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Local Repeaters
GB3MH: 145.625/88.5(FM)
GB7MH: 439.6375(D-Star/DMR/Fusion)
GB3NX: 430.850/88.5(FM)
GB3NS: 439.675/82.5(FM)
GB7NS: 439.1625(DMR)
GB3HO: 430.8875/88.5 (438.4875)(FM)
GB3HY: 430.900/88.5 (438.500)(FM)
Local DX Cluster GB7DXS : Telnet
81.149.0.149 Port 7300



Club newsletter



September 2021

Editor: Richard, G3ZIY

Editorial

The committee met on Tuesday 15th via Zoom and top of our agenda was restarting the twice-weekly meetings at Hut 18. Since the last national lockdown restrictions were removed some six weeks ago, the statistics have beaten even the most optimistic “expert” models.

While COVID remains in wide circulation around the UK, hospital admissions remain relatively low and the worst consequences of the virus even lower. The picture is even better for the double vaccinated. This is excellent news and with booster jabs being rolled out from soon, the committee voted to resume both Wednesday evening and Sunday morning meetings at Hut 18.

Of course, this is not a time to be complacent and we will keep a keen eye on the national and local situation going forward.

There are a few things that we can all do to keep each other safe:

- Social distancing remains a key measure to help reduce transmission. Wherever possible give each other space and be respectful if members want more space
- Ventilation. We will be keeping doors open for as long as the weather allows
- Testing. Lateral Flow Tests (LFTs) are available to everyone free of charge from the NHS. Please consider using them before attending meetings.
- Reporting. If you test positive for COVID in the days after attending a meeting, it is vital that you report this to BOTH the NHS Test and Trace AND to CARC

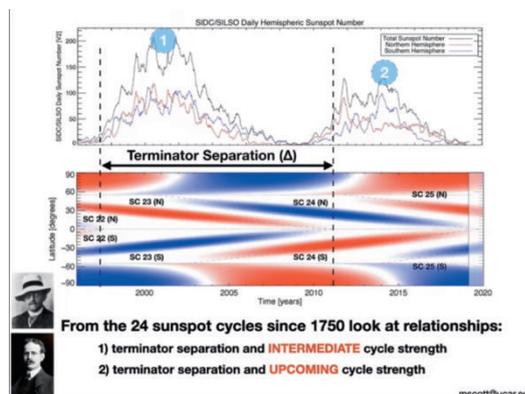
(chair@carc.org.uk)

I hope to see you soon at the club.

Mike, G0KAD

Is sunspot cycle 25 going to be huge?

This video by renowned solar scientist Dr Scott McIntosh explains a new perspective on how the sun behaves, using amongst other criteria, the Hale values. Watch it at <https://forums.qrz.com/index.php?threads/sunspot-cycle-25-will-be-a-big-one-latest-research-for-ham-radio.780498/>



Equipment review - Retevis RT73 transceiver

During the lockdown I came across the above radio being marketed by Retevis (although it appears identical to radios marketed by other Chinese brands). It covers 136-174 and 400-480MHz and is an FM and DMR radio. It's programmable via the extensive front panel menu system, but, as is often the case, it is easier to program via the software on your computer.

It has a nominal 5-20W output power, and is switchable to either 12.5 or 25kHz deviation on analogue channels. Full specs can be seen at <https://www.retevis.com/rt73-dmr-ham-mobile-radio-with-mini-size-gps-dual-band#A9203AX1-C9204AX1-C9018AX1>

The radio is quite small - it fits easily into my hand - and thus should be easy to install in many vehicles, even though it does not have a detachable front panel.



Audio is loud and clear from the built in speaker, repeated in the fist mike if desired. The display is sharp, colourful and bright. It is fitted with GPS for APRS tracking etc., and an antenna is supplied for the purpose which connects

via the SMA connector. The main transceiver has a single SO239 connector.

The programming software has been completely redesigned from the other handheld FM/DMR radios sold by Retevis, but seems more comprehensive as the radio also has more features than the earlier kit. There is sufficient memory for 200,000+ contacts (many more than the number of DMR IDs that are currently issued around the world), 4000 channels (in 250 each in any of 16 zones) and 250 text messages. Even if you are only looking for a new FM rig for the car - or base station - I think it would be worth looking at this rig, as the price is very reasonable for what you get, and you may even find yourself dabbling in DMR once you get comfortable with programming it! The company often seem to have holiday promotions etc., and the price can be quite heavily discounted at times.

Richard, G3Z1Y



ILS - How do aircraft land using radio?

Caspar P

A hidden magic of aviation is all the means of radio navigation used by us pilots – especially when wanting to land at an aerodrome in bad weather conditions... The next time you are landing on your way to holiday, you will now know how it is done!

To do this, we use something called the ILS or Instrument Landing System which was first developed by the RAF in the second World War (very similar method to the German Knickebein system) and is currently in worldwide use today.

This is achieved by the use of two beams, one laterally and one vertically named the localiser and glidepath/glideslope respectfully.

How do pilots use this?

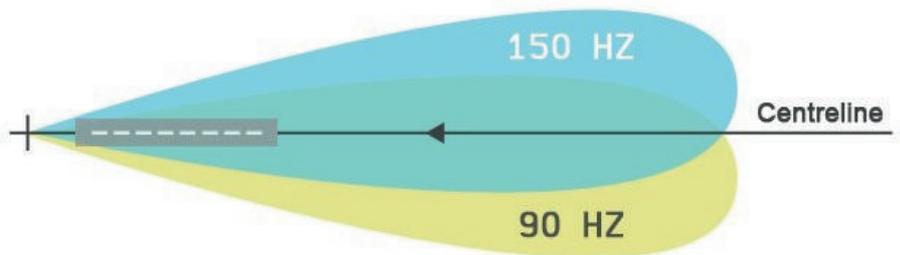
Pilots use the ILS system by tuning into an allocated VHF frequency for the localiser between the range of 108 – 112 MHz, usually at odd decimals (e.g. 109.3 MHz). This will be frequency paired to 20 UHF glideslope spot frequencies 329.3 – 335 MHz automatically with channel spacing either 300 kHz or 150 kHz.

The Localiser:

The localiser beam consists of two lobes – the port Yellow sector at 90 Hz and the starboard Blue sector at 150 Hz.

Aircraft use Difference in Depth Modulation (DDM) to determine how far the aircraft is from the centreline, for instance an aircraft in the Blue sector will receive more of the 150 Hz modulation than the 90 Hz tone, thus instrumentation in the aircraft will show that the aircraft is to the right of the centreline. Ideally the DDM should be at or near zero.

The antenna for this system is located on the runway end in the direction of the approach.

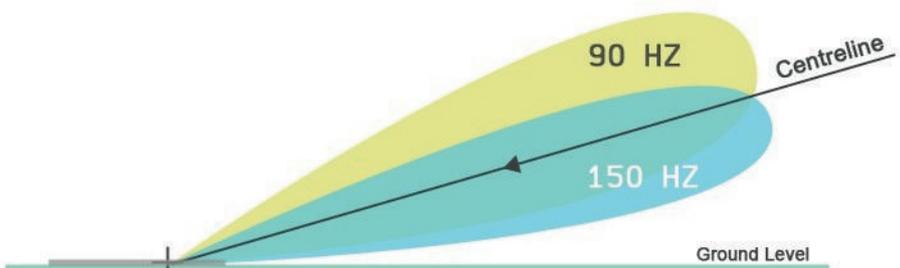


The Glidepath:

In early RAF testing, airmen would stand temporarily on the touchdown zone of the runway to guide the aircraft, however usually they weren't fast enough to run out of the way of incoming aircraft and would damage them! We have since learned from our mistakes and the antenna for this system is placed offset the runway, to the side at the position of the touchdown zone.

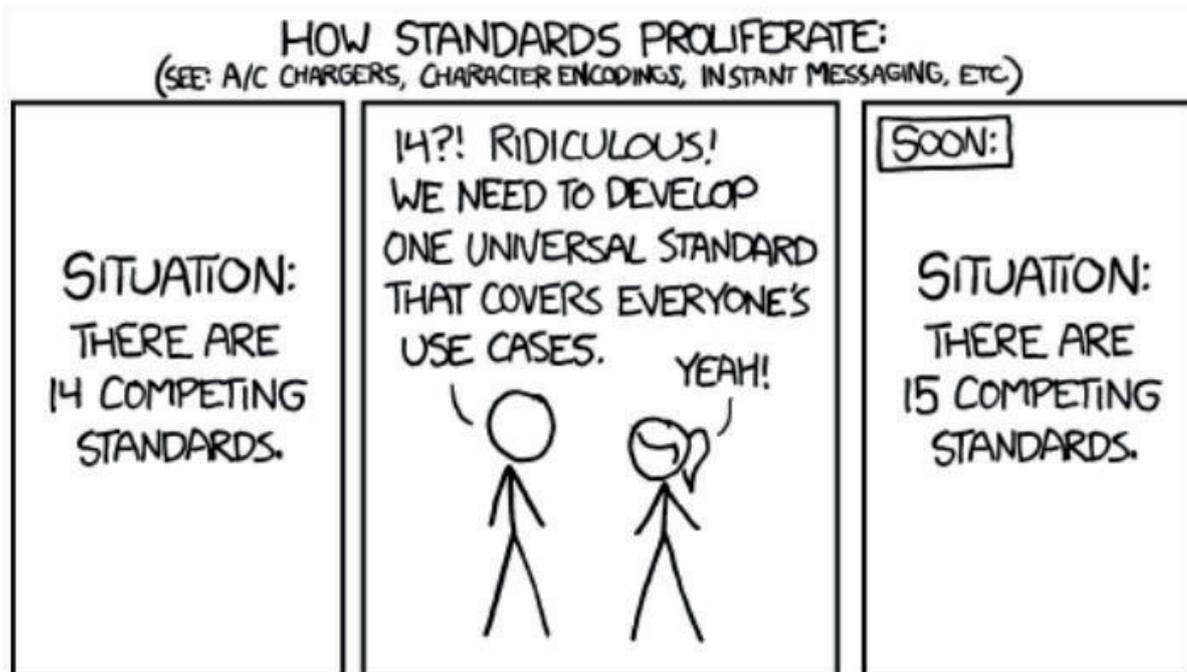
Similar to the localiser, the glidepath has Yellow and Blue sectors on the same tones, although this time the Blue sector is the lowest lobe.

The glidepath system works in exactly the same way as the localiser with DDM.





Both these images are from Adrian, G3VJM's collection



In response to questions about amateur radio digital modes... ©KI4POT

HamPi by W3DJS

I recently came across an interesting YouTube video about HamPi. It's not expensive, but gives you an instant system with numerous useful ready to go amateur radio software programs installed. This link <https://forums.qrz.com/index.php?threads/w3djs-raspberry-pi-ham-radio-image-v2-0-released.680336/> will give you more information.



Mains power plug safety

Once again I have been reminded of this topic. I received an item from a UK shopping channel the case of which has exposed metal parts, no double insulated symbol on the label and was fitted with a three pin plug. This had a partially sleeved earth pin which was fitted with a 13 amp fuse, yet the cable was clearly marked as rated for 2 amp current.

What a recipe for an impending accident! Sleeved earth pins are a no-no, as they usually don't earth the equipment, because the sleeve is the only part that contacts the inner workings of the socket once the plug is fully inserted. It doesn't matter in the case of double insulated equipment; they don't need an earth connection. In that case just make the entire earth pin of plastic... A no-brainer. If it needs an earth, then solid metal earth pins are a definite requirement.

The 13 amp fuse in that particular case is potentially dangerous, as with a decent fault in the connected equipment 13 amps could potentially flow along the 2 amp cable, which will try to dissipate around 3kW continuously, as the fuse will not blow at 13 amps. In fact these fuses will pass 20 amps (~4.6kW) without blowing (blue line on the graph) and will blow within 0.01 - 0.3 seconds for a fault current of 100 amps (red line on the graph). Please, always check that the fitted fuses are suitably rated for the equipment connected to them. And there are some pieces of equipment on the market with plugs containing no fuse, a most definite no-no on UK mains systems; the connecting cable and connected equipment must be protected against fault conditions.

Finally, always buy your fuses from a reputable electrical supplier; those from cheap online sellers don't always comply with BS1362. You and your family's safety is not worth the few pence you may save.

Richard, G3ZII

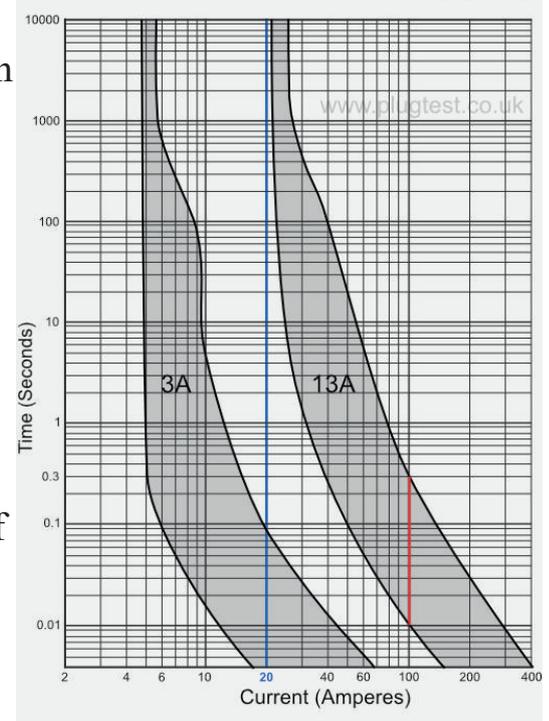
Free PCBs?

A month or so ago I heard about Chinese PCB manufacturer ALLPCB offering hobbyists a set of 5 prototype PCBs each month for no cost, delivery (DHL) included! The free offer covers up to five boards, double sided 1oz copper, max surface area 0.015m² (i.e. up to 150mm x 100mm). Aluminium PCBs are also available with this offer. This seems too good to be true – what was the catch?

This news coincided with the September edition Radcom containing an article by GM4WZG about power supply protection. As I had the need to improve the filtering from a switch mode supply feeding a 2m amp, as well as monitoring the current and facility to shut off the supply in the event of excess current draw or if the reverse power is too high, so this protection device was ideal.

A 100mm x 50mm PCB was designed using Kicad, schematic shown on page 6.

In addition to the LTC4368 supervisor chip as mentioned in the Radcom article a filter was added based on a design by VK-AMPS. My supply is 48V, capable of delivering 10A but the load current quite low, so 1µF surface mount feed through caps were used as an additional



BS1362 fuse characteristics

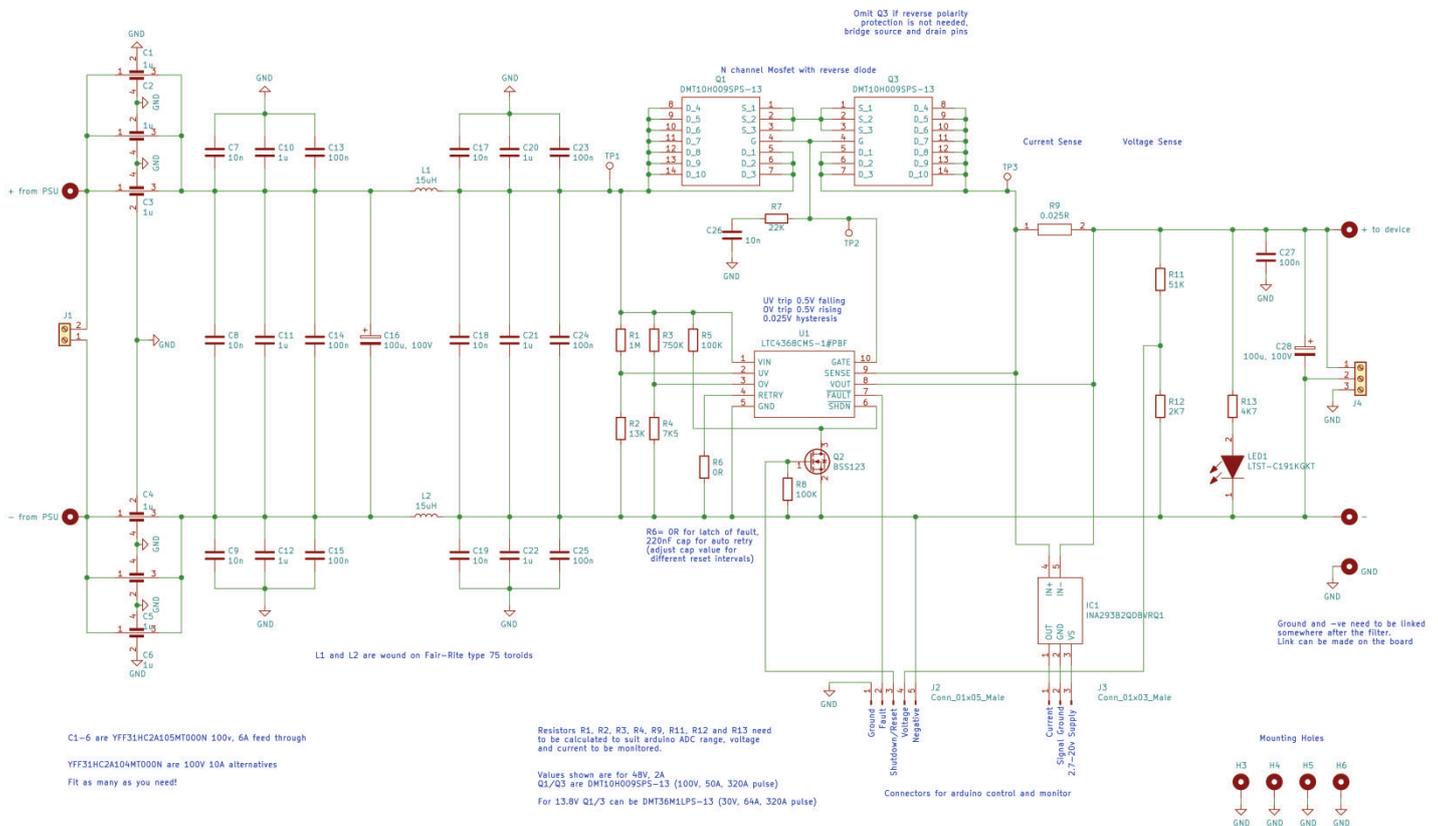
filter. Each of the feed through caps is capable of handling 6A, for higher loads pads are provided to parallel them up. The choke is constructed with two type 75 ferrite tubes (fair-rite 2675665702).

DMT10H009SPS-13 MOSFETS were selected for Q2 and Q3, these are rated at 100V, 320A pulse, up to 80A continuous depending on heat dissipation arrangements. V_{gss} is +20V.

Filtering

Supervision

Sensing



The switch mode supply –ve output is not tied to ground in the supply itself. The board provides the option of linking the negative to ground either on the filter board itself (after the filter) or further downstream.

The LTC4368 is configured to trip on over-current, over-voltage or under-voltage. Recovery from a trip is by toggling the shutdown signal, or a power cycle. A four pin header connectors enables a microprocessor (such as an Arduino) to measure the output voltage, read the healthy state of the LTC or shutdown the LTC4368. During normal operation a charge pump provided the gate voltage at around 13V above the lower of V_{in} or V_{out} ensuring the mosfets are turned hard on to minimise power loss.

The INA29382 current sense chip uses the same current sense resistor as the LTC4368 and is connected via the three pin header.

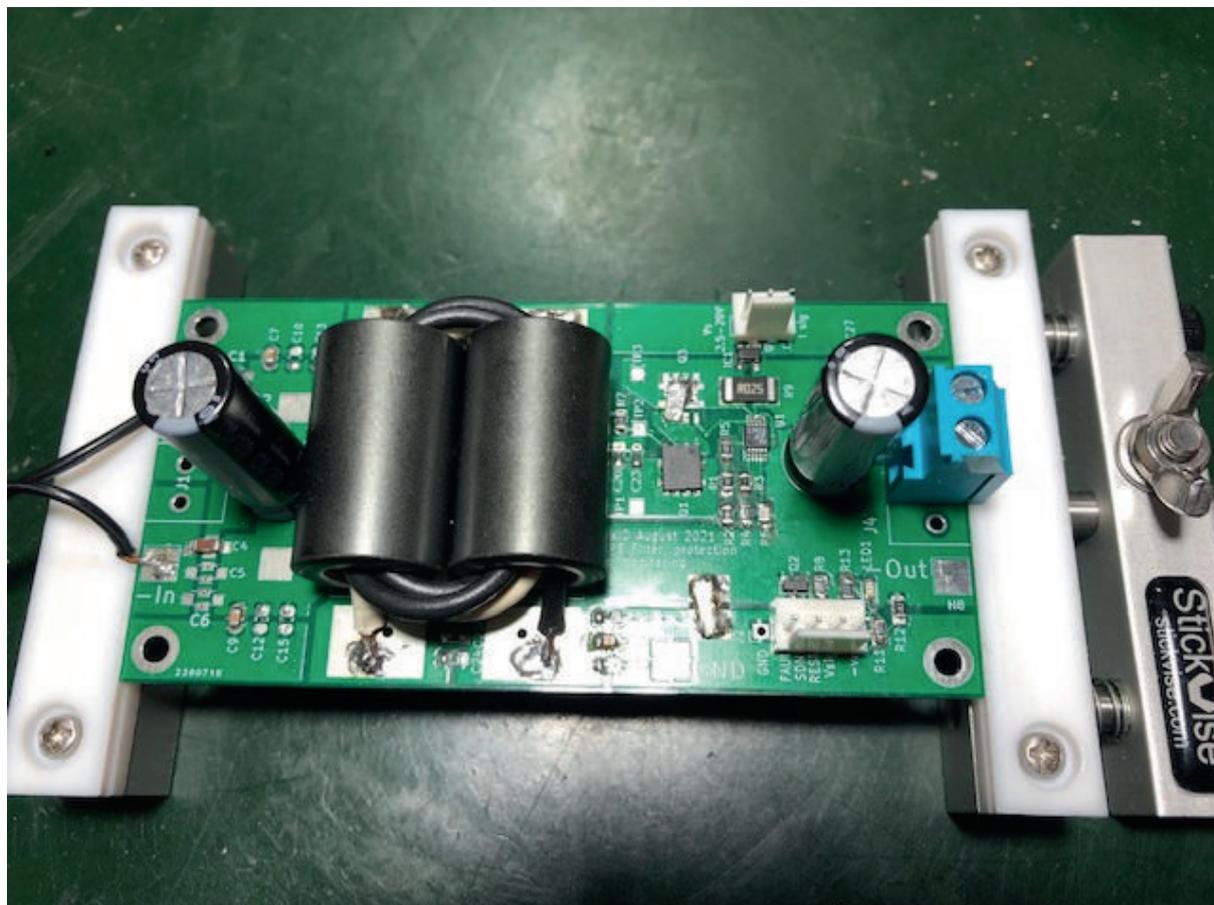
An order for five boards was placed with ALLPCB. It has to be said the website is rather poor – it proved impossible to enter my postcode correctly for example, but when I got fed up and stopped for the evening, the next day I had an email from their customer team asking why I had not completed the order. A few email exchanges later the PCB design had been approved, the delivery address corrected and the PCBs were in production.

Six days later the PCBs arrived well packaged and in good condition via DHL (signed for). They actually sent six boards as presumably that worked out best when they fitted the design onto their standard sheets. Quality is good.

Here is how it looks when completed. Soldering the surface mount parts with hot air for the

large mosfet and a normal soldering iron for the rest is no problem. Q3 is not fitted as reverse protection is not needed in my application, and I forgot to order 100v 100nF and 1µF caps so they are not fitted either, and probably unnecessary.

Powered up using an ancient Heathkit 50V bench supply, under and over voltage trip worked a treat. Testing the over current trip by placing a 10R resistor across the output resulted in a SDI (smoked device index) of 2. The power mosfet and LTC4368 were dead.



Having your protection device fail is not ideal!

Design Fault!

Yes there is a design fault – at least one that I have identified – there may be more – so the challenge is to work out what it is and how to solve.

The generous prize is a free CARC tea/coffee and biscuits to anyone who can spot the design flaw(s), and a free updated PCB for the person proposing the best fix!

Send your responses to david.wilde@tetrapak.com.

Next project?

This project has identified a need for an electronic load to be able to test power supplies properly. Maybe a good reason to try out the free aluminium PCB prototype offer! I think it will need to handle at least 50Vdc, 50A at least for a short time, say 500W continuous dissipation. It should be possible to set a fixed current (or power), and have this change according to a defined profile. Voltage and current would be monitored and logged, allowing power and total energy to be calculated and load regulation observed. A temperature controlled fan(s) would be essential.

Dave, MOWID

Maybe something like this Dave: <http://www.kerrywong.com/2013/10/24/building-a-constant-currentconstant-power-electronic-load/>

The PCB company Dave used in his project has a competition running with some decent cash prizes; see <https://www.allpcb.com/uselessdesigncompetition.html>



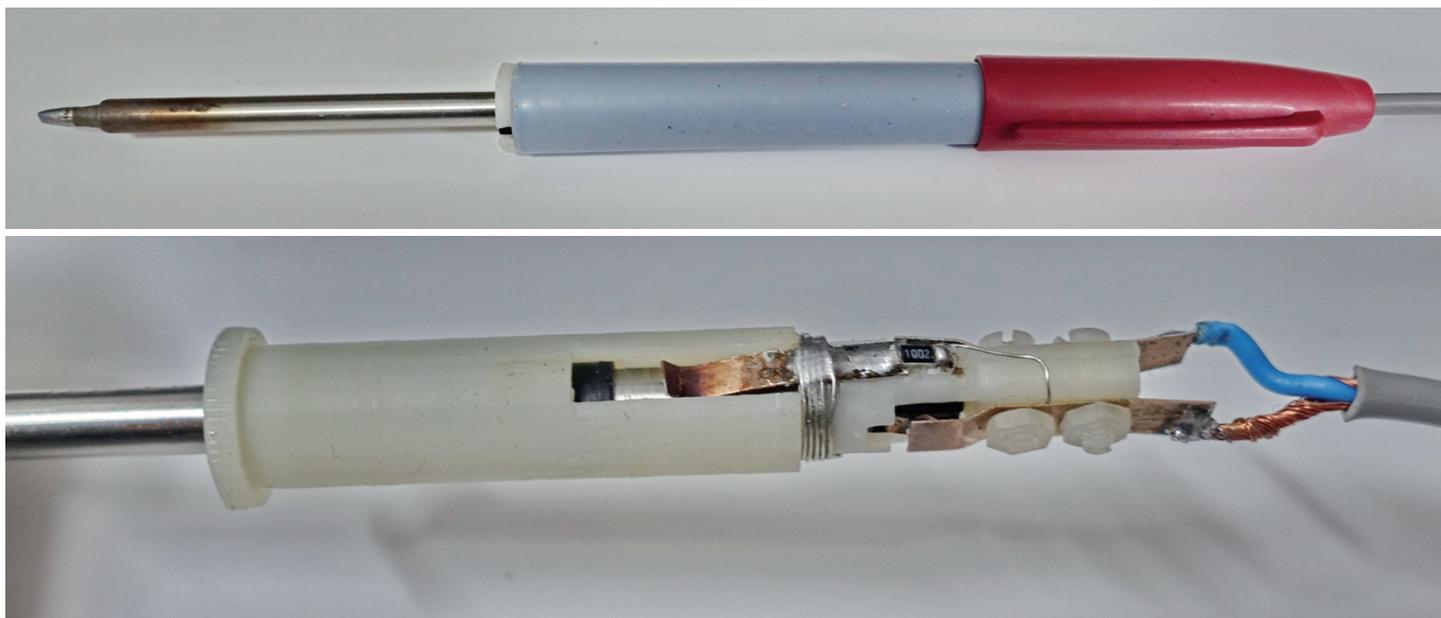
FOR SALE - WANTED

As you may have heard I have been designing and making a proper connector for the soldering Iron element. It fits into the existing handles several club members have and allows instant plug in connection so the element can be changed at will and they can be bought from Farnell.

Obviously if you have a bit that is still operational It can't be used in the new handle as it has been cut down and soldered to push fit in the handle.

I am happy to supply complete assemblies (less the bit) c/w power lead and plug for say £10.

Farnell list the elements at around £13 plus vat, the favourite one is part no 4132180
Adrian, G3VJM, adrian@g3vjm.com



If anyone has a surplus **2 metre/70 cm beam** they would like to part with for a shilling or two I am in the market for one. Thanks, Jim, G4PFT, james.judy@btinternet.com

Deadline for contributions to the Newsletter 15th November

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