Bowser HO Drive Modifications.

By Larry Loyko.

I enjoyed Bob Dietrich's article in the December newsletter and thought I would share some of my secrets on how I use the Bowser drive system. In brief, what I do is turn the universal drive around - that is, I put the ball-and-socket joint on the power truck and the star-and-cup joint on the motor. The star cup fits neatly into the cavity of the A-LINE #20021/20040 flywheel and so does the mating cup. The end result is a much quieter running driveshaft. It was the star-and-cup joint that makes the growling noise when the front truck went into a curve. There is a bit more than just the simple driveshaft reversal, so let me go into some details. None of this requires fancy machine work and ordinary modelling tools will suffice.

THE MOTOR.

To date, Bowser has had two styles of motor. Their first issue came with a 10mm long output shaft, the tip of which is splined, their newest motors have a shorter splineless shaft 8mm long. Both are usable but my personal preference is for the longer shaft.

To remove the spline, I use one of those diamond grit knife-sharpening plates. I put the motor in a vise to hold it steady, then hook up a power pack to run it. With the shaft spinning at speed, I gently touch the plate to only the spline area. It's easy to over-cut, so I test my progress with the A-LINE slip-on flywheel. When the wheel just goes on over the former spline, I stop.

FLYWHEELS

The secret here is DIAMETER. The bigger the diameter, the more the "fly" the flywheel has. The other is balance. The vibration from a not quite true wheal will drain away some of the "fly", and flywheels are not machined true as made by the manufacturers.

There are several flywheels available and all need a 2mm shaft hole. A-LINE offers two possibilities, both are slip fits onto the motor shaft. The most familiar is the slightly tapered @20021 (comes two in a package) and the #20040 (one per package with driveshaft kit. Another bigger wheel is the #20006 that is 16 1/2mm diameter and 18mm long. This works well on the long shaft motor. Northwest Short Line offers two possibilities, both with press-fit 2mm shaft holes. The #405-6 is 17mm in diameter while #406-6 is 18mm.

I turn the slip fit flywheels into a press-on fit because I do not like the ACC gluing method A-LINE recommends. Gluing is too permanent. The press fit wheel can be readily pulled off if necessary. To make the press fit, I take a very small center punch and put three punch marks around the edge of the shaft hole down inside the recess cavity of the flywheel, This upsets the metal just enough to squeeze closed slightly the hole. The motor shaft still slips on but now stops short of coming out the hole. A few taps on the opposite end of the motor shaft drives on the wheel for a snug fit. I found some wheels with slightly oversize holes to where they can be felt to wobble ever so slightly when on the shaft. For these wheels, I also put punch marks on the other end of the hole as well. No small center punch? Make one out of the hard "music wire" the hobby shops sell. Use a motor tool to grind a point on the end of a short piece of this wire, I like the shaft hole length to be no more than 1/2" long, especially when I have the short shaft motor and am doing the driveshaft turn-around. There needs to be sufficient shaft for the star piece to slip onto. What I then do is manually carve deeper the recess cavity of the flywheel. To check the remaining length of shaft hole. I use a long 1-72 flat or hex-head bolt as a gauge. Slip the bolt into the hole, and if the end does not just come to the shaft hole end in the cavity. I carve the cavity until it does.

To carve the cavity I use those 1/8” diameter carbide “rotary files” the tool people sell at train shows. These are the burrs that have about ¾” of spiral fluting on one end. I try to find the ones that are also end-cutting, with the flutes also on the tip. They are hard to find but they are out there. I put the burr in a motor tool and holding the flywheel in my hand. CAREFULLY carve deeper the cavity, until the bolt gauge shows 1/4" of hole remaining. It’s imperative NOT to carve into the side walls of the cavity. Only after deepening the cavity do I now put the center punch marks around the shaft hole to create the press-fit previously described.

FLYWHEEL BALANCING

And now I have an out of balance flywheel, thanks to the carving. Also. I have found many flywheels, as manufactured, have shaft holes not down the true axis of the wheel. You can't true the hole but you can true the rest of the flywheel to the hole. Here is how I fix the problem and balance the wheel.

I install the flywheel onto the motor to where the motor shaft end comes up to the bottom of the cavity but NCT into the cavity. I set the flywheel face down on a small block of steel, start in the motor shaft, then gently tap on the opposite end of the shaft to just seat it into the center-punched end of the shaft hole. DON’T FORGET TO PUT ON THE PLASTIC MOTOR MOUNT.

The motor is now clamped into a vise to rigidly hold it steady solid. The power pack is hooked up to run the motor which now becomes a miniature lathe. I use the carbide rotary file burr in the motor tool to now true up all the surfaces of the flywheel. The flywheel and burr must rotate in opposite directions, otherwise the metal will not be cut. That is, do not have the wheel and burr turning as if they are two meshed gears. Trueing begins down in the cavity, and here I dress down the sidewall and as much of the carved bottom as possible. This is why the motor abaft must not protrude into the cavity. The flywheel and motor tool must be running at safe high speed. EVER SO GENTLY touch the burr to the wall of the cavity and carve until the cavity wall is true. You can tell when it is by the feel - the burr will stop "bouncing" against the metal.

With the cavity now trued up. I fully seat the flywheel onto the motor shaft, letting the shaft now protrude as it should within the cavity. The motor is returned to the vise and now all external surfaces are trued. I work the flywheel end first, then go to the main cylindrical part last. You can both feel and hear the out-of-balance vibration disappear and notice how the motor picks up a little speed and is running quieter. HINT - Try blackening the flywheel beforehand. The black will show spots still needing the milling. A "magic marker" works well. Take the motor out of the vise, hold it in your hand, and rev it up to speed. There should be no vibration and the flywheel will act like one of those toy gyroscopes.

THE UNIVERSAL JOINTS.

The star piece of the star-and-cup joint is now pushed onto the motor shaft that is down in the flywheel cavity. On the A-LINE #20021/20040 wheel, the star should seat fully in and be flush with the face of the wheel. See Figure I. A caution about these star pieces - they are prone to splitting because the shaft hole may be too undersize. I like to test fit the star onto a motor shaft (no flywheel) beforehand and if the fit seems too snug, I carefully ream the hole using a round file.

The cup piece needs no work except for taking off any burrs. There is usually one somewhere on its side.

The ball-and-socket joint has two big problems. First, the socket grips the ball piece tightly, and second, the complete joint has little ability to bend. Both these problems must be fixed to give the power truck free articulation and flexibility.

To fix the flexibility problem, the joining ends of both pieces are carved into a slight taper. I do this with only a really sharp X-ACTO knife blade. On the cup part, the tapered part is only 2mm long, and is evenly carved onto the end of each "lip". I leave about a 1/2mm flat spot on the lip ends, that is, the taper is NOT carved to a feather edge. The ball part also gets 2mm of taper but here I absolutely make sure I do not carve into any part of the ball itself.

With the two tapered parts snapped together, a properly worked joint should now bend almost 45 degrees. It may be necessary to round off a little the tips of the tapers on both pieces so that when the joint is rotating, there is no "cogging" action occurring.

By comparison, the tight grip problem is an easy fix. Here, the joint is "lapped-in" using scouring powder. This cleanser needs to contain pumice, which is the cleaning abrasive. Most cleansers are scratch free and do not have pumice. But there is a product called BAR-KEEPER'S FRIEND made by Servaas Laboratories and I buy it in the ACME supermarket. It comes in a gold color classic fiber can with the punch-out holes in one end.

I mix a pinch of the cleanser with water to make a loose paste, a bit thinner than hand lotion. If the paste is too stiff - like toothpaste - it will not have good lapping ability. The thinner, the better. Not a big issue, but I favor a liquid cleaner such as "409" instead of the water. The cleaner tends not to evaporate as water will do, so the paste stays creamy longer. I put each joint half on a piece of shaft material, one shaft chucked into a pin vise to serve as a handle, the other shaft I hold loosely in the fingers. The parts are dipped in the paste, snapped together then turned back and forth on the shafts while the joint is bent to its maximum angle. DANGER - It is so easy to over-lap the joint, so work cautiously, Lap for a minute or two, wash off ALL paste, and snap the joint together. If there is still snugness, lap for another minute or two. YOU WILL NOT feel the joint go loose when full of paste. A properly lapped joint is loose enough that one joint half will flop down by gravity when the assembled joint is held horizontally after thorough cleaning and drying

And that's it for motors, flywheels, and driveshaft. Adjust driveshaft length so the star and cup provides the needed "slip-shaft" action.

ELECTRICAL PICKUP

Here are some more of my secrets regarding electrical pickups. etc.

TRAILING TRUCK

As regards Bob’s Figure 2 in the article, I use a variant of that method that uses no soldering and lets the truck still be fully disassembled if need be. In lieu of his pair of soldered-on wires, I take a strip of 0. 0l0" thick shim brass (available in hobby shops) and cut it into a strip so - as to contact one pickup plate, bend over and atop the kingpin circular pad, then bend down to contact the other plate, A hole is poked through the metal using a scriber for the kingpin screw, then dressed neatly with a round file. To hold this strip in place and to insure good electrical bond to the pickups, each pickup is drilled with a hole placed between the side frame pins. This hole is clear-drilled for a 00-90 roundhead bolt. A mating tap drill hole is put into the plastic truck frame. This hole need not be tapped as the bolt will go in like a self-tapping bolt. My 0. 010" strip is then also given matching holes to take the bolts. The strip goes atop the pickup plates, not sandwiched between plate and truck frame, but I suppose the sandwiching will work just as well. The strip is made as wide as is the circular pad on the truck top and its 0. 01011 thickness has no effect on truck height on car or its chassis, provided all bends are sharply made. See Figure II..

POWER TRUCK

I use wire here without any difficulty. The only wire to use is the Miniatronics/Circuitron ultra-flex 30 gauge stranded wire. This is the most limp wire I have found so far. The multi colored wires offered for DCC decoder use is way too stiff by comparison.

I set the pickup plates on the power truck and where the tall solder tabs stick up above the SLOPING back end of the truck housing, I scribe a line on the tab AT the sloping surface. The plates are removed then a plate is gripped in a mini vise, the vise jaw tops aligning on the diagonal scribe line on the tab. The tab is then hammered over 90 degrees, the plate taken out of the vise, and excess tab clipped off so as to leave about 3/32” of bent-over tab remaining. When put back onto the truck, the tiny tab now lies atop the sloping surface and has no interference within the chassis cut-out for the power truck.

Each tab gets a piece of the ultra-flex wire soldered on, the wire heading STRAIGHT FORWARD. Each wire is then curved in a neat large U to head backward, with the right wire now over the left tab, left wire over the right tab The bends of the U's should come close to the end of the bolster retaining "nose"' and sit below the universal joint.

What I do now depends on how the car is wired up. For two rail, the two wires head rearward, right pickup on left side, left pickup on right. I cut grooves on the undersides of the plastic motor mounts and use these to pinch and hold the wires in place. For overhead, the two wires are joined together at about the back end of the chassis truck cut-out location and get screwed down to the chassis by a bolt placed in the U area of the front motor mount, The wires now take on a teardrop or heart shape with the apex or point being the terminal bolt. See Figure III.

I have never had any truck swing restriction problems using this method.

One last trick to share.

THE MOTOR CASE, being mounted on plastic mounts, is electrically isolated from the chassis PROVIDED the two bolts that hold the mounts do not stick up to touch the motor case.

I use the motor case as the contact point for the trolley pole. On my rooftop pole mounts I attach, inside the car body, a piece of O. 015" phosphor bronze wire bent in such a way that it touches the motor case. This now makes a no-plug electrical system that makes car body removal no problem. A tiny jumper wire is soldered to the motor case and then to the proper motor terminal. The other motor terminal gets another short piece of wire that is pinched between motor mount and chassis.

LARRY LOYKO

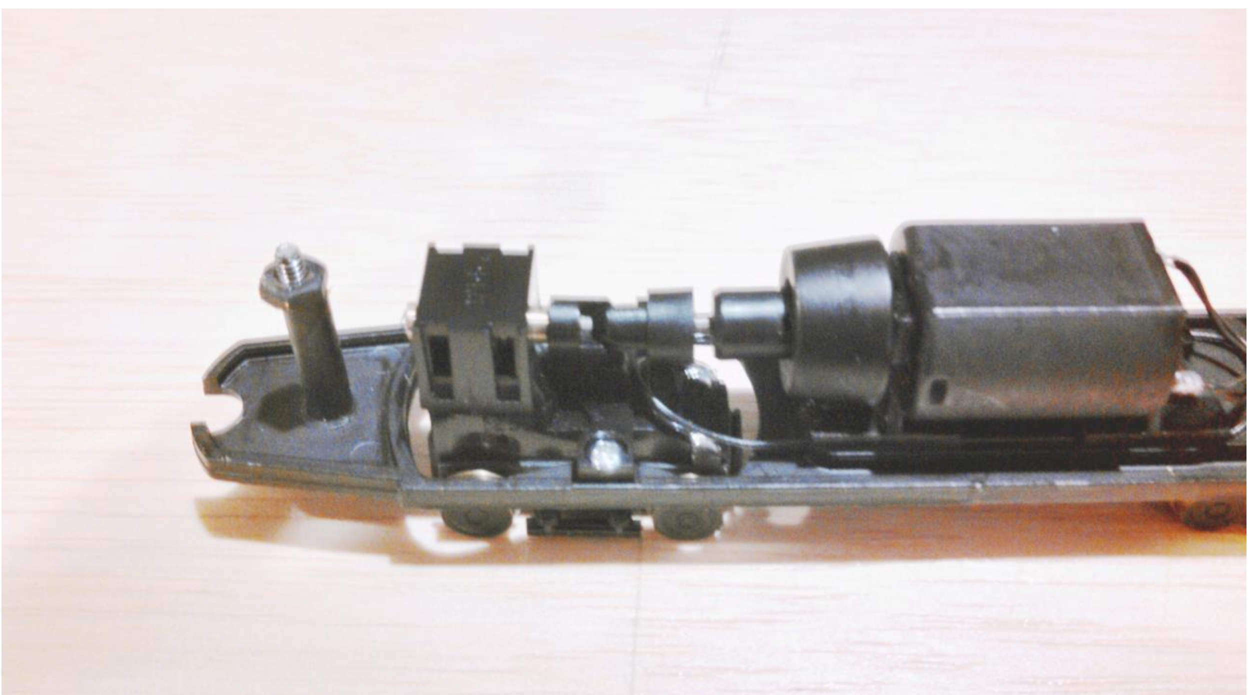

Figure I. The modified universal joint is now attached to the power truck and the star & cup joint is on the motor shaft. This configuration makes for a smoother and quieter operation.

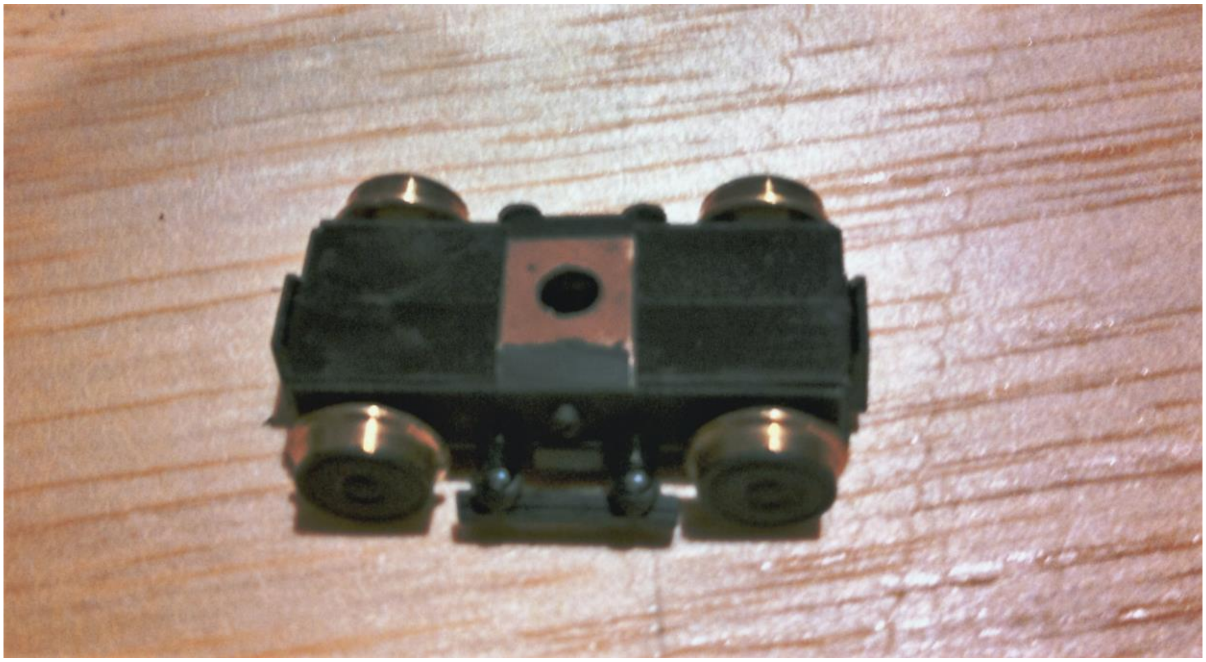

Figure II. The U shaped brass tab eliminates the need for wires from the trailing truck as long as the floor is metal.

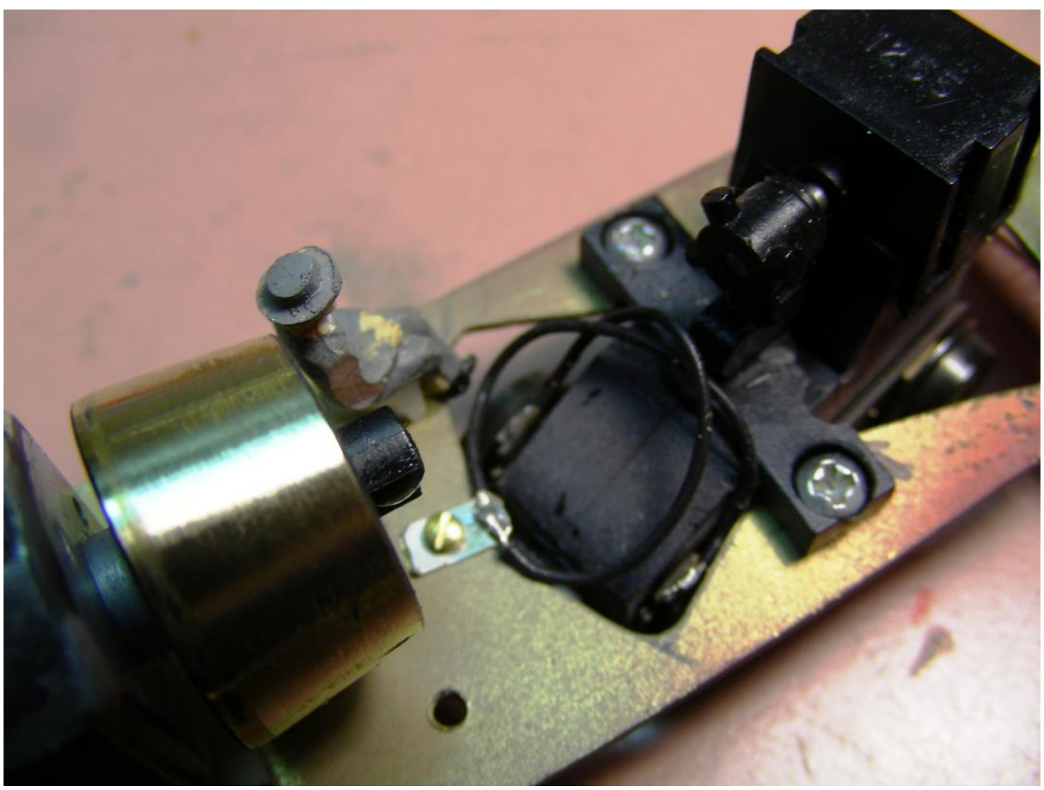

Figure III. The loops of wire from the power truck contacts connect to the floor. Also not the turned flywheel.