# Overland Little Joe Repair Manual

by Ron Bearden


The Little Joe was a much-anticipated brass model made by Ajin for Overland. The detailing is superb, and (visually) it is a stunning N scale model.

These locomotives are currently selling for between 1,500 and 1,800+ dollars. I find this fact astounding since these locomotives can run so badly.

However, having been sent one for repair, I was able to document how BAD these locomotives are. Having participated in some Internet discussions, it is clear that my experience was not unique. And once you see what I'm about to show you, you will see obvious design flaws.

The good news is that the Little Joe can be restored to the glory that was its promise. Just correct the flaws and you now have a great runner.

**Getting started.**

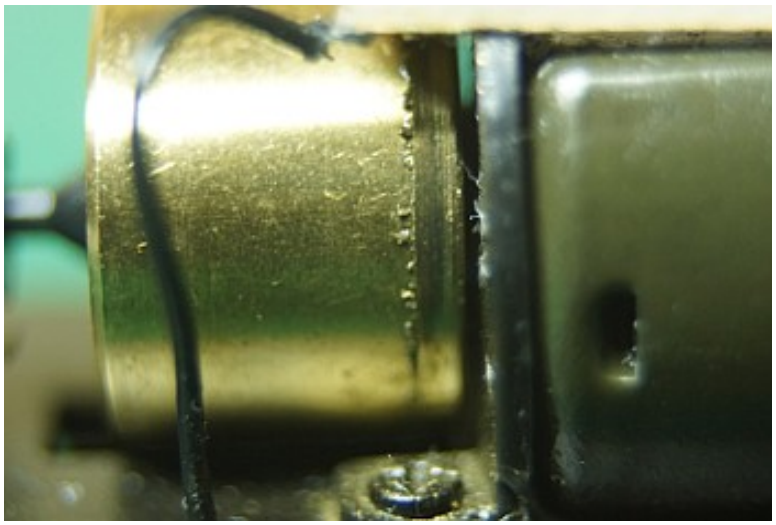
Remove the screws (there are 6) from the underside and carefully remove the shell.

OK. We see that this has two motors- which in my experience is already not a good thing. The reason is because if the motors do not turn at exactly the same speed, they will actually work against each other. Classic examples of typically poor running locos designed with two motors are the Hallmark brass Centipede and the NJ Custom Brass EP-2. Both of these have TERRIBLE reputation for pulling power.

We also see the pick up wires send electricity to boards on top which then sends it to the motor poles via some jumper wires.

Problem- this was a NOISY mechanism.

The first disastrous thing I notice on this particular locomotive is an assembly error. The flywheel has a cut-out in the frame but the flywheels were not located right over the holes. They are too close to the motor and thus scrape on the frame.

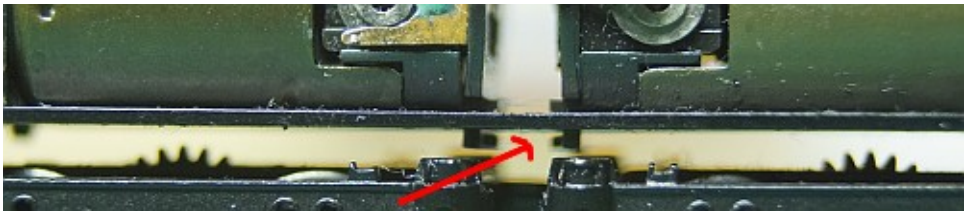


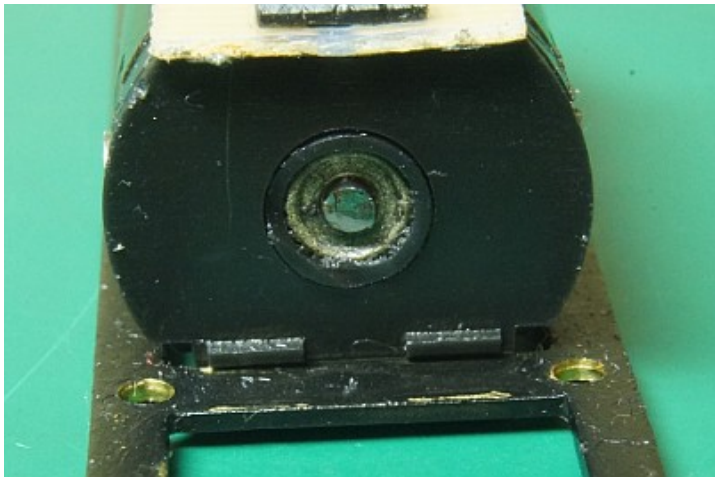
This flywheel was the worst, but the other had significant damage as well. Look at all the horrible metal particles that coming off of this. Not only does this cause dramatically high friction, but it also risks damaging the gears in the trucks.

This is a serious flaw.

The second serious design flaw in this locomotive is that the motors are VERY loose. Thus they are able to vibrate and make a terrible racket when the loco is running.

I made a short video documenting how loose the motors are.
See it on YouTube at: http://youtu.be/y5APq3YNDxI

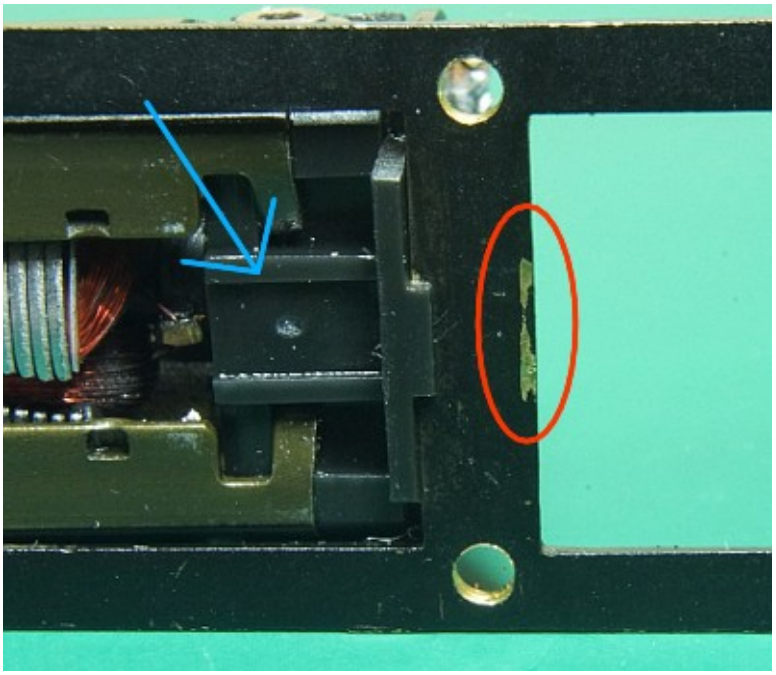




The root issue is that the motor mount is not held securely to the frame. For example, look at this photo. See the gap between the latch on the motor support and the frame. That gap allows the motor to bounce up and down.

In the second photo (left), you see the nubs that hold the rear of the motor to the frame.

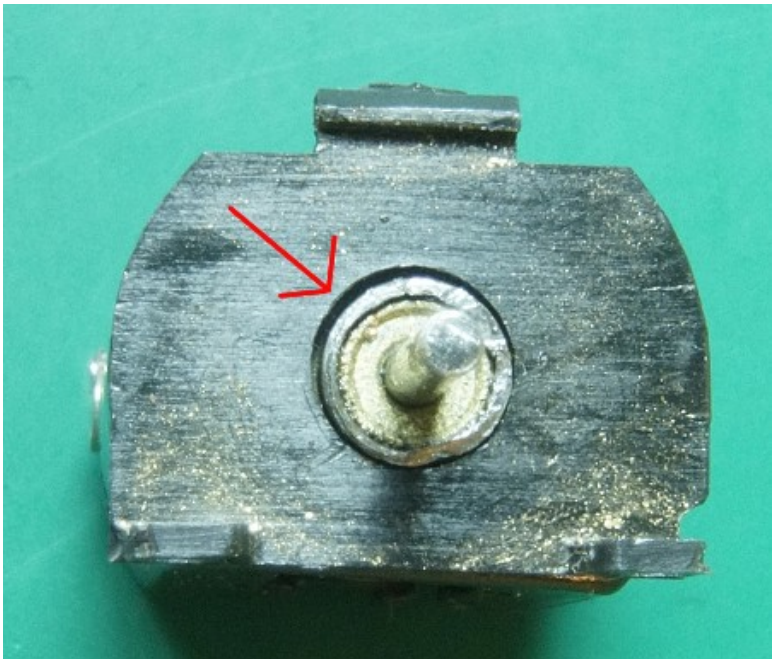
But actually, the nubs only restrict the up and down movement (and not very well). However, there is nothing to prevent the motor from sliding sideways back and forth.



In fact, with the motor removed, the paint scraping (red) shows that this motor has indeed been vibrating back and forth.

We need to find a way to restrict the movement of the motors.

The blue arrow is for orientation. This plastic spot on the motor has a channel- and it is on the underside. That equivalent spot on the top is solid.



But believe it or not, we are not finished with the design errors.

Here is the front motor mount which screws to the frame. But notice that the hole is significantly LARGER than the bearing mount on the motor. This slop ALSO allows the motor to vibrate.

I'm telling you, this is terrible. How did Ajin let these out the door?

Well, we're not finished finding design deficiencies, but let's go ahead and take this thing apart so we can make it better.

**Disassembly**

**Motor Removal**

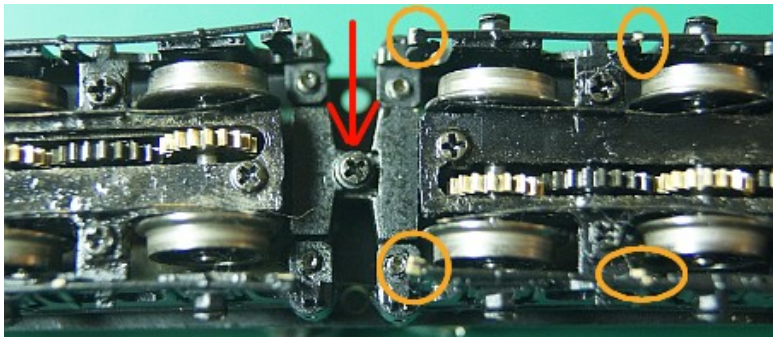
Unsolder wires from trucks to circuit board.

Unsolder the short jumper wires from the motors (you can probably throw them away).

Remove the two screw from in front of motor on the motor mount. With these screw removed, the motor can be lifted out. Just pop the u-joint loose from the cup on the geartower. Pull the motor free.

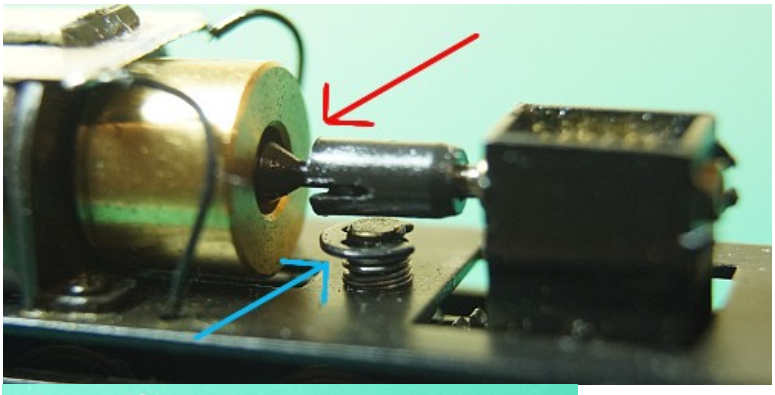
Repeat for other motor.

**Truck Removal**



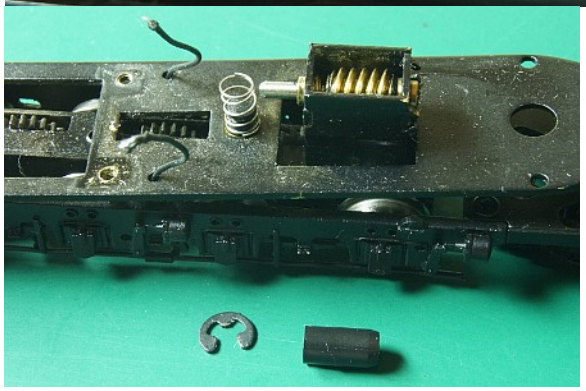
The trucks are drawbared together. So remove the screw between the trucks (red).

Well, while we are here, notice that one truck has SIGNIFICANT wear at spots where the bottom of the sideframe hits trackwork (orange). We will address this last.



Begin removal of a truck by removing circlip on the pivot post. This shot shows the u-joint and the circlip under it.

Absent a special circlip tool, you can take a flat-blade screwdriver and gently twist. That will move the circlip and loosen it. You should be able to use some small pliers to pull it the rest of the way off.

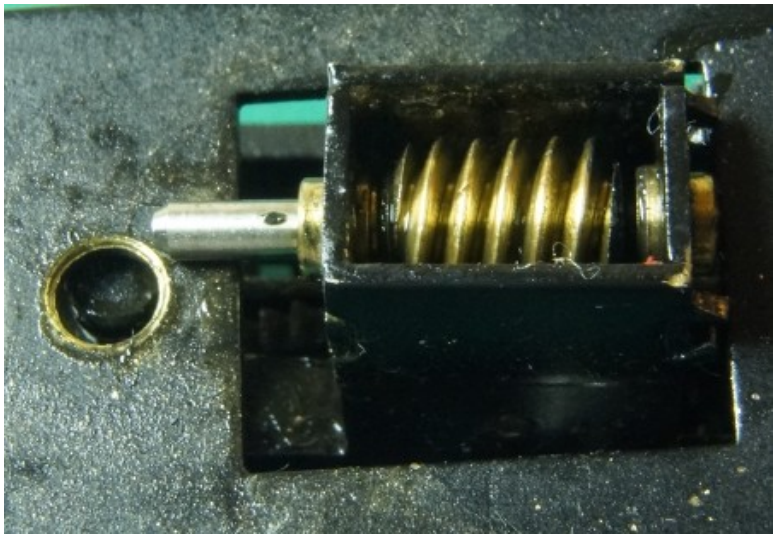


Remove the u-joint cup off the wormshaft. Pull the spring up and away.

If you don't have a tool, VERY carefully insert a flat bade screwdriver and twist gently (it is possible to bend the circlip, so be gentle). Circlip should move slightly on post. Pull it off with pliers.

Remove spring.

Pull truck down so that the pivot post is free of the guide hole.  But wait!  How the heck do you get this stupid truck out?



The answer is- it's not easy.

This is the hard part.  Turn truck at a diagonal so that the worm shaft points toward the corner of the hole.

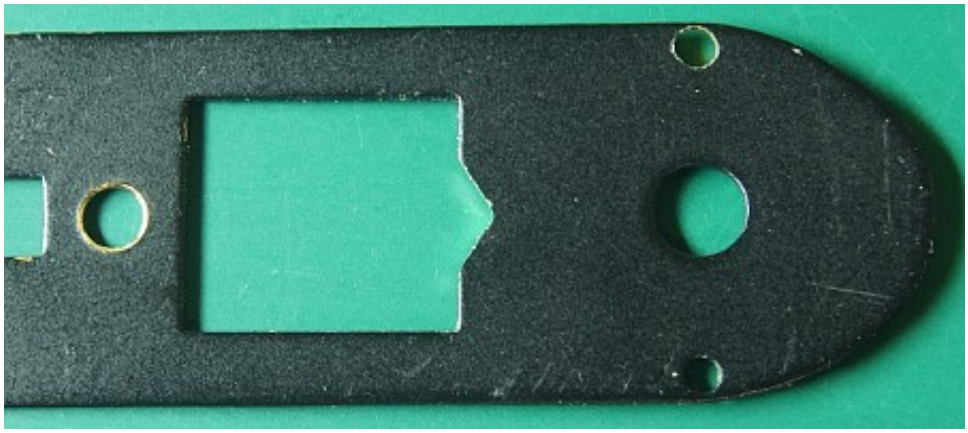
Get the wormshaft clear of main frame.

Now try to get back corners of geartower through frame hole.  It is a VERY tight fit (we will fix this).  Try not to bend the frame- it is VERY thin.  When you get the back of the gearbox clear, remove truck assembly from frame.

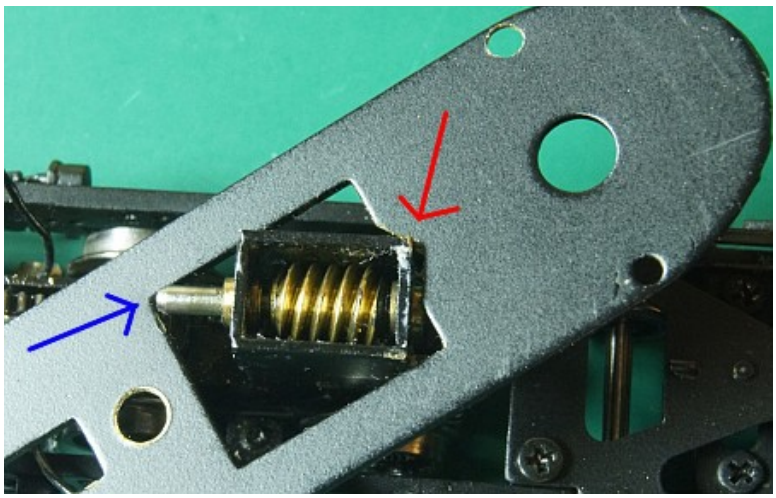
Repeat with other truck.

Time for our first repair.

**Repair the Frame**



Now, frame is bare.  Use a mini file to cut a triangle (sort of like a diamond point) out of outer edge of truck hole.  Test truck fitting this hole by trying to get truck back on the frame.  The triangle should allow the truck to fit into place with no trouble.



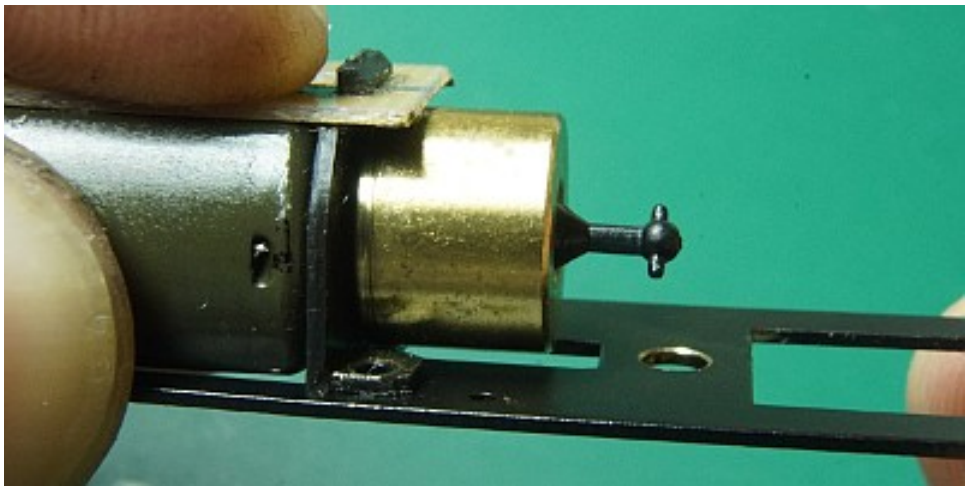
With the diamond point filed into the frame, the truck geartower now easily fits past the two tight spots.

Ajin should have designed the frame like this from the start.

Of course, repeat this procedure on the other end.

**Flywheels**

The next issue is the flywheels. The cut-out holes are big enough for the flywheels- but just barely. And that is the problem. There will always be variability in the assembly process. In this photo, the flywheel has been placed too far down the motor shaft. That's why it scrapes the frame.

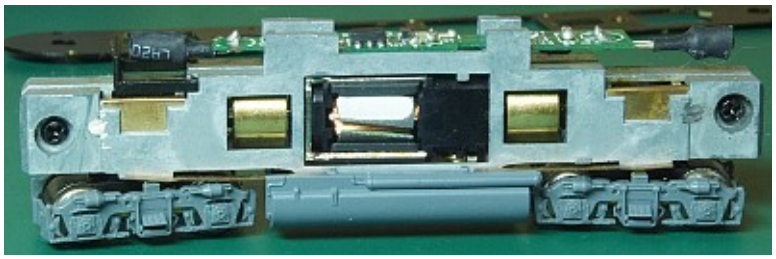


Further, almost any motor has some movement in the shaft. Just watch the motor poles move toward one truck when going forward, and then shift the other way in reverse.

All of this is to say-- either the holes need to be bigger or the flywheels smaller.

If I had a mint Little Joe, I would just open up the holes and keep the flywheels (of course also locking down the motor – which we will do in a moment).

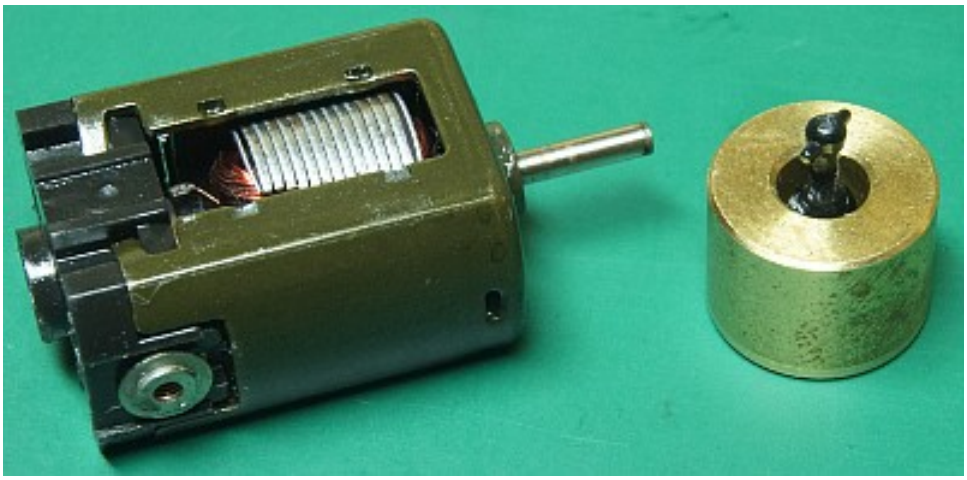
But in this case, the flywheels were so damaged,I needed to replace them.



Now since I'm replacing them, I might as well use some that are a fraction smaller. That will avoid problems with the frame altogether. My search concluded with a Life Like Walthers GP38-2.

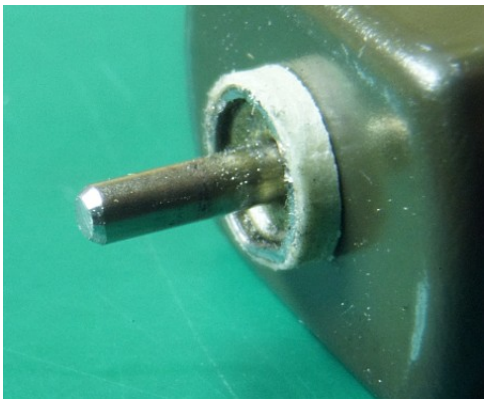
I was looking for a flywheel that was not only smaller, but also had a hex-nut interface that is typical of many high quality locos made by Atlas, Kato, and in some Life Like locos. These Life Like flywheels were perfect. They are a little smaller and have a hex nut hole into which I could insert a newer u-joint. I used a NWSL Puller to get the flywheels off.

Now, in that photo above, you can see that the stock flywheel (middle) is hollow. So it slides onto the motor shaft and the motor shaft extends into the inside of the flywheel. Then, the plastic u-joint shaft piece slides onto the motor shaft.



Getting all this off was not easy. If you can, you could try to pull that plastic piece off first. Then, it may be possible to hold the motor poles in one hand and twist the flywheel off. But don't do this with all your strength. I have had a situation where the flywheel held fast and the motor pole spun on the shaft- potentially damaging the motor! So go easy when trying to twist it off.

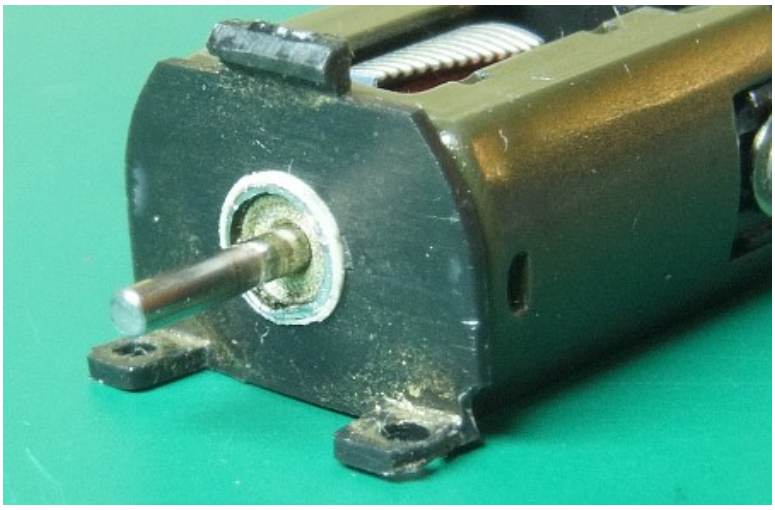
In my situation, a previous owner had added superglue to hold everything together (since it was all slipping on the shaft). Well, that glue worked! I had to get a pair of "nippers" (like wire cutters or Xuron rail cutters) and wedge the diagonal in the tiny space behind the flywheel in front of the plastic motor mount (there was not enough room for a NWSL Puller). Eventually I got the flywheel off without damaging the motor housing or shaft.



**<u>Vibration Reduction 1</u>**

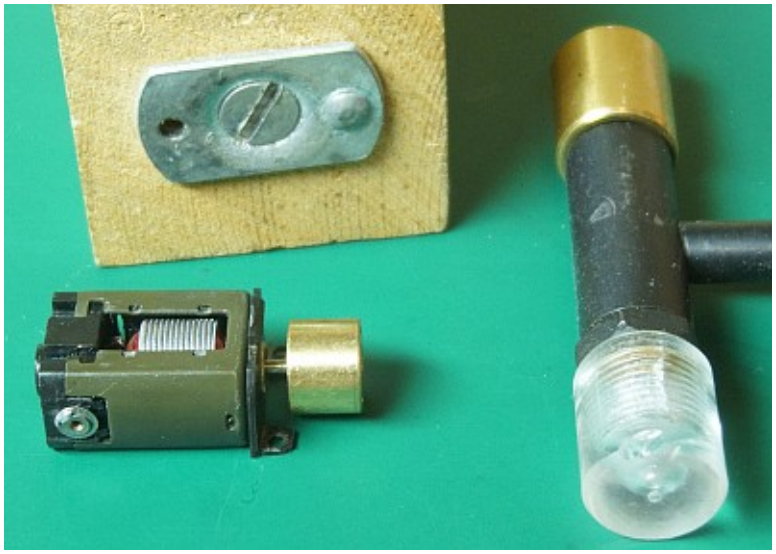
With both stock flywheels off the motors, I then turned my attention to the **<u>motor mount flaw</u>**. I just needed to fill that small gap. So I cut a very thin piece of masking tape and wrapped it 2 times around the bearing holder as shown here.

Now, this view also shows that I cut the motor shaft with my motor tool. I cut 4 mm from the length (actually, 5 is better). The new flywheel does NOT need the shaft to extend inside the flywheel. This photo also shows that I chamfered (rounded) the end. Never place a new flywheel on an un-chamfered shaft.



I installed the plastic motor mount over my taped bearing holder and it was just right- just a little snug. In fact, it went on better with a twisting in the same direction as the tape. This photo was taken for a test-fit, before I had cut the motor shaft.

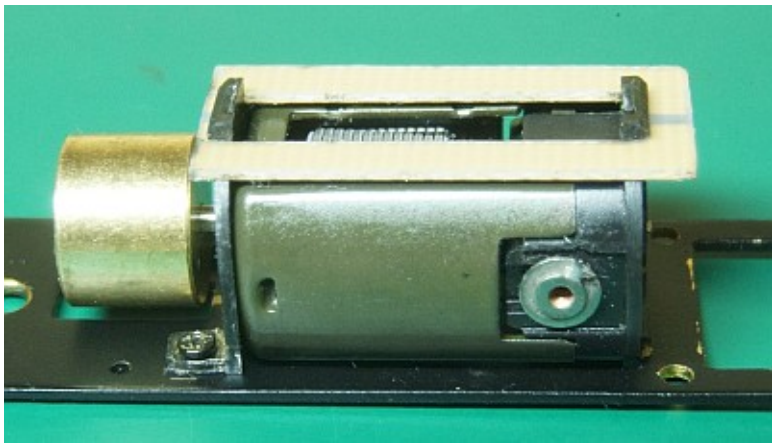
You can see the gap has disappeared so vibration from this spot has been reduced.



Installing the new flywheel was a little tricky since I had to hold the plastic motor mount in place. I placed the back of the motor on a hard metal surface and then gently tapped the flywheel down with a small hobby hammer with a plastic and brass head. I used the plastic head.

Go easy since you don't want to bend the motor shaft.

Now, I'm writing this after I'm finished with the project, so in hindsight, I can say that the flywheel would work better if it was closer to the motor. Since it is smalled, I no longer have to worry about it scraping the frame.



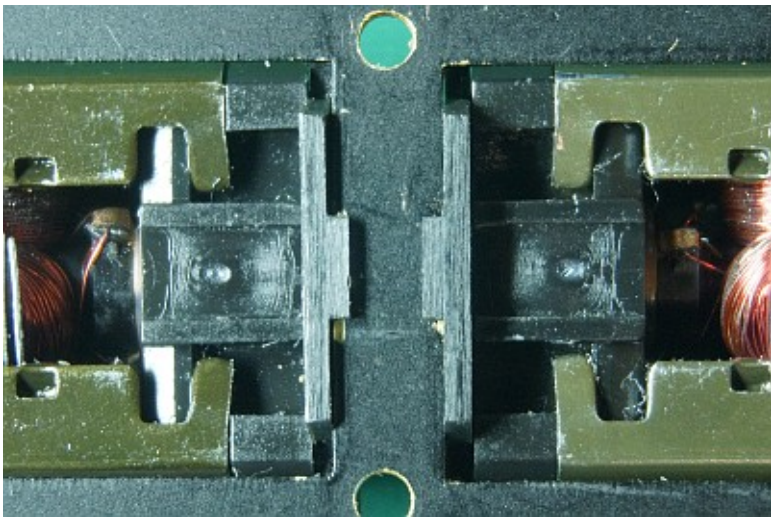
With flywheels in place, I mounted the motors back to the frame. I installed the back plastic motor mount on a motor and then installed the circuit board. Note that the boards have a skinny end and a fat end. The skinny end goes to the back, and the fat end goes toward the flywheel. This photo shows it **BACKWARDS** (it is easy to do).

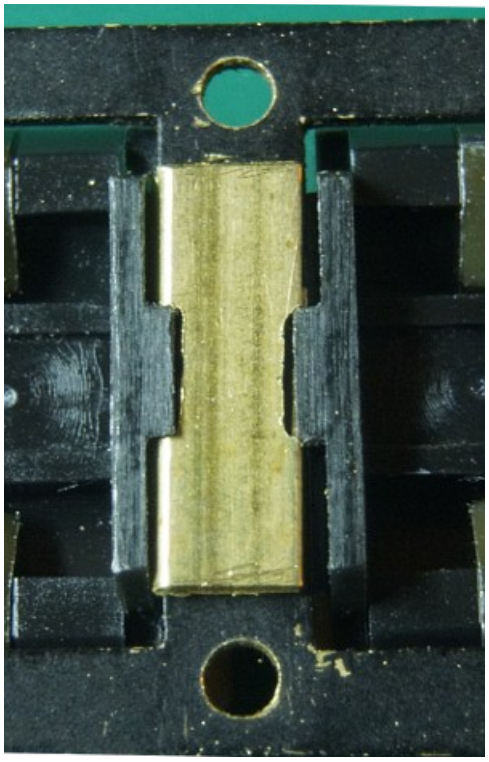
I placed the motors into position and screwed them in place.

Now, I've restricted the movement in the flywheel ends of the motors, now to turn to the rear.

**Vibration Reduction 2.**

With frame up-side-down, look at spot where the backs of the motors meet. I decided to make a brass piece that would match that spot like a puzzle piece. So I found some brass that was about the same thickness and cut and filed it by trial and error until I had something that would fit.





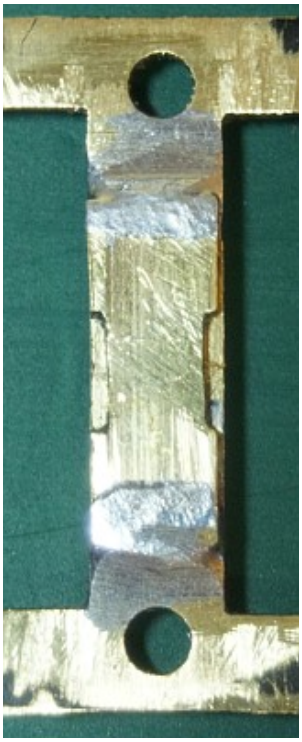
Here is what I came up with. It was a pretty good fit.

I figured that if this piece was soldered to the frame, then it would effectively lock down the movement of the motors.

The solder would need to go on the ends- but not black the shell screw holes.

I also needed to sand the paint off to expose fresh brass for tinning and soldering.

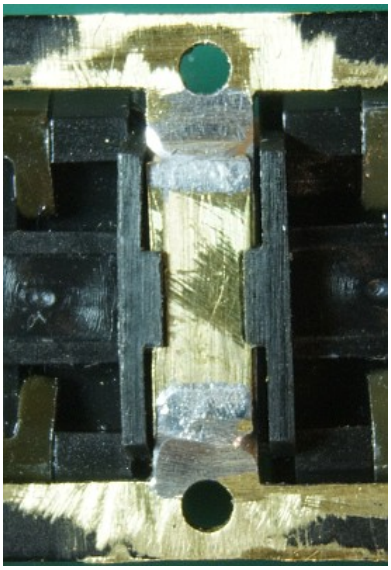
Finished work is right.

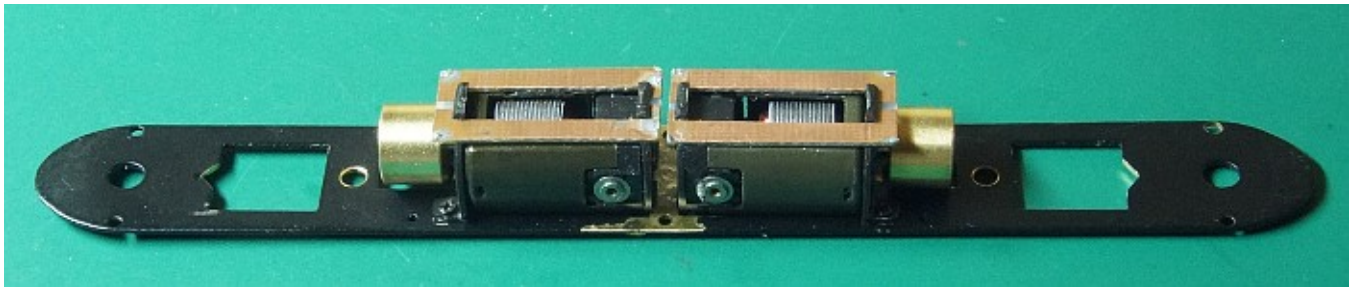


I next wanted to make that section fatter (remember that gap I showed).

So now working on the TOP side (right), I sanded the paint off- down to fresh brass. I then tinned and soldered the area. My goal was just to add a thin layer of solder. I finished it up by passing a file over it to get any high spots.

Left- the modifications are done and the motors are now installed and SNUG. Movement has been eliminated.





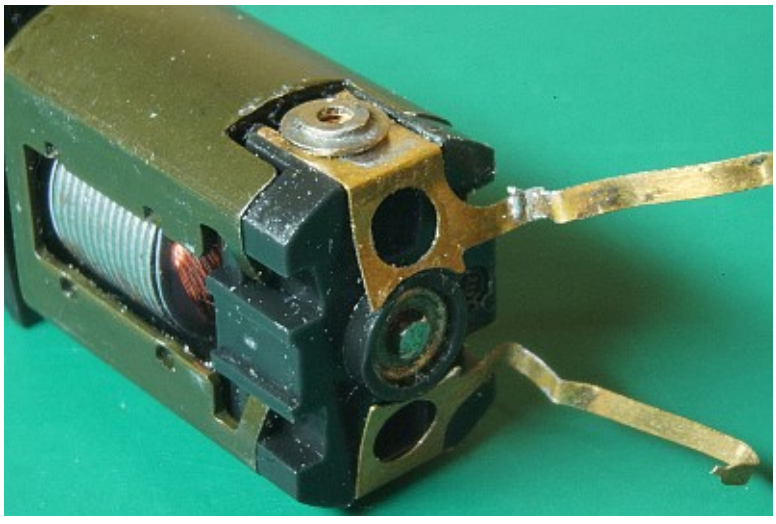
In the above shot, we have made new cut-outs for the geartowers, installed new flywheels and stabilized the motors. Time to move to the electrical system. It can be improved since those jumper wires are terrible.

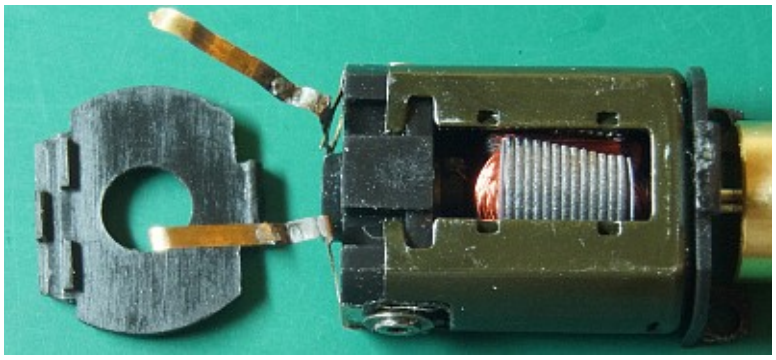
**Electrical System Re-build**

I began by straightening out the forks on the motor tabs. I removed excess solder from a previous owner. You can also see that when new from the factory, the springy-part that goes up to the lights was soldered to the board.

Everything is snug and in its place.

Notice the bottom of the motor is to the left.





The rear cover has bumps that fit into the motor tabs to help lock them in place.

This is the FRONT motor of the two.

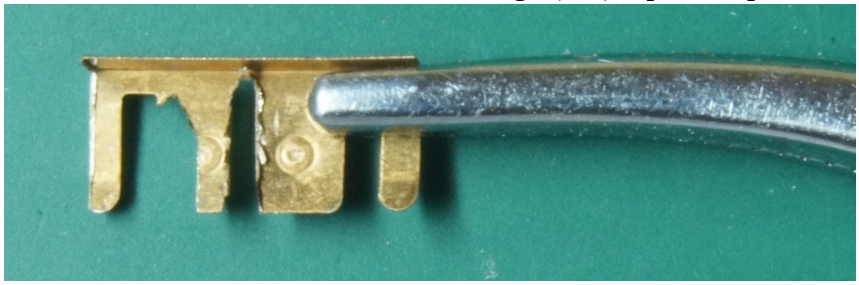
Now, on my sample, the rear motor had no phosphor bronze pick ups. It relied on jumper wires soldered to the motor poles- which is always dangerous because of the pole housing overheats, then the plastic melts and it gets either turned out of position or becomes loose and will no longer stay in place. In other words, always try to NOT solder directly to the motor pole.

So I decided to make my own pick-up.

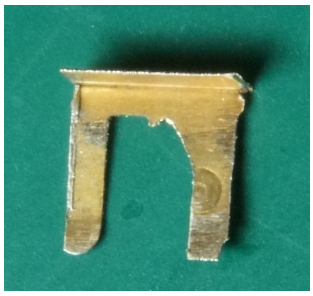
Recognize this? It is a bearing holder from an old Kato or Atlas locomotive. I needed a u-shaped piece, and this seemed like a good starting point.

Open up the back side only. We want the finger side and the 90 corner in their stock positions. On some of these pieces, opening it up like this will snap the metal (which is good).

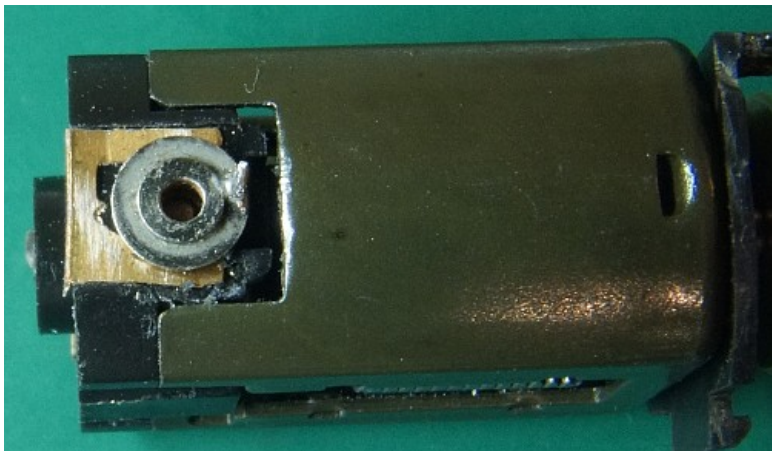
I then took the remaining piece and modified it carefully with a motor tool with a ceramic cut-off wheel. I shaved a little off the outside edge (left), opened up a U-shaped area, and made a cut that would be the outside edge.



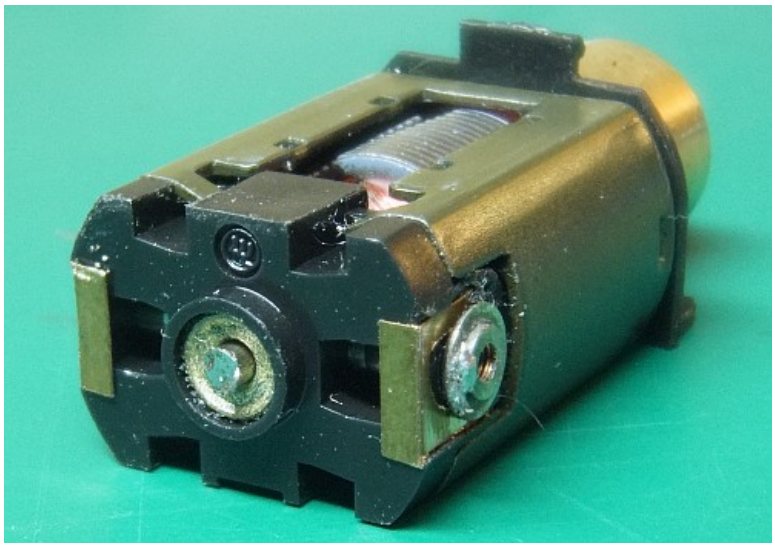
Forceps protected my fingers. Also, the part being held by the forceps was thrown away.



I cleaned up the burrs with minifiles.  Here is the final product.  I made two of these.

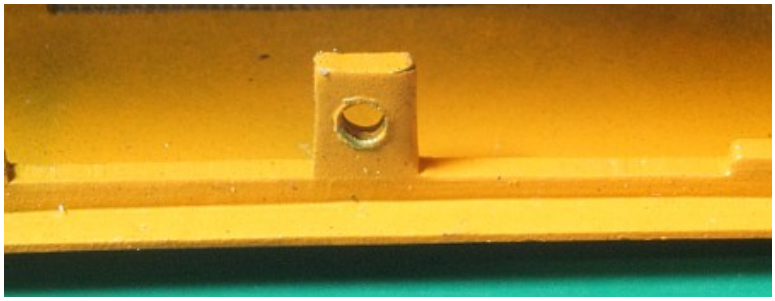


This creation makes a good fit and serves its function well.



Notice the backside wraps around. When the back motor mount is installed, it will keep these new motor tabs pressed forward.

Notice I wiggled the brush housing out a little for more room to work. I squeezed them back tight when the pickups were added.



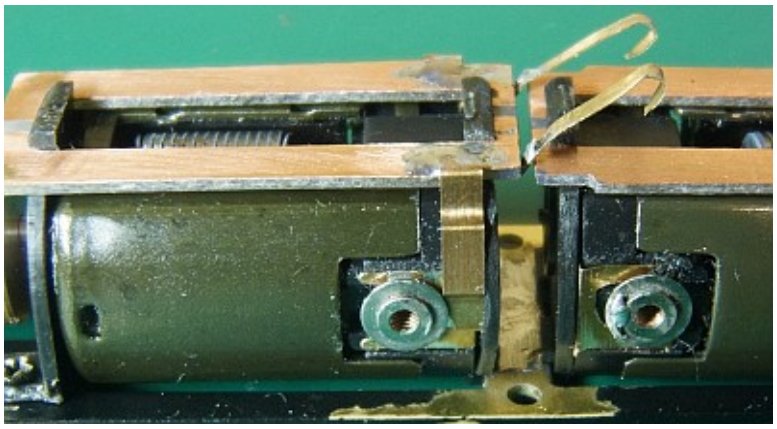
Since we are making design changes, let's solve a minor problem.  This is the middle frame mount for the shell. When you remove the shell, or try and re-install it. These two tabs catch on the circuit boards.

The tab catches at the middle of the loco where the two skinny sides of the circuit boards meet on top of the motors.

So I filed a notch at that spot. I also shined up the board with some fine sandpaper.

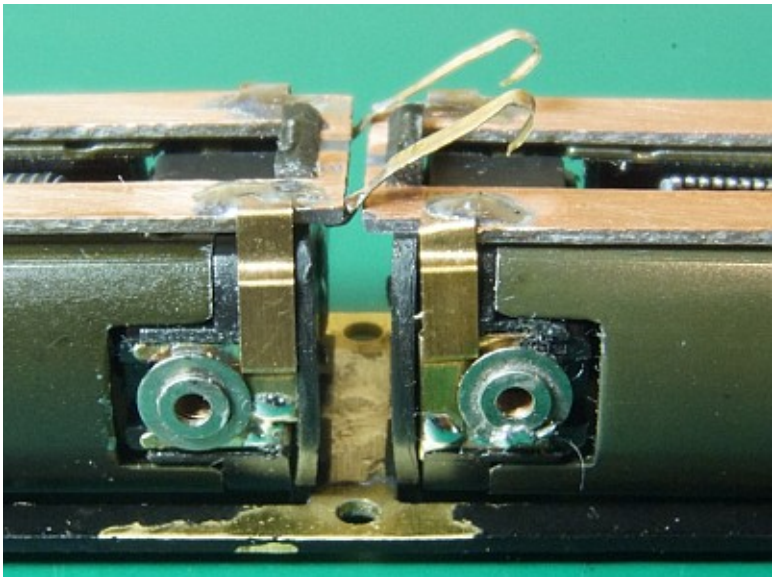
But wait. Let's make some more changes to the design. Jumper wires are terrible.

So I took some leftover frame pick-up pieces and trimmer them. This one came from an Atlas VO-1000. I liked the compressed and curved middle.



I trimmed and bent the piece so that it touched the U-shaped piece I made and then came up and folded to the top of the board.

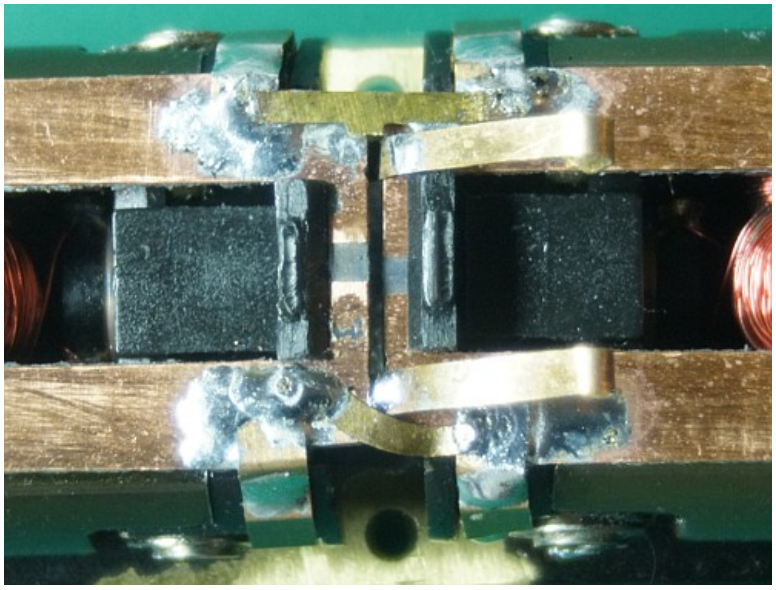
Now, you will notice that I FLIPPED the board. The insulated side is now down, with the soldering side up. This makes it all easier to work with. And I determined there was no risk of a short from something inside the shell.



I solder my new flat “jumper” to the motor tab on the bottom (descretely- don't need much solder) and to the board up top.

All four motor poles are thus treated.

We now have solid electrical transmission from the boards to the motor poles without big fat ugly jumper wires (that the shells gets caught on).



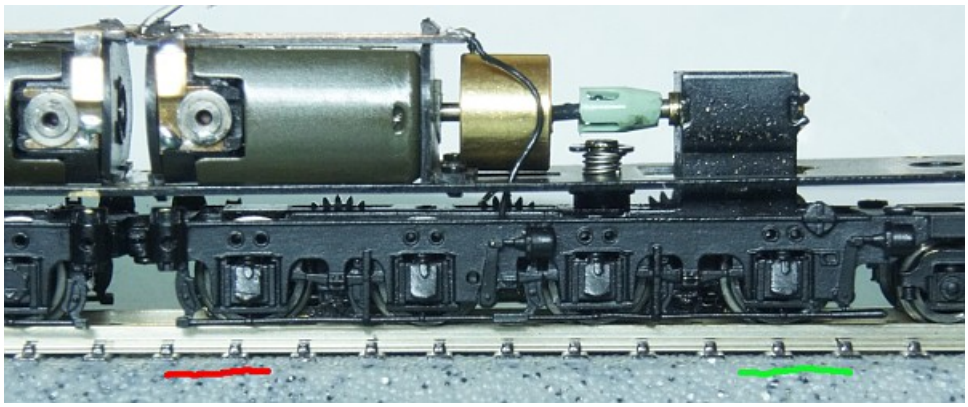
On test running the mechanism at this point, I found it stalled too often. I concluded that tying the motors together was essential so that both motors could draw from all available axles. And in fact, the stock model has a jumper wire between motors.

So, I cut thin phosphor bronze strips to solder across the gap between circuit boards. To remove a motor, just unsolder one end of these jumpers.

As you can see, I tried not to obstruct the extensions which go up to the shell circuit board for the headlights.

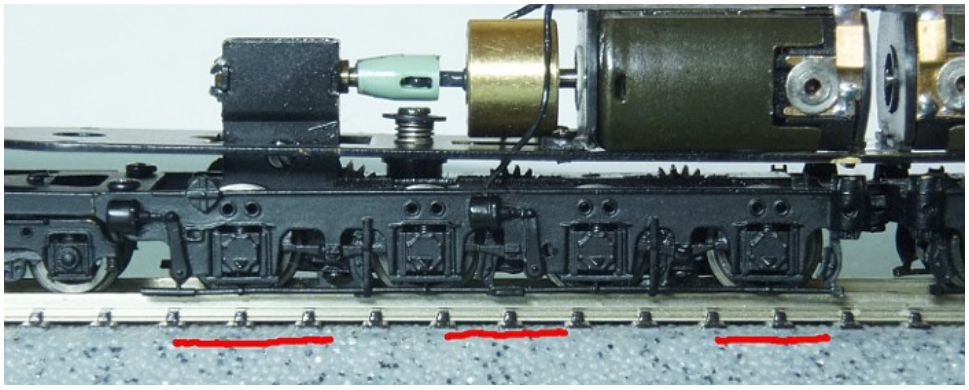
I now had a quiet and pretty reliable mechanism.

Now time to turn to the trucks.

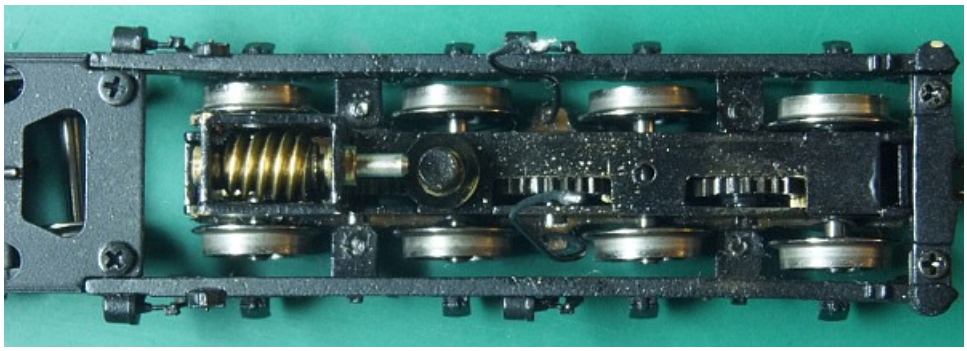


As stated on p. 4 of this document, it is clear from the wear spots that the underside of the sideframes sits too low and details scrape the track.

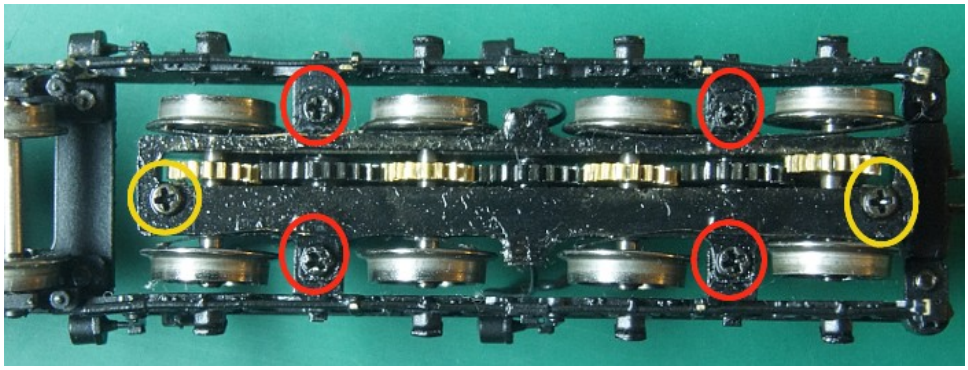
Here, you can see that the right (green) is OK. But the left is too low (red).



And this truck is worse. The whole sideframe appears too low.



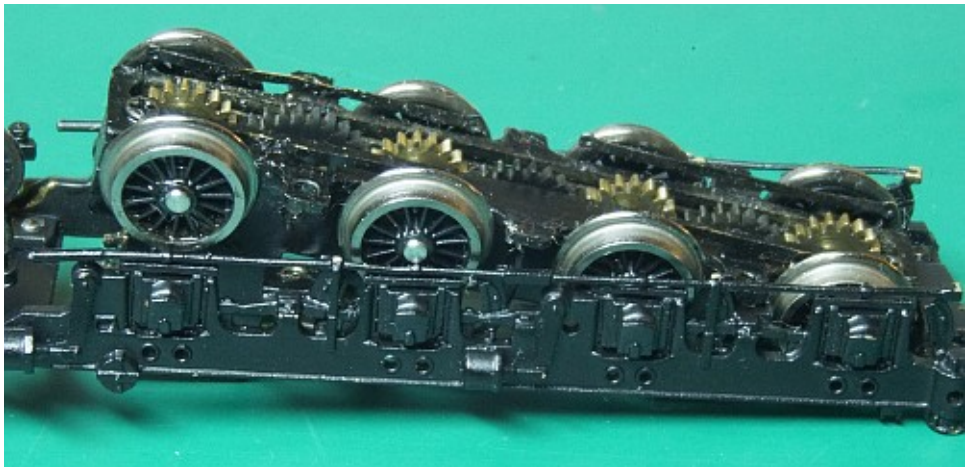
From the topside of the truck, you can see four screws. Leave these alone.



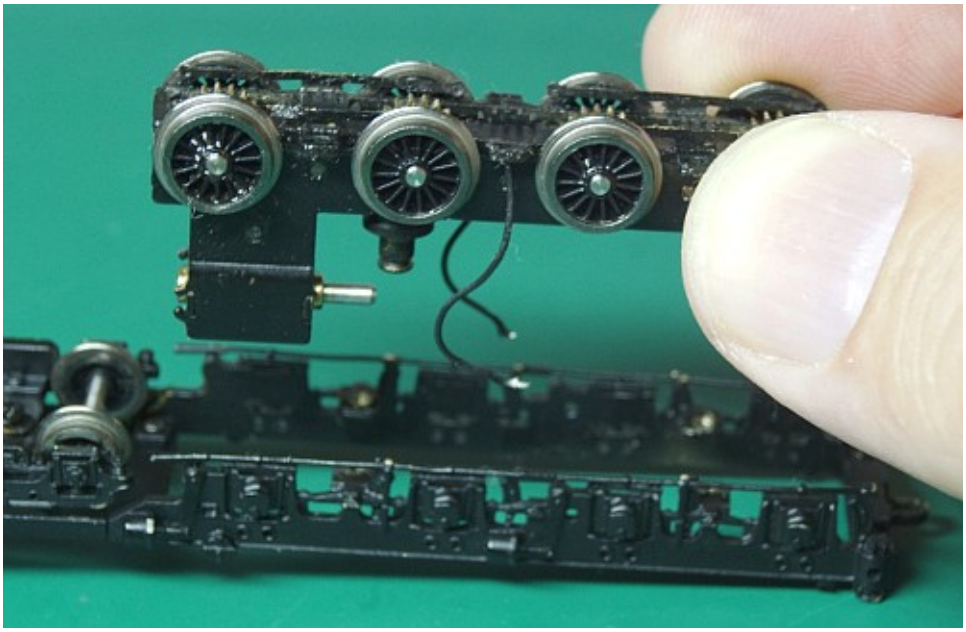
On the underside, there are 6 screws. The four screws indicated by red remove the gearbox from the sideframes.

The two indicated by yellow remove the gearcase cover.

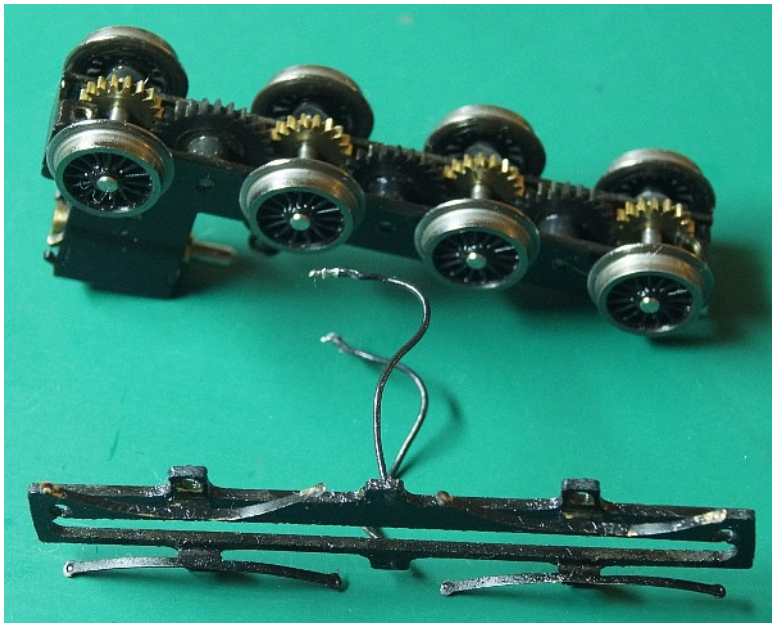
Remove the red screws.



From the underside, the gearcase simply lifts out.

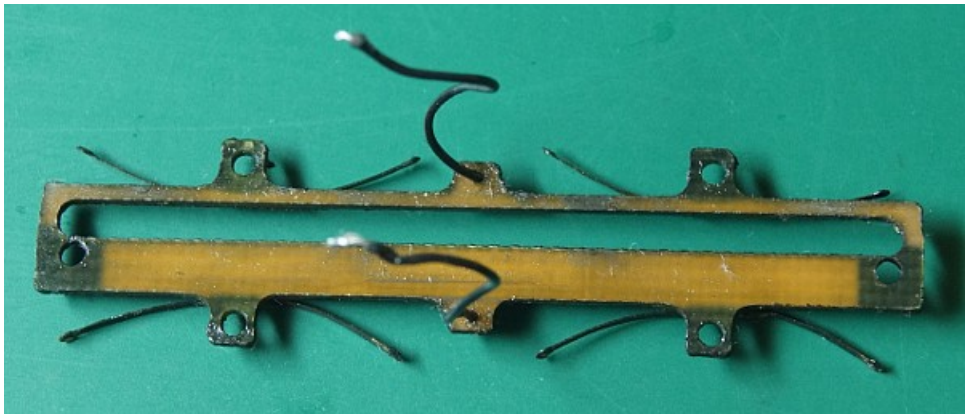


The gearcase is a self-contained unit.



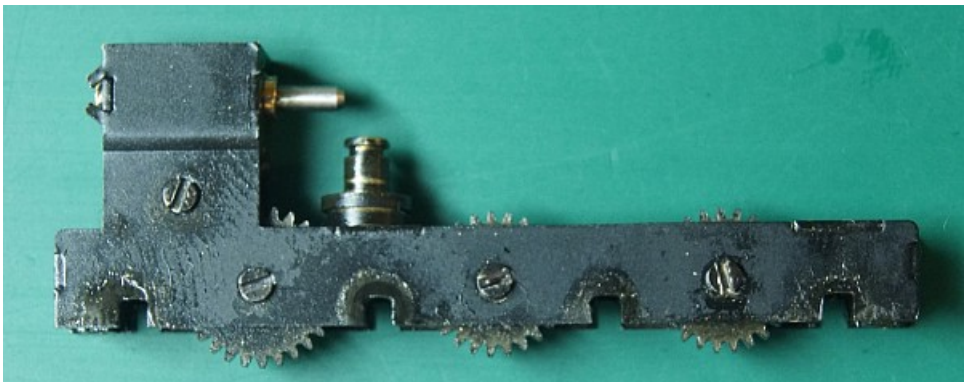
The bottom gearcase cover has the pickups soldered directly too it.

The gearcase was removed by taking out the screws marked in yellow above.



On the underside of the gearcase cover, you can clearly see that this is a perf board.

You can also see the traces. It is rather novel to simply solder the pickups to a perf board. This would make replacing a broken pickup easier. Further, that wire up to the motors will surely break one day. Replacement should be easy. I like this design.



The gearbox itself is pretty simple. The gears are retained by screws.

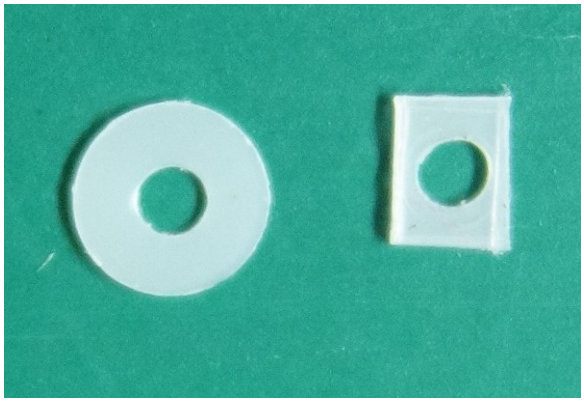
I did not disassemble this. I just washed this gearcase and the wheelsets.

The wheelsets have some kind of fiberboard washers. They go on the OUTSIDE of the gearcase.

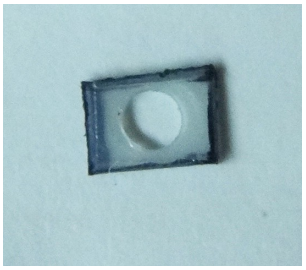
A few deformed when washing (made of paper?). That was disappointing. Their purpose is to keep the outside tread and flange away from the gearcase. In this locomotive, no part of the truck is electrified (unlike most brass locos).

In reality, only the washer in the narrow space is needed since the gear itself restricts the movement preventing the tread from touching the gearcase wall.

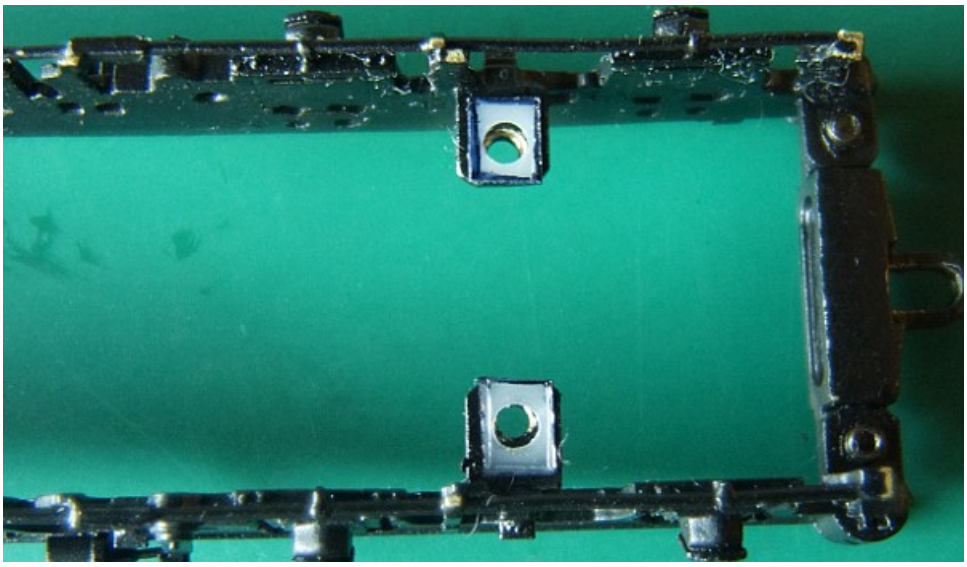
I replaced one washer with a plastic washer I got from Atlas I think it is a thrust washer that rides near the worm on some locos. Of course, a NWSL Puller was required.



Raising the sideframe ended up being easy. I made shims out of Atlas thrust washers- 4 per truck.

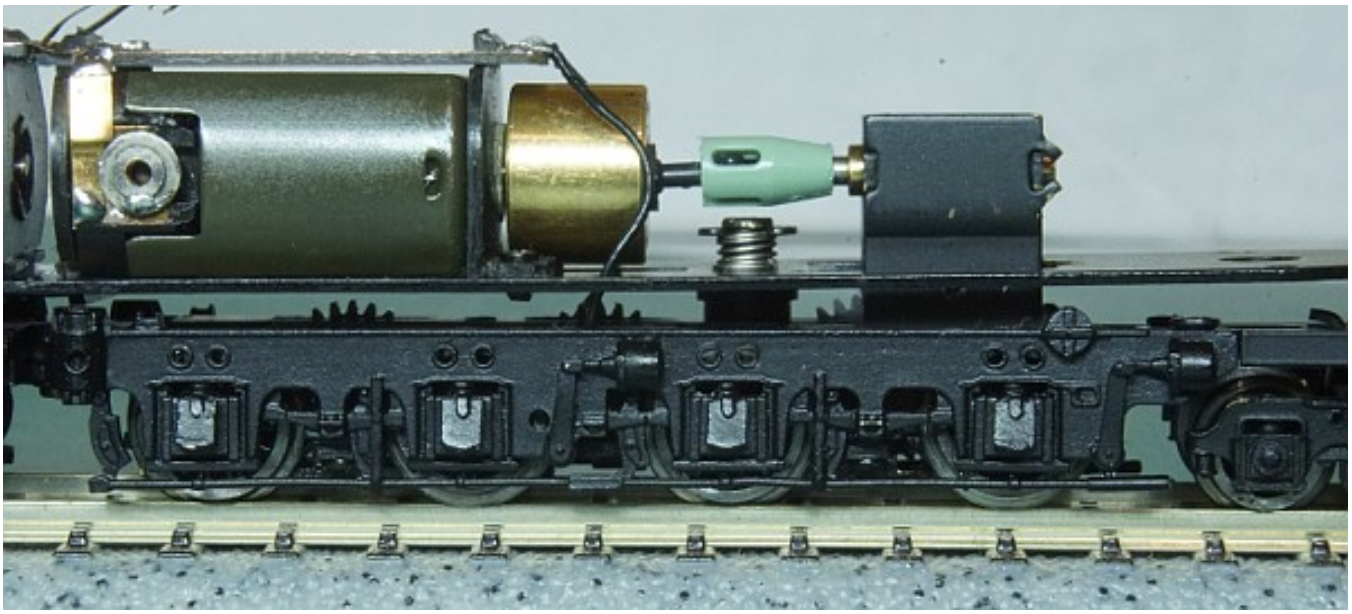


Since the edge would be visible when assembled, I used a black permanent marker to blacken them.



This is the UNDERSIDE of the sideframe assembly. Just lay the shim on each brace and re-insert the gearcase on top of it.

The screws are long enough to accommodate these shims.



Now we're talking!  The brake support rods are now up off the rail.

Trucks have been cleaned with degreasing detergent, warm water and a toothbrush to remove all the bass particles.

Trucks reassembled and installed.

Locomotive has been re-lubed and now is running wonderfully smooth and quiet on my layout. Ready to go back to the owner..

The design flaws in this locomotive were astonishing.  But thankfully, they were repairable.

In fact, I think the mods I introduced made it a better locomotive.

The OMI Little Joe is a unique addition to N scale.