

A fault with the C11 Tx

Richard Hankins, G7RVI and Mike Hazell, G1EDP

The C11 was the last in a line of large, high power, AM/CW mobile transmitters (the others were the WS9, and the WS52). It is capable of providing some 50 to 75W of AM carrier, with good quality high-level modulation. However, with many units approaching 40 years of age, what appears to be a universal fault has emerged. Three units have been diagnosed with the same problem in as many months.

This problem will not be evident when the C11 Tx is tested by itself. It only emerges when used with a Rx, typically the R210, which is the one it was designed to accompany, and the Rx aerial is picked up from the C11 aerial output socket. The symptoms are a loss of receive sensitivity.

The root of the problem is dirty contacts in the Tx/Rx aerial changeover relay¹. And the only solution is to clean those contacts – but that is easier said than done, as the relay is a sealed unit. This article describes how to go about it, and also provides what we believe will be a long term fix.

Cleaning the relay contacts

The following steps are recommended.

1. Locate the relay (Fig.1) and remove it from the set, making a note of the various connections as you remove them.
2. Once you have the relay in your hands, you will see that it is varnished all over. Under the varnish can be seen two retaining bolts on the top. On the bottom there is a metal retaining ring, which holds the relay into the case – this base ring is also soldered to the case.
3. Hold the relay in a vice, and cut the four corners of the base ring with a hacksaw (Fig.2). This helps greatly with separation of the case from the base ring, given the two are soldered together all round. Try to avoid cutting the plastic relay base if possible.
4. Take a big, high power soldering iron, and run the tip around the joint between the case and the base ring, to remove as much solder as possible. Once the solder is molten, giving the relay a sharp tap on the bench is an effective way of doing this.
5. Take a small screwdriver, and prise the base ring away from the case all the way round, heating again as necessary to keep the remaining solder molten (Fig.3).
6. Remove the base ring completely.
7. Moving now to the top of the relay, heat the solder around the two bolt heads, and use a 7BA spanner (or equivalent) to undo the bolts (Fig.4). Remove both bolts completely.
8. Remove the case. The relay should now be in separate parts, with the contacts easily accessible (Fig.5).
9. Clean all the contacts with 800 grade emery paper, or finer. (You can try RS contact cleaning strips, but we have not found them effective against 40 years of crud!).
10. Check for low resistance across all contacts with an ohm-meter, and repeat step 9 until this achieved.
11. Re-assemble the relay, reversing the above steps.
12. Fit the relay back in place, remaking all the connections.

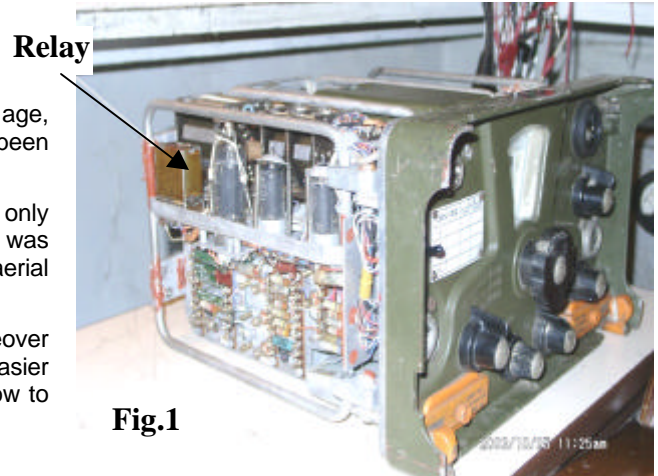


Fig.1

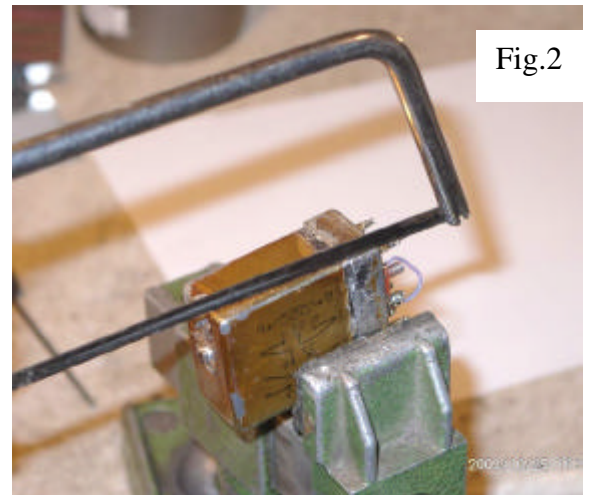


Fig.2



Fig.3

¹ It is worth noting that there is no DC continuity between the external aerial connections on the C11, due to DC blocking capacitors internally. Thus the problem can only be diagnosed *externally* by checking for RF signal level with the C11 in and out of circuit. Obviously, once inside the set, a check with an ohmmeter across the contacts will confirm the problem if there is any doubt.

A long term solution to the problem

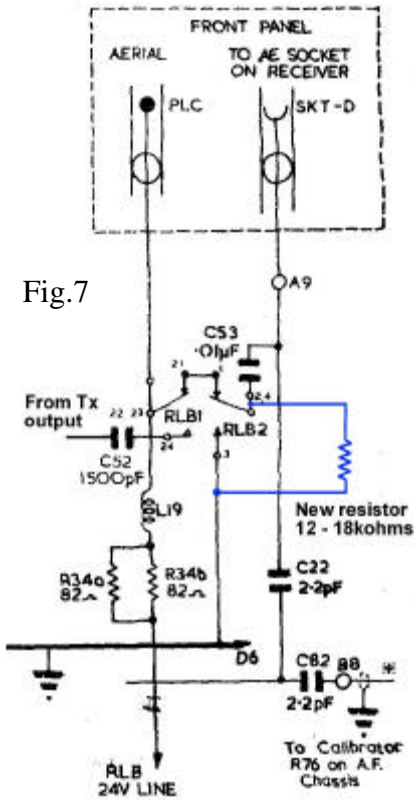


Fig.7

It may be noted that only the relay contacts that make on receive actually have a problem: the contacts that carry the Tx output do not develop this problem. Why? The reason is that on transmit a considerable current flows through the relay contacts – into a 50 ohm load, with 50W output, the current is 1 amp r.m.s. This is many times more than is needed to keep the contacts completely clean.

The same does not apply to the receive contacts – the current they pass is very small indeed, and consequently sooner or later the crud builds up. This takes a good while, as the relay is sealed from dust, grease and other contaminants in the air, and probably explains why this problem did not show up while the C11 was in service, as far as we know.

The solution to this problem is to make sure the receive contacts do carry enough

current to keep the contacts clean. 1 – 2mA DC is generally reckoned to be enough. Conveniently, the relay changeover contact does have 24V DC on it, and thus the addition of a 12 – 18kohms resistor to ground is all that is needed. This resistor has no effect on the RF signals carried by the relay. See Fig.7 shows the circuit of the modification, and Fig.6 a picture of the resistor in place.

Two out of the three units that have had the relay contacts cleaned now have the resistor modification as well. We will be keeping an eye on them to see whether this effective in the long term.



Fig.4

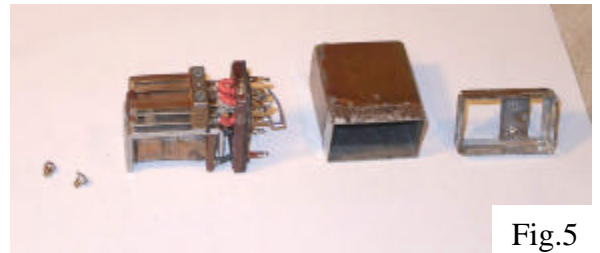


Fig.5

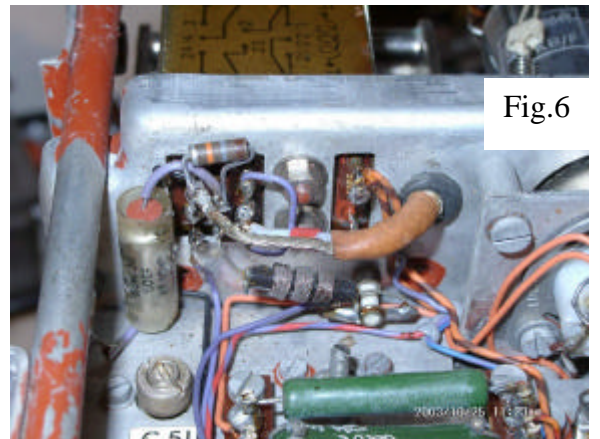


Fig.6