Six-Speed Solutions

By Mike Weinberg
Contributing Editor

In 1993 BorgWarner introduced the T56 six-speed manual transmission for the GM F-body cars (Camaro/Firebird). This unit featured six forward speeds with 5th and 6th being overdriven. Tremec bought the standard-shift division from BorgWarner and continued to refine and develop what is arguably the best six-speed design for the money.

The T56 now is found in Camaros, Firebirds, Dodge Vipers, C5 Corvettes, Aston Martins, the Australian Holden, Mustang Cobra R's, the new Pontiac GTO and the just-released Cadillac CTS-V. Tremec also developed an aftermarket T56 unit that replaces the T5 units used in earlier Mustangs, Camaros and Firebirds. This unit is a direct bolt-in, which will require some modification to the cross member, driveshaft and, on Mustangs, the exhaust system.

The T56 is also a great choice for many hot-rod and kit-car enthusiasts because of its high torque rating, extremely smooth shifting, ease of installation and readily available, reasonably priced parts supply.

The T56 weighs about 125 pounds and has a torque rating of 450 lb-ft. We have routinely exceeded this torque rating in many applications. We have installed T56 units in late-model Impala Super Sports equipped with LS1 engines and twin turbos by Gale Banks. These are heavy cars producing more than 850 horsepower and at least 700 lb-ft. of torque, with no transmission problems.

The secret to exceeding the torque specs is to make sure that the tires become the safety valve. If you can generate wheel spin, you save the transmission and driveline components from torsional damage. In applications such as pro-class drag racing, it will be necessary to upgrade the transmission components to heavier-duty pieces, but that will be discussed later.

The T56 is available in a variety of ratios, but the two most common follow:

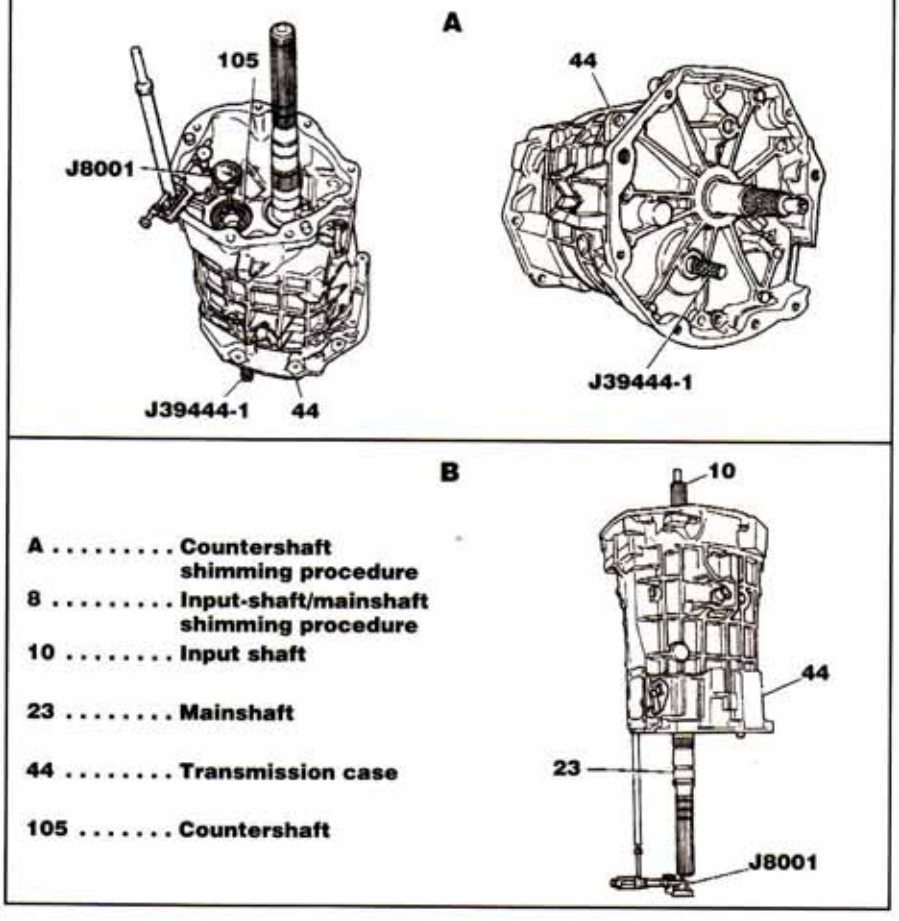
LS1 (MM6) ratios
2.66-1 1st gear
1.78-1 2nd gear
1.30-1 3rd gear
1.00-1 4th gear
0.74-1 5th gear
0.50-1 6th gear

LS6 (MM12) ratios
2.97-1 1st Gear
2.07-1 2nd gear
1.43-1 3rd gear
1.00-1 4th gear
0.80-1 5th gear
0.62-1 6th gear

With 5th and 6th being overdriven, we have the best of both worlds. At highway cruise speeds in 5th, engine speed is about 2,000 rpm at 60 mph. In truth, the sixth speed is

Figure 1

Input Shaft/Mainshaft and Countershaft



A . . . . . Countershaft shimming procedure
8 . . . . . Input-shaft/mainshaft shimming procedure
10 . . . . . Input shaft
23 . . . . . Mainshaft
44 . . . . . Transmission case
105 . . . . . Countershaft

aluminum fork with a steel 3-4 fork, part # TNEC-0843, and end all those concerns.

2 – The earlier-design synchro rings were paper lined, similar to those in the T5. Discard those rings and upgrade the unit to the latest-design carbon-fiber synchro rings. This will improve shifting and durability.

3 – These units will invariably be used at high speeds because of the vehicles they are in and the human "need for speed." At high speeds in many applications, the driveshaft will begin to whip and put a side load on the rear extension-housing bushing, which will cause the bushing to "walk" into the rear seal, causing a leak, and if left unattended the bushing will spin in the extension housing and ruin it. Install the aftermarket silicone bronze no-walk bushing, part # T56-NWB, and make sure to balance and align the driveshaft.

4 – Shimming these units correctly is critical to quiet, long-lasting operation. The factory specifications are 0-0.002 in. on the input shaft, countershaft, mainshaft and auxiliary shaft. Make sure you shim these units to zero endplay with zero preload. There should be no free play in the shafts, but they should turn without any resistance.

As the unit heats up and the cases expand you will have slightly more endplay. If you start at zero, the unit will remain quiet. If you start on the loose side of the spec, you will wind up with noises at

Be a winner.
Shift to Rockland Standard Gear.
We road test our parts at 190 mph.

Huge Inventory of OEM Quality Parts
New & Reman Transmissions & Transfer Cases
Toll Free Technical Support
Same Day Shipping

AWA-AISIN BORG WARNER DAIKIN CLUTCH DANA DODGE
EATON EXEDY SPORT CLUTCH FORD ISUZU JEEP LuK CLUTCH
MITSUBISHI MORSE CHAIN NEW PROCESS NEW VENTURE
NISSAN TTC-SPICER TTC-TREMEC TOYOTA ZF

Call 1-800-227-1523 • 1-845-753-2005 (alt.)
Fax 1-877-774-3294 (toll free) • Online at www.rsgear.com
Shipping 8:30 AM - 5:30 PM EST, M-F

Circle No. 23 on Reader Card

Figure 1
Countershaft Extension

Note: Countershaft shimming procedure must be performed first. Countershaft and correct shim must be installed during this procedure.

basically unusable for top end with street vehicles. You would need about 800 horsepower to have decent acceleration in 6th, but it makes for a really fuel-saving cruising gear and it offers people with radically cammed engines two usable highway gears so you can drive without the valves going through the hood.

Other design features of the T56 include very advanced synchronizer technology that uses double-coned and triple-coned synchronizers for very smooth shifting under high torque loads. The cases are aluminum for enhanced weight savings. Tapered roller bearings support the mainshaft and countershaft, and all speed gears ride on needle roller bearings, which cut parasitic drag losses, improve shifting and support high-speed performance.

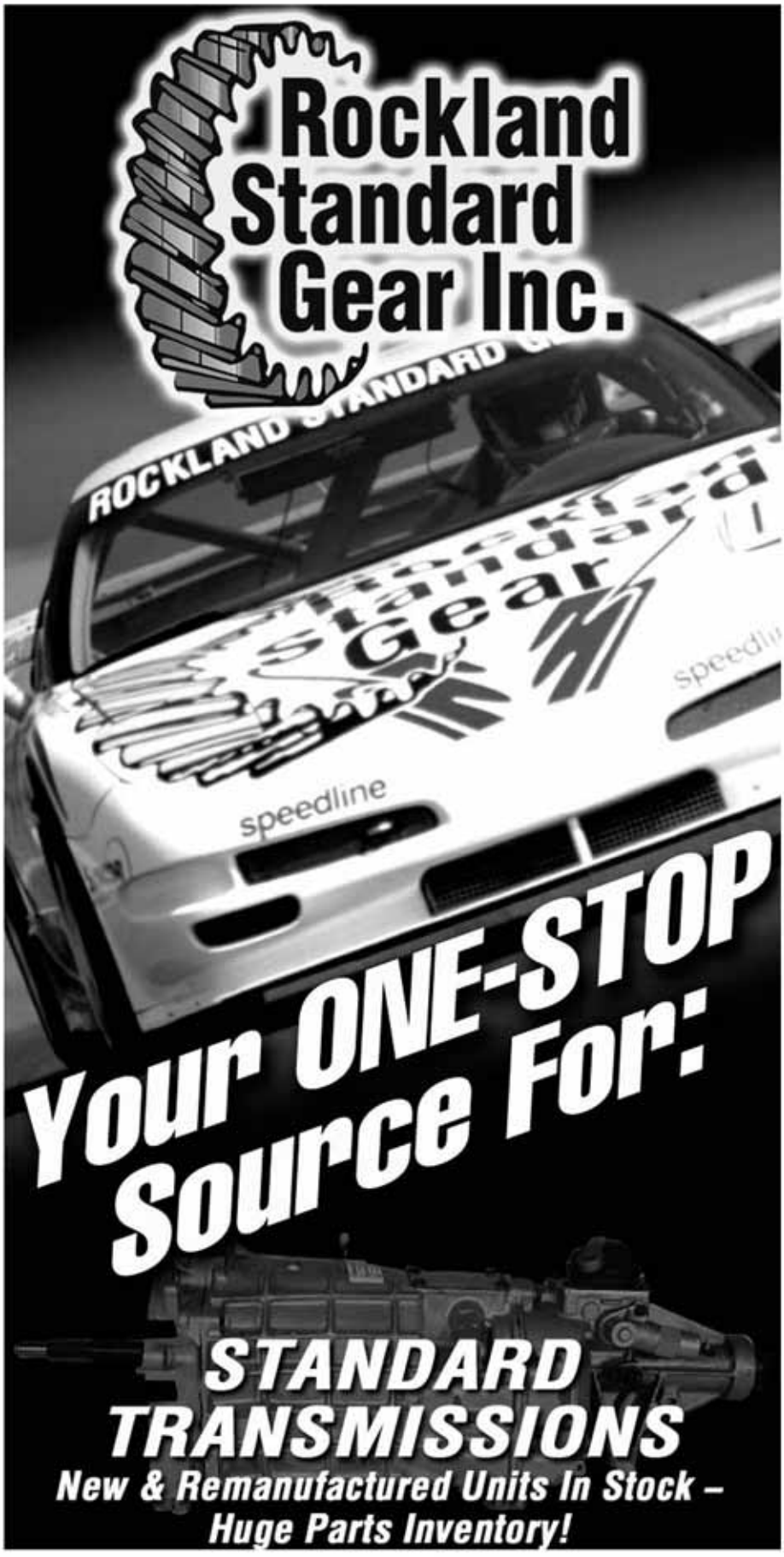
The reverse idler gear is in constant mesh, which reduces shift effort and noise when you engage reverse. The shift forks are on a single rail internally mounted in the transmission, with multiple shifter locations possible. The clutch adapter plate is integral and increases the strength of the unit in response to high torque loading.

Updates for the T56

With such a wide variety of vehicles using the T56, you will see more and more of these units for repair. Whenever you work on one, use these updates to give your customer a value-added, great-shifting transmission.

1 – The 3-4 stock shift fork is aluminum. You will find that the shift rail will begin to enlarge the bore in the fork and cause it to have radial play. Always test the fork by placing on the rail and seeing whether it rocks front to back. This will cause shift problems 3-4 and gear jumpout in 3rd and 4th. You can bulletproof the unit by replacing the

continues next page



Circle No. **14** on Reader Card