

Repowering Your Rapido TurboTrain

By Dan Garcia, Rapido Trains Inc.

Before you do anything to your TurboTrain: **READ THE INSTRUCTIONS ALL THE WAY THROUGH!** I have tried to make them as clear as possible, but there might be the odd step that I didn't make clear until the paragraph following it.

You will need the following tools:

- Set of mini Phillips and slotted screwdrivers
- Hobby Knife
- Foam cradle or other soft surface
- Tweezers
- Needle-nose pliers
- (Optional) Soldering iron and solder

It's a good idea to have a cookie tin lid or Tupperware container handy to store all the bits while you are working on your Turbo. The first repowering job will probably take an entire evening to do. Obviously, it gets quicker with experience. I can change out a power truck and gearbox in about 20 minutes.

Please note that the photos were taken on a cutting mat for clarity. When working, you should rest the Turbo shell on a foam cradle, folded towel, or other soft surface to avoid scratching the paint job. **Please note: upgrading the TurboTrain drive system is done entirely at your risk. If you damage your model, we will try and help you repair it but we can't guarantee that it will be possible as we have a limited supply of parts.**

Let's get started...

The very first thing you will need to do is lubricate the gearboxes. We had thought about doing this at the factory, but we didn't want everyone's gearboxes arriving as a big, smudgy mess. Sorry.

You'll need to have some oil or grease handy. I'm a big fan of both Woodland Scenics Hob-E-Lub HL-664 and Labelle #107 – they are both good quality medium-weight gear oils. A very light clear grease (that is not Teflon-based) will also work, although it may result in the break-in period being a tad longer than with oil.

There are a number of different locations you want to target. Let's start with the worm gear and its bushings.

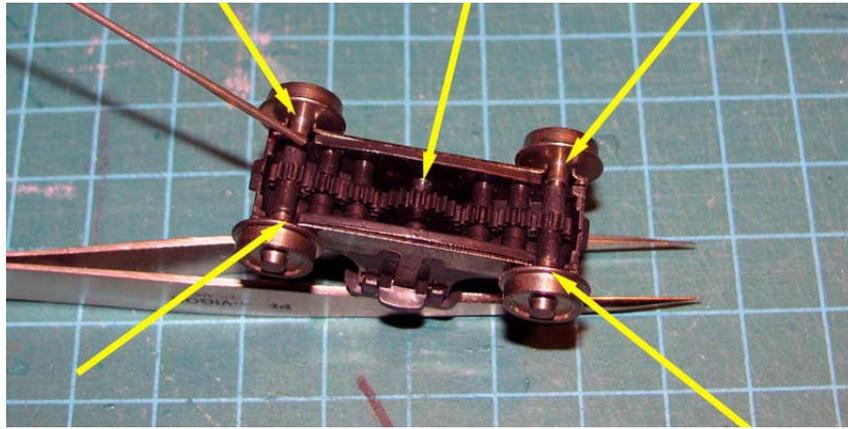
There are four clips around the top of each gearbox which secure the top of the case to the rest of the gearbox. Carefully pry them away from the gearbox with a small, slot screwdriver. Once you've got all four done the top will come off.

Pull out the worm, and lubricate the shaft at both bushings, as seen below.



Don't re-install the worm yet – we will lubricate the drive axles and gears before completely reassembling the gearbox.

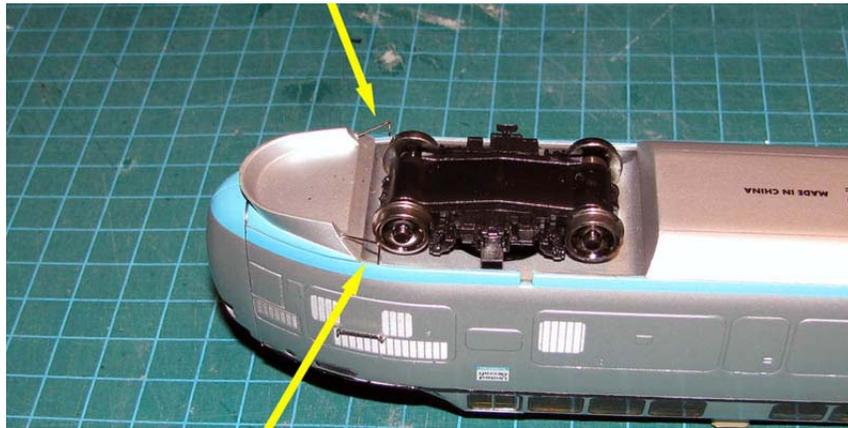
Using the same small, slot screwdriver, pry one of the clips that hold the bottom of the gearbox case away from the rest of the gearbox. Then, while holding the gearbox upside-down, pull the bottom of the gearbox off of the case. Once it is off, you will see the guts inside – put a couple of drops of lube on each gear and the drive axle bushings, as shown below.



Once you've done that, you can reinstall the bottom of the case and turn the wheels a bit. This will help get the lubricant everywhere it needs to go.

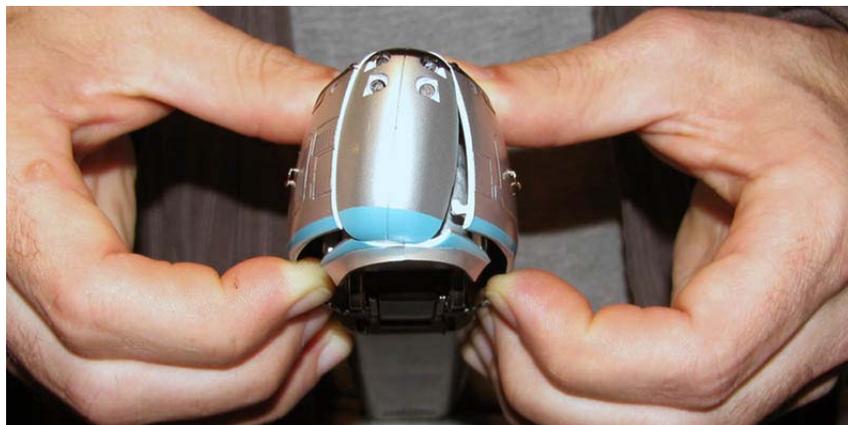
Once all that has been done, you can reinstall the worm and the top of the gear case, and you're ready to go on to the hard stuff.

Once you are ready to get down to work, the first thing you need to do is take the shell off of the underbody and interior. If you have a U.S. TurboTrain, this involves first removing the two small stirrup steps mounted behind the pilot, as seen below. The production Canadian Turbos were not equipped with these stirrup steps.



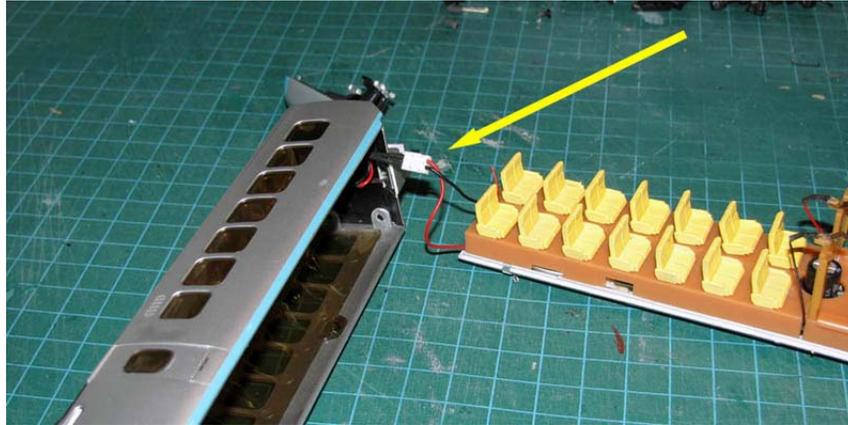
(If you lose any, let me know. I should still have some here in the office and I can send you replacements.)

Once that is done, you can then remove the shell of the Power Dome Car (PDC) itself. I find the easiest way to do it is to hold it and pull outwards on the bottom of the shell as I do below.

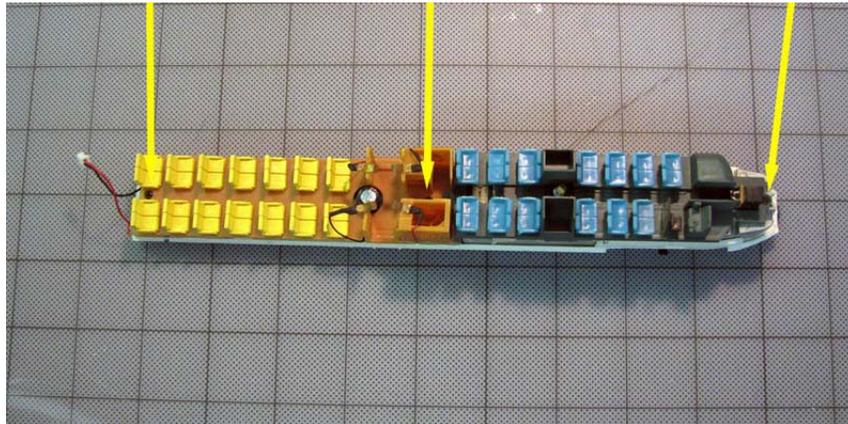


Don't worry about the nose – it will pop off as you do this. Keep an eye on it though, as I have seen some that have been launched a fair distance.

Before you put the shell aside, be aware that there are wires at the back end of the PDC that run to the inter-car coupler. The little white thing is a two-wire micro-connector, which will also help you put everything back together again afterward. Unplug the connector.

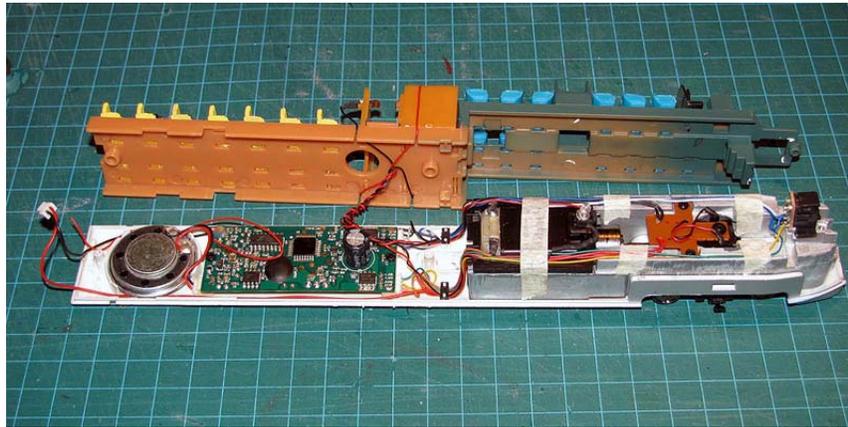


There are three screws that hold the interior in place. Unscrew the screws and put them aside for later.

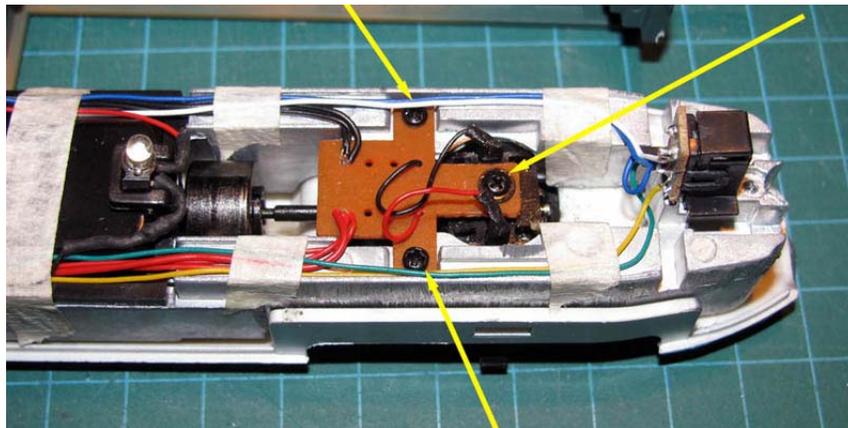


The interior can sometimes be a little bit difficult to pull out even after the screws have been removed. There is a bit of friction between a mounting post and the interior at the back. A little bit of prying with a larger slot screwdriver will free the interior.

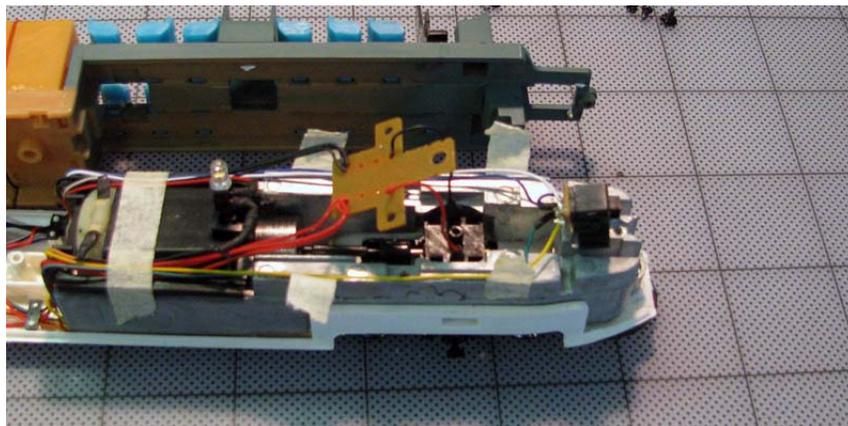
Much like the shell, there are wires that run between the interior and the floor. Unlike the shell, these wires are hard-wired to other locations inside the PDC. There is a little bit of slack, so provided you have a clean workspace, you should be able to lay the interior beside the rest of your PDC.



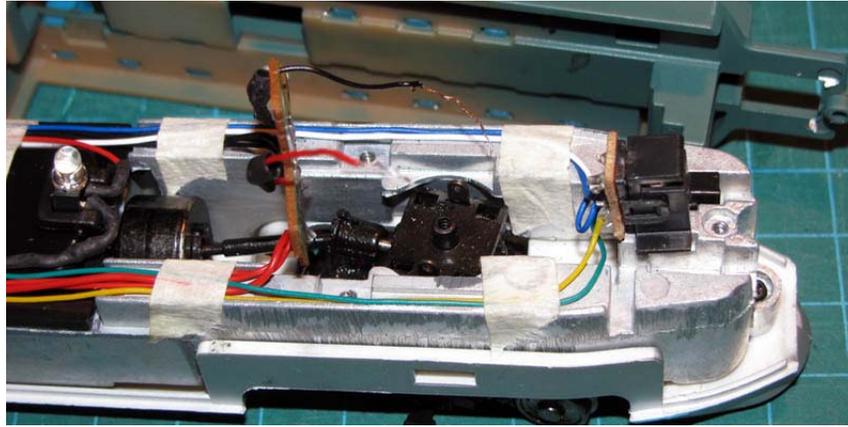
The next step is to remove the Printed Circuit Board (PCB) plate over the power truck and gearbox. Again, there are three screws securing it, and again there are wires that are hard-wired to elsewhere inside the PDC.



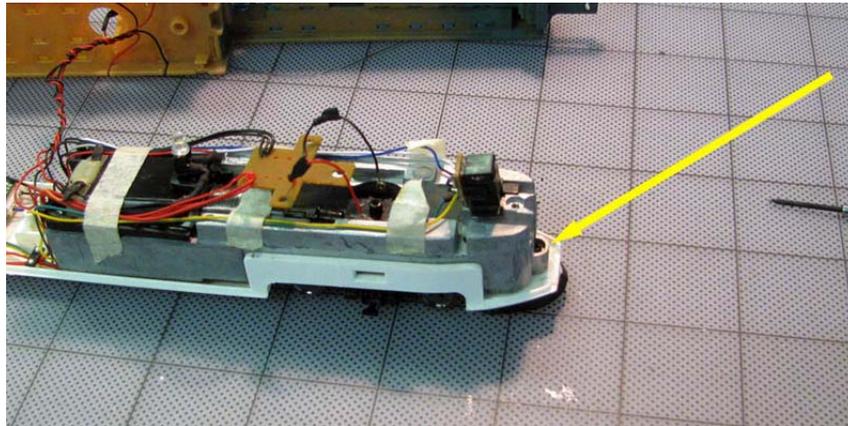
Once the plate is off, you can access the lower portion of the pick-up wires that run from the PCB plate to the contacts on the gearbox. They are each covered with a small piece of heat-shrink tubing. If you have lots of fresh heat-shrink tubing lying around, or if you plan on using some other method to wrap the wires, you can toss the old stuff.



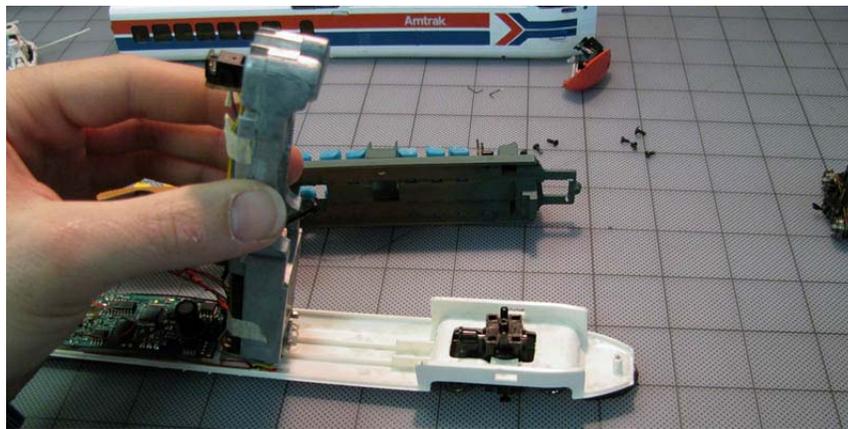
When the heat-shrink tubing is out of the way, you can then untwist/unwrap the wires from the gearbox contact strip. I find a set of fine-point tweezers or pliers will help you with this.



Once you have the wires undone, you can then proceed to removing the gearbox. Start by removing the screw holding the weight in place – it is right at the front of the unit.



Now, lift the front of the weight a bit, as I have below.



You should be able to twist the whole gearbox free of the body now.

Now, it's time to put everything back together!

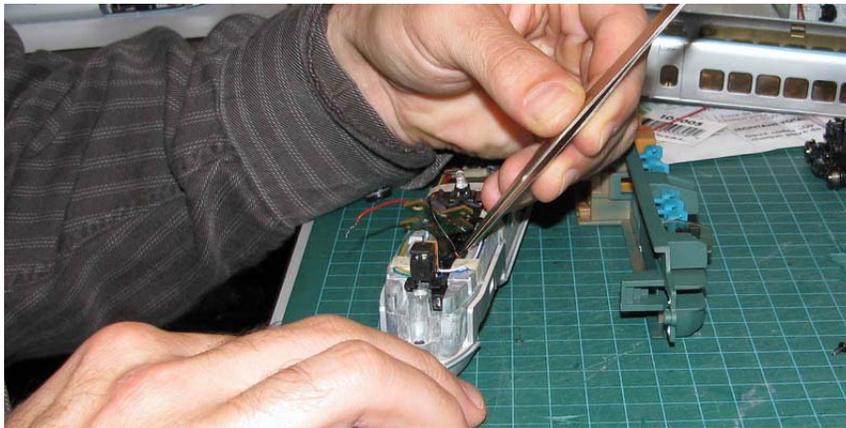
Reinstalling the new gearbox is pretty easy – start by twisting it into place, similar to how you removed the old gearbox. Make sure you have it oriented properly – it is pretty hard to reconnect the driveshaft if the coupling is pointed the wrong way!

Once you have that done, you need to replace the driveshaft between the flywheel end of the motor and the gearbox. I find that it is easiest to do this by lifting the weight off of the chassis a bit to create a little bit of room, and then popping it into place using needle-nose pliers or long tweezers. It may not be a bad idea to place a drop of oil on the ends of the driveshaft as you do this.

(Sorry, I can't provide you with a photo of how I did this – there is no way to easily show it!)

Once the gearbox and driveshaft are back in place, you can secure the weight with its retaining screw.

Next is probably the hardest step of all – threading the wires through the holes through the power contact strips on the gearbox. If you can think of a better way to do it, I'm all ears!



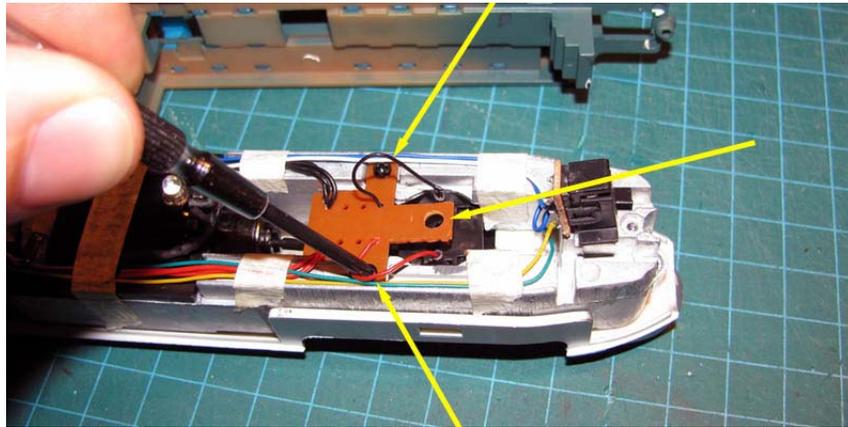
Before you get too carried away, don't forget to place the heat-shrink tubing on the wires. Fresh tubing is preferred, but you can certainly re-use the existing tubing or use electrical tape instead if you are really patient.

I really don't have much advice to give you, other than to take your time and use the finest tweezers you have. As you can see, there isn't much wiggle room there – we needed to maximize the weight over the power truck and gearbox, and this meant that space is definitely at a premium inside the PDC.

If you decide to solder the wires instead – and best of luck to you if you do – you will need to file a bit of the surface of the chemically blackened power contacts on the truck. Otherwise, it will be very difficult to get a good join between the power contacts and the wires. (Ask me how I know!) It will probably be easier to tin the contacts before installing the gearbox in the floor as well.

The final step is to slide the heat-shrink tubing over the wire and top of the power contact strip. The weight is electrically conductive, so this step is quite necessary, unfortunately. If you have a soldering iron handy, you can power it up and use it to heat up the heat-shrink tubing.

Once you have the wires reconnected and the heat-shrink tubing in place, you can reinstall the PCB plate over the power truck and gearbox. The same three screws that you removed oh-so-long-ago will be used to hold it in place. The two screws that secure it to the weight can be screwed down tightly, but the third one in the middle – securing the gearbox – will be tight to thread in, but should have room between the gearbox and the PCB plate to allow the gearbox and truck to turn freely.



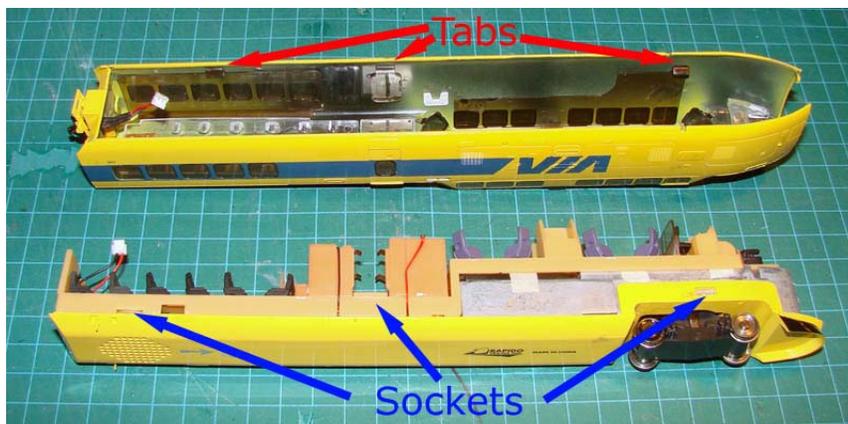
The next step is to reinstall the interior onto the floor. You will probably want to start by wrapping the four wires connecting the interior to the floor around the single capacitor that sits on the control board. They don't necessarily need to be wrapped around, but I find that doing so helps keep them out of the way and from getting pinched when installing the interior.

Once again, you have three screws that hold the interior down. Two of the screws are identical, and are located at the middle and back end of the interior. The third screw, which is countersunk, is located at the very front.

Your TurboTrain is almost back together! The next step is to reinstall the shell. Don't forget to reconnect the two power wires from the floor to the inter-car coupler mounted on the shell. The white micro-connector is keyed, so you don't have to worry about shorting out your TurboTrain when you put it back on the tracks.



Align and slide the back part of the interior and floor into the back part of the shell to get the process started. Then, slide the front part of the interior and floor in. You may need to help the tabs seat into their sockets by pressing on the sides of the shell.



If you have a U.S. TurboTrain, now is as good a time as any to reinstall those two small stirrup steps just behind the pilot. You may need to drill out the holes to get them to sit properly.

And also for those of you who own a U.S. TurboTrain, your PDC won't be complete without installing the third-rail shoes in your new power truck sideframes! As you can see, there is a slight kink in the third-rail shoe – you want the shoe to bend away from the rail. It is a friction fit, so you won't need to use glue when you install them. If you take your train to a local club and it travels often, you might want to add a drop of CA to secure the shoes in case they get jostled too much in transit.



The final step is to reinstall the nose. Start by placing the bottom tabs on their seats in the shell, and then snapping the top into place.



And that's it! You've repowered your TurboTrain – well, one of half of it at least! But don't worry, the second one is always easier than the first!