Equipment Restoration

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Rust Removal--Minimizing Soldering Residue--Replacing a 262 kHz I.F. Transformer

Electrolytic Rust Removal

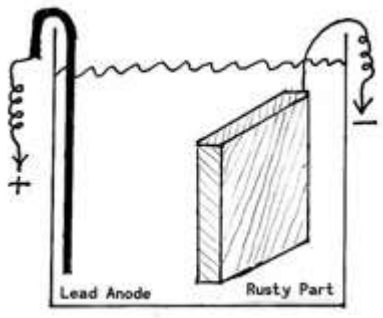
This method of removing rust from radio chassis and other parts did not originate with me. I read it on the antiqueradios.com forum and tried it out on an Atwater Kent chassis which had heavy rusting on one corner from a mouse nest.

Get a plastic bucket big enough to immerse the part in. A 5 gallon bucket from the hardware store or a rectangular plastic trash can is ideal. It must be plastic--not metal.

The electrolyte is composed of sodium carbonate (washing soda)at the rate of 1/2 cup per gallon of water. Do not use baking soda (bicarbonate). I get my washing soda at the grocery store in the laundry products section.

The anode can be iron, but it will corrode heavily in the process. I used a piece of sheet lead for my anode because it is inert. You will need a fairly heavy current, on the order of 10A for a chassis, to remove the rust in a reasonable time.

Bend the lead anode over the edge of the bucket to hold it in place and suspend the part by a copper wire close to the anode. Use wood board laid over the top edge of the bucket between the anode and part to keep them from falling into contact. The arrangement is shown in the sketch.



Pour in enough electrolyte to cover the part and apply the current. There will be a vigorous evolution of gas. Oxygen is liberated at the anode and hydrogen at the rusty part. It is this atomic hydrogen that does the work according to the equation below:

$$6H + Fe_2O_3 \rightarrow 2Fe + 3H_2O$$

This reaction is self-limiting. When the rust is gone, gas continues to evolve, but there is no further action on the metal. You can walk away and come back later to check on progress. The derusted part will have a black coating of iron particles which can be washed away with a brush. The surface will be pitted where the rust was, but there is nothing that can be done about it. The metal is gone and can't be replaced.

After the chassis is clean and dry, I paint the pitted areas with aluminum paint which has a bit of black paint mixed in to give it a slight gray color. While the paint is still wet, I wipe it off the leave paint only in the pits. This prevents future rusting and blends the area in.

The chassis I treated was nickel plated. The process had no effect on the plating. I haven't tried it on painted parts, so I don't know if it will strip off the paint.

Washing soda has been used for a couple of centuries by housewives, so it is safe and does not harm the environment. Used electrolyte can be poured down the drain. *Don't get it in your eyes, and don't inhale the mist which the gas bubbles throw off. It is highly irritating. Do the process in an open area so the hydrogen can escape and not build up an explosive concentration. I work in the garage.*

Here is more in the series of very useful tips from Lane Upton (Salt Lake City):

Over the years I have seen considerable restoration work where the residue from soldering was very obvious. I have been able to minimize the residue by the following procedures and cautions:

1. Use solder with low rosin content, such as Kester #24-6337-8817.
2. Be sure the soldering iron is well up to temperature before using so that most of the flux is vaporized. Mine is adjustable, and I use it between 750 and 800 degrees F. for this type of connection.
3. Pre-tin all materials before making the final solder connection. After tinning, clean all residue from the item before making the final connection.
4. Many of the old insulated wires have a residue from the rubber undercoating which makes them very difficult to tin. I have found by careful use of a small amount of non-corrosive soldering paste they can be easily tinned. Be careful that the fabric outer insulation doesn't wick up the soldering paste because it will discolor the fabric.
5. When the final solder joint is completed, clean with a suitable solvent being sure to cover surrounding areas to prevent splatters. Post-It note sheets are ideal for covering panels etc.

Here is a great restoration fix from John Kaetz, Jr. (Bessemer, AL):

During restoration of a Gloritone 99A, a condition sounding like "silver migration disease" became apparent. It only occurred occasionally so it took a good deal of time to pin it down to the output IF transformer. It didn't respond to the limited things that could be done to repair it. The IF transformer was a 262 kHz unit, close-coupled and single-tuned, appearing to be alternate layer wound. The can was 2 inches tall by two inches square--not exactly an off-the-shelf item.

Remembering that auto radios frequently use 262.5 kHz IFs and having a few junkers around, I found an old 12 volt B+ tube type containing a couple of 3/4 inch units mounted on the PC board. One was removed, checked and looked good. The height was exactly the same as the old IF can but otherwise posed a challenge to mount in an acceptable manner.

I found a piece of 1/2" wide by 0.05" thick steel strip, cut a piece 2 3/8" long, and drilled a hole at each end to match the mounting holes in the chassis for the old IF can. I then drilled a hole in the center large enough to pass an alignment tool through for the hex hole tuning slugs and two small ones on each side of the center hole 3/4 inch apart for the mounting ears.

I filed the edges a bit to get more clearance for the terminals, then stuck the ears through their holes and soldered them in place, thus securing the can to the strip. The terminals straddled the steel strip, hanging off each side. The assembly was placed over the holes in the chassis from underneath to get a bit of headroom in the old can, and then the old can was bolted over the whole thing. From the top it

looked just like it did from the factory. I didn't even have to drill a hole in the top of the old can for alignment, being able to pass the tool all the way through the bottom slug from underneath the chassis to tune the top slug.

I then wired it up, being careful to use the proper connections previously sketched, did a touch up alignment and it worked perfectly. In fact, overall performance was better than the old one when the old one wasn't breaking down. The replacement, not being close-coupled, has better selectivity.

This method would work for a variety of different situations and the mounting base could utilize perfboard that might be more easily worked to fit different transformers or mounting situations. It might not even be necessary to ground the new can because it is inside the old one, which is grounded.