# 1971 Olds Cutlass 350c.i.d. build

# Technical Article part 5

In this last segment of Frank’s 350 ( now 355 c.i.d. ) build, we will now review the fun part, bringing this beast to life and rattling the neighbors windows ( yes we did have the community security patrol called on us…lol..).

The engine installation process began with removing the engine from the build stand so that we could install the rear oil galley plugs, cam bore freeze plug, and the new flex plate. In all my builds, I always replace the flex plate as this is actually considered a wear item and over time, these plates will develop cracks, not always immediately visible to the eye, from the flexing they are designed to permit during acceleration and deceleration .The new flexplate is installed with new ARP high strength bolts, torqued to spec with Locktite thread locker.

Next we installed the new torque converter onto the input shaft and front pump drive of the transmission, using a light coating of moly grease on the input shaft and front pump seal to help align the splines as well as protect the front pump seal during initial start up. We then maneuvered the transmission into place at the back of the block, seated the block locating pins in the transmission bellhousing flange and installed new grade eight bolts. It is important here to never “draw” the trans to the back of the block with the bolts, but rather seat the trans against the block and then run down the bolts. If you draw the trans to the block, you run the risk of breaking the aluminum trans housing or “ears”. The bolts were all torqued to spec and then the converter was aligned with the flexplate and secured with three grade eight bolts, again torqued to spec with Locktite.

At this point, as many accessory items as possible were installed including the trans mount, motor mounts, power steering brackets with freshly rebuilt power steering pump, a/c brackets, starter, trans dipstick tube and alternator brackets.

Just before we installed the engine into the car, knowing that we would be starting the engine within a few days of installation, I went ahead and primed the engine with a special priming tool attached to a ½” drill. With a mechanical oil pressure gauge attached to the engine, I ran the drill in reverse ( remember the distributor in our engines runs counterclockwise ) and achieved a little over 60lbs of pressure which indicated all was good with our internal clearances and galley plugs. After discovering one small external oil leak and correcting that issue, it was finally time after more than five months, to place this engine back in its original home.

The next step was to maneuver the new engine and transmission into the engine bay of Frank’s Cutlass, working around the new headers loosely placed in the engine compartment. With some grunting and groaning and yes, a busted knuckle, the engine was set in place and bolted to the crossmember mounts. This process did require the removal of the oil filter after it got a bit dented up to fit around the headers so a fresh oil filter was installed once the headers were secured to the motor and a quart of oil added to the motor since the filter we removed was full from priming. In retrospect, even though these stainless steel headers were a great price and well made with heavy gauge tubing and flanges, this particular brand does not fit that well and there were several modifications necessary to the engine compartment and overall configuration to make them fit properly. My recommendation for future builds that may be similar to this, stick with Hooker, Hedman, Doug Thorley,Flow Tech, or American Racing Headers for your Olds build. Trust me, you will save some headaches that are more than worth the extra cost of the headers.

With the engine secured in place, all the new wiring harness connections were made, the new HEI billet distributor was installed ( note: the new wiring harness was ordered to accept the HEI distributor and electric choke carb ) along with all the other belts, hoses, accessory items, driveshaft, new speedometer cable, new emergency brake cable, rebuilt Holley carburetor, radiator, fan and other detail items. The starter solenoid wiring was modified and re-routed to avoid the heat from the close fitting headers and a different bracket was needed for the accelerator cable to allow for proper throttle travel of the Holley carburetor. A new set of mechanical gauges, (water temp, oil pressure, and volts), were installed to properly monitor the new engine. Last was topping off all the fluids, using Lucas Hot Rod & Classic car oil ( 10w-30 ) with a bottle of Lucas break in additive, GM Dexron trans fluid, GM power steering fluid, and straight distilled water in the cooling system with one bottle of Water Wetter. The last finishing touch was a fresh charge of the battery and its installation and a thorough check of the entire electrical system to insure all was connected properly.

Now came the big day, Sunday afternoon, May 5th at about 1:00pm, with Frank eagerly looking on, we primed the carburetor, added a couple gallons of 110 octane leaded race fuel for good measure to mix with the slightly stale gas already in the tank, pumped the accelerator twice and turned the key. Success! On the very first crank it roared to life in all its uncorked glory and went right to the preset high idle of 1800 rpm to start the 15 minute break in period. This is always a bit of a stressful time, even for the most seasoned engine builder, but other than one shut down to fix a fuel leak at the fuel pump hose connection, all went extremely well, even with the security guy being called on us by my one of my not so understanding neighbors. He is a car guy too so when he stopped by, I was repairing the fuel leak and the car was not running. He gave his thumbs up on the project and how sweet the engine looked and just said” wait until I drive out of the neighborhood to fire it back up to finish your break in so at least it looks like I did my job when I stopped by” . Got to love your fellow car guy / gals…lol..

The remainder of the break in period went without a hitch with the motor running at a steady 190 degrees in the warm weather. We had no other leaks so we finished topping off the trans fluid and ran the car up and down the driveway a couple of times to make sure the trans was operating properly and didn’t leak. The following week we took the car to the muffler shop to button up the exhaust and the grin on Frank’s face on the drive back to the house from the muffler shop said it all! I think he was a happy camper…lol…

It is important to understand, that with any modified build such as this, there are always going to be bugs that need to be worked out and Frank’s project has been no exception. We kept the car for another week after the exhaust system was re-connected to sort out several minor issues including carb mixture and choke adjustments, loose fitting vacuum hose to the trans modulator, leaking overflow tank hose, and final timing adjustments .

Since Frank and Tonya came over the following weekend to pick up the car and start the 500 mile break in process, a couple of other issues surfaced that have since been addressed. The first issue was that the starter would occasionally grind or improperly engage the flex plate. These aftermarket “mini” starters often require shims to properly align them with the flexplate. You always want to try first not to use them which is what we did here but eventually the starter required three in order to get it dialed in just right. The other engine issue was that the 20+ year old Holley carb Frank provided and we rebuilt proved to have an excessively work front throttle shaft which was drawing air ( vacuum leak ) into the engine, creating a fluctuating idle problem and stalling at stop lights. The decision was to replace the carburetor with a new Avenger Series aluminum 670cfm Holley carb with electric choke. Bolting this carb on immediately solved the idle quality problem and feels as though it may actually have added power to the engine by being more matched in cfm rating to the motor.

The other modification problem came by way of the headers hanging too low under the car in its existing stance and scraping the flange on anything larger than an ant in the road. Since Frank had already made some upgrades to the front suspension with tubular A arms, it was decided to install some adjustable coil over shocks with adjustable valving to both adjust the ride height ( raise it ) as well as tune the ride quality and handling.

To date, Frank and Tonya has logged just under 400 miles in their revived Cutlass and will be soon doing the first oil change and final tune. Once that process is complete, they should enjoy many thousands of miles of Oldsmobile ground pounding performance.

In closing, I would like to extend many thanks to Thomas Jones for his tireless effort in cleaning, detailing, and prepping the Cutlass’s engine compartment, engine removal / disassembly as well as other details, Scott Graham for his time helping with car re-assembly including the pain in the a$# emergency brake cable, and finally my fiancé Karon, for not only documenting most of this process with her camera, but also giving up her garage parking space and time with her man while this project was being completed. And one final thanks, to Frank and Tonya for allowing us all the opportunity to share in their dream to restore and again enjoy their Olds machine.

Grant Warner