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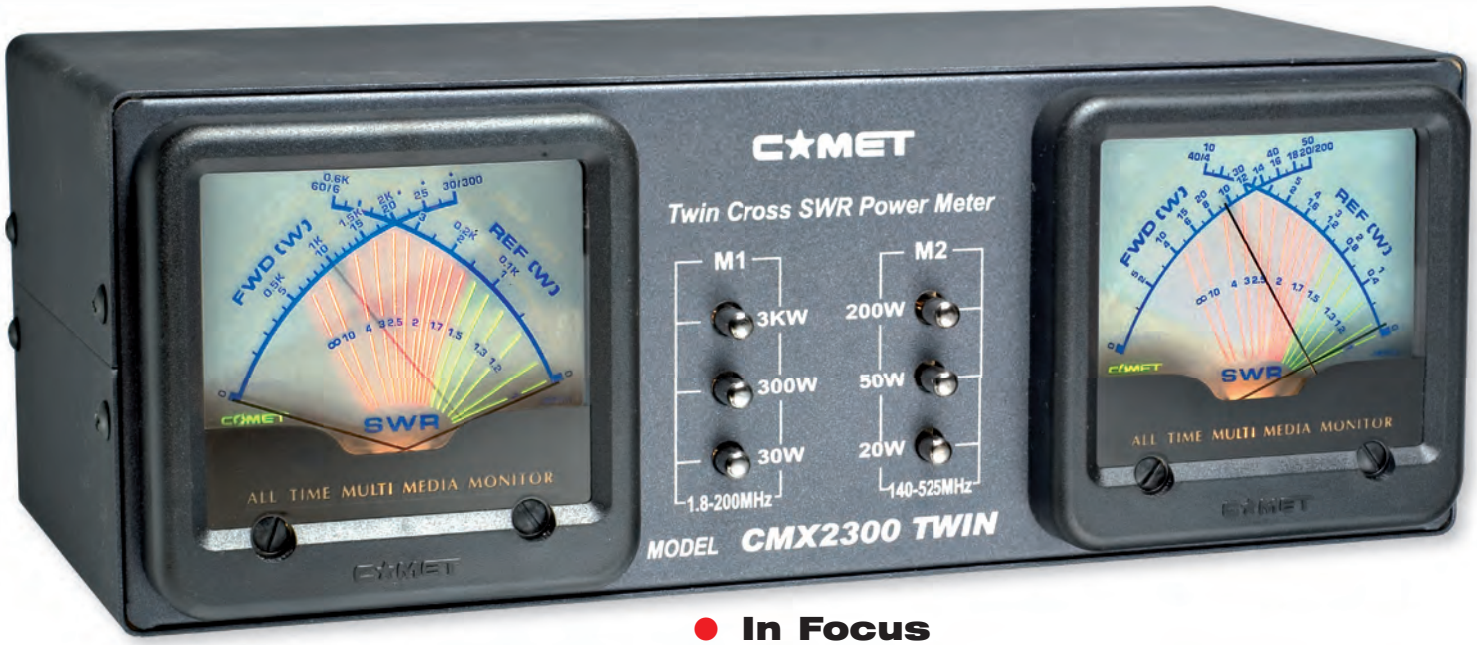

Comet CMX2300

Twin Cross SWR Power Meter Reviewed

- **RF Power Measurements**
- **What Next?**
  Practical Antenna Considerations
- **In Focus**
  The Coventry Amateur Radio Society
- **Fun on 10 Metres!**
  Build a 28MHz Antenna
- **In the Shop With Harry Leeming**
- **A 3-Element Yagi**
  Model versus practical test

Doing it by Design

Build The 198kHz Off-air Frequency Standard

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Front cover: Our thanks go to Tex Swann G1TEX for the Comet SWR/Power meter and the G4CFY Off Air Frequency Standard photographs and the design by Steve Hunt.

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Rob Mannion's

keylines

Rob discusses something here

Everyone involved with *PW* is acutely aware of the essential job that our news pages do for our widespread readers. However, as Editor I realise that we aren't yet providing the best news service possible – although producing the news is a team job and readers can be part of that team!

Recently, during separate club visits I was pleased and dismayed at the same time to hear from two different club chairmen that they regarded that the 'art of communications' within the hobby 'were at a new low'. They were both disappointed at the poor level of contact between clubs themselves and also with the wider world. Although I was saddened at the news, it's a long standing situation and I was pleased that such prominent Radio Amateurs were fully aware of the problems.

Doing Something!

As readers will know, I don't raise a problem without also suggesting that we can do something about it. And we can do something!

First, by working together we can help to ensure the news and information coming from our own clubs can be used effectively and isn't just a jumbled set of notes that can confuse an Editor! It's not difficult and the *PW* team will help anyone acting as a news source in every way possible to help promote the hobby.

Nowadays, one of the most time consuming problems I have as a journalist is trying to make the best of a news story that's bereft of vital information. Even modern E-mail and the Internet can't help us out in many cases because, even though we make it clear that we can't usually spare the time to accept the the common invitation to 'please visit our website for news', when I have been forced to 'visit the website' – the information required still isn't available!

So, to help I'll provide a few points that can help us to produce the best quality and most accurate news story involving your club, group or activity in Amateur Radio. However, if further help is required the *PW Author's Guide* (full of helpful suggestions for article writing) is now available in PDF form for E-mailing.

The list of problems includes: Photographs of groups with no names, or without clear identification, or with Christian/Given names and callsign only, omitting surnames (an essential courtesy to the person I believe). Often, we then find that callsigns with no identifying surnames are listed as 'Details Withheld' in callsign directories!

If a first name and callsign only is provided for personal security reasons I can understand the requirement. However, as there's no point revealing someone's identity via a news item, I'll support the requirement by not mentioning the individual in the report.

When a news item is sent to us please try an ensure we have full contact details, including a daytime 'phone number. It's also important that your club knows you're in contact with *PW*, because recently we published a news item – in good faith – only to have a senior member of the club asking where we'd got the information from! Fortunately, it was due to (well-meant) confusion.

The vast majority of news stories come from reliable sources and I rarely have doubts. But you can help us with as much information as you can and together we'll promote the hobby efficiently!

Video Documentaries

I've recently been enjoying the excellent GPO documentaries available from **www.lovefilm.com** I can thoroughly recommend those from the 1930s where Wick Radio and Aberdeen trawlers are featured in a simulated rescue. The equipment and radio procedures are delightful to see in action!

One film featured a Hebridean Island and the commentary announced that, "a young man is seen, using the hand operated telegraph machine to send orders to the mainland." The machine was small and canister shaped with an operating crank handle on one side. Around the circumference at the top were a row of buttons associated with letters and numerals, which he pressed as an arm rotated. The machine seemed to be some form of an auto-keyer (perhaps with an Amateur Radio application?) and I'll be fascinated to learn more about the device from an informed reader!

Rob Mannion G3XFD/EI5IW

Practical Wireless

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

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

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

Practical Wireless readers' letters

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

Shannon Airport Problems

Dear Rob,

Following my most recent visit to Ireland, I thought you and *PW* readers would be interested to learn of my experience when flying out of Shannon Airport in June with my Amateur Radio v.h.f. hand-held transceiver.

As you know, I'm also a very frequent visitor to Ireland – and additionally – I've visited many other countries with Amateur Radio equipment including most European countries, Brazil, South Africa, Canada and the USA to name a few and I've never encountered any problems whatsoever.

Normally when passing through airport security checks, it's my small magic props that draw the attention of officials. However, when leaving Ireland via Shannon Airport recently, after my cabin baggage was X-rayed, I was pulled over to have all the items in it examined by hand. What seems to have caught the eye of the X-ray operator was my Amateur Radio v.h.f. hand-held. Even though I was carrying the front sheet of my on-line Amateur licence document, I was quizzed in great detail as to the type of radio, did it transmit, was it used for receiving only, what frequencies did it cover and why did I need it to visit Ireland?

The official then intimated that he would have to seek further advice from his manager, so off he went with my licence and radio leaving me to repack my bag. After about ten minutes he returned and clearly in a less belligerent and official mood. It transpired that while talking about the radio to his manager in the office, a member of staff who was a Radio Amateur (officially we are 'Experimenters' in Eire) gave my radio and licence a cursory check and declared all was well.

This of course begs the question that if there had not been a member of staff who was a Radio Amateur to vouch that I was Radio Amateur with a genuine reason for carrying a hand-held with me, would my radio have been confiscated?

It would be interesting to know if any *PW* readers in Eire have encountered similar difficulties when flying out of Irish airports carrying Amateur Radio equipment?

Colin Topping GM6HGW
Glenrothes
Fife
Scotland

Editor's comment: *Colin's reference to 'magic props' is due to his actvities as a member of the Magic Circle. To ensure we can publish the full facts I contacted the management at Shannon Airport and it was some time before a reply was forthcoming. After reading the reply from the Shannon management I invite readers to join me on the Topical Talk pages where I share my own experiences and observations.* ***Rob G3XFD.***

Star Letter

Ken Smith G3JIX's Article

Dear Rob,

With reference to **Ken Smith G3JIX's** article entitled *Amateur Radio Exams & Licences* on page 54 of the July edition of *Practical Wireless*. Modern youngsters taking up radio? How do we do that – have *PW* readers got any ideas? – well I offer a possible solution to this problem.

I currently work as a part time lecturer at a local Further Education College teaching on the EAL course **www.eal.org.uk** The syllabus for the course is divided into three parts. Panel wiring, Electrical installation, and Electronics.

The course is designed to give students a wide range of skills, both theoretical and practical. The Panel wiring and Electrical installation parts of the course are very much laid in tablets of stone and don't leave much scope for alteration. However, the electronics part of the syllabus is open to wide interpretation.

As a Radio Amateur I have suggested introducing radio as the theme for the electronics part of the course. Students would start by making a crystal set, moving quickly on to building an amplifier for the crystal set, which can then be used as part of a radio receiver and so on. It's hoped that the final project for the year will be a superhet radio.

Students will be encouraged to build radio projects using various methods breadboard, stripboard, and p.c.b.s. One of the problems that will be encountered is that of sourcing and supply, particularly for coils. By introducing a radio theme it is hoped students will be motivated to learn. Students will also be allowed to take some of the projects home to experiment with, hopefully motivating them further in the art of radio.

If there are any other *PW* readers or college lecturers teaching on this or similar courses I would be interested to know. I would also be grateful if anyone can help with the sourcing and supply of components for this course.

Brian Parker G4EFW
Sutton Coldfield
West Midlands

Letter From Colin Topping

Dear Sir,

Reference the E-mailed letter from Colin Topping. I apologise for our delayed response to your letter received in early June, in respect of Colin Topping's recent experience at Shannon Airport.

As you can appreciate, from a security perspective once an electronic and/or battery operated device is detected at any airport screening facility it is subject to additional examination. This is so an X-Ray screening officer can satisfy himself / herself that such items are not a threat and operate as intended. In this instance the screening officer brought the v.h.f. hand held transceiver to the attention of his supervisor to ensure that it complied with EU security regulations.

For future reference I would suggest that where a passenger is carrying an unusual electronic and /or battery operated device in their hand baggage, it should be declared in advance of the screening point similar to the way that laptops are presented. This would assist the screening officer in making a quicker assessment of the item being carried. If difficulties are encountered by passengers with such items we would recommend that the assistance of a Screening Supervisor be requested.

There was never any question of this item being confiscated, but as your readers will appreciate, security is paramount and screening personnel need to satisfy themselves of the bona fide of items being presented.

Yours sincerely

Niall Maloney
Head of Operations & Services
Shannon Airport
County Clare
Republic of Ireland

Roy's Accident

Dear Rob,

Since I was a 'Brat' have always been a proponent of mobile and portable communications. That interest has survived through professional operating, CB, and Amateur Radio operating to the present day. I cannot think of a car I have owned which didn't at some time sprout at least one antenna and I rarely go out without a hand-held transceiver tuned to the local repeater. However, as a result of two significant recent events I will be changing my attitude to 'in car entertainment' but the hand-held radio will still stay close to 'hand'.

Recently, I was the innocent victim of a road traffic accident. I was crossing the road on a Zebra crossing when a van ran into the rear of the vehicle that had stopped to let me pass. The result was damage to the van, car and personal injuries to myself and the driver of the van has been charged with driving without 'Due Care and Attention'. I can confirm that suffering injuries, and waking up, somewhat surprised, with post traumatic amnesia, on a hospital trolley half an hour later has had a profound effect on me!

The second seminal event is a recent report in the national press of a driver being jailed for causing an accident when using a Blue-tooth telephone. His attention was distracted, he failed to appreciate that the traffic ahead had come to a standstill, and he impacted another vehicle. A passenger in one of the stationary vehicles was killed. There but for the grace of God go many of us!

I know that the Amateur fraternity have a 'Free Pass' when it comes to using mobile radio, as opposed to cell phone equipment. No doubt that concession was hard won by well meaning people but make no mistake, it's not a 'Get out of Jail Free' card.

Anyone who allows operation of their Amateur equipment, Bluetooth or not, to detract from the normal standard of driving care make themselves liable to prosecution. And – if the current case is a precedent – to imprisonment.

So, my antennas remain on the vehicle, 'just in case' although the radio equipment now lives in a case, in the boot, ready for use 'static mobile' from a fixed, parking spot when required. I would seriously urge fellow operators to adopt a similar attitude. Yes, it could be viewed as an infringement of our legislated rights; but balance that against the possibility of a term of imprisonment, or the memory of wiping out an innocent victim.

Roy Walker G0TAK
Kendal
Cumbria

Editor: *A timely warning Roy! Everyone on PW – and I'm sure readers also – wish you a speedy and good recovery.* ***Rob G3XFD***.

Trimming Dipoles?

Dear Rob,

With reference to the letter by **Graham Hart M0EAD**, *Trimming Dipoles?* in the August issue of *PW* and I must stress that there is a great deal of confusion about matching antennas. First – a (so called) antenna tuner unit does **not** tune the antenna. It only provides a way to match whatever impedance is at the transmitter end of the feeder to the transmitter. An indicated low v.s.w.r. only means that the transmitter is then matched to whatever is 'seen' at the end of the feed line.

If the actual antenna was originally mismatched to the feed line, **it is still mismatched !** The standing wave ratio along the feeder is dependent entirely on the load presented at the antenna end, and no amount of alteration at the transmitter end can alter the actual s.w.r. Take an example of where the s.w.r. is 2:1 due to a mismatched antenna. The s.w.r. meter at the transmitter will show 2:1 (assuming no loses in the feeder system). Using an a.t.u. to reduce this to 1:1 at the transmitter will not change the actual s.w.r. and a second s.w.r. meter placed in circuit between the a.t.u. and feeder will still show that it's 2:1. However, matching the transmitter in this way will ensure that (with a transistor rig) the p.a. is protected and also delivering its full power output to the antenna system.

However, a 2:1 s.w.r. means that some of the transmitted power arriving at the antenna end of the feeder is being reflected back down to the transmitter end. As this is mismatched, some of that is reflected back up to the antenna – being either dissipated in the feeder line losses or by radiation. This loss is why a 'lossy' coaxial cable will show less s.w.r. than a low-loss cable. In other words, if you improve the quality of the coaxial cable used you may well find the s.w.r. has increased!

What is the effect of this high s.w.r. in practice? In an effort to find out I set up a remote r.f. indicator to measure the radiation from my antenna. Starting at the resonant frequency of the antenna on 80m the s.w.r. was 1.05:1 without an a.t.u..

I set the r.f. indicator to read full scale. Changing frequency to get an indicated s.w.r. of 2:1 the r.f. indicator showed only a very small reduction in radiation. I then used an a.t.u. (an AT230) to adjust the s.w.r. to 1:1, the indicated radiation dropped slightly more! Most likely due to losses in the a.t.u..

Checking at both band edges showed the same results. Only when the s.w.r. was higher than 3:1 did my a.t.u. show an improvement in the radiated signal. A s.w.r. up to 3:1 seems to have little effect on the radiated signal. In fact the introduction of the a.t.u. showed a loss of about 0.5dB in radiated power !

These findings should not be taken as conclusive but were unexpected and seem to indicate that we may worry far too much about high s.w.r. It should also be noted that the feed impedance of a antenna will vary with height above ground. For example a half wave dipole on 3.7MHz at a height of 12 metres, drops to around 26Ω. But, by tuning slightly to one side of resonance I found It possible to find a point where it is 50 or 75Ω and appear to get a 1:1 s.w.r..

Ted Rule G3FEW
Lenwade
Norfolk

Part Exchange & Martin Lynch

Dear Rob,

I read with interest the letter from **Tony Corbett G0WFV** regarding part exchange and **Martin Lynch's** reply. However, one thing Martin didn't mention is that retailers have also to add VAT on to their re-selling price. (Yes the Chancellor gets two, or more, bites of the VAT cherry!) which I think is outrageous!

Another way of selling used equipment that **Lowe Electronics** of Matlock used to offer was a service called 'Sold on behalf of' where the person offering the equipment sets the asking price and Lowe added a small commission for offering the shelf space in their showroom. This way there was no additional VAT to charge as it remained a 'Private sale'. They also offered, for an additional charge to the buyer, a full testing service so that the buyer could at least be aware of any problems that there was (if any) with the equipment before deciding to buy or not.

Regarding re-sale prices of used Amateur Radio equipment, I noticed that during the 1980s and 1990s we could get very good returns on used equipment as long as it was in very good (as new) condition and with all original packaging, manuals, accessories, etc., but these days this seems no longer to be the case. I think that this could be that manufacturers seem to bring out newer and updated versions of their existing products with ever decreasing time intervals and therefore 'current' models don't stay current for very long! Regards to you all and keep up the good work with *PW*.

John Blain G4SKU
Flitwick
Bedfordshire

Part Exchanging Equipment

Dear Rob,

I would not want to take sides in the discussion regarding part-exchange and trade-ins of equipment, but I would like to mention a problem, which I experienced in such instances when running my own business (not radio related). If I part-exchanged or traded-in customer's goods for, say, £100 and wished to make a profit of £15, the selling price would be £135.13. Why? Because I had to add VAT, amounting to £20.13, to the whole selling price, and this element went straight to Customs & Excise (now HMRC). My regards.

Nick Hockenhull MW6NCH
Summerhill
Pembrokeshire

***Editor's comment**: My thanks go to to both John G4SKU, Nick MW6NCH and other readers for pointing out the imposition of VAT on secondhand equipment sales by the ever greedy Chancellor of the Exchequer! Martin Lynch and I thank you all for the reminders! **Rob G3XFD**.*

Contests & Exhanges

Dear Rob,

As a sometime participant in contests and now the Adjudicator of the *Practical Wireless* 144 MHz QRP contest, I read **Dave Ackrill G0DJA's** letter in the July issue of *PW* regarding contests (amongst other things) with some interest. In replying I first put myself in the shoes of a station actively participating in the contest.

The rules of many contests state that the contest exchange includes reports and serial numbers. Therefore participating stations will be expecting to exchange this information. Until a participating station is satisfied that the non-participating station is actually non-participating, I think it's reasonable to expect that in contacts with a contest station (who, in most cases. will have clearly indicated this by calling "CQ Contest") the contest station will expect to receive the information required for the contest exchange.

Failure to do so, and record the information accurately risks a deduction of points, and in the spirit of 'fair-play' most participants would want to satisfy themselves the both stations had successfully received the exchange from each other. In weak signal situations actually conveying that you are not participating in the contest might be a bit of a challenge without inventing a new 'Q' code! Speaking frankly, I think that – in such situations – giving a serial number of 001 is probably the quickest way to enable both parties to complete a contest QSO and move on to QSOs with other stations.

However, putting myself into the Adjudicator's shoes, serial numbers exchanged are vital pieces of information. No matter whether logs are cross-checked manually or electronically (or any mixture of the two), the callsigns together with serial numbers are the easiest way to find QSOs for checking purposes – hence they are part of the exchange in most contests including the *Practical Wireless* 144 MHz QRP Contest.

Whilst I will accept that callsigns and time could be used, the reality is that people don't log time particularly accurately, especially when operating portable. Callsigns and serial numbers are absolutes – either they match or they don't! In addition serial numbers are the only pieces of genuinely unknown and un-guessable information in a contest exchange.

Check logs are typically submitted by stations that made a few contacts during a contest, wanted to submit a log, but were ineligible to enter the contest, perhaps because they running more power, were operating portable in fixed contest, or perhaps only operated for a short time and didn't want to be bottom of the results table, etc. A good checklog with serial numbers will be used by the Adjudicator in virtually the same way as a contest entry apart from appearing in the table of results.

Whilst all checklogs are welcome and helpful to Adjudicators, the usefulness of one without serial numbers to my mind is limited. The adjudicator will have lots of extra work to make use of it in comparison to one with properly sequential serial numbers.

Finally, if someone were to ask me, "Colin, would you deduct points from an entrant who had logged a serial number of 001 from a contact from a non-competing station that submitted a check log which had no serial numbers?" – my answer would be a definite '**No**!'

Colin Redwood G6MXL
Poole
Dorset

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

news & products

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

Going Coastal

Neil Tideswell 2E0BHS and friends will be riding their motorcycles around the entire UK coast to raise money for the Assert (B&H) charity, which was set up to help people in Sussex with Asperger's syndrome. One of the other riders, Dominic O'Doherty, is himself a sufferer and Assert (B&H) helped him to get his motorcycle licence and now he is studying to become an M3.

Going Coastal will start in Brighton at noon on Sunday, 17th August and finish some 22 days and more 3,400 miles later on Sunday, 7th September, again in Brighton.

If you'd like to follow Neil on his travels, he will be on the air to give progress reports throughout the journey. He plans to use the IC-7000 loaned by Icom UK and the Outbacker Joey mobile HF antenna loaned by Adur Communications to transmit every evening at 19.00 (UTC) on 80m (**3.650MHz** ± 20KHz). During the day he will be using 2m (**145.525MHz** ±) to keep in touch.

If you want to know more about Going Coastal, their website is at:
www.goingcoastal.org.uk
Assert (B&H) have a site at:
www.assertbh.org.uk

Assert

McMichael Rally Winner

A day out to the McMichael Rally on Sunday July 12th was really worthwhile for **Andrew Birch M0YGB** – he won the Yaesu FT-450AT worth £600 in the grand raffle. Andrew's prize was donated by **Yaesu UK** and **Martin Lynch & Sons**. The popular event, held at Reading Rugby Football Club in Sonning-on-Thames drew many visitors but Andrew – from High Wycombe – had luck on his side!

Martin Lynch G4HKS (right) presents the Yaesu FT-450AT to lucky winner Andrew Birch M0YGB, with Rally Chairman Min Standen G0JMS on the left.
Photo courtesy Martin Lynch & Sons Ltd.

A Message From Hans Hilberling

Stop Press News! The following announcement was posted on the Hilberling company's website in late July. Everyone who saw the full display of the company's equipment at the recent Friedrichshafen Hamfest will be saddened to hear of the company's problems. The original notice was published in German and I hope that no errors have crept into my translation. **Editor**.

"I regret to announce today that Hilberling GmbH has cancelled the production of the PT-8000 series of transceivers. I am really sorry that this will cause disappointment on your side. Let me explain briefly what had led to this decision. Hilberling had to continuously counteract obstacles to meet EU wide requirements. This has forced us (many times) to change the design of this high-end transceiver, which often has been in conflict to our design goals. We finally could meet all our design numbers within a few prototypes but we – and the numerous suppliers – were not able to guarantee these numbers for the line production. Measures that would have to be taken to guarantee the specifications are in no way cost effective. All this has led to the decision to put everything on hold.

Hilberling apologises for any inconvenience you had. We deeply appreciated the confidence you demonstrated for the PT-8000 series of h.f./v.h.f. transceivers. **Hans Hilberling July 24th, 2008**

Obituary

Air Marshal Sir Eric Dunn KBE CB BEM CEng RAF, G3KED Patron of the Royal Air Force Amateur Radio Society, died on the 16th July 2008 at the age of 80.

Air Marshall Eric Dunn G3KED.

Eric Dunn started his Air force career at the age of 16 when he joined the Air Force as an Aircraft apprentice. He trained at No.1 Radio School, then at RAF Cranwell, and graduated after three years as a radio fitter (Air).

Throughout his distinguished Air Force service he was a keen sportsman. After 42 years he had risen to the rank of Air Marshal and was the RAF's Chief Engineer. During the Falklands Conflict he served as Air Officer Engineering at HQ Strike command and shortly after the campaign he visited the Islands to assess the Air Arm's requirements.

Air Marshal Dunn followed in the steps of his father in more than one way. Dunn senior was a Wing Commander in the RAF and a keen Radio Amateur. Sir Eric was licensed as G3KED and retained a keen interest in the hobby, and, as Patron of RAFARS he assisted the Society and visited them whenever it was possible. The photograph was taken on his last visit to **RAFARS HQ** at RAF Cosford.
Roy Walker G0TAK.

Adur's Bluetooth Range

West Sussex-based Adur Communications now have a new range of Bluetooth headsets. The company announce that, "Using the popular 2-pin interface we have models available for both the standard Icom and Yaesu format as well as the Kenwood type. The features are as follows: A very lightweight headset, headset talk time five hours – standby time 120 hours. They are available as a 2-piece design or with the optional separate remote push-to-talk Bluetooth interface that can be attached to the radio with the supplied Velcro strap.

All of the items have internal rechargeable batteries and will charge in less than 2 hours - charger included. Price for 2 -piece unit £79.95 inc. VAT. Price for 3-piece unit £99.95 inc VAT. Further details on the web site at **www.adurcomms.co.uk**

For further details contact **Phil Godbold**, **Adur Communications**, **PO Box 2047**, **Steyning**, **West Sussex BN44 3XJ**, E-Mail **pgodbold@adurcomms.co.uk**, Tel: (**01903**) **879526.**

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Bletchley Park Into the Future

"The true Bletchley Park Story is more incredible than fiction", so the Bletchely Park Trust informed the *PW* news desk.

A desperate race against time, pitting Britain's best brains against Hitler and his chief commanders. The Second World War code breakers' mission was to crack the German Enigma machine and decode other seemingly unbreakable messages. Against them were odds of 158 million million million. Their reward? Ultra' Intelligence that saved Allied convoys carrying essential supplies from U-Boat 'wolf packs' on the prowl and played a major part in the North African and other military campaigns. So effective was Bletchley Park that the decoded messages sometimes reached the Allies before the enemy Generals.

The main mansion at Bletchley Park.
Photo Courtesey of Elle Dunne.

The astonishing achievements of the code breakers are believed to have shortened the war by two years saving countless lives.

Today, Bletchley Park Trust is a charity; conscious of the debt we owe to the brilliant, unsung intellectual warriors among whom **Alan Turing** and **Gordon Welchman** were pre-eminent. The mission of the Trust is to build a world class Heritage Site and Educational Centre but it receives no on-going public funding and relies heavily on its revenue streams from conferences, weddings and heritage visitors, as well as from its Science and Innovation Centre, where Bletchley Park has returned to world-leading research after 60 years

In addition to the Science and Innovation Centre in Blocks A and E, restored and refurbished in partnership with Milton Keynes Capital Partners, the Bletchley Park Trust has also restored Block B, as its main museum area, and Hut 8, the former workplace of Alan Turing. It has established an American Garden Trail; a number of new and fascinating exhibitions and developed unique mathematics learning resources for students and educators. The National Museum of Computing will open later this year in the newly refurbished Block H and a Sculpture Trail is being developed in the grounds.

Heritage Visitor numbers at Bletchley Park are better than ever before, having increased by 40% over the last two years; the Science and Innovation Centre is thriving and the conference and wedding business, in partnership with Zest Leisure Group, is steadily growing.

But now is the time to act to help save Bletchley Park and the Trust are currently in ta ks with the Heritage Lottery Fund and other potential funders. Some of its remaining buildings, where the most important work of the 20th century took place, are in urgent need of repair. The iconic Victorian Mansion requires in the region of £1,000,000 for repairs to the roof and some of the symbolic code breaking huts are in a desperate state of decay.

Simon Greenish, Director of Bletchley Park Trust urges people to visit the Park, saying, "The site is unique and one of the most important remaining from the Second World War. We have exciting plans to develop the Park and save it for future generations. The more visitors we have helps us to realise those plans."

To sign the petition lobbying the Prime Minister to act to help preserve Bletchley Park, please go to **http://petitions.pm.gov.uk/BletchleyPark/**

If *PW* readers would like to make an online donation to Bletchley Park Trust, please go to **http://www.bletchleypark.org.uk/** For further information visit **www.bletchleypark.org.uk** or E-mail **info@bletchleypark.org.uk** or call (**01908**) **640404**. Write to **Bletchley Park Trust**, **The Mansion**, **Bletchley**, **Milton Keynes MK3 6EB**.

New D-Star Repeaters in Dorset & Essex

A new D-Star digital repeater and gateway **GB7MM** is due to go on air soon. Located 2km south of Wimborne in Dorset, the new repeater is to be run and maintained by a small group of enthusiastic Amateurs, who are keen to play a part in the expansion of D-Star coverage in the Dorset area. The new repeater GB7MM will operate on RV56 (145.700/145.100) and employs hardware generously loaned by **Icom UK** of Herne Bay Kent.

The NoV was issued after new digital repeater received approval on 25 June. The GB7MM team is working hard to ensure that the repeater is on air in quick time. The target being by the end of July. A coverage map is available at **www.ukrepeater.net/repeaters/maps/gb7mm.jpg**

Peter Waters G3OJV from **Waters & Stanton PLC** contacted the *PW* Newsdesk to report that, "We are pleased to announce that GB7SS (Southend) 70cms D-Star repeater based in Hockley, Essex, now has an operational Internet gateway. The repeater input is 430.7375MHz and the output is 439.7375MHz.

Torbay 50MHz Repeater

Torbay now has a 50MHz (6m) repeater working. Its callsign is **GB3TQ**, and it operates on Channel R50-4 (the output frequency is 50.750 MHz and the input is 51.250MHz). A CTCSS tone of 77Hz is required to open the repeater. The antenna is vertically polarised, and it is located at one of the highest points in the Torbay area, **Locator IO80FK**. Local, and visiting licenced Radio Amateurs with a 6m capability are encouraged to use the repeater to increase communication coverage in the area. Any comments or feedback to **Martin Foster G3VOF, Linscombe Drive, Torquay, South Devon TQ1 2HH**, E-mail **itnld@btinternet.com**

Telescope Cameras for Amateur Astro-Photographers

Many Radio Amateurs are also interested in Astronomy, reflecting this interest (Hi!) the Image Source company based in Charlotte, North Carolina, contacted the *PW* newsdesk.

Charlotte, North Carolina, July 23rd 2008: **The Imaging Source**, an international manufacturer of imaging hardware and software for astronomy, is now offering amateur astro-photographers a series of highly affordable, low noise telescope cameras to capture high quality images of the night sky.

The telescope cameras ship (are despatched) in blue and black anodised aluminium and zinc housing, measure 50mm x 56mm and weigh only 260g. The included nose piece is mounted onto a C/CS mount on the front of the telescope camera. On the rear, a USB 2.0 or FireWire connector is available (model specific). A threaded tripod adapter on the bottom rounds off the exterior of the telescope camera.

Monochrome and colour types are available with and without an IR cut filter in three resolutions: 640x480, 1024x768 and 1280x960. The cameras use low noise CCD chips from Sony, which have an exposure time of up to 60 minutes and a maximum frame rate of up to 60fps.

The telescope cameras come with the camera control and acquisition software "IC Capture.AS", which allows image sequences and singular images to be saved to disk. Furthermore, using the highly intuitive graphical user interface, all camera parameters, such as exposure, sensitivity and frame rate, can be set.

The telescope cameras are available worldwide and start at only USD$ 350 or EURO 290 (without shipping and sales tax). They can be purchased online and from an international network of dealers. To learn more about The Imaging Source telescope cameras, download "IC Capture.AS" and see hundreds of sample images, please take a look at **www.AstronomyCameras.com** or **www.AstronomyCamerasBLOG.com**

The Imaging Source is a multi-national enterprise with branches in the US, Taiwan and Germany. They have been manufacturing imaging products for scientific, industrial and medical applications for more than 20 years. In 2007, The Imaging Source released a series of cameras designed specifically to meet the needs of amateur astro-photographers.

For further details contact: **The Imaging Source, LLC, 6926 Shannon Willow Rd., Suite 400, Charlotte, NC 28226 USA. Tel: +1 704-370-0110, Fax: +1 704-542-0936** E-mail: **Info@TheImagingSource.com**

websites **www.AstronomyCameras.com** and **www.AstronomyCamerasBLOG.com** **www.TheImagingSource.com**

Plymouth Foundation Examination Successes

Bob Griffiths G7NHB writes: "On Monday July 14th 2008 the students of the **Plymouth Training Team Foundation Course** sat their examinations and there were six successful candidates. Congratulations go to **Len Bennett**, **Colin Sidey**, **Mark Keith-Hill**, **Kevin Moysey**, **Charles Coverly** and **Seth Kneller**. Listen out for these new M6 licensees "on air" to give them a good Amateur Radio welcome.

The course was the 11th Foundation Course that the Plymouth Training Team has organised, bringing a total of 80 students since the Team's first Foundation Course in June 2002. The Team has also run five Intermediate courses, as well as assisting and holding examinations for Advance students.

Our next course should be another Intermediate course, probably in October this year, if there are sufficient candidates. The next Foundation Course will then be held early next year.

For more details or to put your name on the waiting list for the next training courses contact me at the address below."

All our training and examinations are held at **The Scout Centre at Blindmans Wood, Hartley, Plymouth. Bob Griffiths G7NHB, 4 Wolrige Way, Plymouth PL7 2RU. Tel: (01752) 343177**, E-mail **g7nhb@hotmail.co.uk**

Rob James 2E0ONO (Invigilator), Kevin Moysey, Cherles Coverley, Colin Sidey, Len Bennett and Seth Kneller. Seated: Bob Griffiths G7NHB, Mark Keith-Hill, Chris Wingate M5CJW (Lead Instructor)

Amateur Radio to the Rescue

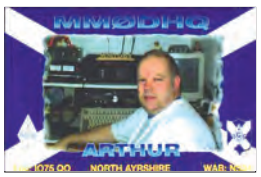
Daniel Small MM3NMI contacted *PW* to share the story of how he was rescued when he got into difficulties while canoeing off the west coast of Scotland in late June

Daniel writes: "My Friend and I were out canoeing on the west coast of Scotland just off Ardrossan in late June. Everything was going well for the first 30 minutes until I realised that I'd taken on a considerable amount of water. My first thoughts were to head for the beach, so after changing my course to head for the shore I was getting hit with waves side-on to the canoe and it was starting to tip me slightly and more water was entering from the sides, this happened a few times until the canoe had fully filled with water. I had to get out the canoe and swim – it's difficult to swim in a lifejacket – to a small island about 30 yards from where I had got out the canoe.

The small island was about three quarters of a mile from the shore. When I reached the Island I pulled the canoe on to the rocks and got my rucksack out. My mobile 'phone was water damaged, so I had to use my 2 metres v.h.f. radio which I only purchased last week and made a call on the local channel, 145.525MHz. I called my friend **Peter Finnie MM3YFT** who was already at the local harbour to look for someone to come and provide assistance. Unfortunately, nobody could be found!

So, I got in touch with **Rick Dunlop MM0CIN** who made a 999 call to Clyde Coastguard who tasked Troon Lifeboat and Ardrossan Coastguard team.

Altogether, I was on the rocks for about 30 minutes before the lifeboat reached my location. I kept close contact on 145.525MHz with all the local guys who were talking me through things to do, including **Arthur Clark MM0DHQ** at Saltcoats Harbour about 2 miles – from where I was looking out for the lifeboat to come from.



So that's my story about what happened – I was rescued thanks to Amateur Radio, my friends and the Royal National Lifeboat Institution. Thank you everyone." **Daniel Small MM3NMI**

All At Sea

Icom's GB0RSR Special Station On The Red Sands Offshore Fort!

Recently, Icom UK launched GB0RSR the special event station based on the Thames Estuary Maunsell Army Sea Forts, seven nautical miles off the North Kent coast. On air over the weekend commencing Friday July 11th, the station was operated by **Icom UK** Managing Director **Phil Hadler G4CZU**, Amateur Radio Product Specialist **John Turner G0KFO** and Radio Technician **Chris Ridley G8GKC**. This was the first special event station that they had operated, and they were soon riveted by the response of Amateur Radio operators globally.

Getting the equipment on board the forts was no mean feat, as the only way up to the forts was up a high, narrow vertical ladder. The full story – illustrated with many photographs – will appear in *PW* very soon!

Any large equipment was hoisted up the side of the tower via a pulley system. The equipment chosen for GB0RSR was an ICOM IC-756 PROIII for h.f., which fed a 5-band vertical antenna, kindly donated by **Waters and Stanton**. On v.h.f./u.h.f. D-Star they used an Icom IC-2820 and vertical dual-band antenna.

The Amateur Radio station received a brilliant response from contacts. The data on **QRZ.com** represents this with a massive 1305 hits to the site and call sign GB0RSR! Chris Ridley G8GKC commented, "Many local contacts were also listening to the broadcast transmission on 1278kHz. Like us, they were pleased to hear Amateur radio presented in a positive way to the general public – the two stations worked well together. The station brought back a lot of fond memories to operators who remembered the days when the forts were the home of the 'pirates'."

Contacts were made all over the world in Europe, Russia, the USA, Japan and Brazil, with the furthest being Melbourne, Australia. One of the Red Sands Radio DJs **Bob Le-Roi** was really keen to try out the D-Star side of things as he found it fascinating and all the DJs started to get involved to attempt to de-code the s.s.b. being received on a.m. receivers!

All GB0RSR QSLs will be sent directly to each contact, with **www.QRZ.com** providing the addresses. Icom UK would like to thank the many people involved in the project:

Bob Le-Roi, from **Project Red Sand**
www.project-redsand.com

Alan White, Skipper of the *X-Pilot*
www.xpilot.pwp.blueyonder.co.uk

Waters & Stanton PLC of Essex
www.wsplc.com

and everyone at Icom UK without whom this event would not have been possible! For more information, please contact:

Ian Lockyer, Marketing Manager, **ianl@icomuk.co.uk**

New 144/430MHz W&S Antenna

Essex-based Waters & Stanton PLC have introduced a new dual-band v.h.f./u.h.f. antenna. The company announce that, "Nowadays, even more Radio Amateurs are using hand-held radios for mobile operation, particularly with the advent of D-Star activity. As a result, Watson have introduced a new mobile whip antenna designed for occasional or permanent mobile operation.
Covering the 2m and 70cm band, the antenna has a built-in mini magnetic mount and the cable feed is terminated in an SMA plug with a total length of approx. 500mm. "

The company claim that, "Tests have shown that it offers around 5dB gain on 70cm over the normal 'rubber duck' supplied with handhelds. It's a very simple and cost-effective way of going mobile with a handheld and the cost has been kept down to a very competitive £19.95. The antenna is available direct from us and from most other UK Amateur Radio radio outlets."

More information from **Waters & Stanton PLC**, Head office and southern store at **Spa House, 22 Main Road, Hockley, Essex SS5 4QS**. Tel: (**01702**) **206835**. E-mail **sales@wsplc.com** Website **www.wsplc.com**

MOONRAKER

Manufacturers of radio communication antennas and associated products

Log Periodic

MLP32 .....£119.95
* Frequency:100-1300MHz TX & RX
* Boom:142cm Longest Element 150cm
* Gain 11-13 dB

MLP62 .....£199.95
* Frequency:50-1300MHz TX & RX
* Boom:200cm Longest Element 300cm
* Gain 10-12 dB

AM-Pro Mobile HF Whips (with 3/8 base fitting)

AM-PRO 6 metre *(Length 4.6' approx)*.....£17.95
AM-PRO 10 metre *(Length 7' approx)*.....£17.95
AM-PRO 17 metre *(Length 7' approx)*.....£17.95
AM-PRO 20 metre *(Length 7' approx)*.....£17.95
AM-PRO 40 metre *(Length 7' approx)*.....£17.95
AM-PRO 80 metre *(Length 7' approx)*.....£19.95
AM-PRO 160 metre *(Length 7' approx)*.....£49.95
AM-PRO MB6 Multi band 6/10/15/20/40/80m can use 4 Bands at anyone time *(Length 250cm)*.....£69.95

Slim Jims

SJ-70 430-430MHz slimline design with PL259 connection. Length 1.00m with N-TYPE socket.....£19.95
SJ-2 144-146MHz slimline design with PL259 connection. Length 2.00m with SO-239 socket £24.95

VHF/UHF Mobile Antennas

MICRO MAG Dual band 2/70 antenna complete with 1" magnetic mount 5mtrs of mini coax terminated in BNC.....£19.95

MR700 2m/70cm, 1/4 wave & 5/8, Gain 2m 0dB/3.0dB 70cm Length 20" 3/8 Fitting.....£9.95

MR 777 2 Metre 70 cm 2.8 & 4.8 dBd Gain (5/8 & 2x5/8 wave) (Length 60") (3/8 fitting).....£17.95

MRQ525 2m/70cm, 1/4 wave & 5/8, Gain 2m 0.5dB/3.2dB 70cm Length 17" PL259 fitting commercial quality.....£19.95

MRQ500 2m/70cm, 1/2 wave & 2x5/8, Gain 2m 3.2dB/5.8db 70cm Length 38" PL259 fitting commercial quality.....£24.95

MRQ750 2m/70cm, 6/8 wave & 3x5/8, Gain 2m 5.5dB/8.0dB 70cm Length 60" PL259 fitting commercial quality.....£34.95

MRQ800 6/2/70cm 1/4 6/8 & 3 x 5/8, Gain 6m3.0dBi/2m 5.0dB/70 7.5dB Length 60" PL259 fitting commercial quality £39.95

GF151 Professional glass mount dual band antenna. Freq: 2/70 Gain: 2.9/4.3dB. Length: 31".....£29.95

Rotative HF Dipoles

RDP-3B 10/15/20mtrs length 7.40m.....£159.95
RDP-4 12/17/30mtrs length 10.50m.....£159.95
RDP-40M 40mtrs length 11.20m.....£189.95
RDP-6B 10/12/15/17/20/30mtrs boom length 1.00m.....£249.95

Single Band Mobile Antennas

MR214 2 metre straight stainless 1/4 wave 3/8 fitting...£4.95 PL259 type.....£5.95
MR214S-2 2 Metre stainless steel ¼ wave with built in spring PL259 fitting.....£9.95
MR258 2 Metre 5/8 wave 3.2 dBd Gain (3/8 fitting) (Length 58").....£12.95
MR268S 2 Metre 5/8 wave 3.5dBd gain Length 51" S0239 fitting.....£19.95
MR290 2 Metre (2 x 5/8 Gain: 7.0dBd) (Length: 100"). PL259 fitting, "the best it gets".....£39.95
MR444S-2 4 Metre straight stainless 1/4 wave with spring and PL259 fitting.....£14.95
MR614 6 Metre loaded 1/4 wave (Length 56") (3/8 fitting) £14.95
MR625 6 Metre base loaded (1/4 wave) (Length: 50") commercial quality.....£19.95

Single Band End Fed Base Antennas

2 metre ½ wave (Length 52") (Gain 2.5dB) (Radial free).....£24.95
4 metre ½ wave (Length 80") (Gain 2.5dB) (Radial free).....£39.95
6 metre ½ wave (Length 120") (Gain 2.5dB) (Radial free).....£44.95
6 metre ⅝ wave (Length 150") (Gain 4.5dB) (3 x 28" radials)..£49.95

Vertical Fibreglass Colinear Antennas

New co-linear antennas with specially designed tubular vertical coils that now include wide band receive! Remember, all our co-linears come with high quality. N-type connections.

All co inears D-Star compatible

SQBM105 Mk.2 Dual Bander Radial FREE!) .£39.95 (2m 2.0dBd) (70cm 4.5dBd) (RX:25-2000 MHz) (Length 28")
SBQBM100 Mk.2 Dual Bander.....£39.95 (2m 3dBd) (70cm 6dBd) (RX:25-2000 MHz) (Length 39")
SQBM110 Mk.2 Dual Bander (Radial FREE!) £49.95 (2m 3dBd) (70cm 6dBd) (RX:25-2000 MHz) (Length 39")
SQBM200 Mk.2 Dual Bander .....£49.95 (2m 4.5dBd) (70cm 7.5dBd) (RX:25-2000 MHz) (Length 62")
SQBM223Mk.2 Tri Bander..... £59.95 (2m 4.5dBd) (70cm 7.5dBd) (23cm 12.5dBd) (RX 25-2000MHz) Length: 62"
SQBM500 Mk.2 Dual Bander Super Gainer.....£64.95 (2m 6.8dBd) (70cm 9.2dBd) (RX:25-2000 MHz) (Length 100")
SQBM800 Mk.2 Dual Bander Ultimate Gainer .....£119.95 (2m 8.5dBd) (70cm 12.5dBd) (RX:25-2000 MHz) (Length 5.2m)
SQBM1000 MK.2 Tri Bander .....£69.95 (6m 3.0dBd) (2m 6.2dBd) (70cm 8.4dBd) (RX:25-2000 MHz) (Length 100")

Single Band Vertical Colinear Base Antenna

All colinears D-Star compatible

BM33 70 cm 2 X 5/8 wave Length 39" 7.0 dBd Gain.....£34.95
BM45 70cm 3 X 5/8 wave Length 62" 8.5 dBd Gain.....£49.95
BM55 70cm 4 X 5/8 wave Length 100" 10 dBd Gain.....£69.95
BM60 2m 5/8 Wave, Length 62", 5.5dBd Gain £49.95
BM65 2m 2 X 5/8 Wave, Length 100", 8.0dBd Gain.....£69.95
BM75 2m 2 X 5/8 Wave, Length 175", 9.5dBd Gain.....£89.95

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See our website for full details.

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MFJ-925 Super compact 1.8-30MHz 200W.....£139.95
MFJ-926 remote Mobile ATU 1.6-30MHz 200W.....£349.95
MFJ-927 Compact with Power Injector 1.8-30MHz 200W £229.95
MFJ-928 Compact with Power Injector 1.8-30MHz 200W.....£179.95
MFJ-929 Compact with Random Wire Option 1.8-30MHz 200W.....£169.95
MFJ-991B 1.8-30MHz 150W SSB/100W CW ATU £159.95
MFJ-993B 1.8-30MHz 300W SSB/150W CW ATU £179.95
MFJ-994B 1.8-30MHz 600W SSB/300W CW ATU.....£279.95
MFJ-998 1.8-30MHz 1.5kW £599.95

MANUAL TUNERS
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MFJ-902 3.5-30MHz 150W mini travel tuner £79.95
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MFJ-904 3.5-30MHz 150W mini travel tuner with SWR/PWR.....£99.95
MFJ-904H 3.5-30MHz 150W mini travel tuner with SWR/PWR 4:1 balun £129.95
MFJ-901B 1.8-30MHz 200W Versa tuner.....£74.95
MFJ-971 1.8-30MHz 300W portable tuner.....£79.95
MFJ-945E 1.8-54MHz 300W tuner with meter.....£99.95
MFJ-941E 1.8-30MHz 300W Versa tuner 2.....£99.95
MFJ-948 1.8-30MHz 300W deluxe Versa tuner.....£109.95
MFJ-949E 1.8-30MHz 300W deluxe Versa tuner with DL £119.95
MFJ-934 1.8-30MHz 300W tuner complete with artificial GND £179.95
MFJ-974B 3.6-54MHz 300W tuner with X-needle SWR/WATT .£149.95
MFJ-969 1.8-54MHz 300W all band tuner.....£159.95
MFJ-962D 1.8-30MHz 1500W high power tuner.....£239.95
MFJ-986 1.8-30MHz 300W high power differential tuner.....£299.95
MFJ-989D 1.8-30MHz 1500W high power roller tuner £329.95
MFJ-976 1.8-30MHz 1500W balanced line tuner with X-needle SWR/WATT mater.....£379.95

Halo Loops

HLP-2 2 metre (size approx 300mm square) £14.95
HLP-4 4 metre (size approx 600mm square) ...£24.95
HLP-6 6 metre (size approx 800mm square) £29.95
These very popular antennas square folded di-pole type antennas

G5RV Inductors

Convert your half size G5RV into a full size with just 8ft either side. Ideal for the small garden
G5RV-IND.....£22.95

Crossed Yagi Beams (fittings stainless steel)

XYG5-2 2 metre 5 Element (Boom 64") (Gain 7.5dBd).....£89.95
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XYG13-70 70 cm 13 Element (Boom 83") (Gain 12.5dBd).....£79.95

Yagi Beams (fittings stainless steel)

YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd).....£29.95
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd).....£49.95
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd).....£69.95
YG11-2 2 metre 11 Element (Boom 185") (Gain 13dBd).....£99.95
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd).....£59.95
YG5-4 4 metre 5 Element (Boom 128") (Gain 10dBd).....£69.95
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd).....£64.95
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd).....£84.95
YG13-70 70 cm 13 Element (Boom 76") (Gain 12.5dBd).....£49.95

ZL Special Yagi Beams (Fittings stainless steel)

2 metre 5 Element (Boom 38") (Gain 9.5dBd) ..£39.95
2 metre 7 Element (Boom 60") (Gain 12dBd) ...£49.95
2 metre 12 Element (Boom 126") (Gain 14dBd)£84.95
70 cm 7 Element (Boom 28") (Gain 11.5dBd) ...£34.95
70 cm 12 Element (Boom 48") (Gain 14dBd).....£49.95
The biggest advantage with a ZL-special is that you get massive gain for such a small boom length, making it our most popular beam antenna

G5RV Wire Antenna (10-40/80m) (Fittings stainless steel)

	HALF	FULL
Standard (enamelled)	£19.95	£24.95
Hard Drawn (pre-stretched)	£24.95	£29.95
Flex Weave (original high quality)	£29.95	£34.95
Flexweave PVC (clear coated PVC)	£34.95	£39.95
Deluxe 450 ohm PVC	£44.95	£49.95

Double size standard (204ft) £49.95
TS1 Stainless Steel Tension Springs (pair) for G5RV £19.95

Reinforced Hardened Fibreglass Masts (GRP)

GRP-125 ★ Length: 2m ★ Size: 30mm OD Grade: 2mm.....£14.95
GRP-150 ★ Length: 2m ★ Size: 37mm OD Grade: 2mm.....£19.95
GRP-175 ★ Length: 2m ★ Size: 44mm OD Grade: 2mm.....£24.95
GRP-200 ★ Length: 2m ★ Size: 51mm OD Grade: 2mm.....£29.95

Portable Telescopic Masts

LMA-S Length 17.6ft open 4ft closed 2-1" diameter £69.95
LMA-M Length 26ft open 5.5ft closed 2-1" diameter £79.95
LMA-L Length 33ft open 7.2ft closed 2-1" diameter.....£89.95
TRIPOD-P Lightweight aluminium tripod for all above £44.95

5ft Poles Heavy Duty (Swaged)

20ft Heavy Duty Swaged Pole Set
These heavy duty aluminium (1.8mm wall) have a lovely push fit finish to give a very strong mast set
1.25" set of four 5ft sections.....£29.95
1.50" set of four 5ft sections.....£39.95
1.75" set of four 5ft sections.....£49.95
2.00" set of four 5ft sections.....£59.95

Mini HF Dipoles (Length 11' approx)

MD020 20mt version approx only 11ft £39.95
MD040 40mt version approx only 11ft £44.95
MD080 80mt version approx only 11ft £49.95
(slimline lightweight aluminium construction)

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(UK mainland only)

This meter hit the right spot with Tex!

Comet CMX2300

Twin Power and SWR meter

One of the first pieces of test units that many Radio Amateurs need when setting up a station, especially when using a manual antenna matching unit, is an s.w.r. meter to enable the maximum efficiency of the antenna itself. When reducing the s.w.r. seen by the rig at the bottom of the feeder to the antenna, two improvements take place.

I'll not be going to go into the pros and cons of differing matching units, but when the s.w.r. seen by the rig is as low as possible, then the p.a. stage of the rig is going to be operating with minimum losses and maximum output into the feeder. The actual s.w.r. of the rest of the feeder to the antenna itself alters very little (see comment below), though the overall efficiency of the whole system will generally improve.

What's Of Interest

But what is it about the Comet CMX2300 Twin that will be of interest to the reader? Well, it's actually a twin sensor, twin cross-needle indicator s.w.r. unit. The unit can cope with both h.f. and v.h.f./u.h.f. to be in operation at the same time, each showing forward and reverse power and where the two needles in each display cross, the s.w.r.

The unit is some 250mm wide and 130mm front-to-back and stands some 95mm high from the base. It contains two well screened sensing units, each one feeding the control circuits feeding two 85x80mm back-lit meters. Each of the screened sensors also has a 30dB monitoring output that may be used for other purposes,

The two meters are at extreme ends of the main heavy metal box, with two vertical rows of power level switches in the middle. When looked at from the front, the left-hand sensor is suitable for 1.5-200MHz operation at three power levels of 30, 300 and 3000W. The right-hand sensor covers from 140-525MHz at power levels of 20, 50 and 200W.

The two meters have the capability of being back-lit for use in lower light levels. In operation, the actual background of the meters themselves, are back-lit and glow with a translucence like Victorian pictures made up from butterfly wing scales on fine glass. Additionally, the fine needles in each meter, are lit from below and stand out well against the backgrounds.

As the s.w.r. meter should be fitted between the rig and the antenna matching unit so, the unit would be of far less use to anyone with a built-in automatic antenna matching unit, for the reason mentioned earlier.

In use, the unit gives smooth indication of the power levels and s.w.r. when used with PSK (or other data modes), f.m. or a.m. operation. The needles tend to move around rather more when using s.s.b. mode. But moving the mode switch on the back panel from peak to average reading, helps a little to dampen the needles movements. To be fair though, testing and reading s.w.r. values wouldn't be carried out when using s.s.b. – but knowing the peak envelope power (p.e.p.) is useful.

In My Shack

I suppose the ultimate test of any item that's being reviewed is "would I pay for the unit to feature in my shack?" And I have to say that this unit could quite easily replace two of the units that are in use in my shack. I'd have no quibbles reaching into my pocket to end up with the unit that I've tested.

The unit would make an eminently suitable add-on for any shack, where there's one of the wide-band 100W transceivers in use. They seem to be all the rage these days and many have two output sockets, one for h.f./50MHz and the other for 144/430MHz operation. It would also suit a shack that has several rigs in use at the same time. ●

Comet CMX2300 Twin cross-meter s.w.r. and power unit Specifiation
Size: 250x130x95mm
Weight: 1.5kg
Twin sensors and cross-needle meters

Sensor 1 feeding Meter 1
1.5 – 200MHz SO239 sockets.
Switched power levels of 30W, 300W and 3kW peak or average.
A -30dB monitor output to a chassis-mounted BNC socket.

Sensor 1 feeding Meter 2
140 – 525MHz SO239 sockets.
Switched power levels of 20W, 50W and 300W peak or average.
A -30dB monitor output to a chassis-mounted BNC socket.
Both meters are elegantly back-lit via an isolated, but un-switched 12V supply.

Pros
The unit operates smoothly, it's well-built and screened at 1.5kg weight and with meters that look custom-made for this (or similar) unit adding a quality look to it. It's compact when compared to the two units it could replace.

Cons
As with all external s.w.r. units, it's less useful for rigs with a built-in antenna matching units. No others that I can think of.

Price £149.95 + £8 P&P
But mention this review and *Practical Wireless* for **free P&P** on the meter.

Supplier
Nevada Radio,
Unit 1, Fitzherbert Spur,
Farlington, Portmouth,
Hampshire PO6 1TT.
Tel: 023 92131 3091
www.nevadaradio.co.uk

Our Technical Editor 'Tex' Swann G1TEX, has taken a first look at a dual circuit power/Standing Wave Ratio (s.w.r.) meter unit.

club news

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

Send all your club info to

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BEDFORDSHIRE

Shefford &DARS
David Lloyd. Tel: (01234) 742757
www.sadars.org.uk
The Shefford and District Amateur Radio Society meets every Thursday at the Community Hall, Ampthill Road, Shefford, SG17 5BD (next to the Chip shop).
On September 25th, they will be holding their 60th anniversary celebrations and would like to hear from any past members of the club (see web site for full programme).

BERKSHIRE

Reading & DARC
Pete Milton. Tel: (01189) 695697
www.radarc.org
The Reading & District Amateur Radio Club meets on the second and fourth Thursday of the month at Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Berkshire RG5 4LY. Only one meeting this month, on Thursday 14th August "On the Air Evening" with your host Tom G0VQR.

CHESHIRE

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Graham. Tel: (07930) 655 121
E-mail: info@chesterdars.org.uk
www.chesterdars.org.uk
The Chester & District Radio Society meets on Tuesday evenings at the Burley Memorial Hall, Common Lane, Waverton, Chester CH3 7QT.

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

Macclesfield & DRS
Ray King. Tel: (01260) 278431
www.gx4mws.com
The Macclesfield & District Radio Society meets every Monday at the Pack Horse Bowling Club, Westminster Road, Macclesfield SK10 3AT at 8pm.

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

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

CORNWALL

Cornish RAC
Ian Williams. Tel: (01872) 561058
E-mail: ianporsche964@aol.com
www.cornishradioamateurclub.org.uk
The Cornish Radio Amateur Club meets at the Church Hall, Church Road, Perranarworthal, Truro TR3 7QE on the first Wednesday of every month at 7.30pm. There is also a Computer Section that meets at the same venue and time on the second Monday of every month, except December.

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

COUNTY DOWN

Bangor and District ARS
Mike. Tel: 028 4277 2383
http://www.bdars.com
The Bangor and District Amateur Radio Society meets on the first Thursday of every month in 'The Boathouse', Harbour Car Park, Groomsport BT19 6JP at 8pm. Visitors and new members are most welcome.

COUNTY DURHAM

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

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

DERBYSHIRE

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

DEVON

Exeter ARS
Paul Cheshire. Tel: 01392 660246
E-mail: pchesh-29@hotmail.co.uk
The Exeter Amateur Radio Society meets on the 2nd and the 4th Monday at 7.30pm in the Moose Centre, Spinning Path Lane, Blackboy Road, Exeter EX2 5RP. Tuition for Foundation, Intermediate and Advanced licence is available. The club is registered as an RSGB examination centre.

Torbay ARS
Dave Helliwell. E-mail: g6fsp@tars.org.uk
www.tars.org.uk
The Torbay Amateur Radio Society meets Fridays at 7.30pm in the Teignbridge District Scout Headquarters, Wolborough Street, Newton Abbot, Devon TQ12 1JR. August 15th - Natter Night, August 22nd - Operating Night, August 29th - A Talk by Derrick G3LHJ about DXpeditions

DORSET

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

Poole Radio Society G4PRS
Tex Tel: 07966 460 552
www.g4prs.org.uk
Meetings are every Friday at 19:30 for 20:00 at the The Old Chapel Hall, Cabot Lane, Creekmoor, Poole BH17 7BX, the second friday meeting of each month is the formal evening, all others are basically shack and Natter nights. After successfully getting five new Advanced candidates through the exam, training for the Foundation and Intermediate licences starts again early September.

EAST SUSSEX

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

Hastings E&RC
Gordon Sweet. Tel: (01424) 431909
E-mail: gordon@gsweet.fsnet.co.uk
www.herc.uk.net or http://g4cus.mysite.wanadoo-members.co.uk/
The Hastings Electronics & Radio Club meets on the third Wednesday at the Taplin Centre, Upper Maze Hill, St Leonards on Sea TN38 0LQ at 7pm.

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

Colchester RA
David Chambers. Tel: 07766 543784
www.g3co.ccom.co.uk
The Colchester Radio Amateurs meets at 7.30pm on alternate Thursdays at St Helena School and The Colchester Institute, Sheepen Road, Colchester, Essex CO3 3LE. Members and non-members welcome.

Chelmsford ARS
Martyn Medcalf. Tel: (01245) 469008
E-mail: info2007@g0mwt.org.uk
www.g0mwt.org.uk
The Chelmsford Amateur Radio Society meets on the first Tuesday of each month in the Marconi Sports & Social Centre, Beehive Lane, Great Baddow, Chelmsford CM2 9RX at 7.30pm.

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

HAMPSHIRE

Fareham & District ARC
Ken Sapsed. Tel: 023 9279 7240
E-mail: secretary@fareham-darc.co.uk
www.fareham-darc.co.uk/
The Fareham & District Amateur Radio Club meets on Wednesdays evenings from 7.30pm in the Portchester Community Centre, Westlands Grove, Portchester, Fareham PO16 9AD.

Horndean & District ARC
Stuart Swain. Tel: (02392) 472846
E-mail: g0fyx@msn.com
www.hdarc.co.uk
The Horndean & District Amateur Radio Club meets on the first and fourth Tuesdays each month in the Lovedean Village Hall, 160 Lovedean Lane, Lovedean, Hants PO8 9SF at 7.30pm. Visitors are always very welcome. On August 26th there's a talk on 'Amateur Satellites' by Quintin Gee M1ENU

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

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

HUMBERSIDE

Hull & District ARS
Raymond Penny. Tel: (01482) 504618
E-mail: sirraymond@sirraymond.karoo.co.uk
The Hull & District Amateur Radio Society meets every Friday at the Walton Leisure Centre, Walton Street, off Anlaby Road, Hull HU3 6JB.

KENT

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

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

LANCASHIRE

Oldham RC
Christopher Cunliffe. Tel: 07749347142
E-mail: secretaryoarc@btinternet.com
www.oarc.org.uk
The Oldham Radio Club meets on Thursdays at Royton Air Training Corps, Hillside Avenue, Royton, Oldham OL2 6RF at 7:30pm. August 28th is our AGM Meeting 8pm start, On September 4th there will be the start of our next foundation course.

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

LINCOLNSHIRE

Eagle RG
Eddie Lingard. Tel: 01507 472695
E-mail: e.f.lingard@btinternet.com
www.eagleradiogroup.com
The Eagle Radio Group meets at The Eagle Hotel, Victoria Road, Mablethorpe LN12 2AJ on the second Tuesday of each month, meetings start at 8pm. The group operates an open policy so, if you are in the area, pop in.

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

LONDON

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

Southgate ARC
Donald F Berry. Tel: 020 8360 3614,
E-mail: dfberry@eggconnect.net
www.southgatearc.org
The Southgate Amateur Radio Club meets on the second Thursday of the month at Winchmore Hill Cricket Club, The Paulin Ground, Firs Lane, Winchmore Hill, London N21 3ER at 7.30pm.

Wimbledon and District ARS
Jim Bell. Tel: 020 8874 7456
E-Mail: james@jbell5.wanadoo.co.uk
www.gx3wim.org.uk
The Wimbledon & District Amateur Radio Society welcomes new comers to our meetings whether they are licensed or not. We hold our meetings at 8pm the second and last Friday of each month at Martin Way, Methodist Church, Buckleigh Avenue, Merton Park, London SW19 9JZ. The church is on the corner of Martin Way and Buckleigh Avenue. August 29th Summer Camp debrief Eric G0KRT.

THE LOTHIANS

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

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

MERSEYSIDE

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

NORFOLK

King's Lynn ARC
Ray Dowsett, MBE. Tel: (01553) 671307
E-mail: ray-g3rsv@supanet.com http://www.klarc.org.uk
King's Lynn Amateur Radio Club meets every Thursday at the Scout HQ, Chequers Lane, West Winch, King's Lynn, PE33 0NY off the A10 at West Winch at 7.30pm.

Norfolk ARC
Mark Taylor. Tel: (01362) 691099
E-mail: narc@g0lgj.co.uk
www.norfolkamateurradio.org
The Norfolk Amateur Radio Club meets every Wednesday at the *Happy Landings, Norwich Aviation Centre, Norwich Airport NR6 6JA a 7.30pm.*

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

NORTHAMPTONSHIRE

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

SHROPSHIRE

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

Telford & District ARS
Mike Street. Tel: (01952) 299677
E-mail: mjstreetg3jkx@blueyonder.co.uk
www.tdars.org
The Telford & District Amateur Radio Society meets on Wednesdays at the Little Wenlock Village Hall, Malthouse Bank, Little Wenlock. Telford TF6 5BG at 8pm.

SOMERSET

North Bristol ARC
Dick Elford Tel:(01454) 218362
E-mail: g0xay@aol.com
www.nbarc.org.uk
North Bristol ARC meet Fridays at 7.30pm at SHE7, Braemar Crescent, Northville, Filton Bristol BS7 0TD. We are having a field meeting on 18th July to try out portable gear and HF operating on 25thJuly. Our next training course will be for Intermediate exams.

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

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

SOUTH GLOUCESTERSHIRE

Thornbury and South Gloucestershire ARC
Tony. Tel: (01454) 417048
E-mail: tonytsgarc@beeb.net
http://jma-databases.co.uk/tsgarc/index.php/Thornbury_%26_South_Gloucestershire_Amateur_Radio_Club
The Thornbury and South Gloucestershire Amateur Radio Club meets in the United Reformed Church Hall, on the corner of Chapel Street and Rock Street, Thornbury BS35 2BA at 7.30 - 9.30pm.

SOUTH WALES

Barry ARS
Glyn Jones. Tel: (01446) 774522
E-mail: glyndxis@talktalk.net
www.bars.btik.com
The Barry Amateur Radio Society meets on Tuesdays from 7.30 to 10.30pm in the Sully Sports & Social Club, South Road, Sully CF64 9TG. September 9th we have a talk called 'Starting in Microwaves' by Keith Winnard GW3TKH.

SOUTH YORKSHIRE

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

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

STAFFORDSHIRE

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

SURREY

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

TYNE & WEAR

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

Tynemouth ARC
Tony Regnart. Tel: 0191 280 1981
E-mail: tony.regnart@gmail.com
www.gx0nwm.co.uk
The Tynemouth Amateur Radio Club meets each Friday from 7 to 9pm at St. Hilda's Church, Stanton Rd, North Shields, Tyne & Wear NE29 9QB. It's known locally as 'the church near the fire station'.

WEST MIDLANDS

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

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

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

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

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

WEST SUSSEX

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

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

WEST YORKSHIRE

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

WILTSHIRE

Trowbridge & District ARC
Ian Carter. Tel: (01225) 864698
E-mail: ian.l.carter@btinternet.com
http://uk.geocities.com/tdarc@btinternet.com
The Trowbridge & District Amateur Radio Club meets at Southwick Village Hall, Southwick (nearest postcode is BA14 9QN). On August 20th it's a Natter night

WORCESTERSHIRE

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

Club Secretaries

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

Speech Processing – The How and Why!

Tuning around the bands I often hear signals that appear to have lots of audio but are almost unreadable. The signal seems to consist of lots of noise with a little speech buried somewhere amongst it. Often the problem is caused by operators 'talking up' the output power on the basis that 'the more audio you put on the better', although it's not true!

To support my argument I'll first take a look at the basics of power output from a transmitter, as shown in **Fig. 1.** This shows the output of a typical single sideband transmitter (s.s.b.) operated correctly, notice the very high peaks relative to the average level. Here it's important to remember that a normal mechanical meter cannot respond quickly enough to indicate the peaks and there lies the problem! The meter will, on average, show only about one third of the maximum power if the rig is correctly modulated. 'talking up' the meter will result in 'flat topping' and severe sideband splatter.

A look at the diagram, **Fig. 2,** that illustrates that increasing the audio drive beyond the correct amount **does not increase** the peak envelope power (p.e.p.). It certainly increases the average level, but at what cost to other band users? The only way to increase average power without 'flat topping' (to be seen in the lower trace in Fig. 2) is to use a properly designed speech processor. Even then care is needed to get optimum results.

There s also a tendency by some operators to use high microphone gain – and yet they speak well away from the microphone. This often results in a high background noise, when cooling fans, room echo and the like can be heard almost as loudly as the speech! Such background noises merely decrease the overall readability of the signal.

Rule Of Thumb

As a rule-of-thumb, when setting up a transmitter that doesn't have automatic level control (a.l.c.), I suggest that the operator should whistle loudly into the microphone and note the maximum reading on the r.f. output meter. Then, by speaking in a normal voice with the microphone about 100-150mm from your mouth, 'talk up' the output to around one third of the maximum.

Operating in this way I've suggested, allows the transmitter to work close to its correct settings. **Note:** If an oscilloscope is available it's possible to observe the peak output and once this is reached, the audio gain shouldn't be increased any further.

If the rig is fitted with automatic level control (ALC), increasing the audio beyond the correct level will cause the a.l.c. circuits to respond and reduce the output. **Note:** The a.l.c. circuits act in a similar manner to the automatic gain control (a.g.c.) circuits of a receiver, preventing flat topping. In practice it's possible to get a little more on the average level but not much. Rigs that have built-in speech processing normally modify the time constant of the ALC circuit to allow up to about 12dB (16 times power) in average level of speech relative to the peaks.

With a 100W rig, an increase in power of 12dB would effectively make the 100W rig equal in signal to a rig of 1.6kW with normal modulation. The effect of this correct speech processing is shown in the screen pictures, **Fig. 3** (normal) and **Fig. 4** (processed). Note the high increase in average level, which is about the maximum one needs to go in practice.

Further increase in processing would only bring up the background noise, which as I said earlier makes the signal less readable. Any extra gain due to the processing will also amplify the background noises by the same amount so, reducing the overall signal to noise once again.

Discussing Microphones

Next, I'm going to discuss microphones and we have to remember that the output voltage of a microphone varies according to the 'inverse square law'. This means that for a given distance from a constant sound source (the mouth) the output will increase by a factor of four on halving of the distance.

Conversely, doubling the distance will reduce the voltage output to a quarter of its previous level. For example, if at a distance of 150mm

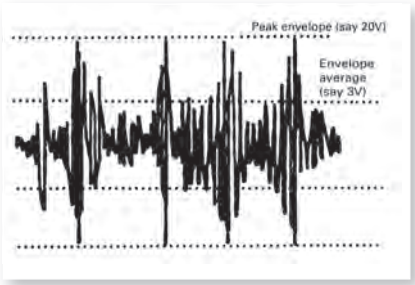

Fig. 1.

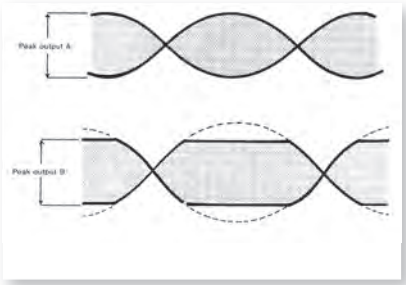

Fig. 2.

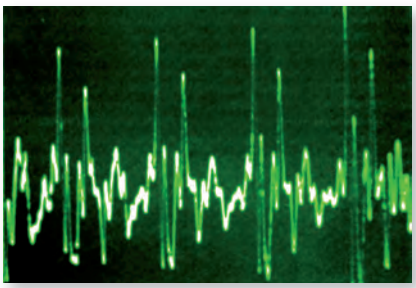

Fig. 3.

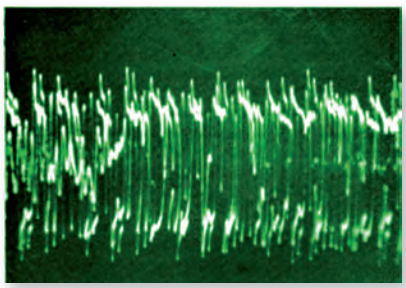

Fig. 4.

Ted Rule G3FEW – with many years on the Amateur bands – suggests that good microphone technique should come before speech processing.

(around 6in) the output is (say) 1V, then at about 76mm(about 3in) it will be 4V, which is a voltage ratio of 12dB.

Note: Power output from a transmitter is the voltage squared divided by the load. So, the effect on power output of an unprocessed rig will be as if the 100W rig tries to produce 1.6kW. Clearly, something must suffer and it will most likely be other Amateurs using the band or a neighbour's TV receiver. (This is 'flat topping' with a vengeance).

From what I've mentioned, hopefully readers will now realise just how important it is to use correct techniques both in using the microphone and setting up the rig. This is especially important if it doesn't have speech processing and/or ALC.

Reasonable Distance

A reasonable distance for a hand-held microphone is about 100–150mm (about 4 to 6 in) from the mouth and try to speak 'across' it not 'into' it. Speaking directly into the microphone will cause 'blasting' as your breath hits the front.

Speaking further away from the microphone will reduce the blast output. However, by increasing the audio gain to compensate, this only increases any background noises. Speaking closer will make it difficult to maintain a constant output level, because small changes in distance between microphone and mouth will result in very large changes in output.

A mouth–to–microphone distance of 75–150mm for a hand-held and 150–300mm for a desk microphone would be about right for maintaining optimum modulation and power output from the transmitter. **Note:** If the transmitter is fitted with ALC , follow the manufactures instructions carefully. Normally, the ALC should be operated so that the meter just starts to indicate on peaks. But remember that once the ALC. circuits start to operate the peak output of the transmitter will be limited.

With a signal of reasonable strength I think that there's little or no need to use speech processing, – in fact, it may even make the signal less acceptable to the recipient. However, under difficult conditions the processor comes into its own and can make an unreadable signal into one of R5.

So, with speech processing, as with transmitter power, I urge readers to only use enough audio to make your signal readable under the actual contact conditions. Good operating means aiming for the best audio quality under the prevailing conditions. ●

rallies

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

Send all your rally info to

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

August 24th
Torbay Annual Communications Fair
Dave Helliwell. Tel: (01803) 864528
E-mail: rally@tars.org.uk
www.tars.org.uk
The Torbay Annual Communications Fair will be held at Newton Abbot Race Course, Newton Abbot, Devon TQ12 3AF. Doors open at 10am for disabled visitors and 10.30am for others. There will be free parking, trade stands, a Bring & Buy and a prize draw.

Milton Keynes Rally
Mike. Tel: (07973) 264473
www.mkars.org.uk
The Milton Keynes ARS 50th Anniversary Rally will be held at Holne Chase School, Buckingham Road, Bletchley MK3 5HP. Admission time for Traders is 8am and doors open at 9am for visitors. Admission is £2. There will be on-site catering and Morse tests with certificates available. Outdoor Pitches are £10 (or £7 in advance) and Indoor Stands are £12.00 (advance booking only).

August 25th
Huntingdonshire ARS Bank Holiday Monday Rally
Julie. Tel: 0790 505 2127
www.hunts-hams.co.uk
The Huntingdonshire ARS Bank Holiday Monday Rally will be held at St Neots Community College, Barford Rd, St Neots PE19 2SH. Doors open at 10am and entry is £1.50. There will be trade stands, a Bring & Buy and an RSGB bookstall.

Rugby Amateur Radio Rally
Tony. Tel: 07759 684411
E-mail: tonyg00ls@aol.com
www.rugbyats.co.uk
The Rugby Amateur Radio Rally will be held at Stanford Hall, Lutterworth LE17 6DH (near Rugby – just off A14). Doors open at 10am.

August 31st
Andover Radio Club Boot Sale
Terry. Tel: (01980) 629346
www.arac.co.uk
The Andover Radio Club Boot Sale will be held at Wildhern Village Hall, SP11 0JE (north of Andover) just off the A343. Starting time Vendors – 09:00 hrs Starting time Buyers/Visitors – 10:00 hrs There is car parking and entry fee is £1.

September 14th
Lincoln Hamfest
Roger. Tel: (01522) 693848
E-mail: hamfest@g5fz.co.uk
The Lincoln Short Wave Club will hold Hamfest in Lady Eastwood Hall at the Newark & Notts Showground, Lincoln Road, Winthorpe, Newark, Nottinghamshire NG24 2NY.

October 5th
Autumn Militaria, Electronics & Radio Amateur Hangar Sale
Rod Siebert. Tel: 01270 623353
www.hackgreen.co.uk
The Autumn Militaria, Electronics & Radio Amateur Hangar Sale will be held at the Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW58AP.

October 10th - 12th
RSGB HF Convention
www.rsgb.org
The RSGB HF Convention will be held at Wyboston Lakes Conference Centre, Great North Road, Wyboston, Bedfordshire MK44 3AL.

October 11th
Chesterfield Rally
Martin. Tel: (01246) 217499
E-mail: martin.briddon@ne-derbyshire.gov.uk
http://GB3EE.com The GB3EE Repeater Group Chesterfield Rally will be held at Hasland Village Hall, Eastwood Park, Hasland S41 0AY (M1 j29/30). Doors open 10am - 4pm and there will be trade stands and a Bring & Buy.

October 12th
Great Lumley AR & ES Rally
David Barclay. Tel: 0191 3888113
E-mail: m0bpm@btinternet.com
Great Lumley Amateur Radio and Electronics Society Annual Rally will be held at the Great Lumley Community Centre, Great Lumley, Front Street, Chester-le-Street, Co. Durham DH3 4JD. Doors open at 10.30am. There will be trade stands and a Bring & Buy.

October 19th
Blackwood & DARS Rally
Dave. Tel: (01495) 228516
E-mail: ddlewhbk@btinternet.com
www.gw6gw.co.uk
The Blackwood & DARS Rally (Wales) will be held at Coleg Gwent, Risca Road, Crosskeys NP11 7ZA. Admission is £2 and doors open at 10am for disabled visitors and 10.30am for others. There will be trade stands, a Bring & Buy and special interest groups as well as plenty of parking.

Galashiels & DARS Radio & Computer Rally
Jim. Tel: (01896) 850245
E-mail: ngm7lun@qsl.net
The Galashiels & DARS Radio & Computer Rally will be held in Volunteer Hall, St John's Street, Galashiels TD1 3JX. Doors open at 11am and entry is £2. There will be trade stands and a Bring & Buy.

October 24th & 25th
Leicester Amateur Radio Show
Geoff Dover. Tel: (01455) 823344
www.lars.org.uk
The Leicester Amateur Radio Show will be held at Donington Park, Castle Donington, Derbys DE74 2RP. Doors open 9.30am to 5.30pm on Friday and 9.30am to 4.30 pm Saturday.

in focus

Bob Nash G4GEE, Chairman of the Coventry Amateur Radio Society put his club in focus for *PW* readers.

Fig. 1: The The society's late President, Arthur Noakes G2FTK, at the 2008 President's Evening.
Photograph courtesy of G8GMU

Fig. 2: Martin Saltzman G1ZSR seen operating at the picnic area alongside Hatton Locks, Warwickshire.
Photograph courtesy of M0HPV.

Fig. 3: The Society Chairman G4GEE, Peter Yardley G0INS and Stuart Robertson M0CAR at the recent Wine & Cheese evening.
Photograph courtesy of G1ZSR

The Coventry Amateur Radio Society was founded in 1932 and has met in many locations around the city. Nowadays, the society meets every Friday at St. Bartholomew's Church Hall in the Binley district of Coventry on its eastern outskirts. The society's **President Arthur Noakes G2FTK**, was a founder member and was until his very recent death in July, still an active member.

After a decline in membership in the early part of the new century, membership has picked up again. The society runs classes for potential new licensees through the splendid efforts of the society's secretary, **John Beech G8SEQ**.

To celebrate the society's 75th anniversary a dinner was held in September 2007 when 48 people attended for a convivial dinner held at the Coventry & North Warwickshire Cricket club. The guest speaker was the well known BBC announcer and Radio Amateur, **Jim Lee G4AEH**.

The Committee

The Society's Chairman is myself G4GEE, the Secretary is John Beech G8SEQ, the Treasurer is **Ivan Thomas M0IRT** and we're supported by committee members **Brian Leathley-Andrew G8GMU** and **Martin Saltzman G1ZSR**.

The 2008 Activities

The society has a regular programme of activities. These began on January 1st with a 144MHz DF hunt with positions counting towards the G2FDC trophy. January also featured the society's annual dinner.

There were also talks from **G4IEV** on frequency management, from myself featuring a trip to Hawaii, and a mini-lecture evening with contributions from club members G1ZSR & G8SEQ. There were also visits from the *PW* Editor **Rob G3XFD**, **Dave Green M0HPV** on Raynet and **John Clarke OBE** who discussed some of the recent exciting discoveries made at the nearby Caludon Castle, providing a busy lecture programme.

Other activities have included a club project to make a simple 144MHz DF antenna from steel tape measures as well as a 144/430MHz antenna for satellite working. Portable evenings are also a regular summer activity with members competing for the **G4ZMC Trophy**.

Other activities have included video nights on Amateur Radio matters. Future events include a talk and possible demonstration of Helikites from **G4ROJ**, a talk by **G4AFJ** on the Leicester Repeater and a visit from the RSGB President, **Colin Thomas G3PSM** in December.

The meeting place is a well equipped church hall which the society uses for social events. Recently we had a wine and cheese evening and in November will have a very tasty Bangers & Mash evening!

New Members Welcome!

The society welcomes new members. Details of the society's activities can be found on our website **http://www.coventryradio.co.uk** or from the Secretary G8SEQ via **079 58777 363.**

The society owns a Yaesu FT-767 h.f. rig at St, Bartholomew's Church Hall, where the club has a rotatable Mosley Mustang beam antenna and a 7MHz dipole.

The h.f. beam was recently refurbished as can be seen from the photograph. For v.h.f./u.h.f. operating work we have a collinear that covers 6m, 2m and 70cm and a 'Slim Jim' for 4m. Visiting Amateurs and short wave listeners are very welcome at meetings. So, come along and join us!

C.A.R.S
COVENTRY AMATEUR RADIO SOCIETY
Affiliated to The Radio Society of Great Britain - Founded 1932
President: F A Noakes (G2FTK) Club Stations: GX2ASF GX7ASF

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Tony Nailer's

doing it by design

The 198kHz Off-air Frequency Standard Part 2

The development of most of the 198kHz off-air project was covered in Doing it By Design (DiBD) in the July issue of *PW*. However, it won't be necessary to refer back to that issue, as the information in this article should be sufficient to make it a stand-alone constructional project.

Circuit Description

To give everyone a good idea of how the project works, I refer to the block diagram, **Fig. 1**. In the design, a ferrite rod with a long-wave coil is used to pick up BBC Radio 4 on 198kHz. The transmissions originate from the main transmitter at Wychbold near Drotwich in Worcestershire, although it's usually known as Droitwich, with another two co-channel transmitters in Scotland, near Falkirk and at Burghead near Inverness.

The incoming signal is amplified using a metal oxide semi-conductor field effect transistor (m.o.s.f.e.t). and a bipolar transistor, to achieve a peak-to-peak signal of greater than 400mV. I had incorporated an amplitude modulation (a.m.) detector, audio amplifier and loudspeaker into the unit to ensure that a good Radio 4 signal is being received. The amplified

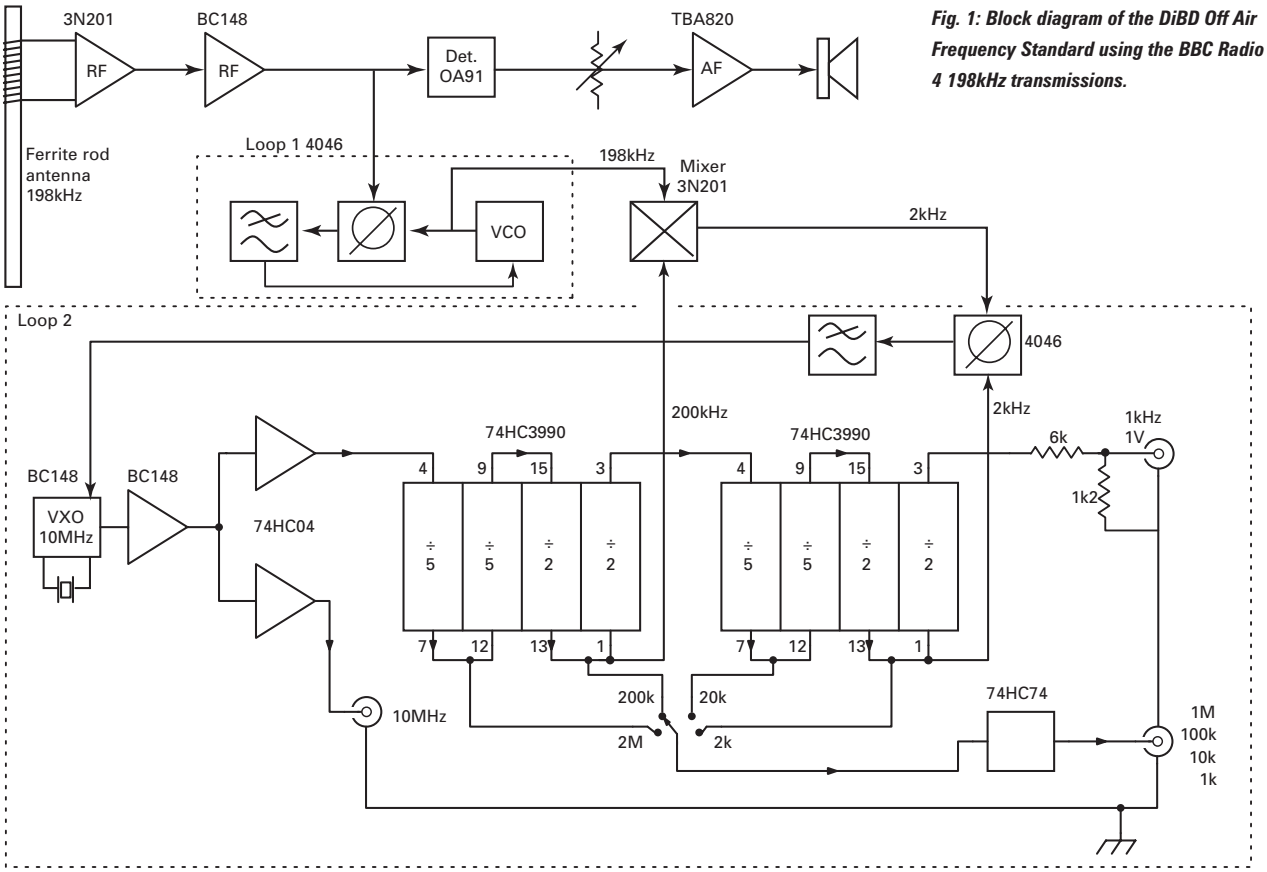


Fig. 1: Block diagram of the DiBD Off Air Frequency Standard using the BBC Radio 4 198kHz transmissions.

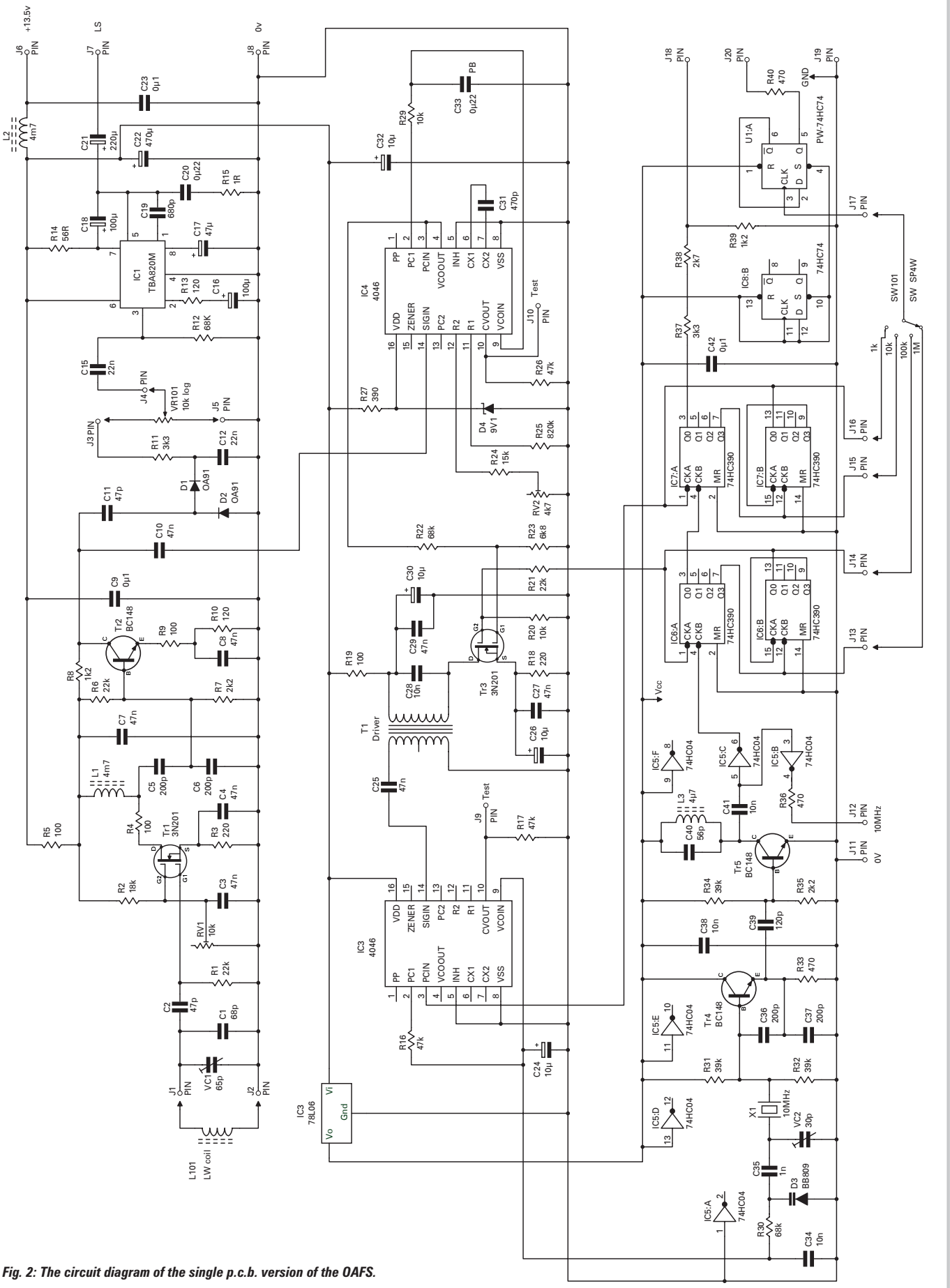


Fig. 2: The circuit diagram of the single p.c.b. version of the OAFS.

198kHz signal is also used to phase lock a 4046 phase locked loop (p.l.l.) integrated circuit (i.c.) running on 198kHz, shown on the diagram as 'Loop 1'.

A 10MHz Colpitts crystal oscillator, with varicap control, referred to as a variable crystal oscillator or VXO, feeds a transistor and i.c. buffer to produce a buffered 10MHz output to a coaxial cable socket. Another i.c. buffer is used to drive a divider i.c. 74HC390. This i.c. contains two divide-by five, and two divide-by two stages. The output from the first divide-by five stage provides a 2MHz signal. This is further divided by five and two to produce a 200kHz signal.

The phase-locked 198kHz signal from the voltage controlled oscillator (v.c.o) of Loop 1, together with the 200kHz divided signal, are fed to a dual gate m.o.s.f.e.t. mixer with a transformer in its drain circuit, to select the difference signal of 2kHz.

The 200kHz signal is further divided by two in the first 74HC390, and then by another 74HC390, first dividing by five to give 20kHz, then by five and by two to give 2kHz. This signal is divided by two again to give 1kHz.

Difference Signal

The difference signal of 2kHz from the mixer, together with the divided 2kHz signal, are then fed to the phase detector in another 4046 i.c. The output from this detector is passed through a low-pass filter and fed to the varicap of the 10MHz Colpitts oscillator. In this way the 10MHz oscillator has been locked to Radio 4 using a twin phase locked loop system.

The divide-by five stages produce an output with a 1:4 mark-space ratio, which completely confuses my frequency counters and would also cause problems with the mixing stages! So, it's necessary to derive outputs from divide-by two stages to achieve a 1:1 mark-space ratio. This is why the 200kHz and 2kHz signals were taken from divide-by two stages.

Outputs from the unit are then extracted from the divider chain at twice the wanted frequency and passed through a 74HC74 D-type flip-flop acting as a divide-by two stage. The supply rail for the digital stages is 6V derived from a 78L06 3-terminal regulator. Consequently, the output signals from the 10MHz source and from the 74HC74 are precisely 6V p-p.

I chose the resistor values to give a precise voltage step-down ratio of six to provide a calibration signal 1V p-p of 1kHz, for use in calibration of an oscilloscope.

Design Considerations

Originally, I had intended to provide a sine wave output of 1kHz by low-pass filtering the 1kHz square wave. Incidentally, I actually did design and develop a suitable elliptic low pass filter to do this and an Op-amp buffer to follow it.

In the end, I decided it wasn't worth the complexity, after all, this isn't an audio generator – it's a phase-locked crystal calibrator! This was when I opted for the resistor ratio to produce the 1kHz 1V p-p square wave output – quite a useful output, achieved with a minimum of components.

Production & Design

Having completed the development work, I found that the ferrite rod picked up both the amplified 198kHz signal and the 200kHz signal from the breadboard. These produced quite a strong very low frequency signal and 2kHz beat notes, unless the rod was kept well away from the board.

I've seen a design of off-air-standard where the ferrite rod and r.f. amplifier stage were fitted in a remote box connected to the main unit with a long cable. However, I didn't really want to go down that route because of the added cost and complexity.

Instead, I chose to fit the ferrite rod on the outside of a screened case with the electronics shielded within. Two schemes were then tried: One with the 198kHz r.f. stages on a separate board screened from the rest of the circuit. The other scheme had everything on a single board.

The circuit diagram was drawn up using the *ISIS* program on my old DOS computer. It was copied and edited so both versions existed. The diagram of the single board version is shown in **Fig. 2**. I then proceeded to lay out the single board version first. If that didn't work I would have been able to quickly move on to the two-board version.

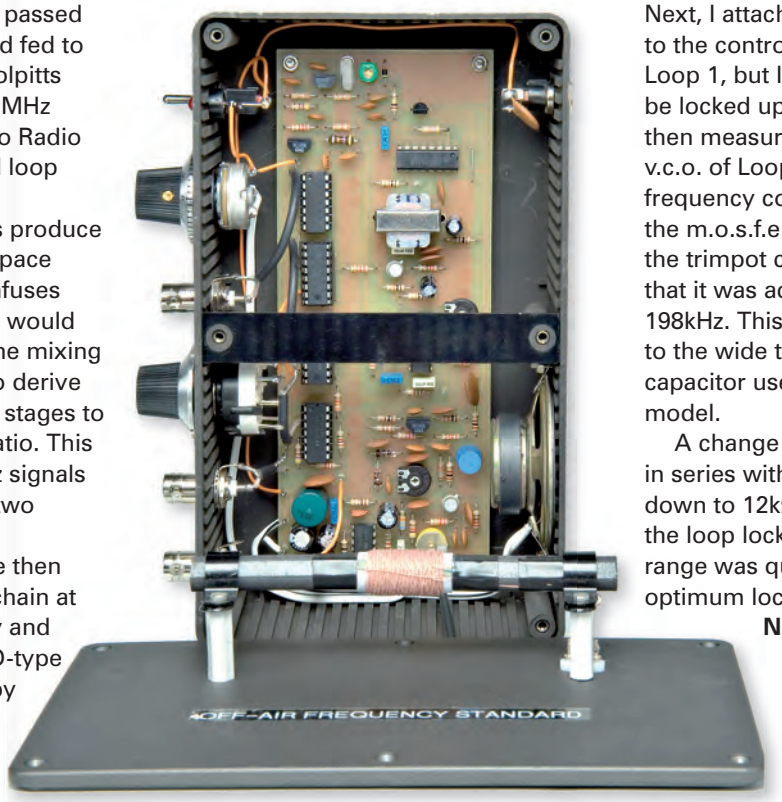
Having produced the artwork shown in **Fig. 3**, I etched, drilled, assembled and then tested the p.c.b. When I switched it on – it was success first time – as I could immediately hear Radio 4 on the speaker and adjustment of the input trimcap peaked this up nicely. The heterodyne whistles were also there as the p.c.b. was not shielded from the ferrite rod at this time.

Loop One

Next, I attached my multimeter probe to the control voltage test point of Loop 1, but I found that it couldn't be locked up to the input signal. I then measured the frequency of the v.c.o. of Loop 1 – achieved by using a frequency counter probe at gate 1 of the m.o.s.f.e.t. mixer. Adjustment of the trimpot control of Loop 1 revealed that it was actually out of range of 198kHz. This was presumably due to the wide tolerance of the ceramic capacitor used in the development model.

A change in value of the resistor in series with the trimpot from 15kΩ down to 12kΩ brought it in range and the loop locked. The control voltage range was quite cramped, with the optimum lock voltage at about 1.5V.

Note: I had intended to



The OAFS mounted in its RFI screened enclosure.

use a polypropylene block capacitor for the timing but have since chosen a multiplayer ceramic with a negative-positive-zero (NPO) thermal characteristic of just ±30ppm/°C.

To cure the problem of cramped control voltage I experimented with different supply voltages to IC4. I found that the supply rail choke L2 was too high resistance so this was reduced in value to 4.7mH. I subsequently found that a 9V1 zener diode fed from the 13.5V rail via a 390Ω resistor gave a control voltage swing of 0-5V.

Observations of the control voltage using an oscilloscope then showed rail to rail pulses, which revealed the low pass filter was not doing its job properly. The five component filter given in the last article was removed and a simple R-C filter tried. With a resistor value of 10kΩ, the capacitor was increased by substitution while observing the waveform. With a capacitor of 220nF the waveform showed an audio ripple synchronised with the audio of Radio 4. With a value of 470nF was over-damped with the loop oscillating, so I chose 220nF. The voltage was set afterwards at a median level of 2.5V.

Loop Two

Having sorted Loop 1, I moved on to test Loop 2 by measuring the control voltage at its test point. Here I found that it was already in lock and by adjustment of the trimcap of the crystal I could swing the control voltage from 1 to 9V.

Again, I observed the control voltage on the oscilloscope and found rail-to-rail pulses. Steadily increasing the value of the timing capacitor C24 resulted in 10μF as the ideal value.

The voltage was then set at 5V. The locked 10MHz signal showed no sign of jitter when observed on the oscilloscope. Also there was no measurable deviation when measured using a deviation meter.

Outputs from the divider chain were then measured using a frequency counter, but they couldn't be read at the 2MHz and 20kHz outputs due to the 1:4 mark-space ratio of these signals. A coupling link lead was connected to the input pin of the 74HC74 and its output measured while probing along the divided outputs.

My counter could then read the output at 1MHz, 100kHz, 10kHz, and 1kHz. The other calibration (CALIB) output at 1kHz at 1V p-p was observed using my oscilloscope.

The next step required positioning of all the hardware, both in and on, the radio frequency interference (r.f.i.)

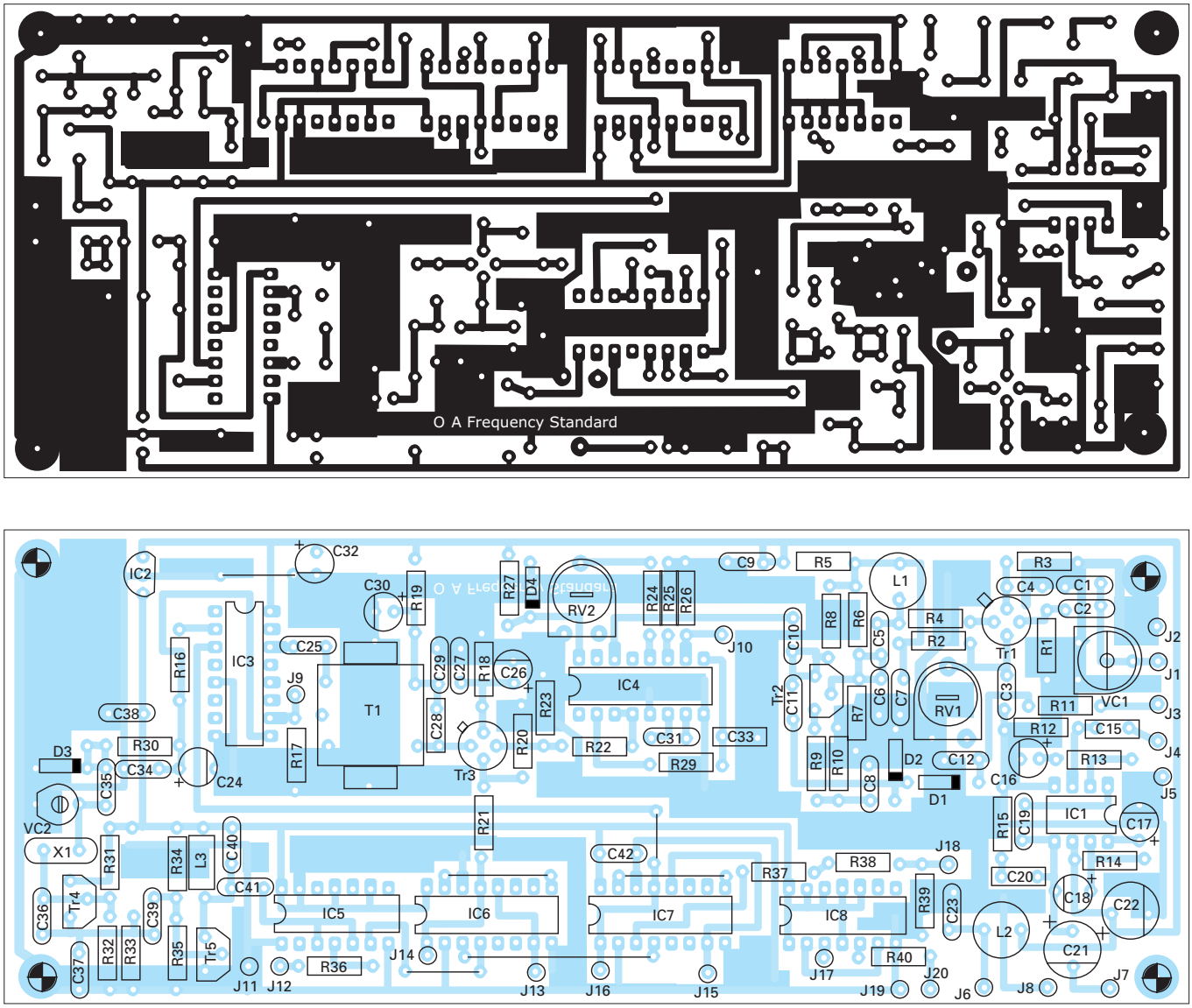


Fig. 3: The OAFS p.c.b. design and component placement overlay diagram.

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screened plastic case. Here, with proper consideration I was hoping I could get it right first time! The only place the speaker could be fitted was facing rearwards, as the front panel was too full, and placing it at an end, was too tight against the p.c.b. I then found suitable plastic pillars for mounting the ferrite rod on the lid and p-clips had arrived in from Farnell.

Next, I drilled the box and all the hardware was fitted onto it. Then came the defining moment! When it was switched-on, I was delighted to find that the Radio 4 signal was really clear and loud with only a slight amount of background noise.

However, there was also the 2kHz whistle in the background due to the 200kHz signal being heterodyned with the Radio 4 signal. This was either from cross-talk on the p.c.b. or due to wiring to the switch. However, it provides the benefit of audible proof that the unit is in-lock!

Assembly & Construction

The next stage was the assembly and construction. Here, it's usual practice to fit the lowest profile components first, followed by those of increasing size. I suggest that constructors start with the resistors and diodes, then ceramic capacitors. Poly block capacitors, trimpots, and trimcaps should be done one-at-a-time holding, them in place with a finger while soldering. **Warning:** Please avoid holding the trimpot on the exposed metal or your fingers will get burned!

Then fit the electrolytics, the transistors and the i.c.s. It's not necessary to use sockets for the i.c.s. (although I did because it was a development model). The final component to fit is the transformer. Bend the frame tabs inwards to secure its position then solder them and its other leads.

If the kit (see 'Kits & Bits' panel) with the pre-drilled and labelled box has been purchased, assembly should be straightforward. Securing the speaker using the solder tabs is a bit fiddly, as is the mounting of the ferrite rod on the box lid.

Following assembly, wire-up the parts using the pictures and plans as a guide. **Note:** It's most important that the wire carrying the 200kHz signal to the switch and the wire from the wiper back to the board are screened cables. This minimises the pick-up of the 200kHz signal by the input r.f. amplifier.

The Alignment

At switch on it should be possible to hear Radio 4 and be able to peak it using the trimcap VC1. Next, attach an oscilloscope probe to the junction of R8 with Tr2 and adjust trimpot RV1 to give between 400mV and 600mV p-p.

Next, measure the frequency of Loop 1 using a frequency counter probe on R23. Ensure that 198kHz is within the trimming range of RV2, if not it may be necessary to change R24. Then use a multimeter on 10V range connected to test point pin J10 and ground and set the voltage to around 2.5V.

Then transfer the multimeter probe to test point pin J9 and adjust trimcap VC2 to give 3.5V. The work will then be completed!

Shoot The Designer?

It's often said in manufacturing companies, that a time comes to shoot the designer! Otherwise he (or she) will keep tinkering with the project forever and it will never get into production. Fortunately for me – this unit works really well and locks up without problem. However, I did try a 74HC14 i.c in place of the 74HC04 and it appeared to square up the bottom of the 10MHz wave more efficiently, but otherwise it was of no benefit.

A final refinement of the printed circuit layout has IC3 rotated 90° so it is in-line with IC4, some other components are juggled about and the earth plane increased. This version will be included in the kits.

So, that's it! I hope readers enjoy the project as much as I did during the design and development stages! ●

Component Details And Kits & Bits

Ferrite rod aerial, Maplin part LB12N. Driver transformer, Maplin LT44.

PTFE Feedthroughs, lug and bush, Farnell 134 7803 & 134 7802.

Undrilled box, Farnell part 117 1599. P clips, Farnell 101 5271.

74HC04, Farnell 101 3912. 74HC14, Farnell 225 9783.

74HC74, Farnell 101 3916. 74HC390, Farnell 119 1835.

Pillar 18mm long, Farnell 359 270. Timing capacitor 470pF, Farnell 145 7670.

Kits & Bits From Spectrum Communications

Off Air Frequency Standard (OAFS) p.c.b. on its own, £10.50 plus £1 P&P,

OAFS p.c.b. and its components including the ferrite rod, £47.50 plus £2.50 P&P.

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Roger Cooke's

morse mode

Roger Cooke G3LDI discusses choosing Morse keys and offers advice directly to the new Morse operator – perhaps you?

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Welcome to the world of Morse where I'm suggesting that the first Morse key you should ever own – if you are new to the mode – should be a straight key. There are a variety of opinions on this, but I personally feel that the correct approach to sending Morse should be acquired by sending it on a straight key first!

There are a large number of keys available these days, ranging from a home made engineering feat of construction to some very expensive keys that can be found. However, there are two ways of tackling the choice.

If you wish to make your own key, you should preferably be a toolmaker or precision engineer. There are those that are suitably qualified and have both the time and equipment to produce a very attractive and functional key. Take a look at this site – featuring **William Smith W4PAL** – **www.wrsmithclocks.com/index.htm** This site was brought to my attention by **Vic G0FEI** – thank you Vic!.

William W4PAL holds a Bachelor of Science in Mechanical Engineering from The University of Tennessee in Knoxville. He is a Fellow in the British Horological Institute and a Fellow in the National Association of Watch and Clockmakers. In addition, he holds the following qualifications from the American Watchmaker-Clockmaker Institute: Certified Master Clockmaker, Certified Master Watchmaker, Certified Master Electronic Watchmaker**, Fig 1**

As you will see, William also restores and makes keys. Unfotunately most amateurs will not be either capable or willing to go down this route. I come into both those categories! So, the only other alternative is to buy one.

The Key For You

Assuming you have been taught how to use a straight key, I suggest that you try to get advice when buying a key as well. Talk to somebody with lots of experience who has been using Morse for years, like a G3 for example! Please take your time and try before buying.

Selection is a very personal decision and should not be treated lightly. A straight key is just a straight key. Ideally, you need to have one that is heavy, constructed well with a good smooth movement and with the ability to be adjusted easily.

A key should – preferably – be made from brass, and have a standard cabinet style door-knob handle that can be held properly. As you increase your speed, the straight key may make way for a paddle but it's still always useful to have around, especially for Straight Key Nights (SKNs). Don't buy a key because it's cheap – they're not always the best! See **Fig. 2** and **3** for the Hi-Mound and Vibroplex keys. Further information can be found on the comprehensive web site of G4ZPY **www.mtechnologies.com/keys.htm** where you'll be spoilt for choice!

Fig.1: William Smith W4PAL – a versatile Radio Amateur!

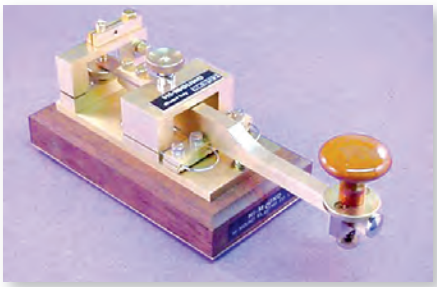

Fig. 2: A Hi-mound Swiss Key.

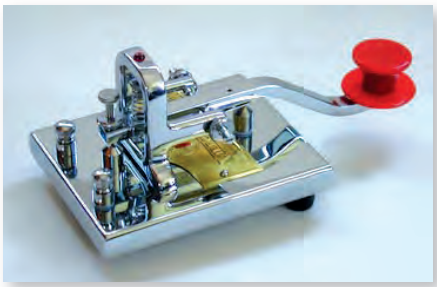

Fig. 3: A Vibroplex key.

Morse Is Dead?

There was an article in *The Times* on-line newspaper recently about the 'death of Morse Code'. The poorly researched article stated that the three letters SOS were used internationally as a distress call in Morse but were no longer needed with modern technology! Think again – depending on the circumstances of course, Morse code might be the only means of communication available and wouldn't it be a real shame if SOS wasn't recognised!

Personally I don't think Morse will ever die. It might be discarded by some, but Radio Amateurs will hold this mode dear to their hearts for years to come.

"One had assumed that Morse code's last hurrah had been in about 1944." But the 'one' had assumed wrongly! The writer **Alan Sillitoe**, who trained as a wireless operator in the Second World War recently revealed that he still practices taking Morse every day, listening to chatter across the airwaves, including a French station that broadcasts poetry in Morse." **Note:** This is a a partial quote from yet another article, this time in *The Guardian*, pointing out that indeed Morse is far from dead, which was also backed up by the RSGB.

Friedrichshafen & Morse

If Morse is dead, then it wasn't obvious at the Friedrichshafen Hamfest in Germany this year. As soon as we walked into the main hall, a rhythmic Morse audio file was playing on the main public address system, with lots of youngsters showing how easy it is to learn!

On moving into the exhibition area, I was impressed with just how many exhibitors there were with Morse as the main area of interest. Those I saw (I might have missed a few!) included Begali, Bencher, Kent and Schurr, selling keys, with various DX and Contest groups all featuring Morse and the High Speed Society for those able to send and receive in excess of 40w.p.m.. The rumour that Morse is dead is greatly exaggerated! 73 and May the Morse be with you! **Roger, G3LDI**

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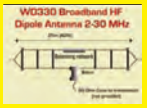

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Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

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RS-402 125-525MHz (200W) ..... £49.95 P&P £6.50
RS-3000 1.8-60MHz (3kW) Incls mod meter ..... £59.95 P&P £6.50
RS-40 144/430MHz Pocket PWR/SWR ..... £29.95 P&P £4
DL-30 diamond dummy load (100W max) ..... £26.99 P&P £4

EP-300

Over the ear earpiece. **£9.95** P&P £3.00

DB-770H (BNC)

2m/70cm Tx + wide Rx. High gain up to 5.5dB. **£44.99** P&P £5.00

MT-3302

Heavy duty universal mount + cable **£24.99**

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Adjustable roof rack/window bar mount **£16.99**

David Butler's

antenna workshop

David Butler G4ASR pauses from chasing v.h.f. DX and describes a 50MHz halo antenna made from water pipe!

Hello to you all – it's my turn in the *Antenna Workshop* again. This time around I'm pausing from chasing v.h.f. DX to describe how to construct a simple 50MHz antenna that can be built in a few hours using easy to obtain materials.

The antenna is really intended for stations that don't have the space to erect a directional beam antenna and yet want to participate in contacting DX stations during the summer Sporadic-E season.

Received signal strengths can be incredibly strong via Sp-E and although this antenna possesses unity gain, the results really will surprise constructors.

Popular Antenna

The halo antenna is a popular form of horizontally polarised radiator that has been around since the early 1940s. It's nothing more than a half wavelength dipole formed (normally) into an almost complete circle and end loaded by a capacitor to establish resonance. In the version I'm describing the halo is actually square in shape and fed to the 50Ω coaxial cable via a gamma match arrangement.

The antenna has an almost circular polar diagram, although there's a point of minimum signal in the direction of the side opposite to the gap. However, the antenna presents a relatively high angle of take-off when mounted low down which is great for single-hop Sp-E contacts around Europe and hopefully beyond.

The Design

Take a look at the layout and design of the 50MHz halo antenna shown in the diagram, **Fig. 1**. It's constructed from sections of 15mm water pipe joined at the corners by 90° elbow bends to produce a square shape with 710mm sides.

The photograph, **Fig. 2**, shows the completed halo antenna with a central support pipe. It's attached to a copper equal-T connector at the driven end and to a c.p.v.c. equal

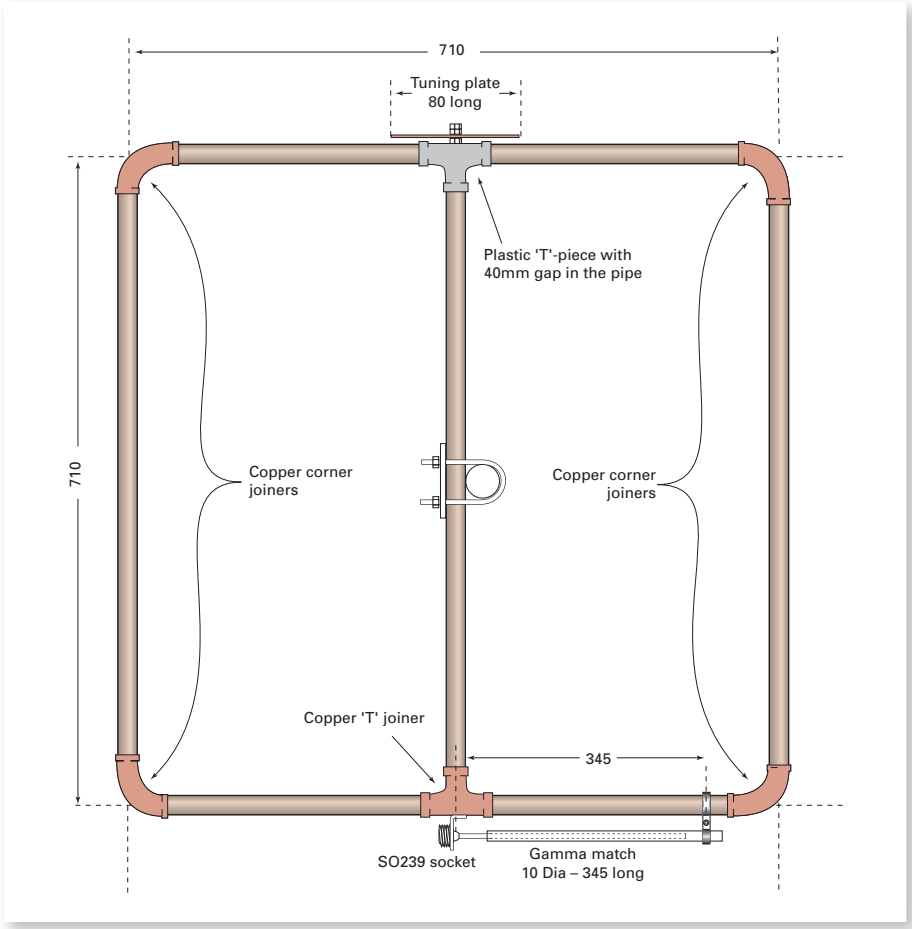

Fig. 1: Overall dimensions of the Halo antenna

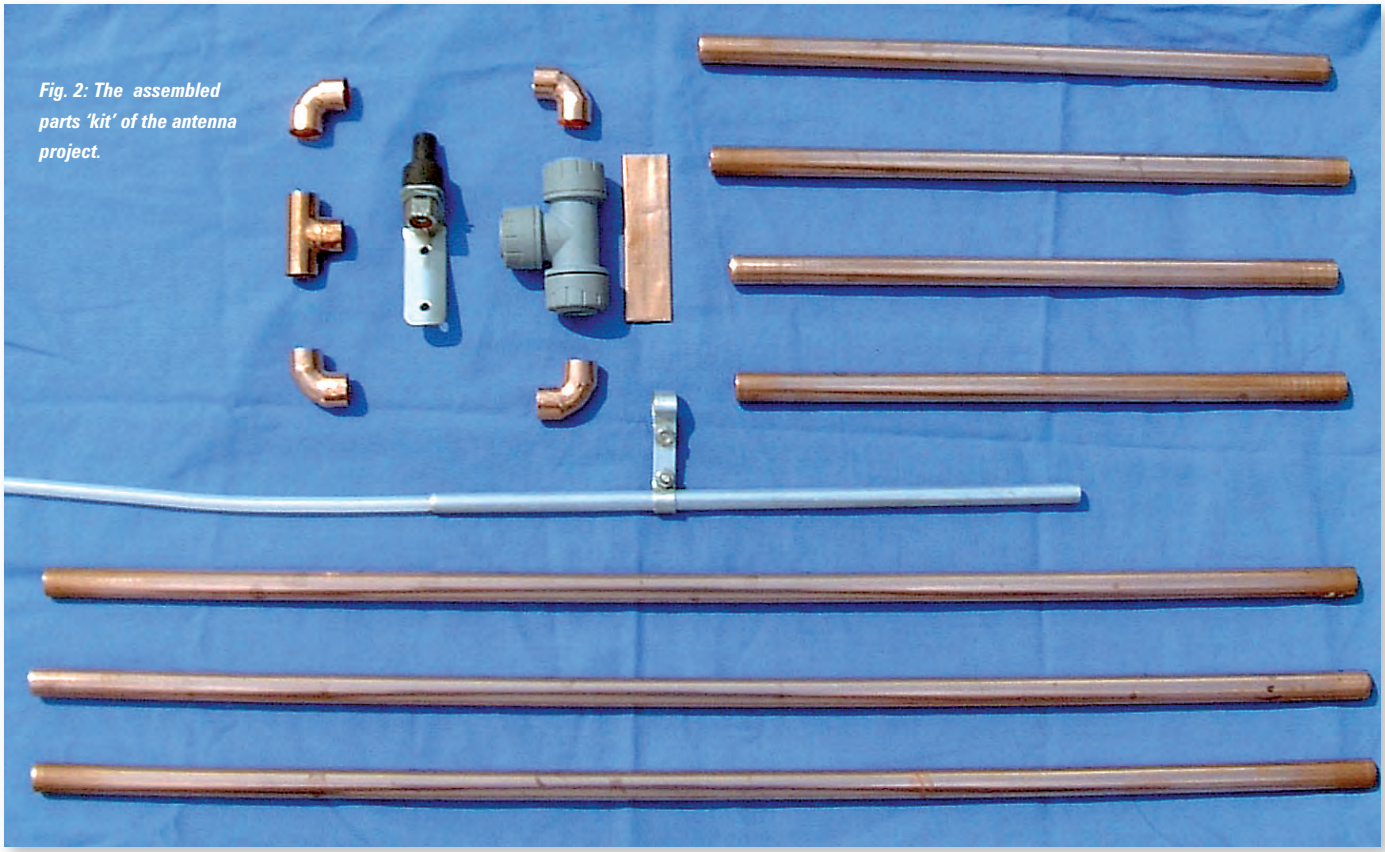

Fig. 2: The assembled parts 'kit' of the antenna project.

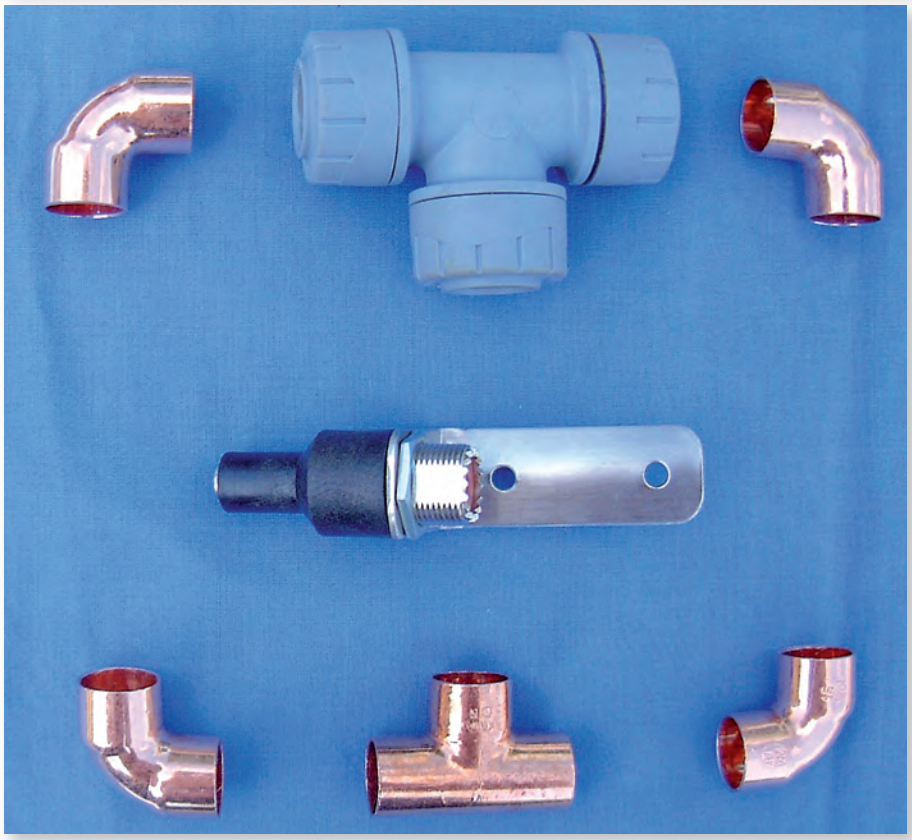

Fig. 3: A closer shot of the corners and joiners

T- component at the open end. An r.f. connector of individual choice is fitted to a mounting bracket attached to the central copper T-connector.

At the opposite end of the support pipe the c.p.v.c. tee section acts as an insulator for the ends of the radiating element and provides a mounting point for a capacitive tuning vane. A gamma matching arm is attached to the square loop via a copper strap at one end and to the coaxial connector at the other.

The gamma match is effectively a capacitor that's constructed from an inner dielectric section of RG8 coaxial cable inserted into a copper or aluminium tube.

The Construction

Start the construction of the antenna by cutting the 15mm water pipe into seven pieces, three long pieces approximately 680mm long and four pieces approximately 340mm long. Note that the exact dimensions will depend on the size of the 90° elbow bends and the two equal T-pieces, shown in the photograph, **Fig. 3**.

The elbow bends can vary depending on manufacturer – but the important dimension to remember is that each side of the square must be 710mm centre-to-centre with all the components in place. **Note:** Make sure there's a 40mm gap at the open ends of the radiating element inside the c.p.v.c. tee connector.

The next step is to make the tuning vane and attach it to the c.p.v.c. T-piece as shown in the photograph, **Fig. 4**. (I used an 80mm length of 15mm diameter water pipe squashed flat in a vice). Then I drilled a suitable size hole centrally in both the end of the tee-piece and in the copper vane and attach together using a screw and lock nuts.

Next, I assembled all the component pieces on a flat surface. I suggest that constructors should re-check that each side of the square measures 710mm centre-to-centre and then permanently join them

Fig. 4: The tuning vane is a brass or copper plate 80x20mm.

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together, using a blow torch and solder.

Then I had to make the gamma match and coaxial connector assembly and constructors should take a look first at my layout shown in the photograph, **Fig. 5**. A 20mm wide brass plate is bent to form an 'L' shape measuring 50mm by 30mm. I used an SO-239 connector that had a threaded centre pin but this is a matter of choice, as any suitable coaxial connector can be used. Two small holes are drilled and the plate is attached to the copper T-piece with self-tapping screws.

The gamma arm is made from a 345mm length of 10mm diameter copper or aluminium tube. Then cut a 280mm section of RG8 coaxial cable discarding the shielding and outer covering. Slide 240mm of the centre wire and plastic dielectric into the tube leaving 40mm protruding.

The centre conductor is attached to the coaxial connector and then the copper tube is attached the radiating element 345mm from the centre of the SO-239 connector. The shorting bracket may conveniently be made by using reformed 15mm copper pipe clips. Note that I actually used a section of aluminium tubing because that's what I had available in my workshop at the time but ideally we should use copper or brass tubing.

Mounting & Adjustment

The central tube is used to provide a mounting point for a mast clamp as shown in the photograph, **Fig. 2**. Alternatively the antenna may be mounted on wooden slats using conventional plastic water pipe clips and then fixed indoors to wooden beams in the loft space or any other convenient mounting points.

Two parameters – the impedance match and the centre frequency of resonance – may be adjusted with this antenna design. Initially, the tuning vane should be set at right angles to the radiating element. If the measurements I've provided have been followed, this should set the halo to be resonant around 50.400MHz. Tuning is carried out by using a suitable transmitter and a standing wave ratio (s.w.r.) bridge. Adjust the transmitter so that it runs just a few watts output on 50.400MHz.

The s.w.r. should be under 2:1 but if it isn't then move the aluminium strap in or out to get an optimum match. Once the stub has been adjusted for the best match, re-check the s.w.r. between 50.000 - 51.000MHz to see where the s.w.r. curve lies within the band.

Note: If the centre frequency of resonance needs to be lowered, then simply rotate the tuning vane to be more parallel with the radiating element. Once it's set up to the chosen centre frequency, the lock nuts should be tightened up.

Typically, the 2:1 s.w.r. bandwidth curve will be around 500kHz or so. However, one point to note is that the circuit *Q* of the halo is relatively high and **very high voltages** can be developed across the ends of the loop! Therefore I recommend that the output power is restricted to no more than 100W.

That's all there is to it. Now get building and improve your plumbing skills at the same time – and I wish halo users 'good luck' with the next 50MHz Sp-E opening! ●

Material Shopping List

Materials needed to make the halo antenna include 3500mm x 15mm (1/2") copper water pipe (3 x 680mm, 4 x 340mm, 1 x 80mm sections) and 1 off brass plate 20mm x 80mm (to mount SO-239 connector). Also required are 1 off 345mm x 10mm copper tubing (Gamma match), 1 off copper strip 10mm x 100mm (Gamma match support bracket), 4 x copper 90° elbows, 1 x copper equal T-piece, 1 x 15mm c.p.v.c. equal T-piece, 1 x 280mm piece of RG8 coaxial cable (centre conductor and dielectric) and 1 x SO-239 coaxial connector (ideally with threaded centre pin).

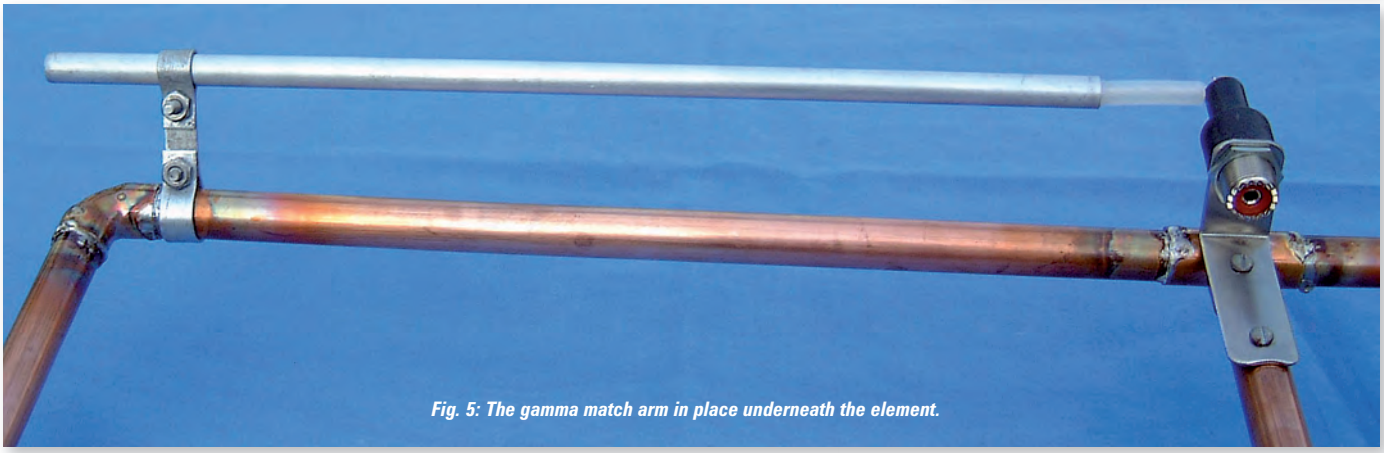


Fig. 5: The gamma match arm in place underneath the element.

Project

Fun on 10 metres!

After several years with few sunspots and generally poor high frequency (h.f.) conditions, the 28MHz (10m) band is once again 'on the up' as Cycle 24 gets under way. Within a couple of years it will again become one of the best bands for working worldwide DX!

When 28MHz is open and in very good shape, DX can be worked with very low power (QRP) and the proverbial 'piece of wet string'. However, an effective antenna is important if DX contacts are to be made during less favourable parts of the sunspot cycle.

What follows this month in Part 2 of my feature on the band, is a 28MHz antenna option combining a very small footprint, near omni-directionality, low cost, easy sourcing of parts, easy assembly and easy adjustment. If mounted in the clear, it's capable of very useful performance – just a few dBs down in gain when compared with a large h.f. beam.

Antenna Options Limited?

Many of us live in small homes with even smaller gardens and our options for effective h.f. antennas are limited. Although many of us would love to erect a beam for 10m, our neighbours, local councils and wives may **not** approve! Even a 28MHz two element HB9CV or a Moxon 2-element Yagi look huge when mounted over a small semi-detached roof!

Close up of erected antenna in place at the top of the mast

On 28MHz a half-wave dipole is small but has directionality and nulls unless rotated. Verticals such as CB end fed half-wave antennas or the professionally designed Cushcraft AR-10 can be very effective and are omni-directional but these can easily pick up switch-mode power supply and personal computer (PC) noise as well as cause TVI through coupling into vertical cables and coaxial cable down-leads.

Many readers will be familiar with the Cobwebb design from **Steve Webb G3TPW**, which is a 14-28MHz horizontal, omni-directional, wire antenna. This works well but it is very expensive and, in my opinion, it looks a bit like a rotary clothes line stuck on a pole up in the sky – my neighbours would certainly not approve!

However, before I get 'stuck into' describing the

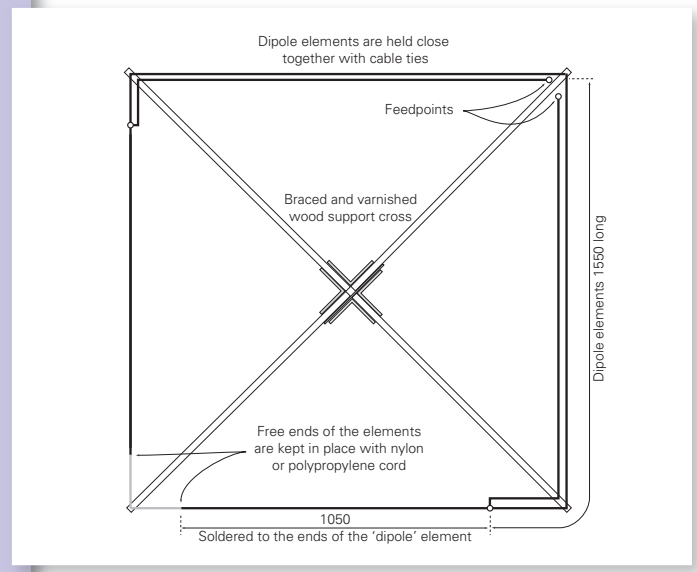


Fig. 1: Overall dimensions of the Home-base 10 antenna .

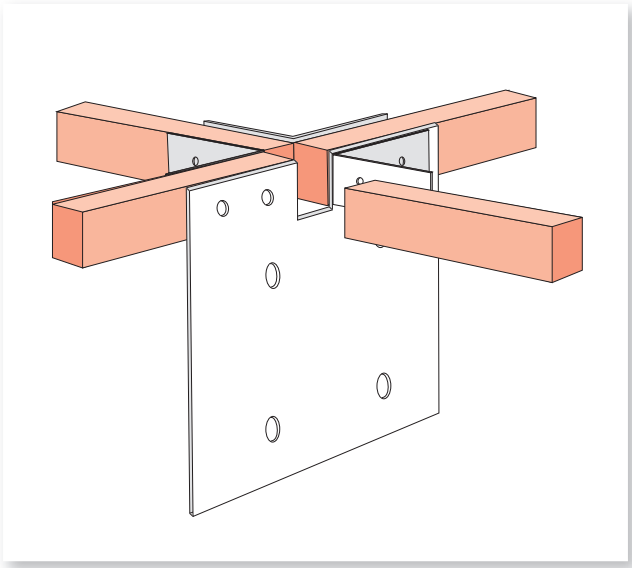


Fig. 2: Details of the method of joining wooden struts with corner braces and mounting plate.

In his second article featuring 28MHz operations, Roger Lapthorn G3XBM describes a simple and efficient weekend antenna project.

28MHz weekend project, I must make it clear that I can make no claims for originality. This antenna takes some of the ideas from various similar concepts such as the v.h.f. halo, the old Cushcraft Squalo, the GM3VLB delta beam and the Cobwebb. On the plus side for constructors the antenna can be assembled for less than £10 and with reasonable luck, the parts required will be available from the junk in the back of the shed.

All the parts required for this antenna may be purchased from the local Homebase, (or B&Q or similar DIY stores) with the coaxial cable, mast clamps and wire available from Maplin. As it is designed for 28MHz (10m) then the name just had to be the 'Home-Base 10' – acknowledging the component source but avoiding trespassing on the company's copyright territory!

Please take the design dimensions and mounting arrangements in **Fig. 1** as starting points for your own version of this antenna. This article is meant to encourage readers to do something similar but be prepared to experiment a little to optimise for personal situations and the materials to hand (wire diameter, support members, etc.).

Wooden Skeleton

The antenna consists of two main parts: (a) a wooden X skeleton section which provides the support struts and (b) a wire dipole folded into a square 'halo' shape. As with the Cobwebb, the centre part of the wire dipole section is made up as a folded dipole, which brings the feed point impedance close to 50Ω.

The folded dipole is made by paralleling up two pieces of the pvc cover multi-strand wire and holding these close together with cable ties. A choke consisting of six turns of the coaxial cable about 50mm diameter close to the feed point helps to keep r.f. from the outer of the cable.

To start the construction first assemble the support strut woodwork by taking four pieces of 21 x 12 mm wood 1m long (with the 21mm side vertical) and drill two holes close to one end to line up with the metal corner brace holes. The four 50mm corner braces and the drilled aluminium plate are screwed together and to the wooden struts **Fig. 2**.

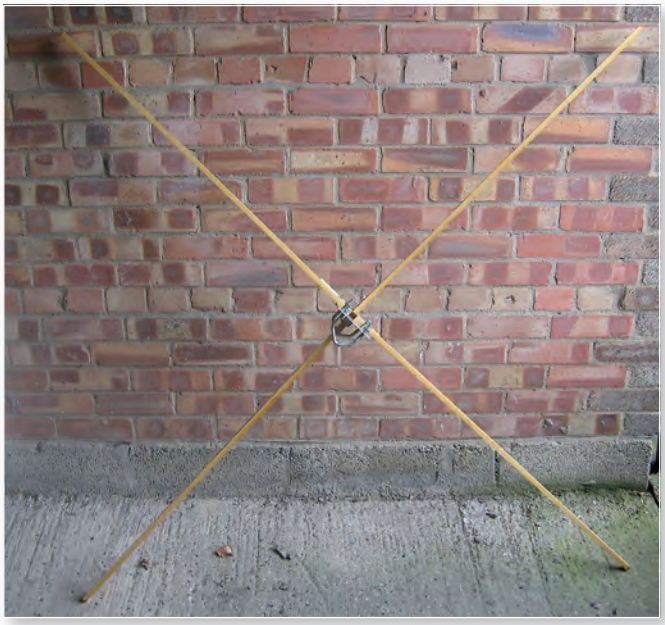
When screwed together the four wooden pieces form a cross, with the aluminium plate trapped between two of the corner braces and the wooden struts. Coat the wood, the assembled brackets and the nuts and bolts with three layers of outdoor yacht varnish to protect them from the elements. A better alternative may have been to use nylon rods but the rectangular wooden struts allowed a simpler mechanical arrangement.

Next, assemble the wire dipole as shown in the diagram, **Fig. 1**. Note how the feed point attaches to the centre of the folded dipole section. Initially it's necessary to 'tack' the wire onto the corners of the cross.

The feed point is then attached at one end of one of the cross members. This helps to provide support as this is the heaviest part because of the added weight of the coiled coaxial choke.

Bring the coaxial feeder away from the feed point back towards the middle of the antenna along the wooden support strut. The free ends of the wires must then be pulled together via a thin piece of insulating nylon or polypropylene cord. Make small loops in the end of each wire to attach the cord.

A closer look at the centre of the assembled antenna



The finished antenna ready for mounting on the mast.

Initial testing of the finished antenna. Note the bird table – a useful support!

Note: The r.f. losses of the material used to connect the wire ends together may be checked by putting a short length of it in a powered microwave oven for 60 seconds. This is to see how hot it gets – if it remains cool the chosen material should be okay.

Testing & Adjustment

To start the testing and adjustment stage, connect a 28MHz rig via an standing wave ratio bridge to the antenna. **Note:** Position the antenna in the air clear of other wires and metalwork. This is best done in the garden as some adjustment of the wire length may be needed.

Next, check the s.w.r. at the bottom, middle and top of the 28MHz band. If all is well, the match should be <1.5:1 over about 600kHz of the band dropping to 1:1 in the centre. If adjustment is needed, lengthen or shorten the free ends of the wire until the lowest s.w.r. is centred wherever the constructor requires to operate within the band.

My version was adjusted to give a low s.w.r. between 28-28.6MHz where most of the single sideband (s.s.b.), c.w. (Morse) and data DX activity is found. Try to position the antenna in the clear when checking resonance each time. Adjustment shouldn't be too critical.

Once adjustments have been completed, attach the antenna wire to the corners of the cross in a more permanent fashion. Make sure that the soldered connections – joining the folded dipole section to the end wires and the feed point junction to the coaxial cable – are suitably waterproofed.

Joints should be covered in heat-shrink sleeving or waterproof tape. Use nylon cable ties to secure the folded dipole wires to each other, the coaxial cable choke and feeder. In my version I added a small extra piece of wood joining the tops of the wooden strut supporting the coaxial cable feeder and its opposite part to give this additional strength.

As High As Possible!

When completed, you'll have a small, lightweight but effective 10m DX antenna that should last a good few years and provide plenty of fun – erect the antenna as high as possible and start collecting 28MHz DXCC countries! If anything should fail, you'll know the whole thing can be rebuilt in a few hours for less than the price of a take-away meal.

Contacts I've made so far suggest the antenna is working as planned with a near omni-directional radiation pattern. Despite running only 5 or 10W on s.s.b. and c.w., reports I've received have been excellent.

Note: The antenna doesn't need any matching when it's used over the intended part of the band but an auto-antenna tuning unit (a.a.t.u.) such as that in the IC-703 helps to optimise the match in other parts of the band.

Other Bands

Unexpectedly, the antenna also performs pretty well on other higher h.f. bands too! Indeed, I had contacts on 14MHz (20m), matching the antenna (and its feeder) successfully with the IC-703 a.a.t.u., before the 10m band 'opened up'.

Although only tested at 5-10W (the most I can run!) the antenna should work with full legal power as long as the losses in the support cord joining the free antenna ends are low.

During a recent c.w. contest I had no trouble working four European stations when running just 50mW into the Home-Base10 antenna – so it definitely works! ●

Parts List

Insulated (pvc) multi-strand wire 10m total approx (including some for prototyping. I used 32 x 0.2mm wire with an outside diameter of 2mm)

Timber 12 x21 x 1000mm	4 off
50mm corner braces	4 off
M4 nuts 15mm long	8 off
M4 bolts	8 off (to secure corner braces to struts)
Self-tap screws	4 off (to support wires at all 4 corners)
Nylon cable ties	As required
50 ohm coax cable e.g. RG58	As required (for feeder and choke)
100 x 200 x 2mm aluminium sheet	As shown (for mast fixing)
Mast clamps	2 off (to fix antenna to mast)
Yacht varnish	As required
pvc tape or heat-shrink	As required to waterproof joints.
Polypropylene or nylon cord	As required to tie free ends

All parts except the coaxial cable may be obtained from DIY stores. Coaxial cable is available from many sources including Maplin.

Originally the wire end-sections should be overlong and adjusted by folding the ends back on themselves before making them securely to the tensioning cords of polypropylene or nylon.

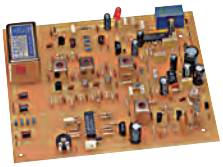
The Home-base 10 antenna erected and in use at G3XBM.

KITS & MODULES

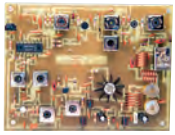
NEW PRODUCT

OFF-AIR FREQUENCY STANDARD, crystal calibrator unit phase locked To Radio 4 using a two-loop system. Includes a monitor receiver to ensure Radio 4 is being heard loud and clear. Fixed outputs 10MHz at 2V p-p, and 1KHz at 1V p-p as oscilloscope CAL signal. Switched outputs 1MHz, 100KHz, 10KHz, and 1KHz at 6V p-p, into 500 Ohms. Single board design as featured in July & Sept 2008 PW. Background heterodyne whistle at 2KHz confirm lock condition. 12/13.5V DC operation at 65mA. **PCB kit with ferrite rod £50.00, PCB kit + drilled box and hardware complete £84.50. Ready built £129.50.**

TRANSVERTERS for 2 or 4 or 6 metres from a 10 metre rig, or 4 or 6 metre from a 2 metre rig. Includes new overtone local oscillator, and integral interface unit. 20dB receive gain, 25W transmit power. Low level drive dual IF versions **TRC2-10dL, TRC4-10dL & TRC6-10dL**, high level drive single IF versions **TRC2-10sL**, **TRC4-10sL**, **TRC6-10sL, TRC4-2sL, TRC6-2sL**, Complete kit **£163.00**. **Built £244.00**



POUNDBURY SSB IF UNIT
9 or 10.7MHz SSB generator & receive IF unit. Incorporates a speech processor, double balanced mixer and crystal filter. Crystal carrier Oscillator. Receive IF amplifier, balanced demodulator and AGC generator, and S meter circuitry. Also a 1W audio amp. Supplied with a 9MHz 6 pole crystal filter and matching carrier crystal for USB generation. **PCB and component kit £80.00 including P&P**. Optional extras mic gain pot, volume control pot, £1.75 each, signal meter £9.00, 8ohm loudspeaker £2.00, P&P £1.50.



POUNDBURY 70MHz FRONT END as featured in this issue. Receive preamp and mixer, transmit mixer and three stage amplifier. Sensitivity 100nV on receive, output 250mW minimum on transmit. Works in conjunction with the POUNDBURY 9MHz SSB IF UNIT the PORTLAND VFO, and the MIXER-VFO board to create a tuneable 70MHz SSB transceiver. Also available is a 250mW to 25W two stage amplifier type TA4S3 to complete the project.
PCB and parts kit with potentiometers £44.00

CB to 10FM CONVERSION, suitable for CB's with LC7136/7 or TC9119P PLL IC's. Puts the rig on 29.31 - 29.70MHz. Each board is aligned prior to despatch. Data available for a variety of chassis types. Please state rig type when ordering. **SC29 Built & aligned £23.00**.

STATION PREAMPS for 2 or 4 or 6metres. RF & DC switched. Adjustable 0-26dB gain. 100W power handling. **RP2S, RP4S, RP6S, PCB & Hardware kit £29, Ready Built £47**.

MASTHEAD PREAMPS, for 2 or 4 or 6meters. 20dB gain 1dB NF. 100W through handling. RF switched & DC fed via the coax. Heavy duty waterproof masthead box, and a DC to RF station box with SO239 connectors. **RP2SM, RP4SM, RP6SM, PCB & hardware kit £38.00, Ready Built £57.00**. **Masthead fitting kit £6.00**.

MASTHEAD PREAMPS 400W rated, for 2 or 4 or 6metres. RF switched. DC fed via a separate wire. 20dB gain 1dB NF. Heavy duty waterproof masthead box with SO239 connector. **RP2SH, RP4SH, RP6SH. PCB & hardware kit £40.00, Ready Built £62.00**. **Masthead fitting kit £6.00**.

TWO TONE OSCILLATOR as featured in *PW* March 2005. A vital piece of test equipment used together with an oscilloscope for setting up AM, DSB, & SSB transmitters. **PCB & bits £10.00. PCB assembled £20. PCB & hardware kit £25. Ready Built £52.50**.

SPEECH PROCESSOR increases the average sideband power of SSB transmitters without driving the PA into clipping. Includes filtering to enhance the higher voice tones to increase intelligibility, and it sounds nice too. Panel control for clip and output level. Supplied with plugs & sockets to suit most popular rigs. Type **SP1000, PCB & Hardware kit £29.00, Ready built £63.50**.

PORTLAND VFO as featured in March 2006 PW. 7-7.2MHz as local oscillator for a 40m direct conversion receiver or transceiver. Otherwise as 7.9-8.4MHz to use in conjunction with a mixer-vfo system as local oscillator for a 4 metre receiver/transmitter with a 9MHz or 10.7MHz IF. Available with Buffer 2 for high drive output or with Buffer 1 suitable for the Poundbury project transceiver. **VFO PCB with Buffer 1 or Buffer 2 PCB and parts kit with potentiometer £14.50. PCB and parts kit with drilled box £24.00**. **Ready built £47.50**.

MIXER-VFO for 4metres as described in DiBD PW May 2006. A crystal oscillator and mixer and amplifier producing 61-61.5MHz or 59.3-59.8MHz local oscillator signal when used in conjunction with the Portland VFO. **PCB & parts kit £23.30.**
Ready built and tested £34.00.

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

A 3-element Yagi Antenna & A Practical Test

Some time ago I was given a 3-element Yagi antenna that was originally sold for use on the v.h.f. Band II broadcast band, had been found discarded in a skip and it didn't look as if it had ever been used. So, I put it to one side and wondered what use I could put it to, at the same time I was experimenting with a new antenna modelling program called *MMANA*.

The *MMANA* software is a freeware program by JE3HHT and the latest version 2.03 is only a 1.2Mb download. It is suitable for use with any Win9x machine and upwards and requires little in the way of system resources. I originally used it on a 466MHz machine with 32Mb of RAM and it runs more than adequately for everyday use. Typical simulations take only a matter of seconds to complete, **Fig. 1**.

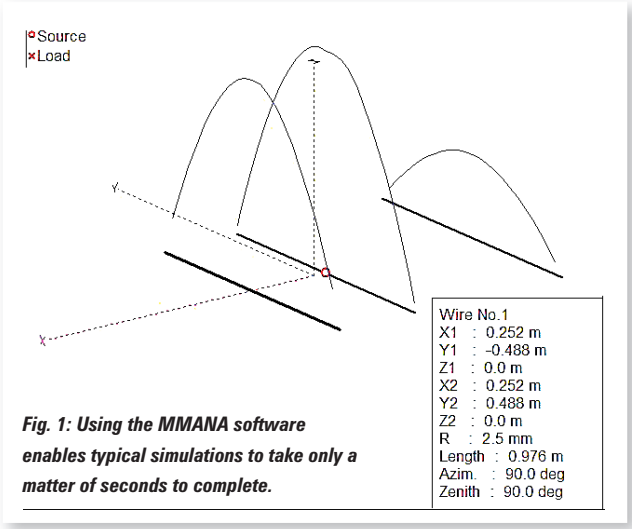


Fig. 1: Using the MMANA software enables typical simulations to take only a matter of seconds to complete.

The *MMANA* software is very user friendly compared to other and often expensive computer modeling software and it has become my preferred program for everyday tasks. Computer modelling is very useful once a few basic lessons have been learned on how to construct a suitable model and you are familiar with interpreting the results.

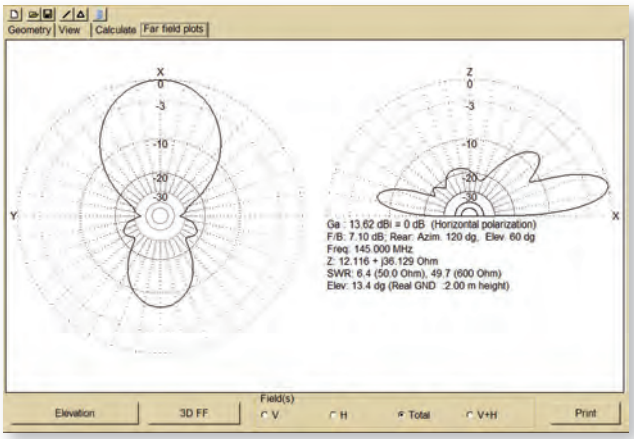
Modelling Easy!

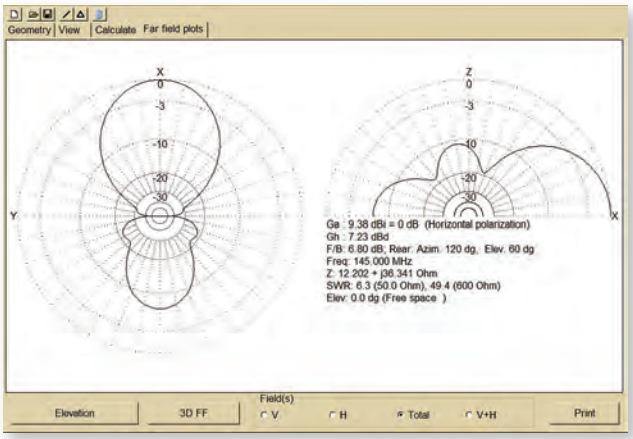
The *MMANA* program makes entering a model very easy. The user can draw an antenna using a mouse and then enter a few operating parameters – such as ground conductivity at high frequency (h.f.) and state how the antenna is to be modelled – including the free space or over ground factors.

The program also provides suitable matching methods to match the modelled antenna to the feed line; Options for coaxial stubs and inductance/capacitance (LC) networks are two examples. With this in mind I decided to convert the old Band II v.h.f, antenna into a simple 144MHz Yagi to see how a computer model compared to the real thing, as well as test the impedance matching options that *MMANA* offers.

The Results

I initially entered some rule of thumb dimensions and these were elements of 1m in length and spaced about a quarter of a wavelength apart – to see what transpired. Clearly, this wasn't optimised so I used the optimisation





Figs. 2 & 3: The MMANA results indicated a 7.2dB gain over a dipole in free space and an unmatched impedance of 12+j36Ω.

Andy Foad G0FTD used the antenna modelling *MMANA* software to modify an old Band II antenna for 144MHz.

Fig. 4: Andy replaced the coaxial cable stub with a trimmer.

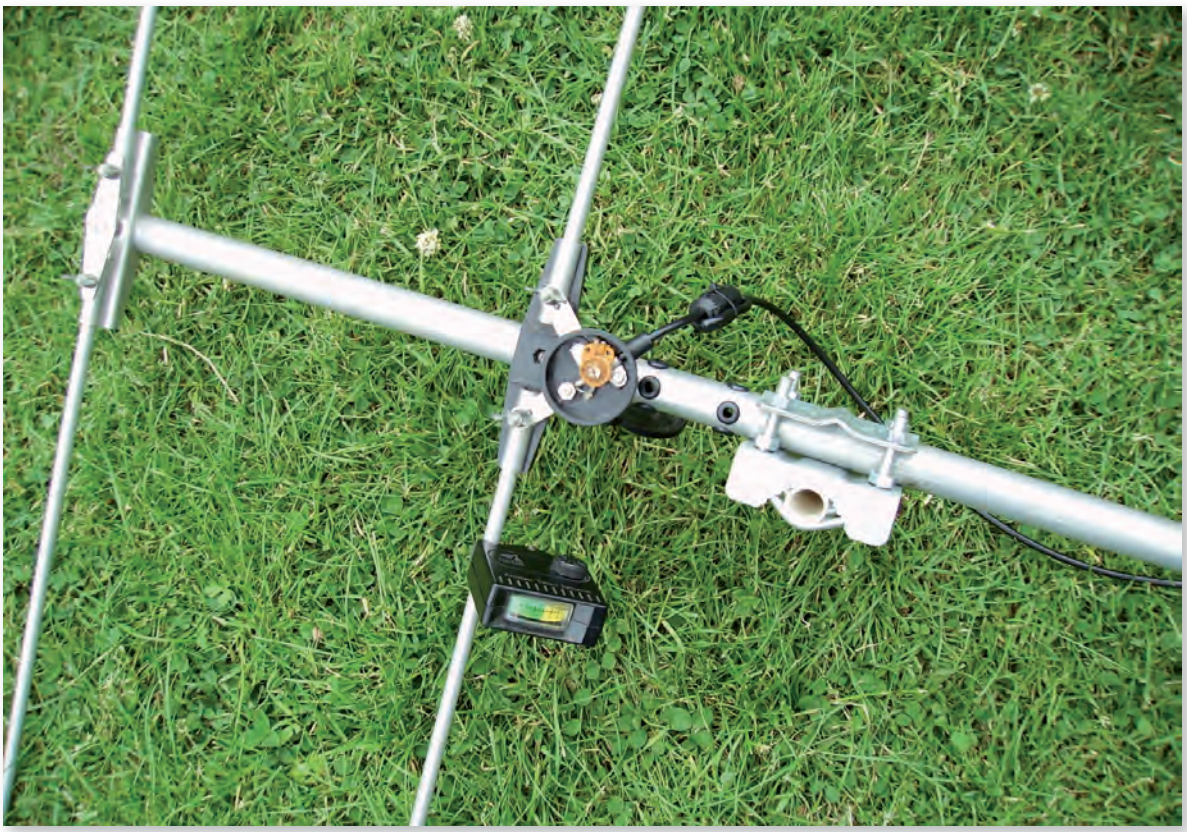


Fig. 5: Another photograph showing the trimmer Andy used during his computer modelling exercise.

feature of *MMANA* to see what it suggested.

The results were: Reflector 1004mm and spaced 600mm away from the dipole. Dipole length 1000mm with the Director 997mm long, spaced 300mm away from the dipole. (The elements were 5mm diameter). The *MMANA* results claimed a 7.2dB gain over a dipole in free space and an unmatched impedance of 12+j36Ω, **Figs. 2** and **3**.

The program also suggested matching using a coaxial matching stub 208mm. This refers to a piece of RG58 coaxial cable, which is attached at the feed point across each side of the feeder cable and this stub is left open ended.

Figs. 6 and 7: Showing how Andy G0FTD mounted his former Band II Yagi.

However, in practice I found that the stub needed to be 130mm long. I also found that it's best to trim the length of the stub in 5mm steps as there's a very rapid onset dip in the voltage standing wave which could easily be missed. I later replaced the coaxial stub with a small 5-15pF trimmer which did the job just as well, **Fig. 4**.

When I used a trimmer for matching the antenna I used a handy clip on field strength meter as can be seen in the photograph, **Fig. 5**.

So, as readers will now realise – there are two matching methods that could be used if it's decided to build this antenna. Obviously, a piece of RG58 for the matching stub is far easier to obtain than a suitable trimmer and a coaxial stub will also handle higher power. Remember that it's best to do the trimming with the antenna in place where it's to be used, otherwise a variation in s.w.r. is almost certain to occur otherwise.

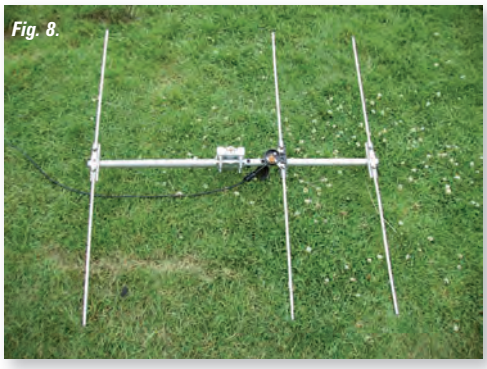


Fig. 8.

Cleaning The Pattern

My first test was to see how clean the (plotting) pattern was by listening to the Wrotham beacon (located near Wrotham in Kent) on 144.430MHz. I was pleased with the result as the pattern appeared to be clean and symmetrical with no skewing effects. The signal from the beacon being reduced quite well off the back of the beam. The expected higher side lobe reduction seemed quite deep too – as it should have been!

I first used the antenna to make QSOs in the *PW* QRP Contest. My station was a little unusual, being my 'shopping trolley station'. which was referred to in **Carl Mason GW0VSW's** *HF Highlights* column in March 2006. (Now in it's Mark 2 stage) and in the full length article in *PW*. I took this to the local hill on contest day with a steep slope in front of me, so I knew that I didn't require a great height to mount the antenna. I mounted it on to the bottom piece of the h.f. vertical as seen in the picture of my main station, **Fig. 6/7**.

With just the low power in the *PW* QRP Contest and a measly 3-elements from here on the Kent coast I was able to work several GW stations and as far as Yorkshire with ease, plus others in Norfolk and Birmingham. Yorkshire represented some 396km (245 miles) distance. I was amazed at what could be achieved with low power and such a simple antenna, **Fig. 8**.

During the contest I operated at a very casual speed during the last two hours of the contest and I could work every single station I could hear. So, with that in mind and bearing my success with using only 3-elements I intend to stick with the simple approach and enjoy myself!

I was also amazed at what the 144MHz s.s.b. section had to offer after all these years of being a diehard h.f. operator. Not bad for a scrap Band II broadcast antenna and as for the contest – I'm looking forward to next year!

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David Butler's

vhf dxer

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

This month David Butler G4ASR has reports on Sporadic-E openings during the month of June for 50, 70 and 144MHz.

The Sporadic-E season this summer must surely go down as one of the worst ever to be recorded. Although propagation was very good during May with numerous Sp-E openings on both the 50MHz and 70MHz bands along with two openings as high as the 144MHz band, this promising start didn't continue into the month of June.

Yes, there were 50MHz openings virtually every day but there were no instances of blanketing Sp-E covering huge areas of Europe for hours at a time. The openings at 50MHz were most definitely lack-lustre and of low intensity. However, there were 17 days during June when the transatlantic path opened up with contacts being made into both North and South America. This is quite unusual considering the lack of E-layer propagation throughout Europe.

As the 70MHz band is higher in frequency there were even less Sp-E openings reported. Indeed, there were nine days during the period when no events occurred at all. It was surprising that any openings occurred on the 144MHz band during June but in fact there were five, all being reported during the last week of the month.

Indeed the period from June 21 to the 30th was by far the best, no matter which of the v.h.f. bands you were active on. Tropospheric propagation on the 144MHz band wasn't particularly good either, although right at the end of the month the excellent 3000km path to the Canary Islands (situated off the west coast of Africa) opened up but only for stations located in Cornwall, Devon and southern Ireland.

The 50MHz Band

Surprisingly, the 50MHz band was

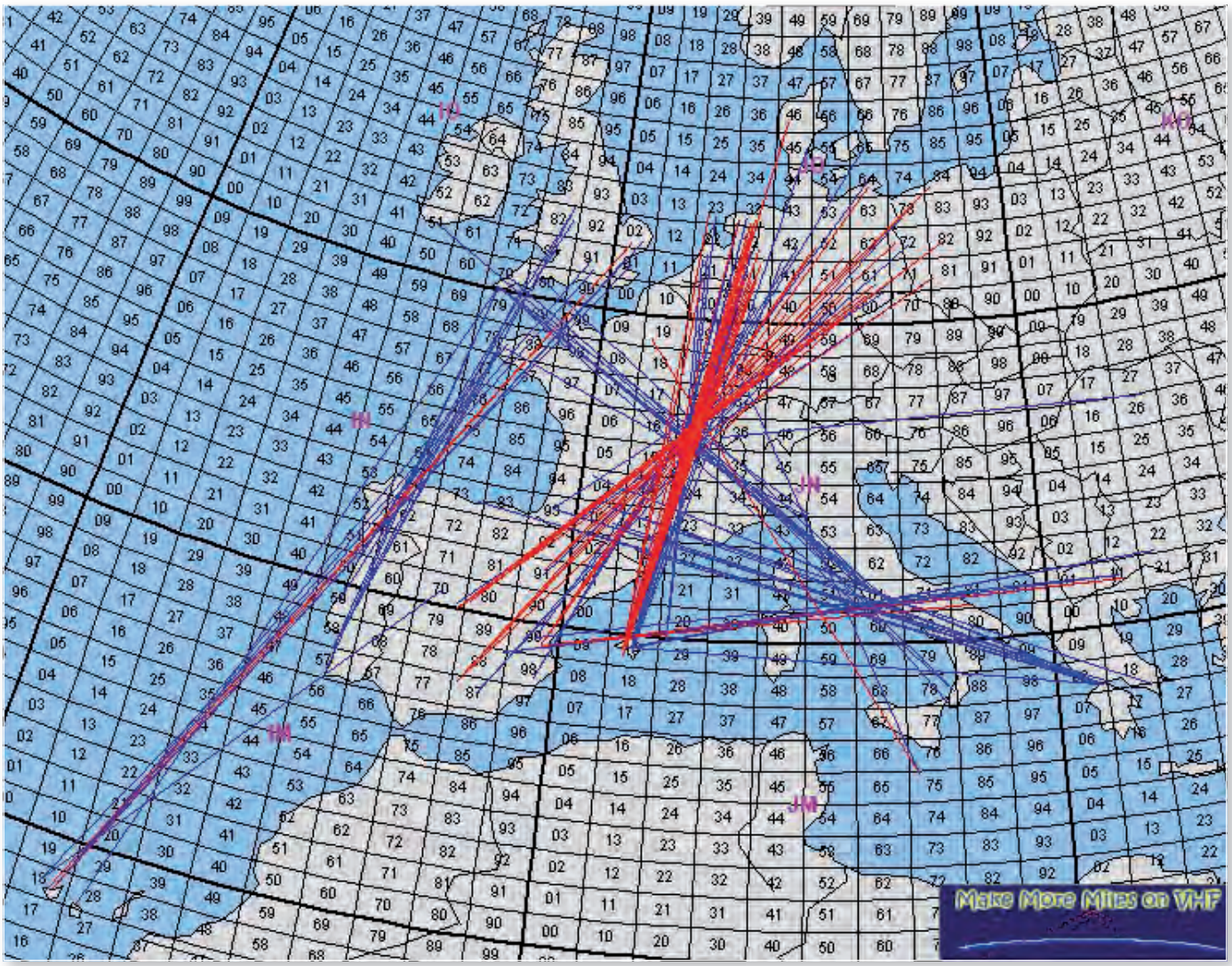

Fig. 1: The 144MHz Sporadic-E opening on June 28th.

Fig. 2: The station of SV8CS operating from the Madeira Islands (CT3)

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open via Sp-E propagation every day throughout the month with the exception of June 2nd. The openings though were quite poor, lacking the real intensity that is often experienced.

There were no instances of widespread E-layer propagation that covered large areas of Europe. Instead, those instances of E-layer propagation mainly seemed to be point-to-point E-layer communication, at times quite strong but often fading into the noise within minutes.

My records show that 50 European, nine African and five Asian countries were worked from the UK during June. Included in these were the stations of 4X4DK (Israel), 6W1SE (Senegal), C31PP (Andorra), C4I (Cyprus), CT3FT (Madeira), CU2JT (Azores), D4C (Cape Verde), ER5AA (Moldova), JX/G7VJR (Jan Mayen), JY4NE (Jordan). Also recorded were OD5KU (Lebanon), OH0JFP (Aland), SU1KM (Egypt), SV5BYR (Dodecanese), SV9CVY (Crete), TB7MPB (Turkey), TF3SG (Iceland), TR8CA (Gabon), UN3M (Kazakhstan), ZB3B (Gibraltar) and ZC4TS (Cyprus Sovereign Base Areas).

David Cox G4RYV (Wiltshire IO91) mentions that although he's a regular reader of *Practical Wireless* this is his first report that he has sent in. Thank you David and welcome to the exciting world of v.h.f. DXing!

David explains that as the garden at his QTH is very small he doesn't have much space for antennas and as he lives in a bungalow there's not much potential for any great height either. He is currently using a home-brewed 4-element Yagi situated only 3m above ground into which he is running 5W from a Yaesu FT-817 transceiver. Despite these restrictions he was very pleased to make DX contacts with the 50MHz stations of EB3JT and EA7HG (Spain), OY1CT (Faroe Islands), SK2AT (Sweden), and SP8AWL (Poland).

The *PW* Editor, **Rob Mannion G3XFD** (Dorset IO90), reports that he made his very first QSO on 50MHz from home (rather than the portable operating that he prefers) with a station in Budapest, Hungary. Rob was using an Alinco transceiver running 25W output into a Diamond dual-band 50MHz/144MHz whip antenna mounted at 10m above the ground.

The QSOs made by David and Rob show that it's not really necessary to have big antennas and run high power to make DX contacts on the 50MHz band. But of course you are limited by the propagation mode and there are only two that you can effectively use with a small system.

The first is Sp-E that is an annual summer phenomenon and the other mode is F2-layer propagation that occurs at the peak of the sun spot cycle. You'll have to wait until 2012 for F2 propagation to return but you can always rely on Sp-E that occurs on the 50MHz band between May and August every year.

Your Reports

Your reports show that there were 17 days during June with multi-hop propagation to stations situated in North and South America. These 50MHz openings though were very selective and it was more a case of listening to white noise before a DX signal popped up for a few minutes. It really depended on where you were located as it appeared that stations in the extreme south and north of the UK had the best of the propagation.

Two tremendous openings however, were of very long duration. From 1430UTC on June 27th right through to 0330UTC on June 28th and then a few hours later from 0830UTC on June 28th through to 1500UTC that afternoon. Signal strengths were very strong at times, as witnessed by the station of **M0BJL** who contacted CY0X (Sable Island) using only an 80m Windom antenna!

Just to whet readers' appetites some of the other 50MHz stations worked during June included those of FJ5DX and TO5E (St. Barthelemy), FM5AA (Martinique), FY1FL (French Guiana). Also logged were HI3TEJ (Dominican Republic), HK4SAN (Colombia), KP4EIT (Peurto Rico), OX3KQ (Greenland), PV2BU and PJ4NX (Netherlands Antilles), V44KAI (St. Kitts & Nevis), YV4DDK, YV4DYJ, YV5ESN, YY4ACU and YY5LI (Venezuela). In addition there were numerous Canadian and USA stations situated in EL, EM, EN, FM and FN locator fields.

The 70MHz Band

Although Sporadic-E propagation was relatively poor there were nevertheless a total of 21 days when the 70MHz band was open for DX contacts during June. The best period was at the end of the month with daily openings from June 21st – 30th to 13 of the European countries that have access to 70MHz.

The DX Cluster shows that contacts were made with stations in Croatia (9A), Czech Republic (OK), Denmark (OZ), Estonia (ES), Faroe Islands (OY) Germany (DI), Gibraltar (ZB), Italy (I), Luxembourg (LX), Portugal (CT), Sardinia (IS0), Sicily (IT9) and Slovenia

(S5). Some of the DX worked on 70MHz included the stations of DI2LP (JO71), DI2PM (JO30), ES1CW (KO29), IM0/IK2DUV (JM48), IQ0HL/0 (JN51), IT9/IV3YND (JM67), LX/PE1ITR/P (JO30), LX1FX (JN29), OY3JE (IP62), SV8CS (KM07) and ZB3B (IM76).

Alastair Campbell GM3NKG (Lanarkshire IO85) reports that conditions improved considerably during the last week of the month with June 26th, 27th and 30th being the days with peak activity. During these three days the most consistent path for GM3NKG was into Italy with a few short openings into the Czech Republic, Portugal, Luxembourg and Slovenia.

A total of 84 contacts were made during the month of which half were with Italian stations, so that's obviously a good path from Scotland. A contact with Sardinia (IS0) has so far eluded him although the station of IZ8DWF further away at 2440km has spotted Alastair with very good signal strength. On June 30 he made his first ever f.m. contact into Italy on 70.350MHz with the station of IZ5MAO/4 (JN54) at 1600km. Alastair is not aware whether this is a first from Scotland or even if it is a common occurrence. Anyway he did report that it was an enjoyable QSO with fully quieting reports both ways.

Cris Henderson GM4FAM (Rossshire IO77) uses a Yaesu FT-1000MP transceiver driving a Spectrum transverter into a modified Bremi amplifier that runs 80W output into a 6-element Yagi. He reports that Sp-E propagation was very poor during June as it seemed that most of the openings only made it as far as central England. However, Cris does mention that his best 70MHz contacts have been made with the stations of CT1JAD at 2288km, IZ8DWF 2599km and SV2DCD at 2644km.

I was active on the 70MHz band from my QTH (Herefordshire IO81) during June and made c.w. and s.s.b. contacts with stations in 9A, CT, I, IS, OK, SV and S5. Some of my more notable contacts included the stations of IZ8DWF (JM78) at 2112km, IG9/I2ADN (JM65 Africa!) at 2211km and SV2DCD (KN00) at 2253km. On June 17, when calling the station of IT9DLN (Sicily), I was heard by 9H1XT (Malta JM75) at 2260km. Unfortunately Maltese stations don't have access to the 70MHz band!

The 144MHz Band

Despite the relatively poor Sp-E conditions during much of June, a total of five openings did make it up as high as the 144MHz band. Interestingly, all of them occurred during the last week of the month on June 21st, 22nd, 25th, 26th and 28th and I'll now take a look at them in more detail.

The opening on June 21st was quite brief lasting for an 18 minute period between 1612-1630UTC, although at any one particular QTH the event was much shorter than this. For example, at the QTH of **Paul Pasquet G4RRA** (Devon IO80), the opening lasted no longer than three minutes. This was long enough however to contact the s.s.b. stations of EA8BPX (Canary Islands IL18) at 2698km and EA8BWY/P in the same locator square at 2683km. Other UK stations who heard EA8BPX included G6HIE (West Sussex IO90) at 2827km and G4EAT (Essex JO01) at 2953km.

On the following day, June 22nd, another Sp-E opening was reported although it could well have been a long duration meteor burst. At 1222UTC the station of EA5SR was heard calling CQ on 144.300MHz by **Tim Fern G4LOH** (Cornwall IO70). Signal strengths of 59 both ways were exchanged before the Spanish station faded into the noise.

In the late afternoon of June 25th the maximum usable frequency (MUF) rose briefly above 144MHz enabling s.s.b. contacts to be made with stations in Bulgaria (LZ) and Serbia (YT). The opening started around 1739UTC and lasted for 10 minutes before disappearing. Stations located in southern England and Wales reported making s.s.b. contacts with LZ1ZP (KN22), LZ2FO (KN13) and YT2T (KN13) at distances of around 2000km.

It's bad enough when there's so little Sp-E activity but the situation is made even worse when an opening occurs very early in the morning! This is what happened at 0615UTC on June 26th when an Sp-E opening to Hungary (HA) and Serbia (YU) was reported. The station of **Pista Nemethy** YT3I (Serbia KN05) mentions that between 0616-0620 UTC he contacted the s.s.b. stations of G0KPW (JO02), G4PCS (IO91), G4ZFJ (JO01), G6HKS (IO92) and DL8EBW, ON4ANH, ON7UC PA3BIY and PD0EBF.

The final 144MHz Sp-E opening of the month on June 28th was at a much more amenable time! During the morning there were several E-layer clouds that enabled contacts to be made from 1100UTC into the Canary Islands (EA8) and Portugal (CT).

In the afternoon – from around 1300UTC – an Sp-E opening to stations in Italy (I) was reported. The first Sp-E opening of the day to the Canary Islands (shown in the diagram **Fig. 1**) was slightly confusing insofar that the 144MHz band was also open to that location via tropospheric enhancement but only for stations situated in Cornwall.

The DX stations worked between 1104 -1140UTC were CT1EEB (IN50, CT1HZE (IM57), EA8BEX (IL27), EA8BPX (IL18) and EA8TX (IL18). The UK stations that were known to have made the 3000km trip to the Canary Islands included G0JJG (JO02), G0KPW (JO02), G4ZFJ (JO01), G7RAU (IO90), G4BWG (IO91) using a 3-element beam fixed south-east and G8IZY (IO91) who was using a 9-element Yagi and heard the station of EA8BPX for over 20-minutes. Another station to contact EA8BPX was M3XDD (JO02) who made the 3008 kilometre s.s.b. contact running just 7W output from a 144MHz transverter. Later in the afternoon between 1258-1322UTC the station of G4LOH (IO70) reported making s.s.b. contacts with I0JMH, I0YLI, IK0XIH, IW0FFK, I5XDI, IZ5EME, IZ8BAD, IZ8FAV and IZ8YFU (JM88) at 2122km.

The Deadlines

Sporadic-E openings on the 144MHz band are now over but you'll probably find openings on the 50MHz band right through to the end of August. Sp-E openings should also be observed on the 70MHz band until the end of the month but with far less frequency than those on the 50MHz band.

Although the Perseids meteor shower will have peaked on August 12th, the shower does last for some time with reduced activity right up to August 24th. There's also the Aurigids shower that created a tremendous amount of s.s.b. activity last year with 144MHz contacts being made for an hour into Croatia, Hungary, Italy, Romania, Serbia, Slovenia and Spain. This year the peak occurs on Sunday August 31st, so take a listen around 144.300MHz just in case. Please send me your DX reports or any other news to reach me before the last Saturday of the month. **73 David G4ASR**

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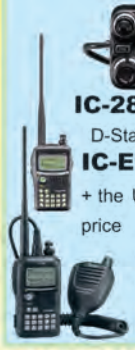

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While the Rev. George Dobbs G3RJV is moving house after his retirement, we're re-publishing some of 'classic' articles and the first is aimed at dispelling the 'Toroid Terrors'! Editor.

George G3RV writes: I was always fond of cylindrical coil formers with powdered iron cores. They are forgiving components in that a poorly wound coil can be brought to the desired inductance by using the adjustable core – often lovingly called 'slugs'.

Now, however, I am almost completely converted to using toroidal cores and this article describes some of their merits and how to grow to love them. So, you too may be 'converted'!

Main Advantages

There are two main advantages in using toroids. The first is the high *Q* available when using a small number of turns on a toroid. The second is the self-shielding property of toroidal cores. Their shape is such that a coil or transformer produces a very self-contained field. A screening can, or metal enclosure, is not required to keep the toroid's field to a confined area. This is very useful when dealing with modest or large radio frequency signals.

It's also possible to vary the inductance of a toroid inductor by opening or compressing the turns, remembering to leave a sufficient gap between the beginning and end of the winding.

Common Cores

The most common toroid cores used in Amateur Radio work are the Amidon cores made by Micrometals in the USA. These are broadly divided into ferrite and powdered iron cores. Powdered iron cores are used in applications that require high *'Q'* tuned circuits. These would include oscillators, r.f. filters, i.f. amplifiers, mixers and circuits that require frequency selection or rejection. Ferrite cores, on the other hand, are used for broadband inductors and transformers. These would include matching transformers, baluns and r.f. chokes.

Three Section Code

The Amidon cores use a three section code for identification (see **Table 1**). The first section is either 'FT', to show a ferrite core, or 'T' to show a powdered iron core.

The second section indicates the physical size of the core by describing the outer diameter of the core in hundredths of an inch. A 'T-50' core is a powdered iron core with an outer diameter of half an inch. So the first two parts of the code describe the core material and state its size.

The third part of the code refers to the electrical characteristics of the core. This describes the material mixture or the permeability of the core. Powdered iron cores have coloured paint on one side to show the material mix but ferrite cores are all black. Usually the average constructor normally relies on the given circuit or design for choosing the core material and the designer simply tells us what to use. The formulation of the core establishes the permeability, useful frequency range, the *Q* and the temperature coefficient for particular applications.

Winding Toroids

Winding toroid inductors is simple, albeit fiddly with the smaller sized cores. You only have to remember that **each time the wire passes through the centre hole it counts as one turn**.

The turns should be arranged neatly, side-by-side, with an aim to make the winding occupy about three-quarters of the core. Try to allow for a 30 to 45° gap between the beginning and ending of the winding (see **Fig. 1**). **Remember: a very small gap between the beginning and ending of the winding will result in unwanted added capacitance**.

The correct wire size is really that which will fill the core, leaving the appropriate gap between the beginning and ending of the winding.

Identifying Amidon cores				
FT	**-**	**37**	**-**	**43**
'FT' = Ferrite core 'T' = Powdered iron		Core size code '37' = 0.37in '50' = 0.50in etc.		Core material (permeability) Ferrite cores are all black, Powdered Iron are colour coded as below
Common Core materials are:				
Mix -2 Coded Red Mix -6 Coded Yellow Mix -7 Coded White The coding is formed by painting one side of the toroidal core only. Ferrite cores are commonly Mix 43 or Mix 61.				

Table 1: Explaining the 'three code' reference system.

Band (MHz)	Turns	Core type	C_{tune} (pF)
1.8	55t	T50-2	470
3.5	45	T50-2	200
7.0	36	T37-2	100
10.1	35	T37-6	68
14.0	30	T37-6	47
18.07	26	T37-6	39
21.0	24	T37-6	33
24.89	25	T37-6	22
28.0	24	T37.6	18

Table 3: Winding details for the h.f. bands.

Inductance values (μH) given by a 10-turn coil							
Mix Type	Colour	T37	T44	T50	T68	T80	Range (MHz)
-2	Red	0.40	0.52	0.49	0.57	0.55	1-7
-6	Yellow	0.30	0.42	0.40	0.47	0.45	7-
-7	White	0.32	0.46	0.43	0.52	0.50	4-8
-10	Black	0.25	0.33	0.31	0.32	0.32	14-25
These inductance figures are based on an evenly wound single layer winding covering 75% of the core circumference. But the equations rarely gives a complete number of turns and the answer should be rounded up or down accordingly.							

Table 2: Values of inductance given by a 10-turn coil.

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Fig. 1: Winding a toroid - spacing of the wire endings is important (see text).

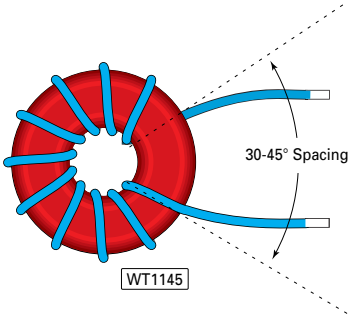
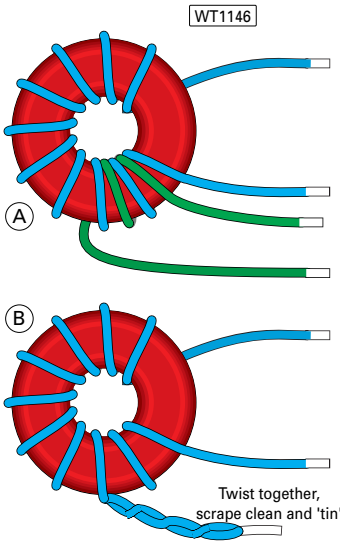


Fig. 2 a and b: Adding tapping points and link windings (see text).



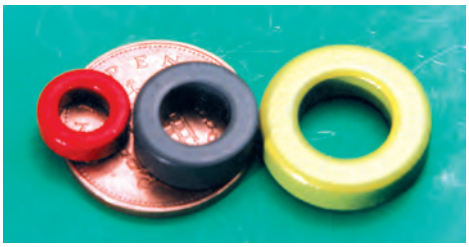
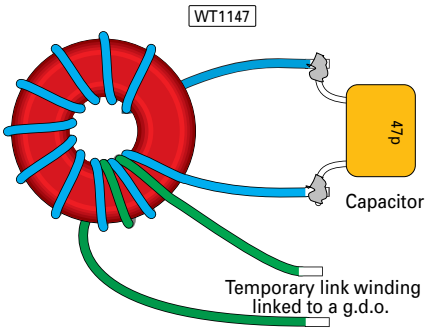


Fig. 3: The G3RJV method for checking the resonant frequency of a toroidal inductance using a dip meter (see text).



If some adjustment is required, it's an advantage to use a smaller gauge of wire. (This allows for some opening and closing of the spacing between the turns to produce a small inductance variation).

Threading the wire through the toroid's hole does mean having to unreel (or even cut off) a length of wire prior to making the winding. Because of this it's helpful to know how much wire will be required to make the winding.

My method for estimating what's required is to make (say) five turns on the core and then unwind them and measure the length. From the total number of turns required, it's then possible to calculate what length of wire is required for the full winding.

Since the windings will usually be made using enamelled copper wire, I suggest you leave at least 20mm at each end to scrape off the enamel and tin the copper wire.

In practice, it's easy to make link windings and tapped winding on a toroid (see **Fig. 2, a and b**). The link winding can either occupy the same area as the main winding or it can be close wound at one end of the main winding.

In either method, the link turns are added **over the main winding**. My preferred method for making a tapped winding is to wind on the turns until the tapping point is reached and then pull out a loop (say about 10mm in diameter) and twist it to hold it in place. Then I complete the rest of the winding.

The loop is then twisted a little more tightly, the enamel is scraped from the wire of the loop and the bare copper is tinned with a hot soldering iron. Make sure you allow solder to run between both twisted wires so they become (electrically) a single wire.

Measuring Resonant Frequency

It's possible to set about measuring the resonant frequency of a tuned circuit using a toroid inductor with a dip meter. Usually dip meters are aligned with the field of a conventional coil to obtain the dip at the resonant frequency.

However, because of the very restricted field around a toroidal inductor the usual dip meter technique is not possible. Instead the easiest way is to make an external link winding to fit over the dip meter coil (two or three turns is enough).

The external link is connected to another link winding, of one, two or three turns, wound through the toroidal winding (see **Fig. 3**). You should use the least number of turns required to ensure a clear dip of the meter needle.

Easy To Calculate

One of the blessings of the toroidal inductor using Amidon cores is that it's very easy to calculate the number of turns required for a particular inductance. **Table 2** shows how to work out the number of turns for a given inductance over a range of Amidon powdered iron cores.

All you need to use it is to know the required inductance, a value called L_{10} (inductance for 10 turns) for the chosen core and a few button pushes on a pocket calculator. Just follow through the stages in Table 2 to obtain the required number of turns - try it and see!.

I hope this short article helps to demystify the winding of inductors on toroid cores. To further help you on your way, **Table 3** gives a set of windings to 'hit' the h.f. Amateur bands using toroids. Maybe you'll also be converted now? ●

Colin Redwood's

what next?

Colin Redwood G6MXL discusses antennas, erecting them and getting the feeder indoors and into to the station.

Welcome to What Next? (*WN?*). This month I'm going to look at some practical considerations around erecting antennas and how to get the feeder indoors from outside. I'm going to focus on h.f. wire antennas such as the 14MHz (20m) and 21MHz (15m) antennas that were featured in the July issue.

Please feel free to experiment and compromise! At my QTH for example, I have one end and the centre of my dipole supported at a reasonable height but the other leg drops down to about 2m off the ground.

When looking at installing one of the supports for an antenna on a house, for a simple installation, I found that screwing a reasonably substantial screw-eye into a soffit or similar, is hard to beat. To gain additional height, and thereby increasing low angle radiation, *WN?* readers might consider using a chimney to increase the height of their dipole, **Fig. 1**.

A galvanised cleat hook, **Fig. 2**, often sold in DIY stores for washing lines, is an ideal way to tie-off a halyard. I have mounted mine about 2.5m above the ground so that it can't be played with by children. I also make sure that I have plenty of rope on the halyard, so that I can replace a longer dipole with a shorter one for a higher band in the future.

Perishing Rope!

Speaking of the rope, it's amazing how quickly string will perish out of doors. Once it gets water-logged it's only a matter of a few months before it starts to rot. I therefore recommend that *WN?* readers invest in some suitable rope. A trip to a DIY store should provide something suitable.

I have seen several techniques used over the years to keep some tension on a wire antenna. A very simple arrangement using a number of plastic cable ties linked together, **Fig. 3**, works surprisingly well, although it will be necessary to replace the ties every few years as they become brittle and decay with UV from the sun.

Other techniques I've seen used included a bucket of water or a brick hung over a pulley, **Fig. 4**, in a similar manner to the way that high voltage overhead power lines are kept tight on railways. Railway 'span weights' are very heavy – sometimes weighing well over a tonne to keep the caternary and contact wires taught but we only need smaller weights!

The Editor, **Rob G3XFD**, mentioned to me that he used a metal bucket filled with sand to tension his long wire antenna for a number of years. However, if you use a plastic container to hold sand or something similar – be aware that some type of plastic are designed to 'break down' (they are bio-degradable) in the sun. The first signs of degradation – that are noticeable – are the fading of the container colours before the plastic actually starts to disintegrate.

Regular Maintenance

Whatever arrangements are adopted, it's a good idea to plan some on-going regular maintenance of an antenna system. Maintenance will include such things as checking all screws, nuts and bolts are really tight.

Any nuts and bolts that you might ever need to undo should have their threads greased. Not only will this make it easier to tighten them in the first place, it will minimise corroding and make it easier to undo in the future. However, if some bolts corrode (they will!) a good squirt of a rust remover such as WD40 or similar will usually help.

Coaxial Cable & Water

It's important that no water gets into coaxial cable feeder – if it does it will cause the copper to oxidise (go green in colour) and become quite brittle and eventually break. Furthermore, and I speak from personal experience, the water can actually make its way back (even 'up hill') to the shack – and up to the antenna! – through capillary action and get into a transceiver causing all sorts of expensive damage.

For a permanent installation a proper dipole centre will help prevent water getting in. Minimising the number of out-door connectors will also help as will the use of good quality pressure sleeve connectors and stretch-wrap several layers of self-amalgamating tape to all joints. Make sure the feeder does not rub against anything sharp.

Incidentally, although it's perhaps rather obvious advice because of our weather, I think it makes sense

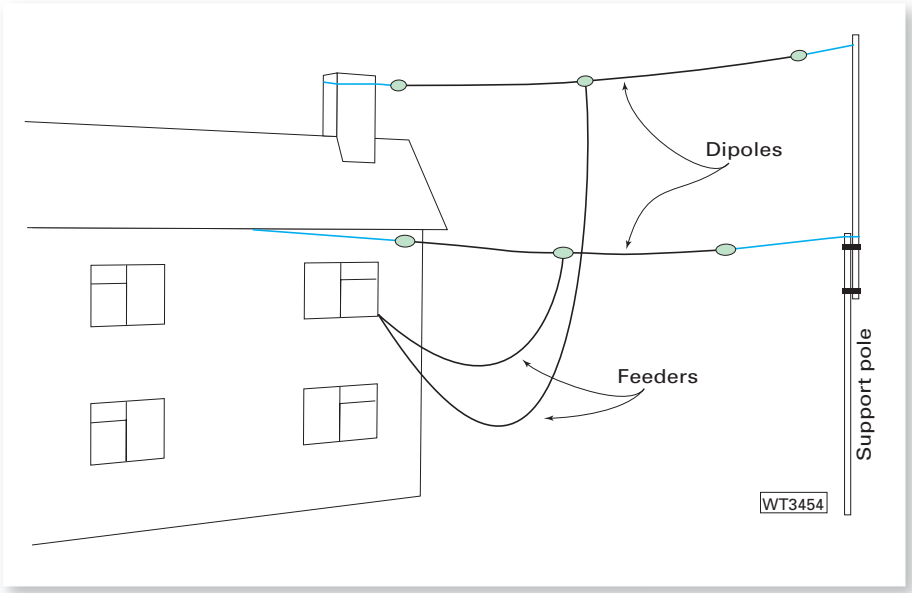


Fig. 1: Using a chimney, rather than the eaves of a roof, to mount the antenna.

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Fig. 2: A galvanised 'cleat' hook (used for washing lines) is an ideal way to tie-off the antenna halyards.

Fig. 3: Cable ties are very useful for use on antennas. They are tough and don't lose their strength quickly due to 'bleaching' due to the ultra-violet rays from the sun.

to try to carry out antenna work in the summer months. Not only is the chance of rain and winds less, but the higher temperatures make coaxial cable feeders a little more pliable than during the colder winter months. The longer daylight hours also enable the work to continue into the evening if necessary.

Getting Cables Indoors

Getting cables indoors is one practical aspect of feeders that rarely gets a mention, yet presents a real issue for many Radio Amateurs! How do get the feeder from an out-door antenna to a transceiver inside the house? As I know it can be a real problem I'm presenting a few ideas that have either used personally at G6MXL or have been seen in use by other Amateurs over the years.

For a temporary or even a semi-permanent arrangement, I have run a piece of string from the upstairs spare bedroom where the shack was located. I tied one end of the string around the feeder and the other end was tied around the window handle.

When I wanted to operate, I opened the window and pulled the string, which in turn pulled the feeder up to the spare bedroom. I then plugged the feeder into the transceiver or antenna tuning unit (a.t.u.) and got on and made some contacts. When I finished operating I just unplugged the feeder and lowered it to the ground outside on the string. This might be a very good arrangement for a temporary station when operating away from home. In the summer months, when it was okay to have windows open, I could have left the feeder connected permanently, but this really isn't satisfactory for the colder winter months.

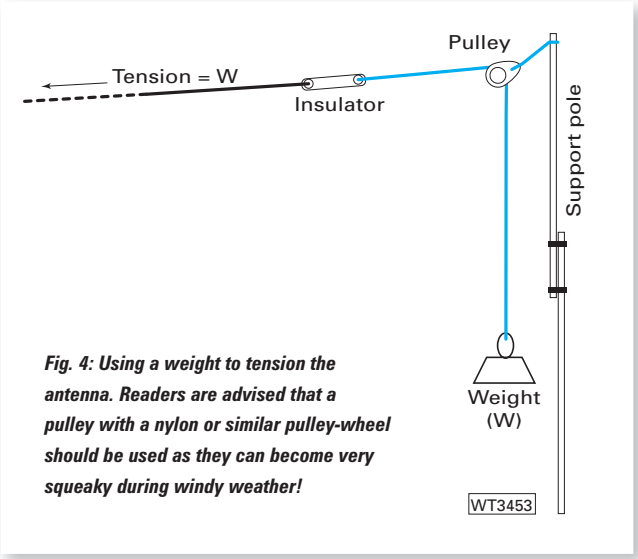

Fig. 4: Using a weight to tension the antenna. Readers are advised that a pulley with a nylon or similar pulley-wheel should be used as they can become very squeaky during windy weather!

For a longer term arrangement, most Radio Amateurs opt for drilling holes either through window frames or through walls and both are quite effective. Whichever you choose, make sure that you seal the area around the hole to prevent moisture getting into the hole and potentially causing damp problems to the fabric of the property. In addition, you should arrange the feeder in a manner that rain cannot run down the feeder into the hole. Typically this can be in the form of a small loop of the coaxial cable immediately below the hole, so that the rain drops off the cable, as – unlike the capillary action effect avaiable inside the cable – it cannot run 'up' to the hole entry point! (See **Fig. 5)** .

When making the loop or any other bend in coaxial cable feeder (such as a choke balun), remember that most feeders have a minimum bending radius. Generally speaking, the thicker the feeder the greater the coaxial cable bending radius. The RG58 type has a minimum bending radius of

Colin's waiting to hear from You!
I like to solve problems with anything to do with amateur radio! I can answer questions and publish my findings here for the benefit of all *PW* readers.

Remember the mains supply is potentially lethal. Unless you really know what you are doing, always pull the mains plug out, do not just switch off at the wall socket, when working on equipment.

20mm, while the popular UR67 has a minimum bending radius of 120mm. Whereas Westflex 103 has a minimum bending radius of 55m. As a rough rule of thumb, assume a minimum bending radius of at least ten times the diameter of the outer of the coax. If in doubt consult the manufacturer's literature.

Cable Clips

Traditional cable clips are an ideal way to fasten coaxial cable feeder to a wall. Be sure to buy the right size of cable clip for the coaxial cable you're using and be careful not to pinch the feeder as you hammer the nail into the wall!

Remember also that the impedance of the feeder is related to the ratio of diameters of the inner and the outer conductors. If you pinch the cable you'll alter the diameter of the outer (screen) conductor and hence the impedance of the cable at that point, risking setting up standing waves and reflections in the feeder. Cable ties and wraps can also be useful for several years until they succumb to the UV from the sun.

Everything I've suggested so far provides good arrangements for a single run of coaxial cable and are commonly adopted by the professionals when they install terrestrial and satellite television

Fig. 5: Forming a 'drip loop' with coaxial cable feed stops any water from tracking along the outside of a cable.

feeders in domestic situations. However, at a previous home, I wanted to have multiple feeders plus rotator control cable, plus a direct current (d.c.) supply to remote transverters and pre-amplifiers. I really didn't want to drill six or eight separate holes in the wall or window frame. Instead I made one large hole in the brick wall, and used a flexible hose – such as those used on washing machine outlets – to go through the wall. **Fig. 6**.

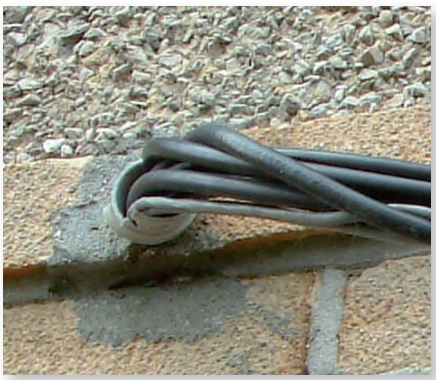

Fig. 6: Using a flexi-hose to route a number of cables through a wall.

Another way of getting feeder into the house is through the soffits or eaves of the house roof. Fortunately for us, quite often it's possible to route the feeder up between the gutter and the roof tiles. The feeder can then be run through the loft or attic space and drop down through a small hole in the ceiling into the top floor shack.

Whatever you are doing with antennas, please remember to carry out your work safely. You should certainly have someone else to hold any ladders you are using. Have a read through the safety sections of the Foundation, Intermediate and Advanced Licence courses – we certainly don't want to lose any *WN?* readers!

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Feature

Making RF Power Measurements

It's often useful to know how much radio frequency (r.f.) power is being generated – either by an existing transmitter or by circuits under development. The power in the load is given by P = V x I, where V is the voltage across the load and I is the in-phase component of the current.

Radio amateurs normally think in terms of power in a 50Ω resistive load. If the load is not resistive, or it's not 50Ω, then it's usual to think in terms of forward and reflected power.

Power & Frequency Ranges

In Amateur Radio the typical power ranges are about 100mW to 100W. The frequency range is typically 1.8 to 30 MHz for the high frequency (h.f.) bands plus the various very high frequency (v.h.f.) and ultra high frequency (u.h.f.) bands.

Unfortunately, the wide range of frequencies means that there's no direct cost-effective equivalent to the cheap digital multi-meter (DMM), which can be bought from the usual suppliers for less than £10. This means that specialist gear has to be made or purchased – although there's a neat trick direct current (d.c.) substitution, where the cheap DMM can be used as part of a power meter working at r.f.

Making measurements at r.f. leads to some special problems. The wide frequency range means that any unwanted variation of sensitivity with frequency degrades the accuracy and stray capacitance is a problem. Components have to be small compared with the wavelength in most cases and so on. If we can manage to make a sensitive detector then it's easily destroyed by excessive power!

Unfortunately, the Radio Amateur has some additional problems! This is because most

Amateur rigs will only give the specified power into a well-matched 50Ω load and may have limited – or no provision – for controlling the r.f. power output, e.g. some frequency modulated (f.m.) transmitters. On top of this, some rigs aren't rated for continuous operation, so any power measurement method requiring operation for an extended measurement process is probably impractical.

The problems I've mentioned may be balanced by another issue – it's relatively easy to make a well matched 50Ω low power load (say up to 10W continuous) with readily available parts, although to make a load capable of absorbing even 100W for any length of time (whilst staying at 50Ω) is a challenge! Thus a rapid response method is favoured on two counts – rig lifetime and load lifetime.

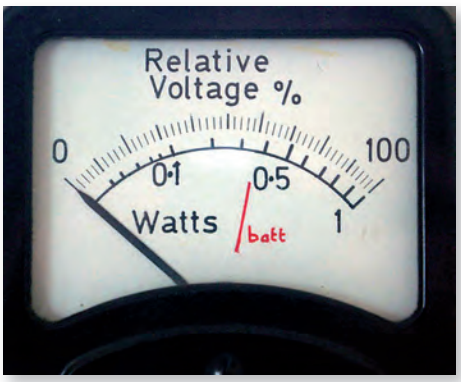


Fig. 3: An r.f. voltmeter with power scale.

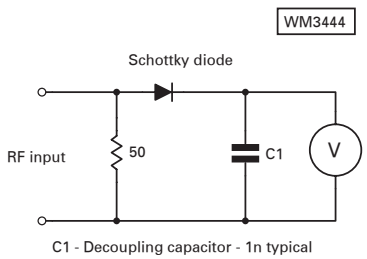


Fig. 1: Measuring power with an r.f. voltmeter.

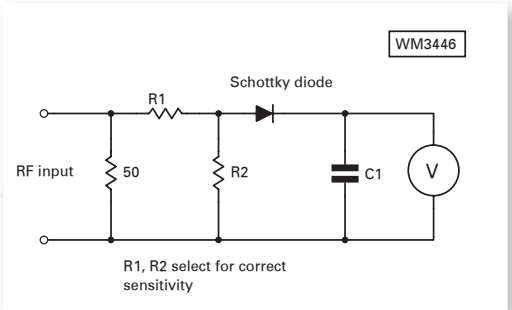
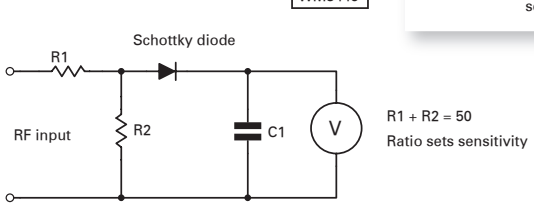


Fig. 2: Dealing with high powers.



Other Problems!

There are some other problems that, we in the hobby may meet with r.f. measurements! For example, if we want more sensitivity from a detector, it's tempting to add a d.c. amplifier based on a cheap op-amp.

However, we must be aware that it's important to be very careful over screening and de-coupling, otherwise the op-

Colin McEwen G3VKQ discusses measuring radio frequency power on Amateur Radio frequencies and at the commonly used power levels.

Table 1

Power	Volts (r.m.s.)	Amps (r.m.s.).
100W	70.7 V	1.414 A
10W	22.4 V	447 mA
1W	7.07 V	141.4 mA
100mW	2.24 V	44.8 mA

Note that since $P = V^2/R$ then the relationship between voltage and power is a square law. Increasing the voltage by 10 times increases the power by a factor 100.

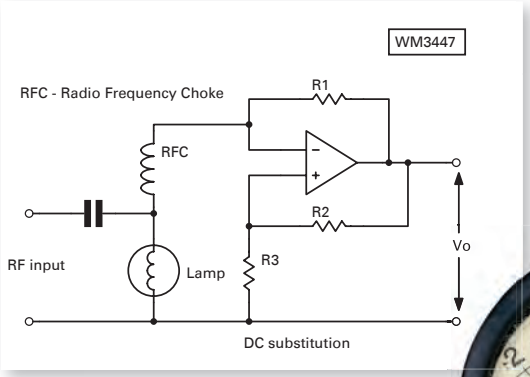
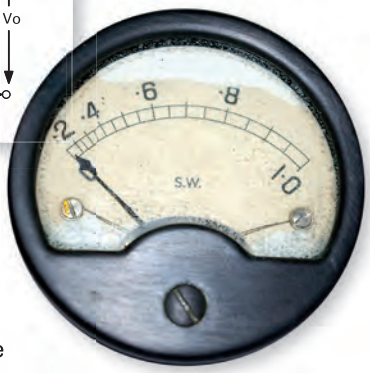


Fig. 5. The d.c. substitution method.

Fig. 4: An r.f. ammeter showing square law scale.



amp may have significant r.f. applied to its inputs and additional rectification may occur. This gives strange results and they can be very difficult to track down.

Just to make matters worse, if we add lots of capacitance between the op-amp input(s) and ground, it can create a low-frequency instability which again gives bizarre results. The only good thing about this particular problem is that if an oscilloscope is available it will be obvious (rail-to-rail signals in my experience).

There are other areas where a power measurement may be true but misleading. If your rig does not have a suitable output filter, there may be significant harmonic power present and a broadband power meter will correctly (but not necessarily usefully) give you the total power present.

The harmonics problem is probably more of an issue when using directional couplers to measure forward and reverse power in an antenna feeder. This is because many antennas are not designed to present a good match at harmonic frequencies and hence the reverse power reading can be significantly affected by the harmonic power reflected.

Power Detectors

A Radio Amateur is normally interested in power in a 50Ω load. The power can be found by measuring the voltage across a 50Ω, or the current through the load, and working out the power. Alternatively, find a d.c. power which has the same heating effect as the unknown r.f. power – this is known as d.c. substitution.

It's useful to get an idea of the voltages and currents concerned, to understand the size of the problem. **Table 1** shows the voltages and currents corresponding to a power range of 100mW to 100W in a 50Ω system.

Measuring The Voltage

The classic r.f. voltmeter circuit is shown in **Fig. 1**. At the low-power end a Schottky small signal diode can be used for good r.f. performance over a wide range of frequencies (I'll come to calibration later).

Readers will probably recognise this as a peak rectifier – if the current drawn by the meter is small then the capacitor will charge up to the positive peak r.f. voltage. On the negative half-cycle, the diode has to withstand the sum of the positive peak voltage and the input negative peak voltage – this is referred to as the peak inverse voltage (PIV).

However, it's not really practical to cover the high-power end by direct voltage measurement. This is because the PIV rating of typical r.f. Schottky diodes is only about 30 V and at 100W the PIV will be $2\sqrt{2}x70=200V$ (!).

The usual dodge is to reduce sensitivity by feeding the diode either from a tap or a potential divider, as shown in **Figs. 2a** and **2 b**. In theory there's no difference between the method of 2a or 2b – both are potential dividers.

However, the difference between the two types is actually the number of high power resistors required and their values. At higher powers the approach of Fig. 2a may be more convenient because this shares the task of power absorption between two high-power resistors instead of just one.

Often, the r.f. power meters using the voltmeter approach normally add a power scale to the voltmeter, as shown in **Fig. 3** (page 56). Note the square law scale — expanded at the low end and cramped at the high end.

Measuring The Current

Meter manufacturers used to make 'r.f. ammeters', which used a thermocouple. These were devices that generated current when heat is applied from the r.f. energy to measure true root mean square (RMS) current. These are now quite rare but have a very characteristic scale (square law) as shown in **Fig. 4**.

Typically the r.f. ammeters indicate around 1A full scale, which is 50W in a 50Ω system. They can still occasionally be found at rallies and club junk sales – but beware of blown thermocouples!

When buying meters at rallies, it's a good idea to take a simple battery/bulb tester. A couple of alkaline AA cells and a torch bulb can easily generate a few 100mA, which should give a cheerful deflection on a 1A r.f. meter **if** the thermocouple is still good.

Also, it's wise to check that the meter on offer isn't a simple moving iron meter – as found on cheap battery chargers (typically with a 5A scale). If the body is gently rotated the needle will hardly move if a thermocouple (well-damped) but if it's a moving iron type the needle will swing around (under-damped). Finally, a look inside will help – if the vendor doesn't mind – but remember that the thermocouple is **very** fragile!

If a thermocouple meter isn't available, or lower power levels are used, then unfortunately it's not particularly easy to measure r.f. current with good linearity and wide frequency range. There are methods – based on toroidially wound current transformers – but the amount of work required to get a good result is about the same as making a directional coupler but without the directional feature.

Using DC Substitution

The d.c. substitution method is a neat trick. It works by finding a d.c. power that has the same heating effect as the r.f. power

being measured and then measuring the d.c. power (with our cheap DMM or whatever).

However, the method does require the ability to turn the r.f. source on and off when required – not difficult in Amateur Radio but it can be a problem for broadcast transmitters! It also requires a device whose properties change with temperature, such as a thermistor but fortunately it turns out that light bulbs can be made to work quite well.

The diagram, **Fig. 5**, shows the basic circuit. With no r.f. applied, the positive feedback applied to the non-inverting input increases the d.c. output (Vo). Since the lamp or thermistor is energised from the output via R1, its temperature (and thus resistance) rises until the bridge is balanced. If R1 = R2 = R3 = R then the lamp resistance must then equal R3 on the other side of the bridge.

The lamp voltage is half Vo and the lamp power is $Vo^2/4R$. The positive feedback is required to achieve the balance condition, the op-amp is working in the linear region and the circuit is not a Schmitt trigger.

With the r.f. applied the extra power in the lamp unbalances the bridge. The op-amp action reduces the d.c. drive until the lamp resistance is again equal to R3 and the bridge is balanced. (Call the new d.c. output V1). The total lamp power must be the same but the d.c. power is now $V1^2/4R$. So, the **reduction** in d.c. lamp power must be the **r.f. power**. **Note:** With this technique we need to make sure that the r.f. power can never be more than the original d.c. power to the lamp, otherwise the bridge cannot balance.

The r.f. choke (r.f.c.) serves to confine the r.f. power to the lamp and also helps avoid large r.f. signals being applied to the op-amp input. In practice, other design details would be needed to ensure correct start-up d.c. conditions and get good results.

Incidentally, a cycle dynamo rear lamp bulb (6V 100mA)) would be 60Ω at full brilliance, so it can be made to match to 50Ω by being under-run. This would give a design whose maximum power-handling would be 600mW.

Absorption & Sampling Methods

Let's now suppose we have a source – a rig, or something under construction – and it's necessary to check how much power is coming out. To do the test we could feed all of the power into the power meter, or take a sample and allow the rest to go to the following stage / load/antenna/, etc. But what are the advantages and disadvantages of the two methods?

1: The absorption method. If we absorb all of the power into the meter then we are measuring the power available – less uncertainty.

Similarly, if sensitivity is a problem then absorbing all of the power into the meter makes best use of the detector sensitivity. Typically this applies when working below 100mW or at the 1.8 MHz end of the h.f bands or worse still – both!

Note that if the meter is slow to respond then a simple un-calibrated 'peaking meter' can be very useful for setting up the rig. This can be a simple diode detector feeding an indicator of some kind – meter, light emitting diodes (l.e.d.s) – so that it can easily be tuned for maximum output.

However, if all the power is absorbed by the meter then there's nothing left for the following stage. This means that the method isn't suitable for in-line measurements nor for antenna matching.

At higher powers there's a problem in where we put the power – 1kW would boil 250g of water in just over a minute – and even at the 100W level there are problems! Incidentally I don't recommend light bulbs as loads, except in the special case of d.c. substitution, since the impedance will vary rapidly with power level.

Despite the difficulties, it's possible divide the power dissipation problem into smaller chunks by building a set of high-power 3dB attenuators and cascade these until the power down to a more reasonable power level. Since 3dB corresponds to half the power, then each of these attenuators must be capable of dissipating half the expected power output.

Don't forget that for a fully matched design the input resistors will get hotter than the output resistors. So make sure that the high power connection is to the high power side of the unit.

Sampling Methods

Number **2:** The sampling method. Sampling requires some kind of coupler to generate a sample proportional to the line voltage (or possibly the line current). The coupler can either be directional – so we can measure forward and reverse power or use it as non-directional.

Non-directional couplers are very easy to get working, especially if accurate calibration is not required. Thus, this approach is very good for simple 'tune for maximum' indicators.

Directional couplers can determine how well matched the load is to the transmission line, as shown by many standing wave ratio (s.w.r.) meter. These are normally are based on some kind of directional coupler.

Making a good broadband flat frequency response directional coupler **is** difficult! Yes – there **are** good designs available for the h.f. bands, based on toroids, but for the v.h.f. bands it is difficult to cover more than one band accurately with a single device at low cost.

Sensitivity can be a problem, since only part of the power is coupled to the detector. Perhaps surprisingly, this can be a problem with well-matched loads where there may be very little reflected power to measure. This must be the only time where having an antenna with a poor match could be seen as a good thing!

Calibrating The Meter

The easiest way to calibrate a new home-brew power meter is to compare against another meter. Some r.f. designs cover down to d.c. or mains frequency a.c., in which case a cheap DMM can help.

If a suitable meter isn't available, it'll be necessary to compare the chosen design against another r.f. meter which usually means borrowing one – ask at your local club. Don't be surprised if the owner would prefer to help you with your tests – it's very easy to destroy an r.f. power meter with too much input!

There's no need to agonise over accuracy – unlike domestic electricity meters we're not trying to justify a power bill and for most Amateur applications ±10% accuracy would be fine. Repeatability (stability of calibration) is far more important – we'll want to know that the changes made to the rig really did increase the power, as opposed to erratic calibration of the meter. Fortunately repeatability is easy to achieve with most designs (I've already commented about need for good de-coupling to avoid erratic results).

In theory, the d.c. substitution method transfers the calibration problem to d.c. – where the DMM is the solution. Even budget-priced DMMs are capable of around 1% accuracy. I've covered the basics of the usual methods in this article. So, there we are r.f. power measurement on a budget! Do let *PW* and me know if you think I have missed out your favourite technique! ●

Harry Leeming's

in the shop

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Heysham
Morecambe LA3 2PQ
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Harry Leeming G3LLL concentrates on older equipment. This month he mentions driver valves and Vicars!

Around the early 1970s the Japanese made a real push into the world-wide Amateur Radio equipment market and started offering equipment that was extremely competitive in price. They were able to cut costs by making use of standard radio and television valves and components.

The components were already being manufactured in millions, for use in Japan's assault on the domestic World radio and TV market. This was fine when the components were used at frequencies and power levels for which they were intended but it can causes problems when it was necessary to replace items that were used for purposes that the designers had not envisaged!

I have mentioned previously the difficulties that can occur when a line output valve is used as a power amplifier valve – but this is by no means the only problem. The driver stage in almost all Amateur transmitters doesn't use a 'driver valve' – instead it uses one that was intended to operate as a video amplifier in a TV set!

In TV receivers the valve only had to handle frequencies up to about 5MHz – but more importantly when it was used as a broadband video amplifier, the internal inter-electrode capacity didn't matter very much as the stage did not incorporate any tuned circuits. Because of this, manufacturers didn't standardise the anode to grid capacity with valves such as the 12BY7A and the 6GK6. Hence, valves from different manufacturers, that are meant to be direct replacements, might, or might not, operate satisfactory in an Amateur transmitter (bear this in mind with replacements!).

A Good Example

A good example of the possible problems with valves, occurs is in the FT401– the driver circuit of which is shown in **Fig 1**. Due to the relatively high internal capacity of the 6GK6, the valve needs neutralising and this is achieved by C81. However, it should be noted that this component is marked on the circuit with a star and this signifies that the actual value is selected **during the manufacturing process** and here lies the problem! When it comes to finding a replacement we need a valve that's identical to the one fitted when the rig was assembled. But how are we supposed to identify an identical valve?

If we were fortunate enough to have had the rig from new, we might know that the valve originally fitted to the rig was stamped 'Toshiba' or 'GE', but did they actually make it?

Some 30 odd years ago, 'Holding's Photo Audio Centre', as we were known then, was appointed as the Blackburn agent for 'Fisher' hi-fi equipment. Fisher only supplied their equipment to dealers who could carry out their own repairs and as part of the deal they supplied a set of spare parts for every new model we took in stock. Stereo radio had only then just become available (nation-wide) recently in the UK and stereo tuners made here tended to be old mono designs with a stereo decoder tagged on.

As stereo radio demands a much higher signal-to-noise ratio frequency modulation (f.m.) mono transmission, the performance of many units just wasn't good enough for use in poor reception areas. The big selling point with the American Fisher equipment was that they were designed for stereo reception from the word go, with a highly sensitive front end and quite a complex stereo decoder. Some of the valves used in these units had numbers on them that I never heard of! One day I showed a valve from my spares kit to a Mullard technician who was a friend of one of our engineers and asked him if he had ever seen anything like it?

The valve was stamped 'Fisher USA'. However, the technician wasn't interested in what was written on the side of the valve but turned it over and squinted at some tiny markings underneath. He then burst out laughing, gave me the British equivalent number and also the date that it had been made on the production line in the Mullard factory less than two miles away from my shop!

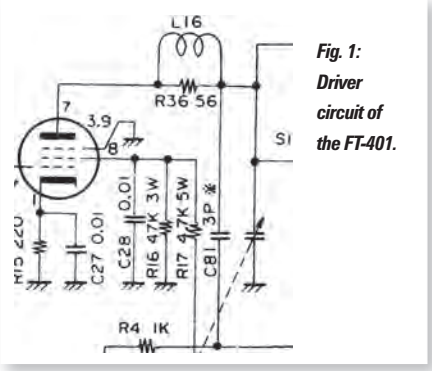

Fig. 1: Driver circuit of the FT-401.

If – dear reader – you have a careful look at the electrode system of two identical valves of the 'same' manufacturer, you'll sometimes find that they look very different! Conversely the inside of two valves from 'different' manufacturers may be identical. The reason for this is that a lot of inter-buying and re-stamping went on between valve manufacturers and unless we're experts, we really do not know who made what!

If in doubt, I suggest that you look carefully at the electrode system, and if two valves look the same, the electrode systems **at least** probably came out of the same factory, although they may have been 'bottled' and the air evacuated (to produce the vacuum) out anywhere in the World!

Replacing The GK6/12BY7A?

Having – perhaps – now completely confused my readers, I now ask you all, "how do you go about replacing a 6GK6, or a 12BY7A?" The answer easy – if you know what type of valve Yaesu fitted originally! I advise anyone in the position to first try and get one of the same make that looks internally like the original – then fit it – and see what happens.

If the neutralising isn't correct, you'll either find that the driver stage bursts into oscillation when you try to align it, or that the grid tuned circuit of the driver valve (also in circuit on receive) peaks up when you try to align it at a different points on receive and transmit.

You can then of course try a multitude of different values of capacitor in place of C81 until you find one that gives correct neutralisation – but this is making rather hard work of the job. The simplest approach is to take two short pieces of stiff insulated wire, twist them together for about a couple of inches, as per **Fig 2**, and use the resultant 'gimmick capacitor' to replace the neutralising capacitor, (C81 in the case of the FT-401). Twist and untwist it by trial and error to adjust its value,

until the stage is stable and the alignment cores or capacitors peak at the same point on transmit and receive.

A Faulty SWR/Power Meter

"I bought this meter from you a few months ago and it has stopped working", was **Peter's** complaint. As business was quiet at the time I took the top off for a quick look and it was pretty obvious as to what was wrong as a track on the printed circuit board (p.c.b.) had fused.

Obviously, tracks don't just burn out without a reason and so I showed Peter the damage, asking him what had happened. "Nothing really, my FT-757 wouldn't work at all on receive or transmit as the negative wire had dropped off on the power supply but when I put it back the power meter would not work." A few more enquiries elicited the information that 'Peter' had the **SWR/Power** meter wired up as shown in **Fig. 3**, and hence had made two, possibly three errors.

The first error was that he had not fitted a fuse, 20 to 30A is a lot of power and any device that's powered from the main power supply should have a suitable fuse in the circuit. The second error was that he had connected the negative lead to the power meter. Having two negative connections on the same item is bad practice in electronics and can result in all sorts of troubles, as two leads going to the same item form a loop.

Any hi-fi enthusiast reading this will recognise the problem just mentioned as an 'earth loop', which can cause hum. Radio Amateurs associate it with radio frequency feedback. However, to power engineers it can spell danger and in this case it was the latter!

When the negative lead had dropped off his FT-757, the earth return was then completed via the 50Ω coaxial cable to his power meter and from there – via the power meter's p.c.b. track and negative lamp lead – to the power supply unit (p.s.u.).

Unfortunately for Peter, the thin copper track on the p.c.b. was certainly was not intended to pass the 20A that the rig pulled on transmit and so it had fused. Fortunately the power meter worked again, once I had bridged across the missing section of track. I politely enlightened 'Peter' as to what he'd done wrong and then sent him on his way.

His third mistake? Pretty little lights are not to be encouraged, why should an antenna tuning unit (a.t.u.), a power meter, or a computer for that matter, be festooned with lights unless it's intended

Fig. 2: A home-brewed 'gimmick' capacitor made from insulated and twisted wire.

for use in the dark? Any extra wiring provides a point for unwanted signals to leak in or out, and in the case of a powered lead, something else that can short circuit. My rule with all attachments, accessories and fancy lights is, 'If it's not needed – don't connect it'!

Some You Win

One of the reasons my wife **Brenda** and I closed Holding's Amateur Electronics and retired when we were only in our early 60s, was the constant worry about theft, violence and security. As things got gradually worse we found that we had to spend considerably more on insurance, security and alarms, to keep out the people we did not want in, than we could afford to spend on advertising to get them in!

Being dragged out of bed in the early hours every time someone tried to get into the shop, or a moth decided to settle on an alarm sensor, and then having to work the following day, didn't go down too well either with Brenda or myself!!

One day, two unlikely looking 'radio enthusiasts' arrived with a brand new sample of an upmarket multi-mode AOR receiver. They said it wouldn't work and asked me to repair it. They had obviously no idea as to what they had in their possession and seemed quite unlikely to be the rightful owners (as I was to own the title deeds to Windsor Castle!). So, to give myself time to think I pressed the shop's video camera's recorder button, booked the receiver in for repair and got an address and telephone number.

When my 'customers' had gone I telephoned my friend **Richard** at AOR and gave him the serial number. He, helpful as ever, let me have the 'phone number of the dealer who had purchased it. A quick call to them established that the receiver in question had been stolen a few weeks earlier from an exhibition at Manchester and that two characters looking like the two I had video-recorded were chief suspects.

So, I contacted Blackburn police, told them the story, asked them to collect the receiver and my videotape, and left them to sort them out. For once it was nice to be on the winning side!

Power Amplifier Modules

A few months ago, I mentioned that the **M57713** and other power amplifier (p.a.) modules, that are used in quite a few multi-mode 10W transceivers, such as the FT-480, can develop a fault in their internal bias network. This makes them become distorted and they cease to be suitable for amplifying single sideband (s.s.b.) transmissions.

As a result, I had some correspondence from users who had managed to strip these modules down and repair them.

I was also warned, however, that the modules, and many other v.h.f. and u.h.f. transistors and devices, can contain beryllium oxide. They should **never be dismantled**, as even slight traces of beryllium oxide – if inhaled – can be fatal. I was even told of an engineer who had dropped dead on the spot after trying to file some!

So, I'm sorry **Mr. Editor** – Rob Sir – although I know that you like *PW* writers to experiment, and that you have a very nice Vicar as an author (presumably also available for freelance funerals?) but you can be sure I shall not be trying this one at home! Cheerio until next month! ●

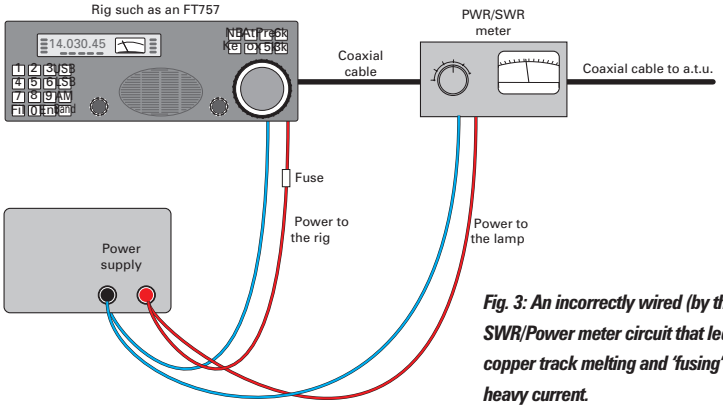

Fig. 3: An incorrectly wired (by the customer) SWR/Power meter circuit that led to the p.c.b. copper track melting and 'fusing' because of heavy current.

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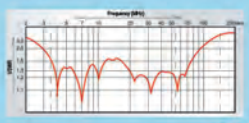

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Phil Cadman's

valve & vintage

Phil Cadman G4JCP continues chatting about those new-fangled transistors!

Hello and welcome to the new, 'high tech' Valve & Vintage 'shop' (*V&V*) – where this time I shall be continuing my look at those new-fangled three legged devices – transistors.

It seems my June column stirred a few memories. **Denis Speirs** from Arbroath, Angus in Scotland, wrote telling how he's recently constructed two transistor receivers, one of which was described in a book entitled *Making A Transistor Radio*. It was written by *PW* author the **Rev. George Dobbs G3RJV** (of *Carrying On The Practical Way fame!*). In fact, there's a web site on the Internet which has extracts from a Ladybird book (remember them?) which appears to describe this very set: **http://www.arar93.dsl.pipex.com/mds975/Content/trfradios02.html** Thank you for a lovely letter, Denis.

My thanks also go to **Richard Goldston** of **Southport**, who has written about OC71s and the OCP71 phototransistor. Like many enthusiasts, Richard believes that the OCP71 was really nothing more than an OC71. I think that's right, although clearly Mullard would have tested each transistor for optical sensitivity before painting and marking the transistor. Back in the days of germanium transistors, the OCP71 was a useful alternative to light dependent resistors such as the ORP12.

Finally, I received a very interesting E-mail (complete with picture) from **Alan Chin GI0XAC**. Alan tells me that when he was 12 years old and living in Kuala Lumpur in Malaysia, he built a transistor amplifier to amplify the output of a germanium diode radio set. A few years back, while on a visit to the family home, he came across the amplifier and subsequently brought it back to the UK. After reading my June column he retrieved the amplifier and decided to get it working again.

There was enough detail in the photograph for me to guess that it might be the **Mullard 6V, 200mW amplifier**. This amplifier, which used two OC71s and two OC72 transistors, was designed by Mullard to serve as an example of a low power transistor audio amplifier.

After checking the components against a copy of the circuit I E-mailed back to Alan, my guess was proved correct! Incidentally, there were two versions of this circuit: one for use on a 4.5V supply and one for a 6V supply. The circuit was also used as a prototype for many variations, one of which I shall come on to later (see **Fig. 3** if you can't wait).

Captain Graham's Circuit

I believe the first transistor project published in *PW* was a diode transistor receiver designed by a certain **Capt. Graham**, which appeared in the February 1955 issue - see **Fig. 1**. Unlike the receiver which appeared at the same time in *The Radio Constructor*, which used an OC51 point contact transistor (see Fig. 1 in the column for June 2008 issue or *PW*), Capt. Graham's design used an OC71 junction transistor.

Readers will remember that the OC70, OC71 and OC72 transistors had all been introduced by Mullard in 1954. Actually, Capt. Graham was really none other than prolific designer and author, **F. G. Rayer G3OGR**.

His little receiver was, in essence, an amplified 'crystal' set. The OC71 amplifying the weak output from the GD3 point contact diode so it could (supposedly) drive a loudspeaker. Given the supply was a mere 3V and the OC71's collector current was to be kept at 3mA or less, the set must have needed an incredibly sensitive loudspeaker!

It's perfectly possible to duplicate this set, although you'll have to wind your own coils. The GD3 diode is obsolete but most point contact diodes – such as the OA81, OA90, etc. – will work fine. And any small signal germanium transistor can be used in place of the OC71.

I suggest that we shouldn't bother with a loudspeaker. Instead, I'd rather use an LT700 transistor output transformer (still stocked by Maplin and other suppliers) and a pair of modern low impedance headphones.

The amplified crystal set approach was popular around this time, because it wasn't until 1956 that Mullard introduced the OC44 and OC45, which could operate effectively (in common emitter mode) at radio frequencies (r.f.). The OC44 was intended as a self oscillating mixer for use in medium and long wave radios, while a pair of OC45s provided the necessary intermediate frequency (i.f.) amplification. The final i.f. transformer fed a point contact diode, often an OA70. An OC71 driving a matched pair of OC72s, completed the line-up.

Annoyingly, for radio constructors on this side of the Atlantic, American

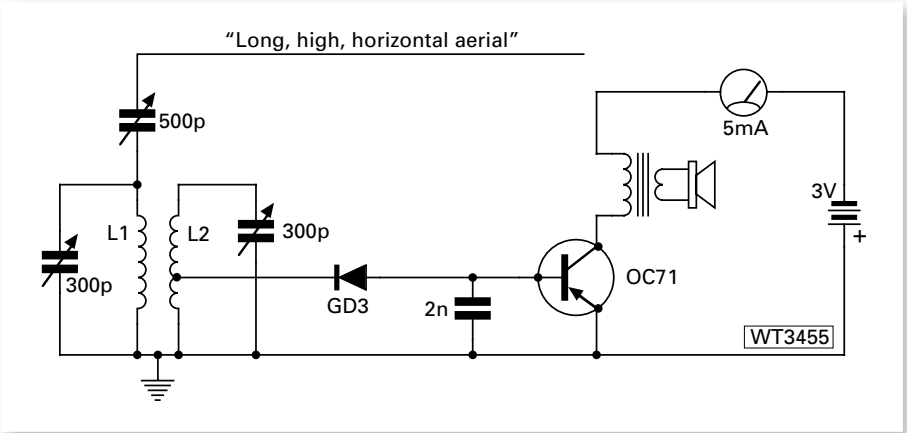

Fig. 1: The February 1955 issue of **PW** *contained a transistor circuit from R. F. Graham – otherwise known as F. G. Rayer G3OGR,*

Phil Cadman G4CJP
21 Scotts Green Close,
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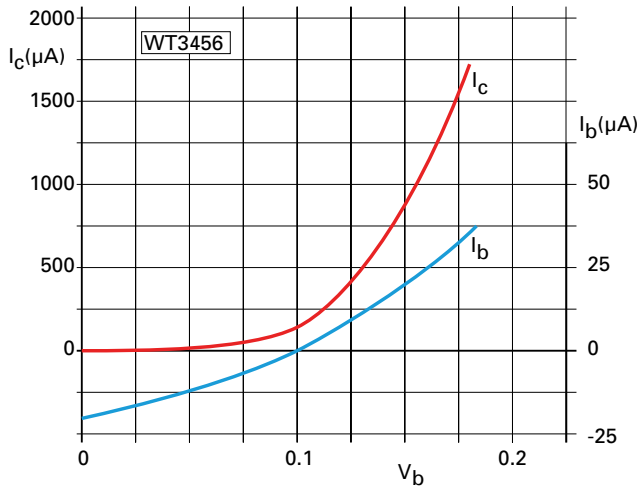

Fig. 2: A simplified graph showing collector current (Ic) and base current (Ib), plotted against base voltage (Vb), at a collector voltage of 2.6V. Note that at Ib=0 (equivalent to the base being open circuit), the collector current is around 140μA.

radio enthusiasts had access to r.f. transistors before 1956, as semiconductor development was significantly more advanced in the 'States' than in Europe.

Delicate & Sensitive

Early transistors quickly gained the reputation of being extremely delicate and sensitive to electrical misuse. They also didn't like heat. To be fair, if the manufacturer's instructions were strictly followed, they were fine.

However, unlike valves that could tolerate gross overloads for short periods of time, transistors would instantly 'pop' if their maximum ratings were even modestly exceeded. And they could also be damaged or destroyed by the application of too much heat during soldering.

Despite warnings that heat shunts are still a good idea, modern silicon transistors are often soldered with little regard for their safety. But generally, we use small soldering irons with pencil bits, which don't have a large thermal mass.

Looking back to 50 years ago, the average soldering iron was somewhat larger, as it had to cope with Octal valve bases and other physically large components. Additionally, I'll bet that some constructors of the time still used those huge copper soldering irons that were heated on the gas stove! No wonder transistors gained a reputation for not liking being soldered!

Another important point was the cost of transistors. In 1958, the retail price of an OC70 was 21 shillings (written as 21/-), or £1.05 in decimal currency. Just remember one shilling equals five new pence! An OC71 was 24/-, an OC72 was 30/-, an OC45 was 35/-, and an OC44 would have set us back two whole pounds Sterling!

Constructors more used to valves were not impressed. For the cost of one fragile OC70, they could buy a 6K7G, a 6SN7GT and a 6V6G; three octal valves which could form the basis of a respectable tuned radio frequency (t.r.f.) receiver.

If what I've already mentioned is not bad enough, remember the prices I've quoted are those from 1958. Looking at the increase in average earnings and in the UK Retail Price Index over the last 50 years, a conservative estimate for the increase in inflation since 1958 would be at least 15 times.

So a single OC70 would cost the equivalent of nearly £16 today – and it gets worse! An OC72 would cost over £22, and an OC44 a whopping £30. The 'six transistors plus diode' needed to make a respectable transistor radio (OC44, 2 x OC45, OA70, OC71 and 2 x OC72), would cost the equivalent of a staggering £150! Imagine how we would feel if we ruined a couple of transistors at the prices I've mentioned. No wonder enthusiasts sometimes gave up in disgust.

Built Today

Most circuits which use germanium transistors can still be built today. The transistors are readily available (at a price, so ask around first) often from dealers whose primary business is, ironically, supplying valves.

More problematic are contemporary r.f. coils, i.f. transformers and audio transformers. Readers will appreciate that the lower input and output impedances of transistors, meant that r.f. coils and i.f. transformers designed for valves produced unacceptable results when used with transistors.

However, once interest in transistors grew sufficiently, coil and transformer manufacturers produced components specifically for use in transistor circuits. It's these components which are likely to be difficult to obtain, but we can substitute modern alternatives from Toko and the like.

I've already mentioned that constructors should treat germanium transistors with the utmost care, and there's one other thing to be aware of – leakage. Modern silicon transistors have tiny collector-emitter (base open), and collector-base (emitter open) leakage currents. Only at very high temperatures and/or voltages do such currents become significant. However, with the base open circuit, the collector emitter leakage current of an OC71 can be tens of microamps (μA) and it's very dependant on temperature.

Testing Transistors

Interestingly, in the December 1955 issue of *PW*, F. G. Rayer – again writing under the name of **R. F. Graham** – penned an article about testing transistors. Of great interest to us is the actual data he obtained through measuring OC71 transistors.

The graph, **Fig. 2** shows collector current (Ic) and base current (Ib), plotted against base voltage (Vb), at a collector voltage of 2.6V. Note that at Ib=0 (equivalent to the base being open circuit), the collector current is around 140μA. That's why we may find some early transistor circuits in which there's no apparent forward bias on the base emitter junction; the signal on the base simply varies the leakage current.

Oh, before I get pounced on, the graph is meant to show only the **magnitude** of the voltages and currents. The 'negative' base current simply indicates that the current flowing in the base circuit is in the opposite direction to that which flows when the emitter base junction is forward biased. I hope that makes sense!

Blueprint To Help

Even in 1961, constructors – especially beginners – were still coming to terms with transistors. Ever eager to help, the November issue of *PW* included a blueprint, which described – in detail – the circuit and construction of a 200mW amplifier built on a 2 x 18-way miniature tag strip - see Fig. 3. Of course, today we'd use an integrated circuit like the LM386, and dismiss the circuit in Fig. 3 as far too complicated. But don't underestimate the importance of such amplifiers in the late 1950s and early 1960s.

In the 'old days', if a low power portable amplifier was needed, the only other choice was to use battery valves, which required both l.t. and (expensive) h.t. batteries. In contrast, the Mullard 200mW circuits needed just three or four low-cost 1.5V torch cells. Also, working in class-B, current drain was dependent on volume – not constant like in class A valved designs, which further saved on running costs.

So, although initially portable transistorised amplifiers cost more than equivalent valve amplifiers, they were much cheaper to run. And in case anyone is wondering, battery valves intended for class B working were available, but they never seemed to find much favour in the UK.

If readers feel tempted to build the *PW* amplifier, I don't see why an OC70 or OC71 can't be used in place of the V6/R2 input transistor. The only real problem will be is getting suitable transformers. An LT700 output transformer can be used for T2, but the output power will be reduced. The LT44 driver transformer (again, still available from Maplin and others) can replace T1, but the impedances are wrong and I don't know to what extent the mismatch will compromise performance.

The OC16

Around the same time as the OC44 and OC45 became available, Mullard introduced the OC16, a stud-mounted, low frequency power transistor. One of the first uses for these new high power transistors was in the output stages of car radios, which allowed manufacturers to finally dispense with vibrator power supplies. Initially, the r.f. and intermediate frequency (i.f.) stages still used valves, but ones which could operate from an h.t. of just 12V. (Regular readers may remember that I've covered these 12V h.t. valves in the past).

Hybrid receivers were only manufactured for a short while, as new r.f. transistors soon made it possible to have all solid-state car radios. At the dawn of the 'Swinging Sixties', still more and better r.f. transistors (like the OC170, etc.) became available and with the introduction of medium power audio transistors (remember the OC81?), mains powered, tabletop radios for use in the home, also became practicable.

Where valves still held sway in portable and mobile equipment, vibrators had completely given way to transistor inverters. The ability of the OC16 and its successors to switch lots of amps at relatively high speed, made it possible to use much smaller (and lighter!) transformers in d.c. to d.c. converters.

Indeed, the Private Mobile Radio (PMR) industry had very quickly gone over to using transistor inverters. My first transmitter – a decommissioned Pye v.h.f. *Ranger* – used a pair of NKT404 transistors to generate the h.t. for the valves. Later on, transistors would be used in the audio circuits too, including the modulator in amplitude modulated (a.m.) sets.

Finally, very high frequency (v.h.f.) transistors were introduced allowing manufacturers to market solid state v.h.f. Band II frequency modulated (f.m.) f.m. receivers. Transistor communications receivers also began to appear, although their performance at the time wasn't in the same class as a good valved communications receiver. However, their portability more than made up for any r.f. shortcomings, and with a few watts from a transistor transmitter, operating /P from just about anywhere became not only possible, but rather pleasurable!

Oh dear. I've run out of space and I've still not finished my look at early transistors – I shall have to 'tie the ribbons' next time. And I shall also be pondering a few thermionic 'what ifs' too! In the meantime, you can contact me either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21, Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.**

73 de G4JCP

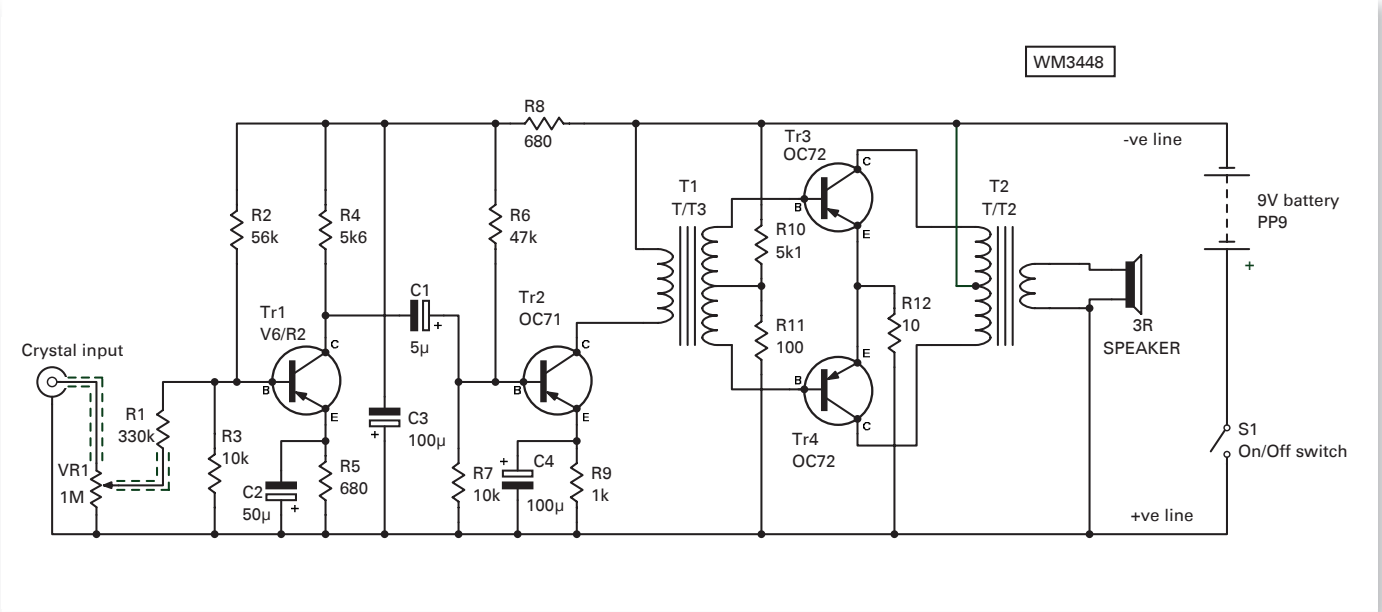

Fig. 3: The **PW** *'blueprint' (presented in the November 1961 magazine) transistorised amplifier.*

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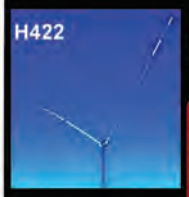

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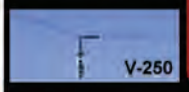

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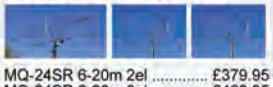

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Carl Mason's

hf highlights

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

I begin this month with news of a sequel to the Special Event Stations **GB4TWC** and **GB4JHF** activated in June and July last year by members of the **Royal Signals Amateur Radio Society** (RSARS). The calls **GB4LRG** (Long Range Desert Group) and **GB2ASS** (Air Support Signals) were run by **Dennis Egan GW4XKE, Peter Fletcher G0RGB**, **Tim Williams G4YVY**, **John Dixon M0BZG**, **Daniel Millan G0OZU** and short wave listener (s.w.l.) **David Vickers** between June 2nd and 8th 2008 and further activity was expected in July.

Once again the barracks of 21 Signal regiment based in Colerne, Wiltshire were used to set up the station that would eventually make well over 600 QSOs with amateurs in the UK and most of Europe plus America and Australia. The 3.5, 7 and 14MHz bands were the preferred bands as conditions allowed the group's 50m (132ft) doublet and small vertical to be used throughout the activity. Their colourful QSL card has some interesting information on it.

The Long Range Desert group was set up by **Major Ralph Bagnold** from the Royal Signals to reconnoitre behind enemy lines in North Africa. Its first operation began on September 15th 1940, just before the Italians invaded Egypt eight days later. The groups co-ordinated attacks on airfields and supply dumps, stalled

Michael G1HZJ sets up on the school playing fields during his lunchtime.

The GB4LRG/GB2ASS qsl card.

the invasion. Its success in these operations led to the formation of similar units elsewhere. At about the same time the Air Support Signals Units or ASSUs were also formed to co-ordinate attacks by light bombers in support of ground troops in many areas and they too were to prove highly successful and continue to be so to this day.

The DX News

On to this month's DX news now and to *PW* reader **Chris Vernon GM0TQJ**, who will be leaving his home in Kinloss on the North East coast of Scotland to travel to the Canadian province of Labrador. There he will be active as **VO2/GM0TQJ** from September 23rd to October 2nd. His equipment includes a Kenwood TS-480SAT and a Windom antenna. Chris says that RTTY, PSK31 and s.s.b. will be used at up to 100W on all bands from 3.5 to 28MHz. As Chris will be very close to the North Atlantic coast, he should have a good take-off to Europe. A QSL card can be obtained via the home call or direct to **3 Tedder Close, Kinloss, Morayshire IV36 3UT.**

French Radio Amateur **Laurent Rigal F8ATM** will be active as **6V7L** from Senegal in Western Africa, which borders the North Atlantic Ocean between Guinea-Bissau and Mauritania. Laurent plans to operate both s.s.b. and RTTY on all h.f. bands until the August 22nd and a QSL is good via the bureau or direct to **Colombier, 81140 castelnau de Montmiral, France**.

Special Callsigns

On behalf of the **Amateur Radio Society of India** (ARSI), **Prasad Rajagopal VU2PTT** was active in July's IARU HF World Championship using his special callsign **AT6T** as the HQ station. Prasad has permission to use this callsign until the end of September and will also participate in other contests on all the h.f. bands. His new QSL address is **PO Box 7523, Bangalore 560075, India** and he only handles cards for VU2PTT, AT0PTT, AT2PTT, VU2AQB and VU3FED.

The callsign **PI9NOZ/A** was used on June 27th by the **KPN Broadcast Services Amateur Radio Club** for a special event activity from the station at Zeewolde, Flevoland in central Holland. The Dutch KPN Broadcast Services discontinued its short wave transmissions from that site at the end of 2007 and the station will be totally dismantled later this year.

The group used 17 curtain antennas with 21dB gain and 2 omni directional antennas with 7dB gain to make their contacts on all bands from 7 to 24MHz.

Due to the nature of their working environments (building and maintaining national a.m./f.m./DAB/DVB-T and DVB-H broadcast networks) the club members often have access to rather exotic locations – including all kinds of masts and towers or even complete sites! A special QSL to mark the event is available through the bureau or direct to **Bernard Grijpstra PA3FZV** at **Zadelmaker 12, 3401 TN IJsselstein UT, The Netherlands** and more information is available at **www.pi6atv.com/pi9noz**

In France **TM0WPC** is the callsign being used until August 17th. It's on the air to mark the World Parachuting Championships of: formation, free style/skysurf and artistic skydiving and it will be held at Maubeuge-Elesmes or La Salmagne airfield between August 9th - 14th. We can expect activity to be on all the

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New contributor Jos van Gelder PA3ANF.

The operating position in the mobile 'shack' of Paul Morrison G0VHT.

One of the stations worked from Paul G0VHT's mobile shack.

h.f.bands using c.w., s.s.b. and digital modes. The QSL is via F5KEB.

Reader's Reports

Operating on 7MHz with a Yaesu FT-857D at 25W, using PSK31 with a home-brew 'Slinky' inverted 'V' dipole was **Steve Norman 2E0MVB** (M3MVB) in Newmarket, Suffolk. Steve's log shows contacts with DL3HXX (Germany) 1342, SG7BBO (Sweden) 1840, OK1DOZ (Czech Republic) 2154 and IW1GEE (Italy) at 2206UTC.

In East Finchley, North London **Martin Addison 2E0MCA** used his Yaesu FT-2000 with Heil headset and up to 50W output to his half-size G5RV working TM0G (France) EU-048 at 0816, 8S6KOS (Sweden) on EU-043 at 1234. This is a special callsign dedicated to IOTA expeditions from the Koster islands (North & South Koster) and the QSL manager is SM6WET. DM6KW (Germany). Then followed at 1708, OE2008R (Austria) 1917, and PA143ITU (Netherlands) 2018UTC. The callsign was a special call for World telecommunications Day which has been celebrated annually on May 17th since 1969, marking the founding of ITU and the signing of the first International Telegraph Convention in 1865. It was instituted by the Plenipotentiary Conference in Malaga-Torremolinos in 1973!

On the 10MHz band was **Ted Trowell G2HKU** on the Isle of Sheppy who used c.w. once again around 2100UTC to work EA9EU (Ceuta & Melilla), OJ0/OG3A (Market Reef) EU-053, CN8ARA (Morocco) and OH0/PA3ALK (Aland Island) EU-002 using his Ten Tec Omni V at 70W to a G5RV.

Also on the band was Steve 2E0MVB who worked UT4UZA (Ukraine) 0722, DL2HS (Germany) 1050, GI7OMY (Northern Ireland) EU-115 at 1022, OK2ZDL (Czech Republic) 1417and PJ2MI (Brazil) 2225UTC using PSK31.

The 14MHz Band

On to the 14MHz band and to the log of new reporter **Michael (Mick) Devine G1HZJ** in Seascale, Cumbria. Mick has recently decided to use his Yaesu FT-817 portable as he suffers from a lot of electrical noise from the freezers and chillers in a butchers shop next door and a nearby store. Mick works in a school near Gosforth and during his lunch breaks heads for the sports field not far from the A595 giving him a good view of Scafell Pike, a popular mountain climb in the English lake District.

Michael uses a Miracle Whip long wire, with one end supported by a nearby tree and the rig is powered by a Maplin 12V rechargeable battery, which usually lasts a few days. Using just 5W s.s.b. around 1200UTC HB92008EM (Luxemburg), IO1WWC (Italy), DL7UCW (Germany), ON4LJA (Belgium), OE2008C (Austria) were all worked. Two stations were heard, VE3AR (Canada) and JO7CVU (Japan) calling "CQ" but unfortunately conditions did not allow a contact.

Welcome also to **Jos van Gelder PA3ANF** who lives in Utrecht, Netherlands who found conditions on the band. "fairly good for most of the time" and had s.s.b. QSOs with E73ESP (Bosnia) 2015, V4/9H3TI (St Kitts & Nevis) NA-104 at 2125, PJ2LS (Netherlands Antilles) SA-006 at 2145, HC2GF (Ecuador) 2213. Jos also worked VK2GWK (Australia) OC-001 his in One Mile Beach, New South Wales at 2244UTC using a Yaesu FT-2000 and tri-band 2 -element beam for 14, 21 and 10MHz.

Working the band once again was **Martyn Medcalf M3VAM** in Chelmsford, Essex who lists CT9L (Madeira Island) AF-014 at 0932, CT1DIZ (Portugal) 0942, LY9Y (Lithuania) 0949, SX1L (Greece) in Athens at 1005 (QSL via DL1JCZ), K1ZM (USA) Jeffrey Briggs in Hopewell Junction, New York at 1458. Then came UW8I (Ukraine) 1507, EA5SKV (Spain) 1509, C4I (Cyprus) AS-004 at 1653, YT9X (Serbia) Radio Club 'Sevojno' at 1655 (QSL via YU1AAX). Finally, he reports AO8O (Canary Islands) AF-004 at 1907UTC using his Icom IC-746, SGC-237 auto tuner into a half-sized G5RV.

It has been a while since **Paul Morrison G0VHT** in Silverstone, Northamptonshire (yes, where the

Martyn Medcalf M3VAm received this colourful QSL card from Serbia for one of his contacts.

famous motor racing circuit is!) sent in a report. However, as he has recently converted to portable operating from his car and thought he would share his log showing just what can be done with a very simple set up.

Paul says, "both my brother **Keith M1VHT** and I have wasted untold hours and lots of cash we don't have, meddling with new and old rigs, antennas and all things Amateur Radio! I have previously tried and enjoyed the challenges of s.s.b. QRP operating as well as data modes such as RTTY and PSK but in recent months I have gone back to basics and now only operate 'stroke portable' from my car with the front seat doubling up as the shack. Some DX contacts occasionally find their way into my log book which is amazing as I rely on a simple home-brew antenna strapped to my roof bars.

It's this type of operating that makes our hobby so challenging but eminently enjoyable! Equipment wise, the 'shack' is fairly basic compared to other more elaborate stations but it is fully functional. I use a modified solid state amplifier to boost the r.f. output of my Yaesu FT-817 to around 100W p.e.p. and the home-brew 4m (13ft) tall helical antenna is very quick and easy to use. It weighs next to nothing and cost me exactly zero pence to build as all the parts were salvaged from old discarded antenna parts and or past projects. Setting up takes less than a minute from getting out of the car to calling 'CQ', which is not bad going for a thrown together station! It might not have all the 'bells and whistles' of a home shack but it's fantastic fun all the same."

Thanks Paul! Your station obviously works well as your log shows contacts with ET3SID (Ethiopia) 0620, WH6R (Hawaii) Eran Agmon in Honolulu OC-019 at 0715 and KH7DX Stuart Johnston who is also on the island in Kailua-Kona a little later at 0744. Around the same time Paul also worked SX24ELI (Greece) a special call celebrating 24 centuries after Alexander the Great's birth (QSL via SV2GWY) and EH5K (Spain).

In Greenford, Middlesex is **Steve Pursey M3SXA** – who is a keen digital operator – sent in a huge 14MHz log using BPSK31. Using an Icom IC-756Pro III, SGC Smart Tuner and TGM MQ-26SR 6-band hybrid cubical-quad antenna, Steve logged OE20008OIL (Austria) 0943, OK1AW (Czech republic) 0953, SP7NHS (Poland) 1022, DM5DL (Germany) 1036, IK6DGK (Italy) 1214, HA1BF (Hungary) 1251. Also worked were RK6DL (European Russia) 1301, 9A2UB (Croatia) 1310, 4Z5NF (Israel) 1326, EW6FW (Belarus) 1347, SM6CAL (Sweden) 1355, HB9CQV (Switzerland) 1409 and later SX24IMA (Greece) at 1812UTC.

Back in Kent Ted G2HKU used his Icom IC-703 at 5W c.w. to work CN2EH (Morocco), EA8AY (Canary Islands), YR1C (Romania), RK3AWR (European Russia and DA6J/P (Germany) around 2100.

Steve 2E0MVB used PSK to log, IZ2EXF (Italy) 1108, HB9CQV (Switzerland) 1317, UU4JC (Ukraine) 1759, DL3COB (Germany) 1602, EE3URR (Spain) 1616, OK1AW (Czech Republic) 1926, SX24PIE (Greece) 2139.

Martin 2E0MCA worked s.s.b. reaching 4Z4DX (Israel) 1632, 5X4X (Uganda) 1935, ZB2FX (Gibraltar) 2003, JY4CI (Jordan) 2008 and 5N8NDP (Nigeria) at 2013UTC.

The18 & 21MHz Bands

The 18MHz band provided Martin 2E0MCA with SM0OWX (Sweden) 1128 and T77C (San Marino) at 1950 while Steve M3SXA found US0KS (Ukraine) 0912, OM7OM (Slovak Republic) 0918, IZ5ILH (Italy) 1209, DG2PHE (Germany) 1610 and SP9UPV (Poland) 1624UTC once again using PSK31. Changing to 21MHz he worked DB3RJ (Germany) 1534, IW5ELL (Italy) 1542, RA9QBD (Asiatic Russia) 1543, ES3BR (Estonia) 1630UTC and RA3BL (European Russia) at 1713UTC.

The 24 & 28MHz Bands

Moving up to 24MHz Steve found IK3KSO (Italy) 1610 and DM2BPG (Germany) at 1628UTC using BPSK63 though band conditions were quite poor.

Finally, the 28MHz band found **Elgin Mackinlay M0ELG** in Kidderminster using a homebrew rotary dipole and just 3W QRP to log voice contacts with CT2IVH (Portugal) 1111, 9A2YM (Croatia) 1315, LY1TR (Lithuania) 1522. He also logged SM6AFA (Sweden) 1530, HA5AWT (Hungary) 1538, I5SDG (Italy) 1603, YU7GL (Serbia) 1606, OE2008A (Austria) 1650, S51K (Slovenia) 1652, F4ECJ (France) 1722 and EA1EVS (Spain) 1732UTC.

In the Netherlands Jos PA3ANF managed PJ2GT and PJ2LS Netherlands Antilles) using s.s.b. around 2115. Martin 2E0MCA found SP3FON (Poland) 1143, EI5IX (Ireland) 1429, OE2008A (Austria) 1432, UT5PW (Ukraine) 1458, DO1DEL/M (Germany) 1500, LY600W (Lithuania) celebrating the 600th anniversary of the city of Kaunas at 1522. Finally, he worked E77AA (Bosnia) at 1611 and Steve M3SXA logged DL6MDA (Germany) with PSK31 at 1558UTC.

Signing Off

That's it for this month and there has certainly been lots to fit in! It has been a good month for all our reporters who managed to work most of the h.f. bands using one mode or another. It's also very encouraging to see that simple stations, home-brew antennas and low powers work very well and can bring in some surprising results. Thanks to all those who sent in their reports and to **Mauro Pregliasco I1JQJ/KB2TJM** editor of the *425 DX Newsletter* for all the DX information. Until next time I wish you all good DX.

73, Carl GW0VSW.

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For your advert in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry.

BARGAIN BASEMENT RULES - £4 per advert

Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words f**or your contact details on the form provided and send -it together with the dated corner flash and your **payment of £4 (subscribers** can place their advert **free of charge** as long as they provide their **subs number and corner flash),** cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0845 803 1979**.

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

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.**

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

FT-817 ND VGC, complete with manual, box, tilt stand and soft case, £250 o.n.o. Miracle Ducker tuner, £40. Portable telescopic antenna, 6m-80m, £25 or £300 the lot.
Tel: John QTHR 01249 890674 (Nr. Chippenham).

FT-897D plus AT-897 tuner. Purchased November 2007, £550 o.n.o. Tel: Arthur G1KRU 01952 811026 (Telford).

ICOM IC-765 TRANSCEIVER c/w mic and manual. Icom IC-735 transceiver c.w mic, leads, (12 volt) and manual. Watson W-25AM PSU. Vectronics model VC300DLP ATU. BuxCom interface suitable for all Icom rigs with 8 pin ACC1 DIN socket at rear. SignaLink interface model SL-1+ for all Icom rigs with 8 pin ACC1 DIN socket at rear. Offers, buyer collects.
Tel: Ken 020 8455 8831 (London).

KENWOOD MC-50 MICROPHONE for TS-930, etc., £35. Bush 91, three-band valve radio, £25. Both in good condition. Tel: Colin 01634 250427 (Kent).

KENWOOD NARROW SSB filter. YK-88SN-1, unused, £40. Tel: 01698 888618 (South Lanarkshire).

MORSE KEY LORENZ ZTK-129 as used with 128 special forces set. Original lead and plug, £30. Midland 98 plus CB. Brand new, boxed with guarantee card, £65. Both plus post.
Tel: G Axford G4AQZ QTHR 01255 429117 (Clacton-on-Sea, Essex).

RECEIVER TYPE RA-17 MkII good working order, clean as new, £200. No cabinet – rack mounted, must collect.
Tel: 0121 453 3290 (Birmingham).

SG230 SMART TUNER as new 10-20 watts, £180. Tel: 01903 772563. E-mail: dennis@ellis3147.fsnet.co.uk

TEN METRE BASE AERIAL Antron 99 fibreglass with information sheet for use on 14-28MHz. Brand new, boxed, unused. Buyer to collect or arrange carriage. Will accept £50. Tel: G Axford G4AQZ QTHR 01255 429117 (Clacton-on-Sea, Essex).

TRIO TW-400A 2m/70cms FM 25 Watt mobile transceiver and mic 5 and 25kHz. No CTCSS operating or service manuals, £100 o.n.o. Trio TR-9500 70cms, all-mode 10 Watt mobile transceiver and mic. 25kHz and 100Hz steps. No CTCSS operating, or service manuals, £100 o.n.o. Philips PM-3217 50MHz oscilloscope, working, needs attention, £50 o.n.o. Microwave modules 432MHz transverter 144MHz IF around 10 Watts, £20. AKD 4001 FM 70MHz TX/RX. 5 and 25 Watts output with mic, £25. RN Electronics 70MHz converter, 28MHz, £10. Walford Electronics 80m QRP TX/RX kit. Partly built, £25. Buyer collects or pays carriage. Tel: Kim G6JXA 0781 273 5507 – phone or text 24hr answerphone. Talk-in available by arrangement only (Morden, Surrey).

VARIOUS MAGAZINES from 1961 to 1987 (not complete years) including *PT, EE, WW, ART, SWM* and *RA*. Send SASE or e-mail for full list. You can pick them up or I can send them at the appropriate postal rate. E-mail: wendy-michael@wmevans.wanadoo.co.uk

YAESU FT-101E transceiver. 160-28m, lovely condition, full O/P AM, SSB-CW. Easy to use. Trio 1000 communication 29 band SSB, AM-Nar/Wide, RF gain, green display, 240-12V longwire timer record clock. Tel: Roy Jowett 01282 86618 after 7pm (Colne, Lancs).

WANTED

BATTERY BOX for Yaesu hand-held FT-60E, Yaesu reference FBA-25A in working condition. This item is now discontinued by Yaesu. Any other accessories for the FT-60E? Contact G0TAK Roy Walker, Highgate Barn, Old Hutton, Kendal LA8 0LX.
E-mail: gotak@kencomp.net

CIRCUIT AND CONNECTION drawing for Yaesu FT-747GX transceiver. Tel: Pat G3OUC QTHR 01635 551159 (Berkshire).

CIRCUIT DIAGRAM Medresco hearing aids. Types OL15A (also known as Mark IIA) and OL35A(Mark IIIA). Contain 3 miniature valves. Tel: Godfrey G4GLM 020 8958 5113 or write 63 The Drive, Edgware, Middlesex HA8 8PS or E-mail: cgmm2@btinternet.com

DRAKE R-7 in need of repair, might suit but prefer working order. Tel: Mike 01603 503944 (Norwich).

EDDYSTONE EC-10 scrap, not working. As long as cabinet is rust free. Tel: E Cameron MM0BIX 01674 676740 (Angus).

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, in diameter and be six inches long or more. Will pay very good money for the rods. Tel: Peter Tankard 0114 2316321 between 9am and 9pm (Sheffield).

PANASONIC SHORTWAVE AM/FM/LW receiver model RF-3100L DR-31 in very good condition with box and instructions if possible. Tel: Richard 07515 448167 or E-mail: richard007@vodafone.net (Kent).

T1154 transmitter. Write: Mr F W Hall, 38 Elmbank Way, Hanwell, London W7 3DG.

VHF RECEIVER SCANNER DR-600 made by Swinburne Aviation early 1980s in good working order.
Tel: George 01443 437345 (Mid Glamorgan).

Any cheques sent must be made payable to PW Publishing Ltd

Bargain Basement order form

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PLEASE WRITE IN BLOCK CAPITALS

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Signature ..... Security number

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Switch issue number (if on card) .....

Start date of card ..... Expiry date of card .....

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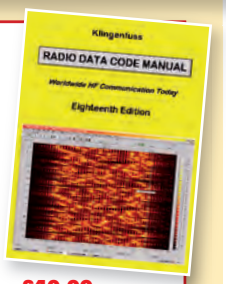
RADIO DATA CODE MANUAL

Worldwide HF Communication Today

The totally revised new edition has, again, more than 600 pages with 131 new graphics and screenshots.



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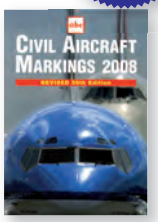

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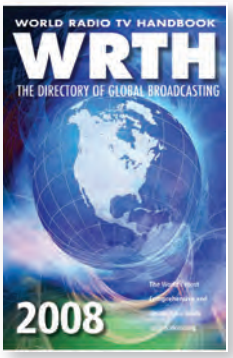

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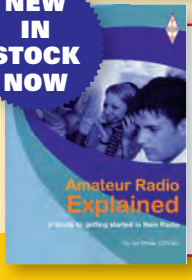

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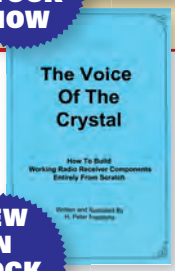
£14.95



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£4.99

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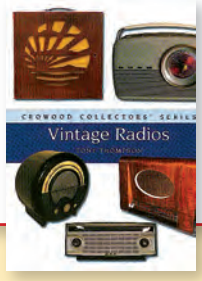

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Rob Mannion's

topical talk

Rob Mannion G3XFD discusses the letter from Colin Topping GM6HGW and his own airport security experiences.

Although it took some time for the Shannon Airport authorities to reply to my original letter, they eventually responded. The resulting correspondence can be read on this month's letters pages.

The reply from **Niall Maloney**, **Head of Operations & Services** at Shannon was perhaps predictable as I've had one or two little problems myself because – as Mr Maloney said in his letter – "unusual" items attract their attention.

The "unusual" category has often led to my palm-sized diabetic glucometer being checked for explosives because I've requested that it doesn't pass through the X-Ray machines at airports. I ask because I've had several of these units damaged by poorly adjusted X-Ray scanners as it's comparatively easy to have the liquid crystal display (l.c.d.) 'cooked' by a badly set-up screening unit. (Despite the claims by security staff that the X-Ray units are 'safe'!).

Nowadays, even though most airport security staff are under much pressure they will – if asked – allow my glucometer to be handled separately. And, of course, I always ask!

Flagged Up

In his letter Mr Maloney suggests that Amateur Radio equipment carried in hand baggage should be 'flagged up' to the security staff beforehand. I fully agree with this approach as it often works well and airport staff have been very understanding whenever I've been carrying a small hand-held rig.

However, there are exceptions as I've found to my own embarrassment. Belfast City Airport has an extremely rigid – and suspicious – approach to anything that looks like a portable radio transceiver, directly due to Northern Ireland's fairly recent and tragic history. So, my advice is to avoid problems and whenever possible pack equipment in luggage that will be carried in the aircraft's hold. Of course, it will then be X-Ray screened before its loaded on the aircraft.

Despite the fact that **Colin GM6HGW** often carries props for his magic act – even these usually pass through on inspection and no doubt cause amusement – especially as he's well known for giving impromptu conjuring demonstrations! Sometimes though, Colin has to be prepared to use all his natural charm – especially when his 'special effects' are involved!

Unfortunately however, I have personally witnessed occasions when even cursory screening has been been 'apparently 'bypassed' because of what we know as the 'Politically Correct' approach.

Setting Off Alarms!

Of course, because of my prosthetic arm and other metalwork in my body, I'm used to the metal detector alarms triggering when I pass through them at airports. Sometimes, the airport staff can be a little embarrassed at the necessity to 'pat me down' – but a friendly smile and perhaps a joke can help break the ice as I go through the procedure. I know it's necessary for the staff to satisfy themselves that I'm not a threat to aircraft security in any way and I'm always pleased to co-operate!

Despite my experiences of the security system I have witnessed a number of occasions – particularly at Glasgow Airport – where the same tight monitoring approach has seemingly been avoided when women wearing the Muslim burka/burqa or even partial veils have passed through with seemingly minimal checks in case offence is caused. This is the infamous PC approach in action – even though it's well known that an alleged male Muslim terrorist (over 6ft tall) escaped from the UK via an airport while hidden under a burka!

It's perhaps worth noting that I regard that the different – not so invasive – security approach towards the Muslims came about after complaints from Muslims based in Scotland regarding their treatment at Glasgow Airport. Although I'm not suggesting that Radio Amateurs (as a group) should protest in the same way as the Muslims, we should be aware that the authorities do listen to minorities. Radio Amateurs are found in all walks of life and I'm sure we can also make our feelings known in the usual, polite British fashion!

Perhaps it's time for Radio Amateurs who are travelling, to make sure that we represent our useful, harmless and 'indigenous' hobby in the best possible fashion to the authorities.

Rob Mannion G3XFD/EI5IW

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