

# NorthWest Short Line

## REPOWERING the:

### NWSL Sierra #18 2-8-0

This motor replacement using NWSL #10253-9 motor and NWSL #139-6 gearbox kit provides performance and reliability improvement for this fine model smoother, quieter, slower operation. We here describe the general method we used which can be accomplished in about 3 hours (plus overnight bond/set time) if proper materials and tools are on hand.

**Tools required:** Miniature screwdrivers

Gear puller (such as NWSL's THE PULLER #45-4 or #55-4)

Hand motor tool (Dremel, etc.) and grinding bit

**Skill required:** This job assumes you have reasonable proficiency in soldering and disassembly/assembly of mechanical devices. If not, your learning experience here will be valuable despite problems you may encounter in achieving quick and satisfactory completion.

**Time required:** About 3 hours (plus cure time for bonding agent and sealant)

**Parts required:** NWSL #10253-9 flat can motor

Silicon sealant (sold at hardware stores as bathtub caulk, window caulk, etc.)

NWSL #139-6 gearbox kit

NWSL #166-6 1.2mm input shaft conversion kit for #139-6

28 or 29 gauge wire, two approx. 1.5" pieces (NWSL #10007-9, #10001-9, etc.)

1. Remove locomotive (boiler) superstructure—2 screws at rear of cab, one screw in cylinder saddle.
2. The axle gear must be replaced with the new axle gear included in the #139-6 gearbox kit. Determine the geared axle (driverset) and remove the gearbox bottom cover (two screws). Remove the geared driverset crankpins. With locomotive chassis on your work surface upside down, remove the bottom cover plate (2 screws). Lift the geared driverset out of the chassis carefully watching for the driver springs (they should stick on their frame posts, but if they don't, corral and save them).
3. You will need to remove one driver wheel and the axle gear after checking the quarter (so you can duplicate it) and/or scribing across the axle end and driver hub so you can align the marks when re-assembling the driverset (and thus re-gain the proper quarter). Press the axle into the new axle gear and center gear on axle. Re-install the axle bearing (in correct direction) and then the driver wheel (in proper quarter) in proper gauge.
4. Now we assemble the power drive system. First—assemble the gearbox input shaft. We prefer to install the gearbox directly on the motor shaft. To do so, install one wormshaft bearing and a Bronze thrust washer on the motor shaft, then press the motor shaft into the worm (CAUTION—this is a critical operation which can easily result in bent motor shaft!!) The wormshaft is bored with pressfit at one end of the bore (approximately 25% of the length). The balance of the bore is a slip fit—place the motor shaft into this slip-fit end first, then using a tool with good control such as the NWSL SENSIPRESS+ (#50-4) with a bored tool to hold the shaft end being pressed, and a 'V' plate #5060-4 or similar with worm/shaft aligned on the smaller hole (so the shaft will enter the hole as it is pressed through the worm). When pressing, work slowly, positively, with fingers holding the assembly in alignment and restrain the shafts from buckling (which would bend the shaft) press ONLY on that opposite end of the shaft—NEVER on the motor body or frame to avoid destroying the motor. Press the worm up to the bearing/washer parts—NOT tightly, leave .010"-.020" space to assure free operation of the gearbox. Install the other washer and other wormshaft bearing. Get the gearbox sides and idler gear. Install the idler gear in one gearbox side, then install the gearbox side on the wormshaft and then secure the other gearbox side with the assembly screws. Test for free operation and resolve any restrictions that might exist.
5. Install the gearbox assembly onto the geared axle. Check fit and that the gear teeth are meshed (ie. The gearbox sits down on the axle), then attach the bottom cover plate. Test run—if free, proceed, if not, adjust as necessary to achieve free operation. Test wiring for polarity (correct direction of travel—make it the same as a "known" locomotive) and then solder lead wires to motor terminals.
6. Place a small dab of silicon sealant on the motor mount plate where the rear of the new motor touches the plate. Let cure 24 hours.
7. Assemble superstructure (boiler/cab) to chassis.
8. This small motor does not overpower, so be careful to watch for overload condition, but it does nicely power a tiny locomotive otherwise virtually impossible to power for lack of suitable motor. Enjoy!

Installation 11-2001 by F Raoul Martin