

NorthWest Short Line

REPOWERING the:

Bowser Challenger 4-6-6-4 and similar HO gauge steam kit locomotives

This gearing and motor replacement project using NWSL #22403-9 size motor (or #22363-9, #18367-9, #20323-9 et al) motor plus stock NWSL gearbox kit provides significant performance improvement for this fascinating model - smooth, quiet with improved power.. or revival of a unit long dead due to broken or worn gearing. We here describe the general method used which can be accomplished in about 5 hours (plus overnight bond set time) if proper materials and tools are on hand.

Tools required: Miniature screwdrivers; needle-nose pliers
X-acto or similar knife, Soldering iron

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 5 hours (plus cure time for bonding agent and sealant)

Parts required: NWSL 22x40 or 18mm can motor - #22403-9, or #22363-9 or #18367-9
NWSL HiLo gearbox kit #149-6(or #159-6 for slower operating speed range)
Silicon sealant (sold at hardware stores as bathtub caulk, window caulk, etc.)

1. Remove superstructure (boiler) if the kit is already assembled. Completely disassemble the mechanism. Remove the main and side rods, the cylinders and saddle, the bottom (cover) plate, the geared driver and its bearings from each frame. You'll need to modify the frame and cover plate castings before re-installing them with the new HiLo regear set.
 - 1a. The existing gear slots in the engine frames must be enlarged to accept the new NWSL gearboxes. Assemble the gearbox sides and set them on the frame/gearslot. Scribe an outline to guide you in material removal as you enlarge the slot. If you're lucky enough to have a small milling machine, secure the frame and mill the slot larger. If not, get out the file(s) and start filing.
2. Before you remove any wheel (driver) from its axle, scribe a witness mark off-center across the driver hub and axle end. You will use this to align these parts upon re-assembly. Remove one wheel (driver) from each geared axle and press off the old gear (hint: do one engine and driver at a time). Remove both bronze axle bearings from each axle. The bearings are longer than necessary - and will not permit gearbox installation without shortening.
3. After shortening (file end opposite the flanged end shorter as necessary) replace one bearing, press on the NWSL axle gear and then add the second bearing (the flanged end outboard). Check to see that none of the original knurl extends beyond the face of the gear. If any of the knurl does show, carefully file the axle (knurl) to remove it. Otherwise the knurl will interfere with the axle gearbox bearing area and may cause poor operation.
4. Reinstall (in quarter) the driver that you removed (use the witness marks you scribed in the second step - the QUARTERER doesn't work well with Bowser kits because of the large bronze axle bearings Bowser uses).
5. The existing openings in the bowser main frames must be enlarged to permit installation of the new NWSL gearboxes. Do this by filing an opening 9/32" wide by 7/8" long in each frame. Center the new opening over the original frame (gear) openings. The front and rear surfaces of the openings may need to be angled to allow gearboxes to tilt forward for proper shaft alignment.
6. The forward gearbox from the HiLo set must have the bottom half of the raised area (in original "square top" moldings - not required on "round top" 2001 upgraded version) around the worm thinned to the same thickness as the bottom section of the gearbox sides. Start by assembling the gearbox halves and cover. File away material below the center of the raised areas until they are even with the lower (side) surfaces (or return the plastic moldings to NWSL with \$5 for exchange 2001 upgrade moldings). The easiest way to file this area is to remove the screw from one side, file that side as described, then replace the screw and repeat on the other side.
7. Test fit the gearboxes by removing the gearbox cover and, one at a time, holding the geared driver and bearings in place. Slip the gearbox down over the axle. There should be some fore-and-aft movement and no binding on the sides. Clearances can be adjusted by carefully filing appropriate areas of the frame and/or sides of the gearbox and cover.
8. The valve gear hangers need to be filed where the horizontal part of the mounting flange crosses the enlarged gearbox opening in each frame. Do so by carefully filing away the flange on each hanger with a small file until they just clear the gearboxes. Leave adequate material around the hanger mounting holes to fasten them to the frames when you re-assemble the mechanisms.
9. The original frame retainers (cover plates) need to have the cast-on gear covers filed off even with the bottom of the cover plates and the opening enlarged to 5/16" by 29/32". There should be adequate clearance to avoid interference with the new gearboxes and mechanisms.
10. The locomotive can now be assembled and checked for fit. Remove additional material from the frames and/or bottom plates as necessary for proper operation. Lubricate all gears lightly with gear oil and bearings with light oil.

Installation 4-98 by David Plebanek