SIX-SPEED MANUAL TREMEC T56 (MM6/MZ6//M10/M12) CAR TRANSMISSION

2006 model year summary

- One-piece countershaft added for durability (MM6)
- 32-spline output shaft added for durability (MM6)
- Rear extension housing bolt pattern change (MM6)
- DEXRON® VI compatible
- Stepped clutch teeth on synchronizer sleeves (M12)
- High-density carbon blocker rings (M12)
- Stronger snap rings on synchronizer hub (M12)
- Carbon reverse synchronizer (M12)
- Revised shift precision (M12)

Full descriptions of new or changed features

One-piece countershaft added for durability (MM6)

On the new optional Corvette Z06 package, a stronger single-piece countershaft replaces the two-piece countershaft. The 505-hp LS7 creates 470 lb.-ft. of torque, which required the stronger shaft for durability.

32-spline output shaft added for durability (MM6)

The output shaft was enlarged to a 32-spline unit, which is more durable than the 27-spline unit used in the standard Corvette applications. The rear differential was also increased in size from an 8.25-inch ring gear to a 9-inch ring gear and a larger pinion gear. The bias ratio on the limited-slip differential was increased to 2.5:1 from 2.0:1, and the differential side-cover mounting arms were made stiffer, as well.

Rear extension housing bolt pattern changed (MM6)

The bolt pattern for the rear of the case extension of the Six-Speed was changed for Corvette applications to match the same bolt pattern as the new six-speed 6L80-E automatic.

DEXRON® VI compatible

Until the mid-2006 model year, all six-speeds will be produced filled with DEXRON III fluid, although the transmission has been validated for used with new DEXRON® VI. In mid-2006, the six-speeds will come filled with DEXRON® VI, which was developed to behave more

consistently during temperature and other environmental variations, as well as to provide even lubrication of the moving surfaces of the transmission.

Stepped clutch teeth on synchronizer sleeves (M12)

Stepped clutch teeth on the synchronizer sleeves are now added to the LS2-powered CTS-V application. These staggered teeth sequentially engage the gears, which makes engagement feel lighter and more positive to the driver. This modification originally appeared on the 2005 Corvette.

High-density carbon blocker rings (M12)

More durable carbon friction material is used on the synchronizers.

Stronger snap rings on synchronizer hubs (M12)

For the first-second gear hub, a stronger snap-ring is used to increase durability.

Carbon fiber reverse synchronizer (M12)

To reduce efforts to engage reverse, the synchronizer friction surface is changed to a carbon fiber material. Reverse-inhibit mechanism to block the shifter from going into reverse when the driver is aiming toward fifth or sixth gear gate with the shifter is also modified to make it easier to engage reverse.

Revised shift precision (M12)

Tolerances for the shifter mechanism for the Cadillac CTS-V application have been tightened to make the shifter feel more precise.

Low maintenance

The six-speed uses DEXRON III fluid and is certified "fill-for-life," requiring no fluid changes. The clutch is activated hydraulically, which automatically compensates for clutch disc wear, eliminating manual adjustments. The six-speed was originally designed to require virtually no maintenance. The M10 for the SSR is validated at a higher gross vehicle weight for greater durability.

Overview

Originally, the Tremec T56 evolved as a higher-torque capacity, six-speed version of the proven M49 five-speed manual transmission, and was introduced in the 1993 Chevrolet Camaro and Pontiac Firebird. It was also added to the 1997 fifth-generation Corvette.

Further applications included high-performance models, such as the Cadillac CTS-*V* in mid-2004, which used the 400-horsepower LS6 engine mated to the M12 version of the six-speed, and the Pontiac GTO, which used the 340-horsepower LS1 engine with the M12 but with a higher ratio fifth gear to maximize acceleration in that gear.

The sixth-generation Corvette with Z51 option uses the MZ6 version of the six-speed, with ratios from the M12, which are higher ratios in first, second, and third gears than the MM6, which is the standard gearbox, as well as a lower-ratio fifth gear to increase top speed in fifth gear with the 400-horsepower LS2 engine.

In 2005 a new version of the six-speed was added, with an RPO of M10. It is a version of the M12 but with a more robust first gear, and it is used in the Chevrolet SSR, a convertible pickup truck roadster based on the midsize SUV platform. The first gear is a higher ratio, and is made stronger and with fewer teeth than the first gear in an M12, which is necessary due to the higher weight of the SSR truck. For the first-second gear hub, a stronger snap-ring is used to increase durability. To reduce efforts to engage reverse, the synchronizer friction surface is changed to a carbon fiber material. Reverse-inhibit mechanism to block the shifter from going into reverse when the driver is aiming toward fifth or sixth gear gate with the shifter is also modified to make it easier to engage reverse. In addition, the temperature sensor for transmission fluid is removed, and the Computer Aided Gear Selection (CAGS) system is not used. The CAGS system is used on car applications to increase fuel efficiency in low-speed city driving conditions.

One revision made for 2005 Corvette applications is the addition of stepped clutch teeth on the synchronizer sleeves. These staggered teeth sequentially engage the gears, which makes engagement feel lighter and more positive to the driver. Combined with bearings in place of bushings, which lower the friction of the shift rail movements, the feel of the Corvette shifter is lighter and more direct. Corvette applications also use carbon for the reverse gear synchronizers for improved durability. Also, because the Corvette uses a keyless entry and starting system that requires the transmission to be in reverse position to start and to lock after the engine is shut off, a redundant reverse switch is used to ensure complete reliability. To

enable even quicker shift throws for both the standard Corvette and Z51 option, side-to-side and fore-aft shift rail detents have been moved closer to their stops.

The synchronizer sleeves have been lengthened for applications in the SSR and CTS-*V*, which effectively shortens the distance the synchronizers travel when engaging a gear. This reduces the shift throw distance at the shifter, for quicker gear changes.

For the 2002 model year, the 6-speed received carbon blocker rings on its synchronizers, increasing the durability of the transmission. The Z06 Corvette model was added for model year 2001, featuring a high output LS6 V-8 engine. To get maximum performance from this model, a variation of the Tremec T56 (the basis for the Six-Speed Manual) with a higher ratio first gear was used (M12 - see specifications page). This variation of the Six-Speed is used on the CTS-*V* model, while the Six-Speed with the lower ratio first gear is used on the base Corvette (MM6).

Design features include a combination of double-cone and triple-cone synchronizers on all forward gears. Synchronizers act like clutches to speed up or slow down a gear that is being shifted to. Double-cone synchronizers have two friction surfaces to effect this gear acceleration, and triple-cone synchronizers have three friction surfaces. The greater the friction surface, the easier the transmission is to shift. In addition, double-cone and triple-cone synchronizers are smaller in diameter than a single-cone synchronizer with the same friction area allowing the transmission to remain more compact.

Refinements common to the design of all Six-Speed Tremec T56 products include needle bearings on all forward gearsets and 5^{th} and 6^{th} gear synchronizers located on a countershaft. The countershaft location of the 5^{th} and 6^{th} gear synchronizers allow those gears to be selected without affecting the 1^{st} through 4^{th} gearsets, contributing to ease of shifting.