



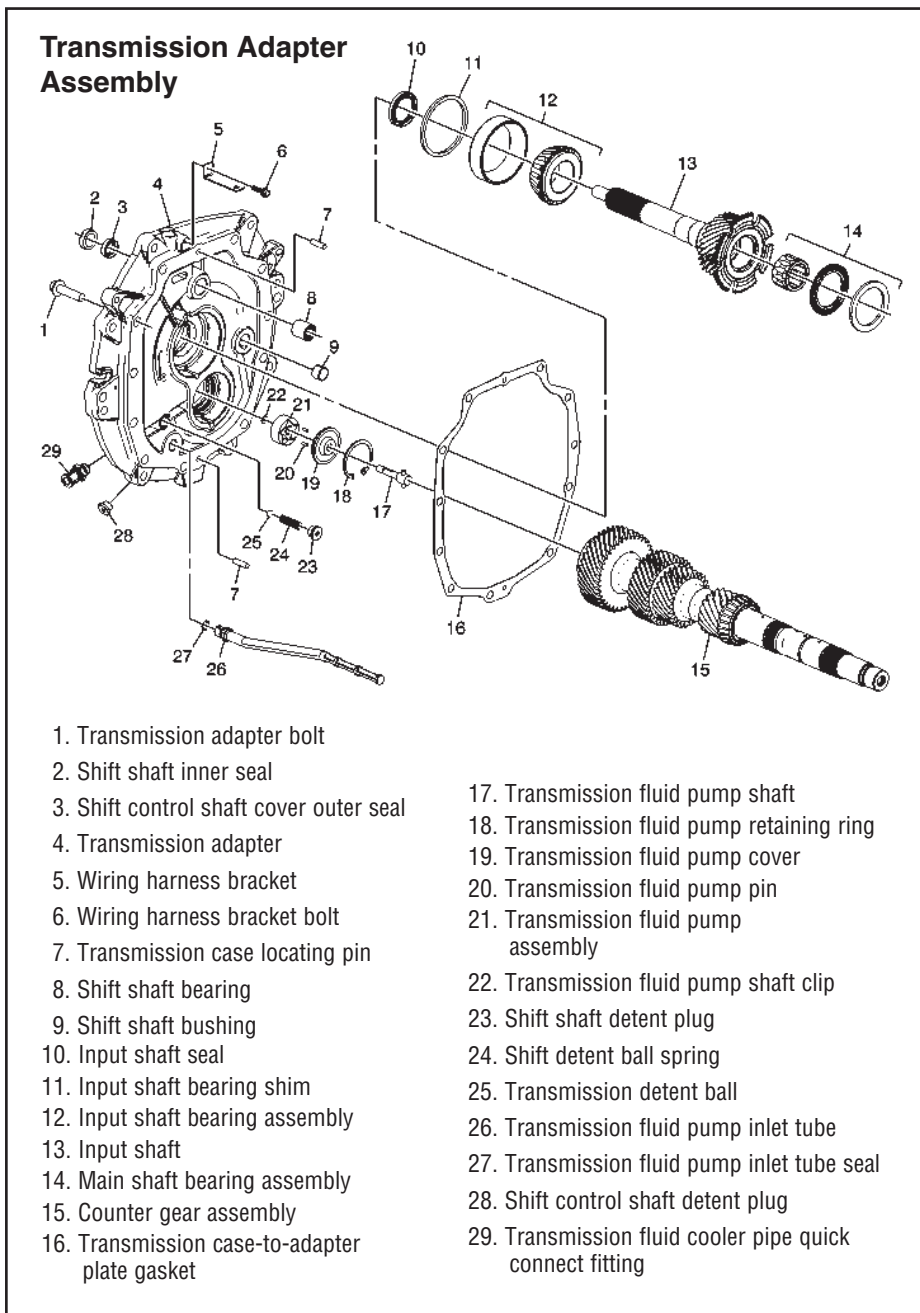
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- **Unit:** Tremec TR6070
- **Vehicle Application:** 2014 Corvette Stingray

Inside the Tremec TR6070 7-Speed Manual Transmission

Last month we looked at the new C7 generation of Chevrolet Corvette, which brings the famous “Stingray” name back into use. GM has invested tremendous amounts of labor and capital to create a real world-class new model, which will be the first to use the new Tremec TR6070 seven-speed manual transmission. The new Stingray’s advanced computer controls will enable the driver to tune the vehicle to a number of driving modes, and Tremec did a really first-class design to provide seven speeds in a package that is only slightly different in size from the previous TR6060.

In this article we will explore the internals of the gearbox to prepare us for the coming generation of automatic and manual transmissions that have six, seven, eight or more speeds, reflecting the manufacturers’ push for improved fuel efficiency to comply with stricter federal requirements on the horizon.

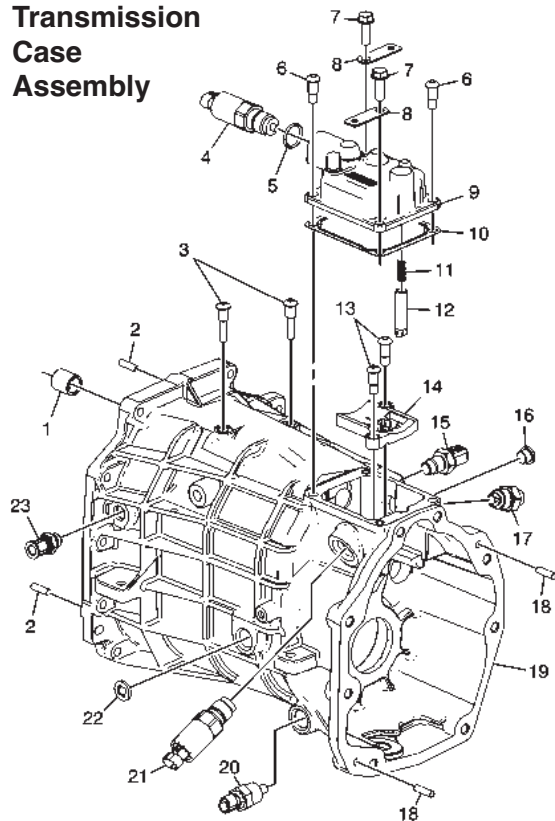
The TR6070 seven-speed gearbox will have several ratio options that are based on GM RPO codes for vehicle orders by the dealer from the factory.



RPO Code	1st	2nd	3rd	4th	5th	6th	7th	Reverse
MEP	2.66-1	1.78-1	1.30-1	1-1	0.74-1	0.50-1	0.42-1	2.53-1
MEL	2.97-1	2.06	1.43-1	1-1	0.71	0.57	0.48-1	2.85-1
MEK	2.26-1	1.60	1.20	1-1	0.82	0.67	0.45-1	2.70-1

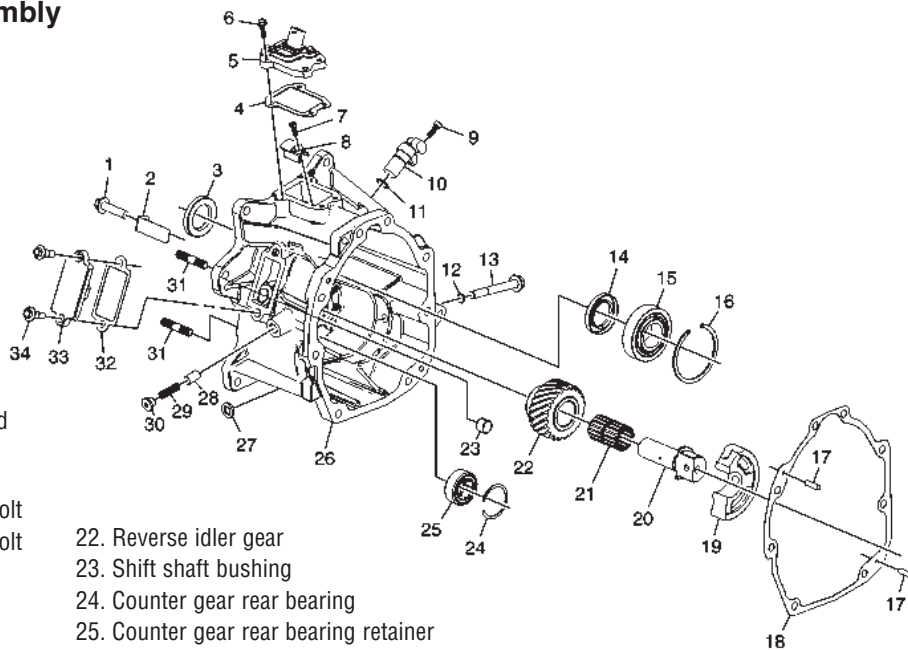
Note: The MEK version is a close-ratio gearbox that has not been released but probably will show up in a “Super Sport” version of the new Corvette.

Transmission Case Assembly



1. Shift shaft bearing
2. Transmission case locating pin
3. Transmission interlock bolt
4. Manual transmission reverse gear block-out solenoid
5. Manual transmission reverse gear block-out solenoid O-ring seal
6. Reverse lockout solenoid cover shoulder bolt
7. Reverse lockout solenoid cover hex bolt
8. Wiring harness bracket
9. Manual transmission reverse gear block-out solenoid housing
10. Manual transmission reverse gear block-out solenoid housing gasket
11. Shift shaft detent spring
12. Shift shaft detent roller
13. Shift guide plate bolt
14. Shift guide detent plate
15. Backup lamp switch
16. Shift shaft detent spring cover bolt
17. Shift interlock detent
18. Transmission case locating pin
19. Transmission case
20. Manual transmission fluid temperature sensor
21. Skip-shift solenoid
22. Transmission oil fill plug
23. Transmission fluid cooler pipe quick connect fitting

Extension housing assembly



1. Transmission extension bolt
2. Transmission identification tag
3. Main shaft rear outer seal
4. Manual transmission gear position sensor gasket
5. Manual transmission gear position sensor
6. Manual transmission gear position sensor bolt
7. Transmission gap magnet bolt
8. Transmission gap magnet
9. Transmission speed sensor bolt
10. Manual transmission output speed sensor
11. Vehicle speed sensor O-ring seal
12. Reverse idler gear shaft bracket bolt
13. Reverse idler gear shaft bracket bolt O-ring seal
14. Main shaft rear inner seal
15. Main shaft rear bearing
16. Main shaft rear bearing retainer
17. Transmission case locating pin
18. Transmission extension gasket
19. Reverse idler gear shaft bracket
20. Reverse idler gear shaft
21. Reverse idler gear bearing
22. Reverse idler gear
23. Shift shaft bushing
24. Counter gear rear bearing
25. Counter gear rear bearing retainer
26. Extension housing
27. Transmission oil drain plug
28. Transmission detent ball
29. Shift detent ball spring
30. Shift shaft detent plug
31. Transmission extension stud
32. Manual transmission control lever 7th/reverse inverter link cover gasket
33. Manual transmission control lever 7th/reverse inverter link cover
34. Manual transmission control lever 7th/reverse inverter link cover bolt

The synchronizers on these units are gear specific and must not be interchanged or flipped over. The seven-speed TR6070 uses “hybrid” synchronizer rings that are a combination of sintered-metal and carbon-fiber material for improved shifting and durability. First and second gears use triple-cone hybrid rings; third, fourth, fifth and sixth gears use double-cone hybrid rings; and reverse uses

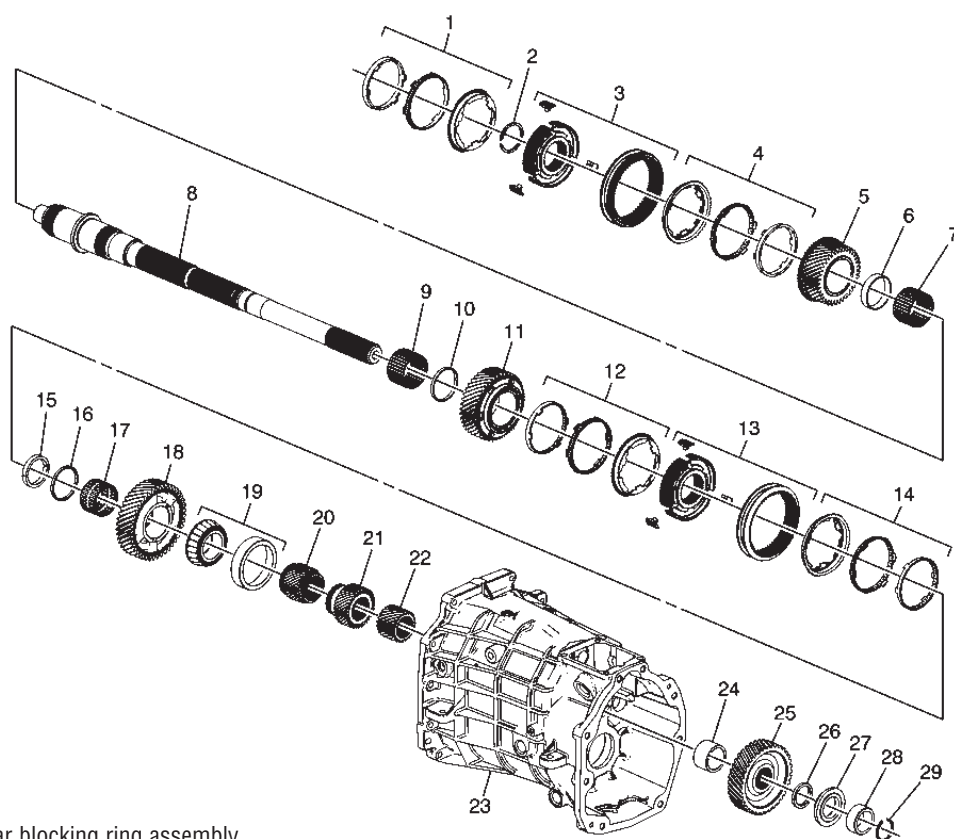
double-cone sintered-bronze rings.

A good habit to get into is to match-mark the synchronizer hub to sliding sleeve upon the start of disassembly from the shaft. Using an engraving tool or carbide bit, make a mark on the hub continuing onto the sliding sleeve. This allows you to disassemble the synchronizer components for inspection and cleaning and then reassemble them in their original

mating condition and orientation (which side of the sleeve faces which gear). This prevents inducing a new wear pattern into the assembly, which will result in notchy shifts, and allows you to make sure which side of the slider faces the correct speed gear to prevent annoying comebacks.

These synchronizers use the same synchro struts with spring-loaded balls as those in the six-

Main Shaft Assembly



- 1. 4th gear blocking ring assembly
- 2. 4th gear retaining ring
- 3. 3rd gear synchronizer assembly
- 4. 3rd gear blocking ring assembly
- 5. 3rd gear – drive
- 6. 3rd gear bearing spacer
- 7. 3rd gear bearing
- 8. Main shaft
- 9. 2nd gear bearing
- 10. 2nd gear bearing spacer
- 11. 2nd gear – drive
- 12. 2nd gear blocking ring assembly

- 13. 1st & 2nd gear synchronizer assembly
- 14. 1st gear blocking ring assembly
- 15. Transmission main shaft split washer
- 16. Transmission main shaft washer
- 17. 1st gear bearing
- 18. 1st gear – drive
- 19. Main shaft bearing assembly
- 20. 6th gear – driven
- 21. 5th gear – driven

- 22. 7th gear – driven
- 23. Transmission case
- 24. Reverse driven gear spacer
- 25. Reverse driven gear
- 26. Reverse gear split washer
- 27. Transmission main shaft split washer
- 28. Main shaft bushing
- 29. Reverse gear retaining ring

speed TR6060, which were a major improvement in durability and shift feel over the previous T56 spring-and-key design. The specs for measuring the gap between the synchro-ring bottom and the top of the engagement teeth are 0.037-0.078 inch for first and second, 0.035-0.080 inch for third and fourth gears, and 0.036-0.080 inch for fifth, sixth, seventh and reverse gears. When measuring the re-

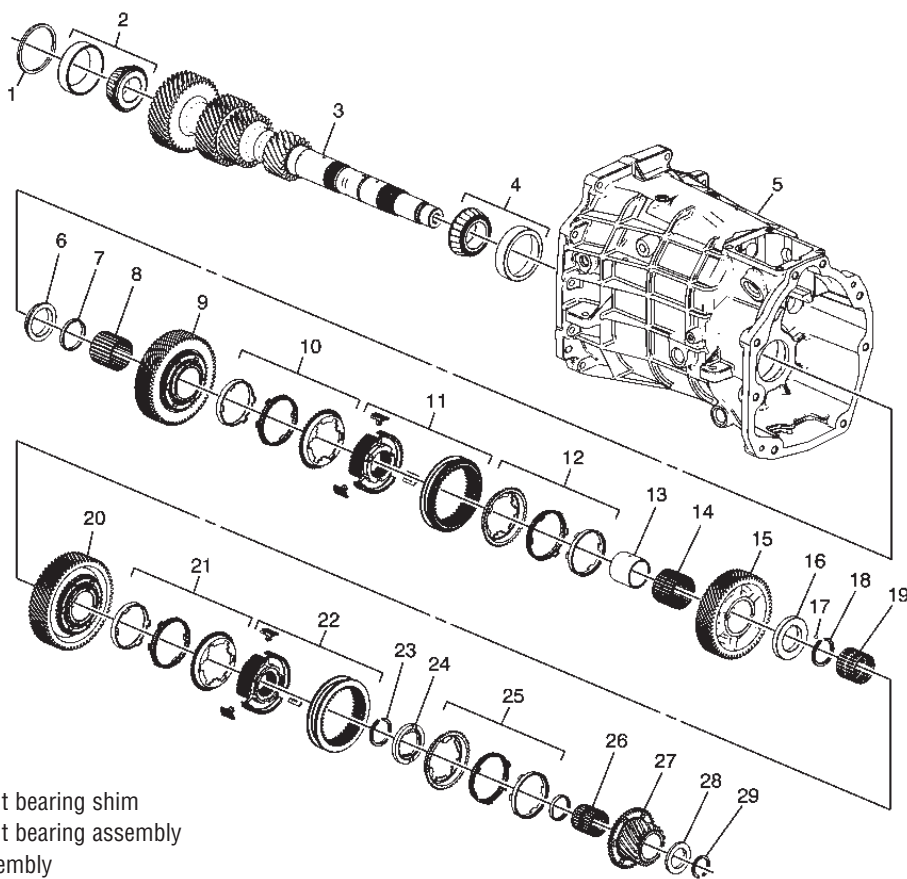
verse-gear clearance make sure to remove the wave washer from the cone of reverse gear.

The TR6070 includes a number of computer controls. On the driver side of the case just below the shift tower is the "skip-shift" solenoid. In an attempt to produce better fuel efficiency and to comply with the federal fuel-economy standards, the PCM is capable of inhibiting shifts to second and

third gears. If the driver tries to shift from first to second under conditions outside the computer parameters, the skip shift will force a shift from first to fourth gear. The conditions for the skip shift to actuate are coolant temperatures above 169°F, vehicle speed of 15-19 mph, a throttle opening of 21% or less and barometric pressure greater than 76 kPa (11 psi).

Automatic transmissions shift at

Counter Gear Assembly

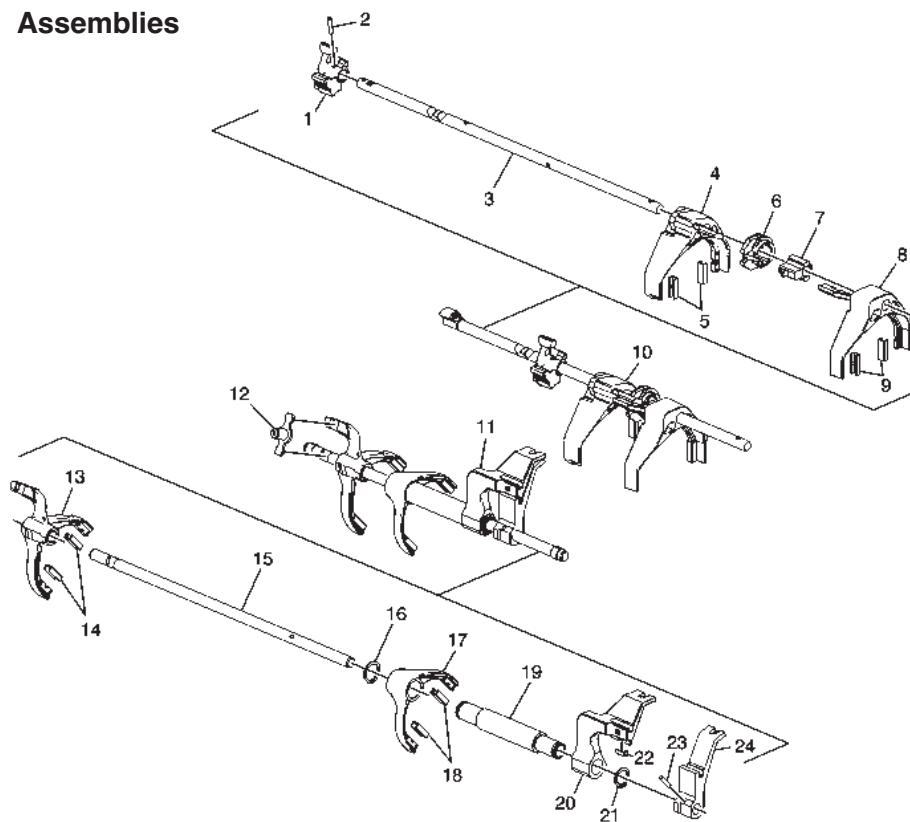


- 1. Counter gear front bearing shim
- 2. Counter gear front bearing assembly
- 3. Counter gear assembly
- 4. Counter gear bearing assembly
- 5. Transmission case
- 6. Thrust washer
- 7. 6th gear bearing spacer
- 8. 6th driven gear bearing
- 9. 6th gear – drive
- 10. 6th gear blocking ring assembly
- 11. 5th & 6th gear synchronizer assembly
- 12. 5th gear blocking ring assembly
- 13. 5th gear bearing bushing

- 14. 5th gear bearing
- 15. 5th gear – drive
- 16. 5th gear thrust washer
- 17. 5th gear thrust washer location ball
- 18. 5th gear retaining ring
- 19. 7th gear bearing
- 20. 7th gear – drive
- 21. 7th gear blocking ring assembly
- 22. 7th & reverse gear synchronizer assembly
- 23. 7th gear blocking ring retainer

- 24. 7th gear bearing spacer
- 25. Reverse gear blocking ring assembly
- 26. Reverse gear bearing
- 27. Reverse gear – drive
- 28. Reverse gear thrust washer
- 29. Reverse gear retaining ring

Shift Shaft Assemblies



1. Offset shift lever
2. Roll pin
3. 1st/2nd & 3rd/4th shift shaft
4. 1st & 2nd shift fork
5. 1st & 2nd shift fork insert
6. Manual transmission shift lever interlock bracket
7. Shift control lever
8. 3rd & 4th shift fork
9. 3rd & 4th shift fork insert
10. 1st/2nd & 3rd/4th shift shaft assembly
11. 5th/6th & 7th/reverse shift shaft assembly
12. Manual transmission selector lever pivot pin
13. 7th & reverse shift fork
14. 7th & reverse shift fork insert
15. 5th/6th & 7th/reverse shift shaft
16. 5th & 6th shift fork retainer
17. 5th & 6th shift fork
18. 5th & 6th shift fork insert
19. 5th & 6th shift shaft
20. 5th & 6th shift lever
21. 5th & 6th shift lever retainer
22. 5th & 6th shift lever insert
23. Roll pin
24. Reverse shift lever

open throttle, but the driver has control with a manual transmission. If the driver is going to shift at light throttle as described in the previous paragraph, the unit will go 1 to 4. There is nothing wrong with the unit; the driver merely has to stop driving like grandma and open the throttle for the skip shift to cease and desist.

There is also a reverse-lockout system that will inhibit a shift from seventh gear to reverse at a speed above 3 mph. It is possible for the driver to hit reverse when attempting a downshift from seventh to sixth. This invariably produces some unwanted noise along with damage to the synchronizer and gears. A reverse-lockout solenoid is installed on the shift tower of the main transmission case. With the ignition in run, battery voltage is

directed to the reverse-inhibit solenoid. At forward speeds above 3 mph, the control circuit to this solenoid is opened by the PCM, which mechanically blocks the shift lever from going to the reverse position.

On the extension housing, we have a vehicle-speed sensor, a manual gear-position sensor, and a manual transmission control lever/seventh-reverse inverter link cover and assembly. On the end of the shift rail is a transmission gap magnet that the gear-position sensor uses to inform the PCM of the current position of the gear lever, so that the various mode controls can function correctly. This cover also allows easier assembly of the seventh/reverse shift fork.

One of the challenges a transmission manufacturer faces with

any new design is to keep the package as small as possible. Tremec did this by changing the gear train on the TR6070 to move the fifth, sixth, seventh and reverse speed gears and synchronizers to the countershaft and move the opposing driven gears onto the mainshaft. Although Corvette production is not in huge numbers, this new design is a preview of how other designs will follow as the manufacturers comply with federal and state regulations and fight for market share.

One thing we know for sure: The only sure thing in the repair business is continual change. Being the guy who understands and embraces the design and engineering changes will make you the last guy standing, as more and more of your competitors fall by the wayside. **TD**