# Bearing Block Magic:

## Reducing Noise in Short Locomotives

By Ron Bearden

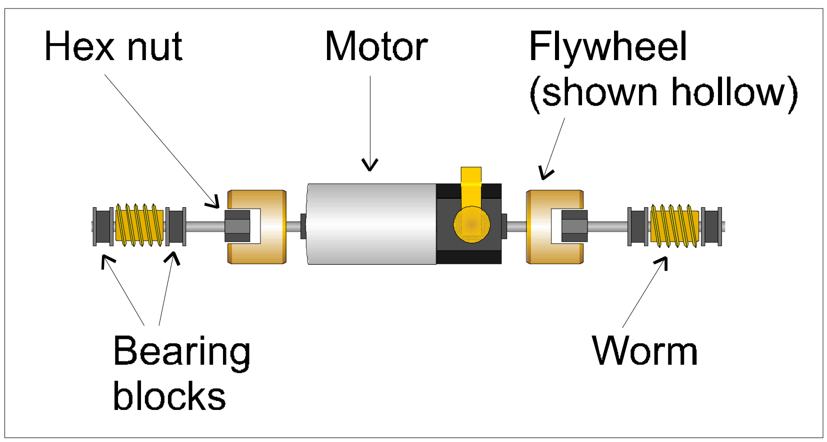
*All photos and drawings by the author*



It was a Yogi Bera moment---"Déjà vu, all over again". I had an Atlas GP40 that was one of the best locomotives I owned. Not only did Atlas do a great job on the shell, but this locomotive was one of the smoothest runners in my fleet. **UNTIL**, that is, I needed to take it apart.


**Got any short 4-axle locomotives like this Atlas GP38? Follow these procedures and you will be amazed at how smooth and quiet you can get yours to run.**

After reassembly, the mechanism made horrible noises and ran terribly. I then spent a large amount of effort trying to fine tune the mechanism and did make some progress, but the locomotive still ran terribly when compared with its performance before it was taken apart. Arrrghhhh!! No matter how hard I tried, I just could not get the unit to run as wonderfully as it did before I disassembled it. I can't imagine what the folks do at the factory that I wasn't doing.

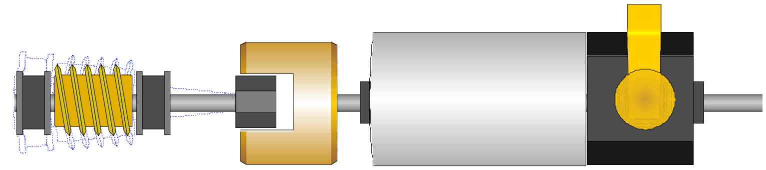



**Here is a typical short axle split-frame mechanism drive train. There are essentially two parts: the motor with flywheels and the worm shaft assembly (one on each end).**

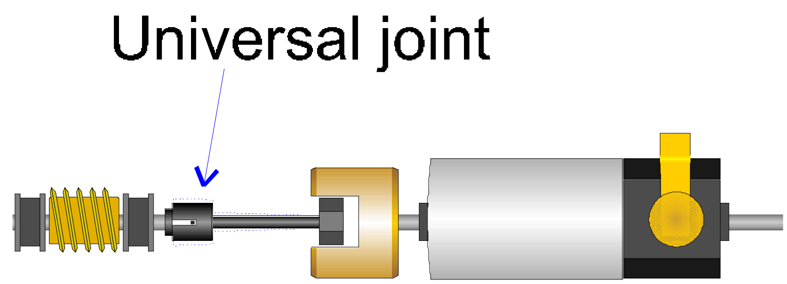
It was Déjà vu because years ago, I wrote an article for N-Scale Magazine on this very same problem in the Kato-made GP30 and GP35 mechanism (see GP35/30 Tune-up, May-June 1996). In that article I explained how noise is potentially created if there is any slight misalignment between the motor shaft and the worm shaft. When the motor shaft is directly connected to the worm shaft, any slight misalignment causes the motor shaft to force the worm shaft to wobble.

In longer wheelbased locomotives, the insertion of a universal joint between the motor shaft and the worm shaft improves performance. The universal joint absorbs any slight misalignment. In the last several years, all Atlas and Kato 6-axle locomotives have employed a universal joint in the drive train. The real problem lies in the shorter 4-axle mechanism design. I advocated seven years ago that all future locomotives use a universal joint if possible, and longer 4-axle units have indeed used them (e.g the Atlas B40-8 and the Kato P42). But the shorter locomotives like the GP40, GP38, GP7/9, GP20 and 4-axle ALCOs don't allow much extra room for u-joints.

Well, back to the present with my now-noisy GP40. I gave up following my own technique in the old article. Upon closer inspection of the GP40 mechanism as it slowly moved on the track, I noticed that the outward bearing block was wobbling. The inward bearing block acted like a pivot point, and any misalignment of the shafts was transmitted to the outward bearing block.



**Slight shaft misalignment can translate into worm wobble and noise. This is what I observed in my noisy locomotive. The inner bearing block was fixed and acting like a pivot point. The outer bearing block was moving around and wobbling like crazy. The end result was unwanted noise.**



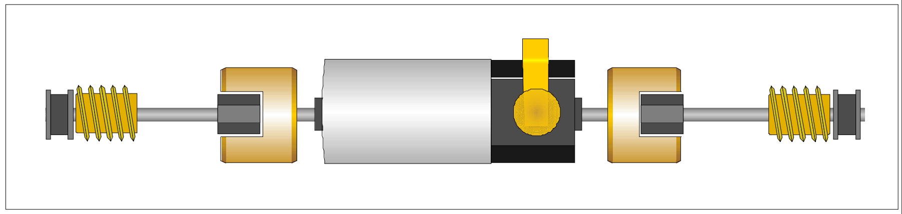

**In longer locomotives, a universal joint can absorb a slight misalignment with no excess noise. This is the advantage of most 6-axle and longer 4-axle locomotives. Unfortunately, there just isn't enough room for a universal joint in shorter locomotives.**

Thus, I finally tried something new and obtained amazing results. The simple fix was to remove the inside bearing blocks. I pulled off the plastic hex nut from the worm shafts, and then removed the inside bearing blocks. I then partially pushed the hex nuts back onto the worm shafts. I test fitted the worm assemblies into the drive train and made further adjustments. My goal was to place the hex nut on a worm shaft so that there was very little back and forth play in the worm.

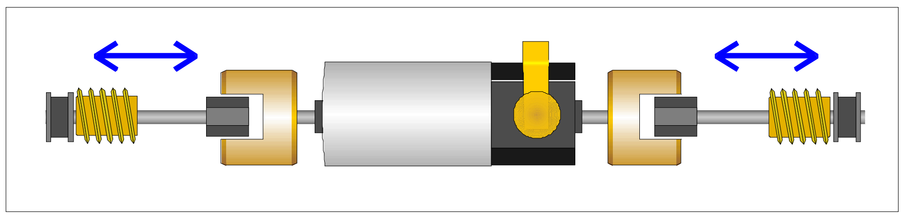
When reassembled, the locomotive ran not only unbelievably quiet (even quieter than before), but also faster. Moreover, when the power was cut, the coasting flywheel effect was much stronger. It was a great improvement.

Let me explain what's happening in this modified configuration. First, the locomotive runs faster and smoother because I had removed two points of friction in the drive train by removing some of the bearing blocks. But more importantly, without the inward bearing blocks, the drive train is now allowed to absorb any slight shaft misalignment (just like u-joints). Now, the fixed point on the worm shaft (the pivot point) is at the outside bearing block. With no inside bearing block, the shaft is allowed to freely wobble slightly with nothing to restrict it---and thus it makes very little excess noise.

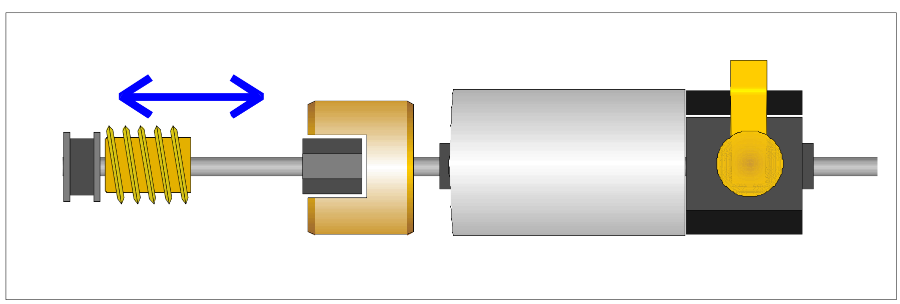
This change was so phenomenally successful, that I performed the operation on every possible Kato, Atlas, and Life Like short split-framed locomotive my son and I own. In the end, all were improved. One or two still made a slightly excessive noise, but there are other sources of noise besides the worm shafts (like damaged gears, motor bearings that need lubrication, etc.). Even still, they were quieter than before. On the whole, the mass overhaul was a **resounding** success, and I highly recommend it to others.



**My new solution is to remove the inside bearing blocks. Noise and friction are dramatically reduced. Slight shaft misalignments are absorbed by the worm shaft which is now able to wobble freely with no resistance. Now, it is important to note that the hex nut is pushed into the flywheel until it touches the back inner wall of the flywheel. This keeps the worm shaft from sliding back and forth.**



**This is what you should NOT do. If you remove the inner bearing blocks, but do NOT adjust the hex nut properly, then you may still have excess noise if there is too much room inside flywheel. You must not only remove the inner bearing blocks, but you must also take up the slack so the worm shaft does not move side to side.**



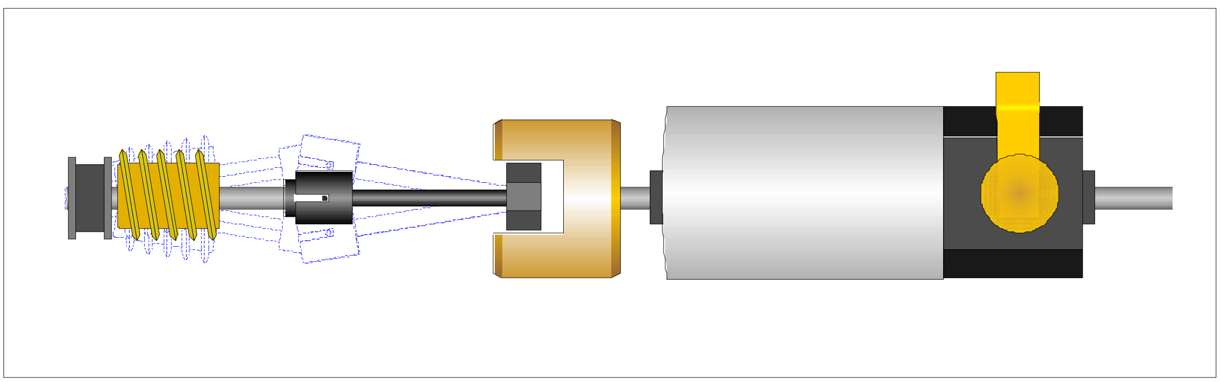
**Here is the ideal situation. You want only the tiniest amount of play in the worm. If the hex nut is pressed too far outward, it will place a bind on the worm shaft.**

If you attempt this project, let me note a few pointers. First, the inside bearing block is designed not only to keep the worm shaft in alignment, but also to restrict the movement of the worm. Without the bearing block, the worm can slide back and forth far too much. My adaptation was to slide the hex nut further into the flywheel so that it touched the back wall of the flywheel. Now, the worm was once again restricted from excessive movement.

Second, there are brass retainers attached to the right frame half. I bent the arms that touch the outer bearing blocks outward a bit so they would hold the outside bearing block tighter.

The great thing about this project is that it is not permanent. We are not cutting anything. If you find the results unsatisfactory, you can easily put the parts back in their factory order. But I predict you'll vastly improve some noisy locomotives---especially if you take them apart from time to time like I do (once again, factory units don't seem to have this problem).

One last note. What about longer locomotives with u-joints? I would **not** recommend removing the inside bearing blocks on these locomotives because the worm shaft would then have two pivot points and would truly slop around. The change would be self-defeating.



**You do NOT want to remove the inner bearing blocks on locomotives that use a U-joint in the drive line. The u-joint would create an extra pivot point that would just allow the whole worm shaft assembly to flop around (as illustrated here). In this case, you want the inner bearing block because it is the u-joint itself that absorbs slight shaft misalignments.**

Locomotives that may benefit from this conversion include the following (this is only a partial list):

| Manufacturer | model | notes |
|---|---|---|
| Atlas | GP7 | China |
| Atlas | GP9 | China |
| Atlas | GP30 | China |
| Atlas | GP35 | China |
| Atlas | GP38 | China |
| Atlas | GP38-2 | China |
| Atlas | GP40 | China |
| Atlas | GP40-2 | China |
| Atlas | MP15DC | China |
| Atlas | U23B | China |
| Atlas | U25B | China |
| Atlas | RS-1 | China |
| Atlas | RS-3 | China |
| Atlas | RSD4/5 | China |
| Atlas | RS-11 | China |
| Atlas | B23-7 | China |
| Atlas | B30-7 | China |
| Atlas | B36-7 | China |
| Atlas | H15-44 | China |
| Atlas | H16-44 | China |
| | | |
| Kato | GP30 | for Atlas |
| Kato | GP35 | for Atlas |
| | | |
| Life Like | GP18 | split-frame version |
| Life Like | GP20 | |
| Life Like | GP38-2 | |
| Life Like | GP60 | |
| Life Like | BL-2 | split-frame version |
| Life Like | C424/5 | |
| Life Like | GP9r | Canadian |
| Life Like | FA-1 | |

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