

How To Repair a Cushcraft R5

Solution

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Overview - R5 Matching Unit Rebuild by G0WCW using EI7BA method

This article describes how to rebuild a matching unit of a Cushcraft R5 vertical.

Below are a few pictures of a re-built and slightly modified R5 matching unit. The transformers and choke of the matching unit were assembled using the method defined by John Tait (EI7BA). His page describing the method is here. Other links on related articles are at the bottom. My thanks to him and others on the R7 as well as the R5 pages. If you cannot see Johns article, a PDF version is here - note this is John's Copyright.

History

It started when I found an old R5 at the club shack (<http://www.mrs.bt.co.uk/mrs>) that was non-functional. The main aluminium parts looked fine, but the matching unit was faulty (see first picture below).

A bit of looking online found a number of resources explaining how to fix the matching unit and the traps.

After finishing the job late in December 2006, the unit works fine again as it is and is back in use after a few years of gathering dust.

Parts

Toroid Cores

In essence, I used the method described by John and this worked fine. The two toroid cores came from<http://www.jabdog.com/> and at the time of writing, they are still in stock if you need them in the UK.

You need to order a "Q1 material Ferrite core (FT240-61)" for the choke and a "Amidon Iron Dust core T200-2" for the balun. This is to keep at as per the recipe from John, but you could use two "Q1 material Ferrite core (FT240-61)" for the balun with six bifiliar turns instead of 11. Cost is about four UK pounds pounds for the T200-2 and just over eight UK pounds for the FT240-61.

Wire

The wire for the balun is 1.0mm from a new one metre piece of twin-and-earth (old style red and black). This wire works fine.

Enclosure

The box is from maplin, product number YM91Y and is one of their 'IP enclosure' range. The box is 150 x 110 x 70mm in size (product codes YM91Y - grey, YM93B - grey with clear lid). Cost is around six UK pounds.

It is physically the same size as the Cushcraft variant, but the PCB has to be slightly 'nibbled' at the corners to get it to fit inside the newer box. I'd say the original Cushcraft enclosure isn't that good as they used steel screws into brass fixings. The screws rust over and then shear off. In my view, the Maplin IP enclosure is a better solution to outdoor use (IP56 rated).

RF Choke

If you look closely, I have put in a new RF choke as the original one broke (they seem to be very fragile). The new choke is from Radio Spares (UK), part number, 2113-1932, 470uH, 0.3A (costs just under one UK pound).

Testing and Other Observations ...

An antenna analyser makes life much easier. I used an MFJ259B from Bob (G4BAH - thank you) and this saved a lot of time during the repair. If you plan to do more of this kind of work, consider investing in one.

When rebuilding, make sure that the radial strap has a good contact with the underside of the PCB. I found that unless the bolt securing the PCB to the box was very secure, the contact caused an intermittent. This meant that the matching unit had 'no radials' and then simply didn't match at all.

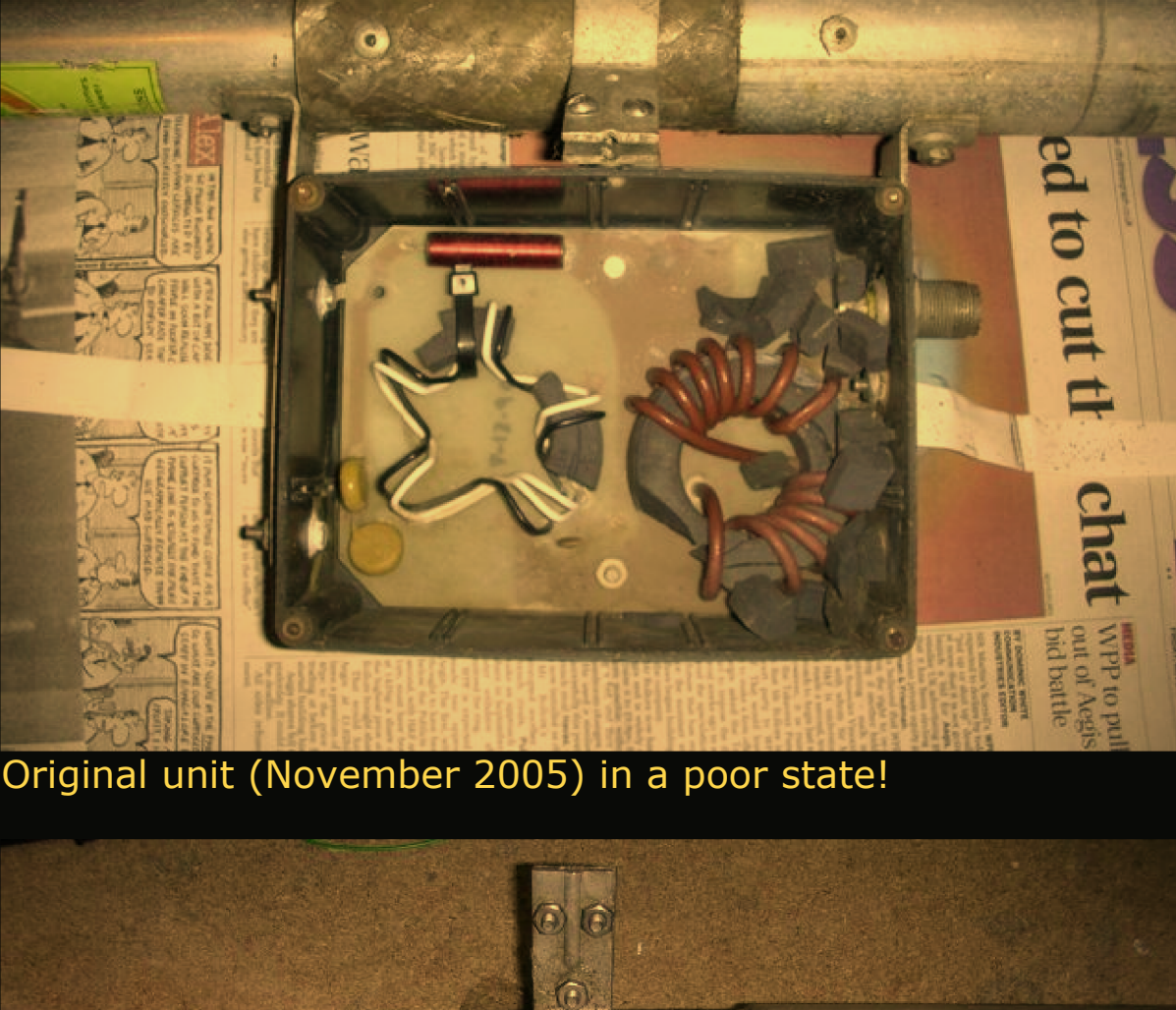
Testing against the complete aerial is a nuisance for repeated measurements of the matching unit. So if you need to repair and/or test the matching unit indoors, make a couple of wire radials using hook-up wire (4 feet long) and then a vertical wire (about 20 feet long). These can be easily used indoors without issues (especially if the 'other half' has anything to say!). It'll only work on one band, but that's enough to verify the repair. Use two or more radials as this simulates the real world and gives a better match.

I was lucky enough to borrow a newer (working) R5 to compare parts and found the traps on the older R5 were all ok (using the newer R5 matching box). I also used this method to prove the re-built matching box in the new R5 to make sure that I had not caused other problems. Again, the re-built matching unit worked fine in the newer R5.

Other Articles Which May Help You

- * Cushcraft R5 Manual
- * Cushcraft Trap Repair by Gerry VE6LB
- * R5 Maintenance and Repair by PA0FRI
- * Troubleshooting Traps by John Tait EI7BA

Good luck and happy building - Darren G0WCW - 9th Jan 2007, updated 11th June 2007 ("mrs (at) hatcher.org.uk")



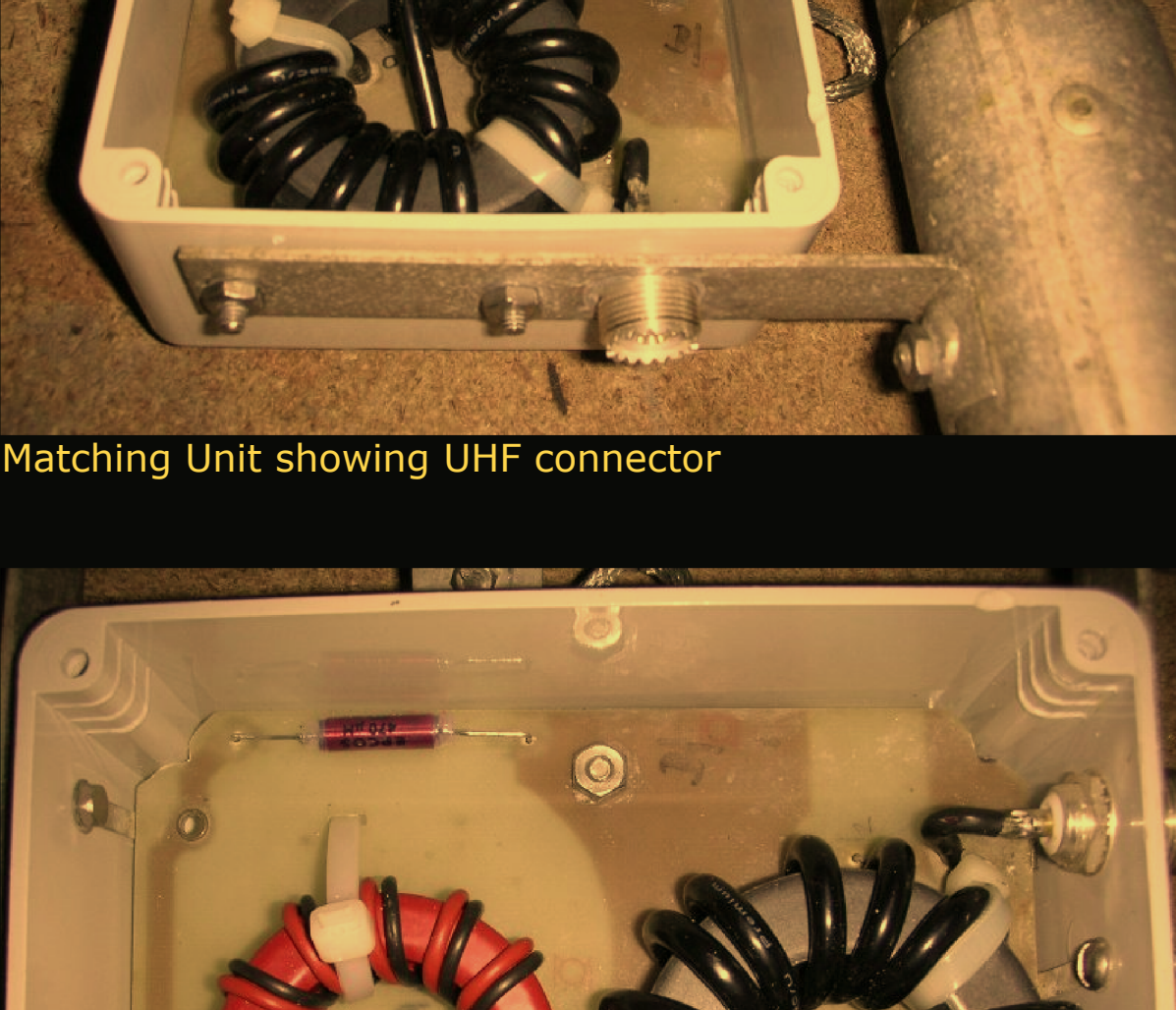
Original unit (November 2005) in a poor state!



Matching Unit with new transformers



Another view



Matching Unit showing UHF connector



Closer view of matching unit with new transformers



Another view



Rear of matching unit with radial connection



Matching Unit with cover in place



View of the complete R5 system as put together

Disclaimer: The above method worked for me. Obviously I am happy to modify items I own or have been given the right to modify. If using the above method problems arise, feel free to ask for advice but remember its your aerial and therefore down to you if anything goes wrong.

Club site (<http://www.mrs.bt.co.uk>)

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