

Motorola Mitrek front end casting repair by Karl Shoemaker

Introduction:

This document is supplement to the main Mitrek repeater conversion project. The Mitrek being a mobile, may have been exposed to the elements. This sometimes causes instability in the receiver's front end and transmitter's filtering, possible due to dissimilar metals used. This may cause PIM (Passive Inter Modulation) in either the receiver, transmitter or both.

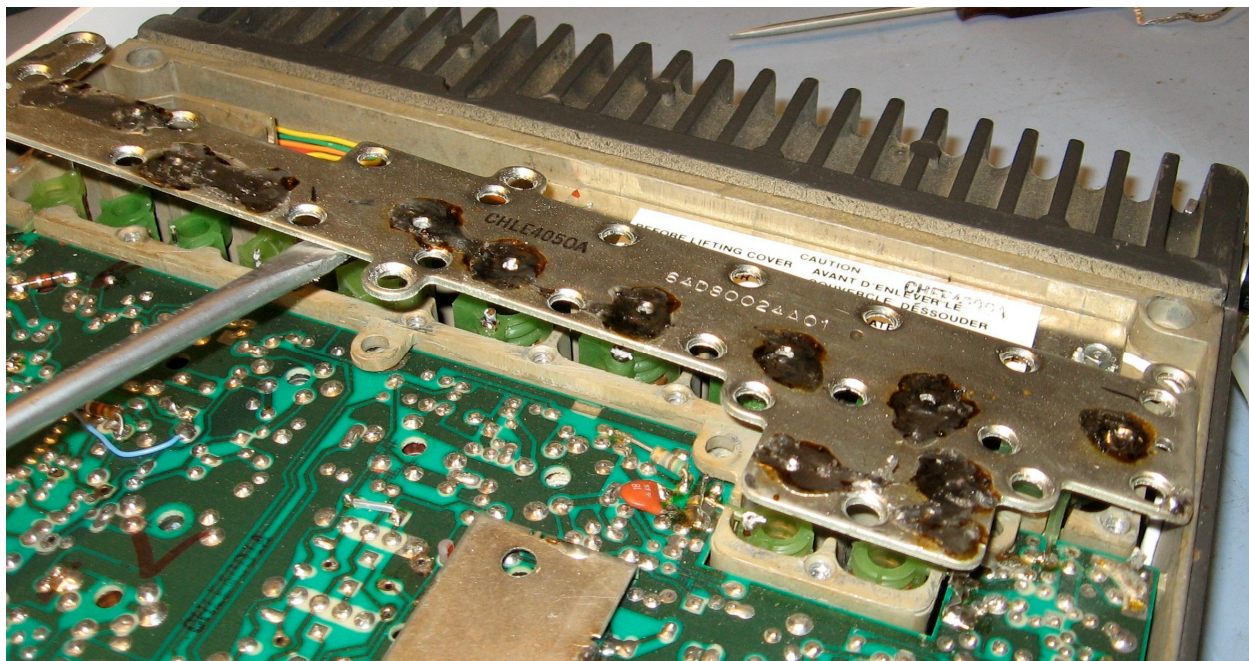
The casting is made up of 6 front-end (resonant) cavities with coils; its multiplier has 2 more; and the transmitter's filter of 4. All the coil's "bottom" has a lead turning 90° from the coil, pointing down into the bottom covers. The cover has a hole for each coil lead and is soldered (only) at this point. The casting is aluminum therefore, won't solder to anything. The 26 screws maintain a solid connection between the casting and cover. Since the cover can be soldered, its presumed it has tin plating or is completely a tin type of metal. The two surfaces are four points apart on the galvanic chart so there's a slight chance of some corrosion, especially if the radio is subject to an environment to "encourage" this, such as salty air.

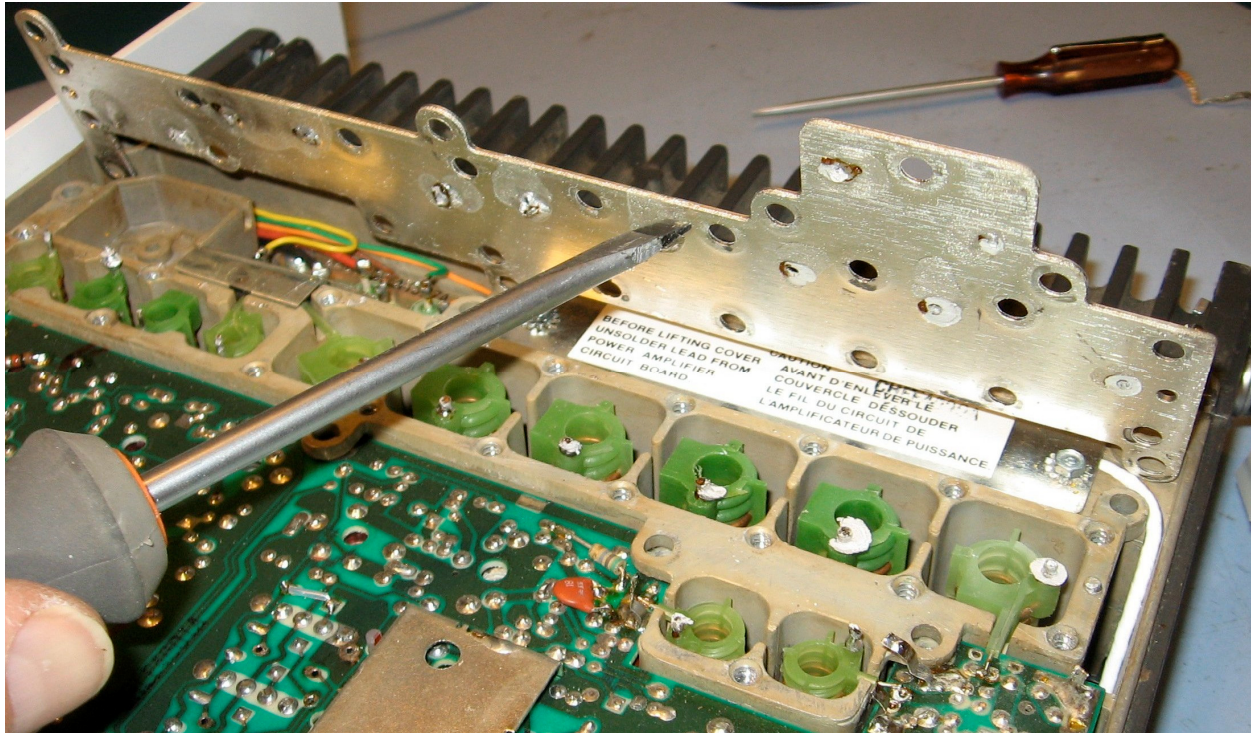
Solutions:

PIM can plague a remote site repeater and this radio is no exception. By cleaning the surfaces can possibly solve this issue.

First, remove the 26 screws and 3 (some have more) ground straps. It's not necessary to remove the 4 I/O RF connections, unless you wish to remove the casting from the radio chassis.

To remove the cover you will need a rather large iron in the 150w (or higher) area so there is enough heat to melt the solder connections in a short time. Even though the coils (inside) are supported with good plastic type forms they do have a limit from heat exposure (they are not teflon, etc.).





Next, clean the excessive solder around all the holes. This will allow easy re-installation of the cover, later. Shown below is the in and outside of the cover.

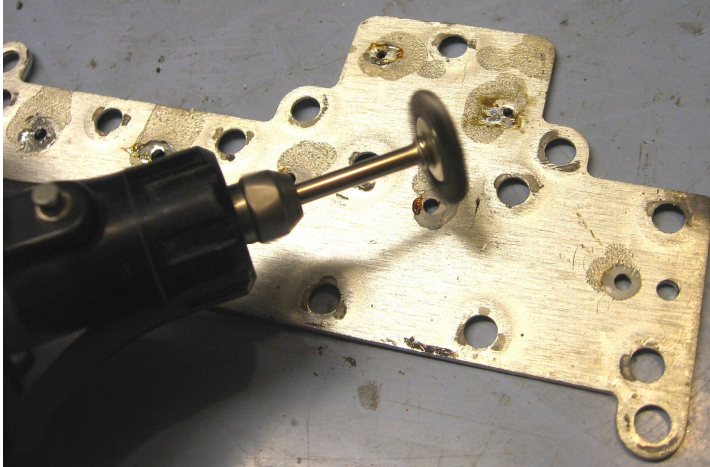
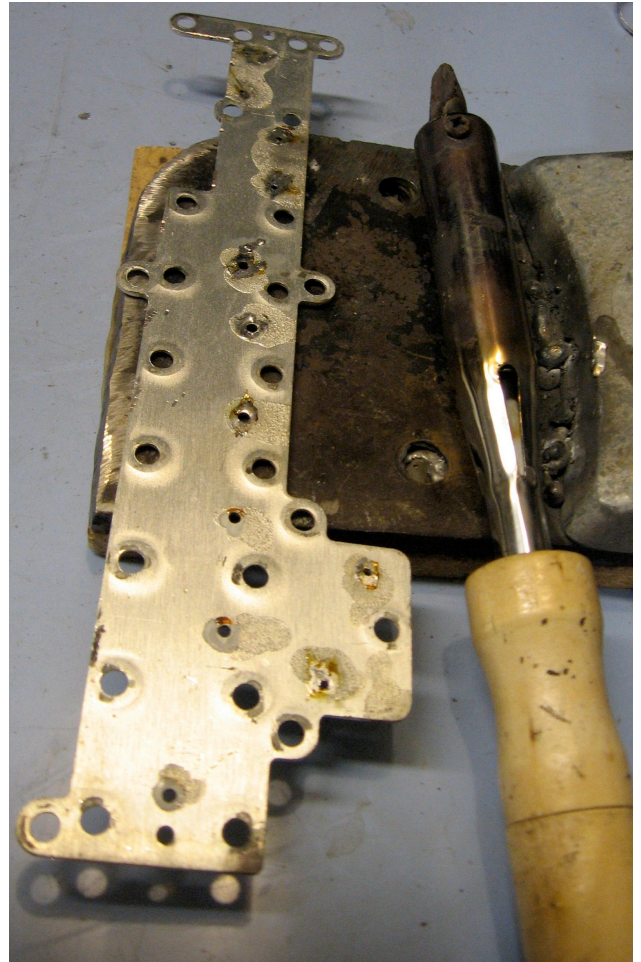
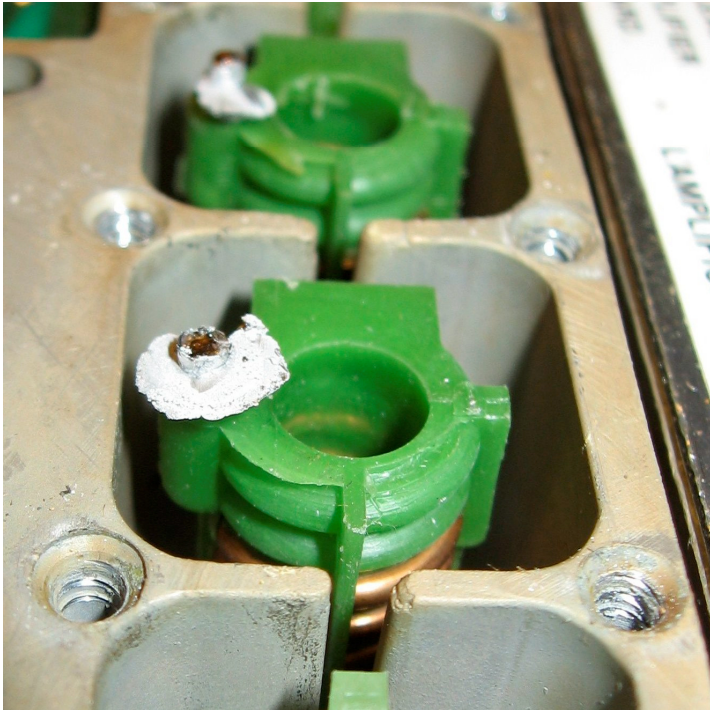
Cover holes cleaned out



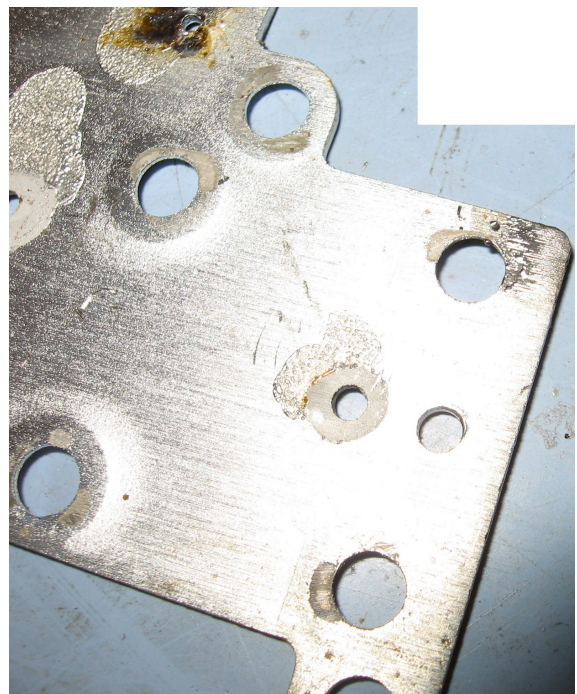
Cover holes cleaned out



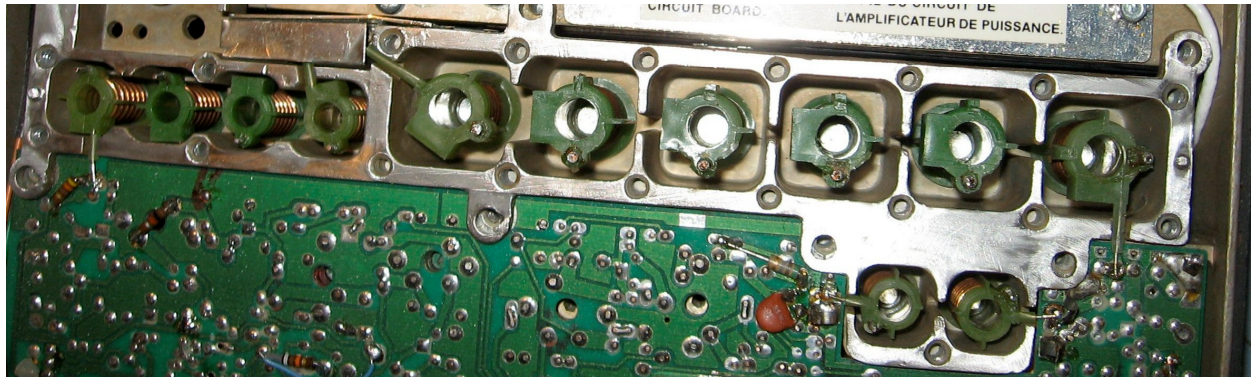
Some of the coil leads will have leftover solder as well, so they will need to be cleaned up. Using a sucker or wick helps. The cover can be cooling off while you perform this task. Note the large iron used for the removal task of the cover, but not for wicking the coil leads.



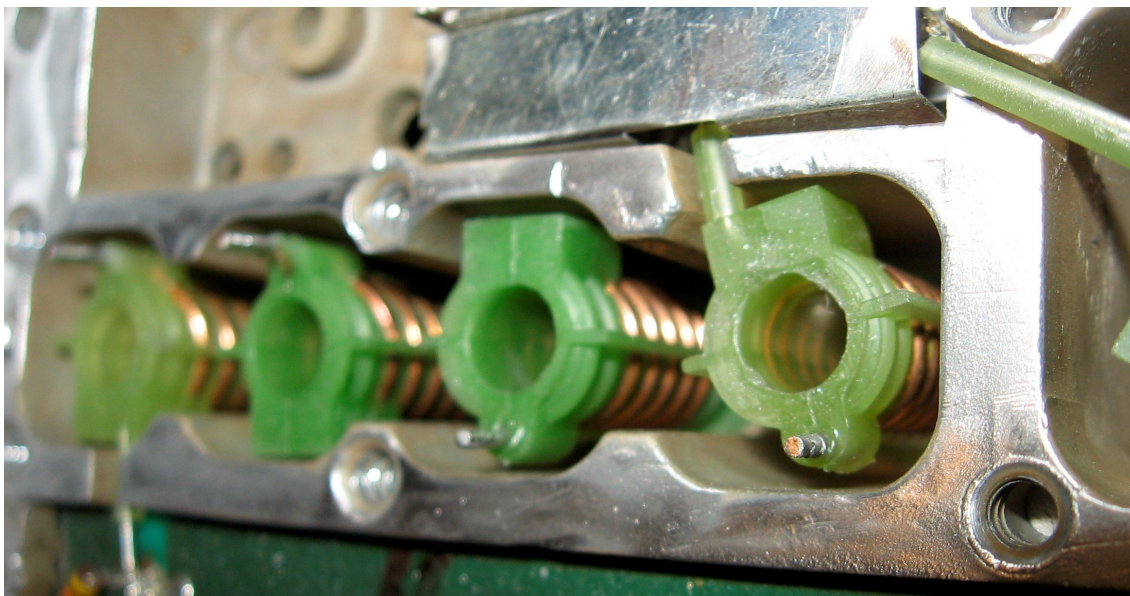
Using a "dremel" you can clean/polish the surfaces of the cover that touches the casting's edges. This may eliminate the PIM issue. On the right shows the result.

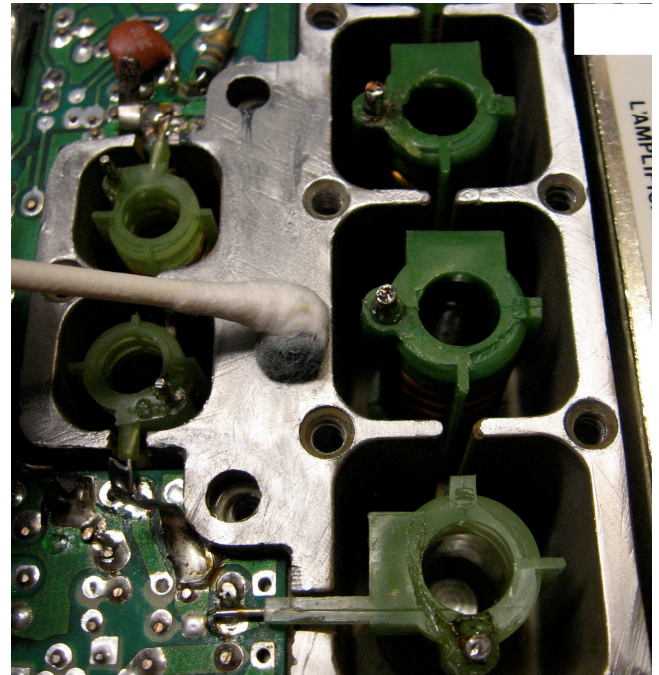
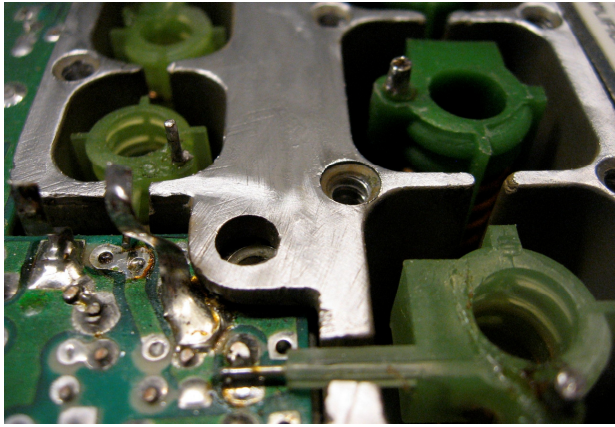


Here's the overall view of the coils and how they sit in the casting. The 4 on the left are the transmitter exciter filter (that feeds the PA section). The 6 in the middle are the receiver's "front end"; with the far right being one part of the mixer. The 2 on the bottom are part of the LO's multiplier section.



Here's a close-up of a coil's lead that was cleaned up of excessive solder. Note the edges of the casting have also been polished to remove any source of corrosion and PIM issues. Do this for the cover, too. Also, clean and blow out any debris that may have lodged on the bottom of the filter cavities. This will also clean out any "whiskers" that might have "grown" inside the cavities. This is a phenomena that happens with other brands of radios (GE Mastr-II for example). In this case there is enough (presumed) chemical reaction to the metals to cause "crystals" to form and grow across the cavity and "short" things out, causing complete failure to specification performance. It's unknown if it happens with this radio (at time of the research by the Author).



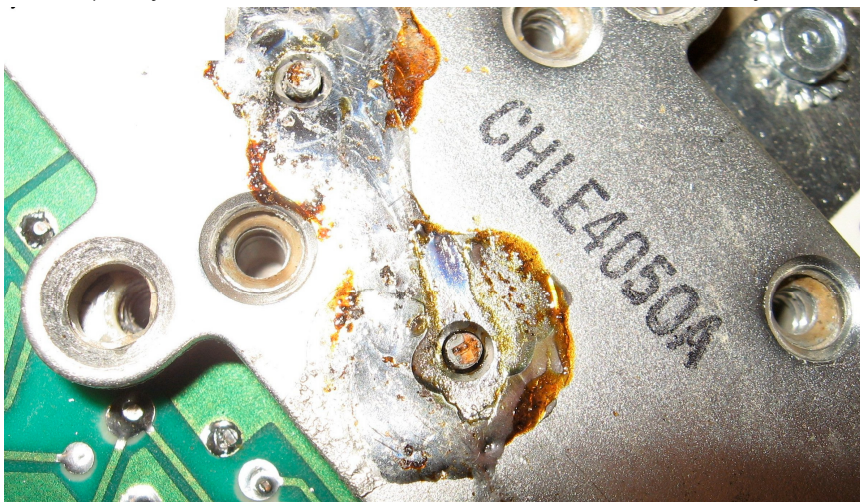


After the casting edges are cleaned and polished you can optionally apply a very thin coat of “interface” compound that solves the dissimilar metal corrosion issue. Using a Q-tip apply it on the casting anywhere it would come in contact with the cover. Apply it to the cover in the same areas. Make sure you don’t use the copper content type of compound because it would compound (pun intended) the PIM problem.

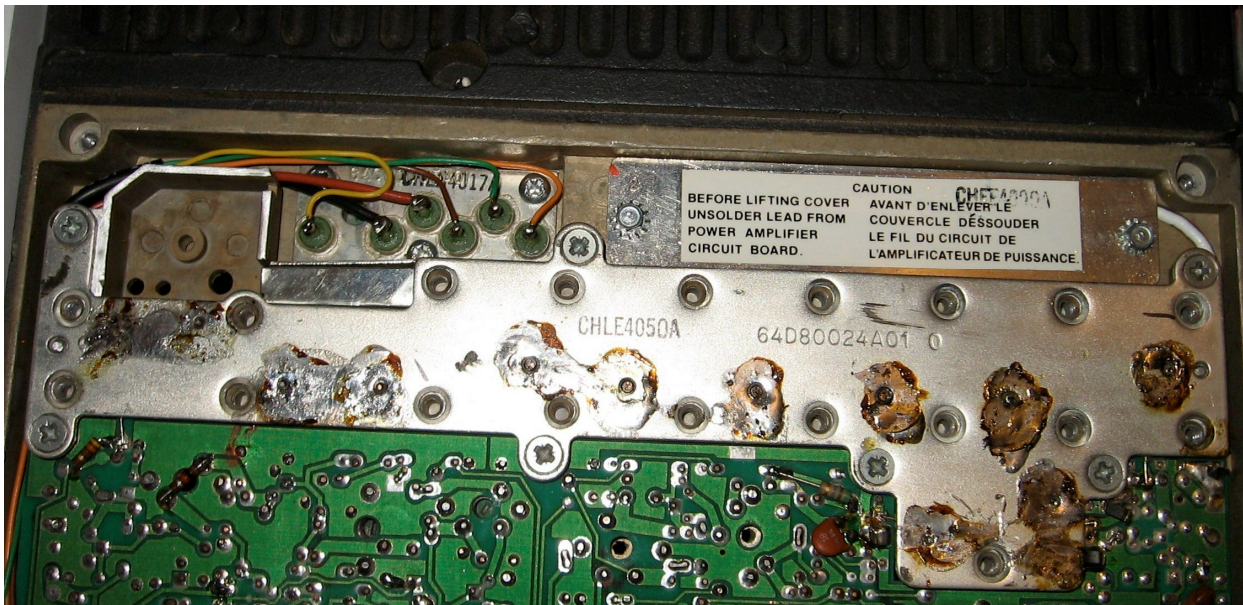
It’s a good idea to place the cover back down on the casting to verify all coil leads clear, and enter all the associated cover holes. In this close-up shows excellent lead placement and clearance. Ideally, each lead should slightly protrude out of the cover for easy bonding when soldering to the cover.

Starting with the 7 (longer) outside screws, secure the cover to the casting as shown. If you removed the I/O pins (will move the casting) you will have to hold the casting with another hand, so the screw holes line up to start the screws. Once the 7 screws are in place the cover will stay in the correct position. Then install the 19 (short) screws. Set the 26 screws with medium torque. The Author uses his experienced hand to work this with the (pozi-drive) screwdriver. If this is your first time you may obtain a calibrated wrench. It’s unknown what the spec is; common sense will tell you not to over tighten them. Another tip: these screws easily get cross-threaded when starting. It will take a special “feel” to get around that issue so they go in with little resistance in the start of the threading.

Solder the 12 coil leads to the cover’s holes, the 3 ground straps to the cover and the 4 I/O pins (if needed) It’s your choice whether to clean off the rosin. Generally, the Author leaves it if it’s not excessive.



The lower picture shows the completed task of the Mitrek's RF casting front end and filtering section.



Finally, tune the radio per the procedure to check performance.

