NWSL

NorthWest Short Line
PO Box 1349, Hamilton, MT 59840 USA

#2800-6

HO Bachmann Spectrum® 80-Ton 3-Truck Shay Locomotive (#81907)

Regearing Kit

INSTRUCTIONS

STOP! Before you starting taking your Shay apart, please read these instructions in their entirety. The goal is straightforward—you'll be replacing six plastic factory bevel gears with the six enclosed steel gears—but you'll need to remove and re-install a number of factory parts to restore the locomotive to operational condition.

ALSO! There are lots of tiny parts involved in this project. Experience has taught us that these parts can easily go flying, and can be extremely difficult to find. Before you start, choose a well-lit area in which you feel that parts can be well contained should they fly off on you. To improve your odds, sweep or vacuum the area before you begin.

This is an intermediate-level project so if you've not done something like this before you might want to hire a professional to install these gears for you. Installing these gears violates Bachmann's factory warranty, although if you run into problems replacement trucks are available for purchase from Bachmann (as of this writing.)

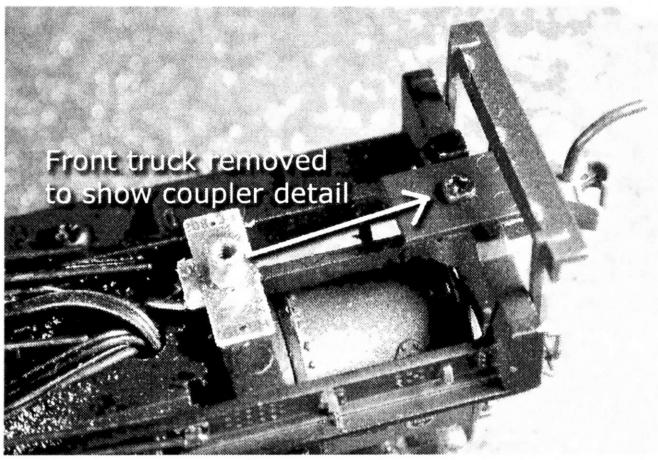
Overview: One by one, you'll remove each truck, disassemble the side running gear, re-assemble the side running gear using the enclosed replacement steel bevel gears, and then re-attach each truck to the locomotive. When you are done, you **must** lubricate the gears properly (more on that later) or the steel gears will damage the plastic gears on the wheels.

The three trucks on this model are all slightly different, so we strongly recommend you do them one at a time as outlined in these instructions.

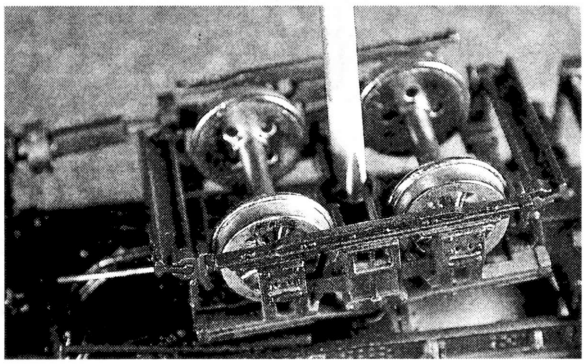
Front Truck:

1. Turn the locomotive upside down. We used the foam in the box the locomotive came in to prevent cosmetic damage to the engine.
2. Remove the front coupler assembly, which consists of a plate and the coupler. You only need to do this for the front truck. For clarity, the following photo shows this assembly without the truck in place; you cannot remove the truck until you've removed the coupler assembly:

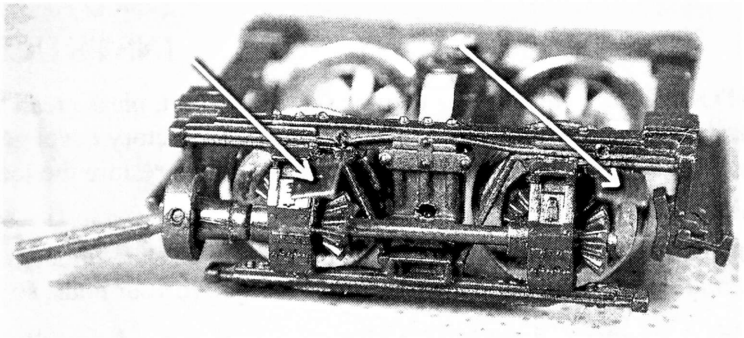
3. Each truck is held in place by a single screw. Using a properly sized screwdriver (to prevent stripping the screw) remove this screw and place it in a safe spot.



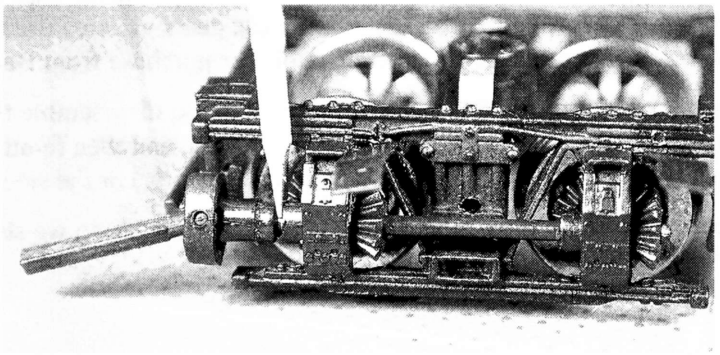
4. SLOWLY and GENTLY pry up the gear covers as shown in the second photo. The top photo shows the single screw you need to remove after you've removed the coupler assembly.



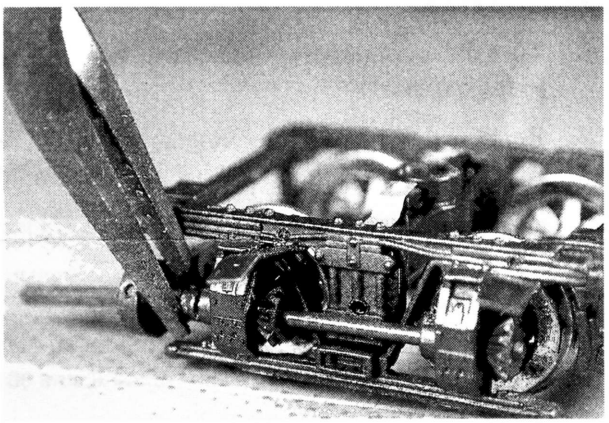
5. The three trucks have slight differences but all are assembled and disassembled the same way: All parts are press fit, so you won't need to remove or use any glue. Your goal is to remove each truck's side shaft entirely.



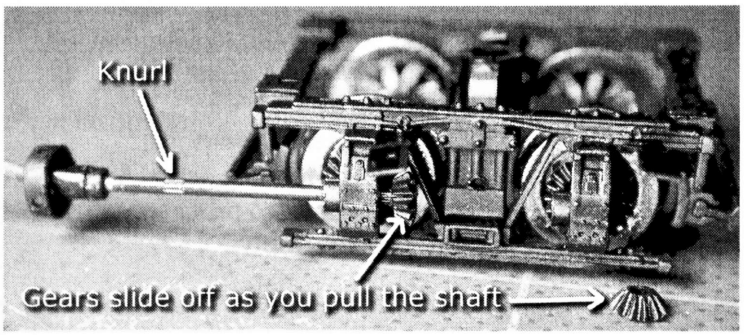
6. Begin by prying off the flexible U-joint assembly. This assembly comes off as a single part; you do not need to disassemble any of the U-joint. We used a small screwdriver to wedge in and then wiggle apart the joint, and we then used needle nose pliers to help persuade the part to come off.



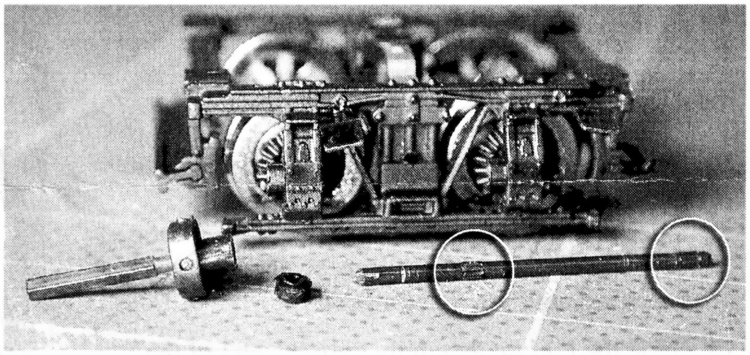
7. Please note (and yes, this is the voice of experience.) As you disassemble these, you'll probably find that no two are alike. Some parts are a bit stubborn; in other cases the side axle assemblies will practically self-disassemble, resulting in flying parts. Work slowly and carefully, keep careful track of the parts as you disassemble and re-assemble, and you should do just fine.



8. The next photo shows what the disassembled truck looks like after you've pulled the shaft completely through and the small gears have come off. Please notice a few things: The universal joint assembly off the left end of the shaft as one piece; there is no need to disassemble that. Notice also that the shaft has two knurls (circled) on it. These knurls are your friends because they show you exactly where the replacement gears will go. Finally, notice the small plastic retaining ring. This ring is *very easy to break* so take special care when removing it.

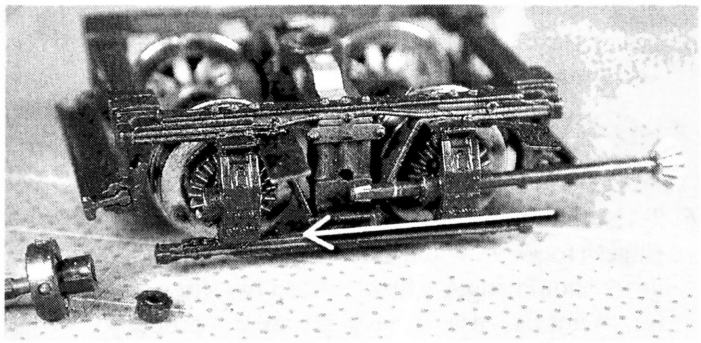


9. Install one of the NWSL replacement steel gears on the right end of the shaft as shown in the third photo. Use a NWSL Sensipress+ or a drill press if desired to help keep the gear and shaft aligned. You want the gear to cover the knurling entirely and so you'll need to push the shaft through the gear a bit. (Refer back to the third photo to see the gear and shaft in stock condition.)

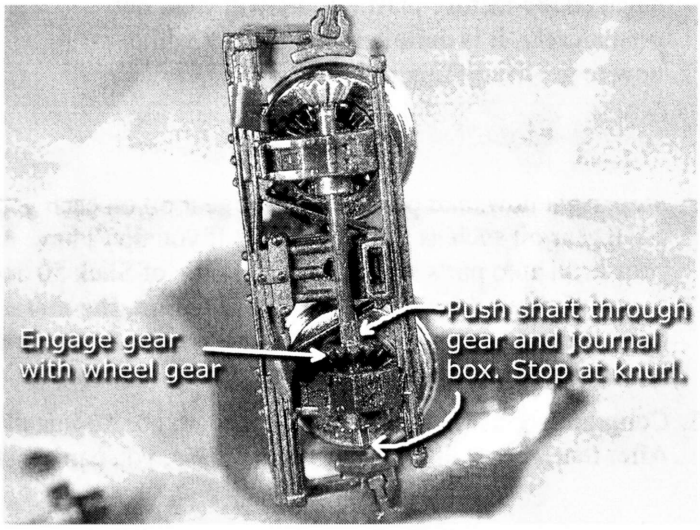


10. Push the shaft through the hole in the front journal box. Don't push the shaft into the other journal box hole yet because you have one more gear to install.

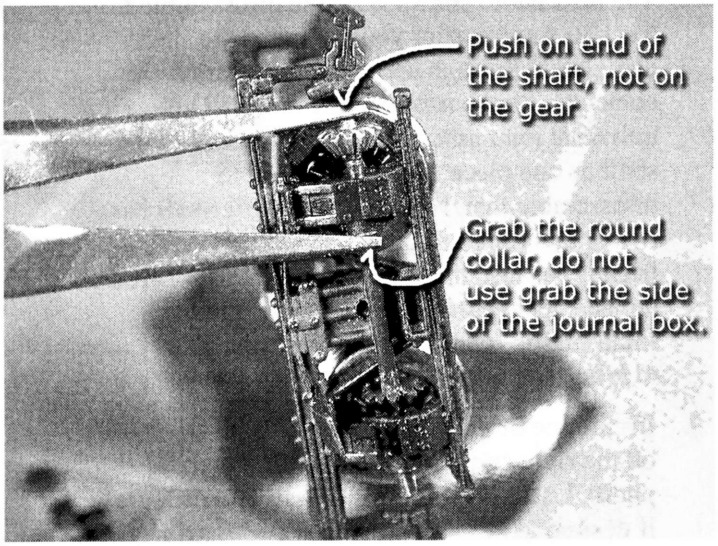
11. We turned the truck on edge for this next step. Place the second NWSL replacement gear on the wheel as shown, engaged with the gear on the wheel. Then, slide the shaft through the gear and the journal box hole as shown here.



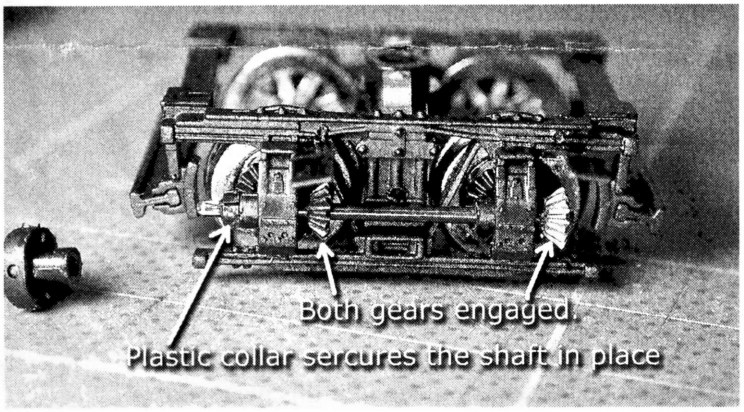
12. You may need a little P&P (Patience & Profanity) for this next step. Use a pair of needle nose pliers, and push on the end of the shaft (not the gear!) as shown in the following photo. To give you something to press against, put the tip of the other jaw on the round collar along side the journal box—not on the journal box side. The angle is a little odd here, hence the potential for P&P, but by doing this single operation you'll also push the shaft through the lower gear. Push until the upper gear engages with its wheel gear and the knurl completely enters the lower gear.



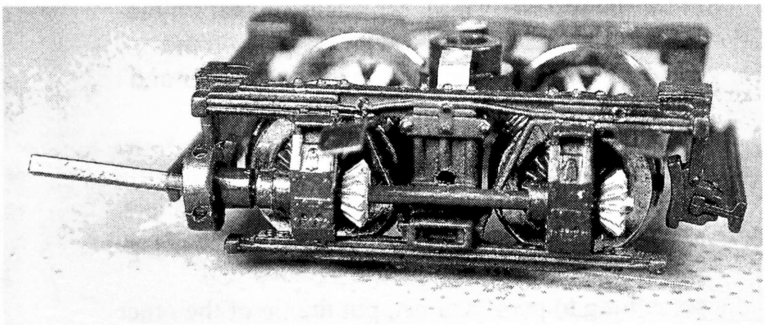
13. Tweak as necessary until both NWSL replacement gears engage with the factory wheel gears. You can adjust these later if need be but it's an excellent idea at this point to get the gears just right. You want a nice, tight fit for both gears. Any "slop" is going to reduce gear life, so make very sure each pair of gears engages firmly.



14. Slip the plastic collar you removed earlier over the end of the shaft and push it on until it touches the side of the journal box. This plastic collar holds the shaft in place, so continue any tweaking until you have a good fit.
15. Slide the U-joint assembly onto the end of the shaft.

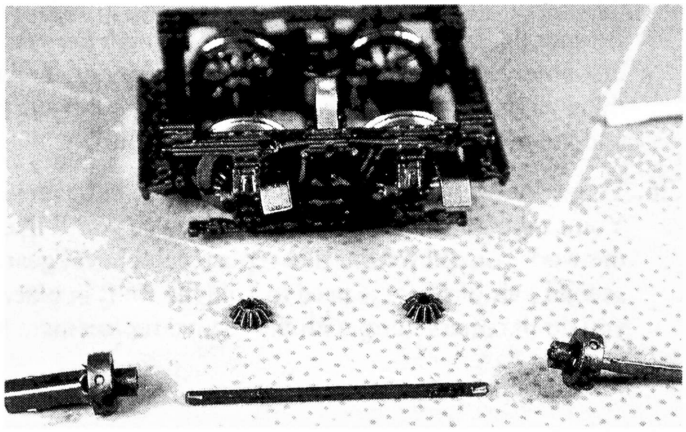


16. Twist the square U-joint shaft with your fingers to see how the assembly works. The gears should engage firmly; keep tweaking if this is not the case. If the gears are not properly engaged the factory plastic gears will wear out prematurely. It is definitely worth your while now to get everything right.



17. Stop, right now, and put one drop of gear oil on each gear pair (we use Aerocar's NG GEL gear lubricant, or you can use a gear oil such as LaBelle #102.) If you don't have either of these and don't have the patience to find some, go to your local auto parts store and get a bottle of Slick 50 and use that. **If you do not lubricate these gears, and keep them lubricated by periodic re-application, the metal gears will damage the plastic gears. Oh, and while we have the bold type going, *do not* use grease on the gears. Unlike gear oil, grease attracts and holds dirt, dust, etc. and will definitely create problems for you.**
18. Congratulations! One down, two trucks to go. Re-install the front truck on the model using the single "kingpin" screw. After that, re-install the front coupler. (No, you can't install the front coupler first, no matter how tempting it seems.)

19. Remove the middle truck and essentially repeat what you did for the front truck. Yes, the middle truck is a bit different because it has two U-joint connectors, but otherwise it's identical. Here's a reference photo of the disassembled center truck.

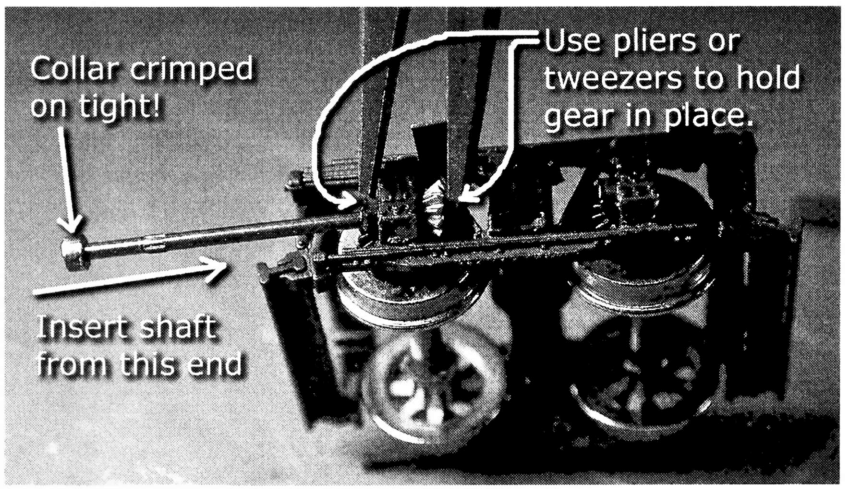


20. Another item of note is that the center truck does not have a plastic collar on the left end, probably because it has the U-joint collars on both ends to hold the shaft in place.

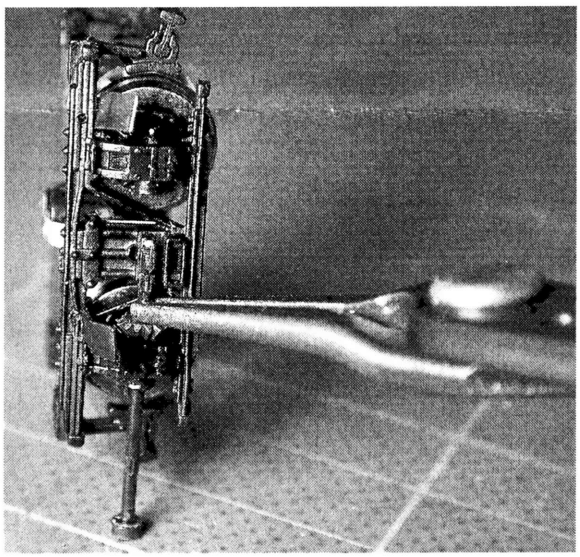
21. To recap, press the right-hand gear on first, covering the knurl. Slide the shaft through the hole in the journal box partway, then engage the other gear with its wheel gear, and then push the shaft all the way all the way through. Use pliers to get the gears into place, then re-install the U-joint assemblies on either end to hold the shaft, and test turn the shaft with your fingers to make sure the gears engage well. Tweak as needed until you have a good fit. **Put a drop of gear oil on each gear**. Re-install the truck on the model.

22. The rear truck is basically the same although on our model we found we had to modify the installation process. Bachmann may have varied these over the production runs, but the collar on the end of our model's rear truck was firmly crimped in place, so we had to do the assembly backwards.

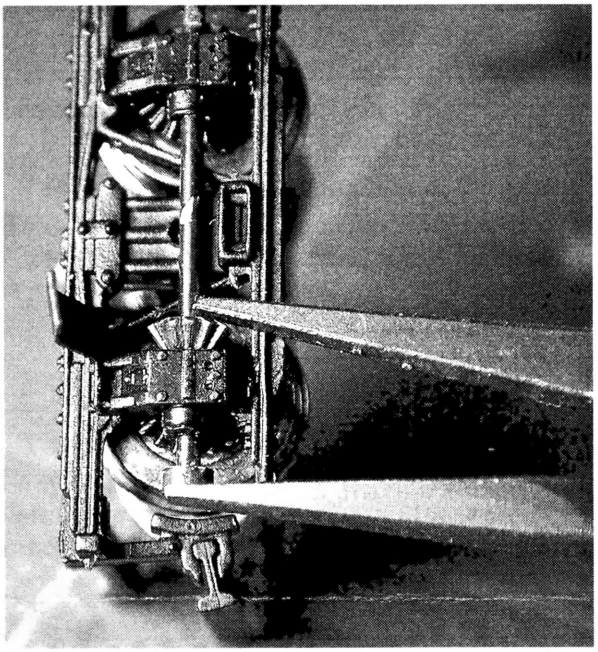
23. We found that inserting the shaft through the smaller end of the gear was not as easy, so extra P&P may be called for here. Resist any temptation to hurl this truck across the room in frustration because this is the last one and you're almost done.



24. The toughest part is getting the shaft into and through the first gear. Once you've finally accomplished that, use your pliers as shown to apply pressure to the back of the gear, pushing the shaft onto your work surface to persuade it through. Do not push on any part of the truck to help accomplish this task. Push ***only*** on the shaft itself or on the gear.



25. Be sure the far end of the shaft goes through the other journal box hole. Next, to push the shaft all the way in, do the pliers thing as shown here to get the collar next to the journal box and the replacement bevel gear onto its knurl.
26. To get the second gear on we had two use two pairs of pliers. You cannot just push on the shaft because you'll likely undo the work you did for the first replacement bevel gear. The second pair of pliers is used to hold the shaft in place while you do the pliers thing with the second replacement bevel gear.



27. Replace the U-joint assembly on the shaft, test the gear fit by twisting the shaft with your fingers, and make any necessary adjustments. **Put a drop of gear oil on each gear.**
28. Re-install the third truck. Check that the square drive shafts are all connected properly; as you've probably learned these can become disconnected if the trucks are rotated in opposite directions. To reconnect and disconnected drive line, rotate the two trucks on opposite directions until there's enough room to replace the square shaft into the square tube and then rotate the trucks toward each other until the trucks are straight.

29. Test run your model. If you took your time during the assembly of each truck then all should be well and you can get this fine little engine back into the woods, the quarry, the mine, or wherever else you need the pull of a "sidewinder" to get the job done. If you have a test stand, use it for initial testing because if you hear or see any problems with the gears you'll want to stop and **fix them immediately** to prevent any damage to the gears.
30. When you're satisfied with the operation, ***slowly and carefully*** bend the gear covers back down to their original position.
31. Remember to periodically use gear oil to keep these gears lubricated!

Thank you for choosing NorthWest Short Line!