BACK TO THE STREET, PART 2

WE CONTINUE TO PUZZLE TOGETHER THE DRIVETRAIN FOR OUR '71 CAMARO WITH A 4L60E AUTOMATIC FROM LEVEL 10 TRANSMISSION SYSTEMS.

By Mike Ficacci | Photos by the author

After making boatloads of horsepower and torque for our Back To The Street Camaro, complements of our GM Performance Parts ZZ454, we tackled the challenge of harnessing all that power with a critical piece of the drivetrain—the transmission. The Back To The Street '71 F-body will serve duty on the street, at the dragstrip, and through the S-turns, and we kept this in mind while deciding which was the best gear changer to bolt up to the big-block.

Since the car was already set up for an automatic, we decided to upgrade to a more modern version. Level 10 Performance Transmission Systems in Hardyston, New Jersey, was up to the task of assembling a custom bulletproof trans to suit our exact needs. Adjustability was essential as we search for seamless gear changes in traffic, but also giddy up and go on the 1,320. The 4L60E electronically controlled transmission will meet all our requirements, as Level 10 can utilize its tuning software to adjust everything from rpm shift points to valvebody line pressure with a few simple changes on a handheld tuner, or through a laptop computer.

General Motors introduced the 4L60E transmission in 1993 to replace the 700R4 that was in service for many years in its cars and trucks. The housings of these transmissions are virtually identical, although the absence of a throttle valve (TV) cable is easily noticed by the 700R4 faithful. The 4L60E provides equal, if not better durability than the 700R4, but allows for electronic monitoring and tuning.

Believe it or not, "4L60E" actually does stand for the specifications of the trans and isn't just General Motors trying to mess with us—4L60E stands for four speeds, longitudinally positioned, 6,000-pound GVW, and electronically controlled. When the 4L60E transmission was phased into production, the 700R4 was renamed 4L60. Notice the missing "E" for non-electronic.

Level 10 only builds custom transmissions so they can tailor each and every case that leaves the shop to the end user's specifications. Much more durable than the factory units, and with cleaner/more crisp shifts, our 4L60E will have no problem pulling the reins on our ZZ454's 540 lb-ft of torque. Follow along as we assemble the unit and get yet another step closer to bringing our former bracket car "Back To The Street."

1

When Level 10 Performance Transmission Systems receives an order for a trans, the customer is asked to fill out a specification sheet containing any and all information about the automobile, including weight, horsepower, torque, gear ratio, etc., and the intended use of the vehicle, be it street, strip, road course, a combination of the above, or other. At left, owner Pat Barrett is analyzing our specification sheet. He then specs out the tranny and relays said information to the assembler, who pulls the needed pieces from Level 10's massive inventory.

2

All the pieces of the puzzle are laid out to ensure no mistakes are made during the assembly process. The assembly of any automatic transmission can be compared to the most complicated layer cake you have ever seen. It's like trying to stuff 10 pounds of sugar in a 5-pound bag. I assure you, all those pieces do fit in the 4L60E case.

3

Here, larger holes are drilled in the valvebody plate to allow for a better flow of fluid across the valvebody. One thing we don't want to do is starve the system of fluid while trying to change gears. Orifice size can dramatically change shifting characteristics, and Level 10 knows exactly which ones to change per the application.

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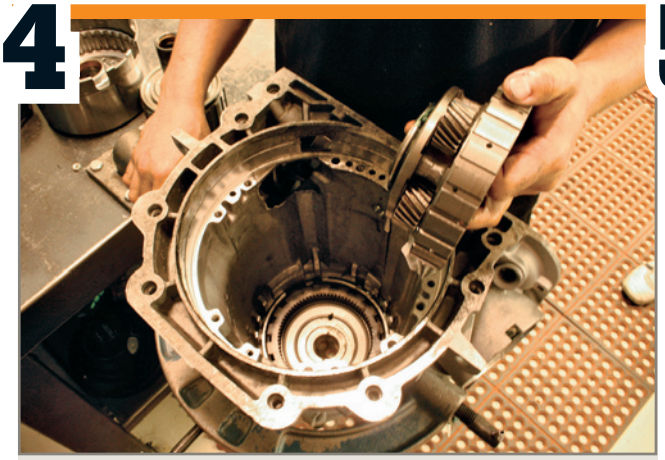

After all the parts are cleaned, the assembly begins with the installation of the rear gear and planetary gear into the bottom of the case. The 4L60E transmission consists of two complete planetary systems, which are responsible for all four forward gear ratios and the reverse gear.

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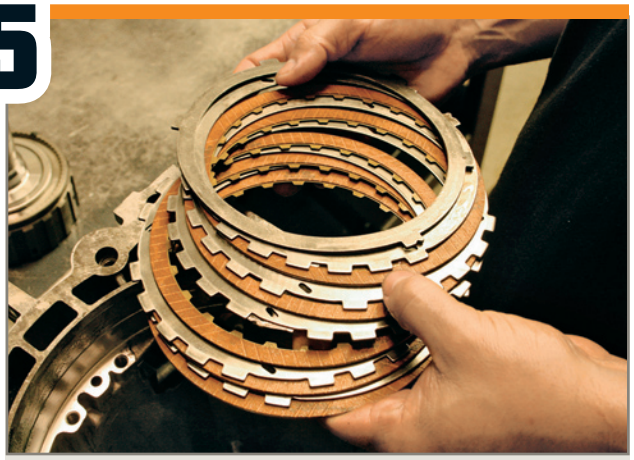

Next, one of three clutch packs is assembled in alternating layers of steel plates and clutch bands. The intricate system of fluid flowing through the valvebody directs fluid to one of these sets of bands, causing them to compress and engage the next gear.

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After installing the thrust washer, sun gear, and sun shell, the forward ring gear and forward planetary are installed. The planetary gears are at the heart of any automatic transmission. Each of the three components of the planetary can be held stationary, creating a different gear ratio.

7

Next, the mainshaft is installed through the tail of the case. Once installed, the driveshaft will bolt up to the back of the mainshaft and the torque converter to the front. The mainshaft also works as a rotational center for all the moving parts inside the transmission.

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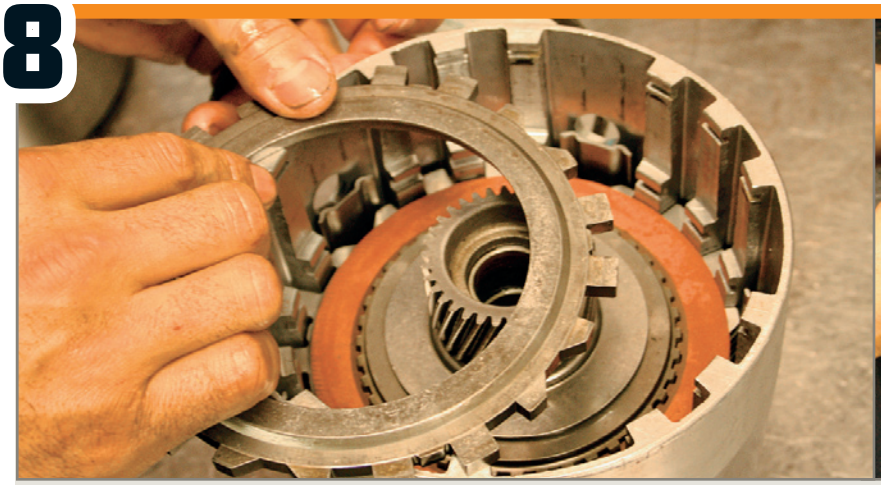

The input and reverse drums can then be assembled. These each receive a clutch pack and locking rings, and a sun gear is installed in the input drum. Once assembled, the drums are locked into place and installed in the case.

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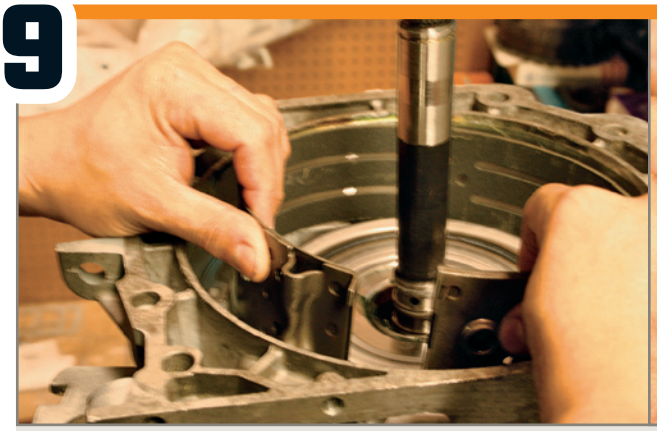

The intermediate band is installed next. Transmission fluid is guided through the valvebody and actuates the band, locking that part of the gears. In our electronically controlled transmission, the intermediate servo is activated via the automobile's ECM, and controls the action of the band. Level 10 assembles its own servos using a spring chosen per application, and a rubber seal to ensure no fluid is pushed through.

10

The PTS Super Pump is then installed, providing cooler transmission temperatures, lockup valve technology, increased pressure, and overall longevity. The stock pump can only pump so much fluid at a given time and is unsatisfactory for our application.

11

The case is then flipped over so we can continue work on the underside of the transmission. The valvebody balls are installed with grease to ensure they do not move during the process. These balls regulate the flow of fluid through the veins of the transmission and into the main case.

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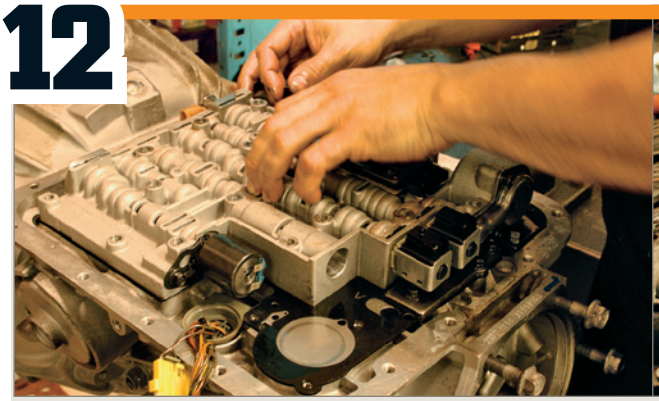

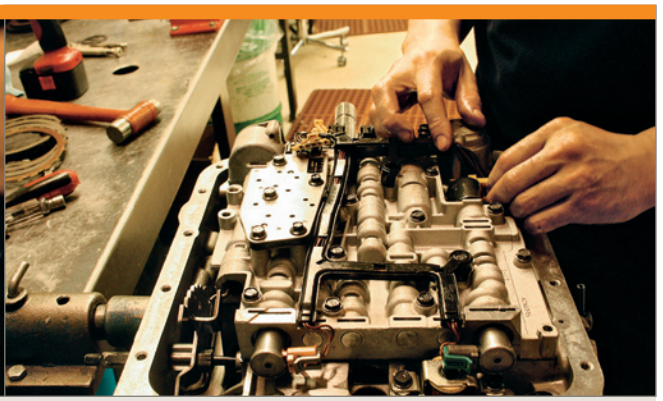

The valvebody itself is then installed after the gasket and plate we drilled out earlier. “We carefully select the spring weights, orifice sizes and location, valve size, and port modifications to suit your driving style and vehicle,” Pat told us. After putting that in place, we installed the electronics and wiring that control the transmission. This is the main difference between the 700R4 and 4L60E transmission. Yes, TV cables are quickly becoming a thing of the past and are being replaced by electronics and servos.

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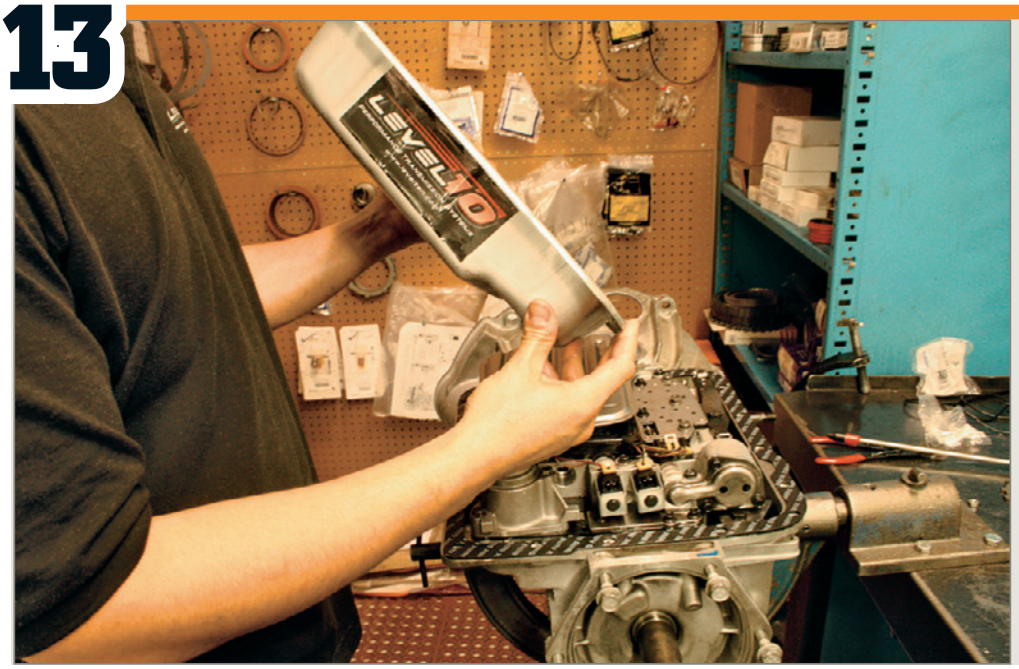

Lastly, the transmission fluid filter and deep sump pan are installed. The deep sump on the pan allows for added fluid in the system, which is essential when demanding firm shifts and lower operating temperatures.

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Level 10 also builds custom torque converters per application. Small changes in the angle and clearance of the veins in each of the components will affect stall speed, flash, and slippage. To keep things simple, we can say that the torque converter replaces the clutch in a manual transmission setup and transfers power from the engine to the transmission. In our case, we have yet to determine vehicle weight and rear gear ratio. Once we provide that information, Level 10 will create a custom converter for us.

15

Level 10 utilizes this SCT Xcalibrator handheld tuner to set shift points, line pressure, and all the necessary information the ECM needs once the transmission is in the vehicle. Level 10 can also perform laptop tuning once the transmission is dropped in the vehicle. It provides full-service diagnostics and tuning after the purchase of a trans.

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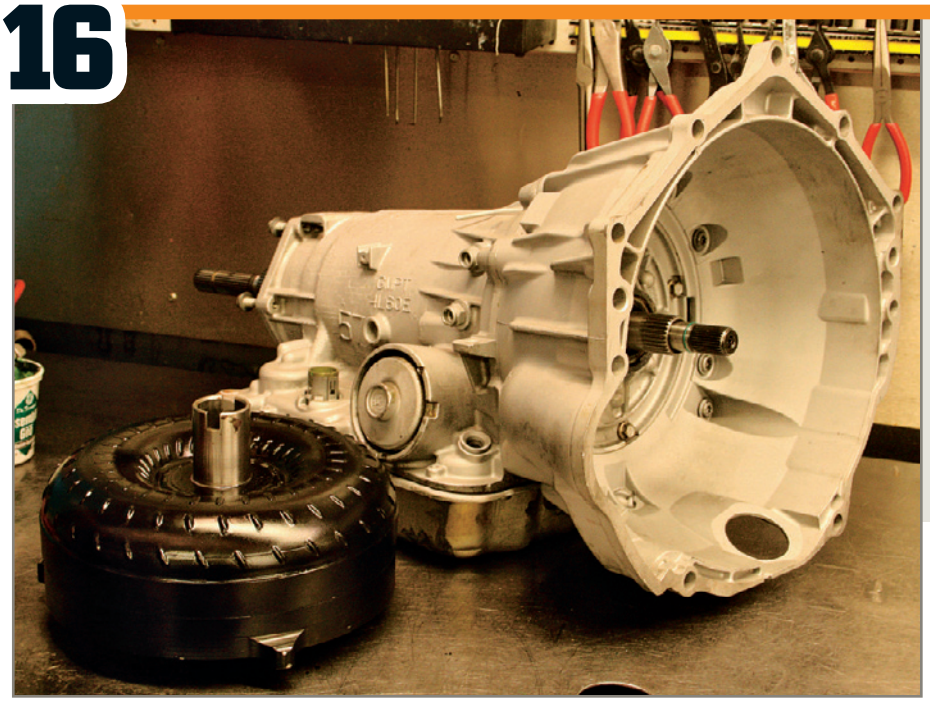

Our finished product is almost ready for installation in our Back To The Street '71 Camaro. Once we fab up our Camaro, get it on the scales, and report back to Pat at Level 10, his builder can make our torque converter, bolt up a tailshaft, and have us rocking and rolling in no time.

SOURCE

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