Upgrading Proto 2000 4 axle Geeps with Stewart Trucks

November 27, 2010
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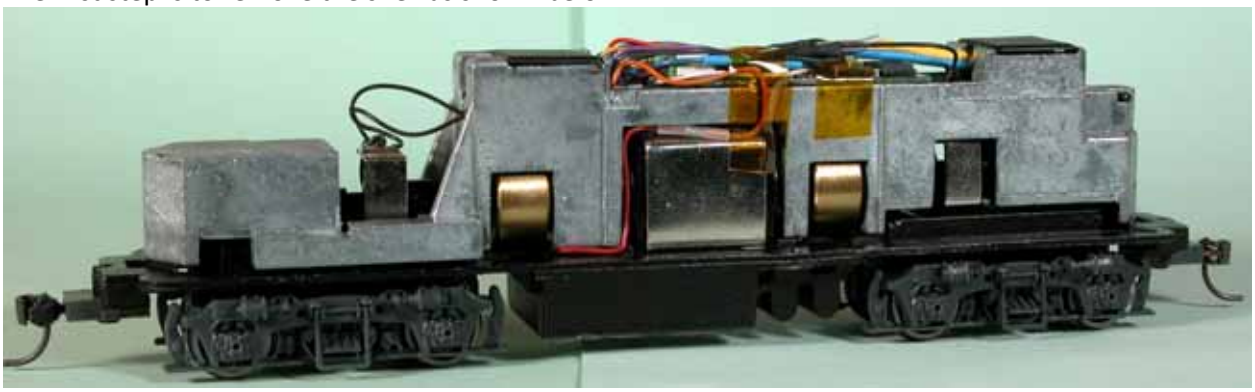
Introduction
Several years ago Proto 2000 made a bunch of 4 axle locomotives that used trucks that were a copy of an old Athearn design. The axle gears on all these locomotives are prone to crack and the design of the floating axle bearing promotes oxidation and power pickup problems with prolonged running. The axle gear cracking problem can be fixed by using either Athearn or NWSL replacement gears but the oxidation and longer term power pickup problem will continue to plague these locomotives.

This paper will talk about an alternate solution, replacing the Proto 2k trucks with Stewart trucks. The Stewart trucks do not have the gear cracking problem and do not have floating axle bearings.

Step by Step Instructions
The model that I will use as an example is a Proto 2k GP-20 but the steps are the same for any of GP7/9 locomotives with 4 axles.

Here is a photo of the model.

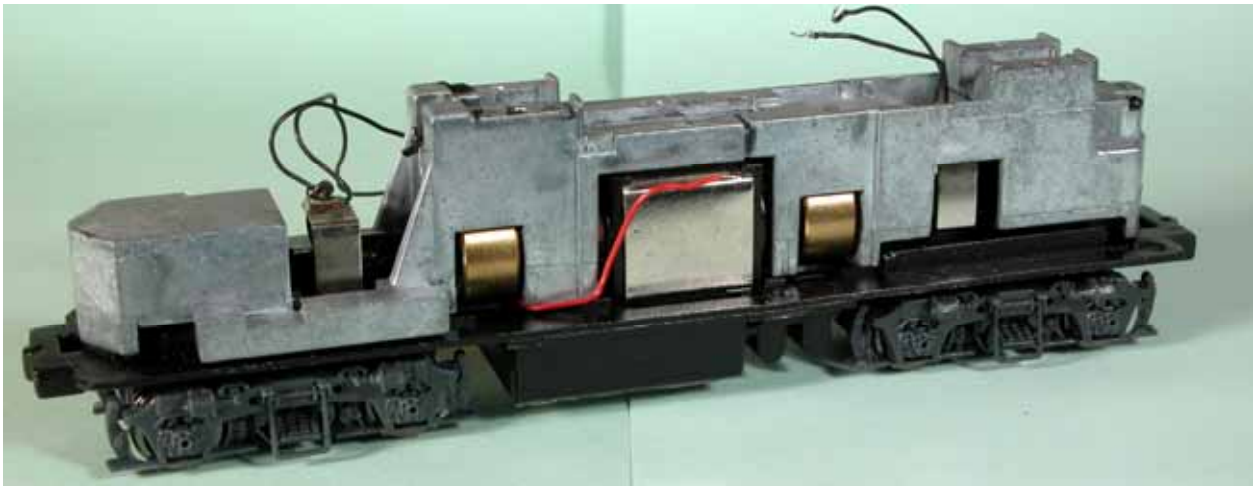
The first step is to remove the shell as shown below.



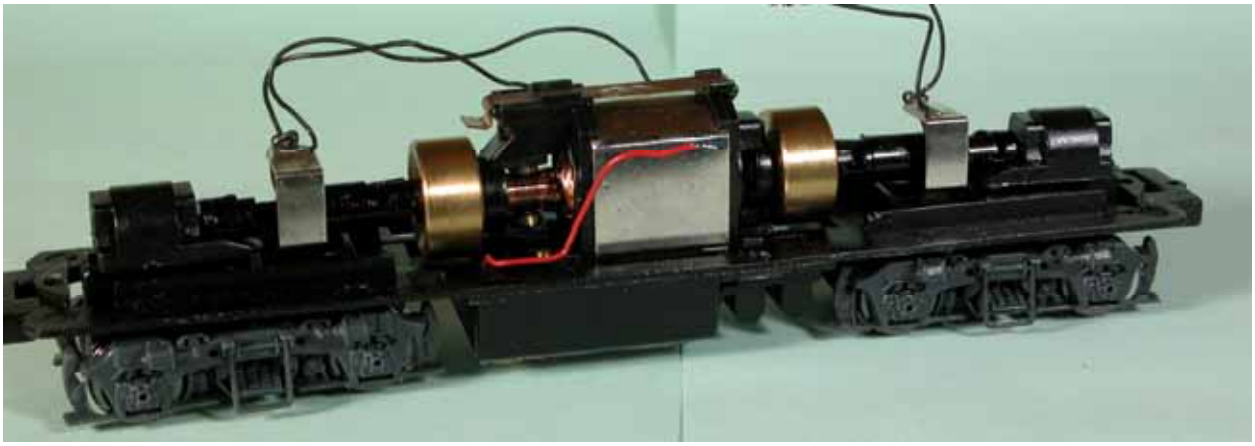
I had previously installed a DCC decoder in this locomotive so this looks different from the stock locomotive as the factory lighting board has been replaced by the DCC decoder. I had also previously added a second track pickup wire to the truck side frame to eliminate the poor electrical contact through the frame.

The next step is to disconnect the pickup wires and motor wires so that the weight can be removed. You will also want to remove the stock light board, or the DCC decoder in my case.

Here is a photo with all the wires disconnected and the weight ready to be removed.



The next step is to remove the weight. There are two screws at either end and two screws in the middle right next to the motor mount. Here's what it looks like with the weight off.

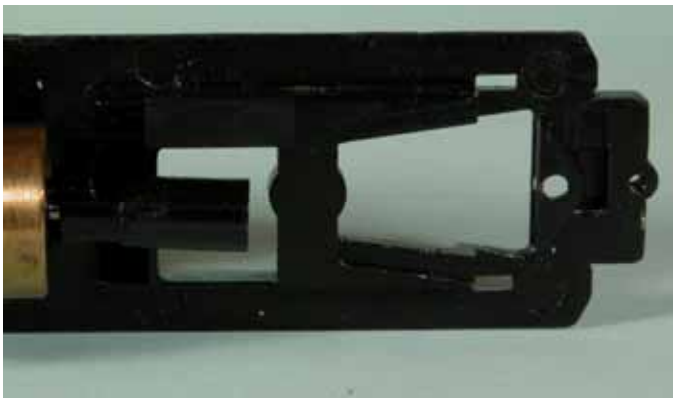


Next remove the trucks by snapping off the plastic clip that holds the worm in place. After removing the clip lift the worm out and remove the trucks from the frame.

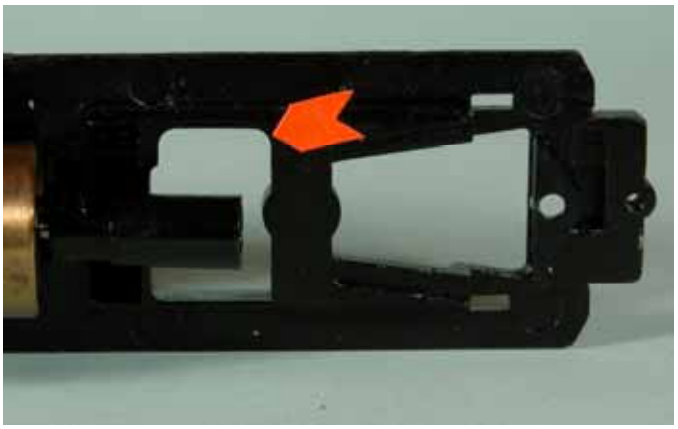
The Stewart trucks have two pickup wires running down to the side frames of the trucks where the Proto 2k trucks only had one pickup wire. You need to modify the frame a bit to allow room for the second pickup wire. Since you need to file or mill on the frame you want to remove the motor next.

Since I had already modified this model with the extra pickup wire I had already made the frame modifications so I don't have step by step pictures of this.

Here is photo of the model that shows the frame in the area of where the truck mounts. The black piece of tape has been put in place to represent what the original frame looks like.



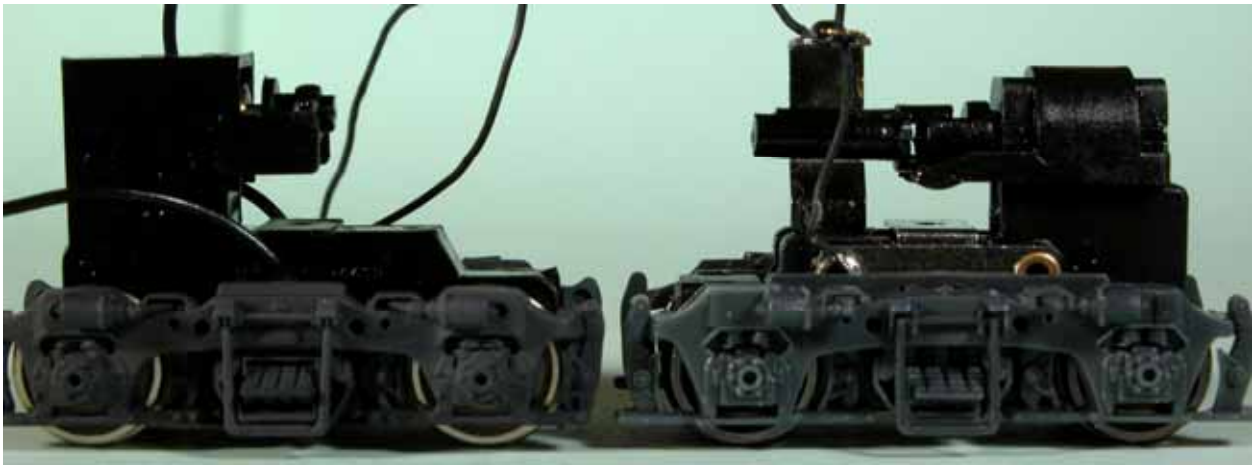
Here is a photo showing where an area has been milled out (orange arrow) to allow room for the second pickup wire to run. The same area should be removed on both ends of the frame.



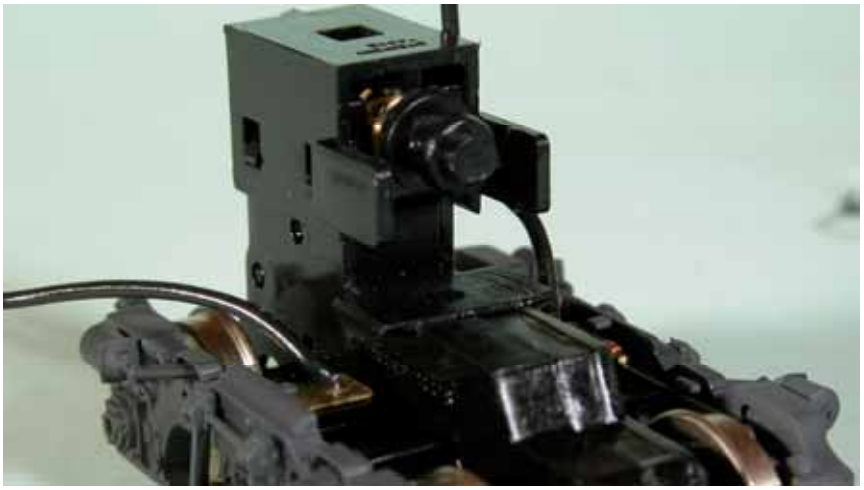
If you don't have access to a mill and you don't want to do a lot of filing you can probably just drill a hole in the center of the area that I removed. You just need a place to run the wire up from the trucks side frame and you also want to keep it away from turning driveline. Something like a 1/8" to 3/16" diameter hole would probably also be fine.

After modifying the frame you can re-install the motor.

While the Stewart trucks can be used in place of the Proto 2k trucks they are not exactly the same. The foot (bolster) on the truck where the frame sits is about 30 mils higher on the Stewart trucks and this will raise the frame and cause the coupler height to be about 30 mils high. To fix this I milled down the bolster foot by about 30 mils. Here is a photo of the Stewart truck next to the Proto 2k truck after the bolster foot has been milled down.



Here is another photo of Stewart truck showing how the bolster has been milled down.



The universal coupling that comes on the Stewart trucks will not work with the Proto 2k universals so the universal ball needs to be removed from the Proto 2k worm and transferred over to the Stewart worm. An adapter bushing will also be needed as the worm shaft diameters are different between the Stewart and Proto 2k trucks. The worm shaft diameter on the Stewart trucks is 2.0 mm, the Proto 2k trucks use a 2.4 mm shaft. You will either need to make your own adapter bushings or you can buy them from NWSL (part number 10159-9)

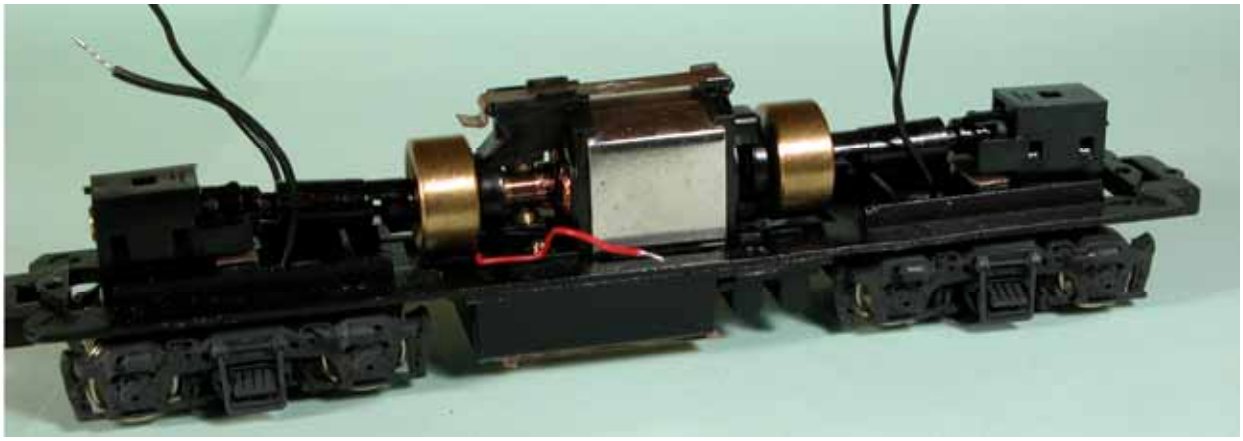
Here is a picture of the bushings I made. The picture on the right shows a bushing pressed into the Proto 2k universal ball.

Install the bushing and the universal on to the Stewart worm shaft and secure it with a little bit of Loctite or ACC glue. Make sure you keep the Loctite away from the bearings.

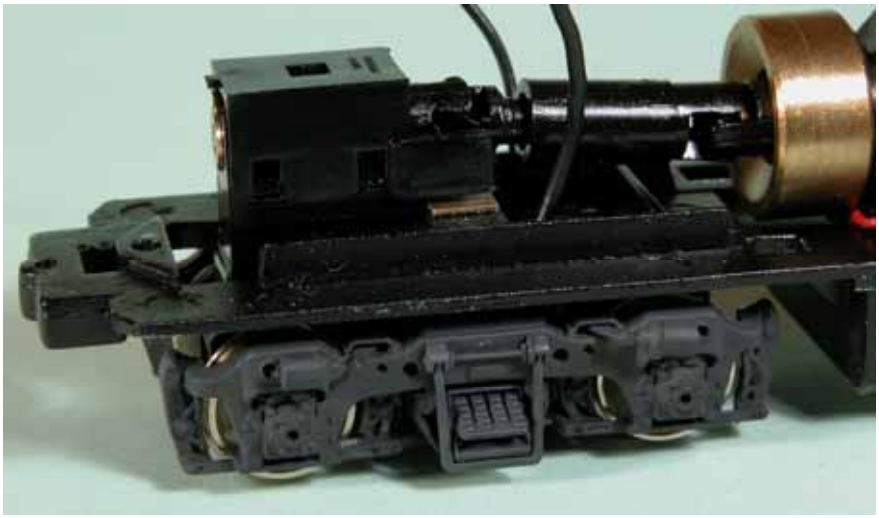
Here is a picture showing the installed universal.

The next step involves building up the frame so that the trucks stay attached when the worm cover clips are snapped into place. The bolsters on the trucks were originally about 30 mils too high and the bolster was milled (or filed down) in an earlier step. After the bolster is lowered there will be a bigger gap under the worm cover clip and the truck may be able to fall off the frame. To fix this you need to add a piece of .031" brass to the frame in the area where the clip rests. Here is a photo showing the piece of brass (.031" x .2" wide x .5" long) glued in place with 5 minute Epoxy.

The next step is to put it all together. Here is a picture showing the Stewart trucks installed.



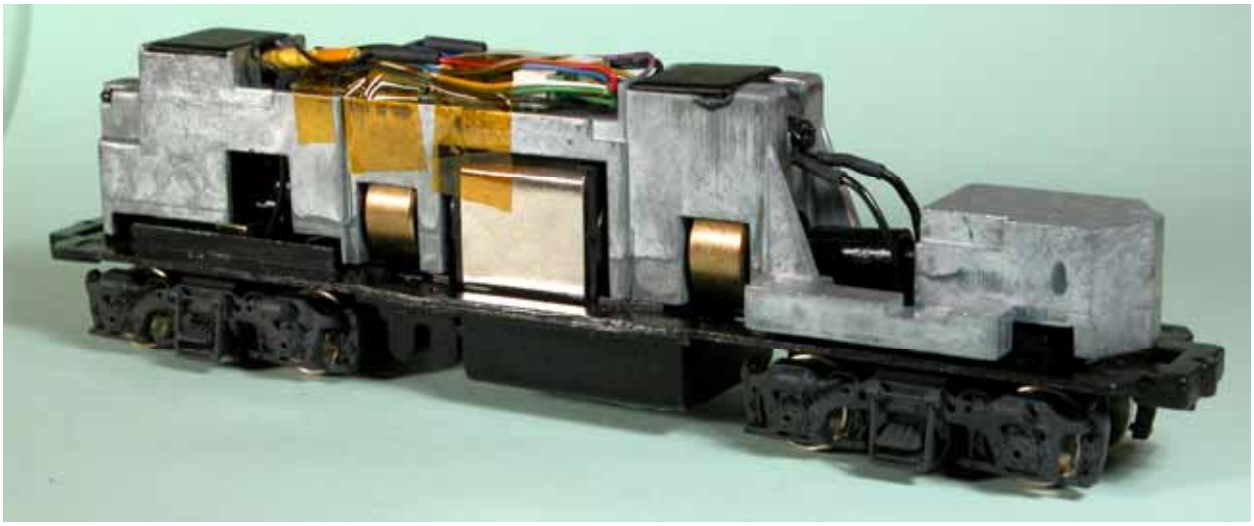
Here is another shot showing how the brass piece helps to fill up the gap under the worm cover clip.



Now it is just a matter of putting the weight back on and hooking up all the wires to the light board, or the DCC decoder.

NOTE: The gearing arrangement on the Stewart trucks is different than the Proto 2k such that the Stewart trucks run backwards compared to the Proto 2k trucks. When you reconnect the motor wires you need to swap the connections to the wires so that the model will still run in the right direction.

Here is picture with everything put back together with the new trucks installed.



That completes the installation of the Stewart trucks.

Alternate methods

If you don't mind the look of the frame sitting up higher than normal you can skip the bolster milling and the extra piece of filler brass. You can probably take care of the coupler height issue using a medium overset coupler to bring the coupler height back down to where it should be.

Supplies

Stewart trucks are available from Bowser and the part number for the F unit trucks is part number Stewart 41.

2.0mm x 2.4 mm bushings are available from NWSL. Part number 10159-9 contains two bushings.