

Testing That New Locomotive

What to Do if It Doesn't Run Perfectly Out of the Box...

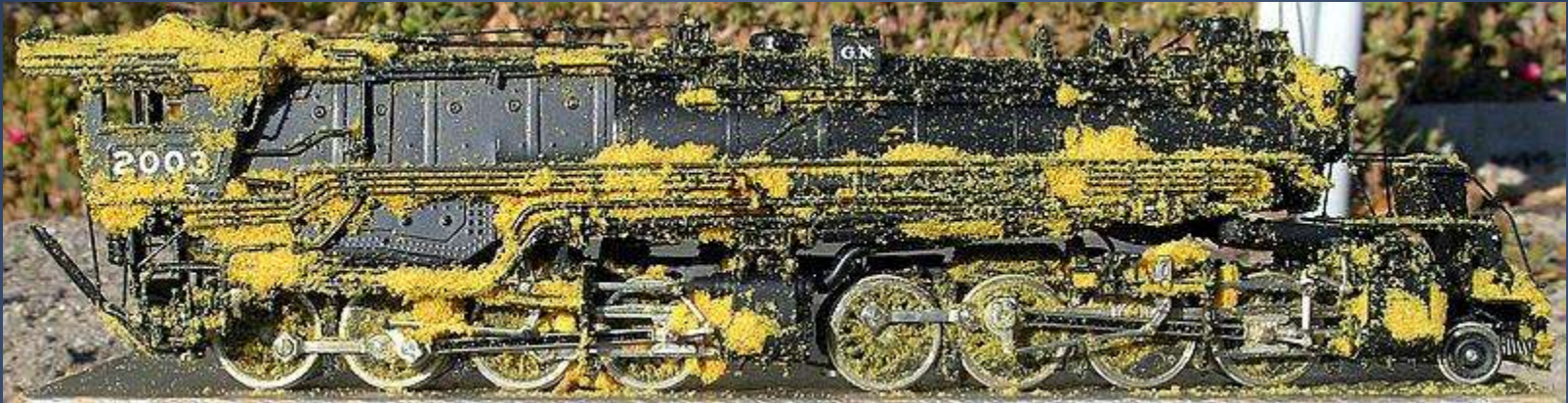
Carefully Unpack the Model

- Packaging is not a strength of many eBay sellers
- If the model is not firmly supported by the foam or if the foam has deteriorated, proceed cautiously looking for loose parts.
- A can of Dustoff is useful in clearing debris after the model is unpacked; pieces of foam can get in everywhere.
- Visually inspect for damage and/or missing parts
- Separate the engine and tender if they were shipped connected with plug-in cables.
- Press on the drivers to see if they are sprung, if one set of drivers does not move a driver spring may be missing or there may be a severe mechanical problem, investigate before testing.

Packaging is not a strength of many eBay sellers



If the model is not firmly supported by the foam or if the foam has deteriorated, proceed cautiously looking for loose parts.



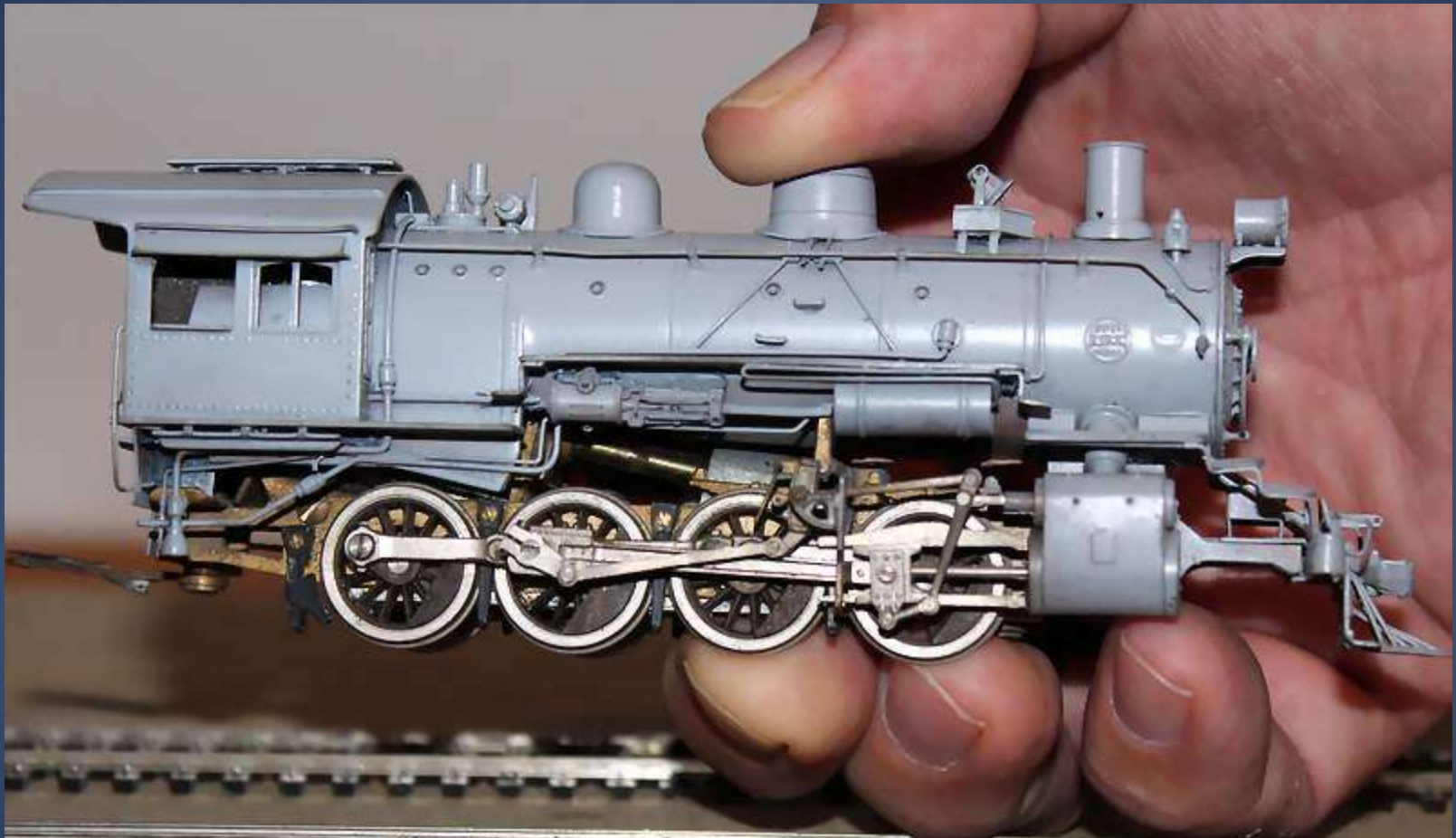
Visually inspect for damage and/or missing parts



Separate the engine and tender if they were shipped connected with plug-in cables.



Press on the drivers to see if they are sprung, if one set of drivers does not move, there may be a severe mechanical problem, investigate before testing.



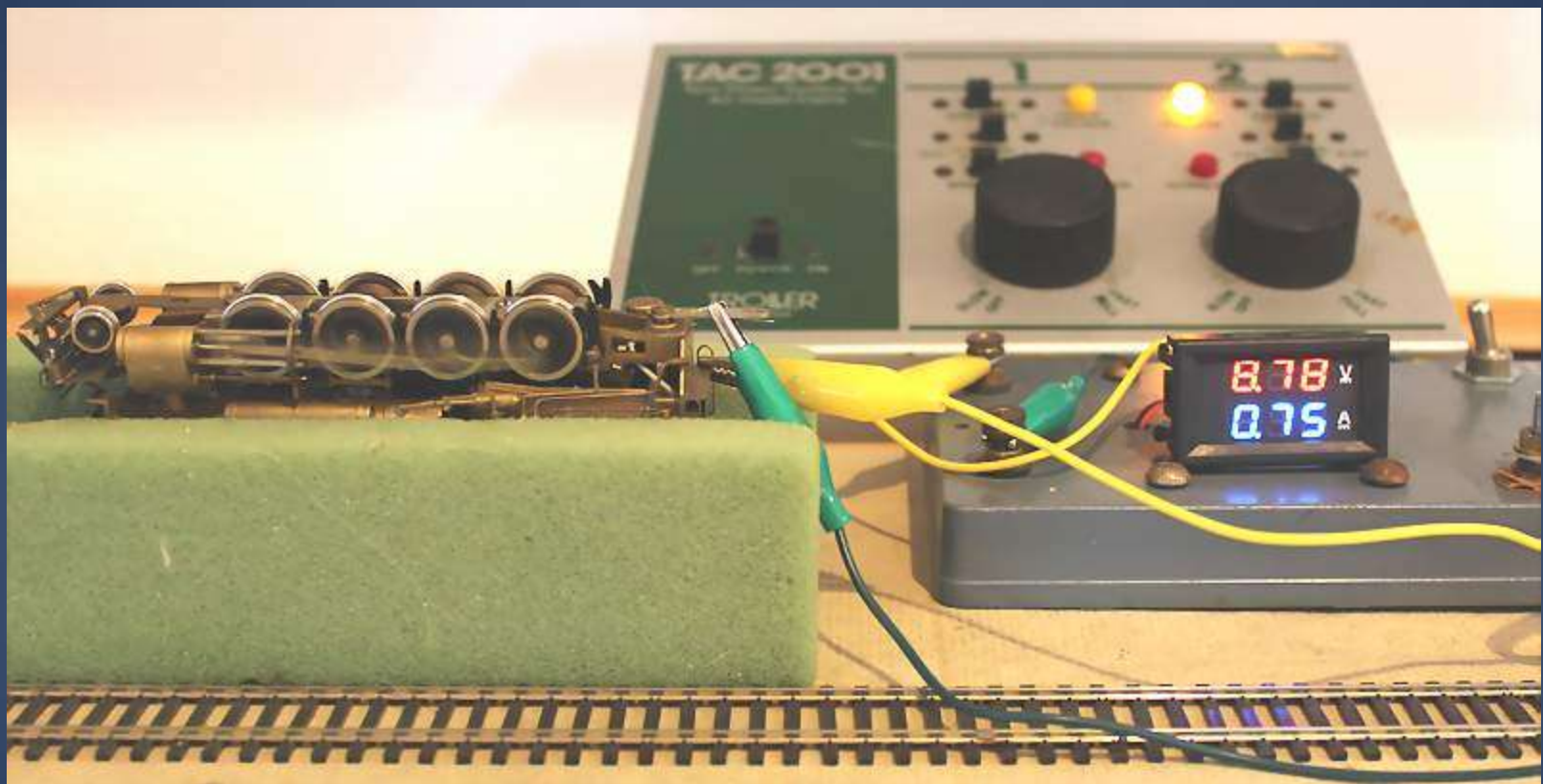
Testing the engine w/o tender

- Roll the locomotive drivers back and forth across your hand, the drivers should have enough play to move a few degrees in either direction. If the drivers other than the geared axle are frozen, skip this section.
- Using a DC power supply with voltage and meters, connect one test lead to the engine frame and the other to the wireless drawbar.
- With the model on test rollers or suspended so that the drivers are not touching; Slowly apply power to the engine. If the model runs smoothly at all speeds in both directions, proceed to Testing the Model on the Test Track. If the model does not run and draws zero current, then the wiring is broken somewhere and the engine needs the superstructure removed to trace the electrical path.
- If the model lopes at very low speeds but then runs smoothly with more power, the flexible tubing needs replacement and alignment. After replacement with silicon fuel line tubing, proceed to Testing the Model on the Test Track

Roll the locomotive drivers back and forth across your hand, the drivers should have enough play to move a few degrees in either direction



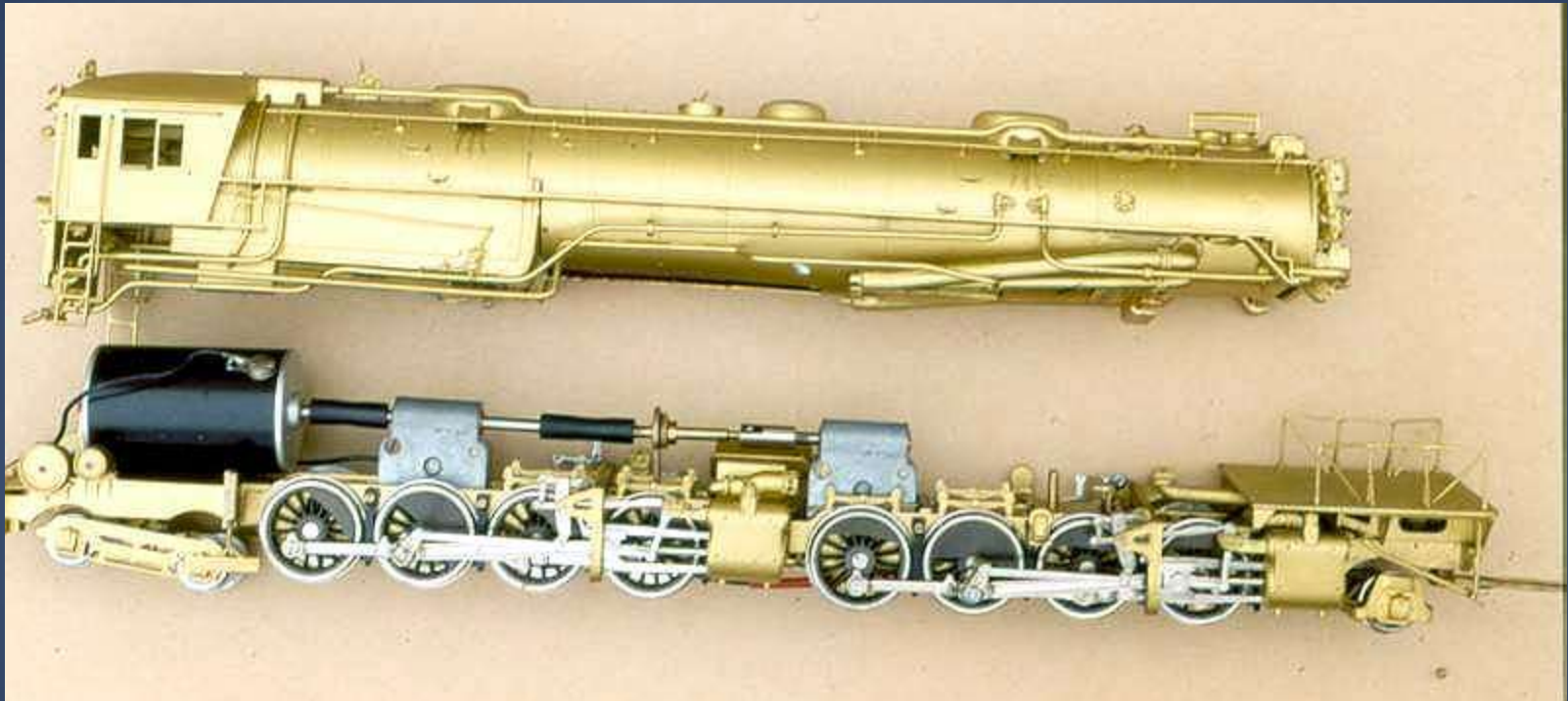
Using a DC power supply with voltage and meters, connect one test lead to the engine frame and the other to the wireless drawbar



With the model on test rollers or suspended so that the drivers are not touching; Slowly apply power to the engine



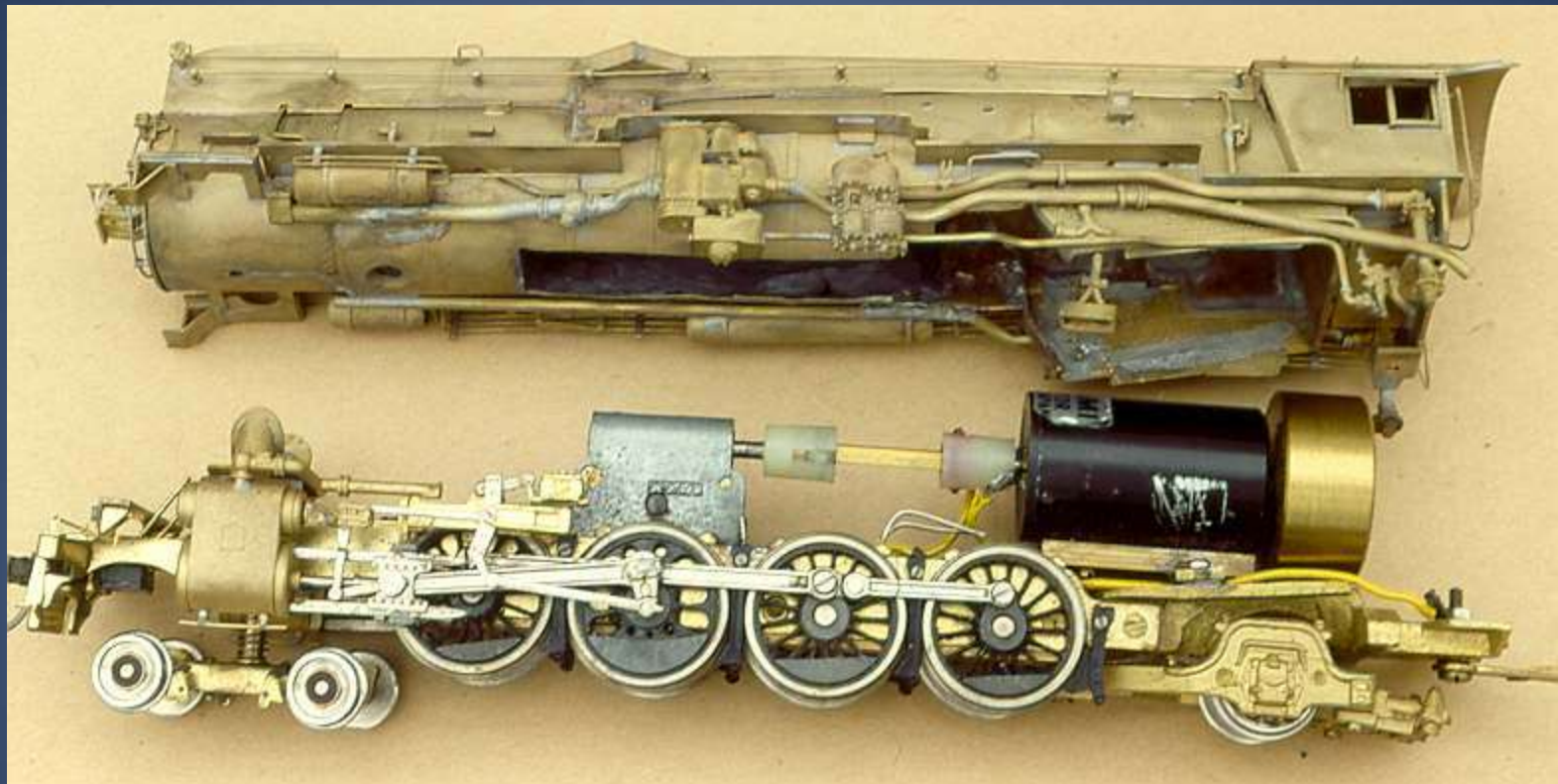
If the model lopes at very low speeds but then runs smoothly with more power, the flexible tubing needs replacement and alignment



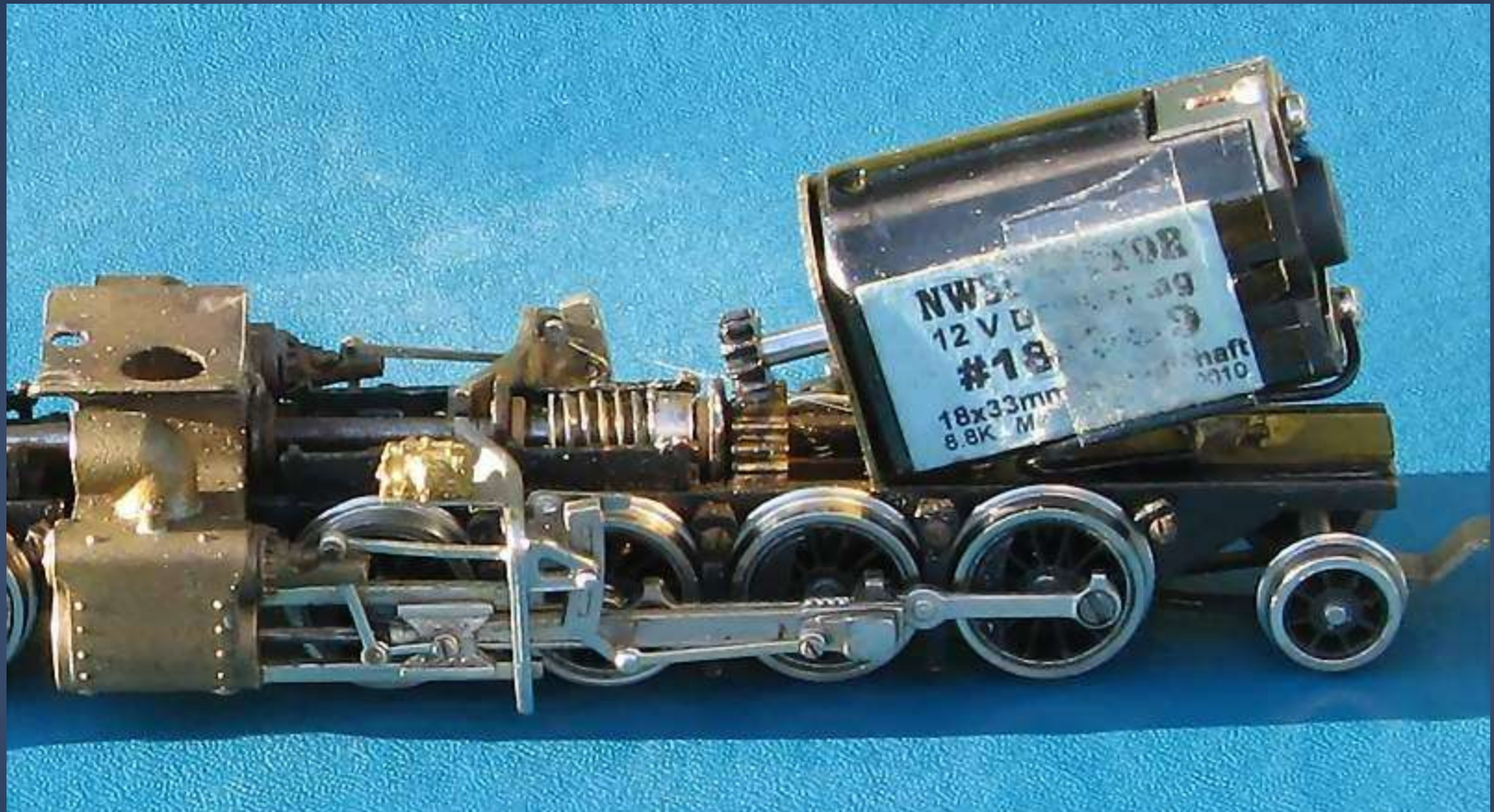
Testing the engine w/o tender

- Observe the amp meter at various speeds. A model with a can motor should not draw more than 150 milliamps during this test. A model with an open frame motor should not draw more than 500 milliamps. For models with excessive current draw, proceed to the Excessive Current Draw section.
- If the model is excessively noisy, it is most likely due to an older, possibly worn out open frame motor or poor gear mesh. To replace a bad or worn out motor, consult an on-line repowering guide (mine can be found at www.shastasprings.com). Gear noise can be due to poor gear alignment, spur gear towers, repair using the wrong gear pitch; or excessive gear wear due to poor gear box design or the wrong parts. Excessive noise and current draw will likely require gearbox repair by replacement, consult a repowering guide before proceeding.
- If the model has an obvious bind with each driver rotation; there is likely a driver quartering problem. Perform a quick visual check. By hand rotate each driver so that the counterweights align on one side; carefully turn the model over, the counterweights should be parallel, about 90 degrees from the alignment on the other side. Models failing this visual test will need to have the quartering checked.

Observe the amp meter at various speeds. A model with a can motor should not draw more than 150 milliamps during this test



If the model is excessively noisy, it is most likely due to an older, possibly worn out open frame motor or poor gear mesh



If the model has an obvious bind with each driver rotation; there is likely a driver quartering problem. Perform a quick visual check



Testing the engine w/o tender

- By reaching this step you have an almost fine running model with a hesitation (or lobe) at all speeds. This normally indicates a mechanical bind in the running gear. Look for crossheads hitting pistons, valve gear hangers, misaligned crosshead guides, poorly soldered or loose guides. Look for broken, detached or bent valve gear components. Look for side rod and main rod interference with eccentric cranks, side rod screws, other rods. Move the drivers side to side in the frame; sometimes the interference occurs only in one direction when the drivers move to one side.
- This model is a hard one to diagnose, 99% of problems will have been found by this step. Indications are that it is a hidden defect, such as broken solder joints in the frame, or wiring interference, that can only be discovered by careful disassembly. Proceed with caution.

By reaching this step you have an almost fine running model with a hesitation (or lobe) at all speeds. This normally indicates a mechanical bind in the running gear.



This model is a hard one to diagnose, 99% of problems will have been found by this step. Indications are that it is a hidden defect



Testing the Model on the Test Track

- Connect the test DC power supply used before to the test track.
- Place the engine on the track, apply power, look for shorts. Current draw should be zero. IF there is any current draw then you may have failing insulation in the wheelsets or drivers, or brass parts touching a wheel flange. Brass brake shoes are a very common culprit for this; if you have a short, remove the brake shoes before proceeding. The paper insulation between the driver center and driver tire can be compromised by over lubrication; at 12 volts DC, smoke may be seen from the oil/insulation actually burning. The driver will have to be repaired/replaced before proceeding.
- Place the tender on the test track by itself. Again apply power looking for shorts. If the engine and tender have not been modified with electrical enhancements such as DCC, etc; all insulated tender wheels should be on the same side. Look for tender trucks rotated 180 degrees, causing the tender to short itself. Correct if necessary.

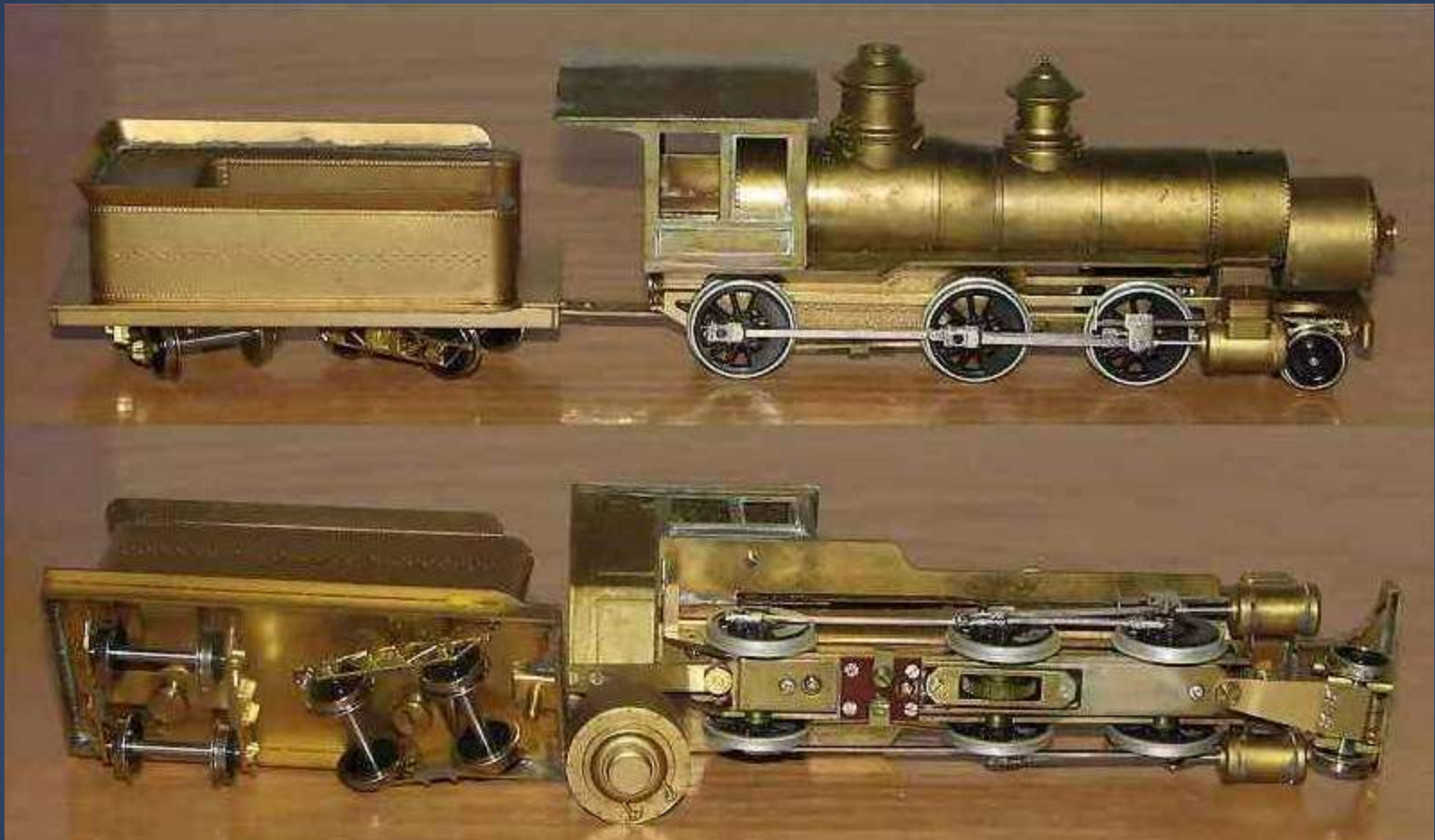
Connect the same DC power supply used before to the test track



Place the engine on the track, apply power, look for shorts.
Current draw should be zero



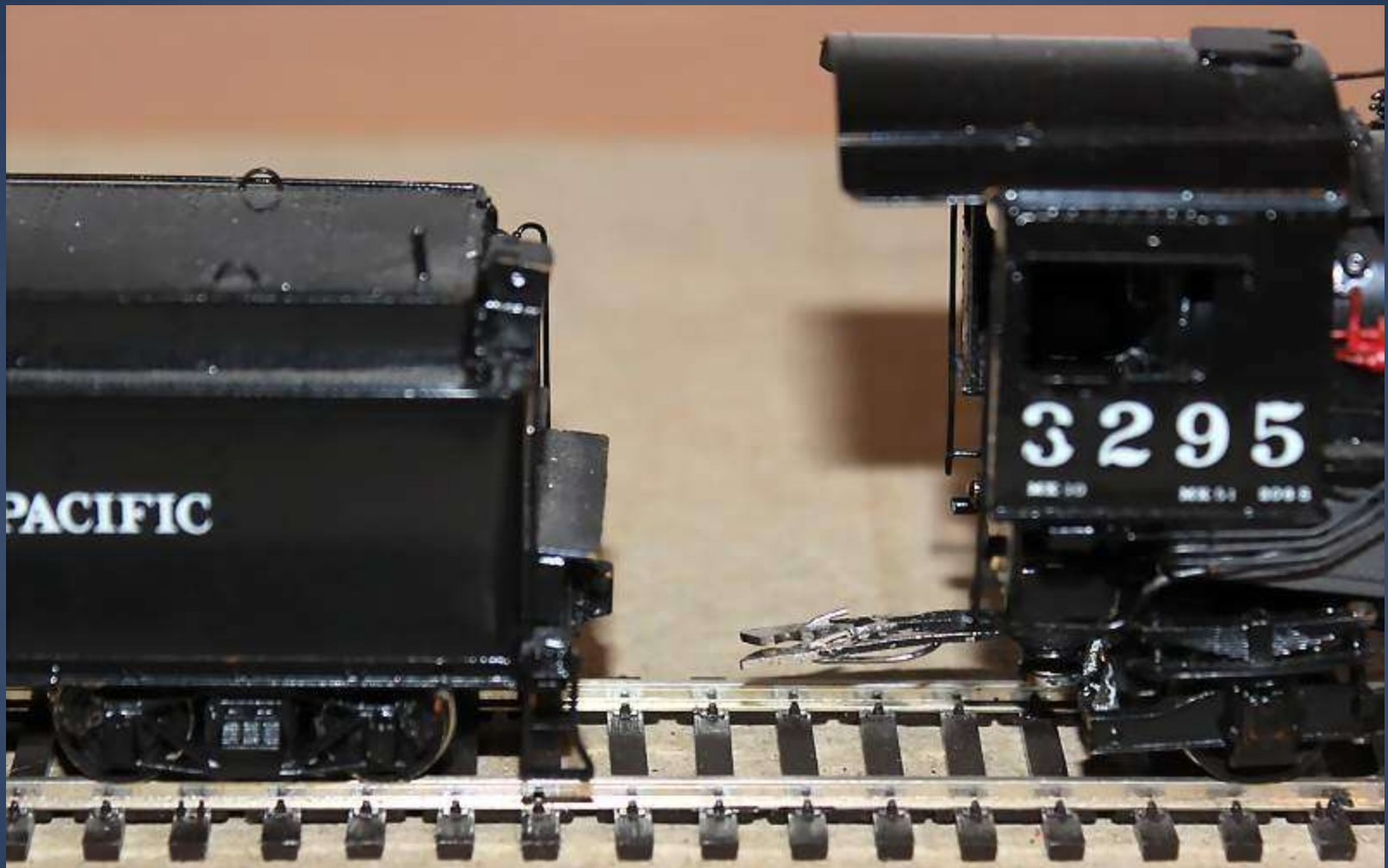
Place the tender on the test track by itself. Again apply power looking for shorts, reversed wheels



Testing the Model on the Test Track

- Connect the engine and tender on DC models. (Further testing of DCC models is outside the scope of this discussion)
- Run the model back and forth on the test track, observe current draw. If the model does not run smoothly; Repeat the testing steps D-H of Section II. Current draw should not increase more than 10% when running the engine and tender on the test track. If the model runs fine you are done. Congratulations
- The test track will show problems such as wobbling or hunting down the track. This behavior is common with 0-4-0 tank engines; but with larger locos is normally due to wheels not squarely pressed onto their axles
- Check to see if all the drivers are on the rail at all times. Stiff or poor springing may make one driver set high-bottom on the track. Common causes are torque arm motor mounts, engine weights or neoprene tubing that do not allow free movement of the geared axle

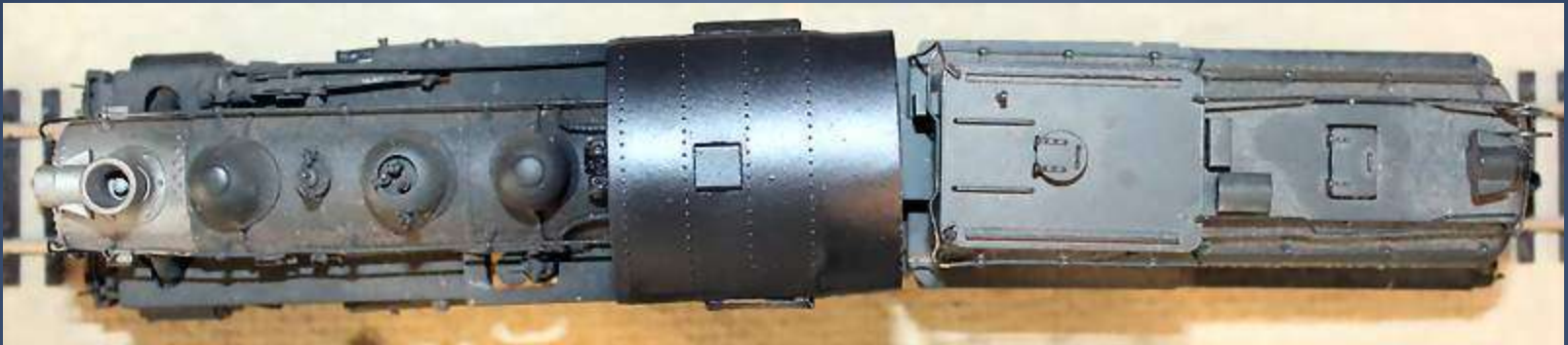
Connect the engine and tender on DC models.



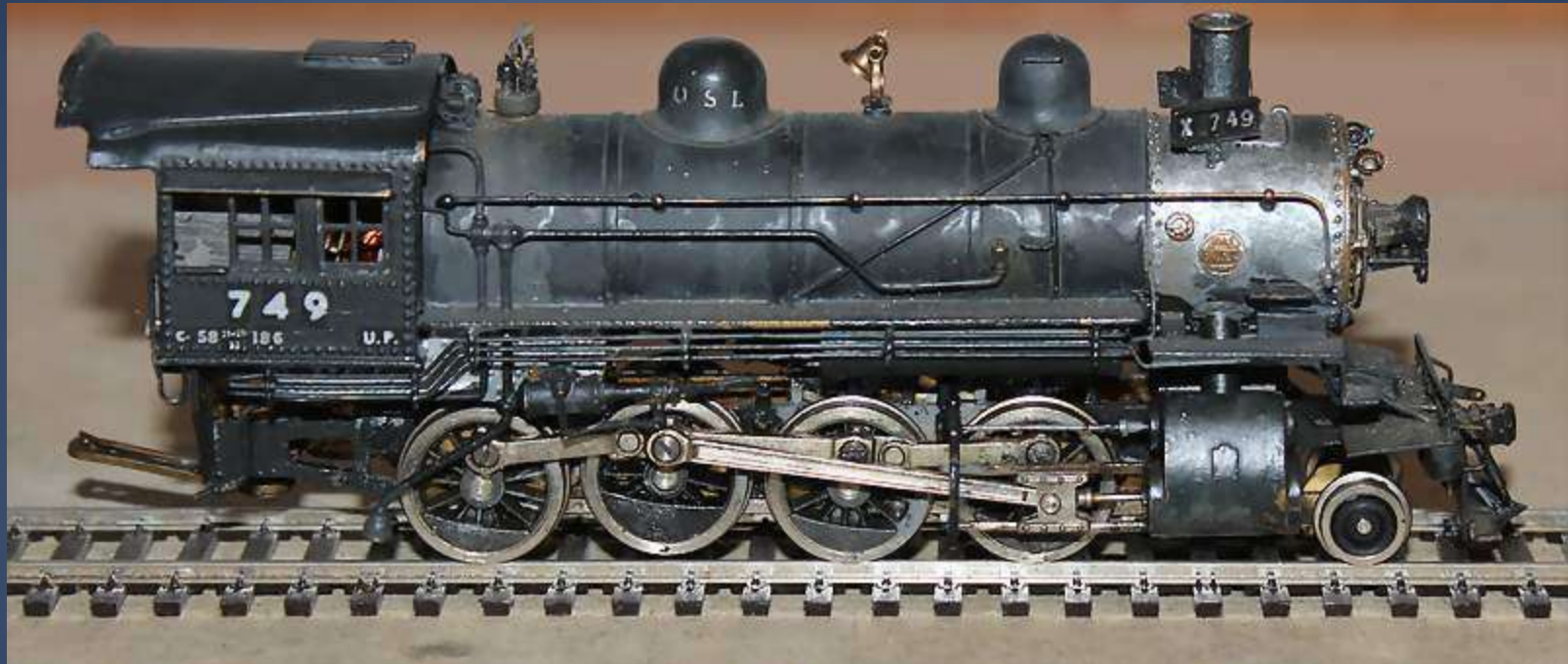
Run the model back and forth on the test track, observe current draw. If the model does not run smoothly; Repeat the testing steps D-H of Section II



The test track will show problems such as wobbling or hunting down the track.



Check to see if all the drivers are on the rail at all times.



Testing the Model on the Test Track

- Frankly there are some bad models that have been produced. Typically these are very early models, produced in the 1950s in Japan or in the late 1970s in Korea. Check a brass guide for the production date and builder location for the model.
- Some highly desirable and valued models suffer from poor craftsmanship and quality control. Caveat Emptor.

Frankly there are some bad models that have been produced. Typically these are very early models, produced in the 1950s in Japan or in the late 1970s in Korea. Some highly desirable and valued models suffer from poor craftsmanship and quality control. Caveat Emptor



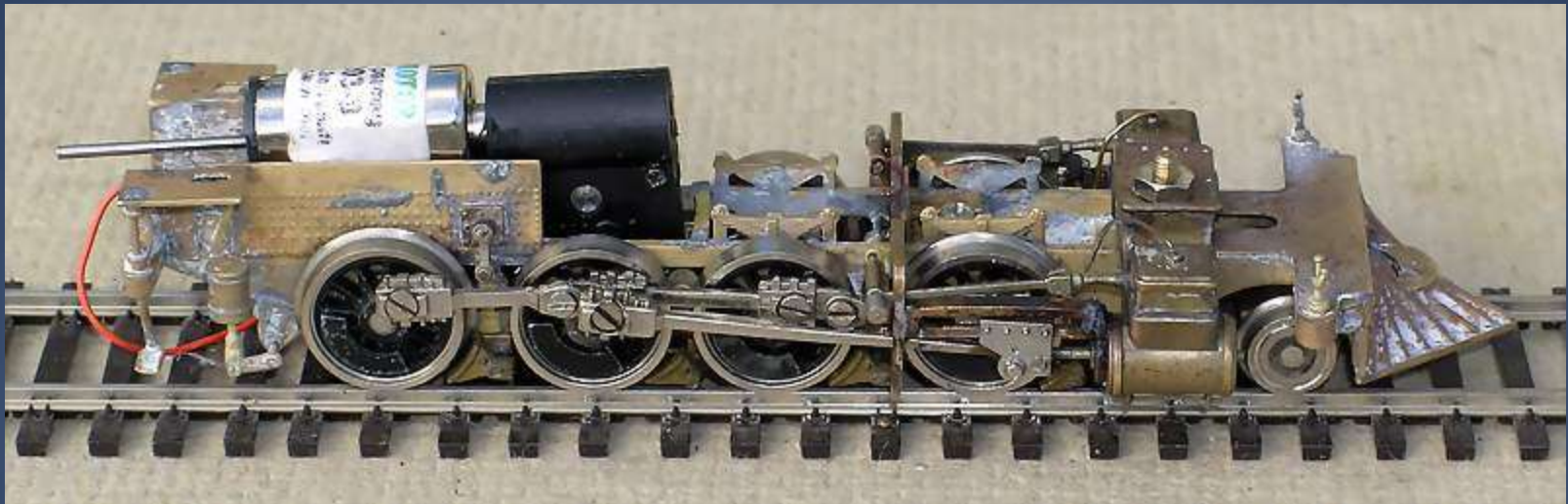
Excessive Current Draw (Advanced Evaluation)

- Carefully remove the frame from the superstructure, look for items that may impact the rotation of the drive shaft or press upon the motor or gearbox.
- Test just the mechanism with the DC power supply. If current draw is now normal, there was an obstruction you missed during the visual inspection
- Visually inspect the drive train from the motor to the gearbox. Flexible tubing will markedly increase current draw if there are bends; sharp bends are much worse. Good universal drives can correct this problem. Disconnect the motor from the gearbox. If current draw is still high, you have a bad motor
- If current draw for the motor is normal, reconnect the motor and gearbox. Disengage the gearbox from the geared axle by removing the gearbox cover and raising the gearbox slightly until the drivers spin freely. Test again, if current draw is still high, you have a bad gearbox.

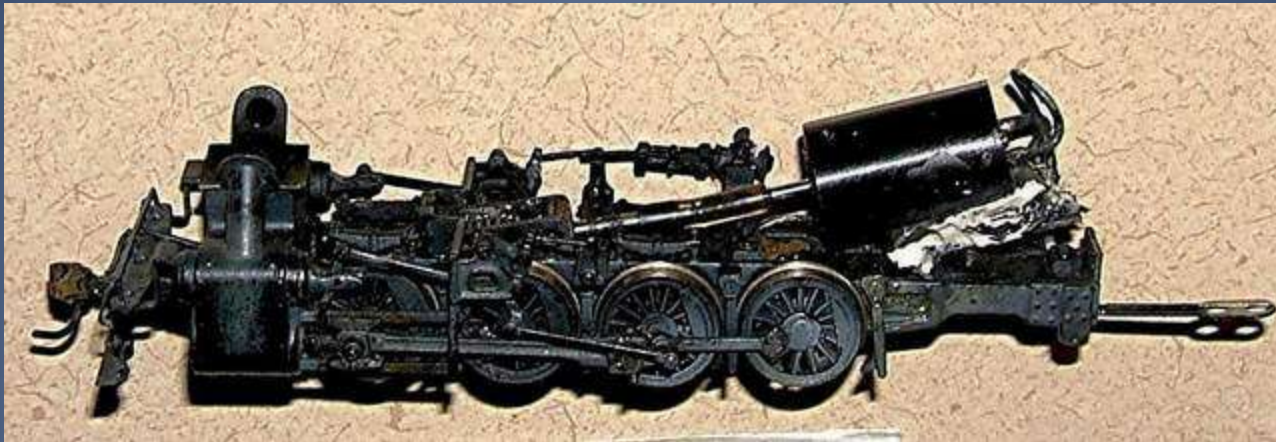
Carefully remove the frame from the superstructure, look for interference with the drive shaft, motor or gearbox



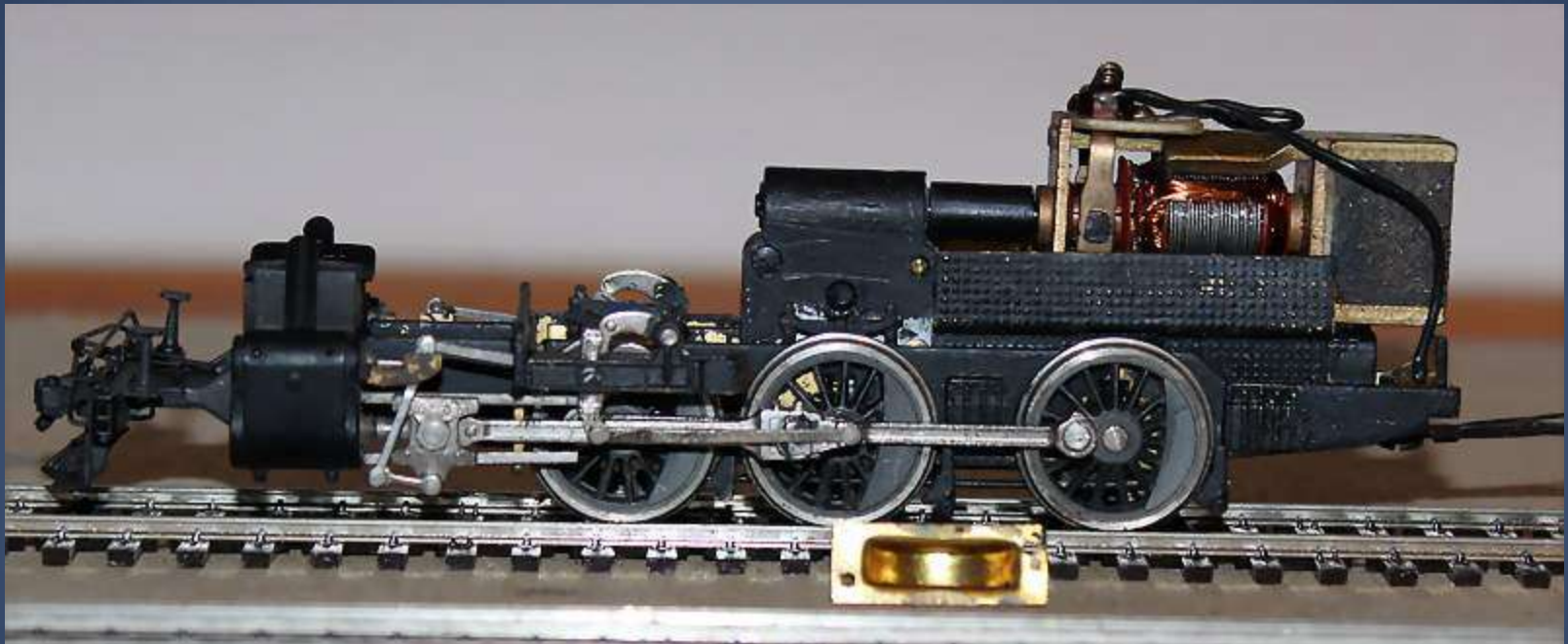
Test just the mechanism with the power supply. If current draw is normal, you missed a problem during the visual inspection



Visually inspect the drive train from the motor to the gearbox. Flexible tubing will markedly increase current draw if there are bends; sharp bends are much worse. Disconnect the motor from the gearbox. If current draw is still high, you have a bad motor that must be replaced.



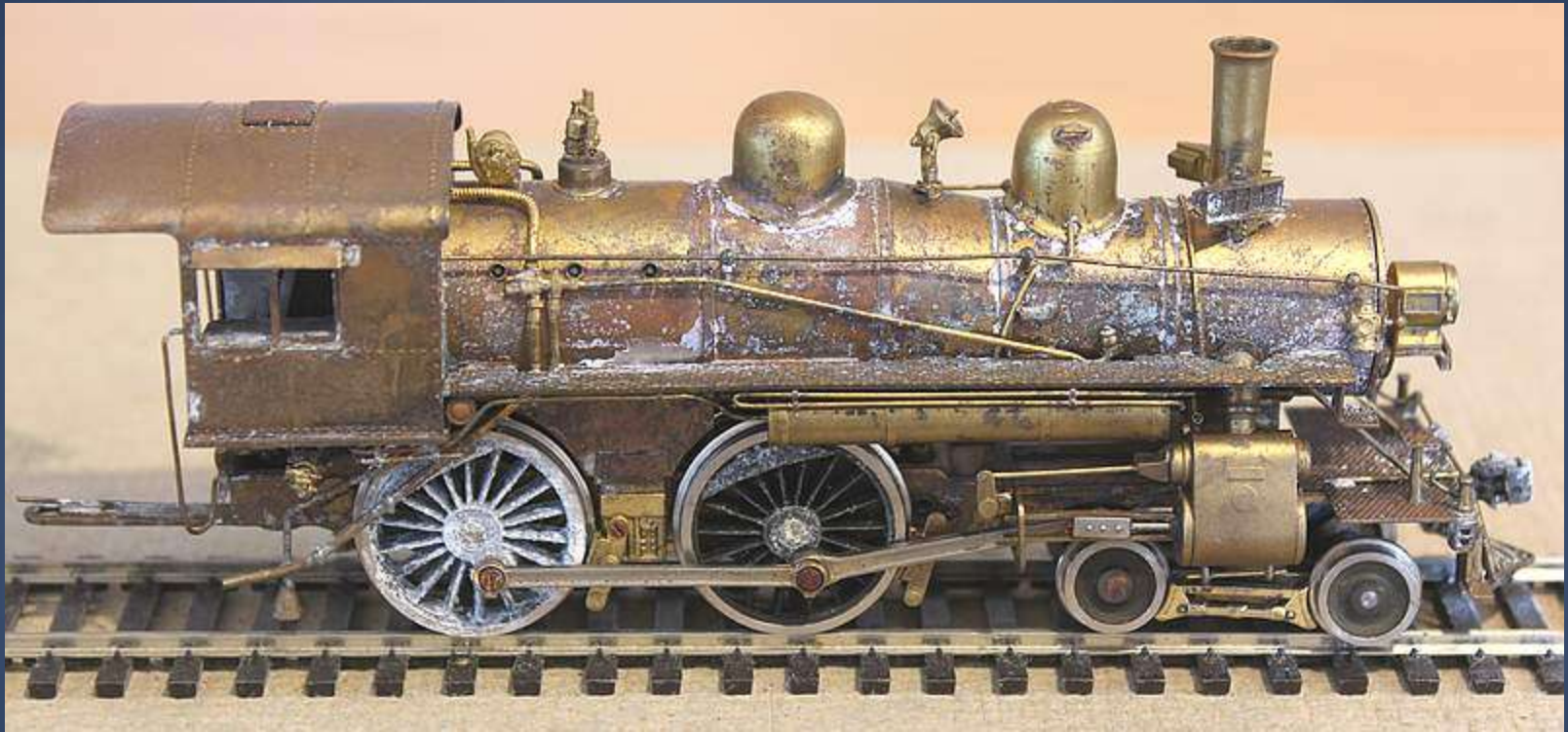
Disengage the gearbox from the geared axle, remove the gearbox cover, raise the gearbox until the drivers spin freely. Test again if current draw is high, you have a bad gearbox.



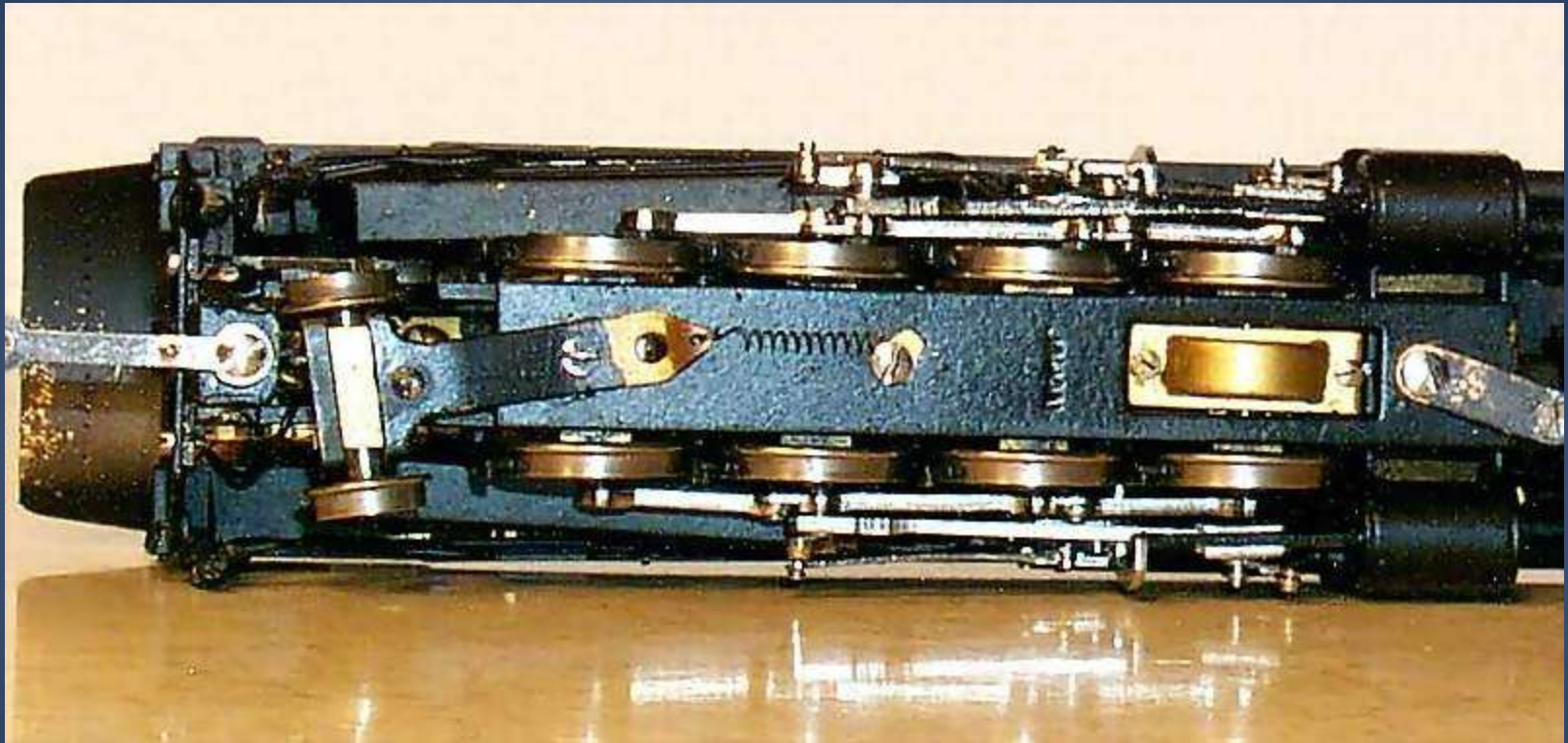
Excessive Current Draw (Advanced Evaluation)

- If the drivers do not spin freely with the gearbox disengaged then something in the frame is keeping the drivers from turning. Corrosion in the bearing is commonly seen in older models, the steel axle rusts inside the bearing. This freezes the axle inside the bearing in the worst cases, in milder cases it creates a heavy drag on the mechanism. Lubricate with an anti-rust lubricant after removing corrosion
- Look for screws that when tightened may rest against a driving axle. Pilot and trailing truck screws are frequent offenders as their threaded holes in the bottom frame cover may be directly over an axle. Replacement with the wrong screw can contact the driver axle, locking up the mechanism or creating considerable drag.

If the drivers do not spin freely with the gearbox disengaged then something is keeping the drivers from turning.
Corrosion in the bearings is commonly seen in older models



Look for screws that when tightened may rest on a driving axle. Pilot & trailing truck screws are frequent offenders



Open Circuit, No Power to Motor

(The Obvious Problem)

- Are the locomotive electrical pickup wheels dirty? Clean the wheel treads with alcohol then polish with extra fine polishing wheels in a Dremel.
- Open electrical path in Tender not providing power to wireless drawbar? Simple check, are the insulated tender wheels on the same rail as the insulated locomotive drivers?
- Brass models are frequently coated with clear lacquer, an excellent insulator if on the wireless drawbar pin, tender truck bolsters, wheel treads, etc... Clean and polish these surfaces to ensure good electrical pickup. Look for corrosion
- Check tender electrical path with multi-tester, there should be virtually zero resistance between drawbar pin and non-insulated wheels after cleaning and polishing. Normally the tender frame provides the electrical path from the pickup wheels to the drawbar pin.

Are the locomotive electrical pickups/wheels dirty?



Open electrical path in Tender
Not providing power to wireless drawbar?



Brass models are frequently coated with clear lacquer



Check tender electrical path with multi-tester,
there should be virtually zero resistance between drawbar
pin and non-insulated wheels



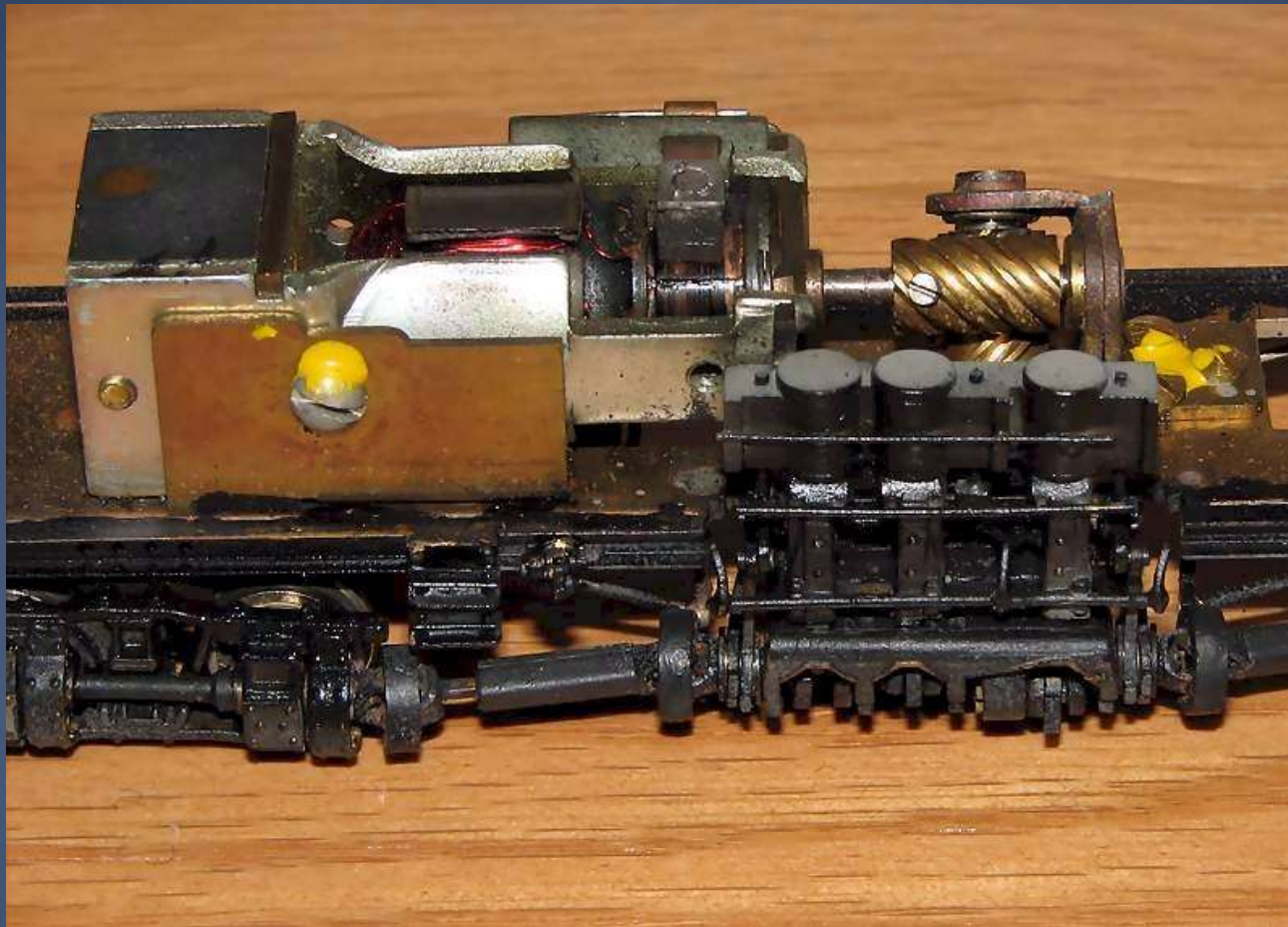
Open Circuit, No Power to Motor

(The Obvious Problem)

- Open electrical path in Locomotive. Generally there are three causes; a broken wire from the frame to the motor brush, very dirty motor brushes on an open frame motors, and a broken wire in the armature. Clean open frame motor brushes and commutator with electronic grade contact cleaner and lubricant. Next, apply power directly to motor with test leads. If the motor doesn't run; it will have to be replaced. If motor now runs but doesn't run on track power, check the electrical path from the engine frame to the motor.

Open electrical path in Locomotive.

Generally there are three causes; a broken wire to the motor, very dirty motor brushes, or a broken wire in the armature



Seek Help Online

- There are numerous online resources available. NWSL has much of their catalog online including some repowering guides for specific models. At www.shastasprings.com I have repowering guides for KTM engines as well as PFM Shays and Climaxes.
- Join on an on-line group like RepowerAndRegear on Yahoo Groups. Members of this group have repaired and or/owned a large variety of models and can provide suggestions for getting that engine running again. Check the archives for discussions of your model.
- Evaluate the seller; it isn't hard to track test a model. If an online model railroad retailer can't test a model with a DC power supply and test leads or guarantee that the engine runs, don't pay top dollar or shop elsewhere.

END of TRACK

