

## Here is How I Do It!

### Disassembling a model Locomotive & Servicing It

Michael C. is a CMRCI member who routinely services and repairs model locomotives (and freely gives his advice and expertise to other Club members!)

Michael was approached to provide information about how he carries out this important function so that it could be shared with others in a Club presentation and a possible Bulletin report. Here is what he provided:

#### Tools needed for the task:

- Cotton buds
- Screwdrivers – a selection of small flat and small Phillips-head screwdrivers
- Electrical contact cleaner spray e.g., “Supacheap” SCA or isopropyl alcohol
- Tweezers – flat, long points, pointy ended type, etc.
- Files – point files, 3-sided files, flat files, **but not coarse ones!**
- Small side-cutters
- Pointy pliers – fine ones e.g., see “Specialty Fasteners” at Fyshwick ACT for good small tools
- Lint-free cloth or lint rollers
- Multi-meter
- Reaming tool for axles boxes
- Soldering iron with fine point
- Small, fine cutters for cutting small sections of fine copper sheet
- Small hammer
- Small vacuum Cleaner with **light** suction.
- Small syringe
- A cradle to hold and not damage models – foam best, but you can improvise with short lengths of timber and bubble wrap
- Containers for screws and other components + labels for compartments

#### Lubricants:

- Light machine oil (e.g., from “Lincraft”)
- Graphite powder (fine)
- Light grease – multi-purpose Lithium-based

**Disassembly of the model locomotive:** To begin, we will assume that this is an older steam loco model:

1. Check over the body and chassis of the loco to find out how and where to take it apart.
2. If needed, remove the couplers and coupler boxes. Store parts carefully.
3. Take the body off **carefully** – try not to break any plastic holding lugs.
4. On some older models, bogies are rivetted to the body. On some, take pins out of the bogies to access wheels. Check if old model wheels are round (some may be flat in part and will not roll properly. Get replacements for worn wheels/bogies. Possibly look at 3-D printed replacements.
5. Check wiring. Check soldered joints for solidity – they may require cleaning & re-soldering. **Label** wires for future re-connection. Check bulbs – replace if necessary.
6. Check all carbon brushes for wear. If worn, replace if needed. Clean as needed. Check wiring connections to the motor. Use heat shrink tube on butt joints for added strength.
7. Check inside of wheels & flanges for cleanliness. Clean well if needed. Check the chassis to ensure it isn't cracked. Check pint-pint ends of axles and their holes in the axle boxes on the bogies frames. Use reaming tool if needed, but sparingly (2 or 3 turns **at most**.) Fit tiny metal bearings in axle boxes if they are too worn.
8. Check linkages on steam locos between the footplate and the tender. Clean/mend/replace damaged parts. Lubricate moving parts very sparingly. Check parts are not bent.
9. Older motors have the power wire to the brush assembly insulated from the body of the assembly and the chassis of the locomotive. The power wire is connected directly to one of the brushes that is insulated from the brush assembly, the other brush of the brush assembly that is not insulated from the motor or chassis, otherwise it will cause a short.
10. The wheels on the side of chassis on the older units where the power pick up connects to are insulated from chassis as is the power pick up where it is attached to the chassis of the locomotive, the power wire comes of the pick-up. and is attached to the insulated brush IE Tri-ang early Hornby.
11. Some newer locomotives have the body of the motor fully insulated from the chassis of the locomotive. Each side of the chassis are also insulated from each other. The power comes from track through the chassis to a brush on one side of the brush assembly that is insulated from the other side of the brush assembly. The other brush completes the circuit through the chassis back to the track. IE like a little trike.
12. Check to see which motor layout options you have.
13. Check to see which way your motor assembly it mounted.
14. Check motor for damage

15. Check base of motor, the stators, magnets, supports, bearings, lubricate, when necessary, the shaft between the supports, the rotor/coil, the commutator plates, brushes for wear

### **What is the next step?**

With the body removed, place the loco chassis on the track. If it is “sparking” or shorting. Then a short is occurring between the body and the track.

1. Check to see if the pick-up assembly is insulated from the chassis and the collector arms are also not touching the chassis.
2. Check there are no cracks in the chassis
3. Check that positive wire is connected to the insulated brush on the motor assembly.
4. Check that the comutators are both clean of oil and dirt
5. If fitted with steel wheels, check to see if they are also not cracked.
6. Check to see that the wheels on the pick-up side are insulated from chassis.

Run the chassis to check how the motion works and how the motor runs.

Carbon brushes, if dirty, need to be cleaned **carefully** and not too much should be removed. If magnets get dirty, they need careful cleaning. If magnets are removed, put them back the same way as they were so that polarity is not changed.

Each motor type is not built the same way and the brushes are removed from each motor differently.

The X04 motor release spring pressure from brush arm and withdraw brush with tweezers, ensure that the insulating sleeve on brush spring is position correctly.

The other side of the motor has a spring without an insulating sleeve holding the brush in place, again release spring pressure from brush arm and withdraw the brush with the tweezers. Replacing brushes is the reverse operation.

The Ring-gear motor has 2 spring retaining arms that hold the 2 springs and 2 carbon brushes in place. With care not to let the springs jump out, lift the 2 retaining arms with a screwdriver blade. Withdraw the springs, if carbon brushes do not come out turn mechanism over and tap lightly. If the non-tapered ends are less than 1/16” long, the brushes should be replaced.

Using a sharpened matchstick to replace springs, again be careful not to let spring jump out. Once you have the carbon brush and spring in place bend the retaining arms back to their original position.

**Cleaning:** Use methylated spirits on cotton buds or a small paintbrush. If metho doesn't remove dirt, try “Desolvit” (from Bunnings). That cleaner also removed old glue deposits. You can try white spirits (dry cleaning fluid) **but first test it** to ensure that it doesn't remove paint. If using emery paper, use the finest grade. You could also use **point files** (photo needed.)

If the mechanism is “oily,” remove any excess lubricant with a cloth dipped in methylated spirits.

Make sure that no oil or grease is found on the commutators or brushes or collector arms.

Once you are happy that everything has been cleaned, checked for damage and parts are ok, reassemble the locomotive in the reverse order.

### **Lubrication:**

Lubricate with light machine oil (or even a finer grade), using only **one drop!** Lubricate bearings on wheels and bogie bearings. Remember, “Less is Best!” On shaft bearings on the motor, one drop will suffice. Test for effect by turning or running the component.

The best method is to pour a little oil into a metal screw-top bottle lid and to transfer one drop only on each oiling point on the end of a piece of wire. Do not use the nozzle on the oil can as it will dispense far too much oil at a time. When a drop of oil has been applied to each oiling point wipe off any visible oil with a cotton rag.

An oiling tool can be made by cutting a piece of stiff wire about 2 inches long, into a cork.

After running the locomotive for about 2 minutes at a fast speed, wipe off any surplus oil that has appeared. If Loco runs well, add a carriage or two to see how it runs under load.