Repairing the gear lever dust cap on the RV8 LT77 gearbox

The gearbox dust cap on the LT77 and R380 gearboxes fitted to RV8s and many other Rover products is a little weak in its design, relying on a single screw to hold it in place. Often you will see that the small bracket on the side has broken or the spot-welds holding the bracket on to the cup have detached.

The LT77 on my BV8 Roadster conversion had suffered badly so I fabricated a small right angle bracket from a small steel disposable spanner that I think came with a flat pack bed. I never throw this sort of thing away, even though they are pretty much useless as tools, because they can provide a useful supply of what a Texan friend of mine calls “Makins” as in “I’ve got the makings of a bracket here”.

You’ll need to remove the cap from the gear lever assembly first. To hold the bracket in place while I silver soldered it in position I wrapped it around with stainless steel locking wire, a little tricky but it avoided drilling a hole through the cap.

For those not familiar with silver soldering, sometimes called hard soldering, brazing or bronze welding, the process is similar to regular (soft) soldering where a joining metal called solder is melted onto heated parts of the parent material. The solder forms an intermetallic bond with the atomic structure of the parent metal(s) and holds the part in place.

Soft soldering uses an eutectic alloy (as that gives the lowest melting point) of Tin, Silver and Copper with a melting point close that of the original Tin Lead solder now obsoleted by RoHS (Restriction of Use of Certain Hazardous Substances) rules. The melting point is low, typically around 200 deg C, but the bond is not mechanically strong under vibration and stress. Silver solder, or hard soldering (or brazing) uses an alloy that contains silver, copper and other metals (there are many variants) but the melting point is very much higher at 800 deg C to 1000 deg C, and so produces a much stronger joint.

Metals to be joined should be cleaned well with a wire brush, file, etc and coated with the appropriate flux, usually in the form of a white powder that is mixed with water to a creamy consistency applied to the joint before heating.

The temperature of the metal required to get a good intermetallic bond is such that a gas fired torch. If it is small item a good (Rothenberger) torch as below, perhaps two, might be sufficient. Otherwise an industrial propane torch with a greater heat output will be needed.

Typically the metal will be heated until it glows dull red and the filler rod applied to the fluxed area and it will melt and flow. This is very satisfying and the capillary action will carry molten metal into the spaces between the parts to be joined.

Almost all motorcycle and bicycle frames used brazed joints, a similar process to silver soldering, using a bronze alloy to join the tubes to the head lugs and fork brackets because the process did not stress or cause the steel tube to lose its temper.

Soldering or brazing differs significantly from welding. When welding two pieces of metal the skill of the welder is called upon to form a molten puddle of the parent metals and add a filler rod of similar composition, so effectively the weld is a small area of cast metal at the join interface. You will hear of many techniques - Oxy-acetylene, TIG and MIG are the most popular, the latter two rely on the heat from an electric arc to melt the metal.

In soldering or brazing uses (usually) a joining metal that is different to the parent metals and does not require the parent metals to be melted, it is suffice to raise the temperature to a sufficiently high level to enable the atomic structure of the parent and joining metal to interact at the atomic bond level.

A word or two on cleanliness and flux. In all soldering it is vital that the metals to be joined are clean and free from grease, paint, oil, dog poo or anything else. The flux is applied - they are of two kinds, inactive and active, the latter being the most common - and when heated they actively reduce (remove oxidation) from the metal and allow the solder to “wet” the metal to be joined. If you are joining wires for example, the flux is usually of the rosin type, often inside the solder wire and is primarily a shield to prevent oxidation of the metal when it is heated, but does have some active properties, but these are not corrosive after soldering. Active fluxes, such as those used in silver soldering and brazing are quite aggressive and remove oxidation and shield the surfaces while the soldering is in process. The residue looks like a glassy coating and should be chipped off or mechanically removed after soldering.

Aluminium and stainless steel present great problems to the amateur for the reason that they don’t corrode because they develop a cathodic film of a protective nature that prevents further corrosion. To solder, weld or braze these materials requires an aggressive flux and in the case of aluminium often mechanical stimulation. These are best taken to an expert, particularly if you are repairing an unreplaceable part - imagine trying to weld your cylinder head and having it melt into a big pool of molten metal where it wasn’t as thick as you thought it was.

Last tip, if you remove the gearbox with the engine, the screw holding the cap is not easy to get at, just file a small indent into the transmission tunnel above it to enable you to get a small socket ¼” drive on to it, then replace it with a socket head screw (Allen head) and put a little grease on the end of the key when refitting the screw.