interest to some PW readers. I had noticed the SWR was a little higher than normal on my 40m four-square and the back-to-front seemed well down. On opening the case, which had been opened approximately three months earlier, to my surprise I found a colony of ants had moved in!

After a prolonged clean up, the third picture shows where I am back to now. Amazingly, the phase shift capacitor has come back to life and is working well, which says a lot about vintage construction techniques. For

interest, the antenna is a four-square using 6.15m (20ft) centre-loaded verticals with a home made phasing box based on the K1NQ design and when not infested, works a storm.

Steve Pridham G4BVB
Gunnislake, Cornwall

Online Databases

Dear Don,
In some parts of the world there is a lot of reissuing of callsigns. As radio amateurs we tend to use online database resources to access operator locations, equipment and so on.

If you are having a DX QSO in difficult conditions, then

these databases become a very useful tool but with one proviso. We have to remember that past holders of these reissued callsigns may not have deleted their details when moving on and that the new holders of the callsign do not always remember to automatically update these details straight away.

This could lead to a situation where amateur radio operators in other parts of the world, using these databases as a tool for operator information, might in their mind question the validity of the operator's credentials without realising that some of these online resources have not been updated for some time.

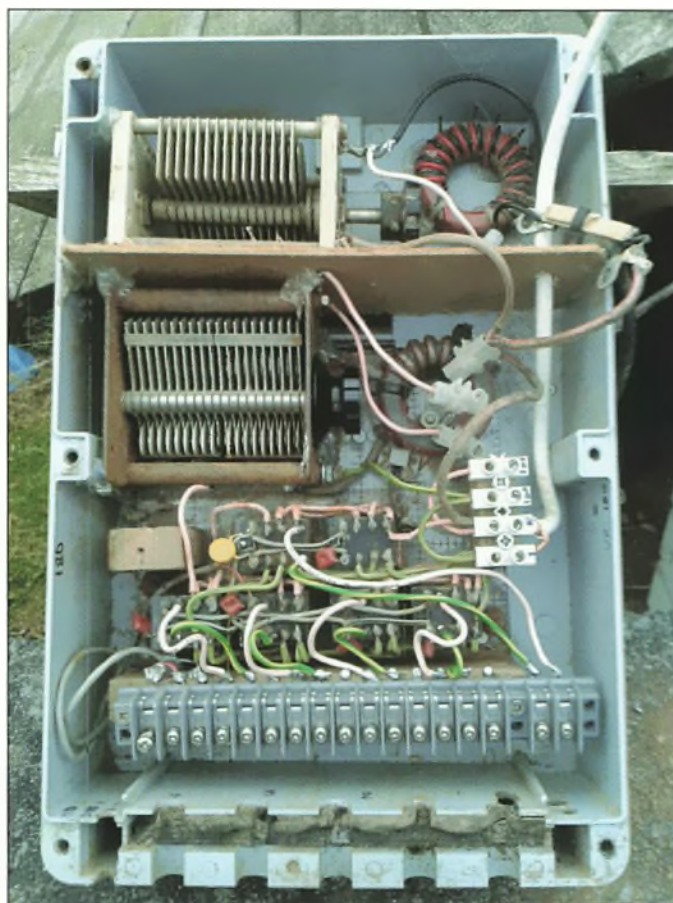
It's also worth bearing in mind there are a fair few of these

online sites out there but they are only good if the operator details are updated, which might not happen for years if the past holder was a 'silent key' and the new holder of that callsign has not refreshed the details.

It's also worth remembering that if, for argument's sake, one of these callsign pages was not updated since 2003, then there might have been a couple of changes of operators using that callsign since then.

I hope this jogs people's memory banks and they find this information helpful.

On another note, it's good to see the evolving success of PW over the years with each new editor having his own style of publishing, which adds to the magazine. Here's to success



Please note: The opinions expressed in any letter published in PW are those of the named correspondent whose letter has been published and they don't necessarily reflect the opinions of the editorial staff or PW Publishing Ltd. Editor

for the next 84 years of this informative publication.

Best wishes from Down Under and good DX.

Martin Burch VK4CG/G0KVH
Woodridge, Queensland

Editor's comment: Many thanks Martin. It's a useful reminder. Many newly licensed amateurs, in particular, are either unaware of databases such as qrz.com (probably the leading example) or see no need to publish their details on the site. However, they are a very handy resource and one that feeds automatically into many logging programs as well as the DX Summit site and elsewhere.

CW on the 2m Band

Dear Don,
I am writing in response to the comments of **Roger Cooke G3LDI** and **David Ackrill G0DJA** regarding CW operation on 2m and above that were printed in the *Morse Mode* column in October's *PW*.

Roger and David's respective efforts to boost Morse on VHF by undertaking frequent 2m CW activity and concentrating on the mode during *PW* 144MHz contests are certainly commendable. However, getting a critical mass of traffic nationwide will require the lead being taken by several interest groups, such as SOTA, FISTS, WAB, ISWL and, of course, the RSGB (as far as I'm aware, FISTS is the only UK-based group to have a regular VHF CW net on 2m).

Looking at contests, such events on VHF/UHF in Britain suffer from the lack of bonus points and/or multipliers being granted for working DXCCs/squares on different modes. Participants, therefore, largely stick to the most popular mode – SSB – and give scant regard

to CW (or digimodes). Similarly, awards' programmes, like Summits on the Air, could give extra credits for CW contacts being made above 52MHz.

Perhaps the best course of action is for the RSGB regions to schedule regular CW 'QSO parties' on 2m (and, perhaps, 70cm) and ensure that plenty of operators across the country are on the air and calling CQ during those times. Whichever way we look at this issue, boosting Morse traffic on VHF and above will require our major amateur radio bodies taking the lead.

Evan Duffield M0TJU
Stockport

Linears vs. QRP

Dear Don,
We have a wonderful hobby that appeals in so many different ways. We are all unique and that is a good thing. As **Steve Ireland VK6VZ/G3ZZD** pointed out, some enjoy HF DXing and 6dB extra from a linear amplifier can make all the difference. However, as a seasoned QRP'er, I'd like to remind people that lots of power, big beams, linears and deep pockets are not necessary to enjoy the hobby.

My first contact on 15m was with a station near Chicago (who was on SSB) when I was using 800mW CW to a simple homemade transceiver (the Pipit in *SPRA7*) that cost well under £20 to make with all new parts! This was with a low wire dipole. When he heard me I nearly fell off my chair. Very many QRP QSOs later, I began to believe that anything was possible with very low power.

In more recent times I have been heard in every continent (including Antarctica) on the 10m band with 500mW WSPR to a very indifferent wire antenna. On JT65, worldwide HF DX contacts are possible with a

Soldering

Dear Don,

I am writing regarding the article on soldering in your current issue (*What Next*, November). While I agree with almost all of the article, there is one thing that I must make comment about.

There is absolutely no need to solder the braid of coaxial cable to the body of a properly fitted PL259 plug. In fact, this can cause more problems than not soldering it.

When I was an apprentice with the Post Office many years ago I was told that a good mechanical connection between the copper wire and the mild steel tag that the wire was wrapped around was the best possible connection and that the solder was there simply to keep the wire tight on the tag. The explanation given was that the solder actually had a higher resistance than the copper or the steel and, therefore, if the connection was not tight and the solder got in the joint, the resistance of the joint went up (albeit marginally).

The same is true of PL259 plug bodies, the screw on type (rather than the clamp-on type) if fitted properly. That is to say, the plug is the correct size for the cable, the braid has been correctly folded back over the outer insulation and the plug is screwed on tightly. In such a case soldering of the braid is not required. In reality I have seen more failed plugs where they have been soldered than where they were not. This is for several reasons:

- the solder hasn't actually bonded properly to the chrome plug (chrome is not a good surface to solder to).
- the joint is full of flux that has been trapped.
- the solder has wicked up the cable, made it inflexible and caused a break in the braid over time with wear and tear.
- too much solder has been used and has shorted or nearly shorted the inner conductor to the braid – flexing then causes a short (hard to diagnose).
- the iron has been held on the plug for too long (usually because it does not have enough heat capacity to heat the plug quickly) and has melted the insulator.

I stopped soldering the braid of PL259 connectors years ago and I have had no failures other than those due to water ingress (they are not watertight so always cover in self-amalgamating tape and don't forget to cover that with black plastic tape because self-amalgamating tape degrades in sunlight).

It's not just for economy that lots of premade cables are often crimped; it is actually a better joint.

If you find that the cable entry for the plug is slightly too big, then you can always bulk-up the outer sheath with insulating tape before folding back the screen to ensure a firm connection but don't try this with RG58 and a plug made for RG8 – that's just too much slack to take up.

Finally, if you think that you are soldering the braid for mechanical strength, then this is unwise. If properly fitted, they will be tight and solid enough. If you pull one apart, then you are putting too much strain on the cable and the braid may fail anyway. Never support more than a couple of metres of cable by the plug; use proper strain relief.

Terry Bailey G6CRF/G0CRF/KW4NQ
Manchester

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

couple of watts even as the solar conditions slide and with simple wire antennas.

Each to their own but please remind readers that DX does not depend on deep pockets or high power.

Roger Laphorn G3XBM
Burwell, Cambridge

Editor's comment: Yes and no, Roger. Steve VK6VZ is obviously a very long way from other centres of amateur radio population and would probably get very frustrated running QRP, although undoubtedly some contacts would be possible using low signal modes and/or during good propagation. For my own part, I must admit that QRP has never appealed. I worked for a full licence, which gives me a 400W limit, and I enjoy pushing my station to its limits, working DX under marginal conditions and on the edge bands (such as 160m) where even 400W won't hack it without a lot of attention to the antenna system (I also worked hard to get full planning permission for a 20m mast rather than accept second best). But I fully agree that QRP is more than adequate to meet the goals of many in our hobby and I applaud them for it.

SMDs and Probes

Dear Don,
Now that PCBs are increasingly populated with surface mounted

components, it's now almost impossible to attach an oscilloscope probe because there are no component leads to clip to.

Professionals can use the Agilent N2786A:
<http://uk.farnell.com/keysight-technologies/n2786a/accessory-2-leg-probe-positioner/dp/1903977>

but at £44.60 + VAT, I decided to look for a cheaper alternative. A visit to a local home furnishing warehouse turned up these pegs at £4.99 for eight (see the photo below)!

Trevor Blinco G8KNJ
Oxford

SSAFA

Dear Don,
Thank you for publishing my letter (October 2016). As I'm pre-war vintage, I still think of miles, feet/inches and so on.

It is a really excellent issue that arrived this morning. Loads of very interesting articles and I have to fight the temptation to get stuck into all of them but I'm going to eke it out for a few days! The picture of the BC221 near the last page brought back a few memories because I had to use one to tune the HROs that were in use when I did my stint in the RAF.

I was wondering whether there was any way that you could publish a few lines on the charity that has been looking out

for me. I have mobility problems and someone suggested I contact an ex-servicemen's organisation called SSAFA. They arranged a visit and then contacted the RAF Benevolent Fund, who arranged for the loan of an electric mobility scooter. The whole process only took a few weeks and I can now get out and about a bit more and take a handheld to keep in touch via the local repeater.

Dave Warner G4OER
Lincolnshire

Editor's comment: Happy to do so, Dave. SSAFA, the Armed Forces charity, as they describe themselves, appear to be active in a number of areas although I can't say I was familiar with them. The website (below) has more details.

www.ssafa.org.uk

Thanks to QRP Labs

Dear Don,
May I use the *Letters* pages of *PW* to express my appreciation of the kit quality and after-sales service of QRP Labs, run by **Hans Summers G0UPL?**

www.qrp-labs.com
This small company is producing a number of excellent value-for-money kits. The main kit at present is the U3S, which will transmit up to about 250mW in beacon mode QRSS, WSPR, Hellschreiber and FSK among other modes.

There is an active QRP Labs Yahoo group where the kits, users' experiences, operating information, problems and ideas are discussed. Hans is also there in the group to provide help and advice. In addition, he swiftly answers e-mail correspondence.

I have found WSPR and QRSS particularly fascinating. For anyone living in an area where local QRM makes the receiving aspects of amateur radio impossible, even an extremely modest indoor antenna and very low power will radiate and you can see where your signal is being received around the UK,

Europe (and usually beyond) via WSPR.net and various QRSS grabber websites. Watching the changing propagation can be particularly interesting.

I have no connection with QRP Labs, other than being a satisfied customer, but these kits have gently introduced me into a whole new area of amateur radio that would otherwise have passed me by.

Ian Liston-Smith G4JQT
Fakenham, Norfolk

Repeaters Again

Dear Don,
I was very interested to read the comments of **David Perry G4YVM** (*Letters*, November) regarding the decline in the use of repeaters. For the decade after I became licensed I was on the road all day, every day and all of the repeaters would be alive all day long with sometimes up to 30 users at a time in the nets.

Probably the use of CTCSS has, as David says, made repeater use more difficult and thus less attractive. Personally, I believe that the decision by the RSGB and OFCOM to give Foundation and Intermediate licence holders access to the HF frequencies has had a major effect on the decline in the use of the VHF/UHF bands.

It is natural to want to have contacts over longer distances and we all chase DX at every opportunity. The result is that most licensed operators concentrate on chasing this DX on HF, neglecting the pleasures of a good old ragchew with other locals. The ease with which contacts can be made from the sofa via D-STAR, DMR and Fusion along with a computer must also have contributed.

Here on the South Gwynedd coast we have no working repeaters. Some people don't know how lucky they are, not that I'm jealous!

Long live VHF and local repeaters.

Peter Brookes GW0DFK
Gwynedd, North Wales



The Art of Conversation

Dear Don

I keep reading letters bemoaning the state of amateur radio regarding the lack of friendly conversation. It seems that despite the ever growing numbers licensed, the actual numbers operating seems to diminish apart from contests and so called digital modes, neither of which interest me whatsoever.

Some 25 years ago I remember trying to find a free spot for a foxhunt without success and moving down to the CW section of the band. Nowadays, to find some lonely soul calling CQ seems to be the norm. And, yes, I do try to reply but mostly one over is all they manage. The art of conversation is apparently lost.

I have just read that a million people have passed the driving test but have never taken up a licence. Perhaps the same is taking over amateur radio.

Now to a totally different subject. **Collin Redwood's** piece in the November issue on soldering. A large illustration of a somewhat scruffy pound reel of solder I find a little unnecessary (Tate Modern, perhaps?). I learned soldering using a small lump of copper heated in the fire before moving on to a Henley Solon 25W (I still have it). Then moving to one of the first 15W Antex irons. I still have and use a later one that must be about 50 years old and with a 3/32in iron-coated bit.

Becoming a Youth-in-Training with the GPO, I learned to manipulate a pound lump of copper, which had to be hammered into shape and heated in a gas or electric 'muffle'. You soon learned to solder perfectly, lest the instructor threw something at you!

Wattage of electric irons can be misleading. More important is the number of joints being made. With regard to the thermal capacity of the bit, 15W is plenty for PCBs at a slow rate of use.

I learned from visiting factory production lines that the 'Industry Standard' was a Weller TCP (Temperature Controlled Pencil) of 45W capacity. Constant temperature was maintained by a cleaver switch using a magnet drawn to the rear of the bit and having a small slug of metal with a known Curie point. This iron will take on almost anything and never overheat. Also, like the production line girls in those factories, I have my Squeezy washing up liquid bottle of water at the ready to keep my sponge moist.

Holding the iron is a personal preference depending on the position of the joint to be made. I will keep steel wool strictly for plumbing work. Bits of steel embedded in the copper are not a good idea. We did use emery cloth and blocks of various grades.

Finally if you buy rubbish described as PL259 plugs, then expect problems. The real silver plated item readily takes solder.



The rally shrapnel of unknown manufacture plated with an unknown substance over an unknown base metal and the 'plastic' insulator is of equally indeterminate quality. Why use this rubbish when you have paid many hard earned pounds for your radio? Also, I might use safety specs but not goggles!
Gus Malcolm G8DEC
Bromsgrove, Worcs.

Help Needed

Dear Tex,
I wonder if you could help or advise me please? I am researching RAF Catfirth, a seaplane base in Shetland that was operational for the last months of WW1. I have found out quite a lot about the station and have started to write a short book on the base, planned for sale from the Shetland Museum in Lerwick.

I used to live in Shetland in the 1970s when the old wooden wireless hut was still in use (as a house). Although the hut has

now disappeared, the concrete blocks for supporting the masts are still there. I am trying to get an idea of how the wireless/radio/WT system would have worked in the RNAS (later RAF) stations like Catfirth.

I would like to know how the antennas would have been set up, what they would have looked like and would they all have been at the station or might some have been situated on nearby hills. I believe Catfirth was set up for Morse, speech and also direction finding. Perhaps you could recommend a book that would explain these in layman's terms.

Incidentally, the old base is still there in part. I am sending a long shot where the base is in the middle distance and a photo of two of the concrete blocks that used to support the mast(s).

Simon Gunn
Ross-shire

Editor's comment: If you can help Simon, do drop Tex or myself a line and we will pass the information on.

J. BIRKETT.

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Club Secretaries and Event Organisers – please send us details of your event if you would like it to be mentioned here.

NOVEMBER

November 19th (Saturday)

The RADARS Traditional Radio Rally
The Rochdale and District Amateur Radio Society Traditional Radio Rally will be held at St Vincent de Paul's Church Hall, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale OL12 7QR. The doors will open at 10.30am (10.15am for disabled visitors) and admission will cost £2.50 (under 12s are free). There will be talk-in on 145.550MHz (S22), on-site and on-street parking, trade stands, a Bring & Buy and refreshments will be available. Pitches must be booked in advance and cost from £5.00. New this year, tables can be hired from RADARS for £5 (pitch & table costs £10.00). Traders will have access to the venue from 8.00am (RADARS members from 7.00am) and the event usually ends about 3.00pm.
Dave G3RIK
Tel: 01706 633400
E-mail: rally@radars.me.uk
<http://radars.me.uk/rally.htm>

November 20th *** New Venue ***

The CATS Radio & Electronics Bazaar
The 39th Coulsdon Amateur Transmitting Society Radio & Electronics Bazaar will be held at the Oasis Academy Coulsdon, Homefield Road, Old Coulsdon, Coulsdon CR5 1ES. The doors will be open between 10.00am and 2.00pm. Admission will cost £1.50 (including a free tea or coffee). There will be free parking, trade stands, a Bring & Buy (10% commission), a flea market, refreshments and facilities for the disabled. Pitches cost £12.50 when paid in advance or £15.00 on the day and traders will have access to the venue from 8.00am.
E-mail: enquiries@catsradio.org
www.catsradio.org

November 20th

The Plymouth Radio Rally 2016
The Plymouth Radio Club Radio Rally 2016 will be held at Harewood House, The Ridgeway, Plympton, Plymouth PL7 2AS. The doors will open at 10.00am and admission will cost £2.00. There will be ample car parking, trade stands, a Bring & Buy, special interest group, an RSGB bookstall, on-site catering and facilities for the disabled.
Sheila Hart 2E0YSH
Tel: 01752 668907
E-mail: sheo@fsmail.net
www.radioclubs.net/g3prc

DECEMBER

December 3rd (Saturday)

The ML&S Hog Roast & Open Day
The ML&S Martin Lynch & Sons Annual Hog Roast & Open Day sponsored by Yaesu, Icom & Kenwood will be held at the ML&S

Superstore, Wessex House, Drake Avenue, Staines-on-Thames, Middlesex TW18 2AP. The doors will be open between 8.00am and 4.00pm and the event will feature the usual extra-low prices, lecture streams and manufacturers on site. Bacon butties will be available for the early birds and a succulent pig in a bun for lunch. For more information, see the ML&S website.
Tel: 0345 2300 599
hamradio.co.uk/hogroast

December 3rd (Saturday)

The South Lancs ARC Winter Rally
The South Lancashire Amateur Radio Club will be holding its Winter Rally at Bickershaw Village Community Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. The doors will open at 9.00am and admission will cost £2.50. There will be car parking, trade stands, a Bring & Buy, displays, special interest groups, a licensed bar, catering and facilities for the disabled. A limited number of pitches will be available and stallholders will have access to the venue from 7.30am.
Jason G0LZR
Tel: 01942 735828 (Bookings)
www.slarc.co.uk

December 4th

The Bishop Auckland Rally
The Bishop Auckland Radio Amateur Club Rally 2016 will be held at Spennymoor Leisure Centre, 32 High Street, Spennymoor, Co. Durham DL16 6DB. The doors will open at 10.30am (10.15am for disabled visitors) and admission will cost £2.00 (under 14s free with an adult). There will be talk-in on S22, car parking, trade stands, a Bring & Buy, family attractions, catering, a licensed bar and facilities for the disabled. The venue is described ideal for both traders and disabled visitors, offering good parking and easy access to the large ground floor hall.
John G4LRG (Rally Organiser)
Tel: 01388 606396
Brian G7QCK (Deputy Rally Organiser)
Tel: 01388 762678
<http://barac.org.uk/rally>

December 8th (Thursday)

The SBARC Winter Table Top Sale
The South Bristol Amateur Radio Club Winter Table Top Sale will be held at the Novers Park Community Centre, which is at the rear of 122 to 124 Novers Park Road, Filwood, Bristol BS4 1RN. It's described as, "A chance to clear some items from the shack and pick up new items or fill that wish list. Please bring equipment, cash and your bartering skills." The event is associated with a regular club night, which starts at 7.30pm and is open to all, not just club members. The sale will take place between 8.00pm and

9.00pm – no trading before 8.00pm.
www.sbarc.co.uk

2017

JANUARY

January 15th

The Red Rose Winter Rally
The West Manchester Radio Club will be holding its Red Rose Winter Rally at Lowton Civic Centre, 23 Hesketh Meadow Lane, Warrington, Cheshire WA3 2AH (just off the A580 East Lancs Road). The doors will open at 11.00am and there will be free car parking, trade stands, a low-cost Bring & Buy, special interest groups, an RSGB bookstall and a café area. The venue is all on one level, with facilities for the disabled.
John (Rally Manager)
Tel: 07870 161953
http://wmrc.org.uk/lowton_winter.htm

FEBRUARY

February 5th

The Canvey Radio and Electronics Rally
The South Essex Amateur Radio Society will be hosting the 32nd Canvey Radio and Electronics Rally at The Paddocks Community Centre, Long Road, Canvey Island, Essex SS8 0JA (the southern end of A130). The doors will open at 10.30am and there will be free parking, trade stands, freshly made refreshments (Mark's famous bacon baguettes) and facilities for the disabled. Traders will have access to the venue from 8.30am.
Vic Rogers G6BHE
Tel: 07957 461694
E-mail: nvr1945@btinternet.com
www.southessex-ars.co.uk

February 10th, 11th and 12th (Friday/Sunday)

The Orlando HamCation
The 71st Orlando HamCation will be held at the Central Florida Fairgrounds and Expo Park, 4603 West Colonial Drive, Orlando, Florida 32808. The doors will be open from 9.00am to 6.00pm on Friday, 9.00am to 5.00pm on Saturday and 9.00am to 2.00pm on Sunday. Admission for all three days will cost US\$15.00 (for tickets purchased at the gate) or US\$13.00 (if purchased in advance). There will be talk-in, free car parking, trade stands, a flea market, a car boot sale, forums, special interest groups, family attractions and a prize draw.
www.hamcation.com

February 12th

The Harwell Radio & Electronics Rally

The Harwell Amateur Radio Society will be holding a Radio and Electronics Rally at Didcot Leisure Centre, Mereland Road, Didcot, Oxfordshire OX11 8AY. The doors will open at

10.00am and admission will cost £3.00 (children under 12 free). There will be talk-in on 145.550MHz using G3PIA, free parking nearby (disabled parking next to Leisure Centre), trade stands, special interest groups and an RSGB bookstall. Refreshments will be available all day.
Ann, G8NVI
E-mail: ann.stevens@btinternet.com
www.g3pia.org.uk

February 19th

Audiojumble
Audiojumble – "The UK's largest second-hand and vintage hi-fi event" – will be held at The Angel Leisure Centre, Angel Lane, Tonbridge, Kent TN9 1SF. Items on sale will include vintage and modern hi-fi, valve amplifiers, transistor amplifiers, speakers, turntables, tuners, tape recorders, CD players, records, components, books and vintage radios.
www.audiojumble.co.uk

February 19th

The RadioActive Fair
The RadioActive Fair, promoted by the Mid Cheshire Amateur Radio Society, will be held at Nantwich Civic Hall, 4 Market Street, Nantwich, Cheshire CW5 5DG. The doors will open at 10.30am. There will be free parking, trade stands, a Bring & Buy, an RSGB bookstall, catering and facilities for the disabled.
Stuart M0WTX (Fair Manager)
Tel: 07880 732534
www.radioactivefair.co.uk

February 26th

The BRATS Rainham Radio Rally
The Bredhurst Receiving and Transmitting Society Rainham Radio Rally will be held at Rainham School for Girls, Derwent Way, Rainham, Kent ME8 0BX. The doors will open at 10.00am and admission will cost £2.50. There will be talk-in on 145.550MHz using GB4ARRA, free parking, trade stands and light refreshments will be available.
E-mail: Trev@wig1.co.uk
www.brats-qth.org

February 26th

The Wyong Field Day
The Central Coast Amateur Radio Club will be celebrating its 60th anniversary with a Field Day at Wyong Racecourse, Howarth Street, Wyong NSW 2259, Australia. The gates will open at 8.30am and admission will cost AU\$10.00. There will be ample car parking, ATMs on-site, trade stands, a large flea market, lecture programme, licence assessments and an air-conditioned licensed area.
www.ccarc.org.au/wp/ccarc-field-day

Classified Adverts

DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. *Practical Wireless* advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of *Practical Wireless* wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Antennas



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Spectrum Lite Trapped Dipoles with Low-Z twin feeder. Rated to full legal limit. Low TVI. Typically 2 to 3 S-points quieter than G5RV's and verticals. Air-cored low loss 1:1 Balun Trapped Inverted-L aerials for small gardens. Spectrum Low-Z feeder available in 100 drums or by metre.
Tel: 01305 262250,
jean@spectrumcomms.co.uk,
www.spectrumcomms.co.uk.

For Sale

CTCSS ENCODER AND DECODER KITS. DTMF kits and modules. Pic development kits. www.cstech.co.uk

USB CAT, CI-V & PROGRAMMING CABLES. Control & programme your rig from your PC – logging, satellite tracking etc. Silabs CP2102 or FTDI chipset for guaranteed reliability. For these and more great items go to www.technofix.co.uk

KITS & BUILT PRODUCTS
Transverters, 100W 4m Linear Amplifier, HF & VHF Preamps, Masthead VHF Preamps, 25W VHF Linear Amps, VLF & VHF Converters, Noise Bridge, HF Power Meter, Capacitance Meter, Regenerative Receivers, PSK31 Interface, Single & Triband PSK31 Receivers, Dual Peak Notch Filter, CW and Speech LS Audio Filters, VFO, etc, Tel: 01305 262250,
jean@spectrumcomms.co.uk,
www.spectrumcomms.co.uk.

COMPONENTS Resistors, Capacitors, Trimpots, 10mm Coils, Polyvaricons, Broadcast Variables, Dust Iron Toroidal Cores, Ferrite Toroidal cores, Binocular Cores, Ceramic Wafer Switches, Transistors, FETs, MOSFETs, Diodes, Linear IC's, CMOS 4000 series IC's, Connectors, Potentiometers,
Tel: 01305 262250,
jean@spectrumcomms.co.uk,
www.spectrumcomms.co.uk.

While prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

Repairs

REPAIRS TO RECEIVERS, TRANSMITTERS ETC. New/old, valve/transistor. Call 07903 023437 for details.
Web: www.kent-rigs.co.uk

Valves

VALVES AND ALLIED COMPONENTS IN STOCK Ring for free list. Valves/books/magazines wanted. Geoff Davies (Radio). Tel: 01788 574774.

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www.langrex.co.uk

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FULL COLOUR QSL CARDS for all your QSL needs. For free samples contact Chris M0DOL. E-mail: qslers@aol.com
24 West Ridge, Kingsthorpe, Northampton NN2 7RA.

ORDER FORM FOR CLASSIFIED ADS PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 20% 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, Tayfield House, 38 Poole Road, Westbourne, Bournemouth, Dorset BH4 9DW. Tel: 01202 751611.

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 20% VAT to total).

Name:

Address:

Telephone No.:

Box Number @ 70p: Tick if appropriate

Category heading:

Please photocopy this form or write on a separate sheet if you prefer

Send your advert to PW Publishing Ltd, Bargain Basement, Tayfield House, 38 Poole Road, Westbourne, Bournemouth, Dorset BH4 9DW. Or E-mail your advert to tax@pwpublishing.ltd.uk If you don't want to include your credit card details on your E-mail, just 'phone us on 01202 751011.

and send it together with your payment of £5 (subscribers can place their advert free of charge as long as they provide their sub number or mailing label). Cheques should be made payable to PW Publishing Ltd., credit card payments also accepted

Please help us to help you by preparing your advert carefully. Any advert which contains ?? marks indicates that the advertising dept. could not read/interpret the wording.

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.

Practical Wireless December 2016

Traders Table

The equipment for sale on these pages is second hand or ex-demonstration



Nevada 023-9231 3090

1. Albrecht AE75H-ED..300ch AM/FM handheld scanner.....	£89
2. Albrecht AE125H-ED..500ch AM/FM scanner close call.....	£125
3. Albrecht DR56-ED..digital DAB radio car adaptor.....	£99
4. Albrecht AE6110-ED..micro-size mobile CB radio.....	£49
5. Alinco DJ500-ED..145/433MHz twinband handy.....	£89
6. Alinco DR135UK-ED..28MHz all modes mobile.....	£149
7. Alinco DR138H-ED..high power 145MHz FM mobile.....	£109
8. Alinco DRB185-ED..85w 145MHz FM mobile transceiver.....	£139
9. Alinco DR638H-ED..high power 145/433MHz mobile.....	£225
10. Alinco DR735E-ED..NEW MODEL twinband 145/433MHz.....	£249
11. Alinco DX-SR9E-ED..hybrid SDR/100w HF transceiver.....	£479
12. Alinco EDX2-ED..automatic antenna tuner wired Alinco.....	£245
13. Antex 690D-ED.. pro-style digital soldering station.....	£175
14. Antex TCS-ED..soldering iron with temp control.....	£64
15. Anytone QHM-02-CL..DTMF hand microphone AT5189.....	£19
16. Anytone AT588 86/88MHz-ED..70MHz 4m mobile 50w.....	£119
17. Bearcat UBC30XLT-ED..compact VHF 200ch scanner.....	£45
18. Bearcat UBC125XLT-ED..500ch AM/FM handheld scanner.....	£119
19. Eton Turbodyne Road Torq-CL..self powered roadside torch.....	£19
20. Fody Tempus-ED..home weather station.....	£55
21. Fody Tempus Pro-ED..Bluetooth (BLE) weather station.....	£95
22. Icom AT180-U..automatic antenna tuner IC706 etc.....	£275
23. Kenwood THD7E-U..Dualband VHF/UHF handheld.....	£199
24. Kenwood TS590SG-U..100w HF/6m transceiver.....	£999
25. Kenwood TS990S-ED..Flagship 200w transceiver.....	£4795
26. Maha MH-808MU-ED..intelligent charger AA/AAA/C/D sizes.....	£65
27. MFJ925-ED..super compact auto antenna tuner.....	£159
28. MFJ993B-U..intellituner dual power level 1.8-30MHz.....	£225
29. MFJ986-ED..3Kw manual antenna tuner as new.....	£319
30. Midland Arctic-ED..waterproof marine handheld radio.....	£85
31. Midland CT890-ED..twinband 145/433MHz colour screen.....	£89
32. Midland D200-ED..digital/analogue PMR licence free radio.....	£125
33. Midland G7Pro-ED..latest style licence free handhelds.....	£89
34. Midland GB1-ED..licence free mobile PMR446 kit.....	£119
35. Nevada PS30M-ED..30amp variable voltage power supply.....	£90
36. Nevada PS40M-ED..40A variable voltage linear PSU.....	£105
37. Nevada PSW50-ED..50A switch mode supply.....	£119
38. Palstar AT2K-ED..2Kw manual antenna tuner.....	£579
39. President Himalaya-ED..26-30MHz antenna.....	£89
40. Superstar 3900 Red Display-ED..all mode CB radio.....	£155
41. Tecsun PL680-ED..NEW MODEL world radio + airband.....	£119
42. Tecsun PL880-ED..NEW MODEL portable world band radio.....	£159
43. Tecsun PL310ET-ED..small world band radio with AM/FM/SW.....	£35
44. TTI TSC100R-ED..200ch AM/FM handheld scanner.....	£59
45. TYT380-ED..DMR 400-480MHz digital/analogue handy.....	£110
46. Yaesu FT897D-U..Classic multibander HF/VHF/UHF.....	£599
47. Yaesu FT991-ED..HF-70cms allbander all modes +ATU.....	£919
48. Yaesu FT1DE-ED..digital/analogue twinband handheld.....	£205
49. Yaesu FTM3200DE-ED.. 65w 145MHz digital mobile.....	£179
50. Yaesu VX5R-U..triple band heavy duty handheld.....	£169

CL - Clearance ED- Ex-Display U-Used

Short Wave Shop 01202 490099

TRANSCEIVERS

ALAN HP450 2A RUGGED with desktop charger	
And kit case.....	£40
ALINCO DJ-S11.....	£75
ICOM IC-700.....	POA
ICOM IC-756.....	£590
KENWOOD TH-F7E.....	£190
KENWOOD TMD700E.....	£230
KENWOOD TS-480 SAT.....	£495
KENWOOD TS-480 SAT.....	£450
YAESU FT-7100M.....	£169
YAESU FT690R MK2 + FL-6020 LINEAR AMP.....	£420
YAESU FT-DX1200.....	£750
YAESU FT-DX1200.....	£799

RECEIVERS

ALINCO DJ-X2.....	£110
ALINCO DJ-X7.....	£160
COMMTEL 214 SPORTSCAN.....	£50
GRECOM PSR-295.....	£99
ICOM IC-R10.....	£165
ICOM IC-R20.....	POA
ICOM IC-R75.....	£550
RACAL RA1792 HF.....	£495
SANGEAN ATS 909.....	£150
SONY AIR 7.....	£105
SONY SW100.....	£159
UNIDEN UBC30.....	£50
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UNIDEN BEARCAT UBC 120 XLT.....	£120
UNIDEN BEARCAT UBC 220 XLT.....	£79
UNIDEN SPORTCAT UBC 180 XLT.....	£100
UNIDEN SPORTCAT UBC 280 XLT.....	£110
YAESU FT-990.....	£799
YAESU VR500.....	£165
YUPITERU MVT-7100.....	£139

ACCESSORIES

ICOM AT-150 Tuner.....	£125
ICOM PS-55.....	£75
JRC MVA 319 SPEAKER.....	£145
MANSON EP-925 25AMP PSU.....	£75
MFJ-260C Dummy Load.....	£45
MFJ-969 ATU.....	from £125
MFJ 993B.....	£199
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MRP2000 PRE AMP.....	£25
NAG 144XL AMPLIFIER.....	£385
PS30 PSU.....	£65
PS85 PSU.....	£145
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SCANMASTER SP-55.....	£35
STAR-MASTERKEY II.....	£55
TRIO AT230 WITH STATION MONITOR SM220.....	£300
VARIOUS PADDLE KEYS - various prices.....	POA
VARIOUS DIP METERS - Various prices from.....	£35
YAESU SP-6 EXTERNAL SPEAKER.....	£110

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<http://www.shortwave.co.uk>

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Radio Book Store

You can see full descriptions of all these books and order securely online at
www.pwpublishing.ltd.uk

RSGB YEARBOOK 2017

There is nothing quite like the *RSGB Yearbook 2017*. Not only does it contain the latest details of over 86,000 UK and Irish Republic call signs in its massive 544 pages but it remains the most comprehensive guide to amateur radio in the UK and worldwide.

The *RSGB Yearbook 2017* remains the very latest and most accurate call sign information available for the UK. Added to the call sign data there are 176 pages of invaluable reference material for just about everything you are ever likely to want to know about amateur radio. There is all the latest information on every aspect of the RSGB from how the Society is organised, the services it offers, committees, who to contact for assistance, etc. Regional information provides details of the RSGB Regional Manager Team, local clubs, contest, repeater and emergency groups alongside examination details. There is a huge range of information sections included from Repeaters, Beacons, Band Plans, RSGB Awards, RSGB Contests and HF Propagation Predictions for 2017. There are also listings of special contest call signs, permanent special event call signs and much, much more.

FREE CD WITH RSGB VIDEOS

This year the Yearbook bonus CD contains not only contains all the 176 information pages of the *RSGB Yearbook 2017* in a searchable PDF format but also four amateur radio videos produced by the RSGB.

These exciting new videos include:

** GB1SS schools calling Tim Peake ** 21st Century Hobby - youth video ** Amateur radio - a world of possibilities ** RSGB volunteers video

These videos are produced in the popular MP4 format which will play in most computers and some DVD players. There is even more included and you will also find extended information from RSGB clubs and even samples of the latest RSGB books.

The *RSGB Yearbook 2017* is as always much more than a simple list of call signs. Fully updated information, great RSGB videos and the very latest licensing data for the UK & Ireland, go to produce the essential publication for every well-equipped shack.

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SECRET OF LEARNING MORSE CODE
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The new version of this best-selling logbook

For many nothing sits better on the bench of an amateur radio shack than a well maintained log book, providing at a glance records of those special contacts and those worked over time. If you are looking for an attractive way to record your log the *RSGB Deluxe Log Book & Diary 2017* provides an ideal solution. Attractively designed this isn't just somewhere to note your QSLs but this hugely popular annual logbook contains a wealth of extra material just where you want it, when you want it, right at your fingertips in your shack.

RSGB Deluxe Log Book & Diary contains the latest UK Band plans, RSGB Contest Calendar, DXCC prefix list and RSGB QSL Bureau information. The information doesn't stop there either, a locator map (and an explanation of how locators work), repeater information, diary section, notes pages, handy lists of operating abbreviations & codes - pretty much everything you want to know when operating is included. The logbook section isn't forgotten either and there is a generous log section with plenty of space for you to record a whole year activity. Even the attractive design means you will also want to keep the *RSGB Deluxe Log Book & Diary 2017* for years to come.

The *RSGB Deluxe Log Book & Diary 2017* includes:

- Current UK band plans
- European locator map

- Prefix guide
- Repeater listings
- QSL bureau information
- RSGB Contest Calendar

Much more than a standard
logbook - for the same price!



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The Best of Radcom Equipment Reviews

There are 'amateur radio equipment reviews' and then there are 'Peter Hart, G3SUX equipment reviews'. For 35 years Peter has been writing amateur radio equipment reviews for the Radio Society of Great Britain's journal *RadCom*. These have simply been some of the best equipment reviews published anywhere. These reviews are not theoretical testing or publishing of claimed data but real world testing of performance and analytical reporting of how amateur radio antennas, radios, amplifiers, etc. really work.

Hart Reviews - The Best of RadCom Equipment Reviews builds on Peter's first book that covered his first 25 years of his reviews and collects together reviews that have been published in *RadCom* since 2004. Readers will find an array of equipment and manufacturers represented with all the major radios launched in the last 10 years included. From the Acorn to Yaesu you find much represented here including Kenwood, Icom, Elecraft and even the mighty Hilberling PT-8000A. SDR radios are not forgotten and you will find Flex, Elad, SoftRock and others included. Antennas and Amplifiers reviews from suppliers as diverse as Butternut, Alphin and Linear Amp also get the same Peter Hart treatment. With Peter's practical review style, the ability to compare equipment tested in the same real world cannot be underestimated. The performance figures can be relied on as what an average amateur is likely to achieve. This book is not only a fascinating view of the advance of amateur radio equipment in recent years but is a valuable guide to anyone seeking to buy new and second hand equipment. There are even a few of the more popular equipment reviews from the previous book have also been included to allow comparison.

It is not difficult to see why equipment reviews have always been popular and it is not surprising to see why *RadCom* equipment reviews by Peter Hart are considered by many as the 'best' amateur radio equipment reviews available. *Hart Reviews - The Best of RadCom Equipment Reviews* is a great book for everyone interested in amateur radio equipment in the real world.



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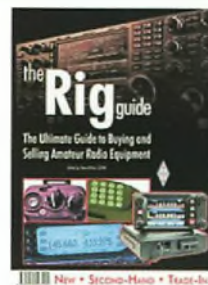
The Rig Guide is a unique publication that sets out to answer the question 'what is the right price for this radio?'. What will you get for a radio if you trade it in or try to buy or sell it on an online auction site? *The Rig Guide* provides the answer.

The Rig Guide continues to define the prices of amateur radio equipment in the UK, fully updated and covering more than ever before. Which is why *The Rig Guide* is rightly one of the most popular amateur radio books around.

If you are planning to buy or sell any amateur radio equipment, you should not be without *The Rig Guide*. The book begins with tips for buyers and a guide to selling and trading. There is a handy guide to selling on ebay and even tips on how to avoid getting lumbered with stolen gear. *The Rig Guide* contains a list of the abbreviations used in the descriptions and an explanation of them all. Amateurs trust RSGB reviews and a full list of *RadCom* reviews since 1990 is included and where a piece of equipment was reviewed by *RadCom* it is highlighted on the list rig.

The Rig Guide isn't limited to popular commercial amateur radio transceivers but also covers receivers, scanners and linear amplifiers too. You'll find extensive lists of past models from Acom to Yaesu, with over 20 manufacturers listed in-between, including Icom, Ten-Tec, Kenwood, etc. We're not just talking about current models either and you will even find details on the many Chinese manufacturers. DSP isn't forgotten either with a dedicated section on the equipment available. Overall, *The Rig Guide* contains details of around 400 of pieces of amateur radio equipment covering HF, VHF & UHF. Each item is described in an easy to understand listing that covers its main features, band coverage etc. with a photograph of the equipment.

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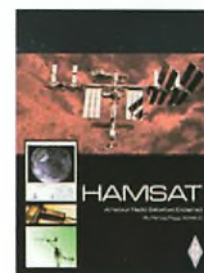
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Hamsat - Amateur Radio Satellites Explained begins with the history of the OSCAR (Orbiting Satellite Carrying Amateur Radio) programme which details the various incarnations from Oscar 1 in 1961 through to the present day. This book explains what is needed in an amateur radio ground station from the antenna through to the receiver. You will find rotator information for tracking the satellite, designs for pre-amplifiers and all manner of technical detail. There is a chapter dedicated to the ground station antennas, giving details of the performance of many commercially available systems and information on 'The Endless Dilemma of Polarisation'. You will also find chapters dedicated to Ground-Space-Ground Propagation, the Doppler Effect, Keplerian Elements and much more too. There's information on suitable transceivers, software, recent developments in this exciting field plus much more.

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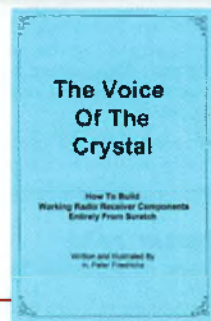
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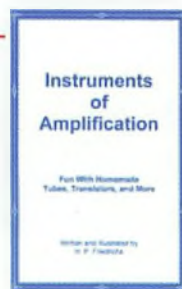
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Because of the wide-ranging subjects it's not easy to catalogue them because there are around 230 articles to browse through. Some of necessity are similar in nature, but all are unique in showing how easy it can be to create small circuits that can be coupled together to produce receivers, transmitters, test equipment or just plain novelties to amuse. But all are part of the self-training aspect of the hobby.

HARRY LEEMING'S IN THE SHOP

A collection of Harry's long running *In The Shop* series in *PW*. Find hints, tips, and anecdotes about customers that Harry met while running Holdings HiFi Audio, an amateur radio shop. If you've got an older Yaesu transceivers, this is the CD-ROM for you with some 300 searchable pages.



MIKE RICHARDS' DATA MODES

Since he started his regular column some years ago, Mike Richards G4WNC has explained the many data modes using a computer with your radio. They're all here, but these are not the only computer related topics Mike has covered, find out how to use the Raspberry Pi, a £25 Linux computer, or create projects using the Arduino system. All this in 178 fully searchable pages.



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Alex's Adventures in Sidelband Land – Part 2 Alex Whitaker concludes his adventures in sidelband land by sharing his thoughts on his President Grant II Premium Expanded CB transceiver

Scanning Scene Bill Robertson offers plenty of hints and tips for scanner listening and advises on distribution amplifiers and digital mode scanners

Decode Mike Richards shows how to incorporate an accurate frequency reference into the shack and considers the pros and cons of buying one new or second-hand

Military Matters Pat Carty reports on air, land and seaborn exercises in the UK, the Netherlands and the Czech Republic and, in the process, brings you details of the assets involved and frequencies used

Sky High Godfrey Manning addresses the questions of what a tower controller actually controls, who lands an airliner, what radio beacons are needed and under whose authority

DXTV Keith Hamer and Garry Smith report that Sporadic-E recovered during August and, instead of the early closure of the season, activity was plentiful until the end of the month

Maritime Matters Robert Connolly gives a rundown on the monitoring equipment he uses in his shack and when he is on holiday

Submarines and the Sun on VLF Georg Wiessala continues his exploration of the very low frequency band and experiments with the reception and display of signals to submarines and looks at solar flare detection using VLF

Airband News David Smith untangles the legislation being put in place to ensure that drones don't compromise aviation safety and then reports on how technology saved the life of a student pilot in the US

LM&S Broadcast Matters Chrissy Brand reports on the annual European DX Council Conference and readers

tune to stations in Iceland, Libya and Algeria. Then, there are transatlantic catches on medium wave and a look back to the days of offshore radio

Mode-S Virtual Radar Pat Carty reports on an experiment to expand oceanic coverage by retransmitting terrestrial ADS-B via satellite. He then brings you his compilation of updates covering Virtual Radar Server, FlightAware and PlanePlotter

RF Development Board – Part 3 Roger Thomas explains how to build a direct conversion receiver that can be used to monitor signals on long wave

News & Products

Radio Websites Chrissy Brand reflects on the vast number of radio-related websites, shares readers' suggestions on transistor radios and an expensive QSL card and then listens to some music both past and present

Off the Record Oscar raises concerns over free radio and the internet, questioning whether democracy truly exists in the UK. He then revisits talkRADIO to see how it's been faring since its launch earlier in the year

Comms from Europe Simon Parker brings you his compilation of CB related news, including information on a new 'old school' transceiver from Super-Star, an update on the AnyTone Apollo II H and his initial thoughts on the President Lincoln II +

Radio Events

Software Spot This month, QSP73 Services software collection includes programs for APRS, the calculation of beam headings, coaxial traps, JTMS for meteor scatter, logging, rig control, signal to image decoding of satellite-based WEPAX and tone detection

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Don G3XTT takes a look at Elecraft's tiny portable, the KX2.

The Chertsey Trilogy DMR Project

Tim Kirby G4VXE reviews a DMR radio being made available through the Chertsey Radio Club Trilogy DMR project.

Christmas Quiz

This year's Christmas Quiz comes courtesy of Bob Glasgow GM4UZY of the Cockenzie and Port Seton Amateur Radio Club, who prepares regular quizzes for the Club newsletter.

Valve & Vintage

Andrew Humphriss M3NDZ brings readers the Chakophone story.

Carrying on the Practical Way

Phil Clotti G3XBZ returns to the fray, with some handy advice on how to set up your home workshop.

The Extended G5RV

Vince Lear G3TKN takes a look at the double-size G5RV antenna.

There are all your other regular columns too, including HF Highlights, World of VHF, Data Modes, What Next, Making Waves, Emerging Technology and Doing it by Design along with the latest News, Rallies and Readers Letters.

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Revolutionary dual microphone configuration features both dynamic and condenser components

Nine-band graphic equalizer for each microphone element

TBC (Treble Boost Cwling) produces a unique tonal texture

PTT key with smooth operating air cylinder construction



«Uncompromising attention to detail»

- Solid aluminum die cast mic stand
- Headphone output for real-time monitoring

- High visibility On Air LED
- Built-in one-click Low-Cut filter

- Large display (featuring anti-reflective AR coating)
- Cannon-type (XLR) Output

- Built-in record and playback feature
- One-touch PTT keylock

YAESU
60th Anniversary

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Specifications subject to change without notice. Some accessories and/or options may only be standard in some areas. Check with your local Yaesu Dealer for specific details.