



*Here are the two brass bars bent and soldered together, ready to be mounted onto the frame rail.*



*Here, the steering cylinder mounts are soldered into place, with the plastic cylinders bolted into place.*

## Modeling a repowered **JOHN DEERE 5020**, Part II

Welcome back to this month's "Down to Details." Last time we were together, I walked you through the beginning of what I call my "ultimate muscle tractor" build. I am converting an Ertl Precision 5020 into a Kinze repower, replacing the original 531 engine with a 3-D printed Detroit 8-71 V-8.

Last time, I had the tractor torn down and was able to remove the engine side panels and replace the frame rails with brass flat stock, similar to what the original repowers had for rails. This month, I am going to walk you through a few more of the challenges associated with this build.

When we left last time, I had both frame rails replaced and the hood was fitting back onto the tractor, just the way it should. The next step is getting the tractor steering cylinder mounts built, making the tractor steerable again. The original Ertl toy had the mount for the steering cylinders cast into the engine block. With the engine removed, I need to build their replacements. Looking over photos

of a repowered 5020, I notice mounts were built under the plate steel frame rails, so that is my plan with this scale repower.

First, I investigate the repower photos I have and determine that the steering cylinder mounts Kinze used were scratch-built steel mounts, so my plan is to make mine the same, except using brass, so they can be soldered onto the tractor.

I put a stick of 0.25x0.062 flat brass into my Dremel vise and bend up four, 90-degree strips, leaving them extra long so they can be trimmed. I then place them on the frame rail to get a good idea of the necessary length. I could leave one long, so it could be soldered to the inside of the frame rail, but the second one for each side I want to cut, so it would mount flush to the outside of the frame rail. Once I have these lengths cut, I place two of these angle brackets together, keeping a 0.100 gap on the lower part of the 90 degree, where the cylinder would slide into.

With the straps clamped together, I solder the two parts together, making a rough-shaped bracket. With this rough-shaped bracket, I clean up the excess solder, then trim and shape the vertical part of this bracket to match the frame rail, with half on the inside and the second flush with the frame rail.

Once I am satisfied with the height of the bracket, I clamp it into place and complete the second side, clamping it into place like the first. I then reinstall the front axle under the tractor and assemble the cylinders into the brackets I just built by drilling and installing a 0-80 bolt. I then install the ram of the cylinder into it and steer the front axle left and right until I can get it to steer fully from one side to the other, adjusting the mounting brackets until it all fits together perfectly.

Once I am happy with the location of the brackets, I clamp them tight to the frame rail. I remove the front axle and plastic cylinders from the tractor and prepare to solder the bracket to the frame. To make this task a bit easier, I remove the frame rail with the bracket clamped onto it, giving me a flat horizontal surface to solder. With both brackets soldered into place, I retest things by assembling the cylinders and front axle again, double-checking that everything fits together correctly.

Satisfied with the fit, I take it completely apart again and cut two right-angle triangle pieces out of the



0.25x0.062 flat brass to be used as braces, adding extra support to the cylinder brackets just like the real tractors used. I solder these into place as well. We now have the tractor steering correctly, at least in scale terms!

With the steering back together and the front axle installed on the tractor, I reinstall the rear wheels. Getting the tractor back on all four wheels gives it stability again and leads us to the next step of the project—assembling the engine.

I drew the 8-71 Detroit much like a model kit, with many individual parts involved to put the engine together. This gives me a chance to modify a few of the parts to fit the application.

To start this project, I lay out the parts and do some pre-assembly, test-fitting the cylinder heads to the engine block, fitting the front cover to the engine, fitting the valve covers to the heads, fitting the rear supercharger drive to the engine block, fitting the supercharger to the valley between the heads, the harmonic balancer/lower drive pulley to the block, the oil pan to the engine block, the starter to the bell housing and, finally, the exhaust manifolds to the heads.

Knowing the real repowered Detroit's had to be slightly modified to fit into the frame of the 5020s, I assemble one component at a time, making sure things fit in the frame before proceeding to the next part.

The first items I add to the engine block are the cylinder heads. After



*The 3-D 8-71 Detroit engine components.*

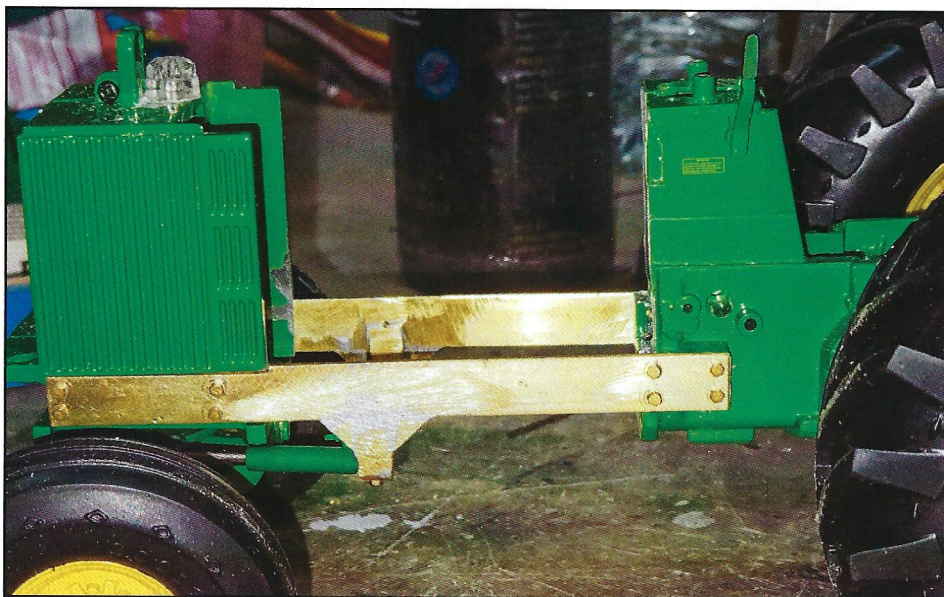
a quick test fit, I sand the mating surfaces and apply a thin coat of superglue, then fit the head to the block, making sure to square the heads on the block. Once the glue has set, I install the front cover pulley assembly, once again test fitting it to the engine block, matching the two locating pins to the locating holes in the block. Finally, I sand the surfaces, apply glue and clamp them together until fully set.

The next item I install is the engine oil pan. With a test fit, I see that both locating pins will not fit in their holes

at the same time, as they are off just a little bit. So, I remove one of the pins and give it a test fit again. The fit is good this time, so—sand, glue, clamp and wait.

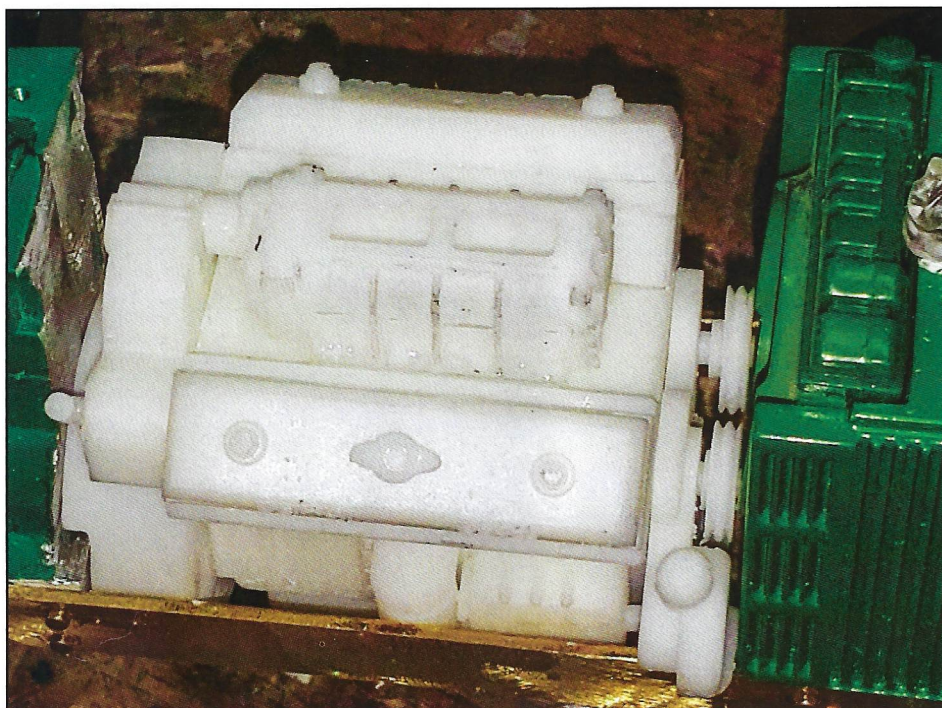
The next step is installing the supercharger drive onto the rear of the engine tightly up to the cylinder heads, and mating the bell housing. Once fitted, I do the glue trick, making sure the engine is centered evenly between the cylinder heads.

Well, the parts I have just installed have had no effect on the fit into the frame of the 5020, when I realize I should install the radiator back into the frame, which will change the length of the engine drastically. Going through the parts I removed for the original teardown, I separate the radiator from the engine assembly and install it back into the tractor. I test fit the engine again, seeing I now have a problem with the overall length of the engine. It is too long now to fit between the clutch housing of the tractor and the radiator. Having run into this problem before on my first failed attempt, I remembered



*The mounts are completely soldered into place, with the side brackets, and ground smooth.*





*The engine is assembled and fitted into the chassis.*

I trimmed the back edge of the bell housing of the engine, shortening it until the engine fit correctly.

I start making small trims to the bell housing, using a combination of my Dremel and a file, until I have the engine in its current form, fitting correctly after trimming about 1/8 inch from its length.

With the engine fitting again, I go back to installing parts to the engine. The next item I know will cause problems. The oil filter cooler assembly located on the right front side of the engine is a little too wide. I have seen real tractors with this problem, and the frame was notched to compensate for the cooler. But on the Kinze repowered models, the cooler and filter assembly is narrowed, allowing it to fit inside the frame rails, so that is my plan as well.

First, I mark the area on the engine block where the assembly mates to it, by installing the assembly using the pins and holes provided. Once the block has been marked, I use my Dremel and trim the casting marks on it, smoothing it out and gaining roughly 0.050 of an inch. Next, I grind off the locating pins from the back side of the assembly and grind down the back side of the assembly until it is paper thin, but just thick enough to hold it together in one piece.

I then apply just a small amount of glue and give the engine a test fit. It hits something when I install the engine. After further examination, I see the cooler is hitting the brass strip I soldered to the inside of the frame rail when I installed the steering cylinder mounts. I grind both the right and left side mounts down, giving additional clearances and cleaning the appearance of the frame as well. With the mounts trimmed, I try reinstalling the engine and it fits good this time.

We are getting close. Now, it's off to the opposite side of the engine to install the starter. I designed a hole in the bell housing to accept a pin I drew into the end of the starter. I actually made a mistake here, and the starter sets too close to the block and at an angle. But for this application, that is fine. I fix this problem by smoothing the block castings, giving just enough clearance for the starter to fit tight and straight to the engine block, aligned with the pin and hole. I install the starter and give things a quick test fit before I glue it to the engine and it fits, with no room for error!

The next item to be installed on the engine is the supercharger, which a friend of mine drew. It is not a 100 percent match to the rest of the engine, but with slight modifications,

it works well. When I drew the supercharger drive, I added a tube that would have mated with the supercharger. When my friend drew the supercharger, he added this tube as well. So, I just grind and remove the tube from the drive side, then the supercharger fits centered on the engine block, just like it should. With the tube removed, I sand the edges of the supercharger to mate up better with the engine block, and glue, clamp and wait.

One last item to add is the front harmonic balancer/belt pulley drive. On the balancer, I added a pin that lines up with a hole on the engine block. It's sand, glue, clamp and wait, then the engine should be complete. It's time for one last test fit. It fits, but tighter than I like. The overall length is just a little too long. I can see that when paint is applied, it could cause some extra trouble in the future. So, I trim an extra 0.050 off the back of the bell housing, praying it will be the last modifications that will have to be done, YES, it fits perfectly!

We now have the engine installed in the tractor and the steering complete, but we are a long ways from done. The Farr air cleaners still need to be installed, row crop fenders and dust shields must be added, new front and rear rims and tires and steps must be installed, and the engine still needs to be securely mounted, but I think this is enough for this go-around.

Until next time, thanks for reading. As always, check out [www.chuckysprecisionpullersandparts.com](http://www.chuckysprecisionpullersandparts.com) for parts used in this project and many more and also for past "Down to Details" columns.

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*Living just northwest of Dyersville, Iowa, in the heart of farm country and farm toy replica country, Chuck Steffens has found a niche in the toy world, building high-detailed replicas in his spare time. He shares his experiences with Toy Farmer readers, hoping to lead other collectors to personalize one of their own tractors. Comments or suggestions can be directed to [csteffens@wildblue.net](mailto:csteffens@wildblue.net).*