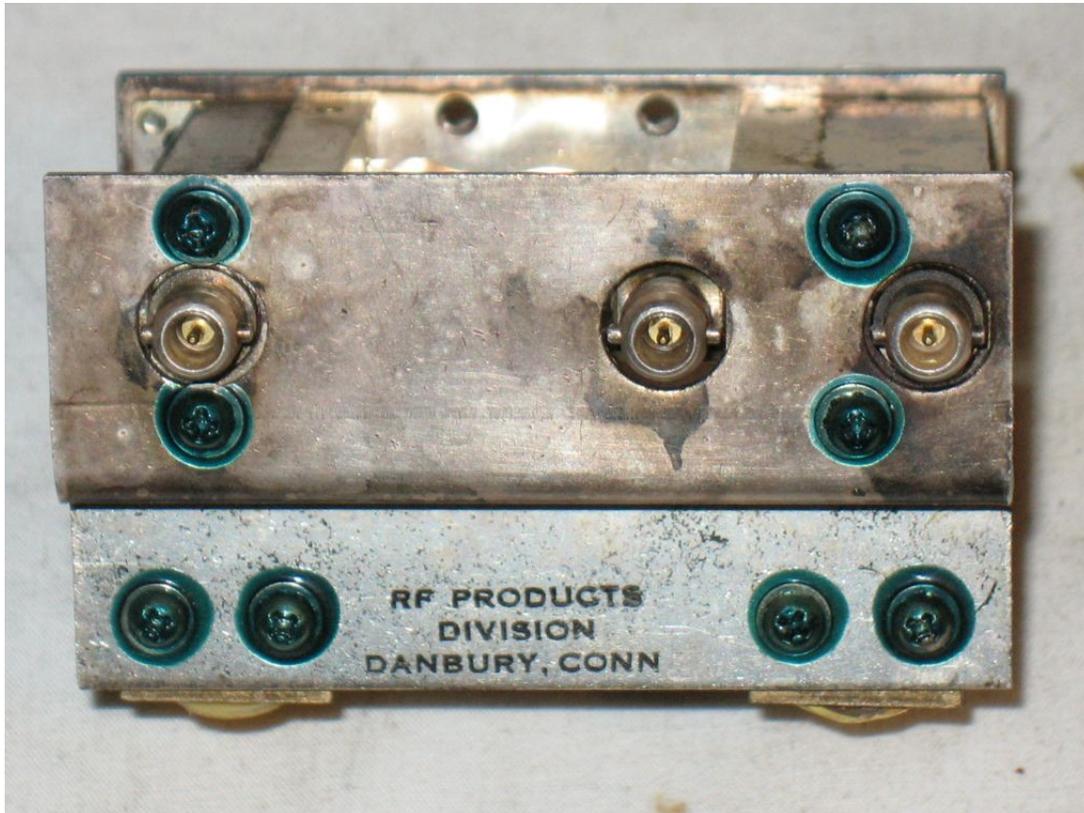
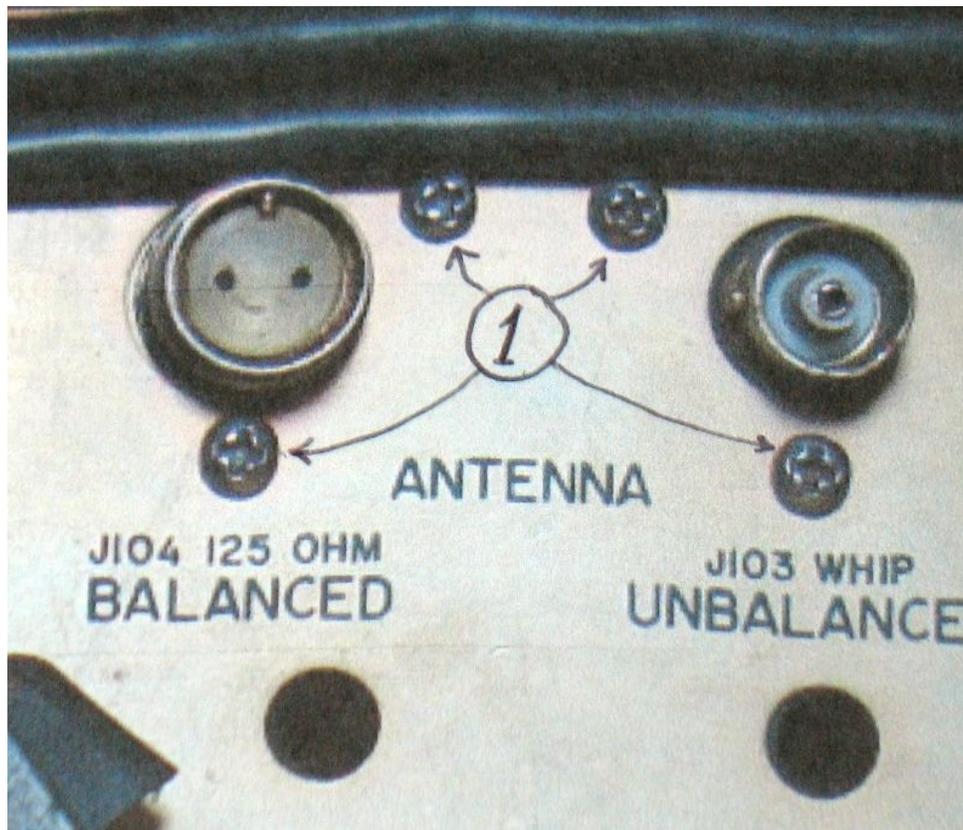


After determining that the antenna relay needed fixing in my R-390A, I looked for documentation on how to remove it and what it looked like inside. I couldn't find anything, so I decided to document what I found. I first removed the three cables with mini BNC connectors on them on the back of the relay. As I removed them, I verified that they were connected to the correct jack. Sometimes they get changed.

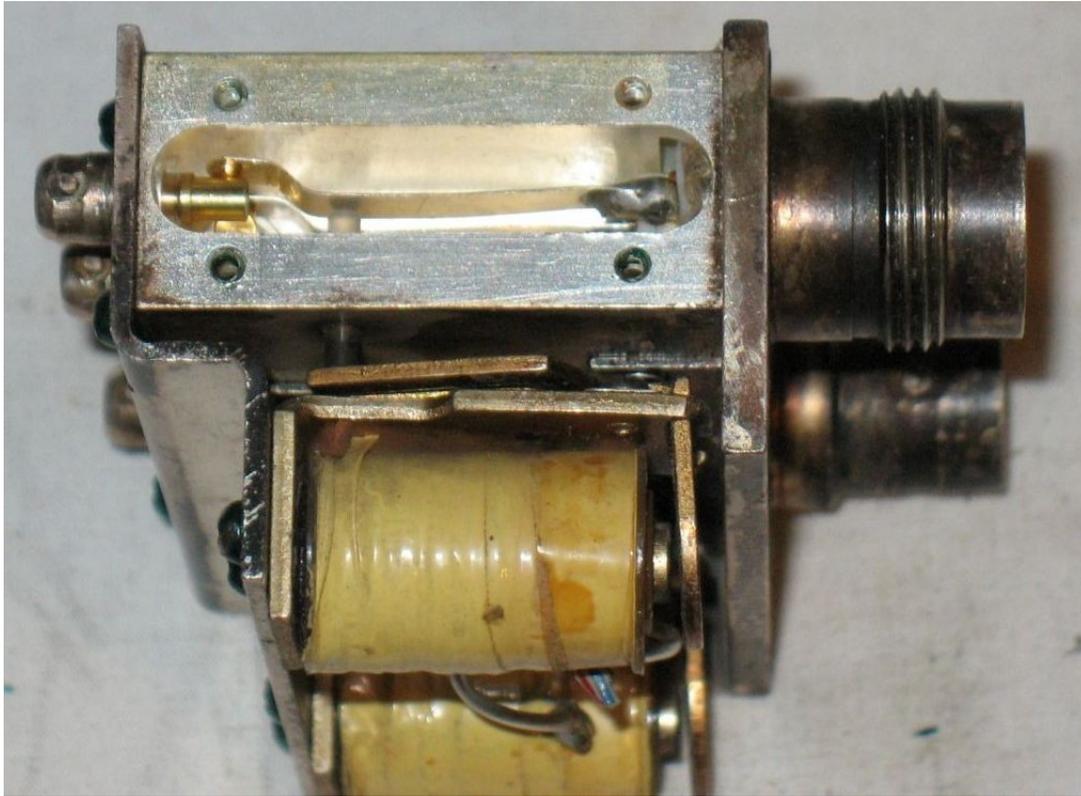


The next step is to remove the four Phillips screws holding it onto the rear frame. They are pointed to in the picture below. When the last screw is being removed, the relay should be held up by one hand. The wires are still connected to it that operate the electromagnets, so be careful not to damage them. They are long enough that some repair can be done on the relay without disconnecting them.

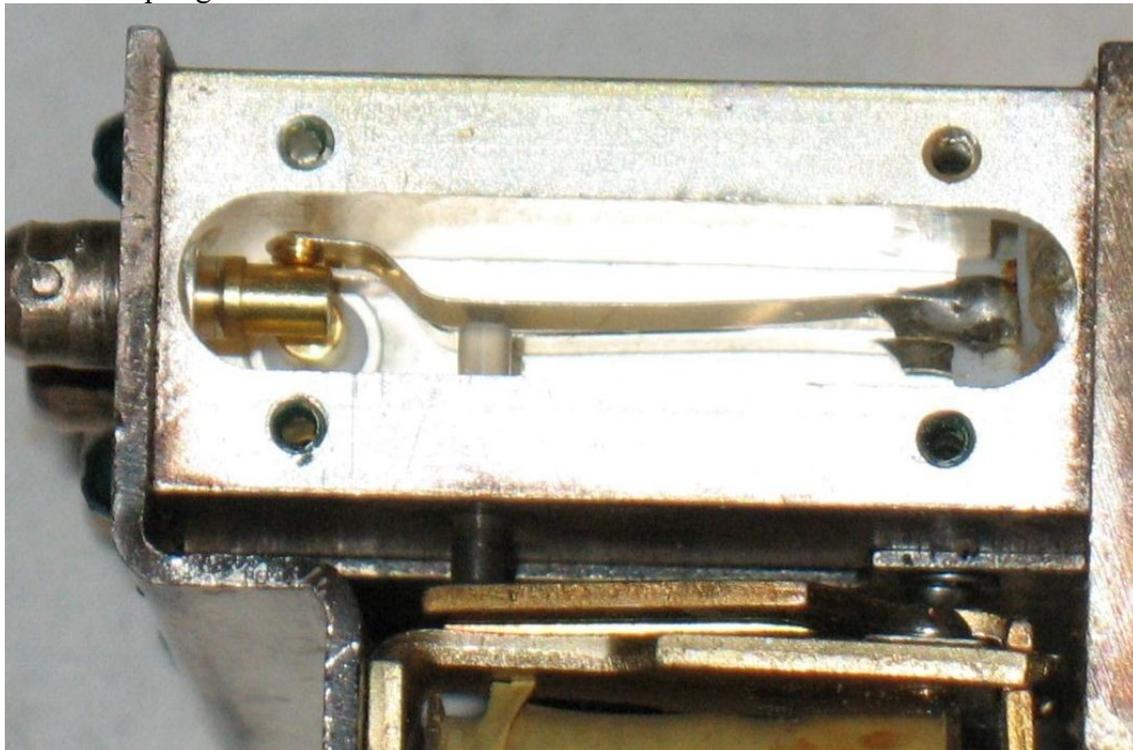


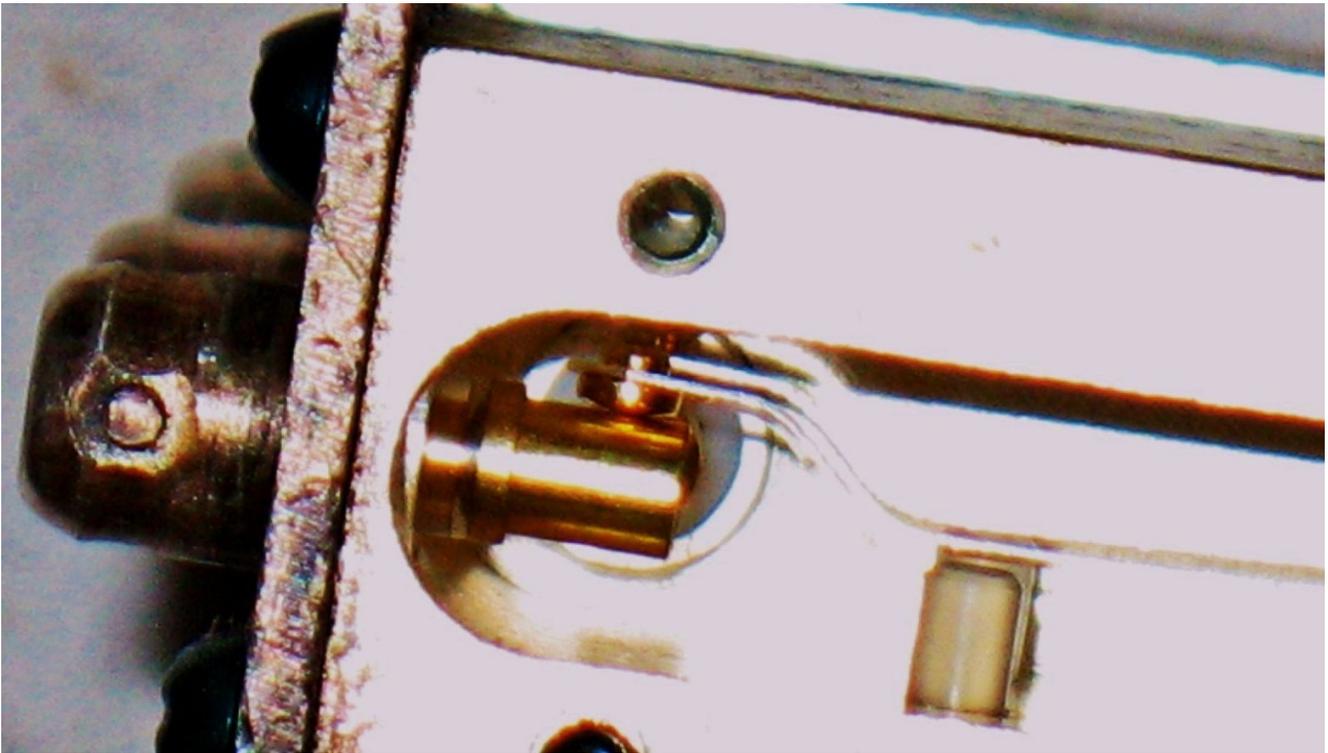
Once I removed the relay, it was easy to remove the access plate to the contacts that I needed to see (the two for the twinax connector). Just remove the four screws and the plate will come off. I think now is a good time to see if the electromagnets are working correctly. See the next picture.

With everything in a safe position, plug your rx in and switch it to Stand By (while keeping an eye on the relay). You can switch it between Stand By and AGC to watch it operate. When you're satisfied with the armature movement, turn it off, unplug it and continue on.



In the above picture, it's easy to see how the electromagnets operate and push the insulated rods against the spring loaded contacts. There are two, but the second one is not easy to see. They are soldered directly to the ends of the twinax contacts. If the twinax connector or contacts are damaged, they will be extremely difficult to repair as it does not come apart. The next two pictures show close ups of the contacts and leaf springs.





In order to see if the contacts are operating correctly, press on the armature simulating magnetic pull on it. Watch both contacts and see if they move and touch the top of the cavity creating a good ground. The armature should push the spring leaves just a little past the point of initial contact flexing them a little. This causes a little wiping action of the contact on the side of the cavity minimizing oxidation build up. The distance the leaf should move past the point of contact with the side is about $1/32''$ at the point of the push rods.

When the armature is released, the leaves should continue moving $1/32''$ after the contacts stop moving. The insulated push rods should keep moving and provide about $1/64''$ of clearance between them and the spring leaves. At this point you could hook up an ohm meter to the contacts to see how it's doing. Once you have them correctly adjusted it's time to see if the electromagnets are working the contacts correctly. With everything in a safe position, plug your rx in and switch it to Stand By (while keeping an eye on the relay). You can switch it between Stand By and AGC to watch it operate. When you're satisfied, you know what to do. This was the end of the document as created on 3-23-2018.

The following section is being added on 7-8-18 to let you know about a problem that I've seen a few times, because it may not be easily repaired. Take a look at the orientation of the 2 pin contacts in the twinax connector on the relay in the picture below:



As you can see, the plane of the 2 pins is no longer parallel to the top and bottom of the relay frame. Compare this to the picture on page 2. The importance of this is that the spring leaf contacts are directly connected to the twinax contacts on the inside of the relay. Take a look at the 2nd picture on page 3. What this means is that the leaf springs inside with the contacts on them have been twisted askew and will no longer work correctly. If by some miracle they are working, I don't think that they will continue to work for very long. I think that if the plane of the contacts were within a few degrees of parallel, that would be okay. If this were my relay, I would feel that it needed repair. Fixing the shape of the barrel is pretty easy using a couple of blunt end pliers of an appropriate width.

Realigning the pins is not too bad if you can get a mating connector onto it and turn it without breaking the relay connector inners or the male connector. To minimize possible damage, make sure that the male connector is all the way on and the outer tightening collar is not quite tight. The inner insulator in the relay mounting is staked in place by bending the frame of the relay mounting frame. The twinax female connector was manufactured as part of the relay back frame and it does not come apart. Once you get the twinax pins lined up correctly, you will need to restake it in place. Be careful to not damage the insulator in this procedure. I disconnected the relay and put it in a vice to do it. I used a long drift pin punch to carefully restake it in place. But, make sure that the insulator will not turn when done.

Once you're satisfied with the connector repair, you need to take the side plate off and check the spring leaf contacts adjustments. See page 4.

I've not come up with a good way to repair the guide pin, so if someone does, please let me know.

As to the cause of this type of damage, I'm sure there are a few. One that comes to mind is using the 'L' shaped adapter and connecting a very stiff large coax to it. Then it accidentally gets pushed down and shears off the guide pin and rotates the inners of the twinax on the relay. I really don't know how this happens, this is just speculation.

Regards, Larry Haney. 7-8-2018.