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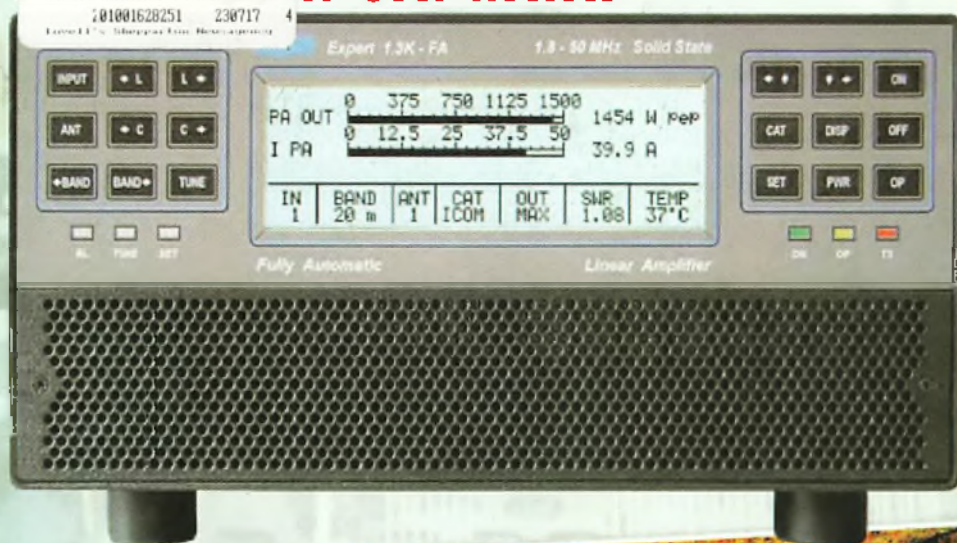
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MFJ-939..... Auto ATU 200W Y/K/L..... £169.95
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FT-857

World's smallest HF/VHF/UHF 100W mobile transceiver including DSP.

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Keylines

Don reflects on UK callsign confusion, bids adieu to Tex and covers some other current thoughts and ideas.

I was rather taken aback at the end of March when operating under my short contest callsign (SCC) M3D in the CQ WPX SSB Contest, to be rounded on by an unidentified but very English station on 80m accusing me of being in breach of my licence conditions.

His argument was that "M3 licensees are limited to 10W" and I was far too loud (not surprisingly, because I was running 400W at the time).

In actual fact, he was the one in breach of his licence conditions because he failed to identify. Yes, Foundation licensees (M3 or M6 or regional equivalent plus a three letter suffix) are indeed limited to 10W but that doesn't apply to my SCC, which is issued as a Notice of Variation to my Full licence. His outburst surprised me in that SCCs have been around for more than 20 years.

That said, though, the UK callsign system can be quite confusing at times with the various prefixes for the different UK regional identifiers, the three classes of licence and the additional prefixes reserved for club use, not to mention the number of special prefixes that come out of the woodwork for special event stations (not just GB nowadays), special occasions (GQ, for example, for the Queen's various jubilees), reissued pre-war callsigns and so on. We old hands take it in our stride but it must be confusing at times for newcomers and, indeed, for overseas amateurs wondering who or what they are working.

Farewell Tex

Although, because of the way publishing deadlines work, Tex Swann G1TEX will be contributing to next month's issue, he is due to bow into genteel retirement at the end of May (actually, he will probably be busier than ever because

rumour has it that his good lady has been saving up plenty of jobs around the house!). Tex started with PW Publishing (PWP) in October 1989 as Technical Projects Sub-editor when he took over from Richard Ayely G6AKG. However, he only 'appeared' in the magazine with the January 1990 issue. By June of that year, though, he'd made it on to the front cover. With over 27 years in the post, he has become not only a well-known name to our readers but, in many cases, a friend to whom they feel they can turn with technical questions. For myself, I am extremely grateful for Tex's support since I took over as Editor – he will be sorely missed.

In reality, Tex undertakes a number of roles for PWP and will continue some of them from home for the time being and, hopefully, will contribute the occasional constructional article or review as time permits. Before then, though, he's taking a well-deserved holiday. All of us at PWP and, I daresay, our readership as a whole wish him well.

2m QRP Contest

This month it's time once more to introduce our ever-popular 144MHz QRP Contest. Please note the change in power levels to bring them into line with the revised power levels for the RSGB Backpackers Contest that runs in parallel. Note also that contest organiser Colin Redwood and I have agreed to make plaques available to the winning Single and Multi-Operator entries. I am happy to sponsor these and, who knows, I might even get on the air to work some of you!

Linear Amplifier Reviews

I am delighted this month that we have two user reviews

of popular linear amplifiers, one with a valve PA and one the employs solid-state devices. It's interesting that the most popular HF linear amplifiers nowadays originate in Europe. This is largely because US regulations limit the gain of linear amplifiers so US products require an input of 100W or so whereas there is no such restriction on European products, which means that most can be driven to UK power levels from a low power transceiver such as the Yaesu FT-817 or Elecraft KX3. The other development that encouraged the arrival of European manufacturers was the availability of large quantities of unused military surplus PA valves from Eastern Europe. The good news is that there is now an excellent range of products to choose from and although the prices may seem high, there is probably less incentive to change them every few years compared with your transceiver.

Readers Letters

I have just about caught up this month with your letters. One of the strengths of PW is the way in which you, the readers, engage with the magazine. I read every letter with interest and, generally, manage to find space to publish them, in whole or in part. But there is a constant balance to be drawn between finding space for letters and finding space for the stream of excellent feature articles that arrive here. I'm certainly not complaining, though – it's a welcome 'problem' to have!

Don Field
G3XTT



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Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone.

Any technical queries by e-mail are very unlikely to receive immediate attention either. So if you require help with problems relating to topics covered by PW, then please write to the Editorial Offices. We will do our best to help and reply by mail.



ML&S News

Martin Lynch & Sons now stock the MyDEL DG-503 SWR/Power meter, which covers 1.6-525MHz at up to 200W with a backlit 3in display. RRP is £119.99 but by using the code PW503, a discount of £20 will be available to PW readers until the next issue of this magazine. For further details see: www.HamRadio.co.uk/DG503

ML&S also donated the main raffle prize for the recent GMDX Convention, held in Stirling. The prizewinner was **Frank MM0HST**, seen in the photo (!) receiving his prize from GMDX Chairman **Rob GM3YTS**.



Club Log to be a Trusted Partner of Logbook of the World

The following announcement was made recently by the ARRL and is a tribute to the work of **Michael G7VJR** and his Club Log team, who become the first to achieve this status. Your editor has already used the facility, which works seamlessly.

"Club Log has become the first logging service to achieve Trusted Partner™ status for Logbook of the World® (LoTW), ARRL and Club Log have announced. Radio amateurs holding LoTW 'callsign certificates' who have uploaded logs to Club Log now can readily cross-post them to the highly secure LoTW – the world's largest repository for confirming amateur radio contacts.

"Club Log has implemented security at the level required by the Trusted Partner program, as verified by ARRL's Information Technology Department. Trusted Partners are re-verified periodically to remain in the program. More information on technical specifications and on current Trusted Partner program members is available on the ARRL website".

Inrad Filters from Nevada

Nevada, as part of IHSG, are now stocking the full range of Inrad filters from the USA. These quartz crystal filters are custom designed for both communications receivers and transceivers.

Initially, Nevada are carrying the popular models for both Yaesu and Elecraft radios but special orders for other models can be taken for delivery within 14 days. The full range of stocked filters is shown on their website: www.nevadaradio.co.uk



Essex Boot Camp

Essex CW Club (ECWARC) is considering hosting a CW Boot Camp later this year. Features would include:

- Morse for the complete beginner
- Morse progression
- Morse for the faster operator
- Contest techniques and programs
- Twin Paddle operating
- Taking the RSGB Morse test
- Supervised on-air operation for the novice.

The event would take place on a weekend (either Saturday or Sunday) during the last quarter in Witham, Essex.

The Club would like to assess interest before making any final decisions. To this end, they have enlisted the help of Essex Ham. A survey is available on their website to assess interest and gauge particular areas on which to focus. Please assist them by completing the survey. It's free, confidential, and only takes a few minutes. You can find it at:

www.sxham.uk/morsecampsurvey

into France and Belgium. HF conditions were variable with contacts around Europe and the Middle East but the best contact was into Australia. In total over 200 HF contacts were made.

HADARS would like to thank Hunsdon Microlight Club for their hospitality and the use of their site.

GB3HG Repeater

GB3HG has given sterling service on 145.625MHz in the North East for upwards of 35 years. It has had site changes but is currently located North of Thirsk with an excellent take off in all directions, with the exception of Teesside. Provision and running of GB3HG has been in the hands of the Harrogate Repeater Group but in recent years, due to work and other commitments, the group felt that it was time to hand over the ownership and running.

At this point, York Radio Club expressed interest and after some negotiation, ownership was transferred to the York Club at the end of February. There are no current plans to change the existing installation, which is working well, but modernisation will take place as equipment nears the end of its life.

Output is on 145.625MHz with the input 600kHz below. CTCSS is 88.5Hz. The new repeater keeper is **Arthur G8IMZ** who can be contacted via the York Club website. Thanks go to the Harrogate Repeater Group for their past service.

For further details please contact Jago Packer: jagopacker@gmail.com

GB0HAF

Over the weekend of April 8/9th Harlow and District Amateur Radio Society (G6UT) operated under the callsign GB0HAF from ex-RAF Hunsdon for Airfields on the Air.

Activity was on HF and VHF using a G5RV, tri-band Yagi and a three-band vertical for 6m, 2m and 70cm, all mounted on a 40ft mobile mast. The weather was excellent and the event was well supported by members of the club. VHF conditions was pretty good with over 110 2m FM contacts with the best being



New SE London Foundation Course/Venue

Darenth Valley RS, a member of the South East Tutors group of clubs, begins a new Foundation training course held over two consecutive Saturdays starting on June 10th (applications close May 28th) at the club's new training venue in Sidcup, Kent DA14 5BP. For further details contact Mike G8AXA at training@darenthvalleys.org www.darenthvalleys.org/training.htm

RSGBTech Yahoo Group & the RSGB

Brian Reay G8OSN, the owner of RSGBTech Yahoo Group, and Steve Hartley G0FUW, the RSGB Chairman, have issued a joint statement to clarify the ownership of the Yahoo Group.

"RSGBTech Yahoo Group was established in 2009 by an RSGB Board Member to provide a forum for all radio amateurs to discuss technical matters. It has never been owned by the RSGB and membership has never been limited to RSGB members. RSGBTech currently has over 1600 subscribers from around the globe.

"Since 2009 a very small number of users have been removed from the RSGBTech Yahoo Group for a variety of reasons, including making inappropriate postings and/or abusing moderators. Such behaviour is not tolerated by RSGBTech nor by the RSGB on its own social media channels.

"The RSGB has always promoted use of the Group, starting with an announcement in the May 2009 RadCom, in its annual Yearbook and on its website. The RSGB recognises that the RSGBTech Yahoo Group makes a valuable contribution to technical discussions relating to amateur radio.

"Both the RSGB and G8OSN wish to make it very clear that RSGBTech Yahoo Group is entirely independent from the RSGB and that the RSGB does not therefore control membership of the group.

"Any questions or complaints about RSGBTech Yahoo Group should therefore be directed to its owner, Brian Reay G8OSN via rsgbtech-owner@yahoo.co.uk"

VMARS News

Once again the Vintage & Military Amateur Radio Society was invited to attend NARSA, the amateur radio rally located on the North Shore in Blackpool.

There were many VMARS members and other visitors to the VMARS stand. Roy Kavanagh GM4VKI brought along a wartime covert radio that was used by its owner in the Netherlands to listen to radio Orange, the Dutch wartime information service broadcast by the BBC. The set was liberated by Colonel Eric Wright of the Royal Engineers in 1945 and has remained in the family ever since.

There was a fine selection of Vintage radio equipment on display, including a very nice RCA AR88D recently donated by VMARS member Ian Pryde GM3LGU. Other equipment on display was a working Creed teleprinter, an RA-1B receiver, a homebrew

World Thinking Day on the Air 2017

This was the first TDOTA for 1st Montgomery Guide Unit. The girls activated the special event callsign GB8MG (Montgomery Guides) on Saturday February 18th, making contacts all over Europe on 15, 20, and 40m. Sadly, conditions within the UK were poor, so no other Guide units were contacted.

All Guides passed messages, filled in the logbook and plotted their QSOs on a wall map. They all achieved their Communicator and On the Air badges at the end of the day, and operator Jon Kempster M5AEO, seen in the photo with one of the visitors, was awarded his badges along with the Guides' Medal of Friendship.

Also, Eric Fairbrother, the Mayor of Montgomery, passed a message to a station in France, which received local press coverage while some older Guides from the Trefoil Guild visited and got on the air. The youngest participant was 10 and the oldest 76.

Unit leader Cath Wilkins, a former BBC World Service producer, was overjoyed with the result and hopes this will be the first of many TDOTA activities in Montgomery.



receiver designed for reception of AM signals all in modular form, the old stalwart the WS19 and an Eddystone 730/4.

World Wide Flora and Fauna

The WWFF programme wants to draw attention to the importance of protecting nature, flora and fauna. The program is covered in detail this month in our What Next feature.

GxFF National Parks Week will be running from July 24th to 30th and it is hoped that operators will take part in activating their local National Park as a single operator or club field weekend. Activations can take place anytime or day and as many times as the operator chooses.

Awards will be offered to hunters and chasers for the number of parks activated and Park-to-Park awards for operators during the event.

Please feel free to contact m0pai@hotmail.co.uk for reference information, operating rules or to register your station event. Similarly, join the Facebook Page, below: www.facebook.com/PARKS.TK

Morsum Magnificat Free Downloads

The English language edition of *Morsum Magnificat*, the Morse Magazine, otherwise known as *MM*, contained a vast amount of information and illustrations of interest to Morse operators, key collectors, historians, researchers and other Morse enthusiasts.

Published from 1986 to 2004, in 89 issues, with readers and contributors around the world, it covered every conceivable aspect of Morse telegraphy, past, present and future, in a truly international way.

With the permission of the copyright holder, Zyg Nilski G3OKD, this vast resource is now available for free download in PDF format, thanks to the generosity of Lynn Burlingame N7CFO who was a reader of, and contributor to, *MM*.

Included in the downloads is an updated and revised version of the *MM* 54-page *Key WT 8 Amp Worldwide Survey*, which has proved to be of great interest to both users and collectors of the many versions of this famous pre-war, wartime and post-war military Morse key.

MM was first published in Dutch by Morse enthusiasts Rinus Hellemons PA0BFN and Dick Kraayveld PA3ALM. They were later joined by Tony Smith G4FAI who helped them launch the English language edition.

After Rinus died, G4FAI produced and edited *MM* alone until he was joined by Geoff Arnold G3GSR, one-time editor of *PW* and founder of *Radio Bygones*. Later, Zyg took over as editor and produced the final 28 issues.

Original readers of *MM* who have copies missing from their collection can now fill the gap with a digital download. Today's newcomers, and those who missed it first time round, now have the opportunity to discover what this unique publication has to offer, and it costs nothing!

Downloads of *MM* are available for personal use only from:

www.n7cfo.com/tgph/Downloads/mm/mm.htm
73 of the 89 issues have been posted so far. It is hoped to obtain the remaining copies in the near future.

Copies of *MM* may not be downloaded or distributed for any commercial purpose. Any website offering digital downloads of *Morsum Magnificat* or the *Key WT 8 Amp Worldwide Survey* for payment is doing so without copyright permission. Anyone finding such a site is asked to send details to g4fal@btinternet.com

Free App Allows Blind Hams to Work PSK31

A free, new app, Accessible DigiPan, has been released that allows blind amateurs to operate PSK31. The download includes the app, audio tutorials, detailed written guides and additional resources, plus the DigiPan PSK31 and PSK63 software.

Richard McDonald KK6MRH and Jim Snowbarger WA0PSS, both blind, developed the program. "Until now, blind hams worldwide have not had any accessible program to work PSK31," McDonald said. Accessible DigiPan brings together the most popular screen reader, JAWS, and DigiPan and the app will work with many different kinds of rigs, interfaces, and Windows versions.

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Useful Features:

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- PC Programming
- Transceiver-to-Transceiver Cloning



Getting Started on 5MHz Part 2

Richard Lamont G4DYA completes his overview of the 5MHz band, with lots of invaluable advice and information.

Last month I gave some of the history behind the 5MHz band and described the frequency allocations used in other countries as well as the 11 UK 'bandlets'. I also looked at propagation and antennas. This month I want to start by looking at modes used. As my mother used to say, *age before beauty*, so I'll start with CW.

CW activity between UK stations (and a few other countries) often takes place in the lowest bandlet, centred around 5260kHz, with QRP around 5262kHz.

Foreign CW activity in the WRC-15 band (5351.5 – 5366.5kHz) tends to be at the bottom end, below 5354kHz, where unfortunately UK stations are not licensed to go. There's sometimes quite a bit of CW activity between 5354 and 5357kHz, which is in a UK bandlet. This is in the all-modes part of the IARU bandplan and it tends to be pretty busy. There's often JT65 activity above 5357kHz and occasionally SSB on 5354kHz, especially in the middle of the day. As an all-modes segment, it's first come, first served.

CW QSOs across the Atlantic tend to occur late in the evening or in the early hours on two spot frequencies. 5373 and 5405kHz are the only frequencies available in both the UK and several American and Caribbean countries. US stations are required to operate CW in the centre of the channel so, despite it being 3kHz wide, they can only accommodate one CW or SSB QSO at a time.

Incidentally, 5MHz contacts do not count towards the ARRL DXCC awards.

SSB

SSB is a popular mode during the daytime, especially in northwest Europe. As well as UK stations, there is a lot of

activity from Ireland and Germany. There used to be plenty of activity from the Netherlands, but this dropped overnight on April 1st when the allocation was reduced from 5350 – 5450 to the WRC-15 band.

UK activity occurs in nine of the 11 bandlets but not in the two used primarily for CW and beacons. There is a lot of ragchewing, several weekly nets, SOTA activations and a GB2RS broadcast on Sunday afternoons at 1500UTC.

Upper sideband (USB) is the standard for 5MHz, worldwide. In some countries this is mandatory. The 'LSB below 10MHz' convention does not apply on this band.

The fragmented nature of the band means that a VFO is of limited use. For convenience, many operators store a limited number of popular spot frequencies for SSB in memories. These frequencies are always exact multiples of 0.5kHz. They must be at least 3kHz below the upper edge of the bandlet. Where neighbouring countries are restricted to spot frequencies or channels, it's best either to operate on those exact frequencies or to keep 3kHz away from them so others can use them. (A few people think 2.5 kHz is enough. There is a word to describe them: unpopular. Other words are available.)

It's important to avoid the WRC-15 band for intra-G working. Over a dozen European countries have only this 15kHz of spectrum to play with. We have 71kHz in our 11 bandlets. The RSGB added a footnote to this effect to the UK bandplan in early 2017.

In choosing a frequency for intra-G QSOs, it's a good idea to start with the frequencies that are available in fewest neighbouring countries and that rarely get used for other modes. For example,

5304, 5320, 5335, 5379 and 5395kHz. At the time of writing, activity is such that at least one of them is usually vacant. If arranging a sked, it may be worth having a picking list of frequencies in case the preferred one is in use by someone else.

The restrictions on power and frequencies make it relatively difficult to work SSB DX. East coast US, Canadian and Caribbean stations are sometimes workable on 5371.5 and 5403.5kHz late at night or in the small hours during the winter. Stations in the Middle East also put in an occasional appearance.

AM

There is some AM activity, nearly always on 5317kHz.

The licence restricts the bandwidth of a 5MHz 'double sideband' (AM) signal to 6kHz. This is achievable with a clean rig with linear modulation. Harmonic distortion in the modulation process can widen the signal even if the audio has been restricted to 3kHz in an earlier stage. I suspect some vintage equipment is non-compliant in this respect. I've seen several AM signals on 5317kHz that are a lot wider than 6kHz and the worst ones can cause interference to USB activity on 5320kHz.

The power of the AM carrier should be no more than 25W, in order to keep the modulated envelope below 100W PEP.

Data Modes

JT65 is probably the most popular data mode on 5MHz and occupies the lion's share of the WRC-15 'channel' between 5357 and 5360kHz much of the time. Contacts across the Atlantic are readily achievable when the path is in darkness. My own JT65 signals have been received in Australia (at the time of writing, the VKs can't transmit but hopefully this will change soon).

UK operators need to be very, very careful here because our bandlet stops at 5358kHz and it's staggeringly easy to transmit JT65 above this limit by mistake.

To ensure that you stay in band, you need to add four frequencies and to ensure that the sum is below 5358kHz:

- The nominal USB suppressed carrier ('dial') frequency of the rig (5357kHz by default);
- The carrier frequency tolerance of the rig;
- The audio frequency of the JT65 synchronising tone;
- The bandwidth of the JT65 signal above the synchronising tone (178Hz)

For example, if you are confident that your rig's carrier frequency is stable and accurate to within 100Hz, and you select a



Fig. 1: An Air Cadets station in Norfolk during Exercise Blue Mam (Photo: Central & East Region ATC).

JT65 audio frequency of 720Hz, then the highest transmitted frequency will be:

$$5357000 + 100 + 720 + 178 = 5357998\text{Hz}$$

so it's just inside the bandlet with 2Hz to spare!

JT9 is a new variant of JT65 optimised for the LF, MF and lower HF bands. It's very similar to JT65 but uses much less bandwidth – 16Hz instead of 178Hz. As such it's ideal for a narrow, congested band like 5MHz. Its only disadvantage is that because of the much closer tone spacing, it's vulnerable to Doppler dispersal, which can happen during auroral conditions. This is more of a risk on the higher HF bands.

JT9 is available as part of the WSJT-X software, which can be operated in JT65+JT9 mode so the user can switch seamlessly between JT65 and JT9 in real time just by clicking on the station he wants to work.

JT9 usually uses frequencies that start about 2500Hz above the JT65 ones. This is a real problem for UK users because it's right in the gap between two bandlets. In practice, there are two places where UK users can try JT9. You can either go in any gap you can find between 5357 and 5358kHz or use the weak signal narrowband section between 5366 and 5366.5kHz.

Incidentally, WSJT-X has the advantage of being developed by the same people who designed the WSJT protocol suite. I'd recommend it over any of the unofficial variants.

WSPR, pronounced 'whisper', is another mode supported by WSJT-X. It stands for 'weak signal propagation reporter'. It's not for making QSOs. It's for testing how far your transmission is getting. You see the results at the WSPRnet website. This mode transmits signals just 6Hz wide in a sub-band just 200Hz wide. Traditionally this sub-band was centred on 5388.7kHz but this was only available in a few countries. A better choice now is 5366.2 kHz (USB dial 5364.7kHz).

<http://wspnet.org>

One data mode that has proved to be highly successful for real QSOs is Olivia 16/500, one of the many modes supported by FLDIGI. This provides slow but accurate transmission of text even in very difficult conditions. The signal is 500Hz wide and UK activity can sometimes be found around 5368kHz.

Occasionally, I've heard PSK and RTTY activity, typically between 5354 and 5357kHz, but there doesn't seem to be very much of it.

Other Band Users

Amateur usage of the band is on a secondary basis. That means we must not cause interference to the primary user. It also means that we have to put up with any interference the primary user causes to us. In the UK, the primary user is still very much the Ministry of Defence (MoD). All sorts of unfamiliar signals can be heard and it's often difficult to know what they are. However, it's important not

to dismiss them casually as QRM. If some mysterious signal belongs to the MoD and you transmit over it, then you're the QRM. If you become aware of causing undue interference to the MoD's use of the band, the licence specifically requires you to close down.

One persistent type of signal is HF data links using a NATO standard known as Stanag 42B5. These are based on audio modems connected to SSB transmitters. The modulation is PSK on a tone of 1800Hz and the signal occupies a bandwidth that's 2400Hz wide across the flat bit and about 3000Hz wide between the –30 dB points. These things transmit continuously, sometimes for weeks. They sound to my ears as if it's raining nuts and bolts.

Frequency-modulated continuous wave radar (FMCW) makes frequent appearances. In this, a carrier is swept repeatedly across 10kHz or more. It produces parallel diagonal lines or a sawtooth shape on a waterfall display.

Sometimes military stations can be heard using SSB voice. From time to time, obviously scrambled signals can be heard.

5MHz is the only band where amateur stations are allowed to work military or military cadet stations. Very occasionally you may get called by a station using a non-amateur callsign: typically M plus two letters plus two figures. These are probably cadet signals stations operated by cadets or their instructors. They use a formal military voice procedure that is more concise and standardised than

anything amateurs use. If you're not familiar with this procedure, it doesn't matter. Just keep it brief and don't waffle. They don't ragchew. And it's best to stick to the standard ITU/NATO phonetic alphabet.

In June 2016, amateurs were invited to participate in a cadet signals training exercise known as Exercise Blue Ham. This was generally regarded as successful. The photograph, **Fig. 1**, shows one of the cadet stations that took part. The exercise was repeated during the last two weekends in March 2017 with cadet stations using callsigns mainly in the range MRE10 to MRE89. There were over 1,500 contacts between cadet and amateur stations during the four days of activity.

All of these types of signals should be regarded as primary user signals and amateurs should never knowingly transmit over the top of them. Fortunately some of them only last a few seconds and then go away.

Bandlet Edges

Because we are often operating right against the edges of narrow bandlets, it's particularly important to keep our signals clean. The occupied bandwidth must not spread over the boundary.

Our licences define occupied bandwidth such that no more than 1% of the mean power in our transmissions is outside it. That's 0.5% below and 0.5% above. Therefore, at the bandlet edges our signals need to be at least 23dB down on PEP, as shown in **Fig. 2**. This is readily achieved with a half-decent rig in a good state of repair and operated properly.

I've heard quite a bit of inadvertent out-of-band operation, with a variety of causes, including:

- Not knowing the bandlet limits;
- Poor frequency calibration of rigs;
- Accidental use of LSB instead of USB;
- SSB splatter;
- Excessive SSB bandwidth (such as eSSB);
- CW key clicks;
- AM harmonic distortion;
- Operation on WRC-15 frequencies outside the UK bandlets, especially JT65.

There are several things you can do to ensure that your signal is clean. The ideal solution is to check out your rig with a spectrum analyser, if you have access to one. Another is to monitor your own transmission using a WebSDR's waterfall display. The one at Hack Green in

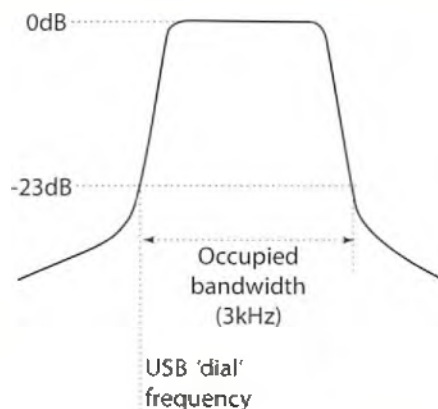


Fig. 2: The occupied bandwidth of an amateur signal is defined by the bandwidth between the -23dB (0.5% power) points. The whole of this bandwidth must be inside the bandlet.

Cheshire (URL below) is very popular with 5MHz operators. It even has the bandlet edges marked.

<http://hackgreensdr.org:8901>

If you're working a station that has a panoramic display, the operator may be able to give you an idea of the bandwidth your signal is occupying.

UK Licence Conditions

There are ten terms and conditions that are specific to operation on the 5MHz band. They are listed in Note (g) to Schedule 1 of the licence. In addition to the ones already covered, they are as follows.

Net operation: give your callsign on joining and leaving it. If using a mode other than speech for at least 15 minutes, give your callsign when next using speech.

You can only operate at your main station address or a temporary location (portable). When operating portable, you must give your location accurate to within 5km every 30 minutes.

You must be contactable by telephone

when operating. For this, you must have given Ofcom your telephone number(s) via the licensing portal. It's your responsibility to ensure that your telephone is usable. If, for example, you can't hear it ring in the shack, or if you've got a mobile with a flat battery, or if you're in a mobile not-spot, then it is not usable.

<https://ofcom.force.com/licensingcomlogin>

And Finally ...

The screenshot, **Fig. 3**, shows typical band activity on a Saturday afternoon in February. The panadapter span is from 5257 to 5409kHz. Marker pips every 10kHz can just be seen at the top of the screen and the receiver was tuned to 5335kHz USB at the time.

Near the left, two CW QSOs can be seen on 5360 and 5262kHz. Centred on 5382kHz, at the bottom of the screen, a bunch of diagonal lines reveals a burst from an FMCW radar, 12kHz wide. Just to the right of that the vertical line on 5288.7kHz is a WSPR transmission. The signal on 5291kHz was probably a beacon. Between 5313 and 5316kHz there's a Stanag 4285 signal. There's an amateur QSO on 5320kHz, then a weaker Stanag 4285 signal between 5332 and 5335kHz. Immediately above it is another amateur signal on 5335kHz USB.

There's not much more until we reach the WRC-15 band, where there's a bunch of CW signals between 5351.5 and 5357kHz. From there to 5360kHz there's a solid wedge of JT65 and an SSB QSO just above it on 5360kHz. Unusually, there's nothing on 5363kHz USB. Another vertical line shows WSPR activity on 5366.2kHz. There's a brief burst of Dutch SSB on 5369kHz and then UK SSB activity on 5371.5, 5379, 5395 and 5403.5kHz.

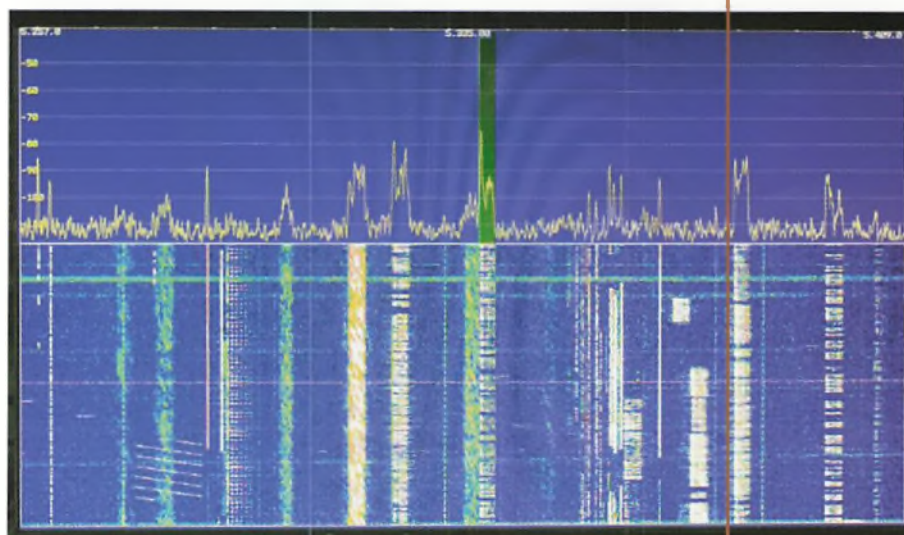


Fig. 3: Band activity on a Saturday afternoon in February.



Acom 1500 Linear Amplifier User Review

Steve Telenius-Lowe PJ4DX has been using the Acom 1500 linear amplifier for three years and more than 66,000 contacts so is well qualified to pass judgement.



Fig. 1: The Acom 1500 front panel.

The articles *Buying an HF Linear Amplifier and More on Linear Amplifiers* by Steve Ireland VK6VZ and Don Field G3XTT

(*PW*, November 2016) may well have caused you to consider buying an HF linear. That was certainly the case for Belgian *PW* subscriber Etienne Vrebos OS8D, as he explained in the May 2017 *HF Highlights* column. But, if you are still trying to make your mind up, I hope this article will help.

The Bonaire licence permits operation at up to 1kW, with a 1.5kW licence available for contests. In 2014 I took the plunge and bought an Acom 1500 linear amplifier, Fig. 1, and feel that after three years I can give an honest, unbiased account of this amplifier. The Bulgarian-made linear covers ten bands from 160m to 6m and is capable of 1500W output on all bands.

But That's Nearly Four Times My Power Limit!

So why would anyone in the UK, with a limit of 400W out, consider purchasing a linear capable of so much more than that? There are two main reasons.

Firstly, UK Full licensees are allowed 400W at the antenna feedpoint, after taking into account the loss between the amplifier and antenna. While it is good practice to use the lowest loss feeder practicable (not least because loss is evident on receive as well as transmit), with long runs of coax 2 or 3dB loss is possible on 10m and certainly on 6m. Such loss is even more likely if you have an ATU, antenna switches, a lowpass or bandpass filter and all the associated

connectors in the antenna system. With a system loss of 3dB, you would need to run 800W from the amplifier to achieve 400W at the antenna.

Secondly, amplifiers should not be run at their maximum possible power. The intermodulation performance is much improved if you under-run your amplifier: 800W from a 1.5kW amplifier provides a cleaner signal than an 800W amplifier being run to the maximum. The valve(s) and other components will also last much longer if they are not being stressed by being run flat out. Together, these reasons mean it's not unreasonable to use a 1.5kW amplifier in the UK, provided you calculate the loss in your feeder system on each band and adjust power accordingly.

Description

The Acom 1500 measures 195 x 422mm x 355mm, weighs 26.5kg (58.3lb) and uses a single 4CX1000A tetrode, Fig. 2, in class AB1. Off-load, the high voltage to the valve is around 2.8kV.

At the bottom right of the front panel is a red on/off push button above which a green LED indicates when the amplifier is ready for use. It takes three minutes for the amplifier to warm up, during which time the LED is blinking. The bandswitch has seven positions: the 7/10, 18/21 and 24/28MHz bands each share a single position. The amplifier is manually tuned and two knobs adjust the Tune and Load capacitors.

Above the bandswitch are four buttons. The first is used to cycle between three antenna outputs; an orange LED indicates the antenna selected. The correct antenna must be selected manually (it isn't possible to associate antennas with



Fig. 2: The Acom 1500 uses a single 4CX100A ceramic valve (bottom left, surrounded by red 'chimney'). (Photo courtesy Acom)

particular bands). The second button is labelled **OPER** and when pushed, a green LED indicates that the amplifier is in circuit. Pushing the button again bypasses the amplifier and the transceiver operates straight through to the antenna. When the amplifier is in circuit and actually transmitting, a red LED labelled **TX** also lights.

The third and fourth buttons are labelled **PREV** (for 'Previous') and **NEXT** and are used to cycle through 14 status displays on the screen above the buttons.

Display Screen

The 75 x 18mm vacuum fluorescent display (VFD) shows information on the status of the amplifier in a dot matrix format. After the red on/off button is pressed, the display shows 'Warming Up: 180 s' which then counts down to 0 seconds. The display then shows 'Warming Up: Ready', Fig. 3, and you are able to use the amplifier.

Once it has warmed up, you can use the **PREV/NEXT** buttons to monitor the 13 other displays. The first is a tuning aid called the 'True Resistance Indicator', the use of which is described later. The other screens are:

- Forward Power (in watts);
- Reflected Power (in watts);
- Output Power (in watts – Fig. 4);
- Antenna VSWR;
- Drive RF power (in watts);
- RF Power gain (in decibels);
- Plate Current (in milliamperes);
- High Voltage (in volts);
- Plate RF peak (in volts);
- Screen Current (in milliamperes);
- DC power input (in watts);
- Exh. Air (temperature of air expelled by the fan, in both degrees Celsius and Fahrenheit).

The Rear Panel

A mains on/off switch is fitted at the top left of the rear panel, Fig. 5. This must be switched on before the front panel on / off button (which starts the valve warm-up timer) can be used. When the rear panel switch is switched on the display screen is illuminated with 'A C O M 1 5 0 0' and antennas 2 and 3 can be selected (when switched off, the connection defaults to antenna 1). Three SO239 ('UHF') antenna sockets are at the top of the panel, with the RF input socket, another SO239, at the bottom.

PTT switching is by an RCA phono plug labelled **KEY-IN**. The switching voltage from the amplifier socket to the transceiver is less than +13V and the closed-circuit current is below 5mA. A fan located



Fig. 3: After 3 minutes warm-up the vacuum fluorescent display shows 'Warming Up: Ready'.



Fig. 4: Close-up of the vacuum fluorescent display, in this case indicating the Output Power of 450W. As can be seen, there is a lot in reserve.

behind the air intake grill and two fuses (16A for 200 – 240V and 20A for 100 – 120V) are also on the rear panel.

Protection Features

As might be anticipated with an amplifier

of this class, the Acom 1500 is well protected against fault conditions. There are three different levels of protection, depending on how serious the condition. The VFD alerts the operator to the nature of the problem. The first level does not cause the amplifier to trip but gives the operator a warning such as 'Reduce Drive'. If the warning is not heeded, it's likely the second level of protection will occur.

The second level causes the amplifier to trip out to stand-by mode. The operator can switch the amplifier back on by pressing the **OPER** button but unless the problem is rectified, the amplifier is likely to trip again. An example of such a condition is if the reflected power is greater than 300W, when the message **** REFLECTED POWER **** appears in the



Fig. 5: The rear panel of the Acom 1500.

VFD. This is unlikely to occur at UK power output levels unless an incorrect antenna with high VSWR is selected accidentally.

The third level of protection causes the amplifier to go 'off line', requiring three minutes to warm up again. This only happens if there is a serious fault condition (and has never occurred in the three years I've been using it). Data for up to seven protection trips is stored in a non-volatile memory and can be sent to an Acom dealer to help with fault diagnosis.

In Use

After switching on, the three-minute warm-up time seems interminable and several times I have heard a DX station, switched the amplifier on, failed to make the contact at the 100W level while it was warming up and the DX has disappeared before I had a chance to call using the amplifier!

Some amateurs who have only used solid-state equipment may be a little intimidated by the necessity of 'tuning up' a valve amplifier. With the Acom they needn't be, it is simplicity itself. The True Resistance Indicator (TRI) makes tuning the Acom child's play. First, press the **PREV** and **NEXT** buttons simultaneously. This inserts a 6dB attenuator at the input to the amplifier to allow it to be tuned using a carrier without having to reduce the drive from the transceiver. Transmit a carrier while looking at the TRI. The upper line gives an indication of the relative power output and an arrow appears on the lower line of the display, **Fig. 6a**. The Load capacitor should be adjusted in the direction indicated to centre the arrow in the display. Once centred, the arrow changes to a 'v', **Fig. 6b**, and the Tune capacitor should then be adjusted for maximum power, as displayed on the upper line of the display. This procedure only takes two or three seconds and the amplifier is tuned. It's that easy.

Best of all, once you have noted the positions of the Tune and Load controls, the 'reset-ability' is so good on each band that I've found it totally unnecessary to use a carrier to tune up again. A final 'tweak' of the Tune and Load capacitors can be made looking at the TRI while transmitting, without needing to use a carrier. The only time you might need to start the procedure from scratch (with a carrier) is if you change to another antenna with a very different impedance from the one first used.

From the TRI screen, one press of the **NEXT** button takes you to the **Forward Power** display, with a digital readout in watts. The **Output Power** (two more presses of the **NEXT** button) shows



Fig. 5: The 'TRI' in use. (a) The arrow indicates that the Load Capacitor needs to be turned to the left. (b) The arrow changes to a 'v' in the centre of the display when the load is correctly adjusted.

forward power minus reflected power, **Fig. 4**. The two are identical if the VSWR is a perfect 1.0:1 but with any mismatch, the **Output Power** reading will be somewhat lower than that of the **Forward Power**.

The amplifier can match loads with a VSWR of up to 3:1 or so, making a QRO (high power) ATU between the amplifier and antenna unnecessary if you use resonant, or nearly resonant, antennas. Even with a much higher SWR it's still possible to use the amplifier, provided the reflected power is under 300W. Although I don't have an antenna for 30m I do occasionally go on that band using an 80m vertical. The SWR is high but the Acom will put out up to about 600W before it trips out. But using around 500W I can work almost anything I hear on 30m despite not having a 'proper' antenna for the band.

On the other bands, where I do have resonant antennas, I usually run the Acom at just under 1000W out, which requires about 50W of drive from the transceiver. For 400W out, I only need 25W of drive. The comments made earlier about under-running an amplifier to ensure a clean signal apply equally to transceivers: a 100W transceiver run at 50W out provides a cleaner signal than one run at full power. Indeed, a 1kW transmission from a transceiver and linear both run below their maximum output produces a cleaner signal than a 100W transceiver pushed to its limit. (A lot of nonsense is sometimes heard on the air about high-power stations "splattering across the band" but such splatter is caused by transceivers and/or amplifiers being over-driven and not by the absolute level of power output.)

I am primarily an SSB operator but I have also used the amplifier on CW. Full break-in (QSK) is standard and the vacuum antenna relay provides virtually silent switching. The maximum output power in continuous carrier modes such as RTTY is listed as 1200W although at UK power levels this is irrelevant: at 400W (or 800W) the Acom 1500 is just loafing along, even on RTTY.

For the CQWW Phone and CW contests last year the group of which I am a member obtained a 1.5kW contest licence (callsign PJ4Q), which allowed

us to use the Acom legally at full power. Although I normally keep to under 1000W for the reasons explained (and to stay legal), in the two contests we used a 200W transceiver under-run at about 85W to drive the Acom to between 1400W and 1500W for the full 48 hours of both contests. The amplifier behaved beautifully. It did not trip out once, it did not overheat (despite indoor daytime temperatures over 32°C) and I formed the opinion that it could have continued operating at that power level for days without a murmur of disapproval.

The Acom 1500 is a heavy piece of equipment so I don't move it more than I need to. However, when I did move it after a couple of years of use I noticed that the air intake grill was almost completely clogged with dust and 'fluff'. Bonaire is a dusty island but I had simply not considered this as an issue. Fortunately, the grill is easy to remove and clean and I now do this from time to time. However, even when the grill was blocked the amplifier had never overheated. In fact, in the time I have used the Acom I haven't had a single problem with it. The only times the amplifier has tripped have been when I transmitted when accidentally switched to the wrong antenna.

Summing Up

The Acom 1500 has been in almost daily use for three years and has proved to be perfectly reliable. In that time I have made over 66,000 contacts, most of which were made using the amplifier. The power output now is the same as the day I bought it.

The Acom 1500 costs £2,900 from ML&S, LAMCO, Radioworld and other retailers. Yes, that's a lot of money but it's less than most other 1.5kW amplifiers and less than some solid-state amplifiers rated at much lower power levels. It is a top-end amplifier and the cost is considerably less than any of the current top of the range transceivers. I doubt I will ever need to buy another linear amplifier so I believe it represents good value for money. It will probably outlast me and I thoroughly intend to be around for quite a while yet!



SPE Expert 1.3kW Amplifier

In contrast to Steve Telenius-Lowe's review of the Acom valve amplifier, Tom Morgan ZS1AFS/ZT1T shares his early experiences of using the SPE Expert 1.3K-FA solid-state linear amplifier for the 160 through 4m bands.



Fig. 1: Front panel view of the Expert 1.3K-FA.

I realised PW had not reviewed the SPE Expert 1.3K-FA, Fig. 1. This is one user's experience with the first of a new generation of amplifiers.

For technical specifications the user manual can be downloaded.

www.expertlinears.com/pdfs/expert_1-3K_manual.pdf

I'd heard good things about this amplifier by Italian company SPE and wanted to replace my aged Kenwood TL-922. This coincided with the increase in power level for South African amateurs from 400 to 1000W. My Elecraft KPA500 needed a big brother. Usually, I get most of my equipment from the UK and saw an advertisement on the Martin Lynch & Sons website to place a deposit with order, which I did.

A couple of weeks later I had a phone call from Tony, while I was driving out of Cape Town. "Do you want a 1.3 because

we've got three out of the order for 20?"

The answer was obvious and about a week later it arrived. What's more, there were no hitches at Customs this time.

After removing the unit from the carrying bag, Sue ZS1AFR and I set it up where the TL-922 used to be. The space around was massive. Also, I could carry the unit easily: it weighed just under 10kg with the ATU fitted! Without the ATU it weighs only 7.5kg. This makes it ideal for DXpeditions. And my automatic ATU was redundant.

Facilities

There are two inputs and four transmission antenna outlets plus one (RX) for a receive antenna so it was perfect for the setup I was developing. The Kenwood TS-480 is for transmissions and I use an ELAD-DUO to monitor and see activity on the bands. When I e-mailed Expert the reply was prompt. The inputs are well isolated. The non-transmitting radio is always connected

to the RX outlet. Further isolation with a relay disconnecting the receiving antenna is an option to explore. To change radios if you 'see' another station, just press the PTT of the 'listening' radio. This works best with monoband antennas.

The software installation worked first time and the readout on the screen shows all the values. One super aspect is that I can TUNE the output at any time. Doing this shows both the SWR of the antenna and the match through the ATU. This is not necessary on the fly, if you follow the instructions to program the 'sub-bands'. Before this, you should select a suitable antenna for each band of operation. Although it takes a little time to prepare the unit, the resultant performance is instant change of antenna to suit band and frequency. I printed out the BAND TABLE page of the very comprehensive Manual with a record of all of the matches of sub-bands and antennas for future reference.

One feature that may interest DXpeditioners is the facility for two banks of antennas. The result is that you do not have to re-do the tuning when you bring the unit back to use on your home antennas. This is great for those of us who have two station locations or you lend the unit to a friend. Getting it back may be a different matter!

In Use

I started using the 1.3K-FA without CAT control and it sensed the frequency of the radio output on transmit. But there is a warning to 'only change bands in standby without CAT control'. With the software installed, the simulated display and keypad on screen means I don't have to leave the operating position to change antennas or bands.

Regarding power levels, there is a warning: *if you don't use ALC, reduce the power to about 30W when retuning.* I performed all of the setting up using my TS-480 showing 10W on the rig display but in reality it is only 8.5W. On CW, with this input, the amplifier puts out over 1kW.

The screenshot, Fig. 2, of the utility program shows the amplifier display and full keypad (sitting over my Logger 32 screen). The display shows 1.2kW output into a dummy load from the nominal 10W of drive. The program also offers a smaller keypad display with fewer features for when you don't need to change bands and are transmitting without changing antenna.

As well as the HF bands the unit transmits on 6m. I will be keen to try this band when my Super Moxon beam goes up. Also, there is a bonus because the it also works on the 4m (70MHz) band, albeit at reduced power.

With regard to the temperature during operation, the amplifier is next to the open door and the temperature has been near 40°C many days this summer. The amplifier has not faltered. The fan is quiet. Controlling it from the software, the unit can be placed elsewhere with confidence. You can, of course, operate the amplifier directly from its front panel but commanding it from the PC allows the amplifier itself to be sited away from the operating desk.

It fitted, seamlessly, into my station setup. I realise this is not an impartial review of the SPE Expert 1.3K-FA. It's more a user's assessment of where it fits into the station and my operating practice. I don't know how I managed with tuning up the previous amplifier on each band. Now, the power is instantaneous and, of course, there is no waiting for valve heaters to warm up.

I must comment on the 'package' as it comes. There are cables for the usual functions such as ALC and connections to the PC. There are plugs for cables that would be used for all of the other equipment that can make operating more convenient. I'm sure I'll get around to them eventually. Having plugs for the unit's

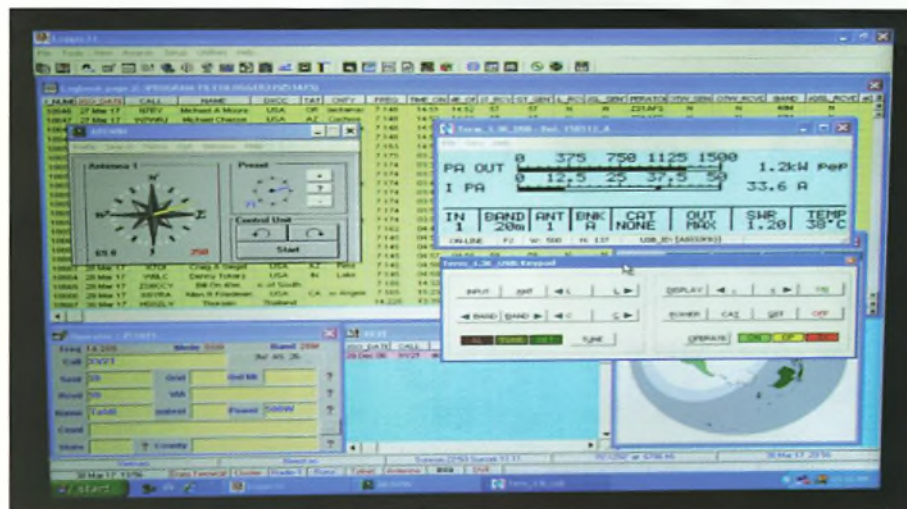


Fig. 2: A screen shot of the PC control software (upper right) sitting above the author's logging program.

sockets is a big plus for operators who are in far flung parts of the globe. Yes, I know you can order on the internet but if you do the cable yourself, you will be confident it will work.

At the time of writing, the Expert 1.3K-FA is available from Martin Lynch & Sons for £2599.95 inclusive of VAT.

(Editor's comments: As a satisfied user of an Expert amplifier myself, I would echo Tom's assessment. As well as changing bands by detecting RF, you can make up

suitable leads to pass band data from transceiver to amplifier so that the amplifier switches bands simultaneously with the transceiver. This is a better solution and is recommended by the manufacturer. The ability to have two transceivers permanently connected also means that, for example, you can have an HF transceiver connected to one input and a 6m transceiver to the other. The internal ATU copes with SWRs of up to 3:1 on HF and 2.5:1 on the 6m band.)



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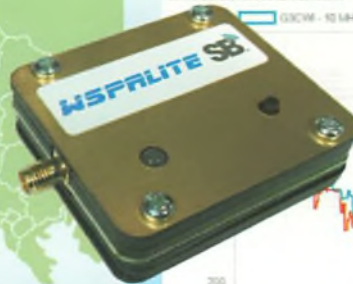
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Have a Go

There will certainly be plenty of other PW readers on the air, keen to exchange reports, serial numbers and locators. Good luck in the contest!

The 34th Annual Practical Wireless 144MHz QRP Contest

Colin Redwood G6MXL, our QRP Contest adjudicator, introduces the 2017 event, which takes place on Sunday June 11th.

The popular *Practical Wireless* 144MHz QRP Contest is the ideal way for newcomers to the VHF bands and contesting to get a good feel for many aspects of amateur radio contests. It is an excellent way to experience the thrill of making contacts over many kilometres on the 2m band.

Power Increase

Ever since the *Practical Wireless* 144MHz QRP Contest started, the power limit has been 3W at the transmitter. It was also the level adopted by the RSGB VHF Contest Committee for the low power section of their series of backpacker contests, one of which runs alongside the PW Contest. With many transceivers now having a minimum of 5W output power and the popular Yaesu FT-817 largely replacing the FT-290, the RSGB Contest Committee have increased the maximum power in the low power section of the backpacker contests from 3W to 5W.

In early February 2017, I contacted entrants to the 2016 PW Contest by e-mail to seek views on a similar power increase. Over 80% supported such an increase so for 2017, the power limit will be 5W at the transmitter.

Equipment

The only equipment you'll need is a low-power 2m transceiver and an antenna. You can expect to make some contacts with a basic 2m FM handheld transceiver. However, most of the activity is likely to take place using single sideband (SSB).

Location

As always at 2m, a clear take-off such as

a hilltop will certainly help. Every year new entrants are surprised just how their signals can travel between hilltops.

You'll need to find out the six-character IARU locator (sometimes it is known as Maidenhead locator) in the format of two letters, two numbers and two letters, for example IO90JQ. I think the easiest way is to use F6FVY's web page to determine it.

<http://qthlocator.free.fr/index.php>

Antennas

Most stations use horizontally-polarised Yagi antennas when operating on SSB or CW.

If you use a directional antenna, then I would strongly recommend that you rotate it to point in different directions during the contest such as South West England, Northern Ireland, the Republic of Ireland and Scotland. This will not only enable you to make more contacts but also increase the number of different locator squares contacted, which is a part of your overall score.

Contest Exchange

For each contact to count towards your score, you'll need to exchange your callsign (including any /P), signal report using the standard RS(T) code, serial number and locator. The RS(T) code consists of readability on a scale of one to five and signal strength from one to nine. For Morse contacts there is also the tone (on a scale of one to nine for tone). The serial number starts at 001 for your first contact and increases by one for each subsequent contact you make. So the fourth contact you make will have serial number 004.

Exchange Example

Imagine your callsign is M6ADG/P and you

are located in IO90JQ and have a contact with M3BDV/P as your fourth contact. You might transmit, "Mike three Bravo Delta Victor Stroke Portable from Mike six Alpha Delta Golf Stroke Portable, you are five and six, zero zero four in India Oscar nine zero Juliet Oscar". Using phonetics will make sure that similar sounding letters (such as B, D, P and V) are clearly understood by the station you are in contact with.

Hints and Tips

Most newcomers to contesting find that replying to other stations' "CQ contest" calls is a good way to start. As your confidence in exchanging reports, serial numbers and locators increases, then finding a clear frequency and calling "CQ contest" yourself and waiting for stations to reply to you is a good technique. A mix of the two techniques can be an effective strategy.

Make a point of accurately recording in your log the details of each contact as required by the rules – in particular the callsign of each station you contact, including any /P suffix, their locator and the time in UTC (not BST). If you are transferring a paper log to a computer log, be careful to transcribe the details accurately.

Many entrants use rechargeable batteries for power. Make sure you have enough power to run your station (particularly if you are taking advantage of the increased power limit) for the full duration of the contest. I suggest making three diary entries: the first a couple of days before the contest as a reminder to charge your batteries, the second for the day of the contest (Sunday June 11th 2017) and the third a few days after the contest to remind you to submit your entry.

The rules appear on the next page. The contest website is also a valuable source of information and has a link for downloading log sheets and an online entry form (known as a cover sheet).

www.pwcontest.org.uk

Submitting an Entry

Don't forget to submit your entry after the contest. Although electronic entries via e-mail are much preferred and make the task of adjudication easier, paper entries continue to be welcome.

Awards

As well as certificates awarded in various categories, the leading Single- and Multi-Operator entries will receive a plaque in recognition of their achievement.

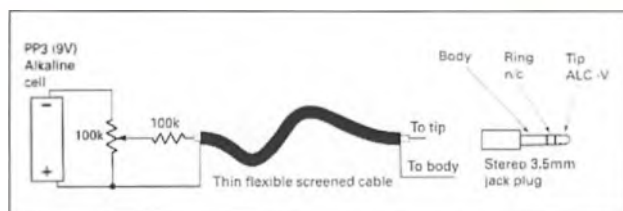


Fig. 1: A useful technique to reduce power to 5W on higher power transmitters.

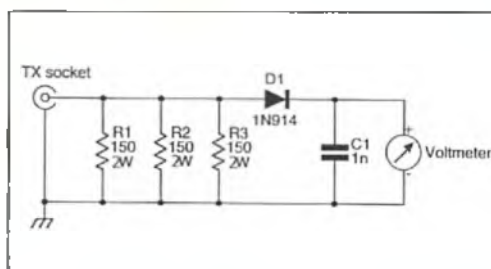


Fig. 2: A small power meter, to verify the power output. A 21.7V level indicates 5W output. 2W metal film resistors are available from Maplin and CPC (Farnell).

1. General: The contest is open to all licensed radio amateurs operating fixed or portable stations, using SSB, CW, AM or FM in the 2m (144MHz) band. Entries may be from individuals or from groups, clubs and similar bodies. The duration will be from 0900 to 1600UTC on Sunday June 11th 2017.

All stations must operate within the terms of their licence. Entrants must observe the band plan and must keep clear of normal calling frequencies (144.300MHz and 145.500MHz), even for CQ calls. **PW Contest stations must allow other users of the band to carry out their activities without hindrance.** Please avoid frequencies used by GB2RS (144.250MHz and 145.525MHz). ATV talkback frequencies (144.525 and 144.750MHz) and any other frequency that is in use for non-contest purposes.

The station must use the same callsign throughout the contest and may not change its location.

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

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

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

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

Contacts via repeaters or satellites or using digital modes (including D-STAR, Fusion, DMR and EchoLink) are not permitted.

3. Power: The output power of the transmitter or transverter final stage must not exceed 5W peak envelope power (PEP). If the equipment in use is capable of a higher power, the power must be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative

voltage to the transmitter ALC line, Fig. 1 (the ALC line is usually available as a pin on one of the sockets on the rear panel). Stations cannot rely on feeder loss to meet the SW power limit.

With a number of modern transceivers, power can be reduced via a menu setting.

The output power can be accurately measured using the simple circuit of Fig. 2. Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 21.7V on a 'good whistle' into the microphone.

4. Scoring: Each contact will score one point. The total number of points gained during the contest will then be multiplied by the number of different locator squares with which contacts were made (a 'square' here is the area defined by the first four characters of the Universal Locator).

Example: 52 stations worked in IOB1, IO90, IO91, IO92 and JO01 squares; final score = $52 \times 5 = 260$.

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

5. The Log: Logs must contain the following information for each contact:

- (i) time (UTC – not BST)
- (ii) callsign of the station worked (including any /P suffix)
- (iii) report sent (e.g. 56)
- (iv) serial number sent
- (v) report received (e.g. 54)
- (vi) serial number received
- (vii) locator received (or location)

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

The REG1TEST, .log and .edi formats or the spreadsheet available on the contest website are preferred. If there is any problem with your entry, you will be contacted by e-mail.

Log sheets and covering information sheets which may be used for paper-based entries are available for downloading from the contest website.

6. Entries: The covering information listed below must be provided with each entry. Please submit this using

the online facility on the website. For postal entries, it should be written on a separate sheet of A4-sized paper.

The information required for every entry is:

- (i) name of the entrant (or of a club or similar in a group entry) as it is to appear in the results table and on the certificate
- (ii) callsign used during the contest including any /P suffix (e.g. G6MXL/P)
- (iii) name and address for correspondence
- (iv) location of the station during the contest
- (v) full 6-character locator as sent during the contest
- (vi) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators' names and callsigns
- (vii) a full description of the equipment used, including transmitted PEP output power
- (viii) if the transmitting equipment (including any transverter employed) is capable of more than 5W PEP output in the 2m band, a description of the methods used to (a) reduce and (b) measure the 2m output power
- (ix) antenna used and the approximate station height in metres above sea level (ASL)
- (x) if you receive or send a report of poor quality signals (e.g. wide/splattering), full details of the complaint, including time, callsign, nature of complaint and actions taken during the contest to investigate and resolve
- (xiii) the following declaration must be included in the e-mail text or written and signed by the entrant: "I confirm that the station was operated within the rules and spirit of the event and that the information provided is correct".

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

Entries & Other Information

Entries by e-mail must be sent to contest@pwpublishing.ltd.uk

Paper entries should be sent to: Practical Wireless Contest, c/o Colin Redwood G6MXL, 53 Woodpecker Drive, Poole BH17 7SB.

Entries must be received not later than Tuesday July 4th 2017. Late entries will be disallowed.

Any other general comments about the station, the contest and conditions during it are welcome (written on a

separate sheet of paper in the case of entries sent by post). Photographs of the station are also invited. Please note that photographs cannot be returned and may be used for publication in *Practical Wireless* or on the contest website. Please send them by separate e-mail or post, to arrive by **Tuesday July 18th 2017.**

A summary of the results will be published later this year in *PW*.

7. Miscellaneous: When operating portable, obtain permission from the owner of the land before using the site. In particular observe any restrictions on access. Always leave the site clean and tidy, removing all litter. Observe the Country Code.

Take reasonable precautions to avoid choosing a site that another group is also planning to use. It is wise to have an alternative site available just in case.

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

If after making the checks above, you are certain that another station that is participating in the *PW* 144MHz QRP contest is radiating poor quality signals, please call the station, giving your callsign, and tell them about the problem. You cannot expect a station with a poor signal to do something about it if they are unaware!

If you receive or send a report of poor quality signals (e.g. wide/splattering), you must record on the cover sheet full details of the complaint including time, callsigns of stations involved, nature of complaint and actions taken during the contest to investigate and resolve.

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

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KG-UV950PL 6/4/270cm transceiver.....	£289.95
WO/PCO-003 software for mobile.....	£19.95

Handhelds

KG-UV9D 270cm Handie.....	£129.95
KG-UV9D PRO PACK 270 Handie + accessory pack.....	£154.95
WO/PSO-110 software for handhelds.....	£20.50



Authorised dealer

Base

TS-990 All mode flagship HF transceiver.....	£5099.95
TS-2000X All mode HF transceiver upto 23cm.....	£1469.00
TS-2000E All mode HF transceiver upto 70cm.....	£1270.00
TS-590SG All mode HF transceiver.....	£1199.00
TS-480HX inc ATU HF to 6M HF transceiver.....	£719.00
TS-480SAT HF to 6M HF transceiver.....	£659.00

Mobile

TM-D710GE Dual band transceiver with APRS.....	£479.00
TM-V71E Dual band transceiver with Ecolink.....	£299.95
TM-281E 65W 2M Transceiver.....	£169.95

Handheld

TH-D74E Dual band with APRS & D-star transceiver.....	£599.00
TH-D72E Dual band with GPS transceiver.....	£379.95
TH-K20E 2m 5.5w FM transceiver.....	£119.95
TH-K40E 70cm 5w FM Transceiver.....	£119.95

Accessories

MC-90 Desk microphone.....	£189.95
MC-60A Desk microphone.....	£129.95
HS-5 Deluxe headphones.....	£56.95
HS-6 Lightweight headphones.....	£37.95
SP-23M Mid size external speaker.....	£74.95
KES-3 Mobile speaker.....	£29.95



Authorised dealer

Base

IC-7851 HF/50MHz transceiver.....	£9999.95
IC-7700 HF/50MHz with PSU & ATU.....	£4999.95
IC-9100 HF/VHF/UHF SSB, CW, AM & FM.....	£2799.95
IC-7600 HF/50MHz transceiver.....	£2399.95
IC-7410 HF/50MHz transceiver.....	£1499.95
IC-7300 New HF/50/70MHz Transceiver.....	£1199.95
IC-7200 HF/50 rugged transceiver.....	£829.95

Mobile/Portable

IC-7100 HF/6/4/270cm transceiver.....	£1199.00
ID-5100E Dual band with D-star.....	£575.00
ID-5100E Deluxe inc accessory pack.....	£729.95
IC-2730 Dual band transceiver.....	£299.95

Handhelds

ID-51E Plus 2 Dual band D-STAR.....	£449.95
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Accessories

AH-4 Automatic antenna tuner.....	£339.00
SP-23 Base speaker with filters.....	£279.00
SP-38 Base speaker for IC-7300.....	£149.95
SP-33 Base speaker.....	£129.95
SM-50 Desktop microphone.....	£249.95
SM-30 Desktop microphone.....	£129.95



Authorised dealer

Base

FT-DX9000MP HF/50MHz 400W Elite Transceiver.....	£9599.99
FT-DX9000D HF/50MHz 200W Elite Transceiver.....	£8799.95
FT-DX5000MP HF/50MHz 200W (inc SM-5000).....	£3699.00
FT-DX5000MP LTD HF/50MHz 200W (without SM-5000).....	£3399.00
FT-DX3000 HF/50MHz 100W Transceiver.....	£1429.95
FT-DX1200 HF/50MHz 100W Transceiver.....	£999.95
FT-991A HF/50/144/430 MHz All mode field transceiver.....	£1299.00
FT-991 HF/50/144/430 MHz All mode field transceiver.....	£999.95
FT-450D HF/50MHz entry level transceiver.....	£599.95

Mobile/Portable

FT-857D HF/VHF/UHF 100W portable transceiver.....	£699.00
FT-891 HF/50MHz 100W all mode transceiver.....	£999.95
FT-817ND HF/VHF/UHF 5W backpack transceiver.....	£549.00
FTM-400XDE Dual band digital transceiver.....	£519.00
FTM-100DE Dual band digital transceiver.....	£299.00
FT-8900 Quad band 10/6/270cm transceiver.....	£319.00
FT-8800 Dual band 270 transceiver.....	£249.00
FT-7900 Dual band 270 transceiver.....	£249.00
FTM-3200DE 2m digital transceiver.....	£189.00
FTM-3100DE 2m digital transceiver.....	£129.00

Handheld

FT-2DE Dual band digital transceiver.....	£399.00
FT-1XDE Dual band digital transceiver.....	£329.00
VX-80E Triband 6/270 transceiver.....	£229.00
VX-6E Dual band transceiver.....	£189.00
VX-3E Dual band mini transceiver.....	£159.00
FT-60 Dual band entry level transceiver.....	£119.00

All Yaesu accessories in stock on line at www.moonraker.eu



Base

DX-SR9 HF 100W Transceiver with SDR.....	£599.95
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Mobile

DR-735E Dual band 270 transceiver.....	£299.95
DR-638H Dual band 270 transceiver.....	£249.95
DR-B185HE 2m 85W transceiver.....	£169.95
DR-138NE 2m 60W transceiver.....	£169.95
DR-135UK 10m 25W transceiver.....	£159.95

Handheld

DJ-G7E Tri-band 270/23cm transceiver.....	£299.95
DJ-MD40 UHF 400-480MHz digital transceiver.....	£179.95
DJ-V57E Dual band 270 transceiver.....	£129.95
DJ-175EUK 2m 5w transceiver.....	£109.95
DJ-500 Dual band 270 transceiver.....	£99.95
DJ-A10S 2m 5w transceiver.....	£89.95

Accessories

EXD-2 Auto long wire antenna tuner.....	£299.95
EMS-14 Deluxe desk microphone.....	£69.95
DM-330MW MK2 30 switch mode PSU.....	£129.95
DM-330FXE 30 amp switch mode PSU.....	£119.95

PICO APRS Mini Transceiver

"World's smallest APRS transceiver with TNC" offers many applications. Matchbox-sized, built-in GPS receiver. The Matchbox-sized, transceiver with GPS receiver, is an APRS tracker, receives APRS data, and a TNC (RTSS protocol) for computer. The OLED display (128x64px) shows received APRS packet of position, APRS messages and status information. Received packets have distance and cardinal direction displayed, with data for the four most recent stations, saved retrievable via menu. Your own GPS coordinates are also shown so, the PicoAPRS can be used as a GPS receiver, say for Geo Caching..... £189.95

Desk Microphone

M-1 Ultimate desktop base microphone.....	£599.00
MD-200A8X Ultra desktop base microphone.....	£249.95
MD-100A8X Desktop microphone.....	£109.95

Speakers

SP-2000 External speaker.....	£159.95
SP-8 Base speaker.....	£159.95
MLS-100 Mobile speaker.....	£29.95
MLS-200 Mobile speaker.....	£26.95

Antennas

ATAS-120A Active motorised antenna.....	£349.95
ATAS-25 Manual tuning antenna.....	£229.95
ATBK-100 Counterpoise for ATAS antennas.....	£89.95
YA-30 Broadband HF antenna.....	£249.95

Antenna Tuning Unit

FC-50 Automatic tuner for FT-891.....	£249.95
FC-40 Automatic tuner for wire antennas.....	£249.95
FC-30 Automatic tuner for FT-857D.....	£279.95

Power Supply Unit

FP-30 Internal PSU for FT-897 (last one).....	£229.95
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Filters

XF-126CN CW Narrow roofing filter.....	£149.95
XF-127CN CW Narrow crystal filter.....	£139.95
YF-122C Collins CW filter.....	£139.95
YF-122CN Collins CN narrow filter.....	£139.95
YF-122S Collins SSB filter.....	£139.95

Cases

CSC-83 soft case for FT-817ND.....	£19.95
CSC-87 soft case for FT-1DE.....	£12.95
SHC-24 soft case for FT-2DE.....	£12.95

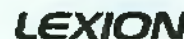


Mobile

MT-270 25W Dual band 270 transceiver.....	£79.95
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Accessories

MT-RM Spare microphone for MT-270.....	£12.95
MT-SC Programming cable for MT-270.....	£9.95



VV-898S Dual Band Mobile Transceiver

New VV-898 "S" version now with 25W as standard – comes complete with keypad microphone, radio bracket all in a compact size with an amazing compact price of just £69.95!



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Handheld

GT-3 136-174/400-480MHz transceiver.....	£44.95
GT-5 136-174/400-520MHz transceiver.....	£39.95
UV-5RC 136-174/400-480MHz transceiver.....	£29.95
BF-888S 400-470MHz transceiver.....	£14.95

Accessories

Speaker microphone.....	£9.95
Software cable.....	£9.95

PRICE MATCH! Due to Brexit prices are going up weekly! But massive stocks mean we still have some stock at old prices - Call or email us now for the BEST DEAL around

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Part Exchange the easy way with 5 simple steps at Moonraker

- 1 Choose your desired rig, scanner or even accessory
 - 2 Call or email what you would like to part exchange
 - 3 We will be give you the best deal and agree the balance owed
 - 4 Pack your equipment securely and wait for the door bell
 - 5 Swap your old gear for shiny new with the delivery driver and enjoy!
- it's that simple

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Yagi Antennas

All Yagis have high quality gamma match fittings with stainless steel fixings! (excluding YG4-2C)

YG27-35 Dual band 3/5 element 3.5/12.5 dBd gain with one feed!	£79.95
YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd)	£29.95
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd)	£69.95
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd)	£79.95
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd)	£79.95
YG5-4 4 metre 5 Element (Boom 104") (Gain 10dBd)	£99.95
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd)	£99.95
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd)	£119.95

ZL Special Yagi Antennas

The ZL special gives you a massive gain for the smallest boom length... no wonder they are our best selling Yagis!

ZL5-2 2 metre 5 Ele. Boom 95cm, Gain 9.5dBd	£69.95
ZL7-2 2 metre 7 Ele. Boom 150cm, Gain 11.5dBd	£79.95
ZL7-70 70cm 7 Ele. Boom 70cm, Gain 11.5dBd	£49.95
ZL12-70 70cm 12 Ele. Boom 120cm, Gain 14dBd	£59.95

HB9CV

Brilliant 2 element beams... ideal for portable use

HB9-70 70cm (Boom 12")	£24.95
HB9-2 2 metre (Boom 20")	£29.95
HB9-4 4 metre (Boom 23")	£39.95
HB9-6 6 metre (Boom 33")	£49.95

Halo Loops

Our most popular compact antennas, great base, mobile, portable, or wherever!

HLP-2 2 metre (size approx 300mm square)	£24.95
HLP-4 4 metre (size approx 600mm square)	£39.95
HLP-6 6 metre (size approx 800mm square)	£44.95

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QRP Antennas

The Moonraker Whizz range are great for getting on HF in a neat compact and totally portable way

Whizz Whip HF/VHF/UHF portable antenna with telescopic whip - ideal for any situation where a long wire or vertical antenna is just not an option - get on air today for just £99.95

Whizz Loop 20-60m compact loop - ideal for QRP Transceivers when space is limited or using portable with a Yaesu FT-817ND or similar. Can be used indoors with surprising results and handy for travelling due to its "pocket" size antenna ideal for indoor or out and can be packed away and all for just £69.95



Whizz Loop V2 same as above but with a frequency range from 40-10m... £79.95

MD-7400 40-70cm Multiband Mobile Antenna at a new lower price! This is a wideband mobile whip that is manually tuned by sliding the telescoping coil at the base. The telescopic whip may also be adjusted for fine tuning and optimizing the VHF/UHF performance. Maximum length of the antenna is 1.77m and maximum power handling is 130W. One antenna HF/VHF & UHF and one amazing new low price £79.95

One antenna HF/VHF & UHF and one amazing new low price £79.95

bhi

Noise cancelling products

Bhi NES10-2 Noise eliminating speaker... £99.95



Hy-gain Antennas

AV-16VS 10-80m 5.48m 1500W	£164.95
AV-12AVQ 10-20m 4.1m 1500W	£199.95
AV-14AVQ 10-40m 5.5m 1500W	£269.95
AV-18AVQ 10-80m 5.48m 1500W	£359.95
AV-620 6-20m 7m 1500W	£459.95
AV-181TJR 10-80m 11.88m 5000W	£479.95
DX-88 10-80m 7.54m 250-1500W	£489.95
AV-6160 6-160m 13.1m 1500W	£519.95
DX-774 10-40m 8.8m 1500W	£579.95
AV-18HT 10-80m 16.13m 1500W	£1399.95

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Mobile Antenna Mounts

TRIMAG-S Triple magnetic mount with SO239 antenna fitting with 4m RG58 and PL259 fitted - ideal for those 'larger' antennas... just £39.95

TURBO-S single 170mm magnetic mount with SO239 antenna fitting with 4m RG58 and PL259 fitted - will suit most antennas upto 5ft... £19.95

HKITHD-SO Heavy duty hatch back mount with SO239 antenna fitting with 4m RG58 and PL259 fitted... £32.95

HKITHM-S Mini hatch back mount with SO239 antenna fitting with 4m RG58 and PL259 fitted... £32.95



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Multiband Mobile

Why buy loads of different antennas when Moonraker has one to cover all! SPX series has a unique fly lead and socket for quick band changing

SPX-100 9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W comp ele with 38th PL259 or BNC fitting to suit all applications, mobile portable or base - brilliant! £44.95

SPX-200S 6 Band plug n' go mobile, 6/10/16/20/40/80m, Length 130cm, Power 120W, PL259 fitting £44.95

SPX-300S 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W PL259 fitting £59.95

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VHF/UHF Mobiles

GP151 Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 76cm complete with 4m cable and PL259 £29.95

MRM-160 MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC £19.95

MR700 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting £9.95

MR777 2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting £19.95

MRQ525 2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality) £19.95

MRQ500 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality) £26.95

MRQ750 2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality) £36.95

MRQ800 6/2/70cm Gain 3.0dBu/5.0/7.5dBd, Length 150cm, PL259 fitting (high quality) £39.95

MRQ273 2/70/23cm Gain 3.5/5.5/7.5dBd, Length 85cm, PL259 fitting (high quality) £49.95

MRQ900 10/6/2/70cm Gain 10m (2.15dB) 6m (2.5dB) 2m (2.8dB) 70cm (5.5dB) Length: 125cm PL259 fitting £49.95

Bhi DSPKR Amplified DSP noise cancelling speaker... £129.95

Bhi Desktop speaker... £179.95

Bhi Dual In-line noise cancelling unit... £179.95

Bhi NEIM1031 MKII noise eliminating inline module... £149.95

Bhi Radamate compact keyboard for FT-817/857/897... £89.95

hy-gain

Tarheel Antennas

Baby Tarheel 7.54MHz 200W	£399.95
Little Tarheel II 3.5-54MHz 200W	£449.95
Little Tarheel II-HP 7-54MHz 500W	£449.95
Tarheel 40A-HP 7-32MHz 1500W	£499.95
Tarheel 75A 3.3-30MHz 250W	£499.95
Tarheel M100A-HP 3.2-29MHz 1500W	£529.95
Tarheel M200A-HP 3.2-26MHz 1500W	£529.95
Tarheel M300A 1.7-28MHz 250W	£529.95
Tarheel M400A 1.6-26MHz 250W	£529.95

Accessories

MT-1 Antenna mount for 100,200,300,400 mobiles	£149.95
LTMT-1 Antenna mount for LT-II	£119.95

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Single, Dual, Triple and Quadband Verticals - we have the lot

Diamond quality - Moonraker prices! These high gain antennas have been pre-tuned for your convenience, easy to use, easy to install, and a choice of connection... look no further

SQBM100P 2/70cm 3.0/6.0dBd, RX 25-2000MHz, Length 100cm SO239... £49.95 special offer £39.95

SQBM200P 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239... £54.95 special offer £44.95

SQBM500P 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239... £74.95 special offer £69.95

SQBM800H 2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type... £139.95 special offer £99.95

SQBM1000P 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239... £84.95

SQBM223N 2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type... £79.95

SQBM4010P Quadband 10/4/2/70cm Gain 2.5/3.2/5.6/5.6dBi Length 120cm... £69.95

SQBM6010P Quadband 10/6/2/70cm Gain 2.5/3.0/5.6/5.6dBi Length 120cm... £69.95

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HF Wire Antennas

All our HF wire antennas are made with complete waterproof potted baluns and high quality "original" fluxweave antenna wire.

MDHF-80 3.5MHz balun matched mono dipole, length 40m... £59.95

MDHF-40 7.0MHz balun matched mono dipole, length 20m... £44.95

MDHF-20 14MHz balun matched mono dipole, length 10m... £39.95

QSHF-80 3.5-30MHz balun matched off set dipole, length 40m... £59.95

QSHF-40 7.0-30MHz balun matched off set dipole, length 22m... £44.95

QSHF-20 14-30MHz balun matched off set dipole, length 11m... £39.95

LWHF-160 1.8-50MHz unun match end fed antenna, length 42m... £49.95

LWHF-80 3.5-50MHz unun match end fed antenna, length 20m... £44.95

LWHF-40 7.0-50MHz unun match end fed antenna, length 10m... £39.95

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Get great results with the Moonraker range of HF mobiles!... from as little as £22.95!

HF Mobiles

AMPRO-10 Slim line design 28MHz 2m approx. 3/8th fitting... £22.95

AMPRO-11 Slim line design 27MHz 2m approx. 3/8th fitting... £22.95

AMPRO-12 Slim line design 24MHz 2m approx. 3/8th fitting... £22.95

AMPRO-15 Slim line design 21MHz 2m approx. 3/8th fitting... £22.95

AMPRO-17 Slim line design 18MHz 2m approx. 3/8th fitting... £22.95

AMPRO-20 Slim line design 14MHz 2m approx. 3/8th fitting... £22.95

AMPRO-30 Slim line design 10MHz 2m approx. 3/8th fitting... £22.95

AMPRO-40 Slim line design 7MHz 2m approx. 3/8th fitting... £22.95

AMPRO-60 Slim line design 5MHz 2m approx. 3/8th fitting... £24.95

AMPRO-80 Slim line design 3.5MHz 2m approx. 3/8th fitting... £27.95

AMPRO-160 Slim line design 28MHz 2m approx. 3/8th fitting... £89.95

Other frequencies available. Call or see online for more details.

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Our website shows real-time stock so you can buy with confidence



Cable	
RG58 Standard, 5mm, 50 ohm, per metre	£0.35
RG58-DRUM-50 Standard, 5mm, 50 ohm, 50m reel	£14.95
RG58-DRUM-100 Standard, 5mm, 50 ohm, 100m reel	£24.95
RG58M Mil spec, 5mm, 50 ohm, per metre (best seller)	£0.60
RG58M-DRUM-50 new 50m reel of mid spec RG58 in a great handy size only	£24.95
RG58M-DRUM-100 Mil spec, 5mm, 50 ohm, 100m reel	£44.95
RG11108 Mil spec, 7mm, 50 ohm, in grey per metre (amateur favourite)	£0.75
RG11108-DRUM-100 Mil spec, 7mm, 50 ohm, in grey 100m reel	£64.95
RG213 Mil spec, 9mm, 50 ohm, per metre	£1.30
RG213-DRUM-50 Mil spec, 9mm, 50 ohm, 50m reel	£59.95
RG213-DRUM-100 Mil spec, 9mm, 50 ohm, 100m reel	£109.95
WESTFLEX103 Mil spec, 10mm, 50 ohm, per metre	£1.50
WESTFLEX-DRUM-50 Mil spec, 10mm, 50 ohm, 50m reel	£69.95
WESTFLEX103-DRUM-100 Mil spec, 10mm, 50 ohm, 100m reel	£129.95
300-20M Ladder Ribbon, best USA quality, 300 ohm, 20m pack	£17.95
300-DRUM Ladder Ribbon, best USA quality, 300 ohm, 100m reel	£69.95
450-20M Ladder Ribbon, best USA quality, 450 ohm, 20m pack	£19.95
450-DRUM Ladder Ribbon, best USA quality, 450 ohm, 100m reel	£79.95

Antenna Wire

Perfect for making your own antennas, traps, long wire aerials etc.

SEW-50 Multi stranded PVC covered wire, 1.2mm	£19.95
SCW-50 Enamelled copper wire, 1.5mm	£24.95
HCW-50 Hard Drawn bare copper wire, 1.5mm	£29.95
CCS-50 Genuine Copperweld copper clad steel, 1.6mm	£29.95
FW-50 Original Fleweave bare copper wire, 2mm	£34.95
FWPVC-50 Original clear PVC covered copper wire, 4mm	£44.95
FW-100 Original high quality Fleweave antenna wire, 100m reel	£59.95
FWPVC-100 Original PVC coated Fleweave antenna wire, 4mm, 100m reel	£79.95

Rigging Accessories

Get rigged up, for full list of all options visit our website!

PULLEY-2 Adjustable pulley wheel for wire antennas, suits all types of rope	£24.95
GUYKIT-HD10 Complete heavy duty adjustable guying kit to suit up to 40ft masts	£54.95
GUYKIT-P10 Complete light duty/portable guying kit to suit up to 40ft masts	£39.95
SPIDER-3 Fixed 3 point mast collar for guy ropes	£5.95
SPIDER-4 Fixed 4 point mast collar for guy ropes	£6.95
PTP-20 Pole to pole clamp to clamp up to 2" to 2"	£5.95
DPC-W Wire dipole centre to suit either 300 or 450ohm ladder line	£5.95
DPC-S Wire dipole centre to suit cable lead connections	£6.95
DPC-A Dipole centre to suit 1/2 inch aluminium tube with terminal connections	£7.95
OPC-38 Dipole centre to suit S0239 socket with two 3/8th sockets to make mobile dipole	£6.95
OOBONE-S Small ribbed wire insulator	£1.00
OOBONE-L Large ribbed wire insulator	£1.50
OOBONE-C Small ceramic wire insulator	£1.20
EARTHROD-C 4ft copper earth rod and clamp	£24.95
EARTHROD-CP 4ft copper plated earth rod and clamp	£16.95
GS9V-ES In-line S0239 replacement socket for 300 or 450 ohm ladder line	£6.95
AMA-10 Self amalgamating tape for connection joints, 10m length	£7.50

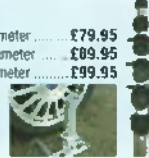
Mounting Hardware & Clamps

We have all the mounting brackets you could possibly want - for all options see our website

TRIPDD-HDA Free standing, heavy duty, fold away tripod, which adjusts from 50-65mm	£149.95
TRIPDD-26L Free standing heavy duty tripod to suit masts 65mm or less	£79.95
TRIPDD-20L Free standing heavy duty tripod to suit masts 2 inch or less	£74.95
TRIPDD-15L Free standing heavy duty tripod to suit masts 1.5 inch or less	£69.95
TK-24 Heavy duty galvanised pair of T & K brackets, 24 inches total length	£29.95
TK-18 Heavy duty galvanised pair of T & K brackets, 18 inches total length	£24.95
TK-12 Heavy duty galvanised pair of T & K brackets, 12 inches total length	£19.95
SO-9 Heavy duty galvanised single stand off bracket, 9 inches total length	£9.95
SO-6 Heavy duty galvanised single stand off bracket, 6 inches total length	£6.95
CHIM-D Heavy duty galvanised chimney flashing kit with all fixings, suitable for up to 2 inch	£24.95
CAR-PLATE Drive on bracket with vertical up stand to suit 1.5 or 2" mounting pole	£24.95
CROSS-2 Heavy duty cross over plate to suit 1.5 to 2" vertical to horizontal pole	£14.95
JOIN-200 Heavy duty 8 nut joining sleeve to connect 2 X 2" poles together	£19.95
PTM-S Pole mounting bracket with S0239 for mobile whips, suits up to 2" pole	£19.95

Portable Telescopic Masts

LMA-S Length 17 6ft open 4ft closed 2-1" diameter	£79.95
LMA-M Length 26ft open 5.5ft closed 2-1" diameter	£89.95
LMA-L Length 33ft open 7.2ft closed 2-1" diameter	£99.95
CARPLATE-HDT brilliant drive on plate with tilt - ideal to be used in conjunction with the portable telescopic masts and only	£44.95
CARPLATE-HD without tilt	£24.95



Amplifiers

BLA350 1.5-30MHz 300W mains powered solid state amplifier	£659.95
HLA305V 1.8-30MHz 250W professional amplifier with LCD	£599.95
HLA300V+ 1.8-30MHz 300W all mode amplifier with fans	£429.95
HLA150V+ 1.8-30MHz 150W all mode amplifier with fans	£349.95
LA250V 140-150MHz 200W professional amplifier with LCD	£499.95
ULA100 420-440MHz 100W compact linear for 70cms	£399.95



20ft Swaged Mast Sets

These heavy duty masts sets have lovely push fit swaged sections to give a strong mast push. Ideal for portable or permanent installations

MSF-125 4 section 1.25inch OD mast set	£39.95
MSF-150 4 section 1.50inch OD mast set	£44.95
MSPX-150 heavy duty 2.65mm 1.50 inch OD mast set	£69.95
MSF-175 4 section 1.75inch OD mast set	£69.95
MSF-200 4 section 2.00inch OD mast set	£69.95
MSPX-200 heavy duty 2.65mm 2.00 inch OD mast set	£79.95



PAM Kit

A great portable freestanding tripod which can be extended to 4m. Perfect for field days at a perfect price. Just £59.95 complete



Telescopic Masts

TMF-1 Fibreglass mast * 4 sections 160cm each * 50mm to 30mm * Approx 20ft erect 6ft collapsed	£179.95
TMF-1.5 Fibreglass mast * 5 sections 200cm each * 60mm to 30mm * Approx 30ft erect 8ft collapsed	£249.95
TMF-2 Fibreglass mast * 5 sections 240cm each * 60mm to 30mm * Approx 40ft erect 9ft collapsed	£299.95
TMF-3 Fibreglass mast * 6 sections 240cm each * 65-23mm * Approx 50ft erect 8ft collapsed	£349.95



Patch Leads

PL58-0.5 1/2m Standard RG58 PL259 to PL259 lead	£3.50
PL58-10 10m Standard RG58 PL259 to PL259 lead	£8.95
PL58-30 30m Standard RG58 PL259 to PL259 lead	£16.95
PL58M-0.5 1/2m Mil Spec RG58 PL259 to PL259 lead	£4.50
PL58M-10 10m Mil Spec RG58 PL259 to PL259 lead	£12.95
PL58M-30 30m Mil Spec RG58 PL259 to PL259 lead	£27.95
PL213-10 10m Mil Spec RG213 PL259 to PL259 lead	£18.95
PL213-30 30m Mil Spec RG213 PL259 to PL259 lead	£39.95
PL103-10 10m Mil Spec Westflex 103 PL259 to PL259 lead	£29.95
PL103-30 30m Mil Spec Westflex 103 PL259 to PL259 lead	£69.95

(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)



Connectors

PL259-6mm Standard plug for RG58	£0.99p
PL259-9mm Standard plug for RG213	£0.99p
PL259-7mm Standard plug for Mini8	£0.99p
PL259-6C Compression type for RG58	£2.50
PL259-9C Compression type for RG213	£2.50
PL259-103C Compression type for Westflex 103	£5.50
NTYPE-6 Compression type plug for RG58	£3.95
NTYPE-9 Compression type plug for RG213	£3.95
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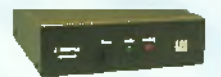
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19 Set Trials and Tribulations

Bill Kitchen G4GHB found an old 19 Set at a rally and has been busy getting it back into working order.



I've not been active on the amateur bands at all these last few months. I've been too busy trying to get my 19 Set working, which I acquired recently at a radio rally. They are rarely seen for sale at rallies nowadays. As a teenager, back in the 1970s, I remember hearing radio amateurs on the 40m band using amplitude modulation (AM), often using 19 Sets (which were available from a number of surplus emporia – ed). The set looked very clean inside on top of the chassis. It was sold 'as seen' and not knowing whether it was working or not, I decided to take a chance and buy it. I always assume 'as seen' means it's not working because a working set would be labelled as such and command a higher price.

I spent a week trawling the internet and found there were several variations of the 19 Set. I knew there was one with the lettering in English and one with the lettering in English and Russian. Apparently there were the Mk1, Mk2 and the Mk3 and to add to the confusion there was the British version, the Australian, the Canadian and the American RCA set. Four decades ago I bought the *Surplus Circuits* book and the 19 Set is in it but the circuit diagram gives no component values and is a bit

blurred. The full circuit diagram in my book is for the Mk2 version with changes shown at the end for the Mk3, which embodies several improvements. Perhaps the better-known and most commonly seen set is the one with the lettering in both English and Russian.

My 19 Set

My set is labelled 'Wireless Sets No. 19 Mk3, ZA10479, Ser. No. 72835'. It also says 'New 4/57' but that lettering appears to have been modified to read 58. The date on the meter says 1944 but that could have been changed at some time so I'm not sure when it was actually made. I assume it's a British set because there's nothing to indicate otherwise but there's no manufacturer's name anywhere. Written in red pencil on the bottom cover was the date it must have been looked at – 4/8/59 – as well as 'OK' and somebody's initials. According to information on the internet that may be when the PVC wiring was installed.

It has had the VHF B Set removed. I understand they were officially removed as better equipment became available. The wiring is all PVC covered and there are no paper capacitors. All holes are filled flush with the front panel. I have seen other sets

in which they use blind grommets in the holes. The paint on the front panel covering the holes is no different to the rest of the set and on the rear of the panel behind the holes it is spray painted the same colour as the front panel. There is also a label inside showing the valves used and their position in the set. It covers several holes and is varnished over but doesn't show the B Set valves. There are no marks of any screws or shakeproof washers having been used on any of the valve base fixing holes for the B Set. Did they manufacture any later models without the B Set fitted, I wonder?

Front Panel

On the front is a small panel with two switches for valve heaters, one for the intercommunication system and the other for the remainder of the set. There is another hole between these two that has been filled in. Because this panel is painted light blue, I believe it must have come from another set.

I have no 12-pin plugs for it so I improvised. I found a multi-pin connector from a computer would, if cut up into individual plugs, make a nice tight fit on to the pins of the 12-pin socket. They require tugging to pull them off. They wouldn't simply fall off and are insulated. It's not ideal for long-term use and perhaps I should look for the correct 12-pin plug, which would look better.

Power Supply

I have an inverter power supply, Fig. 1, that was removed from a valved Pye Cambridge many years ago and used in another project and I will use to supply the HT voltage. It's very useful so I will put it in a separate box so it can be used for other valve equipment if need be. That also leaves space inside the 19 Set to fit an audio output transformer, which is handy if I do an exhibition station so that other people can listen to the audio.

Problems Encountered

The problems I had with the 19 Set are listed below as they appeared.

1. The first thing I did was a visual check and saw that three capacitors needed replacing because they had visibly leaked wax although they were not the paper covered type but in an aluminium can. I'm not bothered about it being original and buying NOS (new old stock). Because I didn't have any to replace them with, I took a chance and left them in at first. I later replaced them. I want reliability and a working set and therefore used modern Mylar capacitors.

2. The slow motion drive didn't work on

receive but the main drive did.

3. Having found the pin connection information for the socket for various functions and connected my wires correctly, I switched on the heaters. There was no loud bang or flash so I connected 12V to the inverter and was rewarded with a nice healthy inverter whine. I did have everything fused just in case a large current was taken. I found the volume potentiometer to be very noisy. The only stages that appeared to work at this point were the last two audio valves. The old 'finger on the top cap grid' trick showed that they were working although the inverter whine changed as I turned the RF gain control, which indicated that stage should also be working. The HT from the inverter as measured on my multimeter is 250V but the 19 Set meter only indicates about 220V. There is probably due to an aged dropper resistor that has increased in value. Let's face it, it's most likely original and around 60 years old! Resistors do normally increase in value as they age.

4. A short while after switching on, smoke appeared near the mixer valve. I quickly switched off. I switched on again briefly and it seemed to be coming from the mixer coils, L8. The smoke stopped and never reappeared so I thought the damage was done but, funnily enough, there seemed to be nothing wrong when I later removed L8 and looked inside.

5. Switching on the following day, the BFO seemed to be working on RT and MCW as seen on my oscilloscope but not in the CW position and the receiver went silent in this position. I figured out that the switch was wrongly wired for switching between them so I had to rewire it. The audio still goes very low in the CW position so I need to look at this again to try to find the problem. Listening on headphones, the BFO still didn't work although the oscilloscope showed it to be oscillating.

6. Another inspection underneath showed that the BFO inner coaxial wire was not connected to anything. Referring to the circuit diagram, it needed to connect to the IF stage via a capacitor. Luckily the BFO circuitry is a separate clear diagram for the Mk3 set and I had a 100pF silver mica capacitor that I soldered in.

7. At the next switch-on there was electrical sparking from a soldered tag strip to chassis, simply cured by moving it further away but then it began sparking from the 'NET' switch. I found that the Paxolin insulation was dirty and cracked and had broken down so the switch needed replacing.

8. The oscillator/mixer stage wasn't working but the same valves would each



Fig. 1: The author's inverter PSU from a Pye Cambridge.

work as oscillators in the BFO. Out came the valve data books. The voltages on the valve seemed reasonable, which led me to look at the oscillator coils. After testing and checking the circuit, I decided the two feedback windings were open circuit so out came the oscillator coils. However, before removing it I made a drawing of where the wires and capacitors went to make it easier to put back without trying to remember or referring to the circuit diagram. Out on the bench I confirmed that they were open circuit and I could see what appeared to be a small area of green tarnish on one wire. I thought that's where the break was and corrosion had set in. As I took off the turns, the wire came free at that point and the same with the second coil but there was no obvious sign of a problem on that one. I get the impression this had been looked at before, the clues being resoldering of wires and one loose nut halfway up the screw holding the coil former on to the chassis. Somebody had not been too careful and very messy with their soldering because I found and removed numerous small blobs of solder everywhere throughout the chassis and on components.

Coil Rewinding

My next task was to rewind the coils. The first thing I did was to make a drawing of what I could see. There was no point in trying to guess which end of the wire goes

where afterwards and getting the phasing wrong. The two coils had to be connected in series and their centre point taken to the central lug on the base of the coil former. The original wire measured 0.004in on a micrometer, which would put it as 42SWG, and I assumed SCC (single cotton covered). I used 38SWG EN, enamelled wire, 0.006in, which I already had, then using a magnifying glass taped to an engineer's scribing block to see what I was doing and a loupe for closer inspection after I wound the coils.

The wires feed through holes in the former and down the centre to the lugs at the base, except from the bottom end of the top coil, which is taken to the halfway lug. After trying to get the wire from the top coil through the hole and down inside the former without any success, I fed a stiffer wire through the former from the bottom to the top on which I made a small hook and fed about one inch of the free end of the coil wire into the former. I then pulled the hooked wire down through the former to hook onto the wire, which was probably bunched up now inside, caught a loop and successfully pulled it through the bottom of the former.

The photo, Fig. 2, shows the original coils, just visible at the bottom of each main coil and wound over the main windings. The next photo, Fig. 3, shows the new coils, 11 turns and 14 turns, which I kept



Fig. 2: Original coils just visible at the bottom of each main coil and wound over the main windings.



Fig. 3: The new coils as described in the text.

the same as the originals. I was undecided whether to add a few more turns on each to keep the inductance value higher because I was using thicker wire. After an hour and a half and a couple of attempts, I had rewound the coils. It took this long because I wasn't too happy with the first two windings with gaps and wires crossing over each other. The windings were held in place with electrical insulating tape and epoxy resin glue applied to fix the ends in position and when dry, the insulating tape removed. I also glued the coils in two further positions to hold them in place and stop them springing apart. The coil former has the typical Army numbering system for parts, seen in Fig. 3 as ZA16883.

I'm very pleased with the result. This was the most fiddly part of getting the set going. The gunge at the top of the former is wax from one of the wax covered capacitors. I now think the smoke didn't come out of L8 but from the top of this coil and melted the wax as it was touching the coil. The top two turns have moved, possibly due to heat, and there was a waxy type of smell to the smoke. Again I found no actual fault to explain why this happened.

Out of interest I measured the inductance of my coils as $3\mu\text{H}$ for the smaller coil and $4\mu\text{H}$ for the larger one. I wonder how they compare with the original values and how it could affect performance. I thought I'd try increasing the inductance values by rewinding the coils with more turns to see what effect this has. Looking at my inductance charts, for the same winding length of 0.1in, the inductance appears to be $7\mu\text{H}$ for 42SWG and only $3\mu\text{H}$ for 38SWG. I'd need to increase the winding length to about 0.17in to bring it up to $7\mu\text{H}$. Given that it's working now, I'll leave this for later because there are still other things to sort out.

Band Switch

While the coil former was out I checked the band switch wiring. It looked correct. Both coils switched in for the lower frequencies and one was switched out to cover the higher frequency band. I did find an anomaly that experience and knowledge said looked wrong. The two bands had fixed capacitors and trimmers switched into circuit. One was 2,000pF and the other, where the marking was indecipherable but which I measured as just over 5,000pF, was switched in on the higher frequencies. Nevertheless, I replaced the coil former with its new windings, wired everything up and switched on. It worked but not very well and the PA control didn't tune the set at all. So out came the coil again and I swapped the two capacitors over, which put the

larger value capacitor and bigger trimmer on the lower frequencies. It worked much better after that.

Calibration

The receiver dial accuracy is not great. It reads 6.3MHz when tuned to 7MHz so that's another thing to sort out. I need to look at and adjust the oscillator capacitor to see whether I can get it to read more accurately. I tuned all the trimmer and padder capacitors and on the oscillator, the dial readout is more accurate now while the receiver gain also came up.

I also looked at the problem of very low audio when in the CW position. I need to look at the audio filter components because this seems to be the only thing that changes when on CW. As a temporary fix, I've bypassed the audio filter in order to get started on the transmitter. There's another good circuit diagram for this stage but again no component values. The information I have says it has negative feedback except at 1,000kHz, which is amplified. Could the resistors have aged in the R/C filter and increased in value so it no longer amplifies at 1,000kHz?

Because my set has been neglected over the years and probably stored in a shed at some time, all the screws are rusted solid. You need to be prepared to have to do some work on a set which is sold 'as seen' but I didn't expect to have to start rewiring switches. You never know what somebody else has done. However, how many modern radios will still be working after nearly 60 years and will those ICs still be available for repairs?

All this work and testing has taken several months so far but, again, I've not been looking at it every day.

On the Air

First results on receive using an indoor wire antenna have brought in several broadcast stations around Europe. With my outside wire another night on 40m I heard a German amateur on CW and two SSB stations in the UK. Another night I heard amateurs in the Netherlands, France, Italy and Switzerland, all on 40m CW, with only Shannon VOLMET so far on SSB in the 2.5-4MHz range. Frequency stability seems quite good.

Next Steps

Next I can start looking at the transmitter. What problems will I find there? Having a circuit diagram was a tremendous help in getting the receiver going. I would have been lost without one. The information in my book says communication is possible to about 10 miles on phone (R/T) and 20

miles when using CW. Remember that this is when using a 12ft tank whip antenna and variometer and with 540V on the PA valve.

It further says battery consumption is 7A on receive with its original power supply, which was with a dynamotor and rectifier valves, all of which take current. That's quite a bit different to my modern inverter, which knocks it down to 2.75A on receive and 1.6A with just the heaters on.

A first check on CW showed 3W out with less than 250V on the PA valve. Power consumption on transmit using my inverter is 1.9A, a huge difference from using the original dynamotor and rectifier valves, which according to my information takes a massive 11.4A.

The outer cabinet is now stripped and ready for spraying. I have fitted a BNC socket to replace the original antenna socket. The round volume control knob replaces the original knob for now because the screw is rusted in as are all the screws and it was simply rotating on the shaft. The screw was very mangled to start with. The only thing I can do is to try to drill it out or even glue the knob on to the shaft. There is already what appears to be a spot of glue on the very end of the shaft. It would be great if I could free the slow motion drive because the whole of the 40m band occupies only 3mm on the dial and requires delicate tuning to move frequency slightly.

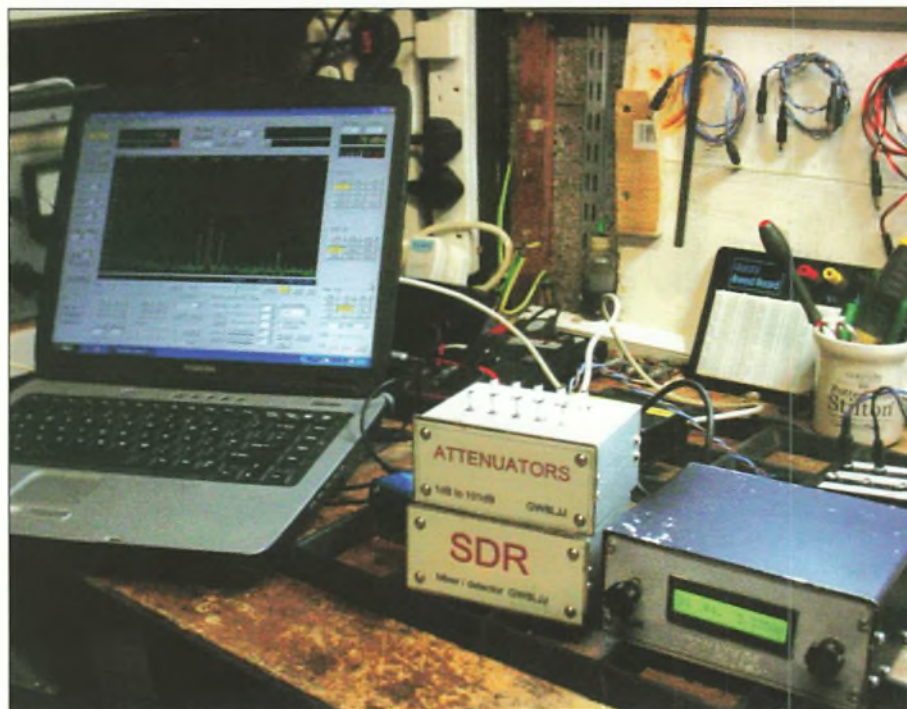
The problem of frequency drift as things warm up also needs to be addressed. I'll try adding one or more polystyrene capacitors to see if I can counteract the upward drift. It worked very well on my homebrew rig but that was using FETs. If this fails, I might make it crystal control only on transmit with my QRP frequency crystals, 5.262, 7.030 and 3.560MHz, and leave the receiver tuneable. The crystals could be fitted inside and each chosen from a front panel mounted rotary switch fitted in one of the B Set holes, which are blanked off at the moment. I'd need to do some rewiring but I could go straight to the QRP frequency without having to find it with a frequency counter as I do now. This would solve two problems – drift and finding the QRP frequencies. Drifting and chasing each other up the band might have been acceptable 30-40 years ago but not nowadays and on 60m I could easily drift out of our spot frequency allocation on 5.262MHz.

At the time of writing, I have two contacts made on Valve QRP Day using a vertical antenna with roller coaster, my first on 40m, with GØRGU 40 miles away and the second, G4ZXN at 80 miles, on 60m and only 2W out here.



An SDR Spectrum Analyser

Eric Edwards GW8LJJ returns, this time with an SDR-based spectrum analyser for checking out your transmitted signal.



Most radio amateurs will be familiar with SDR (Software Defined Radio) being the way forward for receiving as well as transmitting. This project is SDR-based but is not for a receiver, although it can be used as such. Rather it is a spectrum analyser, Fig. 1, and is used to check signal bandwidth along with any distortions. However, this analyser does need a VFO as used in a receiver, because it will be useful to move around the bands. Alternatively, crystals (four times the received frequency) can be used and the tuning made with the mouse or any

other pointing device on the computer. A bandpass filter is not required because the transmitter under test is directly connected, via a suitable dummy load and attenuator so as not to overload the SDR input. A VFO that has the capability of producing four times multiples of the test frequency is ideal. I use one that has a display showing the band frequency on an LCD (liquid crystal display) but delivers the multiple of that frequency to the SDR. It also needs to have an offset of about 10kHz lower than the transmitted frequency. This is standard in receive-only SDRs or, at least, in the ones I have used over the years.

The transmitter under test needs to be modulated and the best way is with a two-tone generator. These are two separate tones that are not harmonically related and are usually 700Hz and 1.9kHz. They have to be pure and typically are usually generated by Wien bridge oscillators with low THD (total harmonic distortion), otherwise difficulties will ensue. This two-tone oscillator is normally connected to the microphone input of the transmitter and the level set at approximately the same as, or a little lower than, the microphone used.

The Circuit

The circuit of Fig. 1 shows the complete SDR spectrum analyser. The VFO (or crystal oscillator) is separate along with the sound card. The VFO is connected via a 1nF capacitor into the first gate of a quad NAND gate (74LS00) configured in linear mode so that it can amplify the VFO sine wave (600mV). This is amplified to become a conditioned square wave at the output of the last NAND gate (pin 11) and is connected to a 74AC74 wired as a Johnson counter to provide the four phases of the wanted frequency. The gates of the 74ACT08 provide the Q and barQ signals from the 74AC74. These outputs are connected to the gates of a 74HC4066 multiplexer (mixer) and the outputs taken to the NE5532 preamplifiers, which select the correct combinations of Q and barQ to supply an amplified I and Q for the sound card. It is important to note the type of logic circuits here, which are selected for their speed. Standard TTL circuits will not work in these applications.

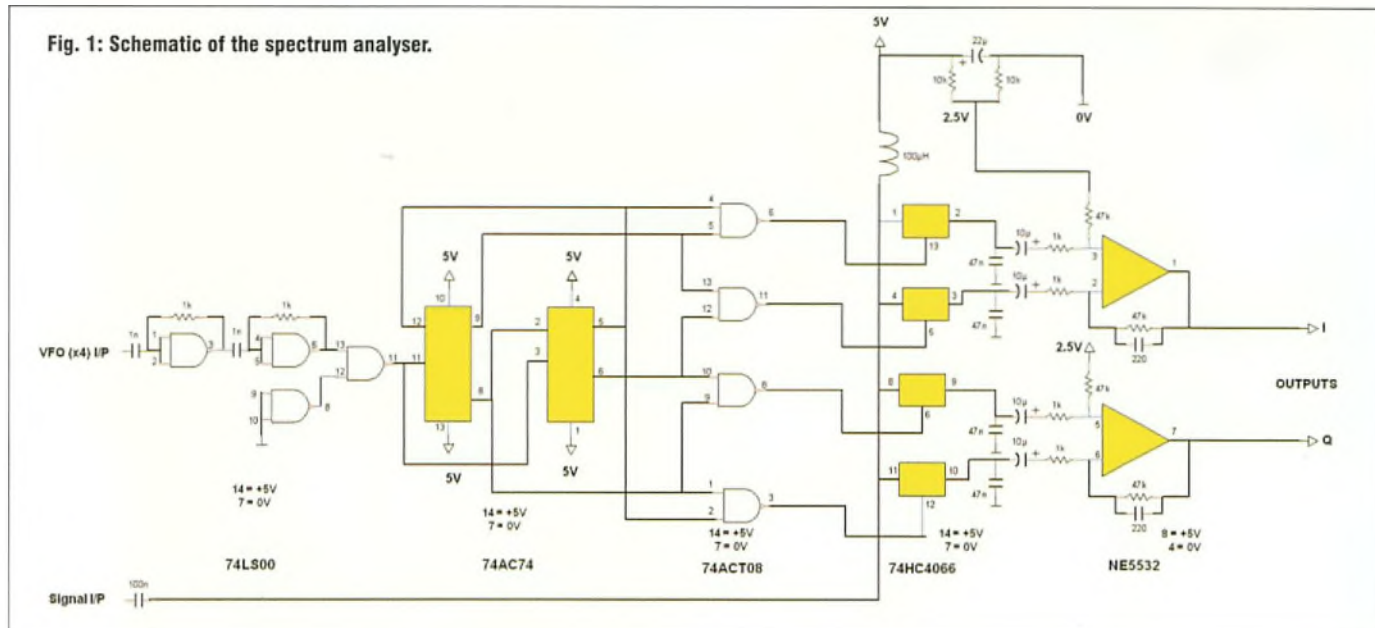
The front end of this analyser, everything up to the NE5532 preamplifiers, is borrowed from an article by Phil Rice VK3BHR, who has kindly permitted me to use his material here. Phil's project is a polyphase transmitter that I built. It works very well and I am currently on 60m with it along with a similar design polyphase receiver.

The NE553211 preamplifier stage is also borrowed, in this case from *Weaver Method SSB* by Hans Summers G0UPL, who has also kindly granted permission for its use. Indeed, most of my 'designs' are from data sheets and other material and much of what I do draws on other people's work and ideas, which I put together to achieve what I want out of the project.

How it is Put Together

The block diagram, Fig. 2, shows the attenuator connected to the signal input of the SDR with the VFO connected to the

Fig. 1: Schematic of the spectrum analyser.



oscillator input. The VFO is used to select the required band and frequency. This is limited, however, to the upper cut-off frequency of the oscillator. This VFO uses an AD9850 DDS module with its upper limit quoted as 40MHz and because it is used here at the four times multiple of the required frequency, it means that the highest useable amateur band is 30m (10MHz). The outputs from the SDR (I and Q) are connected to a sound card. This can be one installed in a computer providing it has two inputs or as shown in the block diagram, via a USB card. As with an installed card, this must have two line inputs. A lot of USB cards are mono so be sure to select one that has stereo inputs. There is free software for the computer display that can be downloaded from the internet – I use PowerSDR, which I find very useful. There are different versions so select whichever is most recent.

The SDR as seen in Fig. 3 is built with through-hole components, making it easy for anyone with reasonable soldering skills to construct. The PCB top view layout appears as Fig. 4.

Those with modern transceivers or ones that have provided good service over the years without any problems will probably think it is not worth testing on an SDR spectrum analyser. This could very well be the case and it could be a good way of setting up the SDR levels so that a known good standard is used for 'calibrating' the analyser. I used a homebrew polyphase transmitter exciter that produces about 100mW and is a design by Phil Rice VK3BHR mentioned earlier. It is useful because it has a choice of outputs – carrier, AM, DSB along with LSB and USB with and without carrier. Fig. 5.

The large square unit in the centre

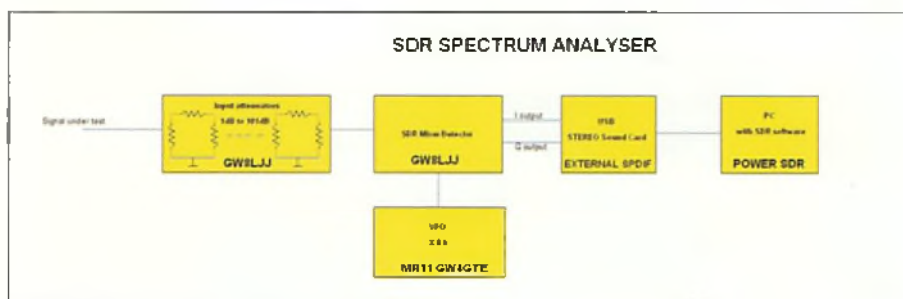


Fig. 2: A block diagram of the SDR spectrum analyser.

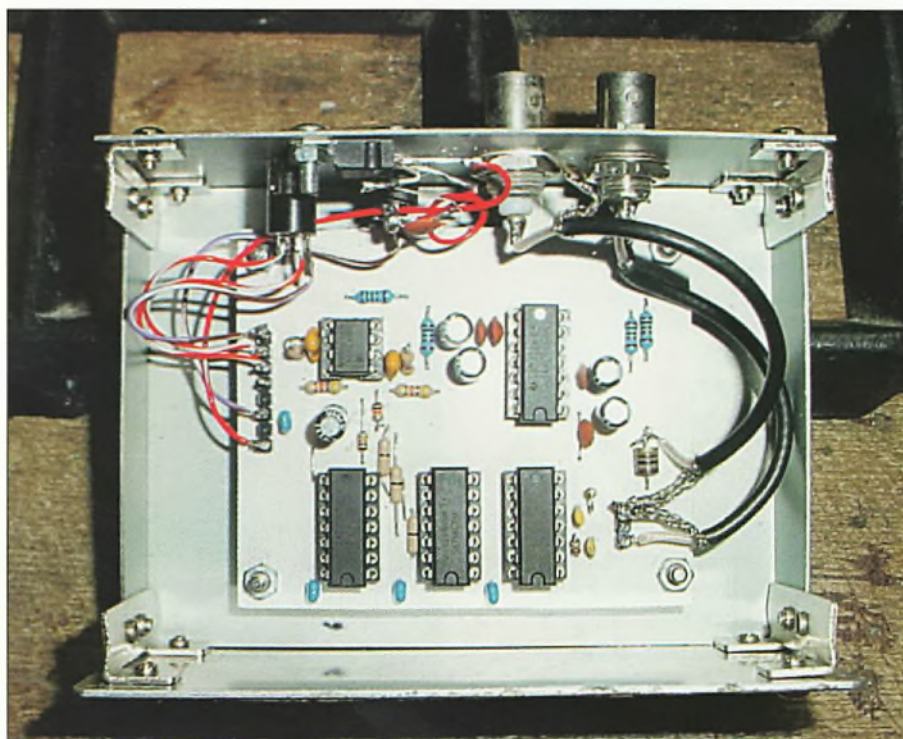


Fig. 3: The inside of the SDR unit.

is my MR11 test set for testing LCDs, DDS and the microcontroller (PIC). The MR11 was designed by Dave GW4GTE and details can be found on his website, below. To the left of this is the SDR and below that is the VFO (another MR11)

while on top is the attenuator. Below the SDR is the VFO (another MR11) and on top is the attenuator with connections between the exciter and bandpass input on the SDR.

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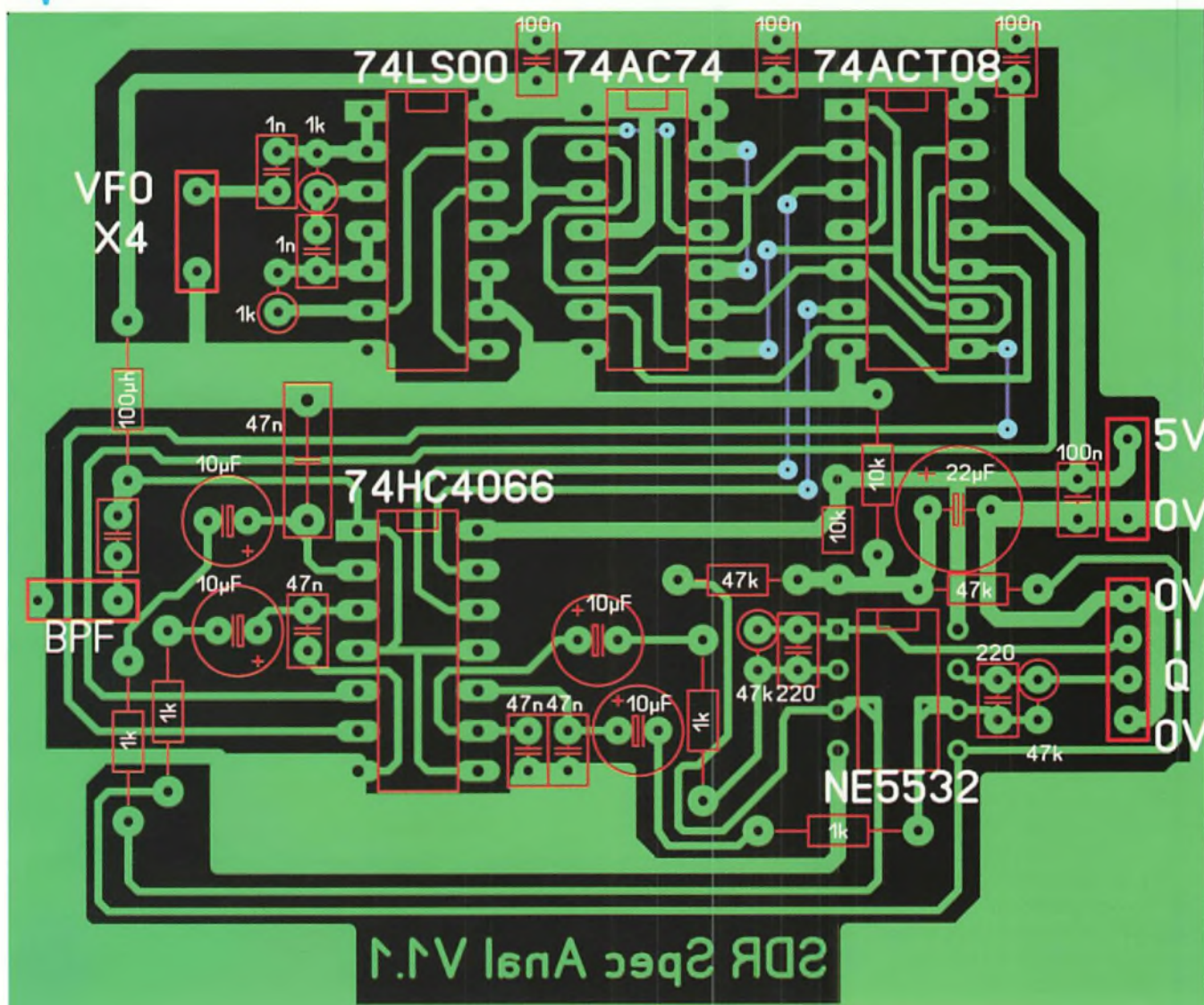


Fig. 4: The PCB layout (as seen from the component side). Also note this is not to scale.

In Use

With the software displayed on the computer screen and the units connected as shown in the block diagram, set the VFO frequency (remember the 4 x frequency needed) the same as the frequency of the transmitter under test. This VFO will need to be about 10kHz lower than the transmitter under test, as mentioned earlier, otherwise a large signal will appear in the middle of the display. After suitable attenuation from the output across a 50Ω dummy load, the transmitter output is directly connected to the SDR input attenuators and these are set for maximum attenuation prior to the start of the test. If a two-tone tester is available, turn this on to provide modulation for the SSB transmitter. The level should be set for a similar output as the average output from a microphone.

Set the SDR input attenuators so that a signal of between S7 and S9 appears when modulated and seen on the SDR screen. With the two-tone input modulating the transmitter, the result should appear as in Fig. 6. Setting the

display to see a waterfall as well as the panoramic display will appear as in Fig. 7. If the generated signal is too high (over S9 on the display), the modulation is too high

or the transmitter or amplifier is non-linear, then you can expect the display to look more like the screenshot of Fig. 8. There are many unwanted signals well out of the

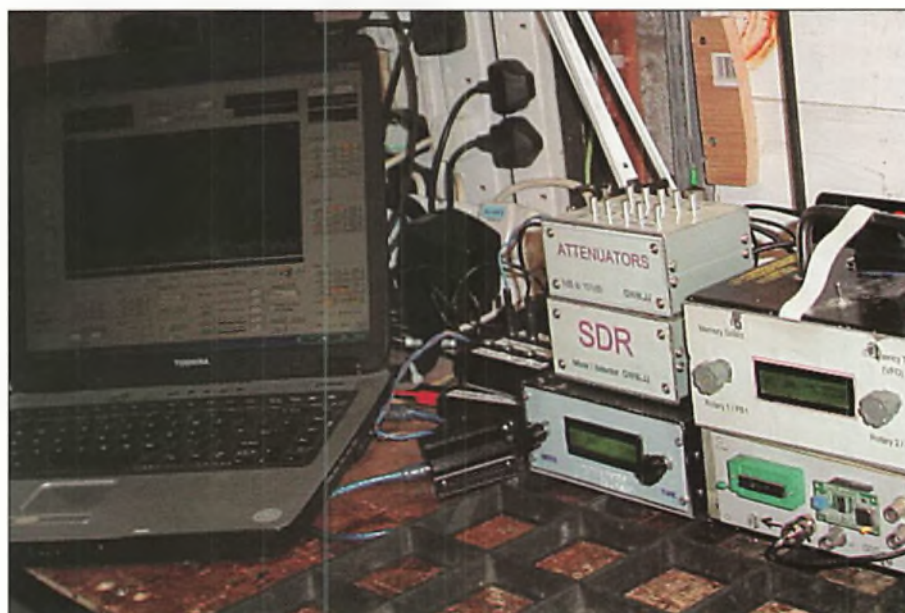


Fig. 5: The SDR on the left-hand side with the test exciter on the right-hand side.



Fig. 6: SDR display of a USB transmission modulated by a two-tone generator. The graduations are 6dB each.



Fig. 7: The waterfall display of a two-tone test. In this screenshot the USB transmitted signal is modulated by a two-tone test oscillator and it can be seen that there are no stray signals outside the two tones.



Fig. 8: Incorrect setup of a transmitter with the IMD created by over-modulation or non-linearity.

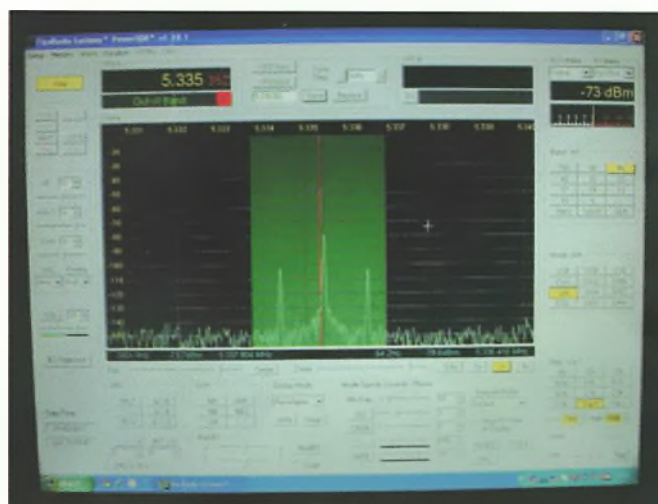


Fig. 9: A 1.9kHz single tone modulating an AM transmitter.

legally required bandwidth with radiation on both sidebands. You would certainly be in trouble if you were to transmit that signal on air! The SDR can also be used to check modulation levels and any problems with an AM transmitter as seen in Fig. 9.

Input Attenuators

I made the input attenuators with selections of 20dB, 10dB and 1dB and the

total on my unit is switchable from 1dB through to 101dB. It has been built from the information on the internet called 'Pi attenuator Calculator', which is available from Le Leivre.com (below). There is a lot of software on that site and the one I use is from the RF tools download label at the top of the page where you will see a lot of calculators, design aids and other useful tools. Click on the third one down,

which will bring up the calculator for the attenuators.

www.leleivre.com

For anyone interested in this project, I can supply a PCB and, if needed, any of the components with my usual non-profit, cost recovery prices. Please note that my e-mail address (at head of article) has changed since I last wrote for PW.

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CARRYING ON THE PRACTICAL WAY. £14.99 20 YEARS OF PROJECTS IN PRACTICAL WIRELESS

Since 1996, there has been an on-going series of small practical projects in the *Practical Wireless* magazine. The Rev. George Dobbs G3RJY has been the mainstay of this series by far, having written around 95% of the articles that appeared up to date. So, as a tribute to George's love of the hobby and to the other authors who take over the task of demonstrating that building your own projects is easier than you might think, we've collated them into one electronic archive.

Because of the wide-ranging subjects it's not easy to catalogue them, as there are around 230 articles to browse through. Some of necessity are similar in nature. Nevertheless, 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. All are part of the self-training aspect of the hobby.





An Improved RF Power Meter

Mike Richards G4WNC revisits his earlier RF Power Meter design, taking advantage of recent improvements in technology.

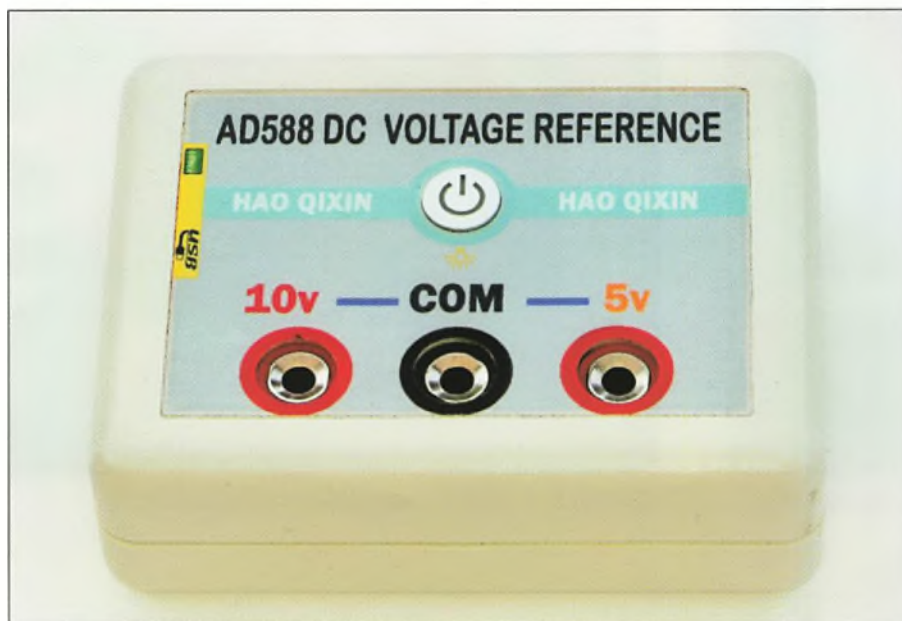


Fig. 1: AD588 calibrator from eBay.

Back in August 2015 I published a wide-range RF power meter design in *Data Modes* that proved to be very popular. As you can imagine, technology has moved on since then so I've been revisiting the design and thought I'd pass on my experiences over the next couple of months. This month I'm going to look at the thorny problem of calibration.

Probably the most common problem faced when homebrewing test equipment is that of measurement accuracy. It's relatively easy to build quite sophisticated measuring instruments like the RF power meter but how do you calibrate them when you've finished? Accurate commercial RF gear is very expensive and much of the cost is due to the high-grade components

that are necessary to guarantee accurate performance over a wide range of operating conditions. The solution to this dilemma comes from a mix of ingenuity and modern technology.

Making a Start

The most important measuring instrument in the shack is likely to be the multimeter

and I suggest you make sure you invest in a good quality instrument. Another essential item for those undertaking any SMD (surface mount device) work is an automatic component tester. I use the Peak Electronic LCR45 but there are others available. When building a project, I routinely use the LCR meter to quickly check every component before use. For SMD users, the dedicated SMD test clips from Peak Electronic make life a lot easier. The next problem is how to ensure that your multimeter is giving accurate readings. While it may have been spot-on when new, how do you know it's still accurate after a few years use? You can send the meter away for recalibration but there is also a simple homebrew solution thanks to modern reference voltage devices.

Analog Devices produce a range of very accurate voltage references that are designed to be used as the internal calibration reference in test equipment so they are also ideal for checking our equipment. Common devices are the AD588 and AD584 series that can produce multiple output voltages, making them ideal for use as calibrators. You will find ready-made calibrators using these devices available on eBay. I have an AD588-based calibrator and it appears to be fine but I'm a bit suspicious because of the price – the unit cost of a single AD588 device from UK suppliers is £21 while the eBay units sell for £18 as a complete calibrator with an internal lithium-ion battery and charger, Fig. 1. An alternative solution is to build your own reference and one of the easiest options is the AD780BNZ 2.5/3V voltage reference. This device is available in a standard 8-pin DIL package so is much easier to handle than many of the SMD variants. The AD780BNZ can handle an input voltage range of 4 to 36V and only requires a single external capacitor. The end result is a DC voltage reference that is guaranteed to be accurate to within 1mV with a maximum temperature drift of 3ppm/°C. I've shown a circuit of the complete reference in Fig. 2. You will see that I've added two 10µF

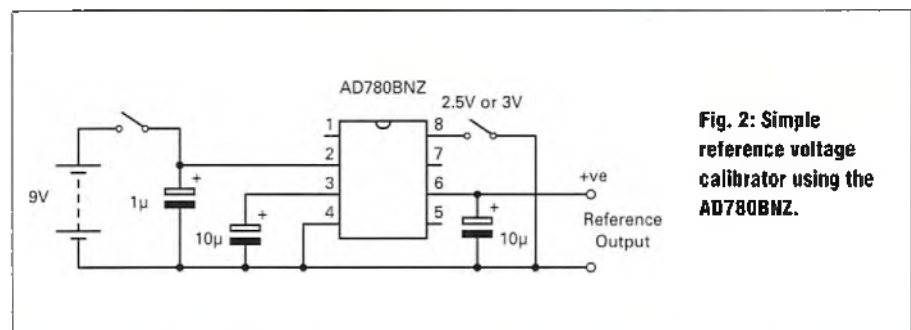


Fig. 2: Simple reference voltage calibrator using the AD780BNZ.

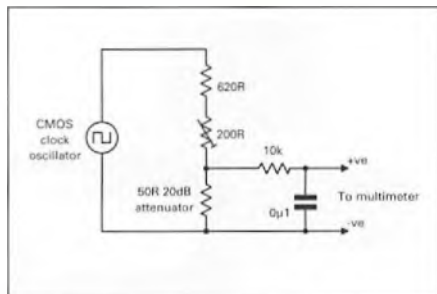


Fig. 3: Providing a stable load and calibration adjustment.

capacitors. These are optional and are used to reduce the, already very low, supply noise.

Using the Reference

You can use the 2.5/3V reference in a couple of ways. The simplest is to measure the reference with your multimeter to check its calibration. If there's a reading error, the difference between the reading you see and the true reference voltage is the correction factor that can be applied to other measurements taken using the meter. For example, if your meter reads 2% high, then you know that you need to reduce the displayed value by 2% when taking critical measurements with that meter.

The other, more adventurous option is to alter the calibration potentiometer in your meter so that the display shows the correct reading. Most digital multimeters use a high quality internal voltage reference that can be trimmed via an internal potentiometer to calibrate the meter. You can use this trimmer to adjust the displayed reading. Once this is set, the accuracy of the different current, voltage and other ranges is dependent of the quality of the dividing resistors. You should only attempt this calibration method if you are confident.

Getting back to my power meter project, to calibrate the power meter accurately we need to apply an RF signal at two different but accurate signal levels so that we can measure the slope of the AD8307 logarithmic amplifier and thus add the appropriate correction factor to the Arduino software. Getting an accurate RF source is a little more complex than in the multimeter example. However, I did find an old ARRL QEX article (Jan/Feb 2004) that offered a novel solution so I thought it would be worth updating that design to use currently available components. The original design, by **Bob Kopski K3NHI**, was for a simple RF calibrator based around a standard CMOS clock oscillator. These oscillators produce a square wave output that swings between about 0.5 and 4.5V when using a standard 5V DC power supply. It's important to make sure that the oscillator supports CMOS output levels

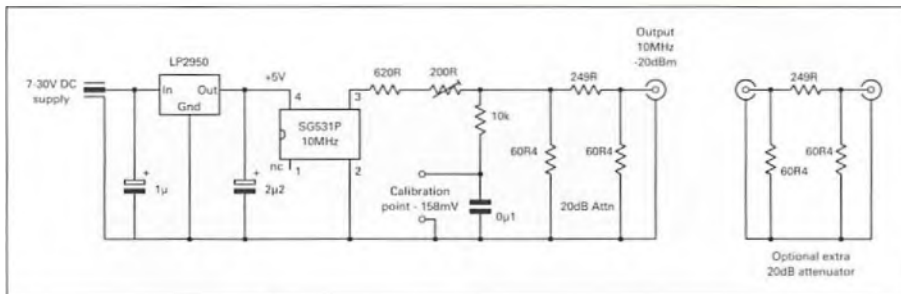


Fig. 4: Schematic of the Mk1 RF calibrator based on the original design by Bob Kopski K3NHI.

because TTL devices are not suitable. Providing the power supply is well regulated and the oscillator load is fixed, the oscillator output will have a predictable power level. While the predictability and repeatability are important first steps, we still need to be able to set the output to a known value that we can use for calibration.

The first step is to provide the oscillator with a stable load and then to devise a method to calibrate the calibrator. Now you may be thinking that puts us back to square one because we still don't have a calibrator! This is where the multimeter calibration I spoke of earlier comes into play. A square-wave signal that swings from 0.5 to 4.5V has a residual DC value that is half the peak-to-peak value. As a result, if we use a high impedance digital voltmeter and a small decoupling capacitor, we can measure this DC value with a simple multimeter. The direct output from the CMOS oscillator is way too high for our purposes but we can use a resistor chain to reduce the output with an adjustable trimmer to set a predetermined DC value at the calibration point, **Fig. 3**. In the original design, the calibration test point was set for a residual DC value of 158mV. The 158mV value indicates that the square wave at the input to the attenuator has a peak-to-peak value of 316mV. The next stage of the calibrator is a simple Pi-type 20dB attenuator to reduce the 316mV square wave down to a more usable 31.6mV. To complete the picture, we need to understand how AD8307-based log amplifier power meters react to square wave signals.

Power Measurement

Traditional power measurement, using laboratory grade equipment, is done by measuring the heat delivered into a resistive load. However, if we know that the load impedance and the signal waveform is primarily sinusoidal, we can calculate the power in the load simply by measuring the voltage across it. That is the principle employed by the AD8307 used in my power meter and many other power measurement systems. This is a very much simpler and cheaper option

than true power measurement and works well for most radio applications. While these devices are primarily designed to measure sinusoidal signals, they also give predictable readings when a square wave signal is applied. The power indication is exactly twice (+3dB) that of the power indicated by a sine wave of the same peak-to-peak value. If we apply that principle to the 31.6mV selected by Bob in his original design, the 31.6mV is equivalent to a 63.2mV peak-to-peak sine wave. Converting that to an RMS (root mean square) value: $63.2 \times 0.3535 = 22.3412\text{mV RMS} = -20.01\text{dBm}$. It turns out that you can also use this calibrator with true power measurement instruments but in that case the output should produce a reading of -23dBm instead of -20dBm. The calibrator even works with a spectrum analyser but in this case the power of the fundamental will be -24dBm.

Practical Calibrator

I've shown my adaptation of Bob's design in **Fig. 4**. The CMOS oscillator is a through-hole mounting type from Epson that delivers the appropriate CMOS output level at 10MHz with a frequency tolerance of 100ppm. I've replaced the original 78-series regulator with an LP2950 low dropout device in a plastic TO-92 case. This regulator provides load regulation of 0.05% and has a maximum input voltage of 30V so you can operate from your shack supply instead of the suggested 9V battery. I found setting the DC calibration level to be quite sensitive so I used a 24-turn 200Ω trimmer and that made calibration much easier. Do be careful not to use a wirewound potentiometer for the calibration trimmer because the added inductance of the wirewound element distorts the square wave and so compromises the calibration.

Because the self-calibration is done ahead of the 20dB output attenuator, it's important to use close tolerance resistors or you will compromise the accuracy of the calibrator. In the prototype I used 1%, thin-film, through-hole resistors for the attenuator. As you can see in **Fig. 5**, I used Schmart Board to build the prototype and mounted the finished unit in a small

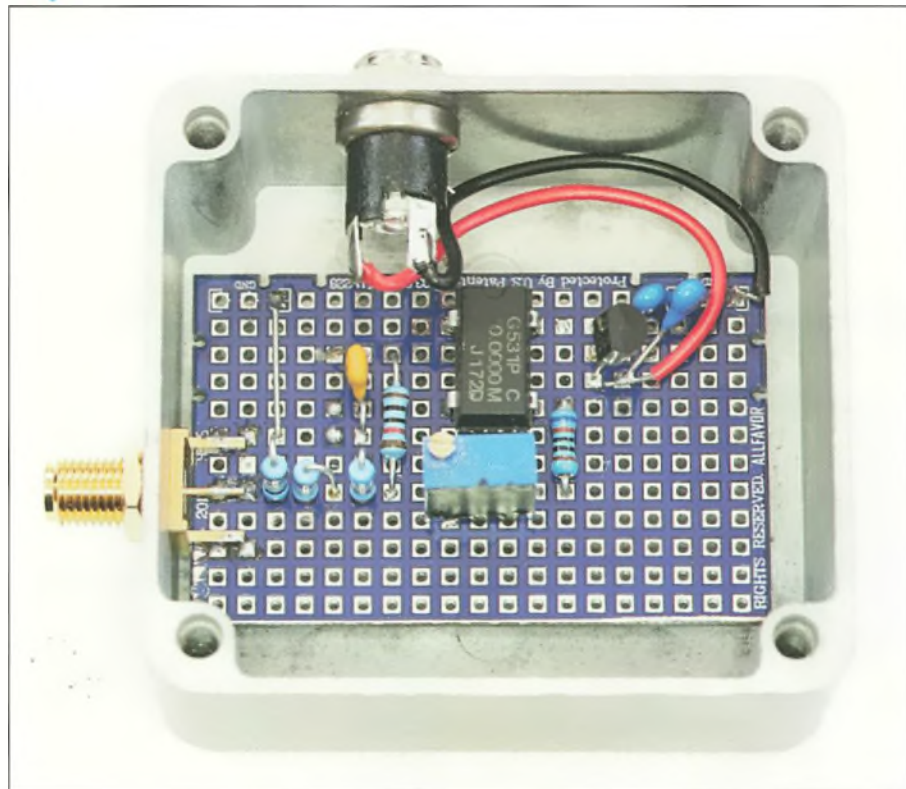


Fig. 5: Photo of the Mk1 RF calibrator.

diecast box. When powered with a 9V PP3 battery, the current consumption was just 10mA so a PP3 will have a very long life.

Improvements

The prototype has worked well for me but I can see a few improvements that I'm building into a Mk2 version. The first is to add a digital panel-meter to display the calibration voltage. A look through the RS Components catalogue revealed a few 3½-digit panel meters with very high accuracy priced around the £20 mark. After some research, I've decided to use the muRata DMS-20LCD meter complete with an optional bezel, Fig. 6. This meter offers a $\pm 200\text{mV}$ input range with an accuracy of one count ($\pm 0.05\%$) so is ideal. If you decide to go for this option, it's important to get the correct

meter. You need the 5V version because it's the only one that supports single-ended measurement from a common power supply. I've shown the exact details in the component list and Fig. 7 shows the Mk2 schematic. I have also been hunting, without success, for a panel-mount 200Ω multiturn potentiometer that's not wirewound. I can't use wirewound because the added inductance will mess up the square wave. For my own Mk2 I will be using the 24-turn trimmer shown in the components list but I'll fix it to the front panel so that the adjustment screw is accessible via a small hole.

That's it for this time and next time I'll show you some developments with the power meter.



Fig. 6: Miniature digital panel meter and bezel from muRata (The SD card is just for scale).

RF Calibrator Mk 1 Component List

- 1 x 10MHz CMOS clock oscillator (Epson SG531P) Farnell stock No: 121-6192
- 1 x LP2950 5V regulator
- 1 x $1\mu\text{F}$ 50V electrolytic
- 1 x $2.2\mu\text{F}$ 25V electrolytic
- 1 x $0.1\mu\text{F}$ 25V ceramic capacitor
- 1 x 620Ω 0.125mW carbon film resistor 5%
- 1 x $10\text{k}\Omega$ 0.125mW carbon film resistor 5%
- 2 x 60.4Ω 0.125mW resistors 1% or better
- 1 x 249Ω 0.125mW resistor 1% or better
- 1 x 200Ω , 24 turn trimpot (Vishay M64W201KB40) Farnell stock No: 960-B575
- 1 x Coax output socket
- 1 x Power socket

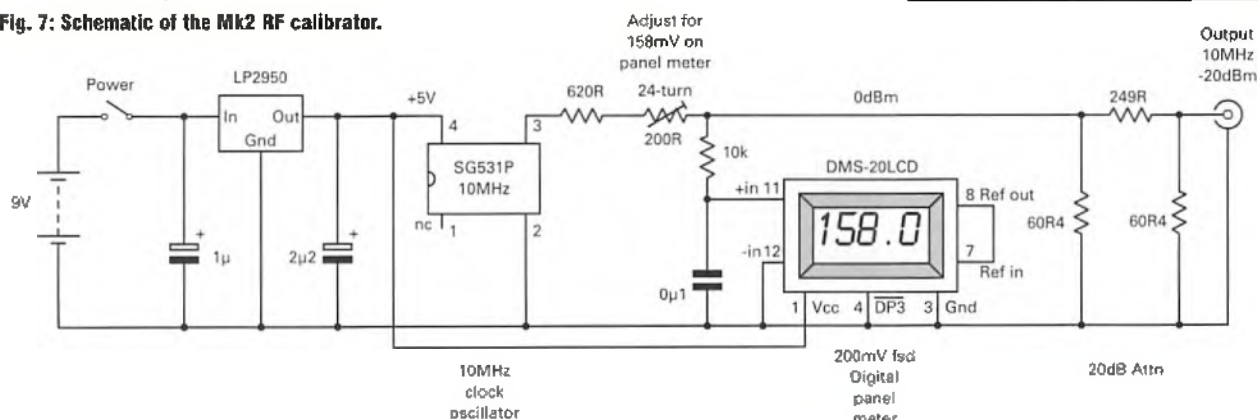
Additional components for RF Calibrator Mk 2

- 1 x Digital panel meter +200mV FSD 5V supply (muRata DMS-20LCD-0-5-C) RS stock No: 810-3328

Voltage Reference Component List

- 1 x $1\mu\text{F}$ 25V
- 2 x $10\mu\text{F}$ 15V
- 1 x AD780BNZ
- 2 x toggle switch
- DC output sockets
- 1 x PP3 9V battery

Fig. 7: Schematic of the Mk2 RF calibrator.



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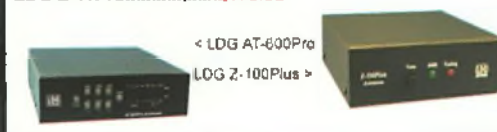
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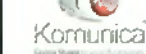
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Why VHF/UHF?

Tim Kirby G4VXE argues that the VHF and UHF have more to offer than ever, despite often seeming dead to the casual listener.

Recently, my stepson Lawrence was 'compelled' for transport reasons to come to a talk that I was giving at the Reading and District Amateur Radio Club about 'Simple Satellite Operating'. It was, as far as I was concerned, an enjoyable evening and it seemed to go well. Lawrence, at 18, is a bright lad, but is not interested in amateur radio in anything more than a fairly superficial sense. That's fine, of course! But I was intrigued to see what he made of the talk.

He said that he did his best to keep up but found the jargon and technicalities quite daunting. I hope that, for the average amateur, it was pitched about right but it did make me think about those who are newer to the hobby and what they might get out of such talks and more particularly, out of this column!

I suspect a lot of new licence holders probably head straight for HF. However, with a 10W limit at the Foundation level, although there's plenty of fun to be had on HF, it takes a certain amount of experience to find that fun and to avoid a lot of seemingly fruitless calling. Does VHF/UHF offer a worthwhile alternative? A perception from many people about VHF/UHF is, "I never hear anyone" – often said in a rather morose tone. Of course, they repeat that to everyone they speak to, which hardly encourages more activity!

Let's be honest. If you compare 2m FM or SSB to how it was in the mid 1980s, then there is a lot less activity apparent. If, say, you switch on once a week at irregular times and tune up and down the FM channels and the SSB segment of the band, you may well not hear anything. Even well-sited repeaters may be very quiet outside the main commuting hours.

What that doesn't mean, though, is that there is no activity. What we have seen in the last 20-30 years is that the shape of activity has changed hugely. In general, an average amateur probably spends

less of his/her operating time chatting (on phone or CW) but more time DX chasing or contesting, more listening, more time on different modes on more bands. So, whereas in the 1980s a newly licensed amateur would almost automatically be active on 2m FM and most likely SSB, that's not necessarily the case any more.

More to do than Ever

The truth is, however, that VHF/UHF activity is far more interesting now than it has ever been before. With the closer integration of computers and software in the hobby and the work of some very clever people, there is more and more that you can do on VHF/UHF from an 'average' station. I remember years ago, just after I was first licensed, my friend Mark David G4MEM saying, "in the future, you'll be able to do 10GHz moonbounce from a back garden and you'll be able to have contacts all around the world using a handheld". I've asked Mark to have a look at my lottery numbers but, unfortunately, he's not been so good at predicting those!

Moonbounce, on many bands, is very possible to the average radio amateur. You only have to take inspiration from the Essex DX Group, MX0CNS making contacts from a back garden with 50W or so, to a 2-element Yagi. If you simply tuned across the bands, you wouldn't be aware of that activity or of, say, a local digital voice gateway allowing worldwide contacts using D-STAR, DMR or Fusion and so it goes on. These are just two examples of VHF/UHF activity but there's plenty more from 50MHz up through UHF and microwaves to near-light.

If you're newly licensed, it would be great to hear from you to know what you're interested in on VHF/UHF, if indeed you are. And if there's something that you've heard about that you'd like more information on, please let me know and I'll be pleased to try to help. I'd like to try to convince you that there's more to VHF/UHF than you may initially have thought.

The 6m Band

Jim Edgar G4FVM (Eyemouth) says that the early months of the year are always pretty blank so he spends his time getting his radio, computers and antennas ready for the season ahead. This year, Jim says, there was very little help from either tropo or auroral openings although several times it looked as though something might happen but it didn't. March 21st looked promising and although Jim was hearing beacons on 6m, no auroral contacts resulted. Jim had all but given up when he thought he might find some auroral Es if he beamed north-east. Sure enough, SM2GCQ was coming in and Jim says that he made a welcome first SSB contact in months. Jim also noticed some improved meteor scatter (MS) conditions towards the end of March, working F6CEI, DM4IM and ON8DM on March 30th (I also saw a couple of reflections from you here, Jim).

Peter Taylor G8BCG (Liskeard) sends a fascinating log and notes that for at least some of March, his antennas were tied down for survival from the strong winds and storms. On March 12th, Peter noticed whispers of trans-equatorial propagation (TEP) on the band. On March 27th, the G2 magnetic storm provided some nice strong auroral signals into Cornwall. On April 4th, Peter went back on moonbounce and made six contacts, including 4O6AH for a new DXCC off the moon and KD7DCR for a new station worked by moonbounce (EME). On April 6th, Peter worked two further new stations by EME, JG1TSG and N4IL.

Jef Van Raepenbusch ON8NT (Aalter) has been running 50MHz WSPR and was heard by DK8NE (JO50) and DF0WSB (JO31) running 5W to a homemade horizontal dipole.

The 4m Band

Simon Evans G6AHX (Twynning) has done a bit of rebuilding since he lost some antennas as a result of Storm Doris. In the shack, he has bought a new Icom IC-7300, which gives him 70MHz multimode capability, with a half-wave vertical and a 3-element OWL Yagi for horizontal polarisation. Simon plans to put a 5-element up in due course. Since installing the new setup, Simon has operated in a couple of contests, working GU6WFB (IN89) during the March UK Activity Contest and G8SFI/P (IO94) during the 1st RSGB 70MHz contest. Outside contests, Simon has made some contacts with Geoff G3NPI (Buckingham) at his home and also when Geoff is out mobile. Geoff runs 100W into a halo antenna. On FM, Simon has successfully joined the

Dorset net run most Wednesday evenings by **Chris G0UZZ** on Bulbarrow Hill. The net starts around 2030 local time on 70.425MHz.

There was an aurora on March 27th, when Jim GM4FVM worked LA9BM on CW, followed by GI4SNA, OZ3OE, GM4JJJ and GM6CMQ on SSB, with the event being over by 1619UTC. Jim also made an MS contact with OZ1JXY on March 30th.

The 2m Band

During the aurora on March 27th, Jim GM4FVM worked GW8JLY and GM4JJJ on the 2m (144MHz) band.

Lyn Leach GW8JLY (Cardiff) writes, "On March 27th, I worked the following five stations via the aurora on 2m SSB – GI6ATZ (IO74AJ), GI4OWA (IO64IX), GM7EEY (IO86JC), GM4FVM (IO85WU) and GM4JJJ (IO86GB). I couldn't hear any of the long distance DX being worked on CW by stations farther to the north of my location in Cardiff.

"On April 8th, I noticed some weak tropo on 2m and worked DL6YBF (JO31OX) from home. Because there was a chance of working better DX from my portable location in IO81LS, I packed my car ready for a trip to my favourite portable spot on Bloreng mountain near Abergavenny at 550m ASL. After setting up my station I tuned the band but found absolute silence apart from some of the continental beacons, some of which were quite strong. A CQ call, however, raised DX from F, ON, PA and DL in the following locators: JO00, JO10, JO21, JO30, JO31, JO32, JO33, JO41 and JO61. My best DX was DL1PZ in JO41TH at 879km and DL4DWA in JO61QH at 1138km. I also heard DL1VPL in JO61UA but couldn't complete a QSO. After an hour or two, conditions were going down fast so I closed the IP station and headed home".

Peter G8BCG worked some new stations by EME during the month, including DM2BHG, RM8A, EA2AGZ and DK5LA (despite the geomagnetic disturbance).

Jef ON8NT enjoyed the March 2m contest on March 4/5th working G8T (JO01), G3M (JO01), G3CKR/P (IO92), G0JJG (JO02), F6HPP (JN19), G8W (IO90), DP5G (JO30), DL0LN (JO31), DL2ARD (JO50), DL6IAK (JN49), DL0MU (JO32), DR3A (JN49), DR1H (JN59), DA0FF (JO40) and DL4VAJ (JN39). During the UBA contest on March 12th, Jef heard DK1FG (JN59) as well as working ON5VU (JO30) and F0FIG (JO10). Using WSPR, Jef was heard by and heard PA0O (JO33) as well as F6DHA (JN19). Jef says that

WSPR on 2m is much underused so why not give it a go while your station is otherwise inactive.

The 70cm Band

Peter G8BCG uses a single LFA Yagi on 70cm (432MHz) and says that DK3WG had a nice (-18db) signal off the moon on March 10th.

Jef ON8NT took part in the Activity contest on March 14th, working G3XDY (JO02), G4RUL/P (JO00), G4CZP/P (IO90), G4NBS (JO02), G4CLA (IO92), G0GGT (JO01) and G0JJG (JO02).

Satellites

Kevin Hewitt ZB2GI writes to say that he operated from the top of the Rock (412m ASL) on March 16th and made his first transatlantic satellite contact through FO-29. Kev worked **Chris NK1K** (FN42) on a maximum 10° elevation pass. Chris was audible for about 90 seconds. A week later, Kev worked KB1PVH (FN42) on a 16° pass. On the same pass, KB1RVT in Vermont reported hearing Kev calling CQ and replied to him but unfortunately Kev didn't hear him. Kev was using an FT-897 and a 2m/70cm log periodic antenna tracked by hand. Kev uses the ISS Detector Pro application on his Android phone for pass prediction. He also mentions that the already complicated juggling of rig, antenna and phone was made even more 'interesting' by having to fend off Rock Apes! Closer to home, Kev also worked I8OHQ (JN70) and RN6BW (KN93) through FO-29.

Patrick Stoddard WD9EWK has been busy on the road promoting AMSAT and operating on satellites. He writes, "Another busy month here. Lots of operating and a nice road trip to Las Vegas at the end of March. Over 850 miles in three days, operating from five different grid locators in northwest Arizona and southern Nevada.

"The ARRL Nevada State Convention,

also known as NVCON, was held on March 31st through April 2nd in a small casino a few miles southeast of downtown Las Vegas. There were a bunch of hams and vendors from Nevada, California and Arizona. AMSAT was well represented, with a booth and demonstrations outside the hotel. In addition to that, I made stops at different locations to activate some rarely-heard grid locators.

"When I arrived in Las Vegas on March 31st, I had plans to drive about 90 minutes north to the DM26/DM36 grid boundary, which lies east of the Arizona/Nevada border. One of the other hams working with me at the AMSAT booth, **Joe K6WAO** (AMSAT's vice president of education), offered to ride along. We drove to that spot in the high desert and proceeded to work several satellite passes in the dark. Lots of contacts with stations all over North America.

"Lots of rover activity is being heard on the satellites once again. As I write this, **Gabe NJ7H** – who just drove north to Canada's Northwest Territories in late January – is mounting an 'invasion' of the Canadian provinces of Manitoba and Saskatchewan. Gabe just sat the Canadian Basic amateur exam and now has the Canadian callsign VE6NJH. To commemorate Canada's 150th anniversary, Gabe's planning on using the special CG prefix with his new callsign during this 'invasion'.

"Later in April, three satellite hams are planning to sail west of San Diego to the very rare grid locator DM02 and activate it for a day or so. The only land in this grid is San Clemente Island, a US Navy base that is almost impossible to visit. **Mike AI6GS**, **Wyatt AC0RA** and **Dave KG5CCI** plan on chartering a boat to sail in that grid locator, without approaching the island, and operating for approximately 24 hours. This may be the first time DM02 has been heard on satellites since 2011.



The March 21st aurora as seen from the Shetland QTH of Peter MM5PSL (photo courtesy of Ronnie Robertson).

DM02 is considered a continental USA grid for ARRL's Fred Fish Award, similar to the VUCC award but specifically for 6m operators making contacts with all grids in the continental USA. DM02 is rare on any band or mode because nowhere in the grid reaches the California coast.

"In May, AMSAT will have a presence at the new location of the Dayton Hamvention, southeast of Dayton in Ohio. Along with the booth, there will be a station working satellite passes for demonstrations during the three days of the Hamvention. It is possible that operators in parts of western Europe could hear – and work – AMSAT at the Hamvention".

Mark Marmont CT1FJC (Algarve) has been busy on the satellites, while waiting for the Es season to start on the lower VHF bands. He has particularly been enjoying FO-29 and making some great transatlantic contacts, including NS3L (FN20), K8YSE (EN91), KE4KOL (EM76), VE3HLS (FN03), WP4T (FK68), WB8RJY (EN72) and WB2SIH (FN31). Mark says that his satellite antennas are still on the rear terrace. Unfortunately, Mark's son-in-law who normally helps on the roof has broken his collarbone so that job has been postponed until later in the year.



Satellite operating from the top of the Rock of Gibraltar by Kevin ZB2GI.

With the news that the ISS digipeater is likely to be returning to 2m from 70cm, I thought it was about time to see whether I could bounce my signals through it, from here at G4VXE. Previous attempts on UHF, even with the Elk antenna, had been unsuccessful. I chatted to David Ryan M0GIW and Dave Boulton G7HCE on Twitter and they had some useful information to the effect that the ISS digipeater seemed 'deaf' at high elevations on UHF so lower elevations were more likely to be successful. The other key piece of information that helped

me was that, unlike on VHF, where the best signals from the ISS are horizontally polarised, on UHF the signals are much stronger vertically polarised. Armed with that knowledge, I was delighted to be able to bounce a position packet through the digipeater. During the following days, I was very pleased to make a packet exchange with M0GIW as well as hearing G7HCE and PD0RLX. It's noticeable that there are many fewer stations active on UHF than on VHF. Back on the NO-84 satellite on 145.825MHz, I was pleased to have an exchange with Dave G7HCE.

Jef ON8NT monitored the ARISS school contact on March 10th as well as operating through the NO-84 APRS satellite for the first time on March 22nd. Jef's packets were received by G7HCE, LA3QMA and SQ5MIA. Jef also worked EA4EOG (IN70) and EA2AB (IN83) via AO-85.

Well, that's it for this month. Hopefully by next month we shall have some news of Es openings. Please keep your news and information coming and don't forget, if you are new to VHF/UHF and would like me to cover something in the column, please let me know. I'd be pleased to do so.

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The Rally Season

Chris Lorek G4HCL gives some useful tips for rally buying.



Fancy a loudspeaker? There is a wide selection of everything at the annual Dayton Hamvention flea market!

We're now coming head-on into the summer rally season, where lots of second-hand bargains may, or may not, be found. So I thought it would be wise to give a few tips on what to buy, what not to buy, and how to prevent yourself being left with a 'dud'. Some of this advice I've given in the column many years in the past, yet much of it is new. Either way, I hope it proves useful.

What to Buy?

Firstly decide what you're after. A bargain at a rally isn't a bargain if you've no use for it! I fondly remember looking at a 1956 vintage British-made Murphy A252 walnut-cabinet domestic valve radio receiver some years ago at the Newbury radio boot sale, thinking 'that looks lovely' and it was exactly the same model I remembered from my early childhood days when staying at my aunt's house in Shropshire. I believed it would be priced above £100 plus as a collectors item but my lady partner asked 'how much?' The answer was £10 so I promptly bought it. Yes, it looks absolutely lovely and it's been a talking point. However, we've never used it and after a recent house move

to a smaller property with limited display space it's been in a cupboard for several months. Maybe one day I'll fish it out. Thus I'd advise readers to think about what type of equipment you're looking for and, as in an auction, stick to it and don't get carried away.

Assurance

Whatever you buy, you should ensure you have some assurance that the equipment is working and that you will be the legal owner after you've parted with your money. Some years ago I acted as an expert witness in Chesterfield Magistrates Court for an RSGB member who had been accused of having a stolen synthesised police handheld radio, when the police found it at his home. He said he'd bought it at a boot sale but he had no receipt, to which you can guess the expected reply! Fortunately, I'd also been at the very same boot sale and I'd taken a 35mm film-based photo of that very trestle-table stand with said radios on sale, for my forthcoming *PMR Conversion Handbook*, which was published a little later. I'd provided written statements and photographs to the court. I also knew, with evidence, that SMC (Northern) in Leeds also had a number of the very same radios in stock for second-hand

sale because I was employed by SMC at the time. Despite all this, the Crown Prosecution Service (CPS), for reasons best known to themselves, still continued with their attempted prosecution. They could not prove it was stolen because the radio serial number wasn't on their records and the case was thrown out of court with expenses granted by the court against the CPS. The radio was returned to the innocent defendant. Thus, please always take along some paper and a pen with you to get a receipt for your purchased equipment. If I hadn't intervened in the above example, the gentleman in question may well have ended up spending time in accommodation at Her Majesty's pleasure.

Working or Not?

Assuming you have a receipt for the equipment, which hopefully will say that it is in working order, then you have at least some redress. If the seller totally refuses to give you a receipt, I would advise that you immediately inform the rally organisers because I'm sure they do not want criminals trading on their site. However, many vendors will simply wish to sell their equipment as 'sold as seen' and will have noted this on the receipt. To be honest, I can often appreciate this reasoning. Thus you need to ensure it's working before you pay your money or otherwise take a risk (or, indeed, assume it isn't and ensure the price you have paid reflects that – maybe you were looking for a restoration project!). With mains powered base station equipment, this may be difficult to test in a boot sale environment with no available mains electricity (although 12V DC car battery to AC mains inverters are available at a moderate cost and if you already own one of these, then do take it with you!). At an indoor rally, though, there will surely be a number of mains sockets available.

So plug the equipment in and if it's an HF unit, attach a length of wire, say 5m or so, and check that the receiver will actually receive off-air signals. If it's a transceiver, then use a power meter and dummy load to check it's transmitting as expected. If you have a scanner receiver, preferably an all-mode receiver, then check the transmit audio. Here I'd advise you to either disconnect the scanner receiver antenna or to use the in-built attenuator to prevent receiver overload to ensure you don't



Boxes of goodies at the 2016 McMichael Rally in Reading.

suffer from distortion from the (hopefully!) strong local signal.

Base Stations

Base station rigs are usually the 'best buys' at rallies and radio boot sales, due to their weight and volume, which often would carry high carriage charges and the risk of damage in transit from a remote sale. You're also dealing directly with the seller so there's no auction commission unless it's at a 'bring and buy' stand where the organising radio club usually takes a small commission for the sale to pay for their stand and manning costs. This may also be to help their club funds, which you may well believe to be a better cause than paying commission to a commercial internet auction site.

Mobiles

Check again with mobiles as with base stations but here the power source will typically be 12V DC, which will let you check from a car battery supply, either the seller's if it's a car boot sale, or from yours. If it's a VHF/UHF mobile, then check with a local repeater or even the rally talk-in station that it's operable.

Handhelds

Likewise with handhelds, check that the transceiver operates. However, a sincere warning is that of rechargeable batteries. If the seller is genuine and honest, then they will no doubt have ensured that the transceiver's internal battery will have been fully charged the night before, ready for use on the day of sale. If it's flat, then beware and possibly ask "why?" I'd personally avoid buying such a handheld if the battery is useless because replacement bespoke manufacturer's rechargeable packs, if indeed they are still available, are likely to be only available

at a price that may be higher than the second-hand price of the handheld offered for sale. Typical battery packs will last around 500-1000 recharges so if, say, a handheld is three years old and the pack has been recharged overnight on a daily basis, it will probably be at the end of its life.

Accessories

Accessories are where you may well be lucky! Many second-hand sellers typically



Radios, test gear and more at the Friedrichshafen show in Germany.

have accessories such as power meters, 12V DC power supplies, antennas, coaxial cable and the like from the station they're selling and after selling the receiver or transceiver, these may be 'left on the shelf' (or trestle table) and you could indeed pick them up at a bargain price. Otherwise, if you see these alongside the equipment you're interested in, the seller may be prepared to do a deal or even throw some of them in if you pay the full asking price for the rig.

Bargaining

Although I've discussed the topic of bargaining before, some or perhaps many sellers will be prepared to accept a slightly lower amount than their asking price for the equipment on sale, as long as you are courteous about this. Don't point out obvious blemishes on the equipment such as cabinet scratches, replacement rotary controls and switches and so on because these will (or should) have been reflected in the asking price and the seller will, of course, be fully aware of them. If the seller doesn't have the original user manual for the equipment, then don't worry too much because these are now commonly available for internet download. Alternatively *PW's* sister publication, *Radio User*, has an annual reader offer of a 4-DVD set of 'Mods and Manuals' for virtually every model of hobby radio equipment for £5.00, including worldwide post and packing. Do, though, ensure that, if it's a transceiver, a microphone is supplied with your purchase – if it's an original manufacturer's microphone, so much the better. Otherwise, you'll be left with having to obtain another, which could be difficult unless you're prepared to wire up your own that you've bought from a third-party supplier.

Travel

If you've travelled to the rally or boot sale in your own car, then you'll hopefully naturally be in a position to bring your purchased equipment back home. Alternatively, if you've used public transport or you've shared transport with others such as a club mini-bus, then do ensure there's room for your equipment, particularly if it's bulky or heavy. I was once at a rally in Greater London, travelling by tube and train back to Hampshire, and I sadly had to decline to buy some wall-mounted Pye M290-based VHF and UHF repeater units due to their size and weight. I simply couldn't carry them. However, the seller kindly agreed to store them for me and I picked them up on my next visit to the area. Be aware also of the weight of equipment. I've seen a number of people at car boot sales with small boot-mountable trolleys to carry purchased items to their distant car, which is not a bad idea!

I hope this month's article has been of use and I wish readers happy hunting for the rally season. I'll be back next month with a further *Emerging Technology* article where I'll be looking at new advances in radio communication.



Burnham Beeches Radio Club



Members of the club at a DX Picnic at the QTH of Uri Grunewald G0BBB in 2016. In the picture are (l-r), Uri G0BBB, Paul Shaylor G6TSF, Trevor Clapp M0TDZ then 2E0LDZ holding the Bob Green M0HVV (SK) award for the club construction contest (Bob Green was an inveterate experimenter with magnetic loops using high power), Andy Birch M0YGB, Dave Chislett G4XDU and G8XCK holding the G0BBB award for greatest contribution to the club, James Birch 2E0KRX and Charlie G0SKA. The shield on the grass is the BBRC President's trophy for winning the club VHF/UHF contest, which in 2016 was also won by Trevor Clapp.

On Saturday and Sunday June 24/25th Burnham Beeches Radio Club (BBRC), in collaboration with the Corporation

of London, will be operating special event stations on HF and VHF from Lord Mayor's Drive, Burnham Beeches, Farnham Common, Bucks SL2 3LB using the callsign GB80BB.

One of the aims of the weekend, in addition to celebrating the Club's 80th anniversary, will be to demonstrate amateur radio to as many members of the public as possible. In addition to HF and VHF stations there will be a satellite station and a display of historic equipment. There may also be a participatory DF hunt.

Burnham Beeches is a 374.6 hectare biological Site of Special Scientific Interest west of Farnham Common. The southern half is owned by the Corporation of London and is open to the public. It is also a National Nature Reserve and a Special Area of Conservation.

The special event is timed to coincide with the ARRL Field Day for maximum

activity on HF bands. BBRC will provide a special QSL card (kindly sponsored by Martin Lynch and Sons) along with publicity material as handouts.

History

Slough Radio Club was formed in 1937 by a small group of radio amateurs and wireless experimenters. It held meetings in the Nag's Head, Windsor and in members' houses. With the outbreak of WWII, activities ceased when transmitters were confiscated by the authorities but after cessation of hostilities the club reformed.

In the late 1940s and the 1950s the club participated very successfully in contests, especially RSGB National Field Day, Fig. 1. Receivers were typically the National HRO and a working example will be on display at the celebration events. In those days transmitters and antennas were usually home-built.

In the early 1960s the club moved to its present premises at Farnham Common Village Hall and adopted its current name. BBRC became affiliated to the RSGB and in 1969 obtained the callsign G3WIR.

GE3WIR and GB75ER

In 1976 the club obtained permission from HRH Prince Philip, RSGB patron, to run a special event station to celebrate the Queen's Jubilee from the grounds of Windsor Castle using the callsign **GE3WIR**. Subsequently in 1988 the club was involved in running another special event station at Windsor Castle for the 75th Anniversary of the RSGB using the callsign **GB75ER**.

The Present

BBRC is flourishing with a membership in the region of 45. The club caters for most aspects of the hobby. Meetings are held twice a month on the first and third Mondays at 8.00pm. Activities include club project construction, a construction competition, fox hunts, a VHF contest, junk sales, a quiz, talks on antennas, radio propagation, data modes, use of oscilloscope/spectrum analyser, broken kit evening, Christmas meal and others. The club also organises weekend contest stations and 'DX picnics' on land owned by one of the members with overnight camping available.

McMichael Rally

BBRC is one of the founder members and a co-organiser of the McMichael Rally, held every July. This year's rally takes place on Sunday July 16th at Reading Rugby Football Club at Sonning.

The rally is named after **Leslie McMichael** whose McMichael factory in Slough produced many domestic and military radio sets in the 1920s to the 1950s. Leslie's callsign in 1912 was MXA. He was present at the founding meeting of the London Wireless Club, later to become the RSGB, at **Rene Klein's** house on July 15th 1913. After WWI he had 2FG as his home station callsign and 2MI as a business callsign, based at Stag Works, Kilburn, London NW6. With the introduction of the G prefix, he became G2FG and the 2MI callsign must have lapsed because in due course it was issued to **Arthur Milne** who for many years ran the RSGB QSL bureau.

Contesting

Some BBRC members have been active in the monthly RSGB AC cumulative VHF and UHF contests as part of the Triple B Contest Group, formed together with members of Bracknell Radio Club. In the 6m contest Triple B came 14th out of 78 and individual members took 4th and 5th positions out of 291 entrants, plus the leading Intermediate licence entry (**Trevor Clapp**, then 2E0LDZ, now M0TDZ).

On 2m, Triple B came 16th out of 105 clubs and members took the 4th, 18th and 68th positions out of 346 entrants. On 70cm, Triple B took 20th position out of 79 clubs and Trevor again secured the leading Intermediate licensee position.

Training

The club has a strong tradition of running training courses and examination sessions. Eleven passes were obtained at the most recent Foundation course last autumn and a further Foundation course is planned for later this year. Intermediate and Advanced courses are organised on an ad hoc basis according to demand.

Scouts Jamboree on the Air

Last October the club put on a station for the 1st Datchet Sea Scouts enabling over 50 Scouts to take to the microphone and there are plans to do this again next October.

The club gives a warm welcome to new members, whether licensed or not and annual membership is a nominal £17.50 per year. All are welcome and further information is available on the club website.

www.bbrc.info



Outside of the 80th anniversary QSL card.



Inside of the 80th anniversary QSL card.

Fig. 1: National Field Day 1949.



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WWFF

Colin Redwood G6MXL looks at the international World Wide Flora and Fauna awards programme.



Fig. 1: Carl Gorse 2E0HPI activating the Northumbrian Coast Special Protection Area (SPA) GFF-0337 in late March 2017 (Photo courtesy of Carl Gorse).

For some time I've been intending to cover the World Wide Flora and Fauna (WWFF) awards programme. I've previously hesitated because I found the supporting website rather unhelpful. However, this shouldn't put prospective participants off and hopefully this article will provide some help to get potential participants started. The website has also seen a number of useful improvements over recent months.

The Flora and Fauna movement within amateur radio commenced in 2008 and was initiated by the Russian Robinson Club as World Flora and Fauna (WFF). In November 2012 the programme was relaunched as an international amateur radio programme, designed to draw attention to the importance of protecting nature, flora and fauna and to encourage the development of radio skills, especially in portable operations. It is a non-commercial programme run by the in-country coordinators of national Flora and Fauna programmes.

The programme encourages radio amateurs to operate from designated national parks and/or protected nature areas around the world and, in turn, to draw attention to these areas while providing the amateur radio community with an interesting and rewarding activity. The WWFF award scheme is certainly proving popular, with over 2,000 amateurs registered on its website and over eight million QSOs logged from WWFF areas!

Activators & Hunters

WWFF defines three types of stations who can qualify for WWFF awards. Activators are amateurs who operate from within a designated WWFF reference area. Hunters are those amateurs who make contact with Activators who are operating portable from within a designated WWFF reference area, Fig. 1. Hunters may, for example, operate outside a WWFF reference area, making contacts with Activators. Hunters can operate from the comfort of their home shacks or elsewhere. Finally, there are also opportunities for listeners (SWLs) to participate in WWFF.

WWFF References

The WWFF awards are based on areas of countryside that are designated national parks, areas of outstanding natural beauty (AONB), national nature reserves (NNR) and similar by the relevant government bodies. The WWFF awards assign a unique WWFF reference to each of these areas. The reference consists of an ITU prefix (such as G, GW, GM and so on),

GFF-0097	active	Elapton Ley	EU / G	-	1
GFF-0098	active	Dorset Heathlands - Anne Roodbush RWS/RSPB	EU / G	[SW-Dx] WAB: DYSB	1
GFF-0099	active	Ballard Down	EU / G	-	1
GFF-0100	active	Garston Wood	EU / G	-	1
GFF-0101	active	Dorset Heathlands - Hock Heath WRR	EU / G	[SW-Dx] WAB: SUD0	1
GFF-0102	active	Lodmoor Country Park	EU / G	-	1
GFF-0103	active	Lundy Island	EU / G	-	1
GFF-0104	active	Nadziele Isle	EU / G	-	1

Fig. 2: Searching for WWFF references.

Fig. 3: Typical detail for a WWFF reference.

FF (for flora and fauna), followed by a number. So for example, Exmoor National Park has a WWFF reference of GFF-0006.

Complications arise in that there are areas within areas. For example, the Y Wyddfa (Snowdon) National Nature Reserve has reference GWFF-0087 but is situated within the Snowdonia National Park with reference GWFF-0074. The rule here is simply to use the most specific reference for the location you are operating from. In this case, that means that if you operate from within the Snowdon National Nature reserve, you use GWFF-0087 and not GWFF-0074.

Getting Started as an Activator

For someone starting out as WWFF activator, I think the biggest difficulty in the UK is to establish whether your proposed location qualifies for WWFF. If you are proposing to operate from a national park, then it certainly does, see Table 1. However, for other locations, the online database doesn't make it easy because the search facility doesn't provide any search by locator, Fig. 2, and isn't in any logical sequence that I can see. However, when you look at the detail of a WWFF reference, the locator square and Worked All Britain (WAB) squares are provided in many cases, Fig. 3. Remember that some WWFF references include large areas of countryside covered in part by many WAB squares.

As many Summits on the Air (SOTA) are located in WWFF areas, I found the cross-reference being put together by Andrew Banks MOYMA, see URL below, to be helpful. For example, Selworthy Beacon in Somerset (SOTA G/SC-005) counts towards an activation of WWFF GFF-0006 (Exmoor National Park). <http://m0yma.uk/uk-flora-fauna/gxlf-to-sota-cross-reference>

Pre-Activation Research

Almost certainly you'll need to do some research to establish the situation before deciding where to activate. You could start by looking through the WWFF references for the ITU prefix that you are in and make

Table 1: The WWFF references for National Parks in the United Kingdom.

Country	National Park	WWFF Reference
England	Dartmoor	GFF-0004
England	Exmoor	GFF-0006
England	Lake District	GFF-0008
England	New Forest	GFF-0010
England	North York Moors	GFF-0012
England	Northumberland	GFF-0013
England	Peak District	GFF-0014
England	South Downs	GFF-0018
England	The Broads	GFF-0019
England	Yorkshire Dales	GFF-0020
Scotland	Gairngorms	GMFF-0001
Scotland	Loch Lomond and The Trossachs	GMFF-0002
Wales	Brecon Beacons	GWFF-0073
Wales	Pembrokeshire Coast	GWFF-0015
Wales	Snowdonia	GWFF-0074

a note of any references that might be candidates. I'd then suggest looking up the nature reserve and related information using your favourite search engine, where hopefully you'll find a suitable map. All parts of your station need to be within the area covered by the WWFF reference.

Don't be put off if you first notice that the area that you are planning to operate from has a deleted status. In many cases these reappear further down the list following various reclassifications over the years. I should also warn readers that a number of overseas British dependencies, such as the Falkland Islands, were originally assigned a GFF reference and now have a deleted status in the England (GFF) section of the database. These now appear in the VP sub-section of the GxFF programme.

Landscape Designations

I found that searching the WWFF website without any knowledge of the various landscape designations in an area is rather difficult. Even with the recent improvements this isn't easy. There's no search by county, locator or map reference, for example. Things are improving as some WAB areas are being added. I found using my browser's 'find on

a page' with key words such as 'Dorset' helped me find many of my local WWFF areas.

You may find it helpful to use other internet resources to locate nature reserves, areas of outstanding beauty and similar in a region that you might wish to operate from and then to use these as the basis to search the WWFF database.

Logistics

You'll need to consider the arrangements for getting your station to the WWFF area. Unlike SOTA, the WWFF rules allow any form of transport. Be aware that some smaller nature reserves may have car parks just outside their boundaries. The WWFF rules allow any source of power to be used for activations, although potential activators will need to consider local regulations. The use of petrol generators would not be acceptable in many nature reserves so batteries or solar power are likely to be a better choice.

WWFF Frequencies

WWFF have suggested LF/HF frequencies for activators using SSB or CW, see Table 2. The suggested frequencies all end 44 (the same as the number of contacts required for an activation to gain credit).

Table 2: Suggested LF and HF frequencies (MHz) for WWFF activations.

Band	Phone	CW
80m	3.744	3.544
40m	7.144	7.024
30m		10.124
20m	14.244	14.044
17m	18.144	18.084
15m	21.244	21.044
12m	24.944	28.894
10m	28.444	28.044

Please use your Callsign as your username

Username:

Email:

☒ Subscribe our newsletter
Registration confirmation will be emailed to you.

Fig. 4:
Registering with WWFF is easy and a prerequisite to being able to have logs uploaded and applying for Activator or Hunter awards.

These frequencies are not mandatory and others are often used by activators. There are no specific WWFF frequencies for digital modes or the VHF/UHF bands.

Activation Accrual

For an activator to obtain full credit for activating a WWFF reference, a minimum of 44 contacts must be made. If you use a club or special event callsign, the requirement increases from 44 to 200 contacts. The 44 (or 200) contacts can be split over multiple bands, dates and modes. For example, working the same station on 20m phone, 20m CW and 20m data on the same date and repeating this the following day from the same WWFF reference would count as six contacts. Incidentally, there's no need to be portable to be an activator. You can activate from a vehicle or a permanent structure or even from your own home if you are located in a WWFF reference.

Submitting Activation Logs

There's no need for QSL cards for WWFF awards. The only way Activators can get credit for their contacts and Hunters can gain credit for their contacts with Activators is for Activators to send in their logs to be uploaded. Before doing so, you'll need to register with WWFF. Fig. 4. So no matter how few contacts you make as an activator, you should attach your log as either a .csv or ADIF (.adi) format file and, in the case of

Applying for: WWFF-H-10 for Colin G6MXL (using call-sign G6MXL)

Count	Reference	DXCC	Activator	Chaser	Date	Band	Mode
1	3BFF-0004	AF / 3B9	3B9FR (3B9FR)	G6MXL	2016-04-04	20m	SSB
2	5BFF-0002	AS / 5B	5B4AIX/P (5B4AIX)	G6MXL	2014-12-23	12m	SSB
3	5BFF-0003	AS / 5B	5B/R2DX (R2DX)	G6MXL	2013-03-10	12m	SSB
4	5BFF-0005	AS / 5B	5B/R2DX (5B4AIX)	G6MXL	2013-03-10	12m	SSB
5	CTFF-0012	EU / CT	CR5LSV (CR5LSV)	G6MXL	2013-08-17	20m	PSK
6	DLFF-0310	EU / DL	DJ2RG (DJ2RG)	G6MXL	2015-09-26	40m	RTTY
7	EAFF-0080	AF / EA8	EA8/DK1AX (DK1AX)	G6MXL	2017-01-11	20m	JT65
8	IFF-0435	AF / I	IG9/IV3TMM (IV3TMM)	G6MXL	2015-09-03	20m	PSK
9	OEFF-0072	EU / OE	OE3SGU (OE3SGU)	G6MXL	2015-02-08	30m	RTTY
10	OZFF-0001	EU / OZ	OZ/PA1H (PA1H)	G6MXL	2013-04-20	40m	SSB

Fig. 5: Some contacts made by the author towards the Novice Hunter Award.

the UK, e-mail it to regular PW contributor **Carl Gorse 2E0HPI** at: logs@gxfr.org.uk

The file should be named callsign@referenceYYYYMMDD. For contacts from the Snowdonia National Nature reserve on May 1st 2017, for example, I'd name my log file GW6MXL-P@GWFF-008720170501.csv (or .adi).

The easiest way of creating the .csv file is to download the template from the WWFF web site into Excel and then save the completed file in .csv format.

<http://wwff.co/LogTemplate.xlsx>

Alternatively, the latest version of the Fast Log Entry (FLE) program by **Bernd Koch DF3CB** now supports the creation of ADIF logs for both WWFF and SOTA. This is a useful way to create .adi files for WWFF activations. www.df3cb.com/file

Historical Activations

If you have operated from WWFF areas in the past, then you can have your contacts uploaded as far back as June 30th 2008. This could provide a kick-start to Worked All Britain (WAB) and Summits on the Air (SOTA) enthusiasts who have previously operated from qualifying WWFF areas. Likewise, it might also be worth digging out logs from various VHF/UHF activities from locations that might qualify as WWFF areas. For example, my contacts from Selworthy Beacon in Somerset (SOTA G/SC-005) that I described in the August 2015 *What Next* also count towards an activation of WWFF GFF-0006 (Exmoor National Park).

WWFF Awards

WWFF Awards are available to Activators, Hunters and listeners and come as electronic downloads (.pdf or .jpg formats). The required contacts must be in the WWFF LogSearch database – no other sources (such as paper QSL cards, LoTW or eQSL) are accepted. I've listed below a number of the WWFF Global awards. There are also some WWFF awards that are specific to certain countries.

Activator Awards

For Activators, the initial award is available for activating 11 different WWFF references, each with a minimum of 44



Fig. 6: The Novice Hunter Award for contacts with at least 10 WWFF areas.

WWFFwatch last refresh: 08:23:51

New Spot DX-Cluster GMA WWFF

03 Apr 0819	7132.0	IQ5QO/ISO	IFF-1027	de IT9BUW	iff-1027
03 Apr 0819	7081.0	F5NLX/P	FFF-2186	de F5MGS	wca f-06336 fff 2186
03 Apr 0818	3701.0	SP5UUD/P	SPFF-1428	de SP5UUD	spff-1428 pga-cy01
03 Apr 0817	7089	ON3YB/P	ONFF-0213	de PD3JAG	[wwff] calling CQ
03 Apr 0814	7132.0	IQ5QO/ISO	IFF-1027	de HB9FBG	cq cq iff 1027
03 Apr 0814	7081.1	F5NLX/P	FFF-2186	de F5MGS	fff 2186 --
03 Apr 0809	7092.0	TM62VIMY	FFF-1700	de F4HRG	fff-1700
03 Apr 0806	7081.0	F5NLX/P	FFF-2186	de ON5SWA	fff-2186
03 Apr 0806	14044.0	JA71C/P	JAFF-0168	de JA1BPA	jaff-168
03 Apr 0754	7089.0	ON3YB/P	ONFF-0213	de ON7NW	onff-0213
03 Apr 0751	7177.0	IQ5QO/ISO	IFF-1027	de IK1UGX	iff-1027
03 Apr 0749	14215.0	IQ5QO/ISO	IFF-1027	de OH3GZ	iff-1027
03 Apr 0747	7177.0	IQ5QO/ISO	IFF-1027	de IZ4AFM	iff-1027

Fig. 7: The filtered version of the DX Cluster.

contacts. Upgrades for each subsequent 11 WWFF references are also available.

The DXFF Award can be gained by activating WWFF references (again a minimum of 44 contacts in each) in three different DXCC entities.

There are also awards for activating WWFF references in different continents and for making contacts with other Activators.

For all of the activator awards, you must have had your log uploaded to the WWFF global database.

Hunter Awards

Life for a WWFF Hunter is much easier. Simply make contacts with WWFF stations and claim your awards when you have made sufficient contacts. You are totally reliant on Activators submitting their logs for uploading. There is no need

for Hunters to submit logs.

The Hunter awards start with a novice award, available for the first ten references worked – a reasonable level to encourage participation in the scheme. I discovered that over recent years I had already made enough contacts with Activators, Fig. 5, to obtain the Novice Hunter Award, Fig. 6. The next level up requires 44 confirmed references.

Applying for an Award

To apply for any of the WWFF awards, you must first register. If you haven't already done so. You then enter your callsign and search the results of your activity as a hunter or activator. If you qualify for an award, you can then apply online.

WWFF Rules

I'd certainly recommend reading the full

rules for the WWFF Awards programme. They contain a lot more information than I could provide in this article and can be found at:

<http://wwff.co/rules-faq>

WWFF Newsletter

I'd certainly recommend signing up for the weekly WWFF Newsletter that is available to registered users of the WWFF website. The newsletter is sent by e-mail. It contains reports of WWFF activations from around the world and future planned activations as well as updates to the WWFF programme and its supporting website.

WWFF DX Cluster

The WWFF website also includes a filtered version of the DX Cluster, Fig. 7, which makes it easy to see stations that have been spotted with WWFF references. This can be particularly useful once you get hooked on WWFF.

Conclusions

I hope that readers will be encouraged to operate from some WWFF areas this summer. There's certainly no shortage of places to operate from. The WWFF team in the UK are planning a UK-wide event for July 2017 so keep an eye on the WWFF website. If readers have any queries, then **Andrew Banks MOYMA**, who is the WWFF coordinator for GxFF areas will be pleased to deal with them: enquiries@gxfl.uk

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Coaxial Connectors

Following the recent discussions in PW about the best way to attach connectors, Tony Nailer G4CFY takes his life into his hands by giving his take on the subject.

The BNC and N-type connectors seem to be considered professional and for everything else there is much controversy and snobbery, particularly about the underdog of the coax world, the PL259.

December's *Star Letter* by Terry Bailey G6CRF on the subject of soldering PL259s has triggered a cascade of letters and divided the readership into those that choose to solder the braid and those that don't.

My Early Problems with PL259s

Before opening my shop in 1981 I had, like most other amateurs, always soldered the braid, because that what the various radio handbooks recommended. What I found subsequently was that

soldering the braid of RG8 or RG213 through the holes in the plug was difficult and wasn't particularly reliable.

I concede here that I wasn't using silver-plated on brass Amphenol connectors but what was considered good commercial quality nickel-plated brass types. With a bit of use, the rotational stresses would break the nickel-plating from the connector and then there would be solder lumps through the holes and round the groove but not a good ground connection.

Using the reducer version with the larger entry types was a similar nightmare, taking a long time to solder and not reliable. When the reduced cable entry versions became widely available, it was so much easier to fold the braid back over and just screw it on but only with coaxial cable with decent size braid wires. The very thin braid wires on the cheaper CB coaxial cable would just be sliced off as the plug was screwed on.

Strangely, in the recent letters to the Editor, the majority of the experienced professionals stress that soldering the braid of cables to PL259s is vital and the screw-on tight fit is not a good joint. Conversely, the BNC and N-types both use the compression method to obtain a good connection to the braid.

Good Quality PL259s

From the 1980s right through to fairly recently, say 2014, the plugs purchased from most stockists and wholesalers came in PL259/6 for URM76 and RG58, PL259/7 for RG-Mini-8 and PL259/9 for RG8 and RG213.

The ones I bought from Sharmans Wholesale and Hills Components were sufficiently tight to grip the braid without further rotation but not too tight to slice off the braid wires. They were available in short shank and long shank versions. A picture of the old short shank version with ribbed back is shown in Fig. 1.

For professional work and for high power use up to 145MHz I recommend the long shank superior quality PL259s available from Sharmans Wholesale. The insulators on these are brown plastic that doesn't easily melt, the pins are gold plated and the finish on the body is well machined. A picture of Sharmans' quality 6mm, 7mm, and 9mm PL259s appears as Fig. 2.

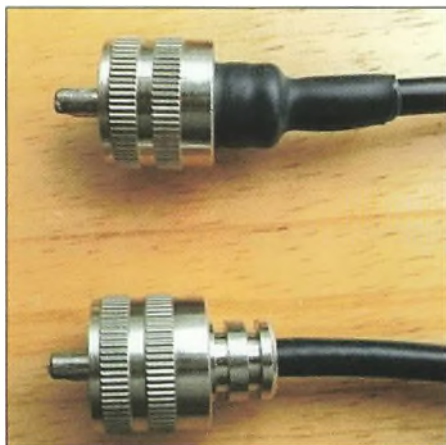


Fig. 1: This was the short shank PL259 that was available from Sharmans or Hills Components.



Fig. 3: this is the newer version of the short shank PL259 plug.



Fig. 2: Sharmans can now supply these quality PL259 plugs with 6, 7 or 9mm entry holes suitable for various types of coaxial cable.



Fig.4: Fitting RG174 into a crimped BNC plug, requires it to be finished off with a strain relief application of heatshrink tubing. Compare this with the lower clamped RG58 type.



Fig 5: A suitable N-type plug, crimped onto RG58 with its heatshrink strain relief fitted.

Recent Problems with PL259s

Since 2014, the plugs available from Hills Components have had braid entry sizes too tight. Indeed, one batch of long shank PL259/6 were actually only 5mm in diameter and were a tight fit on a piece of RG58 cable even without the braid folded back. The rear tube was also thin walled and it was very difficult to drill out the rear tube without causing excessive damage.

I still have a small quantity of these plugs, which I carefully drill out using a 13/64in drill followed by a 5BA tap. The plugs were made of zinc and might even have been cast rather than turned. Prior to this batch, all the previous consignments of PL259s from Hills had been nickel-plated brass.

More recently, the short shank PL259 that had a ribbed outer for the braid entry part was discontinued and the replacement is nickel on brass but the entry inside diameter is about 0.5mm too tight. I drill these out also using the 13/64in drill and there is still enough thread left to ensure the plug screws onto the braid and doesn't easily pull out. A picture of the new short shank PL259 is shown at Fig. 3.

I have found that these short shank types also have a thermoplastic insulator and trying to get the solder to take on the centre pin can easily cause the insulator to melt. The solution is to use Arax solder that has a really viscous flux and almost instantly 'wets', allowing the solder to take.

Another problem from extended use of both short shank and long shank types was that regardless how tight the connector was on the braid initially, after a while it would become loose enough to allow the plug to rotate. Previously, I would take it off and redo the job, which would last a few more years.

Since 2011 I have been using a variety of adhesive heatshrink for the lugs on antenna wires and also on proprietary listener antennas and have started using appropriate sizes to finish and bond cable to plugs of all types.

The BNC and RG58

While fitting a PL259 to a cable is relatively easy, fitting a cable to either BNC or N-type is an art requiring a specific length of exposed inner and a specific length of braid folded back over a ferrule. Indeed, the commercial BNC clamp connector for RG58 is usually large enough for RG59. Fitting a BNC on to RG58 rarely produces a connection that grips the cable sufficiently.

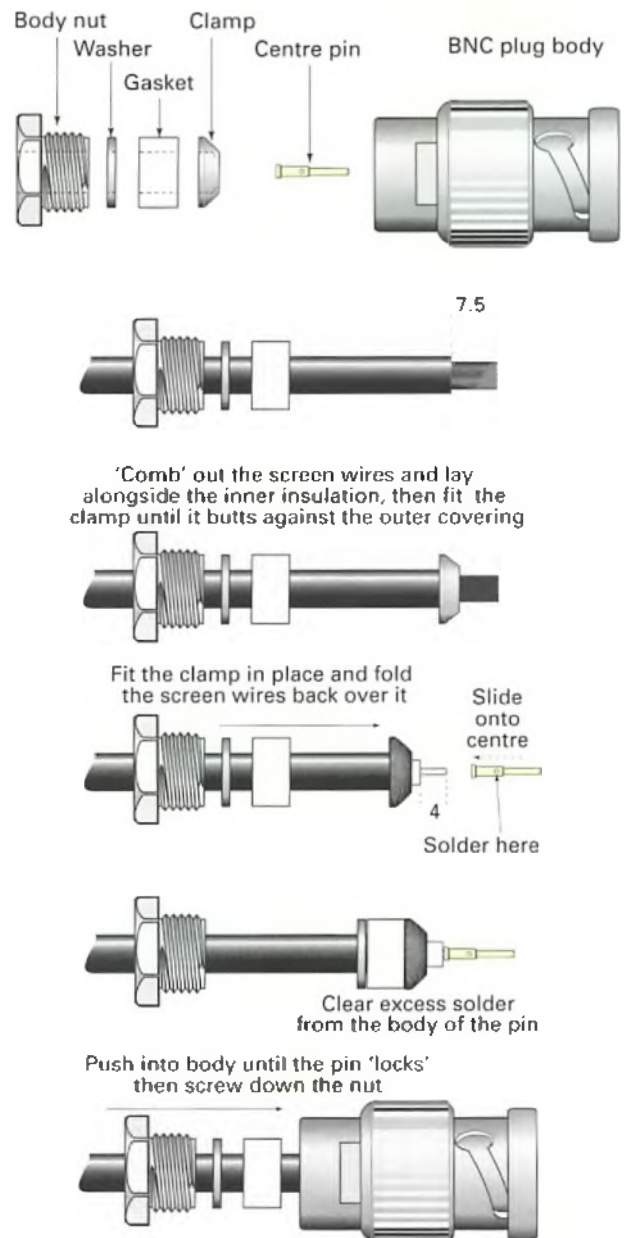
The solution here is to use a 12mm (1/2in) length of 2:1 reduction 6.8mm polyolefin heatshrink applied up to the braid and shrunk down. It needs to allow the ferrule and compression rubber and washer and nut to slide over it. If you are tempted to use 9mm heatshrink, it will be too thick when shrunk and you won't be able to get the fittings over it.

Again it is worth using about 25mm (1in) of adhesive heatshrink over the back of the BNC and on to the cable as strain relief and to stop unwanted rotation. For this you can use 9mm inside diameter (ID) but stretch it using long-nose pliers so you can get it over the back of the plug to start with. Otherwise, use 12.5mm heatshrink that will require quite a lot more effort to shrink it down over the cable.

Fitting the BNC to RG58

The strain relief heatshrink, 9mm or 12.5mm ID is put on the cable first, then the rear nut, then the washer, followed by the compression rubber, then a conical ferrule and finally the 6.8mm heatshrink if that is needed. All are slid back out of the way.

Although the mating end of the BNC has to be compatible with all other makes, the cable fitting and cable preparation differ between makes. I usually look into the back of the plug without fittings in it and gauge how far the insulation of inner of the cable



The 'exploded' layout of a typical clamp on BNC plug, an explanation features in the text.

will be in relation to the braid once assembled.

The next task is to strip back 6mm or more of the cable PVC cover and spread the braid out at right angles. Use a knife to cut round the insulator with the amount of protrusion assessed earlier and pull off the remainder of the insulator to expose the inner. Twist the cores of the inner to ensure a tight bundle then try fitting the pin on to the exposed core. Assess how much too long the core is and snip that amount off so that the pin will fit snugly against the insulator.

I normally hold the cable horizontally in a plastic bench mini-vise with a pin just part way on. Then using thin solder I tin the inner core and push the pin so that it touches the iron before adding a tiny amount more solder to 'wet' it. I then push the pin fully home against the insulator while withdrawing the iron. It is worth pulling the pin to see if it will come off because occasionally it hasn't taken and it is better to be safe than sorry.

If the heatshrink trick has been required, now is the time to slide it up as far as the braid and shrink it down. Then bring the conical ferrule up to the braid and trim the braid with scissors so it will cover the conical shape of the ferrule. Slide up the rest of the fittings before putting the body of the plug on and tightening

the nut. Check with a continuity tester that there is not a short circuit and if all is well, bring up the strain relief heatshrink and shrink it down.

You can use multiple layers of plain heatshrink to build up the diameter of RG174 to make a BNC a good mechanical fit and together with strain relief heatshrink make it reliable as well.

A picture showing a crimped BNC with heatshrink layers onto a length of RG174 and beside it a clamp BNC onto RG58 with the heatshrink strain relief is shown in Fig. 4.

Fitting Cable to N-type

I don't really want to repeat much of the procedure of the BNC to the N-type but it is essentially the same. You need to make sure your cable is not a sloppy fit into the rear nut and other fitting to start with. Be prepared to use heatshrink if necessary to overcome that problem.

Look into the back of the unassembled plug to assess how much the insulator of the cable needs to protrude beyond the braid. Sometimes it is one or two millimetres while at other times it can be almost flush with the braid. Always cut back slightly more than you expect to need because you should always crop it so that the inner fully fills the hollow of the pin.

Again, the nut goes on the cable first, then the washer, then the compression rubber and then the conical ferrule. If you need heatshrink to pad out the diameter of the cable, it goes on last before preparing the braid and inner.

Crimp BNC and N-type

A crimp connector is much simpler to fit than the clamp type but requires a special crimp tool such as the YAC3 available from Hills Components and other suppliers. I buy crimp BNC connectors from Hills Components and crimp N-types from Rapid or CPC for RG58.

I use a 25mm (1in) length of 9mm adhesive heatshrink as strain relief, which is put on the cable to start with. Then add the crimp ferrule on to the cable and slide it back out of the way.

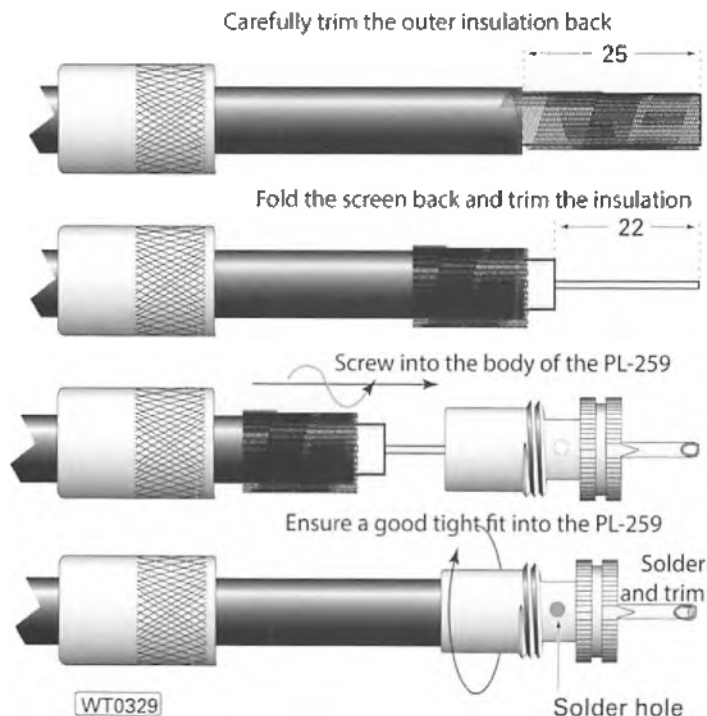
For both types, cut 15mm of PVC cover from the RG58 then using snips cut the braid back 5mm from the end. Now using a knife, cut off 4mm of insulation from the inner. Twist the wires of the inner to make a tight bundle then hold the cable in a plastic bench vice.

Tin the inner with the pin partly on and then push the pin against the iron and add a tiny amount more solder, then push it home against the insulation. Present the body of the plug to the prepared end and push it home, when there will be a noticeable feel of a click. Test to ensure the body of the plug doesn't pull off the cable again otherwise it hasn't mated properly.

When the plug is secured this way, bring the crimp ferrule up over the braid against the back of the plug body and crimp it on using the YAC3. Finally, slide the adhesive heatshrink up to the body of the plug and shrink it down over the crimp and the cable. A picture of a crimp BNC on RG174 was shown in Fig. 4 and a crimped N-type on RG58 with heatshrink strain relief is shown in Fig. 5.

The Humble Phono Plug

The much overlooked phono coaxial connector is just so simple to use and works quite well for low signal levels up to 30MHz. It is



Fitting a coaxial cable to a PL259 plug that uses a screw-in clamp. See the text for an in-depth explanation.

also small and cheap, which is why it is often used on the rear of HF transceivers as a transverter port.

The plug versions with the hard plastic cover are a tight fit over RG58 but can usually be reamed out a little to make them fit. Otherwise use RG174 and hold it in place using the cable grip blades. If you are using RG174, then the version with the soft plastic cover and expanded PVC gauze cable sheath is preferred.

SMA Connectors

The SMA plug is similar to the BNC plug to fit and you need to follow the same procedure, whether it is the clamp or crimp type. The male version is the one with the pin exposed and the female is the one where the tiny socket end is flush with the insulation.

The crimp versions vary in how much insulation goes into the back of the connector. It is simple to bare back the outer PVC of the cable about 12mm (1/2in) and slide the insulation into the back of the connector to find how far it goes in. Then, with a knife, cut the insulation back to that length. Try the tiny socket on to the inner and crop that accordingly.

Slide 25mm (1in) of 6.8mm adhesive heatshrink onto the cable first, then the crimp ferrule. Solder the tiny socket onto the inner with the assistance of the bench vice holding the cable. Push the body of the socket on to the prepared end so that the tiny socket comes up flush with the insulation. Slide the crimp ferrule down against the body of the socket and crimp it using the YAC3 once more. Slide the heatshrink up to the body and shrink it down.

Final Remarks

Always check that the connector is firmly connected to the cable and cannot rotate. Also, always check the cable inner to inner for continuity, outer to outer for continuity and inner to outer for open circuit.



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DXCC Deletions

Steve Telenius-Lowe PJ4DX reports on two deletions from the DXCC list and has lots of reader feedback following various recent DXpeditions and major HF contests.



Fig. 1: Kure and Midway lie at the western end of the Papahānaumokuākea Marine National Monument, north-west of Hawaii.

In a surprise announcement on March 31st the ARRL informed DX chasers that Midway Island (KH4) and Kure Island (KH7K) had both been deleted from the DXCC List. They said this was “an unintended consequence” of action taken by President Obama in 2016 when he expanded the area of the splendidly-named Papahānaumokuākea Marine National Monument (the definition of a

‘national monument’ in the USA includes protected areas similar to national parks). As can be seen in Fig. 1, this national monument is made up of a long chain of islands running north-west from the main islands of Hawaii.

www.papahānaumokuākea.gov

Midway was made famous by the WWII naval battle that took place there. Kure is less well known but was the site of a LORAN radio navigation station that

eventually closed in 1992. UK readers with as long a memory as me will remember the sound of LORAN covering much of the top half of the 160m band until the 1970s.

The ARRL decision could cause some controversy because, politically, Midway Atoll is not part of the State of Hawaii: it's an ‘unorganized unincorporated territory’ of the USA, which is why it was originally added to the DXCC List. The reasoning behind the deletions can be read at:

www.arrl.org/news/midway-and-kure-islands-are-now-deleted-dxcc-entities

However, all this will have little impact for UK operators other than those who are hardened HF DXers. It was difficult to receive operating permission for both islands so they were but rarely activated, Fig. 2. Even when they were on the air, they were difficult to work from the UK because the path passes through the auroral zone, severely attenuating signals.

CQ WPX Contest

The CQ WPX SSB contest was held during the last weekend of March. I took part reasonably seriously and made just over 4,000 QSOs. Conditions here at 12° north were better than I had expected on 80, 40 and 20m and not too bad on 15m, although 10m hardly opened and I made fewer than 50 contacts on that band. It was great to work several contributors to this column, mainly on 20m, not to mention PW editor Don G3XTT, who was operating as M3D.

Readers' News

Owen Williams G0PHY was one of those I contacted in the WPX contest. He wrote: “There was plenty of activity in [March] with three DXpeditions to West Africa and one to Nepal to chase but conditions declined towards the end of the month... I worked both the British DXpedition to Ghana (9G5X) and the Spanish DXpedition to Niger (5U5R) on 20, 17 and 15m. The

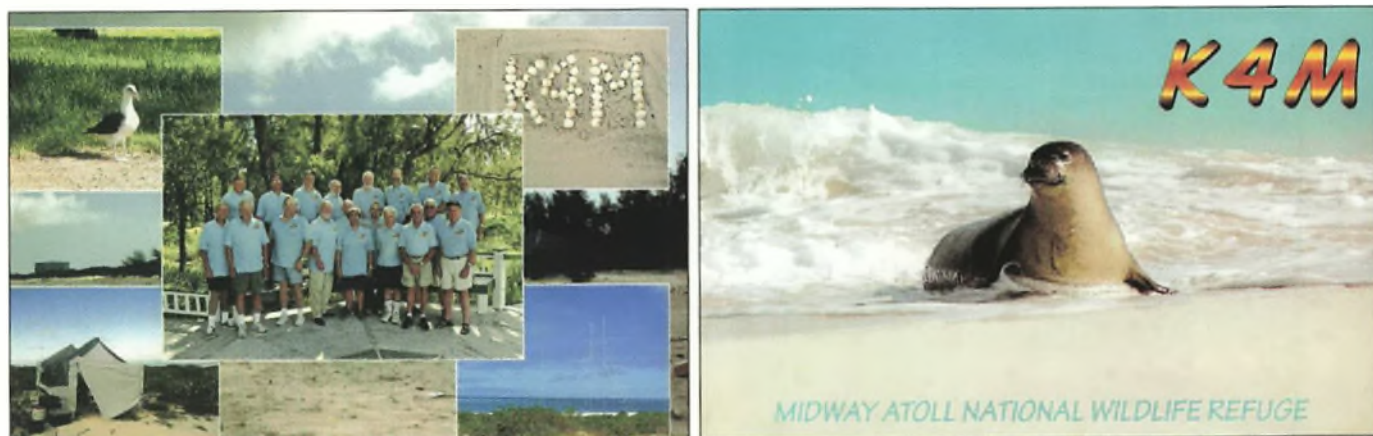


Fig. 2: The last time Midway Island was activated was by the K4M DXpedition in October 2009.



Fig. 4: Mike's certificate for his win in the 2016 ARRL DX Contest was received just after the 2017 contest had taken place!



Fig. 3: Etienne OS8D visiting the three countries border point, where Belgium meets Germany and the Netherlands.

French DXpedition to Ivory Coast (TU7C) was worked on 20 and 17m. I was also lucky to work the Irish DXpedition to Nepal (9N7EI) on 17m. The linear amplifier came in handy with some of these contacts. While none were new entities, they helped fill in some band-slots. I had my first contact with the Yukon when I worked a Vimy Ridge commemorative station (VE100VIMY/VY1) on 20m... The CQ WPX contest produced a couple of interesting callsigns: VX3100 (another Canadian commemorative station for Vimy Ridge) and OF100FI (commemorating 100 years of Finnish independence). The contacts I made were limited to either 20 or 40m; I heard nothing on 15m on Saturday and only a few signals on Sunday. Apart from my contact with you, I made other contacts in the Caribbean with 8P5A on Barbados, PJ2DX on Curacao and YW5T in Venezuela. Although I didn't hear any West Coast USA stations, I managed to work three stations in British Columbia and two in Alberta. Other stations worked during the contest on 20m were UA0BA, D4C and JE6RPM. On 40m I managed to work EF9R (Ceuta and Melilla). Two weeks ago I heard T2AQ from Tuvalu on 20m. I always regard hearing anything from the Pacific as a 'red letter day' due to the current state of the sun and my simple antennas."

Etienne Vrebos OS8D wrote from a "hot Brussels at 19°C" (well, it was only March!) to say "What a pleasure to work you yesterday during the contest. I wasn't very active during the contest (100 QSOs made) due to the superb weather here, which means garden activities and motorcycle trips". Fig. 3. Etienne's March highlights are in the band reports.

It's been a while since we heard from Reg Williams G0OOF so we welcome him back to the column. He had put up a 12m-long dipole for 20/40m but was disappointed by its performance on 40m

– until the CQ WPX contest. Reg said, "Great to work you in the CQ WPX contest recently... I started off at 0616 on 40m. I have a TS-870, which only transmits up to 7.100MHz, so quite limited band space. I searched and pounced and worked a steady stream of stations for approximately two hours. I did a repeat of this the following morning and part of the evening and managed to work 72 stations. Probably not a lot by contest standards but I was really pleased with the results. Amazing what a contest can do and for me [it] confirmed that the dipole was doing its job".

Mike Clark M0ZDZ, operating using his special contest call G7Y, also worked PJ4DX on 20m in the WPX contest but was suffering from an infection so "only made 355 QSOs". He took the tower down on the Sunday morning but first checked "to see if the long path opened to the Pacific. Quite disappointing, only working a few VKs and JAs, but nothing from ZL – very poor. Around 0900 I gave a few calls beaming east and picked up a dozen or so JAs on the short path, which was very unusual for me at that time of day." Mike has just received a certificate for his win for England in the March 2016 ARRL DX Contest, Fig. 4.

David Smith M0OSA/M "managed to work two ATNOs this month, starting with C6APY on 20m... The following day I managed to work another new one on 20m, HV0A. The Vatican City station was much harder to work; because of the size of the pile-up they were working split 5–10kHz up. After about 20 minutes calling in various places I managed to work out their receive frequency and got through. Spent some time in the Russian DX Contest, working some new countries for 2017 for the CDXC Marathon. I was pleased to catch an opening on 15m and managed to work RF9C, 4X1DX, 4Z0T

and 5B4AJC. I also took part in the CQ WPX SSB Contest. Conditions were poor compared to last year, especially on the Saturday. I almost didn't bother on the Sunday (Mothers' Day here in the UK) but did spend another hour late Sunday afternoon and was glad I did because although they weren't ATNOs, I worked ZB2TT and 3V8SS who both confirmed on LoTW, taking me to 104 DXCC confirmed, all 50W mobile".

Carl Gorse 2E0HP1 wrote, "We heard that there was going to be an EU/UK/VK Summits On The Air (SOTA) event taking place on March 11th from 0630 – 0830 so we decided to make a go of it." He operated with Steve 2E0EFP from the G/TW-001 Round Hill summit with "plenty of coffee, which was a must... We knew that there were some local summits at G/TW-002 and -003 operated by G6PJZ/P and MOVED/P, which we both worked for the Summit to Summits (S2S) points. I then managed to work Mike 2E0YYY/P at G/SP-004 Shining Tor in the South Pennines via ground wave on 20m, which was brilliant. I later heard Paul VK5PAS/P operating shortly after 0800 at VK5/SE-005 Mount Lofty, my first 'S2S' with a VK and also a new 'P2P' on VKFF-0778. This was Steve's first portable session with me and to get his first VK station he was over the moon. I later went on to work YO6PIB/P at YO/EC-426 Lisnau on 20m SSB and then on 80m I worked M3FEH/P at Kit Hill, another summit of G/DC-003. Steve 2E0EFP/P worked 15 contacts around the UK also on 80m with his KX3 and SOTAbeams dipole."

Carl sent a follow-up on March 21st to say, "I managed to get out portable today in very strong winds. Our first location was GFF-0380, Holburn Lake in Northumberland, and worked a total of 60 contacts around Europe and also K1RO and RZ9LO. This afternoon we went to Newham Bog, NNR GFF-0379, and logged

58 contacts, which included AB6MB, KA9CFD and WA9TBA. It looks as though we have a nice aurora showing on the coastline now so conditions may not be good for a few days."

As usual, Victor Brand G3JNB sent in a fascinating chatty report but I have had to edit it more than usual for reasons of space. Early in the month Victor worked the 5U5U DXpedition to Niger on 20m using 20W. He tried hard to get past a massive pile-up for 4S7VG in Colombo, saying, "eventually there came a repeated 'only G' and the deed was done!" Peter HA3AUJ was active as J5UAP, Fig. 5, from Guinea-Bissau and Victor made a QSO with just 5W while Peter was "booming in". Peter also operated from next door in Senegal as 6W2SC. "a simple catch on 17m" for Victor. UK travellers also featured widely in Victor's log, with PZ5L (Suriname) and 9G5X (Ghana) on 17m CW, plus Nigel 3B8/G3TXF (Mauritius) on 20m during the RSGB Commonwealth Contest. "It was a unique experience to hear Nigel calling CQ with very few takers, especially in a contest! I nearly collapsed when he heard me. But then, on the 20th, he was so strong on 17m with the vertical that I worked him on QRP!" Victor concluded by reporting, "On 30m S21ZEE in Bangladesh was a strong signal and being heard in EU, JA and W at the same time and, consequently, particularly difficult to work. However, after hours of chasing when the pile moved 'up', I moved 'down' and the QSO was made!" He commented that then "the WWV figures soared and the DX just disappeared" although he still managed a QSO with Robert 3B9FR on 20m using 20W. Indeed, Victor, I noticed that by the 27th the A-index had risen to 59 and the K-index to 6, which probably explained the aurora that Carl 2E0HPI saw in the north-east.

Terry Martin M0CLH sent "a somewhat diminished log this month because March sees a number of birthdays in the Martin family (which have to take precedence!) and the non-too-special conditions. As can be seen [in the band reports] almost all contacts made with some form of data mode (in which I include CW) and a couple of new countries in this way. My DXCC data totals are 146 contacted and 126 confirmed. It was good to catch Noz 5B4AIX operating the special event station H2017PFO to celebrate Paphos sharing the honour of being the European Capital of Culture for 2017 with Aarhus, Denmark."

Writing from Gibraltar, Kevin Hewitt ZB2GI commented that "the Rock apes enjoyed my portable operations up the Rock" – see Fig. 6! His March highlights



Fig. 5: J5UAP was very active from Guinea-Bissau during March.

included working two Middle East countries and the Falklands on SSB plus contacts with Indonesia and India on JT65.

Steph Foster G4XKH wrote to tell us about plans for a special event station but unfortunately too late for inclusion in an earlier issue: "Riviera ARC from Torquay will be running a special event for RAF Airfields on the Air 2017 on April 8th. We have GB4AOA again and aim to be running from our usual spot at Little Haldon near Teignmouth." We hope to hear how the event went next month.

Band Reports

From Etienne OS8D, 40m SSB: 3A2NL, NP4A. 20m SSB: 5T0JL, 5U5R, 8Q7LH, C6APY, D4T, D4Z, EL2BG, FG5GP, FY/F6CKD, KP4CPC, KP4RMS, PJ4DX, S01WS, TU7C, YI3WHR. 17m SSB: 5U5R, EY7AD, H44MS, Fig. 7. 15m SSB: 8P5A, D41CV, FY5KE, PZ5RA, TU7C, XT2SE.

During the WPX contest Reg G00OF worked: 40m SSB: 8P5A, TI5W, WP4X. 20m SSB: 8P5A, CN3A, CS9/PD3EM, D4C, NP2P, PJ4DX, T77CX, TF3CW, VE9CB, YW5T, ZY2A. 15m SSB: D41CV, P33W, PP5JN.

From Carl 2E0HPI: 20m SSB: 4X1DX, 9K2K, IS0BSR, W5MX. 20m PSK: CT2FPY, EA2FHP, SV8RYI. And as 2E0HPI/P, on 20m SSB: AC1U, NR3X, NV9L, VB3E, VC3T, WW2DX.

The report from Victor G3JNB was edited for space reasons but here are more of his March highlights. 160m CW: S01WS. 40m CW: VK7BO. 30m CW: 5Z4/DL2RMC, HI3/N3SY, KP4JRS. 20m CW:

PJ2/W6IZT. 17m CW: RN5M/6Y5.

Here's the highlights of the log from Terry M0CLH. 20m SSB: LZ303MA. 20m CW: 5U5R, 9G5X. 20m RTTY: OE2017CCN. W4/MM0LID. 20m JT9: W0PAS. 20m JT65: HK2PMR, JA4DND, JA4FKX, RW9AD, RW0SR, VE1GG, WB4EQJ. 20m PSK63: TU7C. 17m CW: 3B8/G3TXF, 5U5R, 9G5X, J5UAP, TU7C. 17m RTTY: C6APY. 17m PSK31: 5Z4/DL2RMC. 17m PSK63: H2017PFO. 15m CW: 9G5X, C6APY. 15m JT65: VU2TE. 12m JT65: 4Z4DX.

Kevin ZB2GI used 10W to an aluminium window frame connected via a 9:1 balun. 30m JT65: 9A1FL, OT1V. 20m JT65: 4X4MF, K1GUY, KG6MC, MI0LLG, RX6DY, VU3WEW WS6X, VE9DX, YE6YE. 20m JT9: SP3BGD. 17m JT65: 2M0WMJ, 9H1ZZ, AB1HL, ND4Q, OY1DZ, RV3FT, W8VS. 17m JT9: 9H1ZZ, KQ8M. 15m JT65: ES4NY, KS4S, PU2UMZ, SV8JNL. From the top of the Rock, ZB2GI/P used 50W to a vertical to work: 20m SSB: CS9/PD3EM, EI88WAW, IU2IIO, K9XD, KC1CTB, N7QT, NG0C, R1611M, SV9ANK, VA7JA, WD8KND. 17m SSB: 5B4ALJ, 7Z1JA, 9H1ET, A92GR, AJ2I, KC1CNA, VP8LP, W4WCD. 15m SSB: 5B4AHS, A61FK.

Signing Off

Thanks to all the contributors. Please send input for this column to teleniuslowe@gmail.com by the first of the month (June 1st for the August magazine, July 1st for the September issue). 73, Steve PJ4DX.



Fig. 6: 'Cheeky monkey!' The Gibraltar rock apes take a liking to the ZB2GI/P vertical.



Fig. 7: Bernhard DL2GAC operating as H44MS from the Solomon Islands.



Speech Quality on Radio Links

Harry Leeming G3LLL draws on his extensive experience in the Hi-Fi business to talk about issues of speech quality in amateur radio communications.

The family photographic and electronics business in Blackburn town centre had been very successful but by the 1980s, like many privately owned shops, it was losing money. Brenda and I decided that the only way forward was for us to persuade the other members of the family to let us split off the profitable amateur radio side of the business. We then closed the main business and started Holdings Amateur Electronics in much smaller premises outside the town centre. We were greatly helped by Ken Perfect and Fred Randal of Amateur Electronics Birmingham, who let us have quite a lot of equipment on sale-or-return until we got established. After a couple of years we managed to pay off the bank overdraft and then at last we could afford to pay ourselves enough to have a few holidays.

Budget cruises and hotels, of course, provide 'entertainment' and while much of the music was not to our taste, we would on occasions wander in. If you are at a musical event and the singer tries to make an announcement, the speech often sounds boomy, bass heavy and indistinct. Why? Some singers deliberately choose a

microphone intended to increase the low frequency content of their voice so as to make their singing sound smooth but this is only half the story.

If you are having a conversation with someone, you will normally face each other and at this range the frequencies above about 1kHz will be 'beamed' and emphasised. Because your head, however, is not large enough to act as a reflector on the lower frequencies, these will be dispersed in all directions and so be attenuated. If a singer has his mouth close to the microphone, it captures all the spectrum of the performer's voice and if it is not designed for close speaking, this results in the lower frequencies being over emphasised, rather like someone speaking with their mouth almost touching your ear.

If we are trying to make sense of someone shouting to us from a distance across, say, a field, the 'signal-to-noise ratio' will be poor and while they may cup their hands and beam the middle frequencies, the higher frequencies will tend to be absorbed by anything soft, such as grass, while with no walls to reflect them, the lower frequencies will disappear in all directions. You will be left with only the middle frequencies from, say, 1 to 3kHz and it is these that your brain is tuned to decode.

Hi-Fi versus Communications Audio

For many years I was very involved with Hi-Fi, dealing with customers who wished to create in their own homes sound that was as much like the original as possible. A flat extended response, however, is the last thing you want when trying to copy weak signals with a poor signal-to-noise ratio. In these circumstances your brain will try to sort things out in the 'across the field' mode so for the most efficient long distance speech communication, the main energy of the transmission must be concentrated in the 1-3kHz range.

The exact frequency range that is best for radio communication depends on the language being spoken and the voice of the speaker. In this connection many of the microphones supplied with early Japanese rigs sounded perfectly fine if you were 'five and nine' but tended to generate reports on the lines of "You are slightly muffled and difficult to copy" if the signal was weak or buried in noise. Swapping the microphone for a Shure 444, Fig. 1, made a tremendous improvement and we further improved things by rewiring the VOX switch to act as a local/distance switch. Switching to the DX position placed a capacitor in series with the microphone, which further rolled off the lower frequencies and, while the audio then sounded a little tinny, it certainly improved the clarity, particularly for anyone with a deep voice. I was pleased to note that after I had published this in the late Milton Lowen's *FT News Letter*, Yaesu picked up this simple idea and fitted a switch and capacitor to many of their microphones.

The exact value of series capacitor that will give the best DX results depends on your voice and the impedance and response of the microphone. A good starting point is around 2000pF for 50k Ω microphone inputs and 0.05 μ F for low impedance ones. I now note that Yaesu have taken this idea to its extreme and can supply at a cost of over £500 a microphone with a built-in graphic equaliser, Fig. 2, so as to squeeze the maximum possible clarity from your voice.

Type
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200 to 8,000 Hz (see Figure 1)

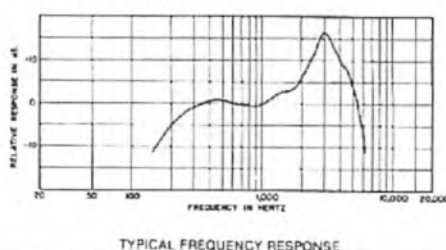


Fig. 1: Frequency response of the once popular Shure 444 microphone.

Fig. 2: The Yaesu M-1 condenser microphone with 9-band equaliser.



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I recently visited the local hearing clinic to have my hearing aids upgraded and had a most interesting chat with the lady audiologist. She was well aware of the need for a hearing aid to emphasise speech frequencies but this can, of course, make speech and music sound somewhat artificial. Because my low frequency response is still quite good,



Fig. 3: An old Marconi valve signal generator.



Fig. 4: A solid-state Marconi signal generator.

she supplied me with aids that amplify the higher frequencies and let the lower frequencies bypass the aid's earpieces. The resulting audio is certainly more natural.

I got my hearing aids on the NHS but a Google search showed me that I would have had to pay around £1000 for equivalent units, had I purchased them privately. I am not complaining, they are really excellent, but when you consider the electronics that are in them compared with, say, a smartphone, I am puzzled as to how they can be so expensive.

Do You Really Need a Signal Generator?

Like most businesses I tried to create a favourable impression and I had some good-looking Marconi signal generators on a shelf in the workshop, Figs. 3 and 4. They certainly looked impressive and I often had customers say that they could not do their own repairs due to the cost of the necessary gear. In truth they had cost very little and I seldom had to use them.

If you have a dead receiver or audio system, you may think that you need an expensive AF or RF signal generator to inject signals into the various stages to ascertain which stages are not working. In practice, you usually don't need any such kit.

In any workshop you will have a 50Hz buzzing around everywhere. Take a small screwdriver, touch your finger on its blade (make sure that you are not touching anything else to avoid any risk of getting a shock) and touch the screwdriver on the base of a transistor or the grid of a valve in the audio stages. You then should hear a buzz, which is the result of harmonics of the 50Hz mains picked up by your body and, obviously, if all the amplifier stages are operating correctly and producing gain, the earlier in the audio amplifier you apply this test the louder it should be.

A rough test of the gain of RF stages can similarly be made if you apply a longwire antenna via a capacitor to the various stages. If this does not produce enough noise, then run something that will generate interference, such as an electric razor, next to it.

Auto ATUs

It's nice to know that you are not forgotten and recently I received a call from George, an ex-customer, asking for advice about his automatic antenna tuning unit (ATU). Now some of the early auto ATUs were extremely limited in their tuning range and it seemed that you had to tune the antenna to the ATU, rather than the other way round. They were often referred to as 'ought to tuners'. However, George was using an FT-990 and the auto-ATU on this is a vast improvement on, say, the FC-757 ATU. Even modern automatic ATUs have their limits, though, and George could not get his to tune up his G5RV at one end of the 80m band.

Now the G5RV is very much a compromise arrangement and even manual ATUs will sometimes fail to bring down the SWR at the shack on some bands. Users tend to forget that the coaxial feeder on a typical G5RV has quite a high SWR on it on some frequencies and, hence, the load presented depends on its length. Adding or subtracting a quarter of a wavelength of coaxial cable (allowing for the velocity factor of coax, this would be about 15m on the 80m band) will completely transform the impedance presented to the ATU so that if it was originally very much lower than 50Ω, it would then become very much higher than 50Ω, or vice versa. As far as the ATU is concerned, this could result in swapping the 'sublime for the ridiculous' so I suggested that George try adding or subtracting 5 or 10m of coax to see what happened. He tried 10m and was then able to tune up on all bands except for 10MHz and because he was not bothered about this, he let the matter rest. Otherwise he could have tried various odd bits of coax until the rig tuned on all bands or, perhaps, just switched the extra length in circuit on 80m.

Increasing the Heater Voltage on a Valve

When repairing valve equipment, the heater voltage is usually the last thing you think of checking, as per the following story.

While working as a radio and TV service apprentice in the early 1950s, I did most of the radio repairs and one day a six-month-old Murphy mains portable receiver arrived on my bench. It was very low in sensitivity and volume and, surprisingly, every valve that I swapped improved the performance. The only way that I could get anything like new performance from it was to replace the lot so I called a senior engineer who, of course, said that it was impossible that all the valves had failed. Half an hour later he had to agree with me but we struggled to find a reason for the failure. We then brought a brand new set of the same type into the workshop from the showroom, to make some comparisons and were about to start checking voltages when we noticed that the valves on the faulty set glowed brighter than the ones from the showroom – strange! We checked further and also noticed that even when the faulty set was fitted with a new set of valves, the radio from the showroom was still somewhat louder.

Being a mains portable, the manufacturers had tried to make it as light as possible and had avoided using a heavy mains transformer by using a series-heater arrangement. The valve heaters and the dial lamps fitted were all 100mA types and required a total HT supply of about 160V. Normally, as was common with AC/DC sets of this era, this would have involved fitting a high wattage mains dropping resistor, such as that shown in Fig. 5 but, instead, they had had made it AC only and had fitted a small auto transformer as per Fig. 6.

In an auto transformer the output current runs in the opposite direction

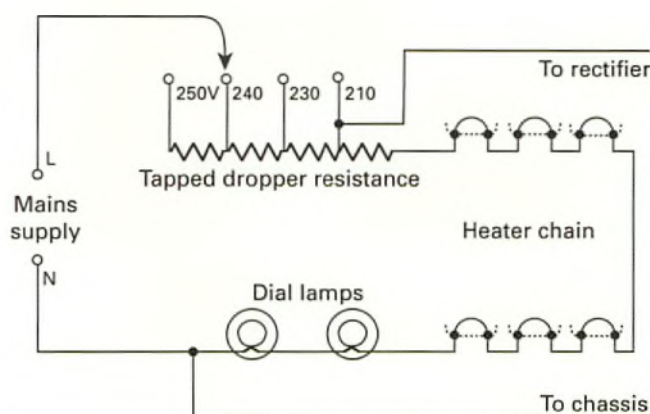


Fig. 5: 1950s mains portable AC/DC receiver with mains dropper resistor.

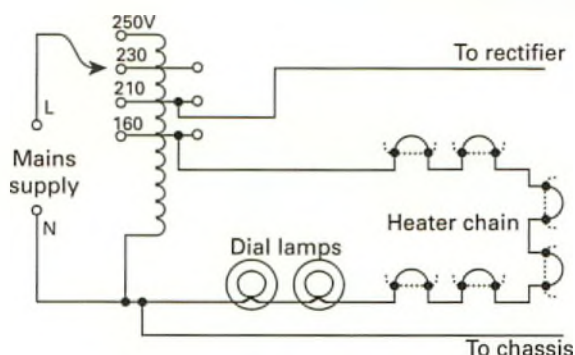


Fig. 6: AC mains portable with lightweight autotransformer.

to the input current and because to a large extent the two currents cancel out, this meant that the transformer could be small, cheap and light without generating a lot of heat as a mains dropper resistor would have done. This is just what you want for a mains portable, except that whoever had assembled the radio had got the two leads to the 210 and 160V taps crossed over. When new, the reduction in the HT voltage and the increase in heater voltage had not been

noticed but as the vastly overrun valves lost their emission, the mistake had shown up. Once we had wired the mains transformer correctly, the set refused to function at all with the old valves because over a few months at the increased heater voltage, the emission from their cathodes had exceeded that which would have been normal even after many years. While the valves were outside their three-month guarantee, they were parcelled up and returned to the set maker, with a

letter of explanation. They let us have a complete set free of charge and because no questions were asked, we wondered just how many other radio sets had been sent out with the same wiring error. Does this jog any memories?

There are occasions however when it can be a good idea to increase heater voltages beyond the manufacturer's intentions but we'll leave that for another time.

73 for now, Harry.

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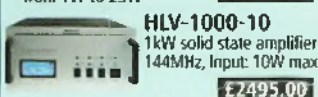


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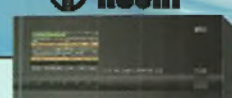
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News from Down Under

Roger Cooke G3LDI is back with yet another selection of Morse-related facts and anecdotes.

Mike VK4MIK sent me some information on a key with some history. He writes, "This key has a bit of history but we have not been able to ascertain its manufacturer or date. It had a heavy base and is nicely constructed, Fig. 1.

"It was owned by Ross VK4AQ who was an RAN (Royal Australian Navy) Radio Operator and he purchased the key from another in the RAN. He used the key while on HMA ships Banks, Quiberon, Stuart, Queenborough and Vampire. He offered it to me last year.

"Pat VK4MUY had longed to get back into CW on the radio but found the WT8 key a bit difficult because it tended to move around on the desk. It was obvious that the new key wouldn't move around but would remain in situ. Wayne VK4ARW in Allora, organised the turning of a new knob with skirt with his retired neighbour, who was glad to assist in the project. Once the knob was sent to me, Dennis VK4JDJ took over the finishing coat and mounting on the key arm.

"Pat, who has now moved to Cooktown, had no idea about the key project until we presented her with the key. The look on her face made it well worth the efforts of the various members of the Tableland Radio Group.

"Lee, a good friend of Lyn VK4EI, has a few keys and paddles in her collection at

the River of Gold motel also at Cooktown".

Well, it looks as though the VK4 area must have something in the water, with all the YL operators that are down there. Send me some pictures please! They will go well in the column. I haven't heard from Lyn for some time now so I guess she is busy with her business on Sweers Island. I hope to work her on Marconi Day. We did manage a sked with Ian VK3MO but his antenna system did all the hard work, I think. Some of the VK4 gang can be found on the Anzac Net on 14.183MHz on Friday mornings.

Mike VK4MIK also asks about temperature variations affecting paddle adjustments. "I live on the Atherton Tablelands at 700m ASL, around 60km south of Cairns in Northern Queensland. I have found an issue with the tension on

various keys over quite a few years – a Junker, PB213, various Marconi keys, and a UK GPO key – in that the tension appears to change from afternoon/night to early morning.

"It is obviously warmer, or hot, in the afternoon or early evening compared with the early morning, when the previous tension has to be adjusted.

"Have you come across this type of issue in your years of experience?"

This obviously would be a problem. The smaller the space adjustments on the paddle, the more they will be affected. Over the numerous years I have been taking part in NFD, it has been noticed there. By Sunday lunchtime in June in the UK, the temperature in a tent can be very high and we have had to readjust the spacing on both dot and dash sides slightly to take account of the temperature increase.

Morse and Youngsters

Derek G3MWO stopped at our CW stand at the Barford Rally last year and subsequently sent me this: "I just found this press picture of me in 1967 demonstrating Morse to the Bury St Edmunds Scout Group, Fig. 2. Note the key in the bottom right of the picture. This key was a copy of an American 'side swiper', made entirely of salvaged parts from scrap electricity meters (the kWh type) and mounted on a solid brass base. It worked well and was actually in the RSGB Exhibition in Earls Court.



Fig. 1: The mysterious Australian Morse key.



Fig. 2: Derek G3MWO demonstrating Morse to a Scout group in 1967.



Fig. 3: The photo that has piqued G3RXP's curiosity.

"We have found that youngsters are attracted to anything to do with Morse. Strange really, when you think of the length of time that Morse has been with us. They like to try their hand at a key too and seem to get a kick out of being able to send their name after a brief period of tuition. This is certainly the age to appeal to the imagination and who knows, a few of those 1967 Scouts might even be licensed amateurs now!"

All About Squeeze Keying

I personally cannot get on with a dual lever paddle, squeeze keying and similar. I was into CW via a straight key and then onto a semi-automatic bug, the Eddystone bug. I used that for a few years before getting a Vibroplex single lever paddle for my birthday and still use that to this day alongside my Begali HST. Actually I use the Begali more nowadays. Three local stations were so impressed with my Begali that they too have now invested in their own HST and the latest version too. Mine is a few years old now and the design has changed slightly since I bought it, with a finer thread adjustment.

Karl Fischer DJ5IL has written a very good article on squeeze keying and it is well worth reading. Go to:

http://cq-cq.eu/DJ5IL_rt007.pdf

Download the PDF file and have a read. Karl was asked if there were any electronic keyers that can work in Ultimatic or OZ mode and replied:

"There are some keyers on the market that can work in Ultimatic mode but as far as I know the only keyer that offers all established iambic modes plus Ultimatic and OZ is the following (see URL below)".

http://cq-cq.eu/DJ5IL_rt008e.pdf

I'm sure these two articles will prove an interesting read for those of you into squeeze keying.

Old Picture

Dave G3RXP sent the following and as it

meant nothing to me, I said I would ask via this column. Dave says: "I found the attached picture, Fig. 3, on the BT website along with an article about the distress signal SOS and how it was formed. I don't know how the picture is related to the article but it begs some questions and I wonder if you have come across anything like it."

"Firstly it could be an amateur – see the bug on the shelf. It looks as though he is monitoring something related to the drum and chart in the foreground. He has some string going from the VFO dial through the desk, to somewhere?"

"Is this the first remote station of its type or maybe it's a feedback system to lock on to a signal. It's quite an old photo but interesting."

I certainly cannot recognise the receiver although it does have a look reminiscent of an early Hammarlund. The bug key dates it somewhat to over 50 years ago, I would say. Any ideas?

Dits and Dahs

The following came from Ed KR3E: "In a few days it will be ten years since the FCC removed CW as a licensing requirement in the USA (What a dreadful decision that was!).

"Listening to the bands during a major contest it may not seem as if interest in CW has dropped but listen again when there's no contest or DXpedition on the air. The keyboard senders and CW readers have disappeared and the CW bands are, for the most part, silent. There are those of us who've been pounding brass for decades, some of us swinging bugs and others having daily skeds at 30WPM with pals who they've been chatting with for years. But, as we all know, newbie CW operators are few and far between."

"So, I've written a little, very basic guide book to CW operating called Dits and Dahs. It's just been printed by CQ Publications. I'm hoping that this book will

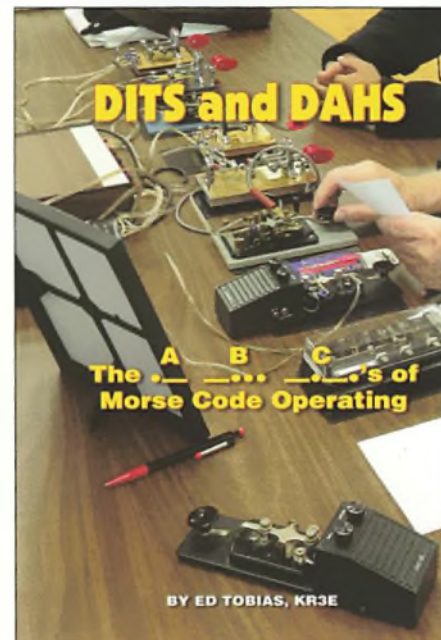


Fig. 4.

encourage some codeless hams to dip a toe into the CW waters and hence to learn our language well enough to enjoy the rhythm and the music of CW that we old-timers love so much.

"This book wouldn't have been possible without the help of several of my FOC pals who shared their knowledge, and some pictures, about things such as keys, contests, DXing and mobile/portable operating. They include K5ALU, WB6BEE, N9RV, IK0IXI, W0VTT, K1JD, AD5A, S53R, DJ1YFK, VK6GX, K4OSO, G3RWF and G3SXW (Forgive me if I've left someone out). Each of these OM's could write his own book about the subject that he shared with me and I very much appreciate their willingness to be a part of this project".

The cover can be seen in Fig. 4 and the book is available in the UK for \$25.95, with ordering details on the CQ Publications website, below.

<http://store.cq-amateur-radio.com/product-category/new-books>

Print Your Own Paddle!

Finally, 3D printers have been used for printing car parts, aeroplane parts and all sorts of mechanical bits and pieces. This latest use is very innovative and seems to work very well, printing a Morse paddle. You can see it being used in the following YouTube video:

www.youtube.com/watch?v=DMsHXPFJ-vs

It's an iambic paddle too but rather small. I suppose it could be mounted on a heavier base. I'm not sure of the cost but it must be able to compete with some of those already on the market.

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

Useful Websites

Dear Don,
I am currently in the IET members lounge at Savoy Place in London. Looking into the library, I saw a copy of *PW* there, alongside a copy of *QST*. Looking through I saw your website list (December 2016). Thanks for mentioning Radio-Electronics.com. I have also set up a new site called Electronics Notes:

www.electronics-notes.com

This is aimed at hobbyists and students and has a lot that is appropriate for radio amateurs. We also have a good number of videos on the associated YouTube channel:

www.youtube.com/channel/UCj5v6V19CtjoeFzuiEQpRg

One video that may be of particular interest is our history of the Morse Key:

<https://youtu.be/OyLpleqfJ4>

or one of crystal sets:

<https://youtu.be/6RPTyFMMLEk>

Ian Poole G3YWX

Editor, *Electronics Notes*,

www.electronics-notes.com

Dorking

Reading Rattle

Dear Don,
I am just writing to thank you so much for printing our request for new readers for the RAIBC *Reading Rattle* (Letters, February). In the past we have only managed to attract one or two new readers when we have made requests so I included the RSGB, *PW* and *RadioUser* this time and have been overwhelmed by the response.

I have had over 30 responses – some from each of the magazine readerships. From those so far I have 12 test recordings and all of these 12 have been placed on the Reserve Reader List. This means that we will shortly be able to get started on a number of recording projects that have been on the shelf due to the lack of readers.

Again, many thanks on behalf of all the sight impaired members who enjoy and find the recordings so useful.

Ian Spencer DJ0HF/G3ULO
RAIBC Audio Manager

Repeaters and CTCSS

Dear Don,
I noted the correspondence on the dearth of repeater traffic in the UK. As an annual visitor I find it impossible to change CTCSS tones in the car as I travel north from the Southampton. So I don't bother.

However, I'd like to suggest a solution that has been in operation in South Africa for some time. While amateur repeaters in ZS are few in number compared with commercial repeaters, the supposed interference has been minimised by CTCSS and all of the amateur repeaters use the same tone. Simple! So, maybe someone from OFCOM or the RSGB will read this and a simple solution will be found.

The other difference in ZS because of the lack of traffic is that nearly all simplex 2m contacts take place on 145.500MHz. Yes, I know it's the calling frequency but it would give a facility to those whose rigs do not have CTCSS.

My VX-7 has a search facility that can check for the CTCSS but I'll be using my daughter's Alinco handheld – and that's another story.

Tom Morgan ZS1AFS/ZT1T/
G0CAJ
South Africa

SMDs

Dear Don,
I'm a bit behind with my reading, so only just got to December 2016 *Letters* and that from Trevor Blinko G8KNJ.

The use of pegs to tripod probes onto SMD pads is a

good idea as long as nothing on the bench moves. Personally I tack wire stubs on and use the probe clips as normal. Clippings from through-hole components are useful but resistor leads are usually a bit chubby. Leads from small diodes like the 1N4148 are better.

There is that faint possibility that you might 'accidentally' nail a fractured dry joint that would take forever to find if you were searching for it.

Someone with sharper eyes and steadier hands than me might get away with using single strands from flex to test point fine pitch IC pins.

Ian Field
Letchworth, Herts.

Antennas

Dear Don,
Regarding *Understanding Antennas* (Technical for the Terrified) in April *PW*, I would like to add my thoughts on the subject.

A well-designed short active dipole should work well. With receivers having excellent sensitivity as they do these days, only a short antenna is required to give enough input signal for incoming noise to mask receiver noise. Once this point is reached, any further increase in antenna output is probably counterproductive. The crucial point is the design of the amplifier, which usually contains low noise FETs and power transistors. Many years ago I worked for Datong Electronics in Leeds and still have and use one of their AD370 active dipole units. In this case the output level is similar to a passive dipole resonant at 14MHz with the standard 2 x 1.5m whips. This unit has for many years given me a relatively low noise floor on receive and a doublet is in use for transmitting. The AD370 is no longer around and I do not know

of a similar design in production at the moment. However a Google search revealed an interesting paper written by Chris Trask of Sonoran Radio Research entitled an *Active Short Dipole Antenna with Remote Tuning*. This is still capable of being built with the specified components.

Interestingly, doubling the length of the AD370 whips does give a 6dB increase in sensitivity but usually the noise is 6dB higher so there is no real benefit. A well-designed small active loop should also work very well. Do not underestimate the benefits of good active antenna. Unfortunately, there are indeed a good few poor designs around. Roger Limbert G4IUP
Bradford

Editor's comment: I don't disagree Roger and I doubt that Tony Nailer would either – a short dipole or small loop can make an excellent receive antenna. A number of the big contest stations in the US in particular are now using active receive antennas with multiple short dipoles or verticals and clever phasing boxes. However, there is generally no substitute for a full-size antenna for transmitting if significant losses are to be avoided.

Clive Sinclair & PW

Dear Don,
At the Poole Radio Society meeting last night Tex Swann G1TEX and I were discussing your *Keylines* request for information on Clive Sinclair's claims that he was at one time Editor of *PW*. In the past I made it abundantly clear in the Wikipedia *PW* entry that there's no evidence of Sinclair ever having been on the editorial staff of *PW*. However, this section was removed by person or persons unknown.

When I visited the Cambridge Amateur Radio Club a few years

End of Amateur Radio?

Dear Don,

Is this the end of amateur radio as we know it? Last year a near neighbour had a solar panel installation installed on his bungalow roof, which has resulted in high levels of interference over the entire short wave spectrum. It takes the form of S9 warbling carriers every 200kHz and lower levels depending on sunlight every 100, 50 and 25kHz. This has prevented the use of 5398.5kHz during daylight hours. My normal background noise level on the 80m band is around S4.

I submitted an online complaint to MCS of which the installer is a member. They 'could not help' because it wasn't my installation but did pass it on to CERTSURE who told me that the installation conforms to relevant requirements. At this point I called in OFCOM. I could see it was going to be an uphill struggle when I asked the engineer what powers they had and was told, "I wish you hadn't asked me that". I also learned from OFCOM that the equipment is self-certified.

The installer will not visit my home and has told me nobody can make me do anything and that I was using an old radio (who's side is OFCOM on?). Yes, it was old but had a proper S-meter but there was no mention of the other four radios. The Department of Trade and Industry have told me, "hobby radio reception can be challenging, can be influenced by atmospheric conditions and can vary even from day to night".

Paul Burgess G3VPT
Norwich

£20 STAR LETTER

Editor's comment: An edited version of Paul's letter has already appeared in RadCom but Paul asked that we print it in full here in PW. Unfortunately, Paul, our hobby is considered to have a very low priority nowadays compared with commercial interests. This is especially true since the licence fee was dropped – you get what you pay for but, sadly, at the time all too many radio amateurs were happy to avoid paying the very modest annual fee. Some years ago, at least partly at my suggestion (I was on the RSGB Board at the time), the RSGB set up its Spectrum Defence Fund and, indeed, we are in a better position as a result than if the RSGB had not been involved (amateur bands notched out on PLT, for example). However, interference from modern devices, whether low voltage downloads or, in your case, solar panels, is here to stay. When we moved to our current house over 30 years ago, I could hear the proverbial pin drop on the 160m band but that is far from being the case now and it's not a single cause but a gradual encroachment of LED lighting, plasma TV sets, wall wart PSUs and so on. Noise cancellation devices can do wonders if there is a single point source but most of us are surrounded by noise generators nowadays. No wonder remote and/or portable operation is becoming ever more popular! However, the hobby still has much to offer and a great future as we record month in and month out in the pages of PW.

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

ago the club members made me very welcome. Many of them had stories to tell of the Sinclair business activities. Quite a number of them had helped to assemble the Micromatic kits that had been ordered ready built, together with the tiny and very clever pulse-counting Band II FM receiver that he marketed. At that time Sinclair was working out of his parents' double garage at the bottom of their garden in Cambridge. Everyone who knew him told me that he had never commuted to London and had never been involved in PW management. All the writing he'd done for PW was either from his office/garage or elsewhere in the Cambridge area.

Geoff Arnold G3GSR sadly died last year but in his time as Editor had known all of the PW staff in London from the 1960s. Whenever the subject of Clive Sinclair as Editor of PW was raised, Geoff made it abundantly clear that there was no foundation in the rumour.

Rob Mannion G3XFD
Bournemouth

Editor's comment: Thanks Rob, it's great to hear from you and I know PW's readers will enjoy seeing your name in the magazine again!

American Successes?

Dear Don,

I feel I must comment on **Robert Dancy G3JRD's** eulogy on American successes (*Letters*, May). Having spent a number of periods working in the USA, the quality of colour TV transmissions using the NTSC system (Never Twice the Same Colour!) is vastly inferior to the PAL (Phase Alternating Line) system developed in Europe so they didn't always get it right.

On another point, I checked my SMD hot air rework blower 858D to discover they had got it half right in that the fuse was in the line but the mains switch in the neutral. It obviously pays to check imported electrical devices rather carefully before use.

Terry Martin M0CLH
Wantage

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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.

MAY

May 14th

The Lough Erne Rally

The 36th Lough Erne Rally will be hosted by the Lough Erne Amateur Radio Club at the SHARE Centre, Lisnaskea, Co. Fermanagh BT92 0EQ. The doors will open at 11.30am and admission for all in the hall (both traders and visitors) will cost £3.00. There will be free parking, free tables for traders, a free Bring & Buy, a G-QRP Club sales stall, special interest groups, shack clearance and so on, a bar and a café offering a cooked lunch. The SHARE is disability friendly and the event has traditionally attracted strong attendances from both Northern Ireland and the Republic. For updates and video of the Lough Erne Rally in 2014, please see the Club's website.

David G4VMO, Secretary LEARC

Tel: 028 6638 5838

E-mail: calderwood110@btinternet.com
www.learc.eu

May 14th

The BVWS National Vintage Communications Fair

The British Vintage Wireless Society National Vintage Communications Fair will be held at the Warwickshire Exhibition Centre, The Fosse, Fosse Way, Leamington Spa, Warwickshire CV31 1XN. The doors will be open between 10.30am and 4.00pm and admission will cost £10.00 (under 14s free). Early entry from approximately 9.00am will cost £25 (no advance ticketing, all tickets on the door). Car parking is free.

www.nvcs.org.uk

May 19th, 20th and 21st (Friday/Sunday)

The Dayton Hamvention

The Dayton Hamvention 2017 will be held at the Greene County Fairgrounds & Expo Center, 120 Fairground Road, Xenia, Ohio 45385, USA. There will be trade stands, a huge flea market, a programme of lectures, forums, special interest groups, a prize draw, family attractions, multiple catering outlets and facilities for the disabled.

E-mail: international@hamvention.com
www.hamvention.org

May 20th (Saturday)

The Rochdale Indoor Flea Market Sale

The Rochdale and District Amateur Radio Society Flea Market Indoor Sale will be held in 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 free). There will be talk-in on S22 (145.500MHz), ample parking, trade stands, a Bring & Buy and catering (coffee, tea, soft drinks, bacon/sausage butties, biscuits and crisps) will be available. Tables can be hired from RADARS (£5.00 per table). Pitches cost £5.00 each or £10.00 for a pitch and a table – please book your pitch at least two weeks before the event. Traders will have access to the venue from 8.00am (7.00am for RADARS members). The event usually finishes around 3.00pm.

Dave G3RIK

Tel: 01706 633400 (afternoons, 6.00pm

to 9.00pm preferred)

E-mail: rally@radars.me.uk
www.radars.me.uk

May 20th (Saturday)

The Moray Firth ARS Surplus Equipment Sale

The Moray Firth Amateur Radio Society Surplus Equipment Sale will be held at the Forces Reserve Centre, Edgar Road, Elgin IV30 6YQ. The doors will open at midday and admission will cost £2.00 for buyers. There will be trade stands, a prize draw and refreshments will be available on-site. Tables cost £3.00 and sellers will have access to the venue to set up from 10.00am.

Victor 2M0JVR

Tel: 01343 820489

E-mail: jvr911@yahoo.co.uk

May 21st

The DDCRC Amateur Radio Car Boot Sale

The Dunstable Downs Radio Club will be holding the 34th National Amateur Radio Car Boot Sale at Stockwood Park, Farley Hill, Luton. The visitors' entrance is at 51.869155N 0.428050W (Whippleyway crossing Farley Hill). The car boot sale will open for buyers at 9.00am and the entrance/car parking fee will be £3.00 per vehicle. Catering and toilet facilities will be available. Traders will be able to access the site from 7.30am via a separate entrance at 51.865229N 0.417671W (Culenhoe Road crossing London Road).

www.ddrcbootsale.org

May 28th

The Causeway Coast & Glens ARC Radio Rally

The Causeway Coast & Glens Amateur Radio Club Radio Rally will be held at Bushmills Community Centre, 14 Dunluce Road, Bushmills, Co. Antrim BT57 8QG. The doors will open at 11.00am and admission will cost £3.00. There will be on-site parking, trade stands, a free Bring & Buy, an RSGB bookstall, on-site catering and facilities for the disabled.

Stevie Morrow M10ULK

Tel: 07544 823956

E-mail: stephen769@talktalk.net
<http://causewaycoastandglens.wix.com/home>

May 28th

The Durham & District ARS Radio Rally

The Durham & District Amateur Radio Society Rally will be held at Bowburn Community Centre, Durham Road, Bowburn, Durham DH6 5AT. The doors will open at 10.30am (10.15am for disabled visitors) and admission will cost £2.00. There will be talk-in, on-site parking, trade stands, a Bring & Buy, on-site catering and facilities for the disabled.

Michael G7TWX

E-mail: dadars@gmx.com

JUNE

June 4th

The Red Rose QRP Festival

The 21st Red Rose QRP Festival will be held at The Rose Centre (Lowton Civic Hall), Hesketh Meadow Lane, Lowton, Warrington WA3 2AH. The venue has easy access from all directions (M6, M61, M60 and A560) and the Festival will be held in

large spacious halls at ground level with facilities for the disabled. The doors will be open between 11.00am and 3.00pm and admission will cost £2.00 (under 14s free). There will be free parking, trade and individual stalls, a very low-cost Bring & Buy, club stands (including G-QRP and RSGB) and on-site catering. Some tables are available at £8.00 but please book early.

Les Jackson G4HZJ

Tel: 01942 870634

E-mail: g4hzj@ntlworld.com

www.wmrc.org.uk/lowton.htm

June 4th

The Spalding Rally

The Spalding & District Amateur Radio Society Rally will be held at the Sir John Glead Technology School, Halmer Gardens, Spalding, Lincolnshire PE11 2EF. The doors will open at 10.00am. There will be free car parking, trade stands, catering and an outdoor car boot area.

John G4NBR

Tel: 07946 302815

Graham G8NWC

Tel: 07754 619701

E-mail: rally-secretary@sdars.org.uk

www.sdars.org.uk

June 10th (Saturday)

Antrim & District ARS Bring & Buy Surplus Sale

The Antrim & District Amateur Radio Society Bring & Buy Surplus Sale will be held at Muckamore Community Centre, Ballycraig Road, Antrim, Co. Antrim BT41 2DH. The doors will be open between 12.30pm and 5.00pm and admission will cost £2.00. Sellers will have access to the venue from midday and tables will cost £5.00. In addition to the Bring & Buy Surplus Sale, there will be a raffle and refreshments will be available to purchase.

June 11th *** New Venue ***

The East Suffolk Wireless Revival

The East Suffolk Wireless Revival (Ipswich Radio Rally) will be held at Kirton Recreation Ground, Back Road, Kirton IP10 0PW, which is just off the A14. The doors will open at 9.30am and admission will cost £2.00. There will be free parking, trade stands, a Bring & Buy, a car boot sale, special interest groups, an RSGB bookstall and on-site catering. GB4SWR HF station will be in operation.

Kevin G8MXV

Tel: 07710 046846

www.eswr.org.uk

June 11th

The Junction 28 Amateur Radio Rally

The Junction 28 Amateur Radio Rally organised by the South Normanton, Alfreton & District Amateur Radio Club will be held in the Bowls Hall at Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DE55 7BD. The doors will be open between 10.00am and 4.00pm. For more information, please contact the Rally Secretary.

Tel: 01159 307322

June 15th (Thursday)

The SBARC Summer Table Top Sale

The South Bristol Amateur Radio Club Summer Table Top Sale will be held at the

Novers Park Community Centre, which is at the rear of 124 Novers Park Road, Filwood, Bristol BS4 1RN. It is 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

June 17th (Saturday)

The SLARC Summer Rally

The South Lancashire Amateur Radio Club will be holding its Summer Rally at the Bickershaw Village Community Club, Bickershaw Lane, Bickershaw, Wigan WN2 5TE. The doors will open at 9.30am 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 (£8.00 if you bring your own tables, otherwise £10.00) and stallholders will have access to the venue from 8.00am.

Jason G0LZF

Tel: 01942 735828 (Bookings)

E-mail: rally@slarc.co.uk

www.slarc.co.uk

June 18th

The Newbury Rally

The 30th Newbury Radio Rally will be held at the Newbury Showground, Priors Court, Hermitage, Thatcham, Berkshire RG18 9QZ (next to M4 J13). This event is organised and run by the Newbury and District Amateur Radio Society and is themed around a 'boot sale'. The gates will open to visitors at 9.00am and admission will cost £2.50 (Children under 16 free, no other concessions). There will be talk-in on S22 (145.500MHz) using GB4NR, free car parking, trade stands, a demonstration marquee (with amateur radio stations, exhibitions and special interest groups), catering and facilities for the disabled. Sellers and traders will have access to the site from 8.00am and car boot pitches (5m x 5m) will cost £10.00 each if booked in advance or £12.50 on the day.

E-mail: newburyrally@nadars.org.uk

www.nadars.org.uk/rally.asp

June 25th

The West of England Radio Rally

The 14th West of England Radio Rally will be held at the Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. The doors will be open from 10.00am to 2.00pm and admission will cost £3.00 (accompanied children under 14 free). There will be free car parking, full access and facilities for the disabled, trade stands (indoors and outdoors) and The Grain Café Bar will be serving hot and cold snacks and refreshments.

Shaun G8VPG

Tel: 01225 873098

E-mail: rallymanager@westrally.org.uk

www.westrally.org.uk

Classified Adverts



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4. Albrecht DR850-ED.. DAB radio with colour screen.....	£75
5. Alinco DJ500-ED..145/433MHz twinband handy.....	£89
6. Alinco DM30E-ED..NEW 20-30A power supply.....	£85
7. Alinco DR135UK-ED..28MHz all modes mobile.....	£149
8. Alinco DR138H-ED..high power 145MHz FM mobile.....	£139
9. Alinco DRB185-ED..85w 145MHz FM mobile transceiver.....	£149
10. Alinco DR638H-ED..high power 145/433MHz mobile.....	£235
11. Alinco DX-R8E-U..all mode HF communications receiver.....	£329
12. Alinco DX-SR9E-ED..hybrid SDR/100w HF transceiver.....	£499
13. Alinco EDX2-ED..automatic HF antenna tuner.....	£269
14. Antex 690D-ED.. pro-style digital soldering station.....	£175
15. Antex TCS-ED..soldering iron with temp control.....	£64
16. Anytone AT588-ED..50w 70MHz mobile transceiver.....	£149
17. Anytone AT588-U..145MHz FM mobile transceiver.....	£99
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Price: £5.99 plus p&p.

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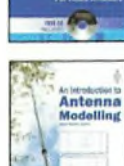
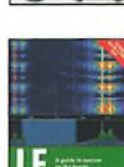
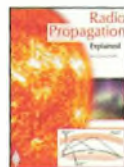
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The *Radio Listener's Guide* is an annual guide for UK radio listeners. It is packed with news, radio reviews and station information. This year's edition includes reviews of personal radios, analogue portable radios, clock radios, DAB radios, internet radios, mini systems and tabletop radios. You'll also find our list of recommended best-buys.

The *Guide* is full of information about analogue and DAB digital radio stations. You'll also find details of radio carried on the main TV platforms as well as information about Internet radio and podcasts. This year we have looked at the latest developments with new technology – including BBC iPlayer, Radioplayer's new in-car device and the Amazon Echo Dot.

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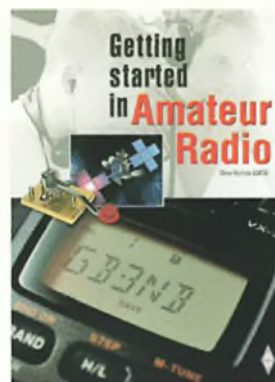
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WORLD RADIO TV HANDBOOK 2017

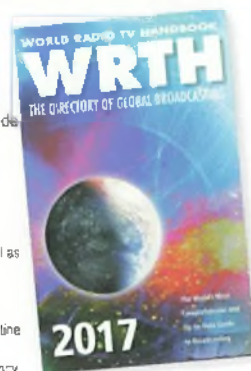
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The Rig Guide continues to define the prices of amateur radio equipment in the UK, fully updated and covering more than ever before. Which is why *The Rig Guide* is rightly one of the most popular amateur radio books around.

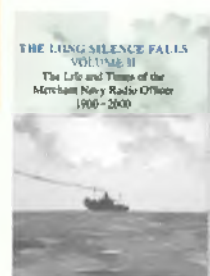
If you are planning to buy or sell any amateur radio equipment you should not be without *The Rig Guide*. The book begins with tips for buyers and a guide to selling and trading. There is a handy guide to selling on ebay and even tips on how to avoid getting lumbered with stolen gear. *The Rig Guide* 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 *RadCam* reviews since 1990 is included and when piece of equipment was reviewed by *RadCam* it is highlighted on the listing.

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 ever 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.

Knowing the worth of any piece of equipment means you can easily cover the cost of *The Rig Guide* with just one purchase or sale.



THE LONG SILENCE FALLS VOLUME II
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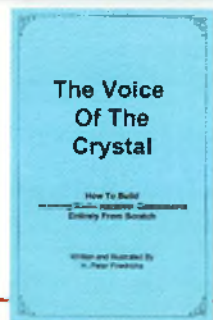
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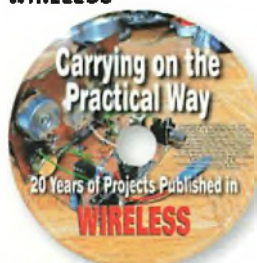
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Pocket Money Radios Alex Whittaker looks at some practical, versatile and fun radios that each cost under £30.00

Scanning Scene Bill Robertson reminisces about earlier days of the scanning hobby, reminds readers about a useful resource, deals with DMR-related correspondence and looks at amateur radio operations on the ISS

Decode Mike Richards reports on the launch of the Raspberry Pi Zero W, evaluates some of the latest products from Klingentuss Publications and tells of a repair job on his Airspy SDR receiver

Military Matters Pat Carty makes a welcome return. He resolves some confusion regarding air-to-air refuelling areas and Hex codes and reports on dissimilar air combat training in the Canaries and Joint Warrior 17-1

Book Review David Harris reviews Music and the Broadcast Experience. Performance, Production and Audiences edited by Christina L. Baade and James Deaville

Sky High Godfrey Manning looks at Notices to Airmen and provides two sample decodes. He then investigates the Ordnance Survey National Grid and latitude and longitude coordinate systems

DXTV & Satellite News Keith Hamer and Garry Smith offer advice on preparations for the new Sporadic-E season, comment on reception reports and provide a compilation of updated TV service information

Maritime Matters Robert Connolly looks at military use of AIS, reports on a SAR operation near Gibraltar, mourns the loss of an Irish Coast Guard helicopter and investigates unusual MSI transmissions from Argentina

Saw Tooth Antenna - Part 1 Kevin Ryan tells of his attempt to install an external low visual impact antenna for the HF bands

Glossary, Feedback, Radio Events

Airband News David Smith explains the advantages of time based and pairwise separation. He then reports on the introduction of a radio mandatory zone at Hawarden and UK-Inish ATC collaboration

IMA'S Broadcast Matters Chrissy Brand shares readers' logs and news, including some transatlantic medium wave catches and clandestine radio stations, and relates how persistence can pay off in the hunt for QSL cards

News & Products

RF Development Board - Part 9 In the final part of his series based on protoboard construction, Roger Thomas describes his design for a crystal controlled direct conversion receiver for parts of the 25m broadcast or 20m amateur bands

Radio Websites Chrissy Brand reports on the launch of the dot-radio domain. She then responds to tips from readers, covering such topics as electrical interference and short wave heritage

Off the Record Oscar responds to feedback regarding several aspects of free radio and critically investigates the government's current public consultation exercise on the future of radio

Comms from Europe Simon Parker scans the CB scene for new equipment, explains discrepancies in transceiver pricing and comments on the activities of a CB network. He also looks at some discontinued transceivers and components

Software Spot This month, QSP73 Services brings you another superb collection that includes plenty of software to help you to get the best out of any seasonally increased activity on the amateur bands

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Reviewed - LDG RT/RC-100 Remote Auto ATU
Tex Swann G1TEX was given an LDG remote ATU to
play with - here are his conclusions.

Review - Frequency Counter & Crystal Tester Kit
Geoff Theasby G8BML describes building a handy
and cheap kit for testing oscillators and tuned
circuits.

The Battle Creek Special

Steve Ireland VK6VZ relates the tale of the Battle
Creek Special antenna - a DXing Legend - along
with describing how to build your own.

Making Waves

Steve White G3ZVW focuses on fading and
multipath reception.

Valve & Vintage

Ben Nock G4BXD is back in military
museum mode and discovers two
interesting sets, one for use in ships and
one for aircraft.

Carrying on the Practical Way

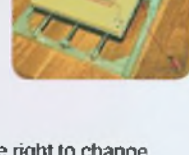
Jamie Williams 2E0SDV wanted a
remote coaxial switch that wouldn't
break the bank. Here's his solution.

What Next

Guest contributor Paul Warman
G0DDP shares his experiences
of using a CNC router to make
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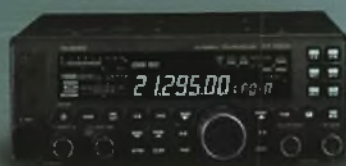
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