

# SILVER SOLDERING TIPS

If you have been modeling for a while you have probably had to do some non-electronic soldering at one time or another. The best candidate for this is Silver Solder. Not to be confused with radio or electronic solder, which is intended for soldering electronic components and has very little strength compared to silver solder. Radio solder usually has a rosin core to eliminate the need for additional flux so if your solder has a core in it, it's not what you want for soldering that landing gear.

Silver solder can be used to join brass, copper, steel, tin and some other metals. Unfortunately Aluminum is not one of these. Over the years I have tried several so called aluminum solders but did not find any of these to do an acceptable job.

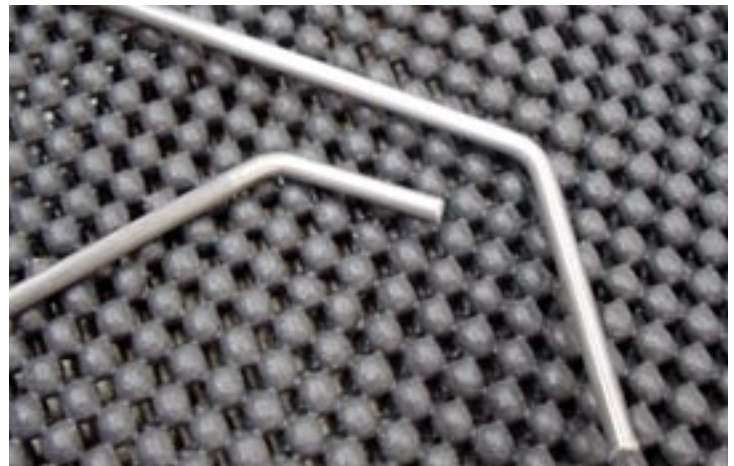
The requirements for a good silver solder job are clean materials, a good mechanical connection, good flux and the correct application of heat and then a good post cleaning. It's just about impossible to assemble wire parts in the air so I usually make some type of jig to hold the parts firmly in the position I want. This can be anything from a bench vice to C-clamps.

## CLEAN THE PARTS

If you are going to use piano wire you will need to degrease it first. This can be accomplished by wiping it down with denatured alcohol until it is removed. When the wire is manufactured it is lubricated with a type of grease to prevent die wear, this material is left on the wire to prevent it from rusting. After the lubricant is removed you will need to remove a layer of oxide with fine (320 grit) sand paper until nothing but shiny metal remains.

## GOOD MECHANICAL CONNECTION

Silver solder alone is not strong enough to survive the stresses placed on a landing gear so a good mechanical connection is required. This is usually accomplished by wrapping the joint with a layer of fine copper wire. I like to use 24-Gauge buss wire, available from Radio Shack in 50' spools (Cat# 278-1341B). This wire is tinned (has a thin layer of solder already applied) so I don't have to worry about oxides. If you use other bare copper wire be sure to pull it through a wad of steel wool a couple of times to remove any oxide from it. Then wrap the entire length of the joint with a neat layer of copper wire. The gear wire parts should be in contact the entire length of the joint. If not adjust the bends until they are, then wrap them. Keep the wrapping neat; no amount of solder will hide a sloppy job here.



Clean parts are an absolute must for good solder adhesion, here the music wire parts have been degreased and sanded to a shiny finish.



A good mechanical joint is created by tightly wrapping the joint with fine copper wire. Try to keep the wrapping neat and tuck the ends under the wraps.

## FLUX

Plumbers solder past can be used however I prefer a liquid flux called Stay-Clean Flux made by J.W. Harris Company because it penetrates the joint at room temperature. Apply the flux and work it into the joint with a tooth pick or acid brush.

## HEAT

Here is where most folks have trouble. I use a simple Weller Soldering Gun, which provides plenty of heat for silver solder. The important thing to remember is that you want to apply the solder directly to the part, not the soldering gun. To do this, the joint must be heated to the melting point of the solder. The soldering tip must be clean and tinned. If it is new, heat it up and apply a thin coat of solder to the entire tip. This will improve the heat transfer and keep the tip from oxidizing.

Heat the iron up and apply a small bead of solder to the tip. Bring this into contact with the joint to be soldered and wait. It may take ten or twenty seconds for enough heat to transfer to the part to melt the solder. Occasionally tap the tip of the solder to the joint to see when it is hot enough. When the solder flows freely apply enough to fill the copper wrapping and the void between the gear parts. If you get too much, just remove the heat and quickly wipe the excess off with a wad of paper towel. Apply enough solder so you get a nice smooth shiny finish, then hold the heat on for a couple more seconds to assure filling all voids.

Remove the heat and do not allow the parts to move until cool. As the solder cools it will go through a plastic state (not liquid and not solid). If the parts are allowed to move during this time the strength of the joint will be seriously compromised. You can tell if the solder joint has a dull granular look to it. If this happens just re-heat the joint until it is shiny again and let it cool.

## POST CLEANING

Now that you have removed the protective lubricant and applied an acid flux you have a perfect candidate for rust and corrosion so a post cleaning is a must. To remove the flux, first wipe all visible remnants off with a paper towel and then dip or brush it with a mixture of Baking Soda and warm water. This will neutralize any remaining acid that would otherwise keep working on the metal to slowly corrode it. Then the best bet to keep the assembly from rusting is a coat of paint, if you don't want to paint it then spray or wipe on a liberal film of oil to keep it looking good.



Silver solder is applied and heated until capillary action pulls the solder in to fill all the voids between and under the wire wrapping.



Here an inner wheel bearing surface is being added. A #4 washer has been placed on the axle and is supported by a short length of silicone fuel tubing. The fuel tubing is impervious to the acid flux and the soldering heat and will prevent solder from flowing through to the other side of the washer. A simple wood block is used as a supporting jig.

## BELOW

The finished gear assembly is ready for paint after cleaning. If you have any rough spots you can sand or file them out before priming and painting to match your aircraft. A matching gear adds some subtle class to your model.

