



- **Author:** Mike Weinberg, Contributing Editor
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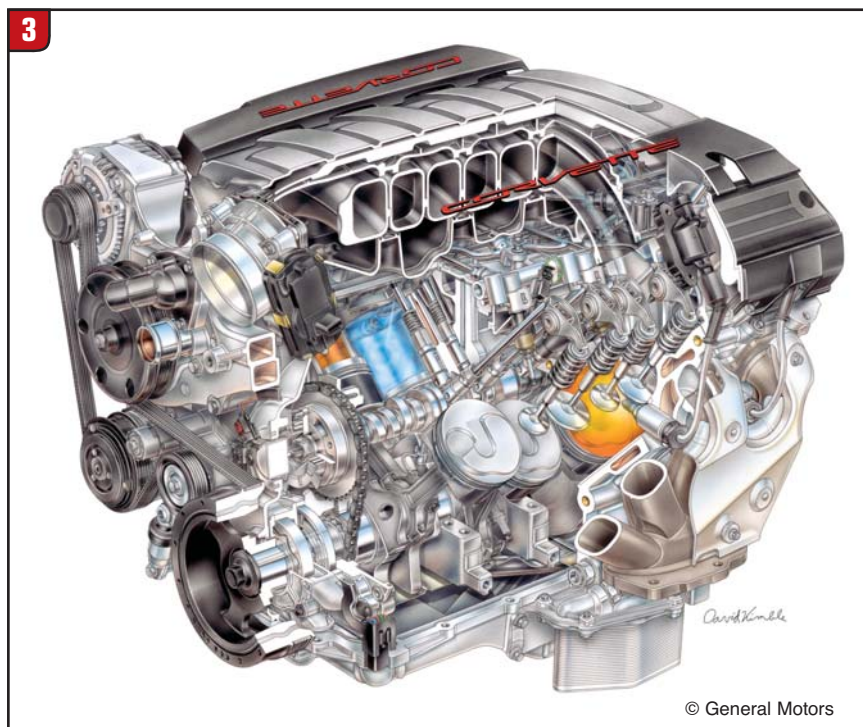
The New 7-Speed Tremec TR6070 Manual Transmission

Technology marches on



General Motors is now building the seventh generation of America's sports car, the Corvette Stingray (figures 1 and 2). The C7 Corvettes should be available for purchase in the third quarter of this year. GM has brought back the Stingray as the model name for this generation of Corvettes.

This is truly a world-class vehicle. It features new technology, design and manufacturing methods that go way beyond the familiar C5 and C6 Corvettes. These cars have come a long way from the older fiberglass models, using an aluminum space frame and many carbon-fiber body parts. GM has invested a fortune in development and design in a totally new LT1 aluminum-block engine (Figure 3) that produces 450 horsepower and 450 lb.-ft. of torque from



the 6.2-liter displacement. Zero-to-60-mph times are in the four-second range, and this is from the stock motor. Higher-performance versions of the new LT1 will be released for the top-of-the-line Corvette models. The most-striking feature of these vehicles is a seven-speed manual transmission, the TR6070 (figures 4 and 5).

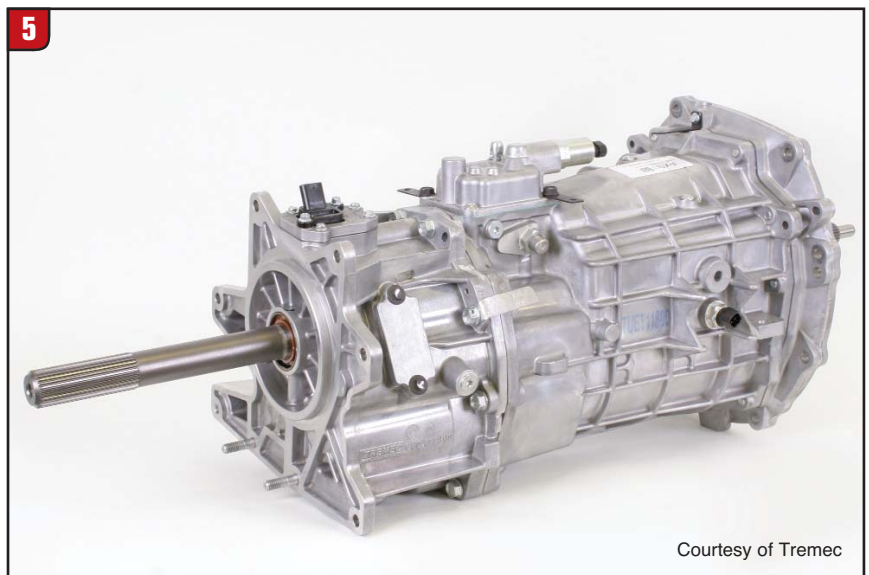
A brief history of the T56 transmission, originally designed and built by BorgWarner and found in Firebirds, Camaros and Dodge Vipers, shows the development of the six-speed transmission. Tremec bought the BorgWarner stick business and continued to improve on the T56 design, which morphed into the TR6060 that is now found in Corvette, Mustang, SRT Viper, Dodge Challenger, Pontiac GTO, Cadillac CTS-V and Aston Martin vehicles. Tremec engineered vast improvements in shift quality, torque ratings and available ratios from the original BorgWarner design. Equipped with fifth and sixth gears being overdrive ratios, there were major improvements also in fuel economy. Part of the technology responses came from the demands by the EPA for better CAFE ratings (Corporate Average Fuel Economy), which never seem to cease. Toward that end the design has now advanced to the TR6070, found in the new Corvettes but slated for release in other models such as the Cadillac CTS-V, to make these cars more fuel efficient without sacrificing vehicle performance.

The TR6060 and 6070 models in the C5, C6 and C7 generations of Corvettes are mounted in the rear of the vehicle, bolted directly to the differential, to achieve as close as possible to 50/50 weight distribution and are driven through a clutch system and torque tube attached to the rear of the engine block. Tremec has achieved a major engineering milestone in creating a seven-speed unit that is not much longer than the TR6060 previous models. This was done by having reverse and seventh share a common synchronizer, and that gearing is mounted on the counter-shaft.

Tremec has created a new friction material for the synchronizer rings that is a composite of carbon fiber and sintered bronze for world-class smooth shifting and improved durability with high-horsepower and high-torque applications. Synchronizer engagement teeth have been modified from the traditional "roof



Courtesy of Tremec



Courtesy of Tremec

peak" design to an asymmetrical 120° angle. Because of this the synchronizer sliding sleeves are now directional and must be assembled with the correct side facing the correct gear. The sleeves are marked as to which side should face a specific gear.

Two ratio configurations are immediately available, with a third, close-ratio version coming to market soon:

	1st	2nd	3rd	4th	5th	6th	7th
1	2.97	2.10	1.46	1-1	0.74	0.50	0.42
2	2.66	1.78	1.30	1-1	0.80	0.63	0.42
3	2.29	1.60	1.21	1-1	0.84	0.67	0.42

The TR6070 also features a rail-position sensor at the rear of the transmission that works with a computer-controlled mode switch called the drive-mode selector (Figure 6). This program controls 12 attrib-



utes including throttle, active fuel management, steering effort, exhaust tone, magnetic ride control, stability control and traction control. The rail sensor informs the computer which gear is being selected, and the management system will blip the throttle on both upshifts and downshifts for much better rev matching without driver intervention.

The drive-mode selector has five general settings – Weather, Economy, Touring, Sport and Track – all of which can be further tuned to the driver's wants. The vehicle uses an advanced clutch set with a dual-mass flywheel to further isolate engine-firing pulses and prevent rattling the transmission gears.

Other new developments in the TR6070 include a speed sensor in the rear of the transmission, a new front transmission plate and extension housing, the pressurized gear-lubrication port being moved to the driver side of the case, and a port on the rear extension that permits easier assembly of the reverse/seventh-gear shift fork. Beaded gaskets are now used to improve sealing between the case castings.

The new C7 Corvette is truly a wonder of design and improvement over an already-fabulous car. Tremec should be proud to be the designated transmission supplier for this epic vehicle. Lighter and faster, with an absolutely gorgeous body design, Corvettes are now truly world-class vehicles. Imagine a car that can handle and perform with the world's great sports cars at a very reasonable comparative price. Those of us who thought four-speeds were a huge step up from the original three-speed manual transmissions never thought we would see a seven-speed manual. **TD**