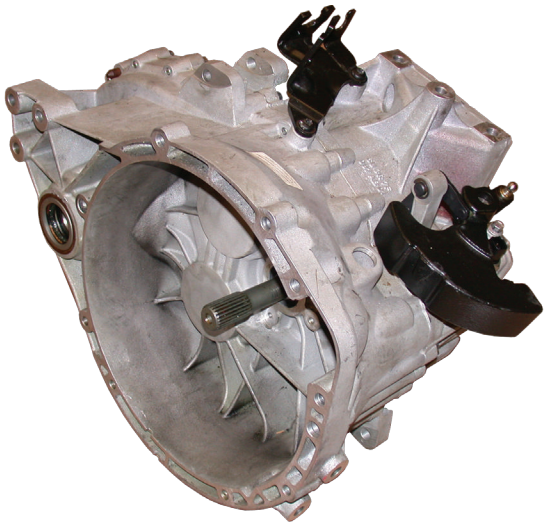
Front Wheel Drive Manual Transaxle



Front Wheel Drive Manual Transaxle

Front Wheel Drive Manual Transaxle

TABLE OF CONTENTS

Front Wheel Drive Manual Transaxle

INTRODUCTION

Chrysler's Front Wheel Drive (FWD) Manual Transaxle training course covers the identification, function, and operation of the following transaxles:

- T350
- T355
- G288 (BUX for 2008+ Model Year)
- DMT6
- BG6 (BUX)

STUDENT LEARNING OBJECTIVES

Upon successful completion of this course, you will be able to:

- Identify the transaxle visually or by using the identification tag.
- Identify the correct transaxle fluid application and fill procedure for each manual transaxle.
- Identify the components of the T350, T355, and DMT6 manual transaxles.
- Describe the power flow of the T350, T355, and DMT6 in each gear.
- Use the correct service procedures and special tools to perform the steps necessary to disassemble and assemble the T355, and DMT6 transaxles.
- Diagnose and evaluate the T350, T355, and DMT6 manual transaxle operation, and determine the appropriate repair path.
- Describe the operation of the clutch and clutch controls and the unique service procedures for each manual transaxle.

ACRONYMS

The acronyms listed here are used throughout this course.

- **2WD** Two Wheel Drive
- **4WD** Four Wheel Drive
- **AWD** All Wheel Drive
- **BUX** Built Up for Export
- **CSC** Concentric Slave Cylinder
- **DMF** Dual Mass Flywheel
- **DMT6** Daimler Modular Manual Transmission, 6-speed
- **G** Getrag
- **Hz** Hertz
- **NA** Naturally Aspirated
- **NPG** New Process Gear
- **SRT** Street Racing Technology

Notes:

MODULE 1 MANUAL TRANSAXLE OVERVIEW

APPLICATIONS

T350 Applications

The T350 is a five speed constant-mesh manual transaxle manufactured by New Process Gear (NPG). All gear ranges except Reverse are synchronized. The reverse gear utilizes a brake and blocking ring for shifting ease. The reverse idler gear is supported on a sliding spindle idler shaft. The transaxle case is a two-piece, middle split design cast aluminum with a steel end plate. The output shaft of the T350 is not serviceable and must be replaced as an assembly. The differential is supported by tapered roller bearings and preload is adjusted with select thickness shims.

The T350 has a wet weight of approximately 39 kg (85 lbs).

Figure 1 T350 Manual Transaxle

Table 1 T350 Vehicle Applications

Vehicle	Model Years	Engine
PT Cruiser	2001 to current	2.4L NA

T355 Applications

The T355 is also manufactured by NPG and is very similar to the T350. The major differences are in the shift shaft assembly and the gear ratios.

The T355 has a wet weight of approximately 43 kg (94 lbs).

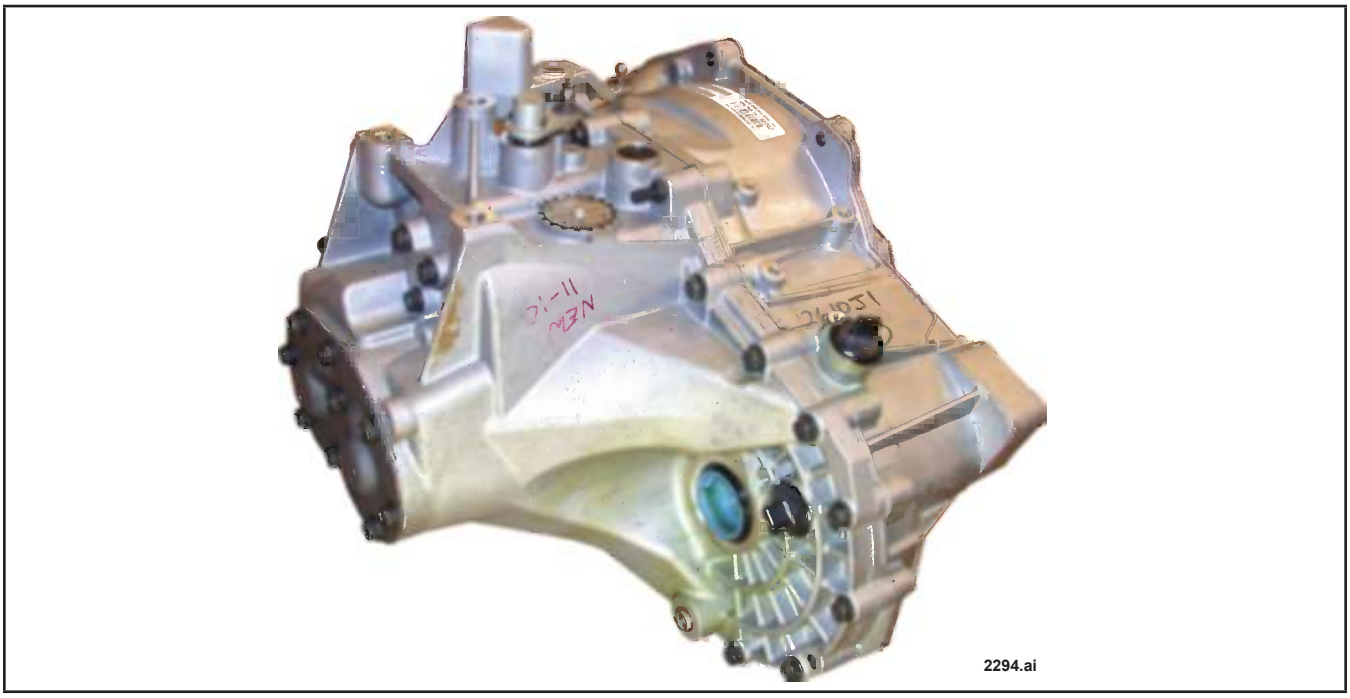


Figure 2 T355 Manual Transaxle

Table 2 T355 Vehicle Applications

Vehicle	Model Years	Engine
Caliber	2006	1.8L
Caliber	2007	2.4L NA
Compass	2007	2.4L NA
Patriot	2007	2.4L NA

G288 Applications

The Getrag G288 5-speed is a constant-mesh transaxle that is synchronized in all gears.

The transaxle consists of four major sub-assemblies: the input shaft, output shaft, reverse shaft, and integral differential assembly. The transaxle is of a split-case design, utilizing a gear housing and clutch housing to contain and support the geartrain via a combination of roller and needle bearings.

The G288 has a wet weight of approximately 56 kg (124 lbs).

Figure 3 G288 Manual Transaxle

Table 3 G288 Vehicle Applications

Vehicle	Model Years	Engine
PT Cruiser	2003 to 2007	2.4L Turbo
PT Cruiser	2004 to current	2.2L Diesel (BUX)

DMT6 Applications

The Getrag DMT6 6-speed is a constant-mesh transaxle that is synchronized in all gears. The transaxle consists of four major sub-assemblies: the input shaft, two output shafts, and the differential assembly. All synchronizers are mounted on the output shafts, with ratios 1-4 on one output shaft; ratios 5, 6, and Reverse are on the second shaft. Each output shaft has a different final drive ratio.

All gears have helical-cut teeth and are constantly engaged. Fifth, sixth, and Reverse gears have simple synchronization. First to fourth gears use double cone synchronizers. The reverse idler gear is incorporated with first driven gear on the 1-4 output shaft, eliminating the need for a separate reverse idler gear and shaft.

The transaxle is of a split-case design, utilizing a gear housing and bellhousing to contain as well as support the geartrain via a combination of roller and needle bearings.

The shift mechanism is cable operated and incorporates a pull-up ring on the shift lever that must be lifted to engage Reverse. This prevents unintentional selection of Reverse when attempting to select first gear.

The DMT6 has a wet weight of approximately 57 kg (125 lbs).

Figure 4 DMT6 Manual Transaxle

Table 4 DMT6 Vehicle Applications

Vehicle	Model Years	Engine
Caliber SRT4	2008	2.4L Turbo

GEAR RATIOS

T350/T355 Gear Ratios

The T350 manual transaxle uses five forward speeds and reverse. All forward speeds use a constant-mesh helical type gear to increase strength and help reduce gear noise. The table below shows the gear ratios used, depending on the vehicle.

Table 5 T350 Gear Ratios

Gear	PT Cruiser			Neon		Sebring Sedan/ Convertible Stratus Sedan
	1.6L*	2.0L	2.4L	1.6L* and 2.0L R/T	2.0L	2.0L and 2.4L
1st	3.50	3.50	3.50	3.50	3.50	3.50
2nd	1.95	1.95	1.95	1.95	1.95	1.95
3rd	1.36	1.36	1.36	1.36	1.36	1.36
4th	0.97	0.97	0.97	0.97	0.97	0.97
5th	0.81	0.81	0.72	0.81	0.72/0.81*	0.81
Reverse	3.42	3.42	3.42	3.42	3.42	3.42
Final Drive	4.12	3.94	3.94	3.94	3.55	3.94

*BUX models

Table 6 T355 Gear Ratios

Gear	PM Caliber and MK Compass/Patriot 1.8L and 2.4L
1st	3.77
2nd	2.16
3rd	1.41
4th	1.03
5th	0.81
Reverse	3.42
Final Drive	4.12

G288 Gear Ratios

The G288 manual transaxle uses five forward speeds and Reverse. All gears are constant-mesh helical type gear to increase strength and help reduce gear noise. The table below shows the gear ratios used, depending on the engine.

Table 7 G288 Gear Ratios

Gear	PT Cruiser 2.2L Diesel*	PT Cruiser 2.4L Turbo
1st	4.25	3.92
2nd	2.35	2.21
3rd	1.46	1.46
4th	1.03	1.11
5th	0.79	0.88
Reverse	3.81	3.62
Final Drive	3.29	3.29

*BUX models

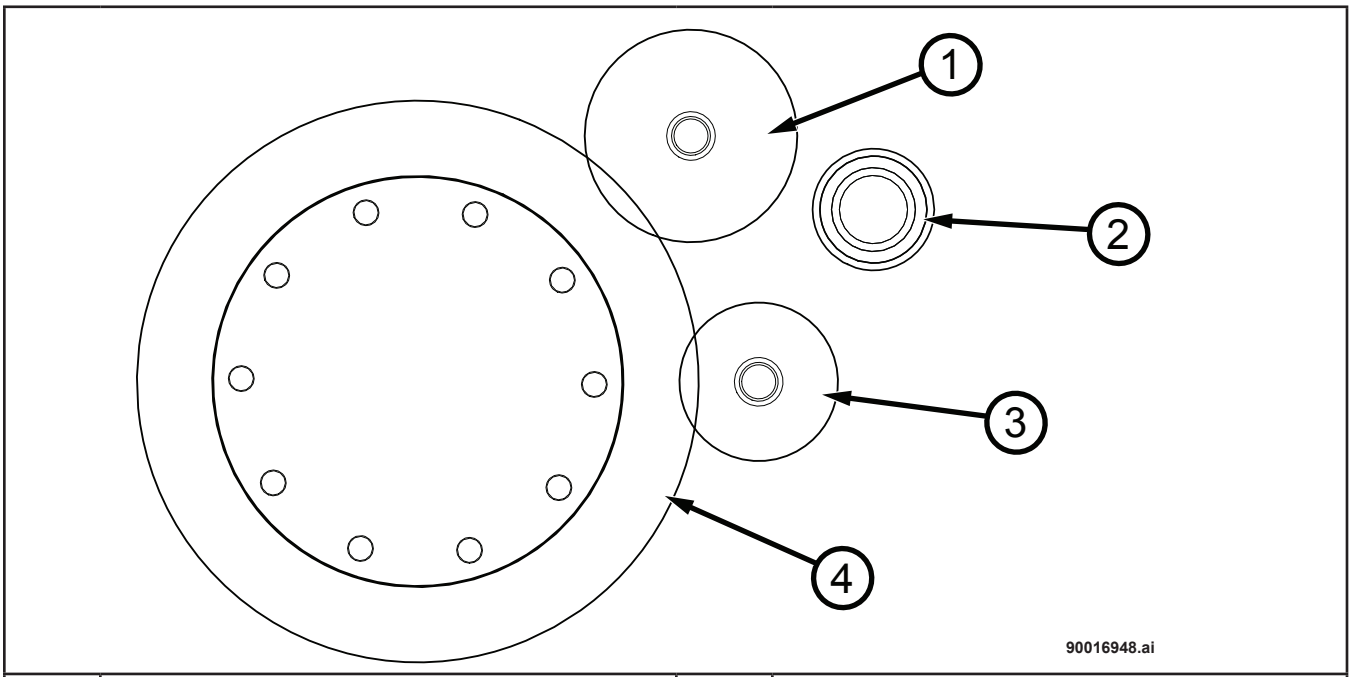
DMT6 Gear Ratios

The DMT6 manual transaxle uses six forward speeds and Reverse. All gears are constant-mesh helical type gear to increase strength and help reduce gear noise.

The DMT6 utilizes two output shafts with different size pinion gears in constant mesh with a common ring gear. This results in fourth and fifth gear ratios appearing to be out of order. However, when the final drive is factored in, the overall ratios are sequential. The table below shows the gear ratios used.

Table 8 DMT6 Gear Ratios

Gear	Ratio	Final Drive	Overall Gear Ratio
1st	3.23	4.06	13.13
2nd	1.95	4.06	7.93
3rd	1.32	4.06	5.37
4th	0.9	4.06	3.95
5th	1.061	2.96	3.13
6th	0.89	2.96	2.17
Reverse	4.598	2.96	13.58



1	5-6-R Output Shaft	3	1-4 Output Shaft
2	Input Shaft Support Bearing	4	Ring Gear

Figure 5 DMT6 Final Drive Section View

TOWING INFORMATION

Recreational Towing (Flat Towing)

Front Wheel Drive (FWD) vehicles equipped with the manual transaxles discussed in this Student Guide may be towed in Neutral for any distance. This includes conditions such as towing the vehicle behind a motor home with all four wheels on the ground.

Note: The above paragraph may not apply to transaxles not discussed in this Student Guide. Always refer to the appropriate Service Information or the Owner's Manual for proper procedures.

Caution: Vehicles equipped with All Wheel Drive (AWD) or 4 Wheel Drive (4WD) must have the transfer case shifted to Neutral to be flat towed.
AWD and 4WD vehicles not equipped with a Neutral position for the transfer case cannot be flat towed.
FWD vehicles equipped with an automatic transaxle cannot be flat towed.
Severe drivetrain damage will result.

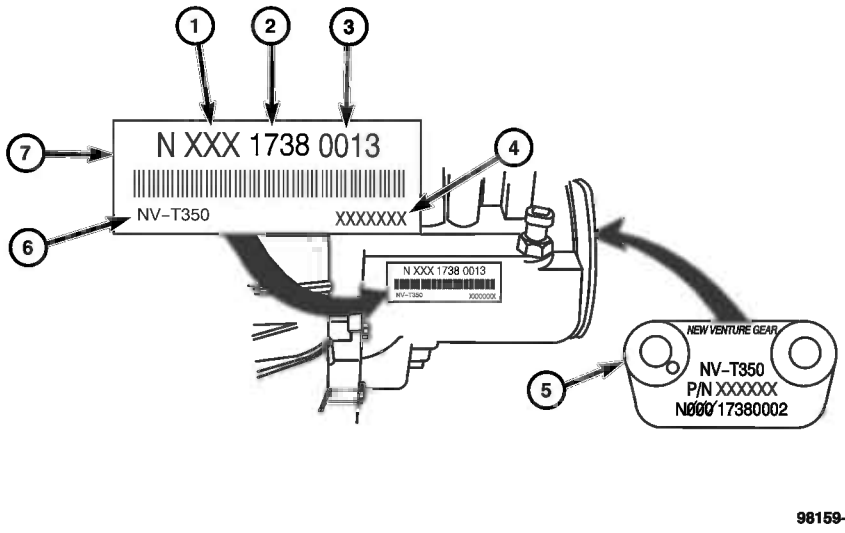
Notes:

MODULE 2 IDENTIFICATION AND MAINTENANCE

CASE PLATE NUMBER DECODING

T350 Identification

An identification tag is located on the side of the transaxle. The tag contains the bar code, transaxle model, assembly part number, and build date. There is also a metal identification tag attached to the end cover.



1	Last Three Digits of the Part Number	5	Metal Identification Tag
2	Date Code (Julian)	6	NVG Model Number
3	Production Line Sequence Code	7	Identification Tag
4	Full Part Number		

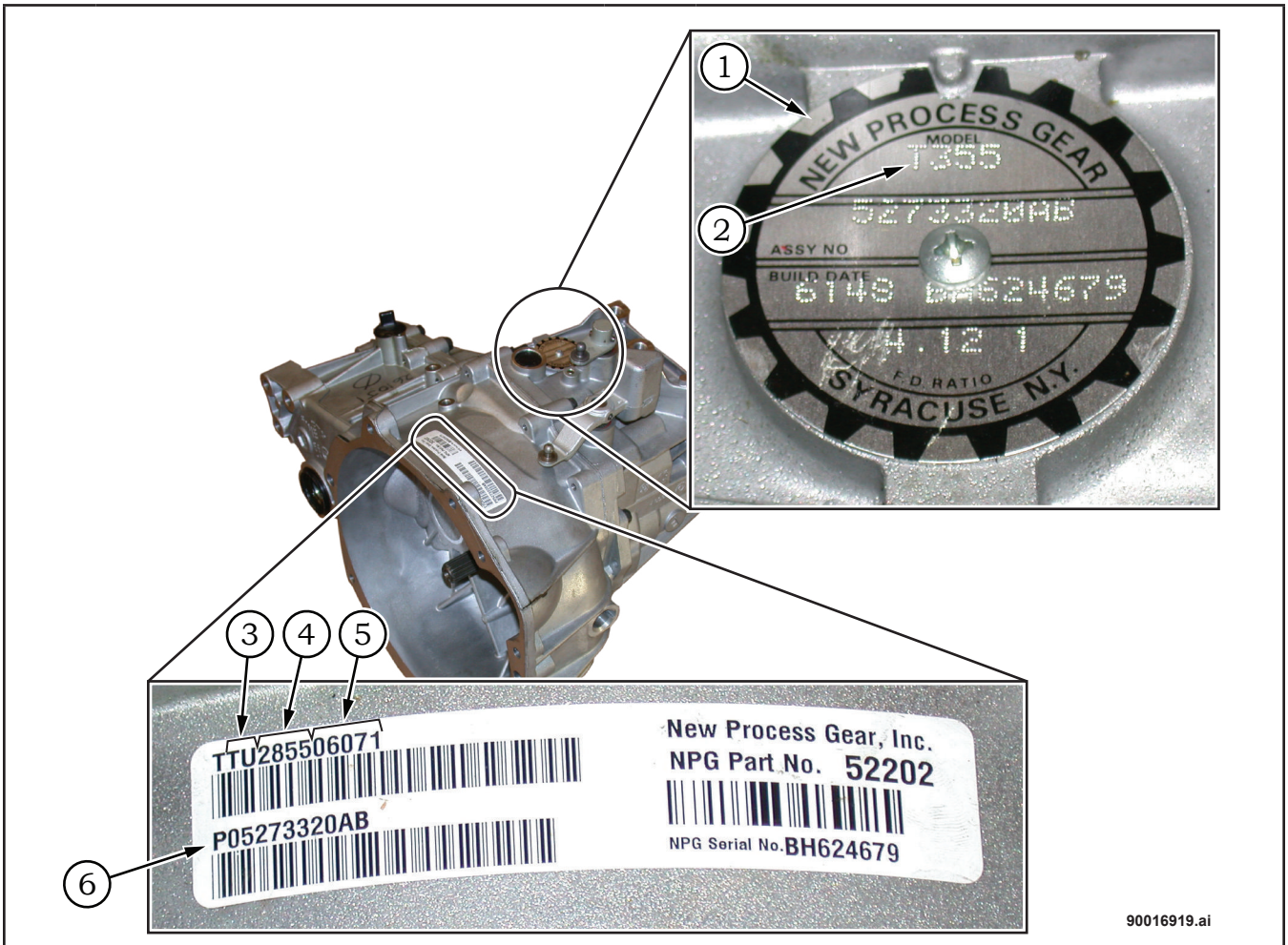
Figure 6 T350 Transaxle Identification Tag Locations

T355 Identification

The transaxle identification label is affixed to the bellhousing. The label consists of the transaxle part number, as well as a 12-character alpha-numeric code.

In this code, the first character will always be a T for Traceability. Characters 2 and 3 identify the component and manufacturer (TU = New Process Gear T355). Digits 4-6 represent the day of the year the transaxle was built (Julian date). The seventh digit represents the calendar year of build, and the remaining five digits are the build sequence code.

There is also a metal identification tag attached to the top of the transaxle, at the rear when mounted in the vehicle. This tag contains manufacturer-specific information.



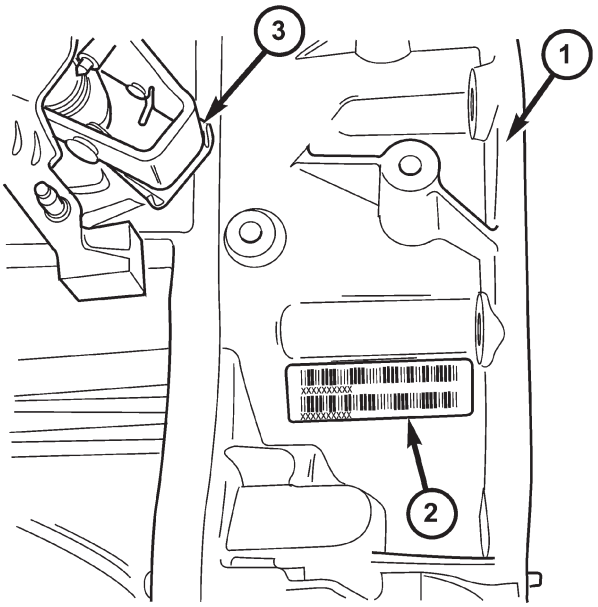
1	Metal Identification Tag	4	Date Code (Julian)
2	Model Number	5	Build Sequence Code
3	Component Identifier	6	Full Part Number

Figure 7 T355 Transaxle Identification Tag Locations

G288 Identification

The transaxle identification label is found on the clutch housing, near the differential cavity. The label consists of the transaxle part number, as well as a 12-character alpha-numeric code.

In this code, the first character will always be a T for Traceability. Characters 2 and 3 identify the component and manufacturer (CG = Getrag G288). Digits 4-6 represent the day of the year the transaxle was built (Julian date). The seventh digit represents the calendar year of build, and the remaining five digits are the build sequence code.

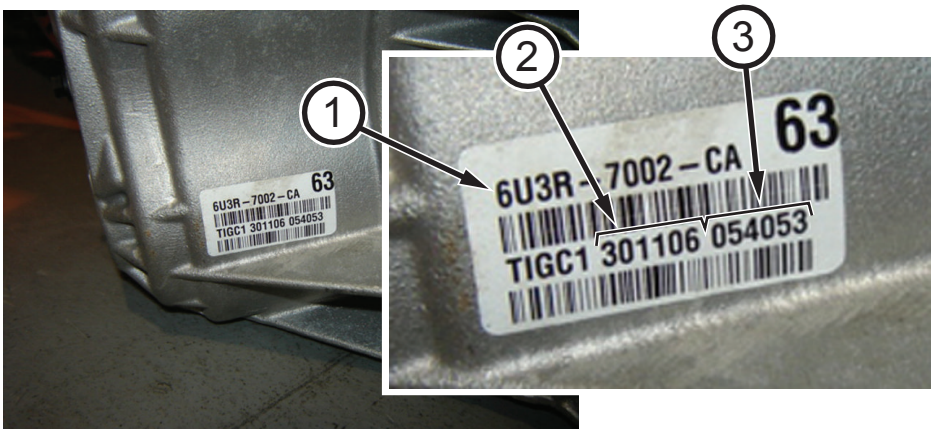


1	Clutch Bellhousing	3	Shift Shaft Assembly
2	Identification Tag		

Figure 8 G288 Transaxle Identification Tag Locations

DMT6 Identification

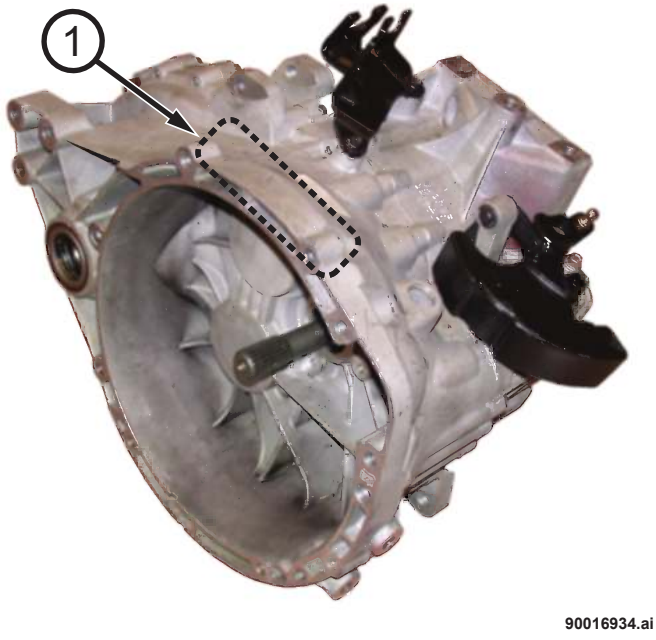
The Getrag identification label is located on the gear case, facing rearward. This label includes the Getrag part number of the transaxle and the build date and time codes. The label shown indicates this transaxle was built on the 30th of November, 2006 at 05:40:53 am.



1	Getrag Part Number	3	Build Time Code
2	Build Date Code		

Figure 9 DMT6 Getrag Identification Tag Location

The standard DCX bar code label is located on the top of the clutch bell housing.

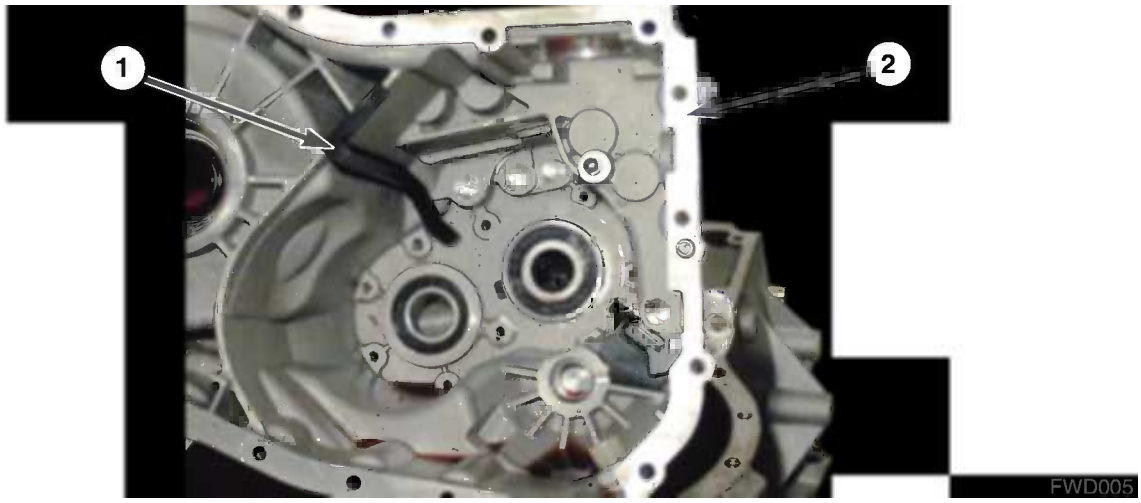


1	DCX Bar Code Label Location		

Figure 10 DCX Bar Code Label Location

MANUAL TRANSAXLE LUBRICATION

The T350, T355, G288, and DMT6 manual transaxles are splash lubricated. The transaxle gears and differential assembly splash oil from the gears to provide lubrication to all the mechanical components of the transaxle. The splashed oil flows down the removable troughs to the rear of the housing end cover. The oil guide (funnel) directs the fluid inside the input and output shafts. Holes in the shafts direct the fluid to the bearings, synchronizers, and gears by centrifugal force.



1	Oil Trough	2	Gear Housing

Figure 11 Oil Trough of the G288 Manual Transaxle Case

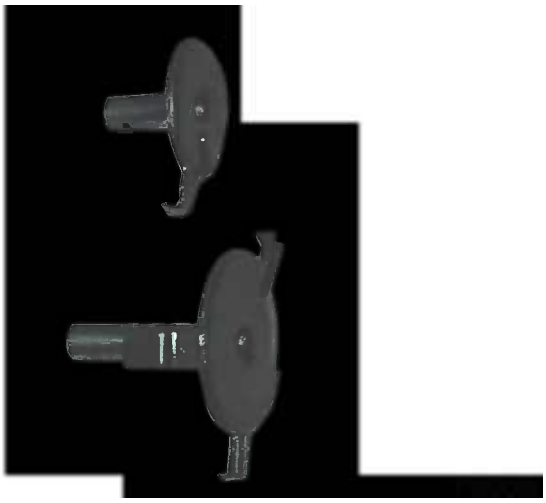


Figure 12 Oil Guides for the G288 Manual Transaxle

Mopar® Manual Transaxle Lubricant was the initial fill in T350 transaxles installed in the PT Cruiser, Sebring, and Stratus models prior to 2002, and in the Neon prior to 2001. However, if the T350 transaxle is completely drained it can be refilled with ATF+4.

Table 9 Manual Transaxle Lubrication

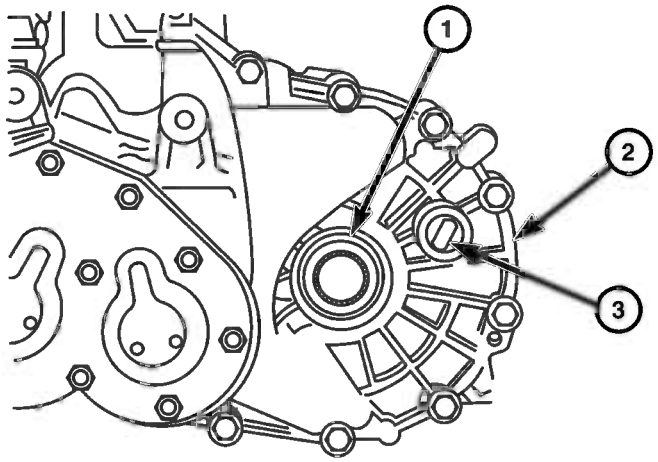
Transaxle	Lubricant
T350	ATF+4
T355	ATF+4
G288	ATF+4
DMT6	ATF+4

Caution: Always refer to Service Information for the correct fluid capacity and fill procedure for each vehicle. Transaxles often require different fluid levels when installed with different engine and vehicle combinations.

Caution: Improper transaxle lubricant can result in noise during shifting, hard shifting, and rapid gear wear.

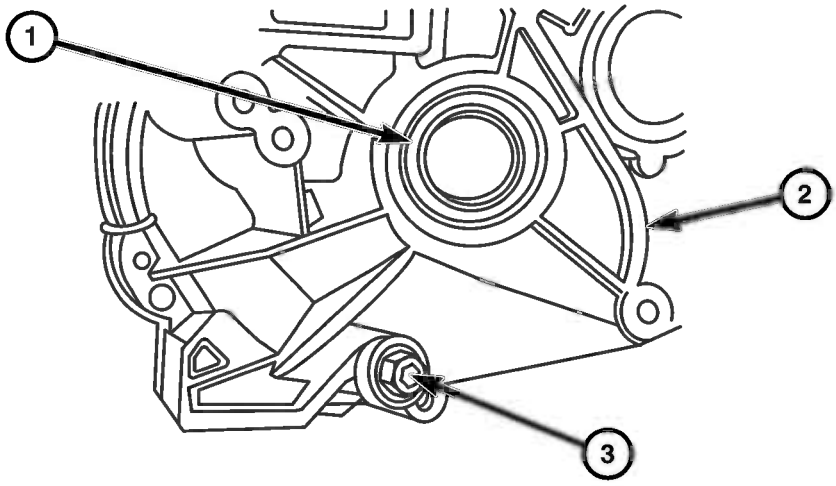
T350/T355 Drain and Fill Procedure

The fill plug on the T350 transaxle is located on the left side of the transaxle differential area. The drain plug is located on the lower right side of the transaxle differential housing.



1	Left Driveshaft Seal	3	Rubber Fill Plug
2	Gear Case		

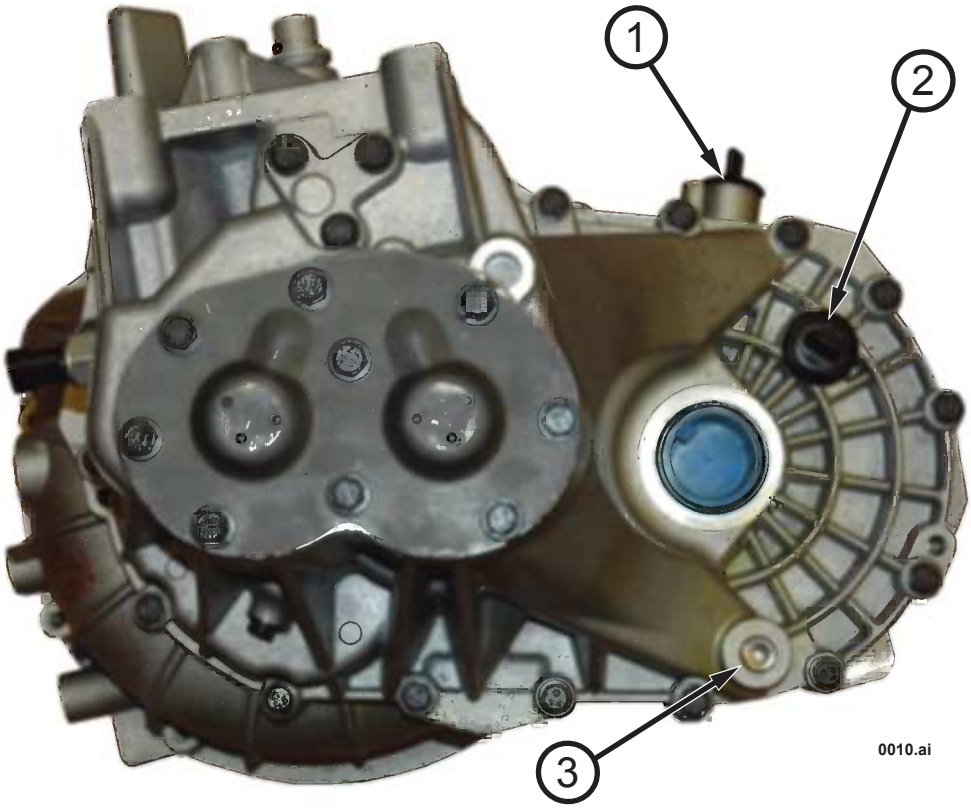
Figure 13 T350 Transaxle Fill Plug Location



1	Right Driveshaft Seal	3	Drain Plug
2	Clutch Bellhousing Case		

Figure 14 T350 Transaxle Drain Plug Locations

The drain and fill plugs on the T355 are located on the gear housing, above and below the left axle shaft.

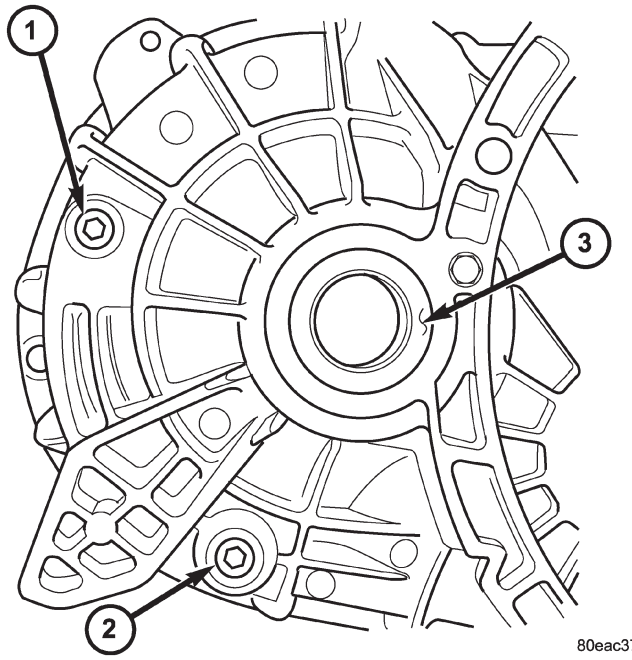


1	Factory Fill Plug	3	Drain Plug
2	Service Check Plug		

Figure 15 T355 Transaxle Drain and Fill Plug Locations

G288 Drain and Fill Procedure

Both the fill drain plugs on the G288 transaxle are located on the transaxle differential housing near the right axle seal.

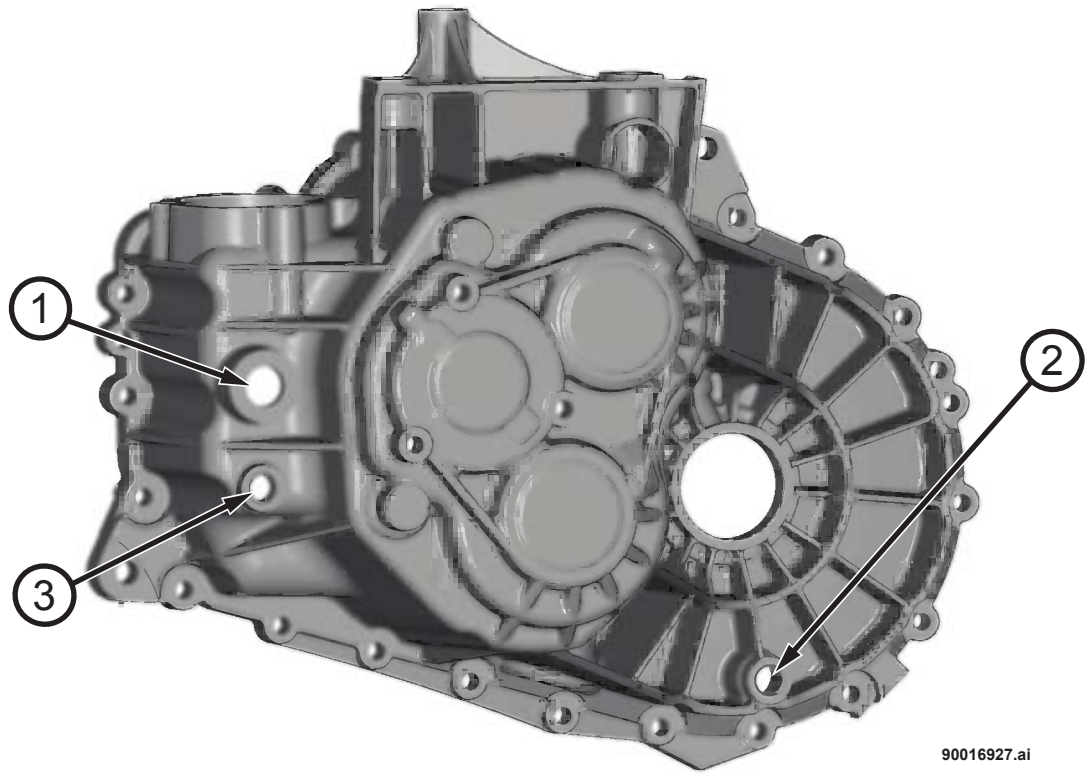


1	Fill Plug	3	Right Axle Seal
2	Drain Plug		

Figure 16 G288 Transaxle Drain and Fill Plug Locations

DMT6 Drain and Fill Procedure

The DMT6 drain and fill plugs are located on the gear case half of the transaxle. The drain plug is below the left axle and the fill plug is to the left of the gear case cavity. An additional plug, directly above the service fill plug, is used at the factory for the initial fill.



1	Factory Fill Plug	3	Service Fill Plug
2	Drain Plug		

Figure 17 DMT6 Transaxle Drain and Fill Plugs

Notes:

Notes:

MODULE 3 MANUAL TRANSAXLE DIAGNOSIS

INTRODUCTION

Performing the correct repair procedure on a malfunctioning transaxle depends on performing a thorough diagnosis. Symptom–based diagnostics are an essential part of being able to diagnose any fault that may occur. From preliminary diagnosis and road testing, up to isolating the problem and repairing it, the ability to look for and identify symptoms is very important. The following section provides an overview of the diagnostic process that should be used to identify a problem and isolate the cause to a specific component.

When diagnosing a manual transaxle concern, this 6-step diagnostic process is recommended:

1. Verify the concern
2. Identify any related symptoms
3. Analyze the symptoms
4. Isolate the concern
5. Correct the concern
6. Verify proper operation

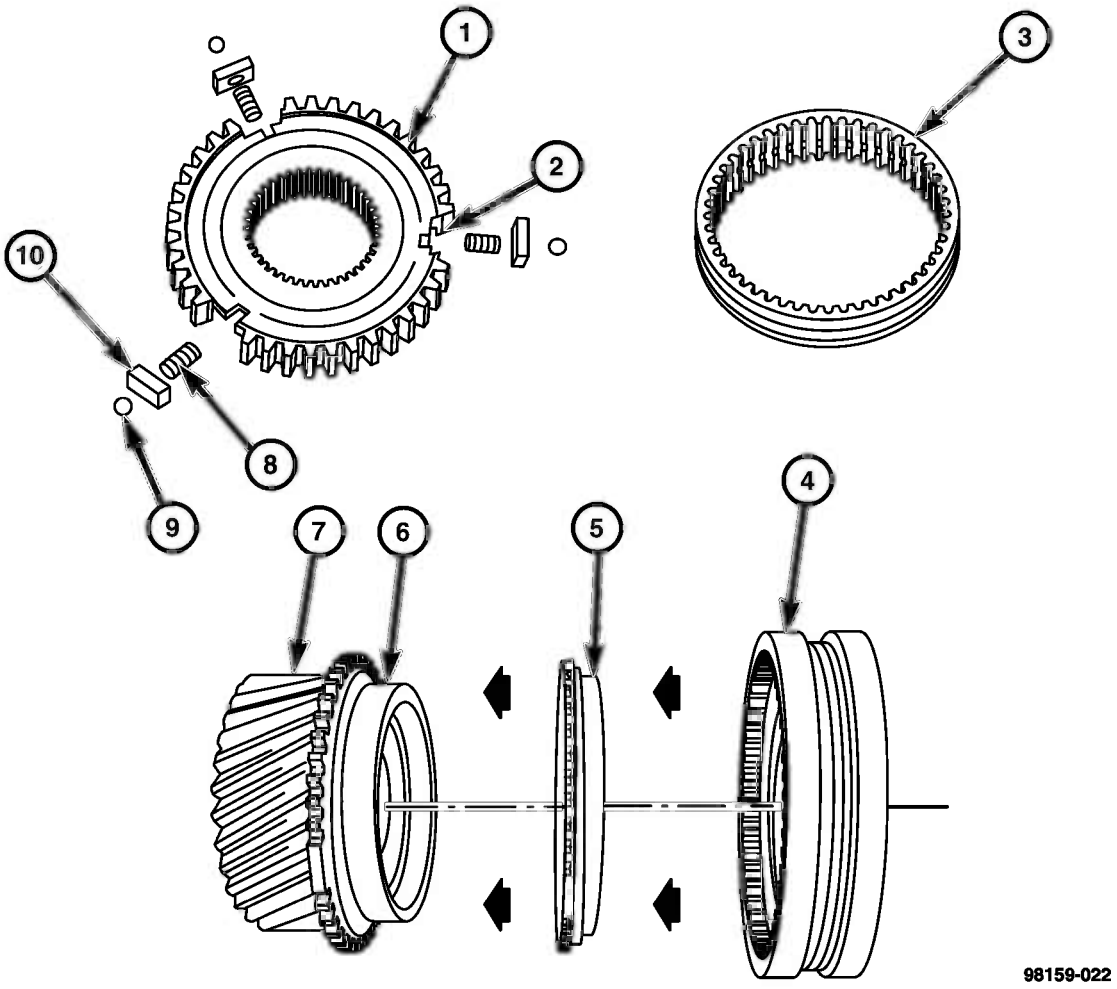
Most customer concerns are generally a noise or shifting problem. By using a logical sequence and diagnostic listening test equipment, you can usually pinpoint the problem. Whenever a noise is being diagnosed, the first step is to have the engine running and the clutch engaged. The transaxle should be tested in every gear, including neutral, to make a good evaluation. As you listen for noise in each gear, think of what is happening inside the transaxle. Keep in mind that it is normal for transaxles to make some noise. What we are looking for during a diagnosis is to duplicate the customer's concern.

SYNCHRONIZERS

Synchronizers are designed to match the speed of the drive gear to the speed of the driven gear. When the speeds match, the gear shift will take place without gear clash.

Single Cone Synchronizer Components

A typical synchronizer consists of a sleeve, hub, struts, springs, detent balls, and synchronizer ring or blocker ring. The struts, springs, and detent balls provide tension within the synchronizer assembly to help the transaxle stay in its selected gear.



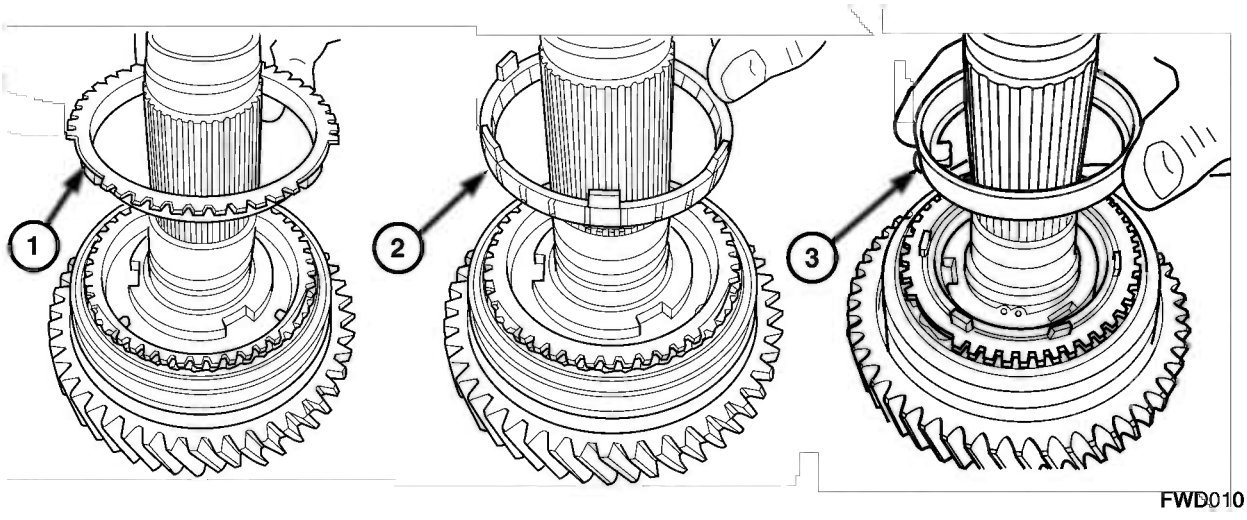
1	Hub	6	Gear Clutch Teeth
2	Strut Slot	7	Gear
3	Sleeve	8	Strut Spring (3)
4	Synchronizer Sleeve	9	Detent Ball (3)
5	Synchronizer Ring	10	Strut (3)

Figure 18 Synchronizer Components – Single Cone

Double Cone Synchronizer Components

Dual cone synchronizers are used in situations where higher shift effort is required, such as during a second to first gear downshift. High shift efforts are eased by generating higher cone torque that allows a smoother transition from second to first gear. Cone torque is generated by pushing the friction ring on the cone and wiping the oil.

Like the single cone synchronizer, the dual cone synchronizer assembly consists of a sleeve, hub, struts, springs, detent balls, and blocker ring. In addition, the assembly contains a friction cone and a reactor ring located between the blocker ring and the gear. Friction material is present on both the inside and outside of the friction cone. Both the friction cone and the reactor ring have tabs to line up with slots in the gear.



1	Blocker Ring	3	Reactor Ring
2	Friction Cone		

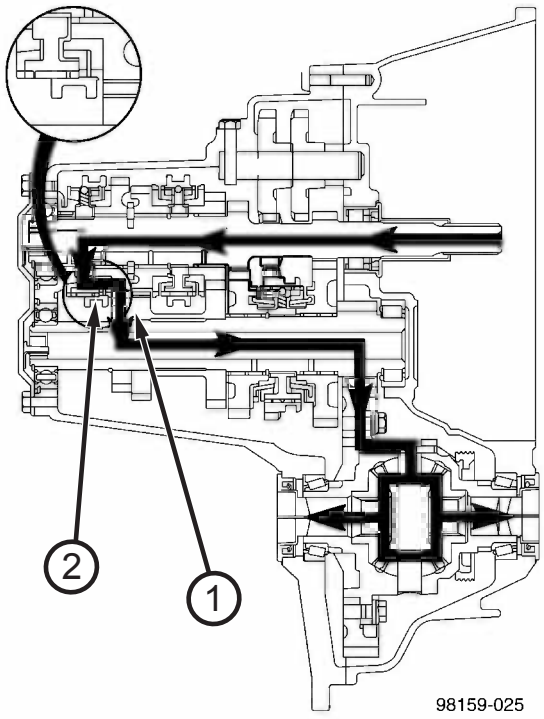
Figure 19 Double Cone Synchronizer Components

GEAR NOISE

Rotating gears generate a mild whine that is audible, but generally only at extreme speeds. Noise during neutral (neutral gear rollover noise) is a normal condition. Also, due to the straight cut of the T350/T355 reverse gear, it is normal if some noise is present when a T350/T355 is shifted into reverse gear. However, highly audible gear noise is generally the initial indicator of a lubricant problem. Insufficient, improper, or contaminated lubricant promotes rapid gear wear. The overheating that results from a lubricant problem can also cause gear breakage. The ChassisEAR™ tool can be useful in situations where it is difficult to pin-point the source of the noise.

The forward gears can be diagnosed simply by driving the vehicle and listening for noise as the power flows through each selected gear. When a selected gear is noisy, the next step is to remove the transaxle. Inspect the gears identified as being noisy during the test drive. If there is a failure, replace the components involved.

Always inspect all of the gears for worn, cracked, chipped or broken teeth. Check the condition of the bearing bore in each gear. The bores should be smooth and free of surface damage. Replace gears only when tooth damage occurs, or if the bores are brinnelled or severely scored. Gear replacement is also necessary if any damage to the synchronizer gear teeth is noted.



1	Fifth Speed Gear	2	5/R Synchronizer Sleeve

Figure 20 Fifth Gear Power Flow

SHIFTING CONCERNS

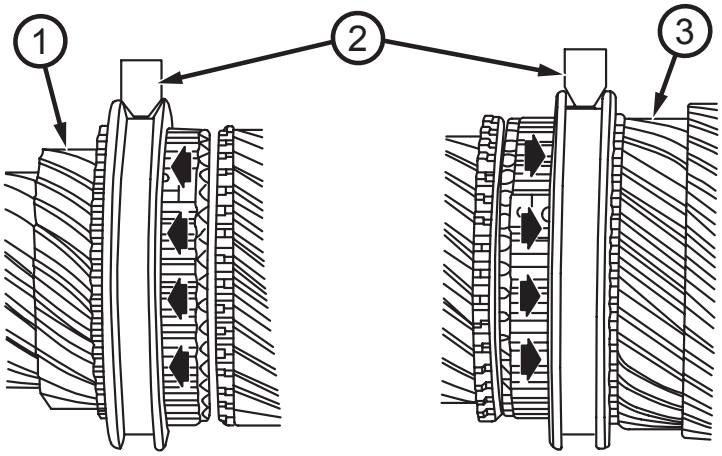
When evaluating shifting concerns in a transaxle, note what gear is involved. Does the concern occur while upshifting or downshifting into the gear? Also, note if the concern occurred when the transaxle was cold or warm.

Good shifting depends on how well the synchronizer ring cuts through the oil on the gear cone to slow down or speed up the gear for shifting. If the treads or the friction material and oil grooves that wipe the oil are not sharp, the operator must use more effort to get the synchronizer ring to operate properly. When the treads on the synchronizer ring start to go flat or the friction material wears or breaks down, they have a tendency to hydroplane on the oil instead of cutting through it and they need to be replaced.

Inspect the synchronizer sleeves for a sliding fit on the synchronizer hubs. Inspect the synchronizer springs and struts for damage. Inspect the blocker rings for excessive wear, scuffing, nicks and burred or broken teeth. Inspect the speed gear friction cones for metal transfer from the blocker ring. Inspect the speed gear teeth for excessive wear. Replace any suspect components.

An inherent characteristic of manual transaxles is that it takes more effort to downshift than it does to upshift. During a downshift, the synchronizer is speeding up the gear that it is trying to engage. During an upshift, it slows the gear down for engagement. Speeding the gear up is more difficult for the synchronizer to perform than slowing it down; therefore, worn synchronizers cause a downshift concern first. It is only a matter of time before the concern shows during an upshift.

Note: Pilot bearing, release bearing, clutch disc, pressure plate, improper shift cable adjustment, and incorrect transaxle alignment can cause shift concerns.



1	Third Speed Gear	3	Fourth Speed Gear
2	3-4 Shift Fork		

Figure 21 Synchronizer Operation

Cold Shifting

If the operator has to use more effort to shift when it is cold, the reason may be high viscosity oil. This oil could prevent the synchronizer rings from doing their job of cutting through the oil efficiently. Check the appropriate Service Information to ensure the transaxle is filled with the correct lubricant.

Hard Shifting

Hard shifting is usually caused by a low lubricant level, improper or contaminated lubricants, transaxle component damage, clutch linkage malfunction, or by a damaged clutch pressure plate or disc.

Substantial lubricant leaks can result in gear, shift component, synchronizer and bearing damage. If a leak goes undetected for an extended period, one of the first indications of a problem is usually hard shifting and noise.

Incorrect or contaminated lubricants can also contribute to hard shifting. The consequences of using non–recommended lubricants are noise, excessive wear, internal bind, hard shifting and high temperatures.

Worn or damaged synchronizer rings can cause gear clash when shifting into any synchronized gear. In some new or rebuilt transaxles, new synchronizer rings may tend to stick slightly, causing stiff and/or noisy shifts. In most cases, this condition declines as the rings wear in. When a synchronizer is damaged, the clutch gear teeth associated with the synchronizer are often damaged. If the clutch gear teeth are damaged, the whole gear must be replaced.

Pops Out of Gear

Worn shift mechanism components, worn synchronizer springs, detent balls and struts can cause the transaxle to pop out of gear. A low lubricant level can also increase the possibility of the transaxle popping out of gear. Worn engine mounts can allow the shift cables to pull the transaxle out of gear.

BEARINGS

A sound shaft support system minimizes bearing noise. Bearings and shaft support systems must be structurally strong and intact and have minimum response to the fluctuating gear tooth loads.

Assessing the condition of a bearing assembly is critical to proper diagnosis of noise complaints. More often than not, a bearing is replaced when it has failed, or is likely to fail in the near future. In most instances, this is a rather easy determination to make. Even if a bearing with high viscosity grease does not require replacement, its condition can help isolate other concerns that may exist.

It is not necessary to tear down a transaxle solely for the purpose of bearing inspection. More importantly, whenever a unit is disassembled, a thorough inspection of the bearings should be conducted.

To perform a quality inspection of a bearing, it must be thoroughly cleaned. Never use steam or hot water when cleaning the bearings because rust and corrosion form in a very short time after cleaning. Lint–free shop towels should be used to dry them.

Caution: Bearings should not be dried with compressed air. This can result in overheating and the bearing surfaces may brinell, resulting in noisy operation.

Inspecting for Bearing Failure

Bearings are manufactured to operate properly for a certain length of time under normal conditions. This quality varies depending on application and manufacturer tolerances. The failure of a bearing before reaching its fatigue life goal is referred to as "premature failure." Most problems related to premature bearing failure are caused by one of the following:

- Insufficient or incorrect lubrication
- Foreign matter or water contamination
- Improper handling and servicing
- Excessive impact loads

Bearings that are removed, cleaned, and dried for inspection are often susceptible to corrosion damage. It is important that bearings be cleaned and dried properly. If they are stored, they should immediately be coated with oil or a good rust preventative and wrapped in protective paper. Bearings, whether new or used, should be stored in a clean, dry area.

Note: Bearing failure analysis is also available in the Service Information.

Table 10 Bearing Failures

Name of Failure	Characterized By...	Probable Cause
Galling	Metal smears on roller ends	Overheating, lubricant failure or overload
Etching	Bearing surfaces appear gray or grayish black with related etching away of material at roller spacing	Fine abrasives, foreign material
Abrasive step wear	Fine pattern on roller ends	Fine abrasives, foreign material
Indentations	Surface impressions on race and rollers	Hard particles of foreign material
Fatigue spalling	Flaking of surface metal	Worn Rollers
Brinelling	Surface indentations in raceway	Rollers under impact loading or vibration while bearing is not rotating
Fretting	General corroded appearance	Caused by small relative movement of parts with no lubrication
Heat discoloration	Discoloration ranging from faint yellow to dark blue	Overload on bearing or incorrect lubricant

There are a series of tests which help to find which bearing is bad in a manual transaxle. Check the following bearings:

- Clutch release bearing
- Transaxle pilot bearing
- Transaxle bearings

The clutch release bearing can be tested with the vehicle stationary, engine running, clutch pedal down and transaxle in gear. This ensures the input gear is not turning, preventing the input gear bearings from making noise. If you hear a growling noise, it may be the release bearing and the noise should go away when the clutch is released. If it does not go away, it is the pilot bearing.

When evaluating bearing noise many components, such as speed gears, turn independently of the output shaft. Noisy bearings would make noise until that specific gear is selected.

The input shaft and output shaft support bearings can be tested with the engine running, clutch engaged and transaxle in neutral. If bearing noise is experienced in neutral, put the transaxle in gear and drive the vehicle. The bearing noise should get louder under load. The output shaft support bearings only makes noise when the vehicle is moving. The noise increases with speed and when upshifting.

CLUTCH DIAGNOSIS

Clutch Spin Time

Improper clutch release is a frequent cause of hard shifting. If the clutch problem is advanced, gear clash during shifts can result. A worn or damaged pressure plate and/or disc can cause incorrect clutch release and result in extended clutch spin time. A visual inspection of the release components usually identifies the failed or damaged part.

To check for clutch spin time, perform the following:

1. Set the parking brake and start the engine.
2. Depress the clutch.
3. Wait five seconds and shift into reverse. No grinding (gear clash) should occur. If grinding occurs, the clutch is not releasing fully.

Clutch Testing

Drive the vehicle at normal speeds. Shift the transaxle through all gear ranges and observe clutch action. If the clutch chatters, grabs, slips or does not release properly, remove and inspect the clutch components.

Clutch Contamination

Fluid contamination is a frequent cause of clutch malfunctions. Oil, water or clutch fluid on the clutch disc and pressure plate surfaces cause chatter, slip or grab. Inspect components for oil, hydraulic fluid or water/road splash contamination.

Improper Clutch Release or Engagement

Clutch release or engagement problems are caused by worn or damaged clutch components. A visual inspection of the release components usually reveals the problem part.

Release problems can result in hard shifting and noise. Look for leaks at the clutch hydraulic release cylinders and lines. Check for loose slave cylinder bolts, a loose or worn release fork, pivot stud, clutch disc, pressure plate or release bearing.

Engagement problems can result in slip, chatter, shudder and noisy operation. Causes may be contamination, wear distortion or flywheel damage.

Clutch Alignment

Clutch components must be in proper alignment with the crankshaft and transaxle input shaft. Misalignment caused by excessive runout or warpage of any clutch component causes grab, chatter and improper clutch release.

Clutch Pedal Adjustment

Some clutch pedals require adjustment following replacement of the master cylinder or clutch pedal assembly. Always refer to Service Information for appropriate adjustment procedures.

Table 11 Clutch Diagnosis

Condition	Possible Causes	Correction
Disc facing worn out.	1. Normal wear. 2. Driver frequently rides (slips) the clutch. Results in rapid overheating and wear. 3. Insufficient clutch cover diaphragm spring tension.	Replace cover and disc or modular clutch.
Clutch disc facing contaminated with oil, grease or clutch fluid.	1. Leak at the rear main engine seal or transaxle input shaft seal. 2. Excessive amount of grease applied to the input shaft splines. 3. Road splash, water entering housing. 4. Slave cylinder leaking.	1. Replace the appropriate seal. 2. Remove grease and apply the correct amount. 3. Replace clutch disc of modular clutch. Clean clutch cover and reuse if in good condition. 4. Replace the hydraulic clutch linkage.
Clutch is running partially disengaged.	Release bearing sticking or binding and does not return to the normal running position.	Verify failure. Replace the release bearing and transaxle front bearing retainer if necessary. Also check clutch for damage and replace if necessary.
Flywheel below minimum thickness specification.	Improper flywheel machining. Flywheel has excessive taper or excessive material removal.	Replace flywheel or modular clutch.
Clutch disc, cover and/or diaphragm spring warped or distorted.	1. Rough handling. Impact bent cover, spring or disc. 2. Improper bolt tightening procedure.	1. Replace disc or cover or modular clutch as necessary. 2. Tighten clutch cover using proper procedure.

Condition	Possible Causes	Correction
Facing on flywheel side of disc torn, gouged, or worn.	1. Flywheel surface scored or nicked. 2. Clutch disc sticking or binding on transaxle input shaft.	1. Correct surface condition if possible. Replace flywheel and disc or modular clutch as necessary. 2. Lubricate splines with high temperature grease.
Clutch disc facing burnt. Flywheel and cover pressure plate surfaces heavily glazed.	1. Frequent operation under high loads or hard acceleration conditions. 2. Driver frequently rides (slips) the clutch. Results in rapid wear and overheating of disc and cover.	Correct condition of flywheel and pressure plate surface. Replace clutch cover and disc or modular clutch. Alert driver to problem cause.
Clutch disc binds on the input shaft splines.	1. Clutch disc hub splines damaged during installation. 2. Input shaft splines rough, damaged, or corroded.	1. Clean, smooth, and lubricate hub splines if possible. Replace disc or modular clutch if necessary. 2. Clean, smooth, and lubricate shaft splines if possible. Replace input shaft if necessary.
Clutch disc rusted to flywheel and/or pressure plate.	Clutch not used for an extended period of time (e.g. long term vehicle storage).	Sand rusted surfaces with 180 grit sanding paper. Replace clutch cover and flywheel or modular clutch if necessary.
Pilot bearing seized, loose, or rollers are worn.	1. Bearing cocked during installation. 2. Bearing defective. 3. Bearing not lubricated. 4. Clutch misalignment.	1. Install and lubricate a new bearing. 2. Install and lubricate a new bearing. 3. Install and lubricate a new bearing. 4. Inspect clutch and correct as necessary. Install and lubricate a new bearing.

Condition	Possible Causes	Correction
Clutch does not disengage properly.	1. Low clutch fluid level. 2. Clutch cover loose. 3. Clutch disc bent or distorted. 4. Clutch cover diaphragm spring bent or warped. 5. Clutch installed backwards. 6. Release fork bent or pivot loose or damaged. 7. Clutch master or slave cylinder failure.	1. Replace hydraulic linkage assembly. 2. Follow proper bolt tightening procedure. 3. Replace clutch disc or modular clutch. 4. Replace clutch cover or modular clutch. 5. Remove and install clutch disc properly. 6. Replace fork or pivot as necessary. 7. Replace hydraulic linkage assembly.
Clutch pedal squeak.	1. Pivot pin loose. 2. Master cylinder bushing not lubricated. 3. Pedal bushing worn out or cracked. 4. Internal problems in clutch master/slave cylinder.	1. Tighten pivot pin if possible. Replace clutch pedal if necessary. 2. Lubricate master cylinder bushing. 3. Replace and lubricate bushings. 4. Replace as necessary.
Clutch master or slave cylinder plunger dragging and/or binding.	Master or slave cylinder components worn or corroded.	Replace clutch hydraulic linkage assembly.
Release bearing noisy.	Release bearing defective or damaged.	Replace release bearing.

Condition	Possible Causes	Correction
Contact surface of release bearing damaged.	1. Clutch cover incorrect or release fingers bent or distorted. 2. Release bearing defective or damaged. 3. Release bearing misaligned.	1. Replace clutch cover or modular clutch and release bearing. 2. Replace release bearing. 3. Check and correct runout of clutch components. Check front bearing sleeve for damage/ alignment. Repair as necessary.
Partial engagement of clutch disc. One side of disc is worn and the other side is glazed and lightly worn.	1. Clutch pressure plate position incorrect. 2. Clutch cover, spring, or release fingers bent or distorted. 3. Clutch disc damaged or distorted. 4. Clutch misalignment.	1. Replace clutch disc and cover or modular clutch. 2. Replace clutch disc and cover or modular clutch. 3. Replace clutch disc or modular clutch. 4. Check alignment and runout of the flywheel, disc, pressure plate, and/ or clutch housing. Correct as necessary.

Notes:

Notes:

MODULE 4 T350/T355 MANUAL TRANSAXLE COMPONENTS

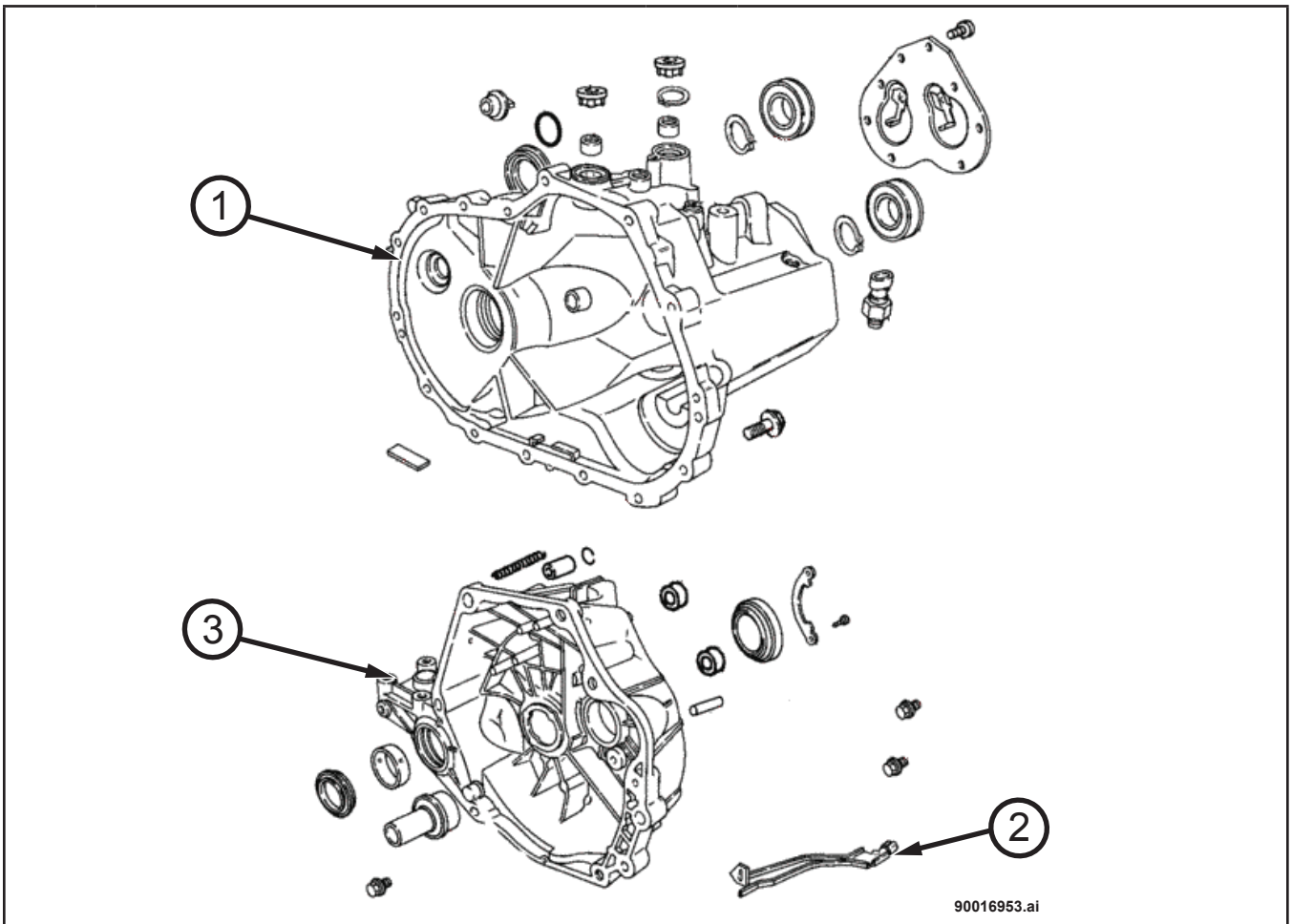
The T350 is a five speed constant-mesh manual transaxle. All gear ranges, except reverse, are synchronized. The reverse gear utilizes a brake and blocking ring for shifting ease. The reverse idler gear is supported on a sliding spindle idler shaft. The transaxle case is a two-piece, middle split design cast aluminum with a steel end plate. The output shaft on the T350 is not serviceable and must be replaced as an assembly. The differential is supported by tapered roller bearings and preload is adjusted with select thickness shims.

Figure 22 T350 Manual Transaxle

TRANSAXLE CASE

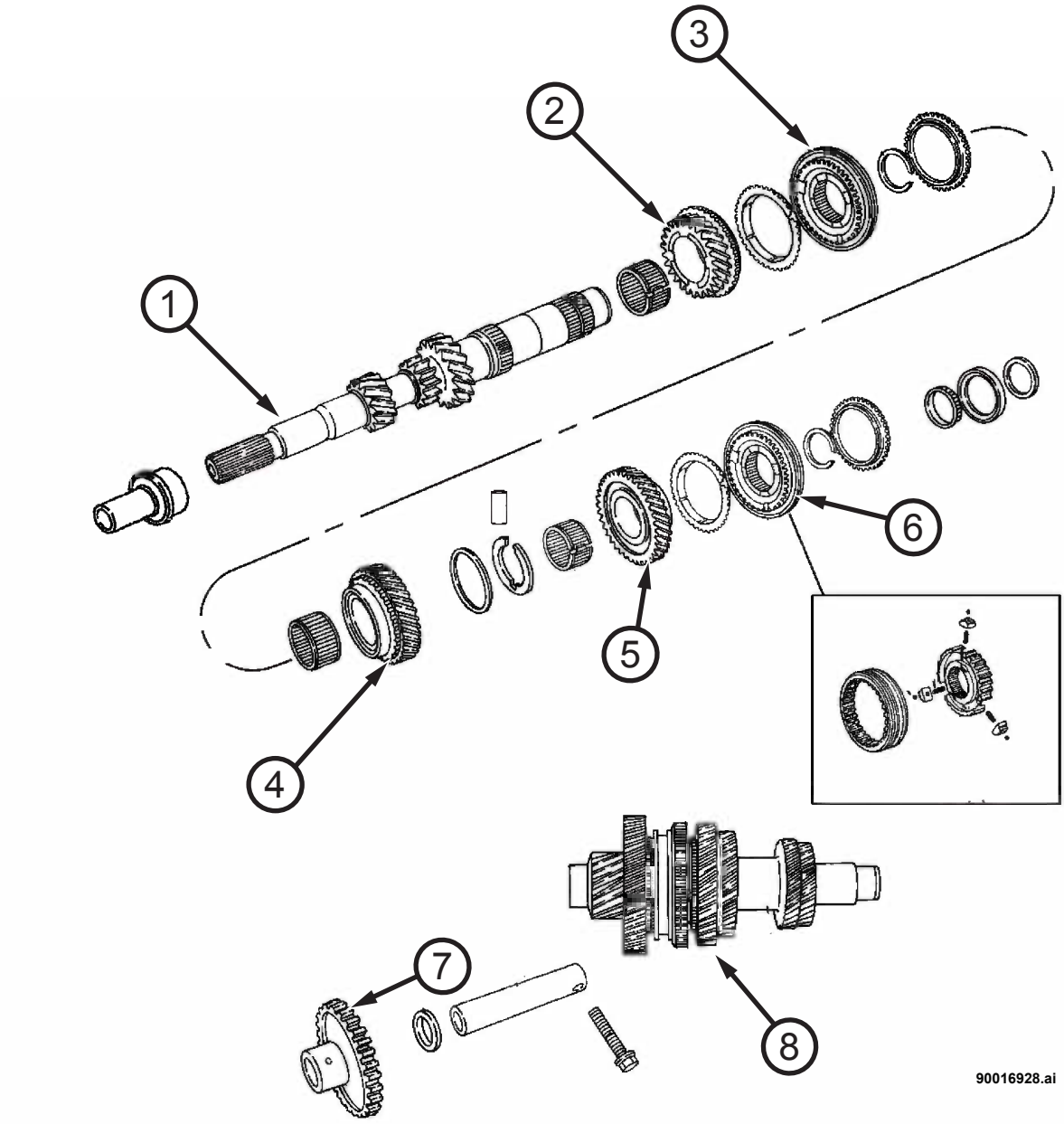
T350 Case

On the T350 transaxle the internal components can be serviced only by separating the bellhousing case from the gear case. The bellhousing case encloses the clutch assembly. To reduce weight, the bellhousing case is a one-piece aluminum casting.



1	Gear Housing	3	Clutch Bellhousing
2	Oil Trough		

Figure 23 T350 Exploded Case View

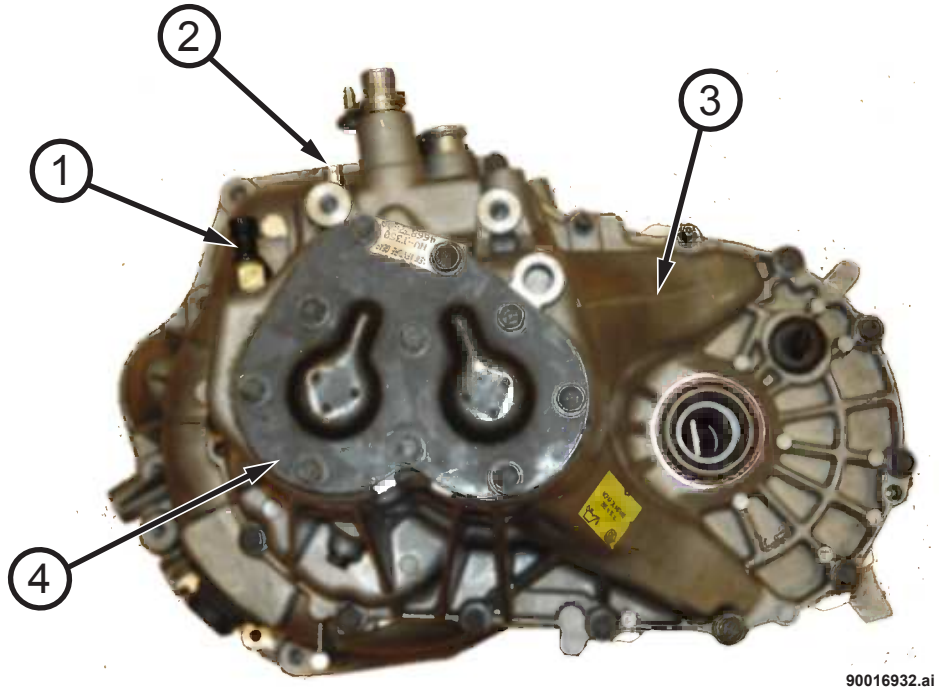


1	Input Shaft	5	Fifth Drive Gear
2	Third Drive Gear	6	5-R Synchronizer
3	3-4 Synchronizer	7	Reverse Idler Gear
4	Fourth Drive Gear	8	Output Shaft

Figure 24 T350/T355 Input Shaft Exploded View

On the T350 transaxle, the gear case housing encloses the rear of the transaxle, and is made of cast aluminum. The back-up lamp switch and the vent are located near the top of the case housing.

Note: Make sure the vent is free from debris and rust.



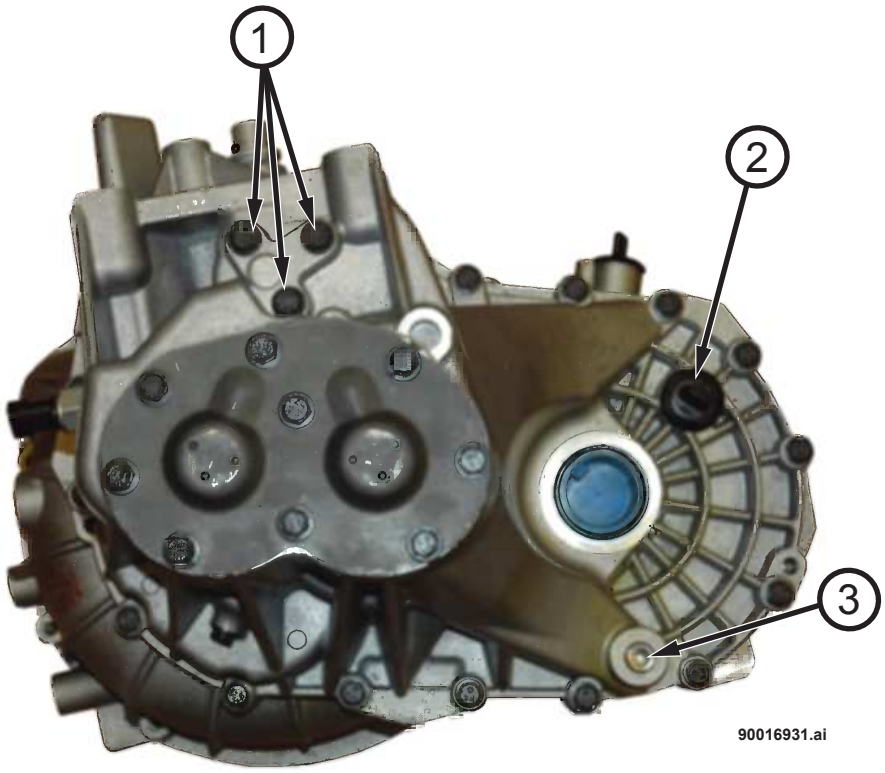
1	Back-up Lamp Switch	3	Rear Case Housing
2	Vent	4	Rear Cover

Figure 25 T350 Gear Case Housing

T355 Case

The T355 case is of similar construction to that of the T350. Major external differences from the T350 include:

- T355 drain and fill plugs are both on the gear case
- T355 shift select detent assembly is secured with three external bolts not present on the T350



1	Detent Assembly Bolts	3	Drain Plug
2	Fill Plug		

Figure 26 T355 Case

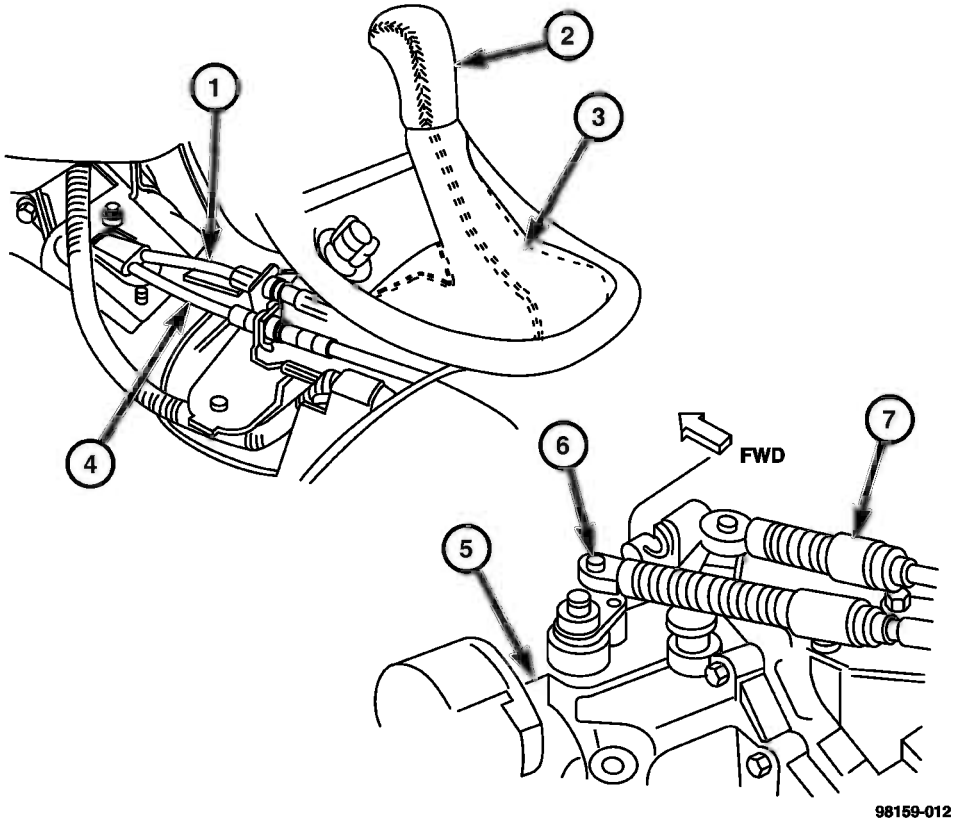
SHIFT MECHANISMS AND PATTERN

T350/T355 Shift System

There is no difference between the shift systems of the T350 and the T355. The shift system is the link between the driver and the transaxle. The shifter assembly selects different gears by moving the shift forks. The shift system consists of the shift knob, lever, selector cable, crossover cable, and transaxle shift mechanism.

The selector cable is non-adjustable. The crossover cable is adjustable for alignment purposes following installation. If either cable is worn or damaged, both cables must be replaced.

Counterweights are present on the transaxle shift mechanism to facilitate smoother shifting.



1	Selector Cable	5	Transaxle
2	Shift Knob	6	Crossover Cable
3	Shift Lever and Boot	7	Selector Cable
4	Crossover Cable		

Figure 27 T350/T355 Shift Linkage System

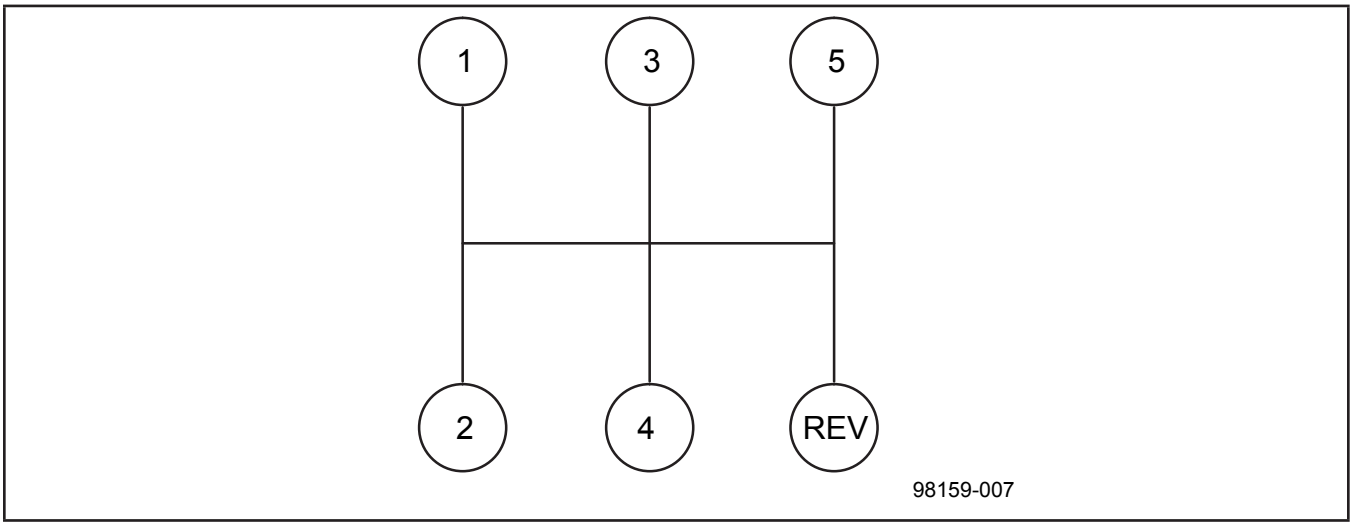


Figure 28 T350/T355 Shift Pattern

T350/T355 Shift Shafts

Operation of the transaxle shift shafts is the same on both the T350 and T355. Two shift shafts, the selector and crossover, operate the shift selector assembly inside the transaxle. The crossover shaft moves the shift assembly from side to side, the selector shaft moves the shift assembly fore and aft.

A bias spring, located in the shift mechanism around the crossover shaft, returns the assembly to the 3–4 neutral position when the transaxle is in neutral and the shift lever is released.

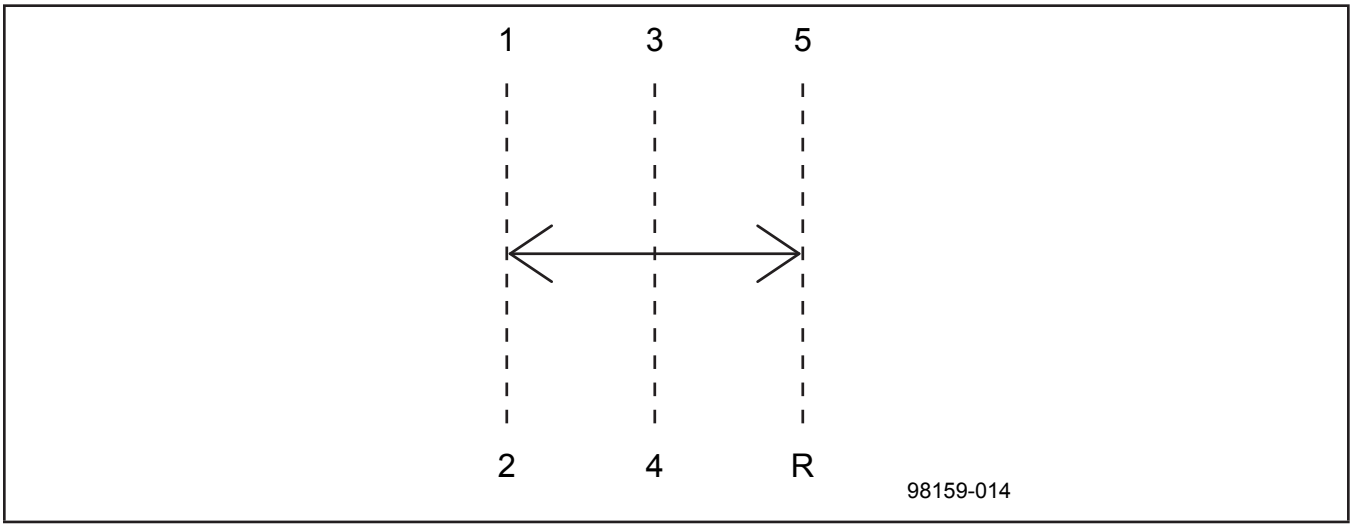


Figure 29 T350/T355 Crossover Shaft Operation

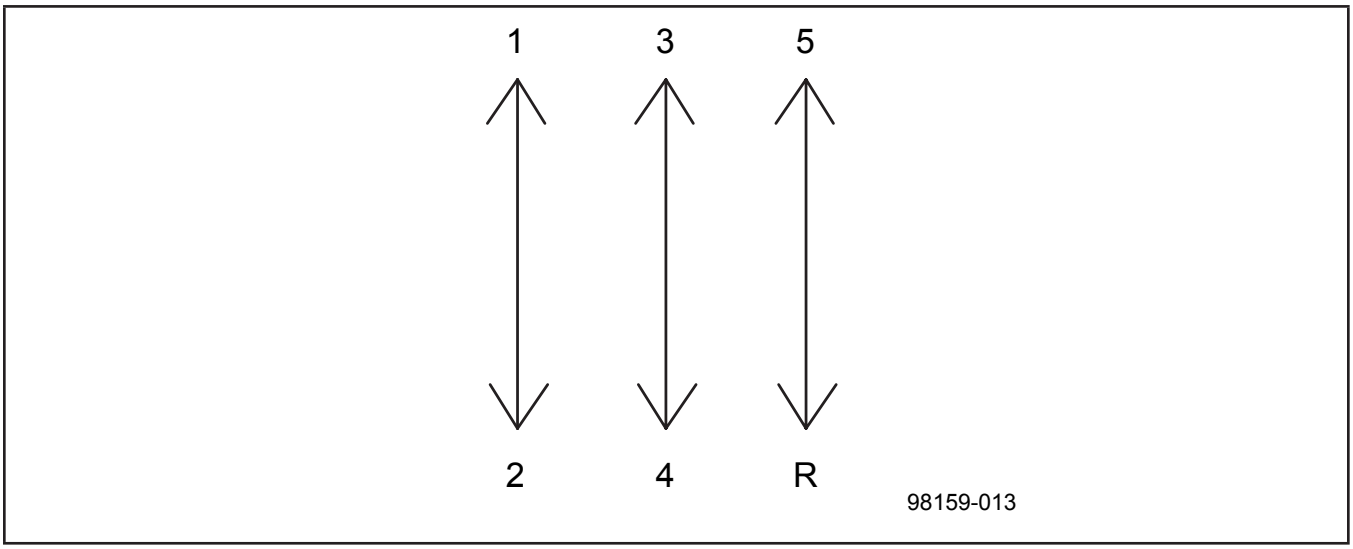
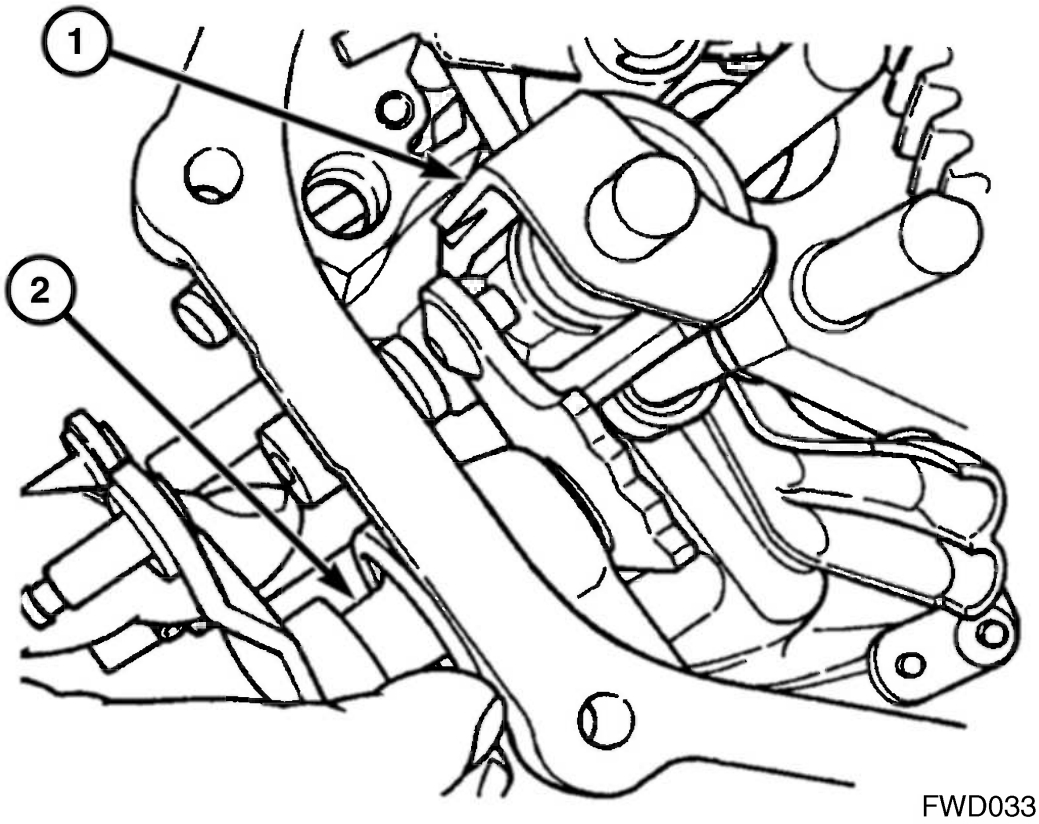


Figure 30 T350/T355 Selector Shaft Operation

T350/T355 Shift Selector Assembly

On the T350 and T355 transaxles, the shift selector assembly is located within the gear case housing.

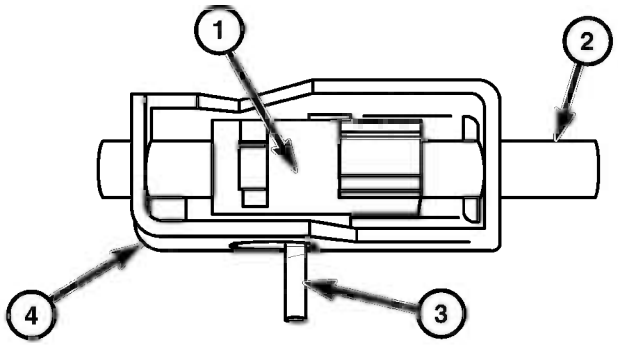


1	Shift Assembly	2	Selector Shaft

Figure 31 T350/T355 Shift Selector Assembly

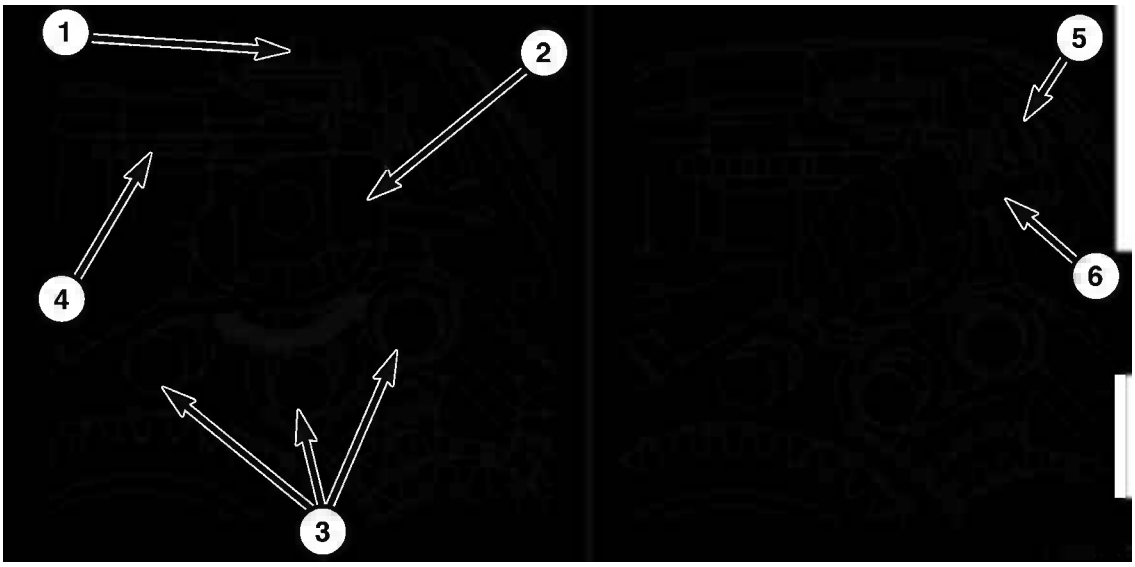
Note: The orientation of the shift selector assembly is critical for proper transaxle assembly.

The shift selector assembly moves the appropriate shift fork, based on the driver's selection. The assembly consists of the selector, shaft, housing, and pin. The selector housing blocks the other shift forks to prevent a shift into two gears at the same time (shift interlock). The selector pivots in an arc to select the different shift forks. A shift from fifth to reverse is blocked by a reverse blockout cam (guides from fifth to fourth). The shift assembly has a pin that engages the cam as it comes out of fifth gear. The cam pushes the pin and shift assembly away from reverse gear.



1	Selector	3	Pin
2	Selector Shaft	4	Selector Housing

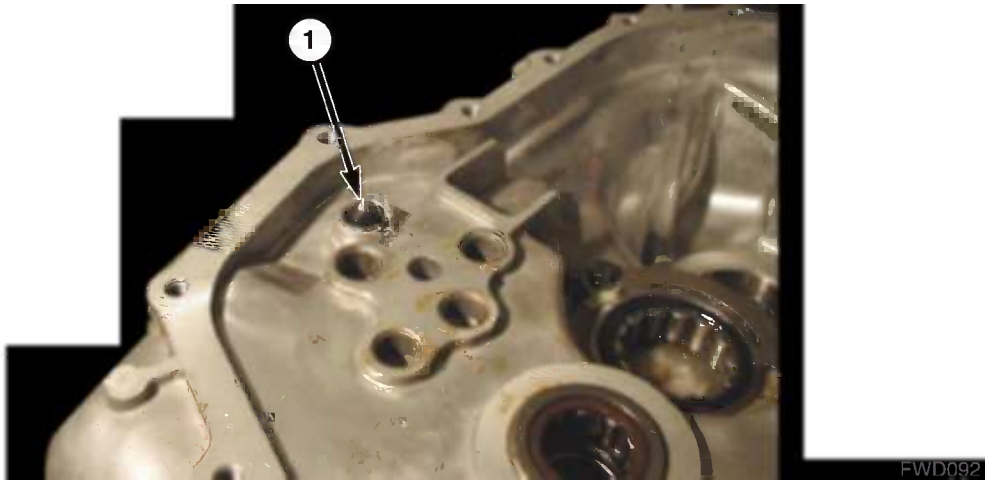
Figure 32 T350/T355 Shift Selector Assembly



1	Crossover Shaft	4	Selector Shaft
2	Shift Selector Assembly	5	Reverse Blockout Cam
3	Shift Rails	6	Pin

Figure 33 T350/T355 Selector Movement and 5-R Guide Movement

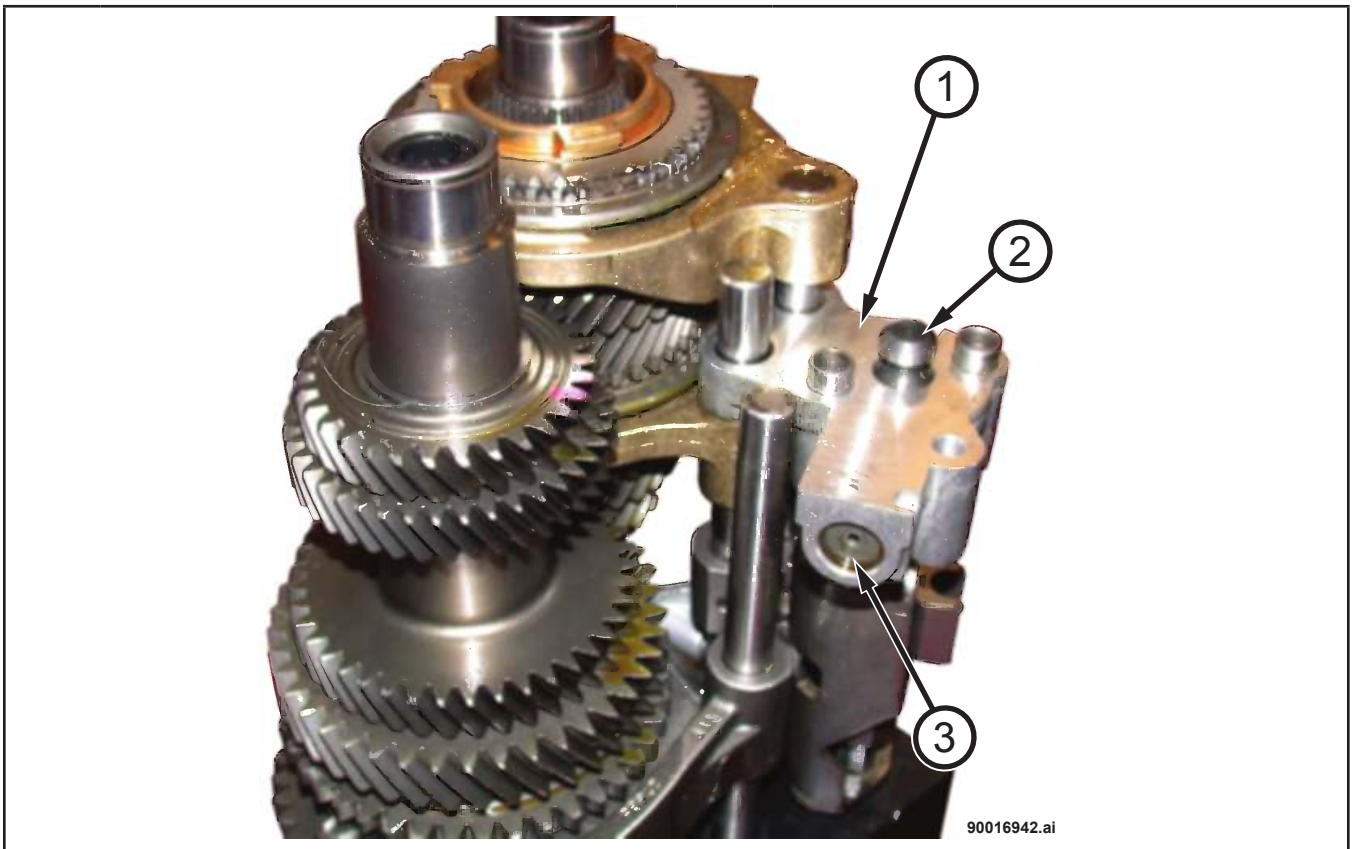
A spring-loaded detent ball is used to lock the shift rails into position and prevent the transaxle from coming out of the selected gear. A detent is located on the backside of the T350 bellhousing which makes contact with the indentations in the selector shaft.



1	Detent	

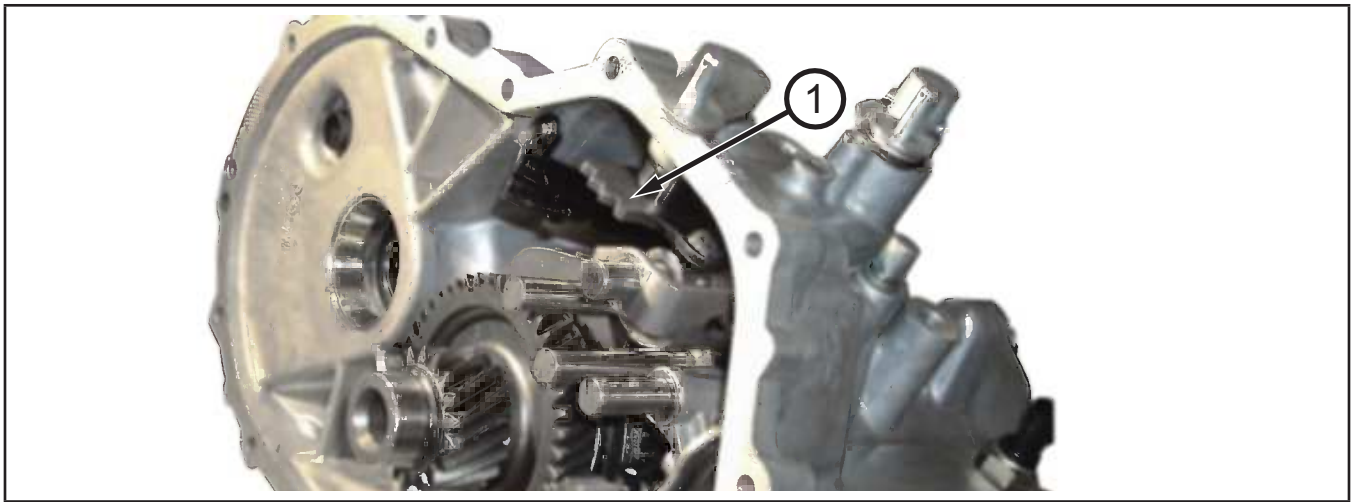
Figure 34 T350 Shift Detent

The T355 shift detent assembly houses the detent spring and ball, two of the shift shafts, and the shift selector shaft, aiding in reassembly.



1	Shift Detent Assembly	3	Shift Detent Spring
2	Shift Selector Shaft		

Figure 35 T355 Detent Assembly

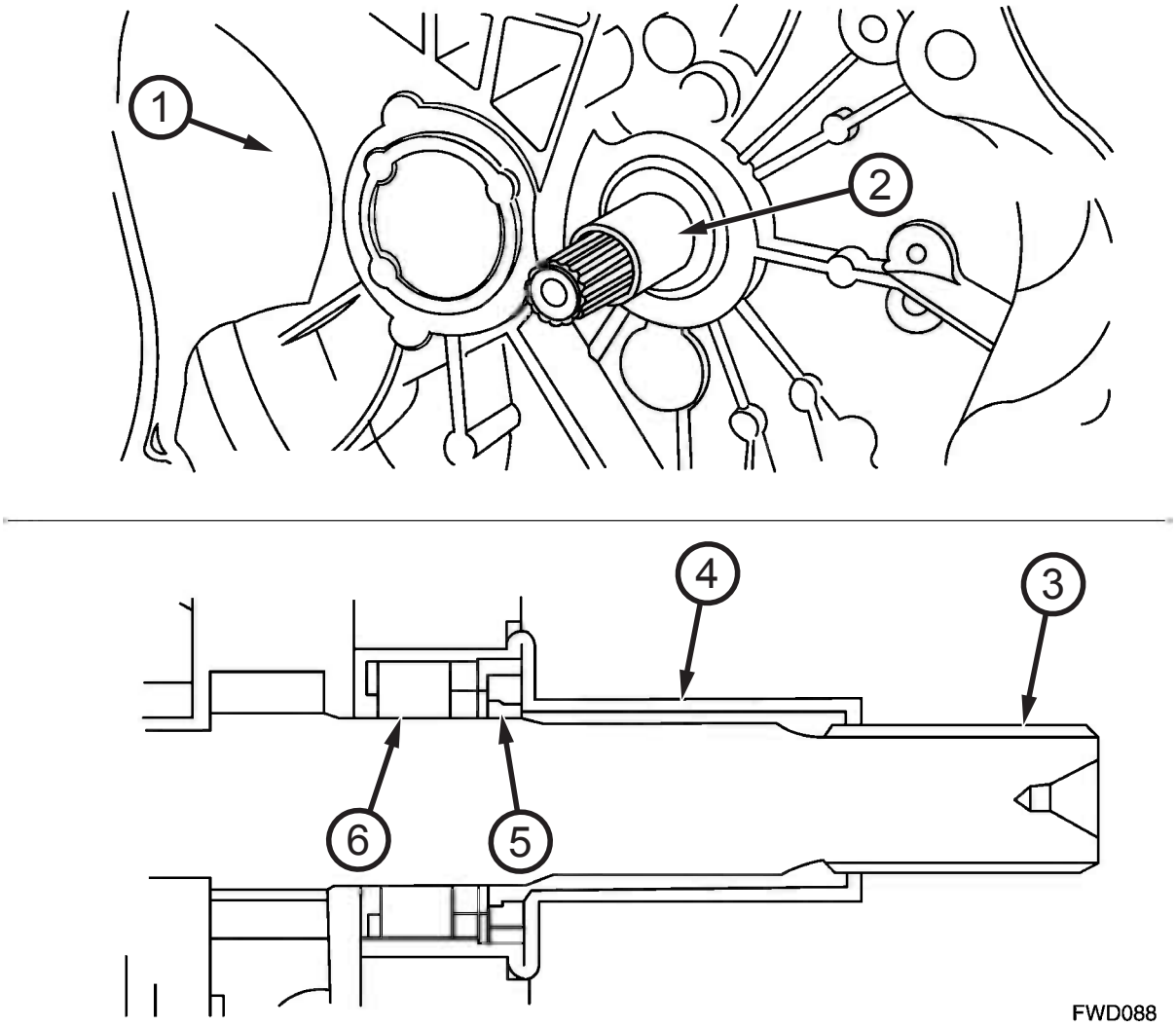


1	Indentations on Selector Shaft	

Figure 36 Indentations on the T350/T355 Selector Shaft

T350/T355 INPUT SHAFT BEARING ASSEMBLY

On the T350 and T355 transaxles, the input shaft bearing assembly consists of the clutch release bearing sleeve, input shaft bearing, bearing housing, and seal. Individual components are not serviceable. The input bearing is a one-piece bearing and sleeve unit. If any of the components fail, the entire assembly must be replaced. Grease is not required on the retainer where the release bearing rides.



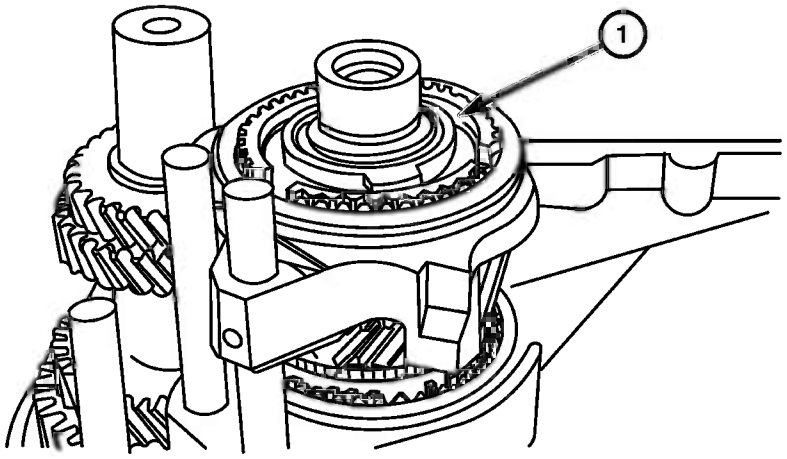
1	Front Case	4	Bearing Housing
2	Input Shaft Bearing Assembly	5	Seal
3	Input Shaft	6	Bearing

Figure 37 T350/T355 Input Shaft Bearing Assembly

T350/T355 REVERSE BRAKE

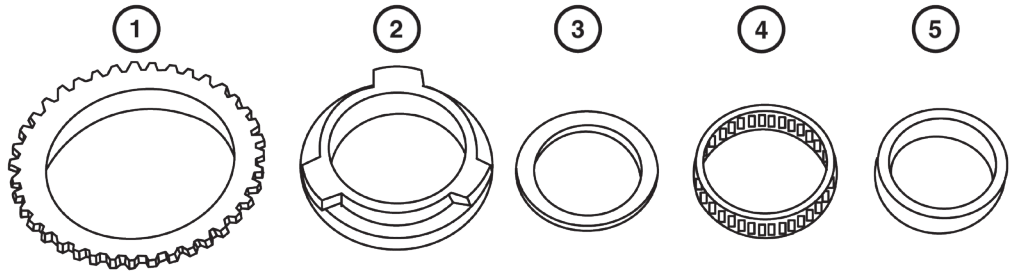
The T350 and T355 transaxles are equipped with a reverse brake. The reverse brake assembly on the T350/T355 is used to stop input shaft rotation through a friction cone that is locked to the transaxle case. The brake is located on the end of the input shaft assembly, behind the input shaft 5–R synchronizer. The brake prevents the reverse idler gear from clashing with the input and output shaft gears. The assembly looks and functions much like a synchronizer. It consists of a stop ring, friction cone, shim, needle bearing, and bearing race. The needle bearing and bearing race are omitted on some transaxles.

If a shift to reverse is attempted before the clutch spins down completely (stops turning), the brake stops the input shaft before the idler gear engages any other gear. The friction cone has lugs that fit into the case and hold the cone stationary. The 5-R synchronizer sleeve engages with the stop ring and the friction cone. Once Reverse is engaged, the friction breaks down, allowing the input shaft to spin freely.



1	Reverse Brake Assembly	

Figure 38 T350/T355 Reverse Brake Location



1	Synchronizer Ring	4	Needle Bearing
2	Friction Cone	5	Bearing Race
3	Shim		

Figure 39 T350/T355 Reverse Brake Components

INPUT SHAFT AND OUTPUT SHAFT

Transaxles consist of drive and driven gears. Drive gears are in mesh with driven gears. Power flows through the drive gear to the driven gear and then to the differential assembly. All of the drive gears are located on the input shaft and all of the driven gears are located on the output shaft.

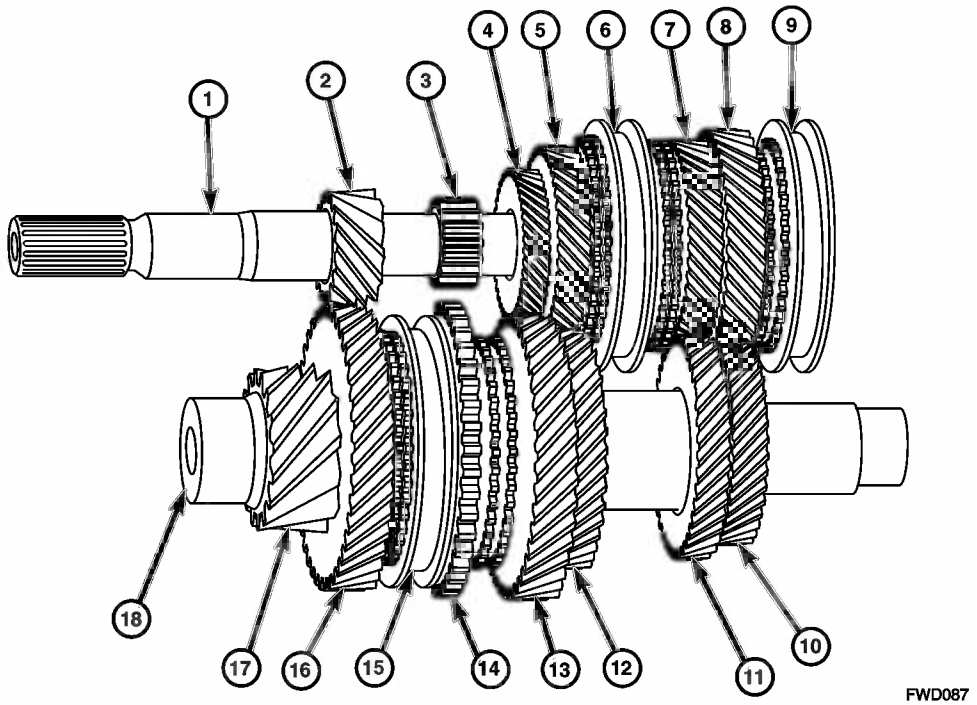
Gears on a transaxle are either fixed or freewheeling. Fixed gears are integral, pressed, or splined to the shaft. As a result, when the shaft rotates so does the fixed gear. Freewheeling gears, on the other hand, rotate around the shaft on bearings or a thin film of lubricant. Freewheeling gears are located next to synchronizer assemblies. When the synchronizer sleeve slides over the freewheeling gear, the freewheeling gear becomes locked to the shaft, causing the shaft to rotate at the same speed as the gear.

T350/T355 Input Shaft, Output Shaft, and Synchronizer Assemblies

On the input shaft of the T350/T355, the first, second, and reverse gears are fixed and the third, fourth and fifth gears are freewheeling. On the output shaft, the third, fourth, and fifth gears are fixed and the first, second, and reverse gears are freewheeling.

Three synchronizer assemblies are used in the T350/T355 transaxles. The 3–4 and 5–R synchronizers are mounted on the input shaft assembly, and the 1–2 synchronizer is mounted on the output shaft assembly.

Note: On the T350/T355, the 1-2 synchronizer is mounted on the non-serviceable output shaft. If the 1-2 synchronizer fails the entire output shaft must be replaced.



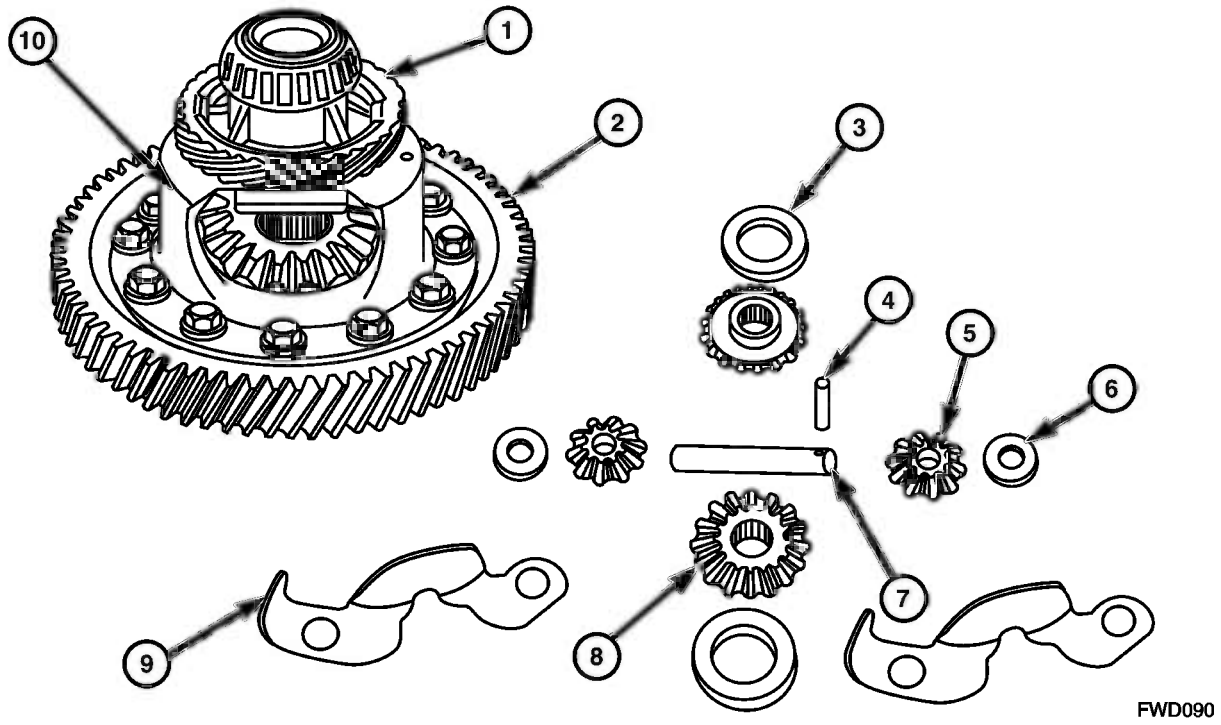
1	Input Shaft	10	Fifth Gear (fixed)
2	First Gear (fixed)	11	Fourth Gear (fixed)
3	Reverse Gear (fixed)	12	Third Gear (fixed)
4	Second Gear (fixed)	13	Second Gear (freewheeling)
5	Third Gear (freewheeling)	14	Reverse Gear (freewheeling)
6	3-4 Synchronizer	15	1-2 Synchronizer
7	Fourth Gear (freewheeling)	16	First Gear (freewheeling)
8	Fifth Gear (freewheeling)	17	Pinion Gear
9	5-R Synchronizer	18	Output Shaft

Figure 40 T350/T355 Input Shaft, Output Shaft, and Synchronizer Assemblies

T350/T355 DIFFERENTIAL ASSEMBLY

On the T350/T355, the speedometer drive gear is mounted on the differential assembly. The ring gear is an open–center design, and is bolted to the differential assembly. The outer bearing races are pressed into the bellhousing case half and gear case half. The outer race mounted in the bellhousing case half uses a selectable shim behind the race for differential bearing preload adjustment. The side gear adjustments are made by replacing the side gear thrust washers. The thrust washers are a select thickness and come in multiple sizes to allow adjustment to correct specifications.

Note: Later versions of the T350 differential assembly omit the roll pin in the pinion shaft but include two metal retaining clips to prevent the floating pinion shaft from moving out of place.

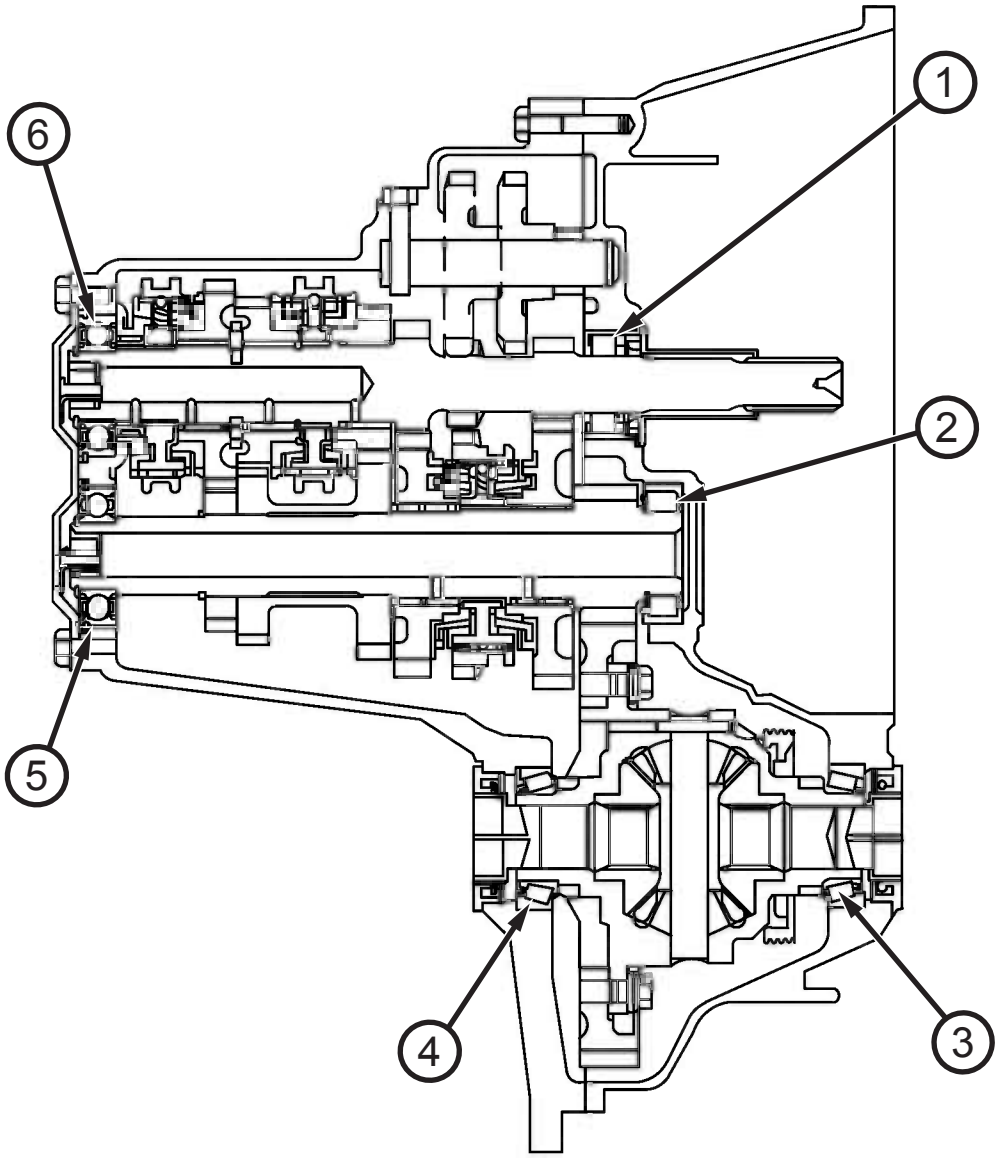


1	Vehicle Speed Sensor Drive Gear	6	Pinion Gear Thrust Washer (2)
2	Ring Gear	7	Pinion Shaft
3	Side Gear Thrust Washer (2) Select Thickness	8	Side Gear (2)
4	Roll Pin (early models)	9	Retainer Clip (2) (later models)
5	Pinion Gear (2)	10	Differential Assembly

Figure 41 T350/T355 Differential Assembly

T350/T355 BEARINGS

Bearing preload and drag torque specifications must be maintained to avoid premature bearing failures. All bearing adjustments must be made with no other component interference or gear mesh. The T350 and T355 use selectable shims to adjust differential bearing preload. The input and output (intermediate) shaft bearings do not require preload adjustment.

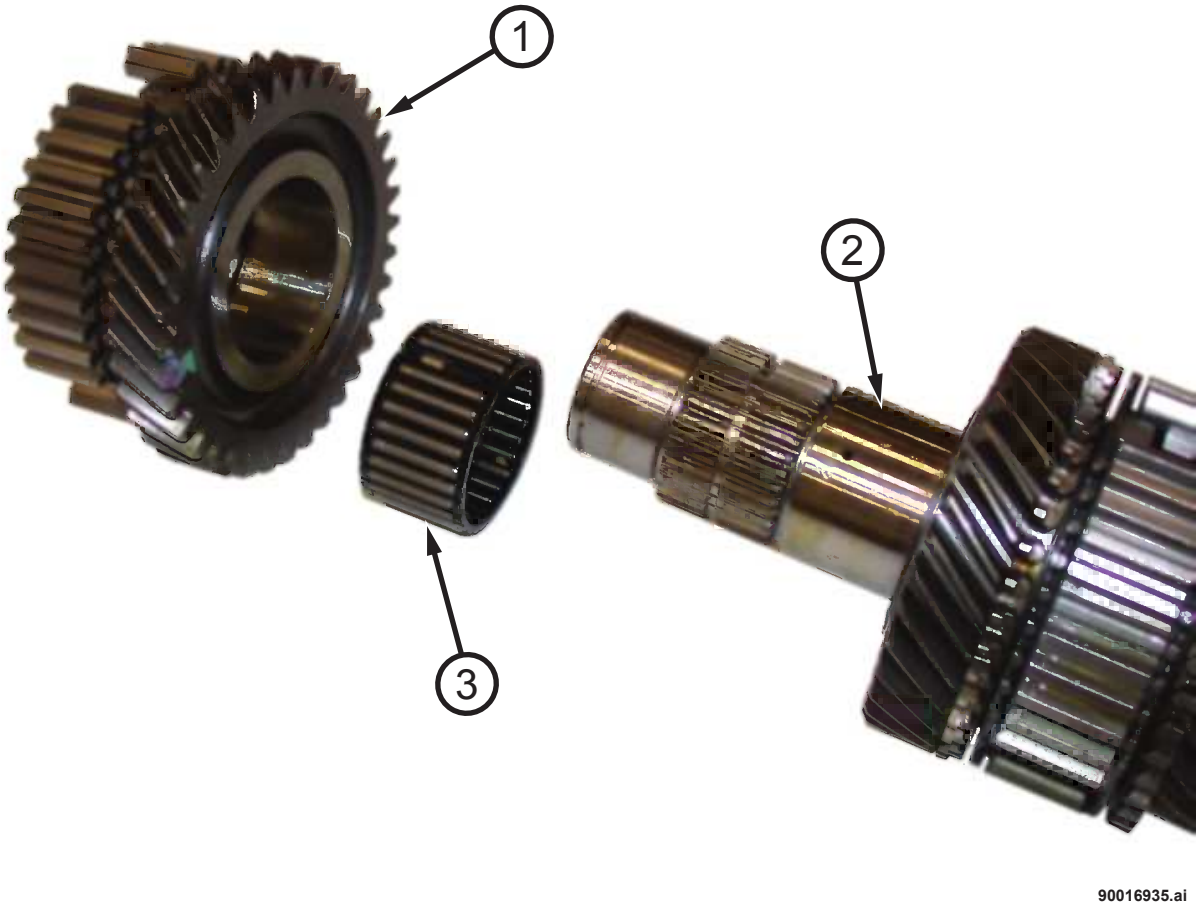


1	Input Shaft Sealed Roller Bearing	4	Differential Tapered Roller Bearing
2	Output Shaft Caged Roller Bearing	5	Output Shaft Sealed Ball Bearing
3	Differential Tapered Roller Bearing	6	Input Shaft Sealed Ball Bearing

Figure 42 T350/T355 Bearing Locations

T350/T355 Freewheeling Gear Bearings

Needle bearings are present under each of the freewheeling gears. The needle bearings under the third, fourth, and fifth freewheeling gears can be replaced individually. The first and second freewheeling gears are located on the non-serviceable output shaft. A failure of the first or second freewheeling gear needle bearings requires the replacement of the output shaft assembly.



1	Fifth Drive Gear	3	Needle Bearing Assembly
2	Input Shaft Fifth Gear Bearing Race		

Figure 43 T350/T355 Needle Bearings

T350/T355 CLUTCH

The clutch assembly is designed to transmit power from the engine to the manual transaxle. This is accomplished by the friction and clamping force generated when the spring loaded pressure plate locks the clutch disc to the flywheel. The clutch disc, which is splined to the transaxle input shaft, transmits power until the center of the diaphragm spring is depressed, and the clamp force is removed from the disc.

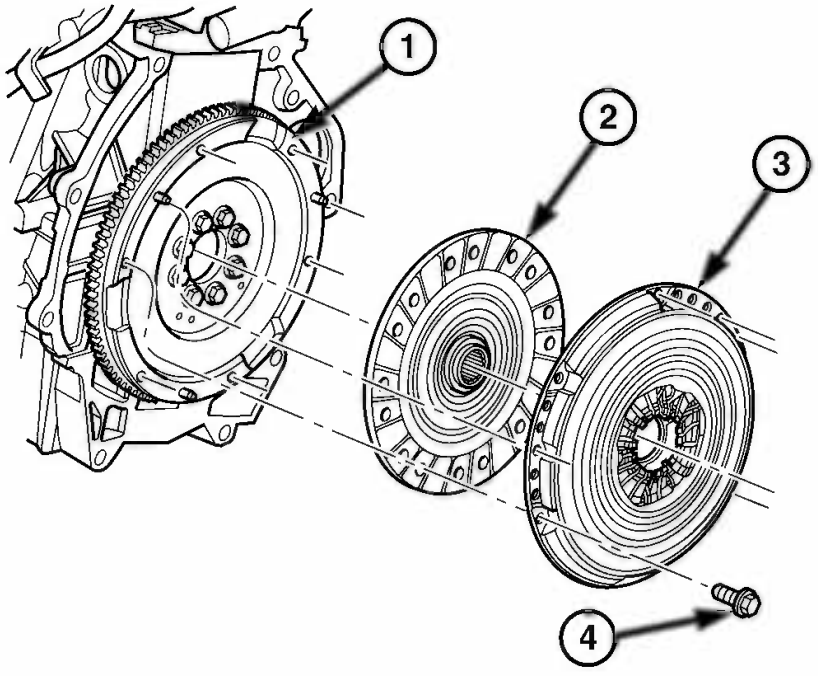
The T350 utilizes either a conventional clutch or a modular clutch design. The conventional clutch is used on the T350 with the 1.6L (BUX) engine and the modular clutch is used on the T350 with the 2.0L and 2.4L Naturally Aspirated (NA) engines.

The T355 uses only a modular clutch with 2.4L Turbo.

Conventional Clutch

The clutch is located between the engine and the manual transaxle. The components of a conventional clutch are all individually replaceable. The clutch system consists of the following components:

- Flywheel
- Clutch Disc
- Pressure Plate Assembly



1	Flywheel	3	Pressure Plate Assembly
2	Clutch Disc	4	Bolt

Figure 44 Conventional Clutch

Modular Clutch

The modular clutch assembly consists of a single dry-type clutch disc, a diaphragm style clutch cover, and an integrated flywheel. The clutch cover is riveted to the flywheel, containing the clutch disc within. The modular clutch can only be serviced as an assembly.

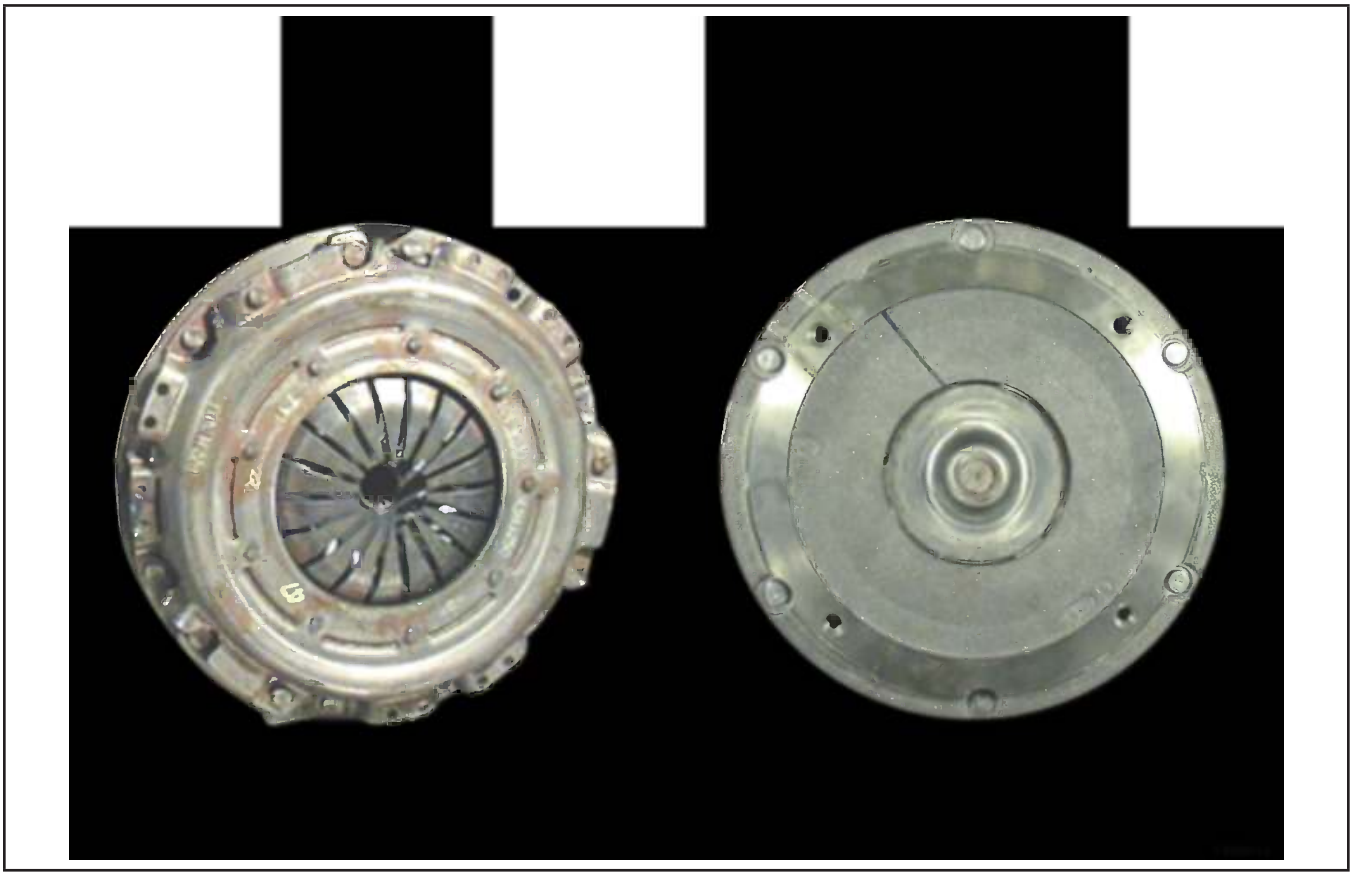
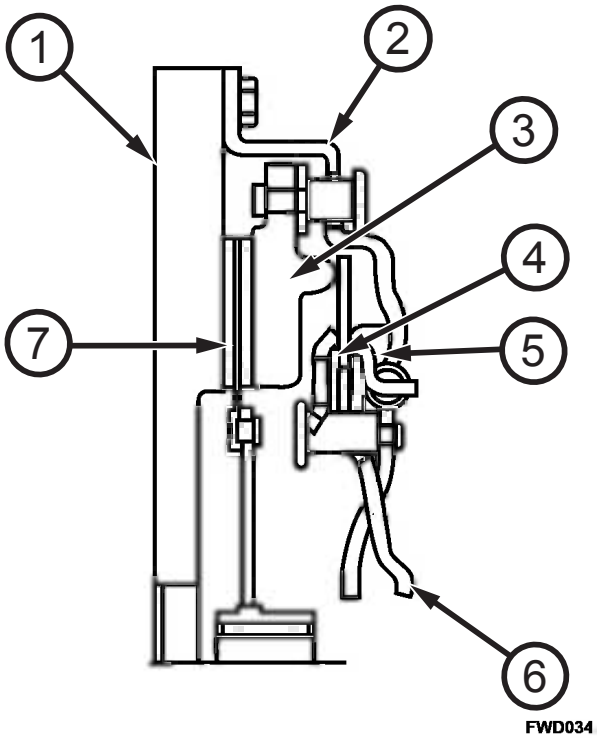


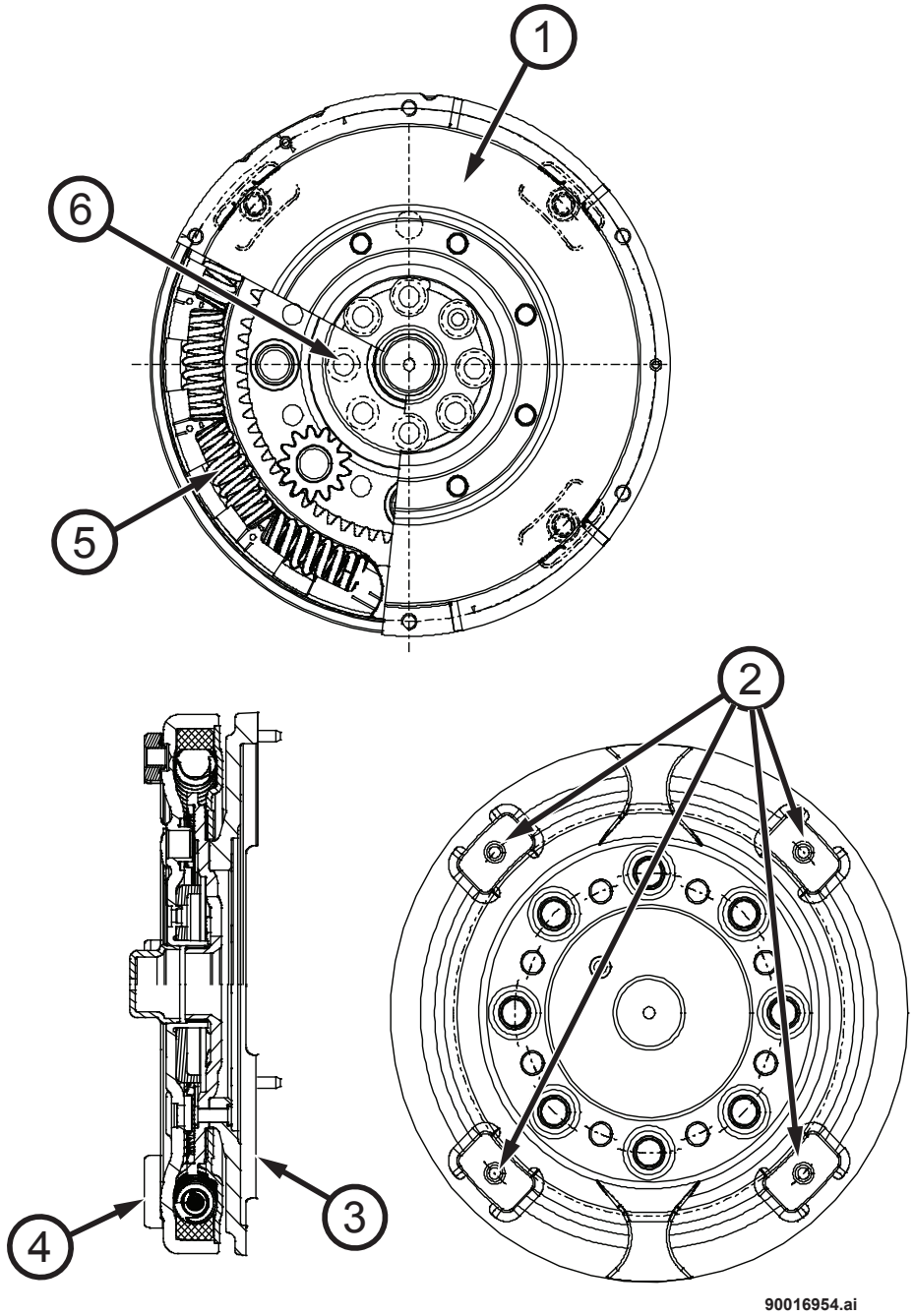
Figure 45 Front and Back Side of the Modular Clutch Assembly

The modular clutch on the 2.0L and 2.4L PT Cruiser incorporates a self-adjusting design. The self-adjusting feature of the clutch assembly relies on the sensor ring and adjuster ring. The adjuster ring works its way around a ramped clutch cover, taking up clearance as the clutch disc wears and maintaining diaphragm spring force throughout the life of the clutch. The primary benefits of this design are reduced pedal effort, constant release load over clutch life, and extended clutch life.



1	Flywheel	5	Adjusting Ring
2	Cover	6	Diaphragm Spring
3	Pressure Plate	7	Clutch
4	Sensor Ring		

Figure 46 Self Adjusting Modular Clutch Assembly



1	Clutch Disc Driving Surface (Secondary Mass)	4	Primary Mass
2	Flexplate Mounting Points	5	Damping Springs
3	Secondary Mass	6	Primary Mass (Crankshaft Driven)

Figure 47 Dual Mass Flywheel Cutaway

The main purpose of the dual mass flywheel is to reduce drivetrain vibration and pulsing. The dual mass flywheel consists of two separate masses: primary and secondary.

The primary mass (4) is mounted to the crankshaft flexplate just as a torque converter would be in an automatic transaxle. The secondary mass (3) is driven by the primary mass through sets of springs (5). The primary mass presses against the damping springs, which cushion any pulsing from the engine and press against the secondary mass, which drives the clutch disc. All of the power is forced through the damping springs; they are the only rotational connection between the two masses.

Since the dual mass flywheel rotates at crankshaft speed, a defective flywheel can cause a first-order vibration.

RPM / 60 = Frequency (Hz)

Figure 48 Dual Mass Flywheel Side View (PT)

Figure 49 Dual Mass Flywheel Rear View (Clutch Disc Side, PT)

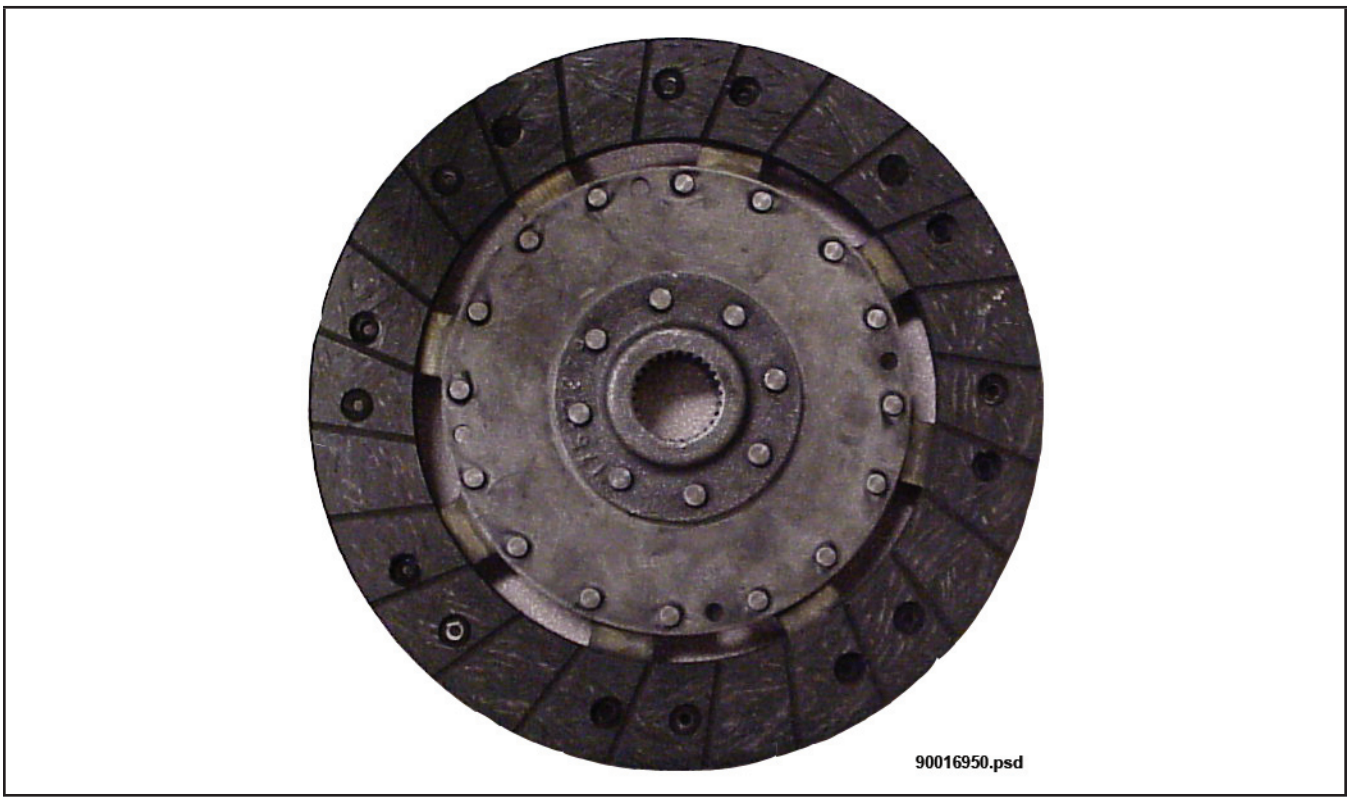


Figure 50 Dual Mass Flywheel Clutch Disc (PT)

The dual mass flywheel typically uses a solid clutch disc. The clutch disc is splined to the input shaft of the transaxle. Normally, there are no springs within the clutch disc that is paired with a dual mass flywheel.

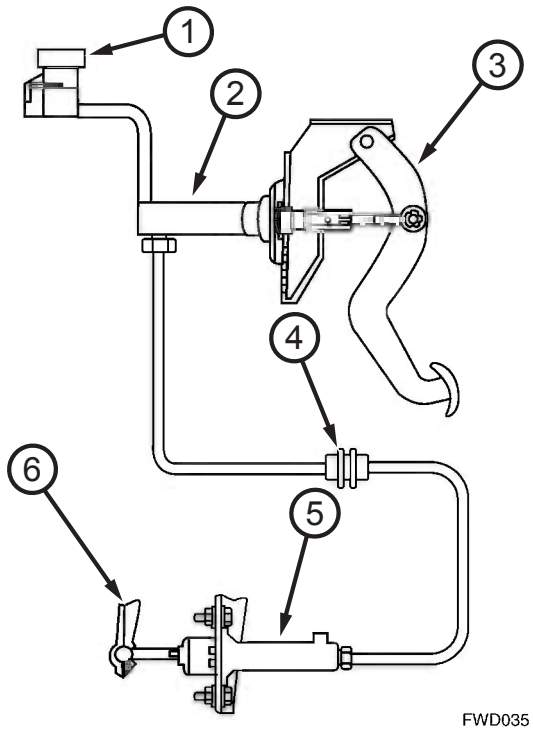
CLUTCH APPLY AND RELEASE SYSTEM

Clutch Master Cylinder

The clutch master cylinder is bolted to the bulkhead and the master cylinder push rod is connected to the clutch pedal. When the clutch pedal is depressed, the push rod forces fluid from the master cylinder through a fluid line to the slave cylinder.

Slave Cylinder

The slave cylinder is mounted to the transaxle clutch housing. When the clutch pedal is depressed fluid pressure from the master cylinder actuates the slave cylinder. The slave cylinder actuates the release bearing and lever.



1	Reservoir	4	Quick Connect
2	Master Cylinder	5	Slave Cylinder
3	Clutch Pedal	6	Release Lever

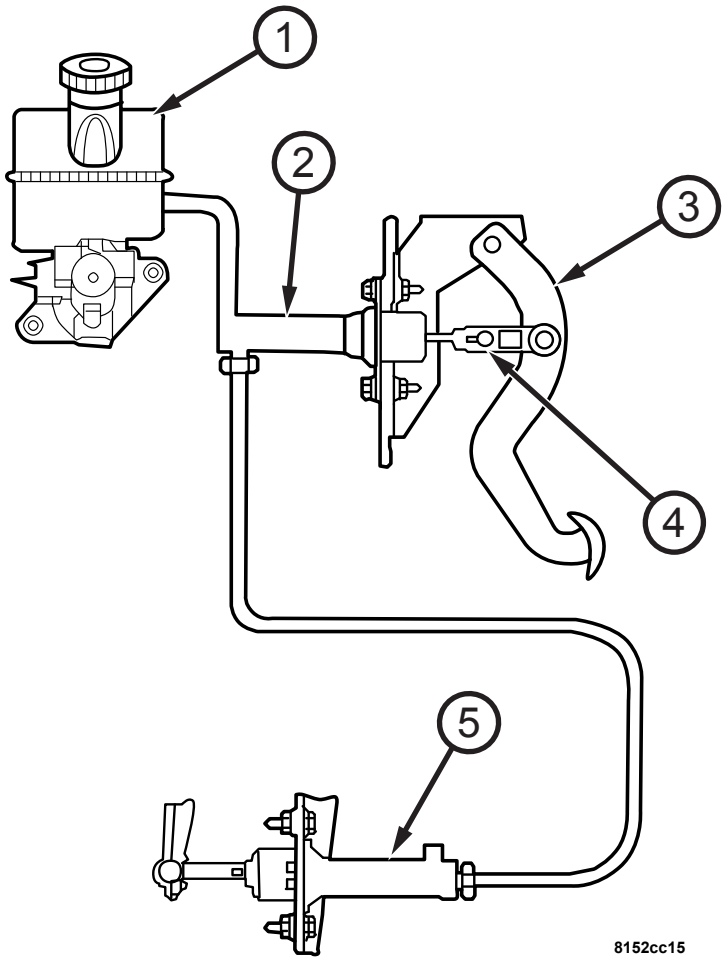
Figure 51 Master and Slave Cylinder

Note: The clutch hydraulic system and replacement components are pre-filled and, under normal operating conditions, additional fluid is not required for the life of the vehicle.

Note: PT Cruisers equipped with T350 transaxles may have a one-piece master cylinder assembly. For these systems, if the master cylinder requires replacement, the master and slave cylinders must be replaced with a two-piece quick connect system.

T350 Clutch Release System

Depressing the clutch pedal develops fluid pressure in the clutch master cylinder. This pressure is transmitted to the slave cylinder through a connecting line. In turn, the slave cylinder operates the clutch release lever. As the release lever is pivoted within the clutch housing it moves a release bearing. The bearing presses the diaphragm spring fingers inward on the fulcrums. This action moves the pressure plate rearward, relieving clamp force on the disc.



1	Reservoir	4	Master Cylinder Push Rod
2	Master Cylinder	5	Slave Cylinder
3	Clutch Pedal		

Figure 52 T350 Clutch Release System

Note: Depending on the model year, the T350 may be equipped with a dedicated remote-mount master cylinder reservoir or it will share the brake master cylinder fluid reservoir.

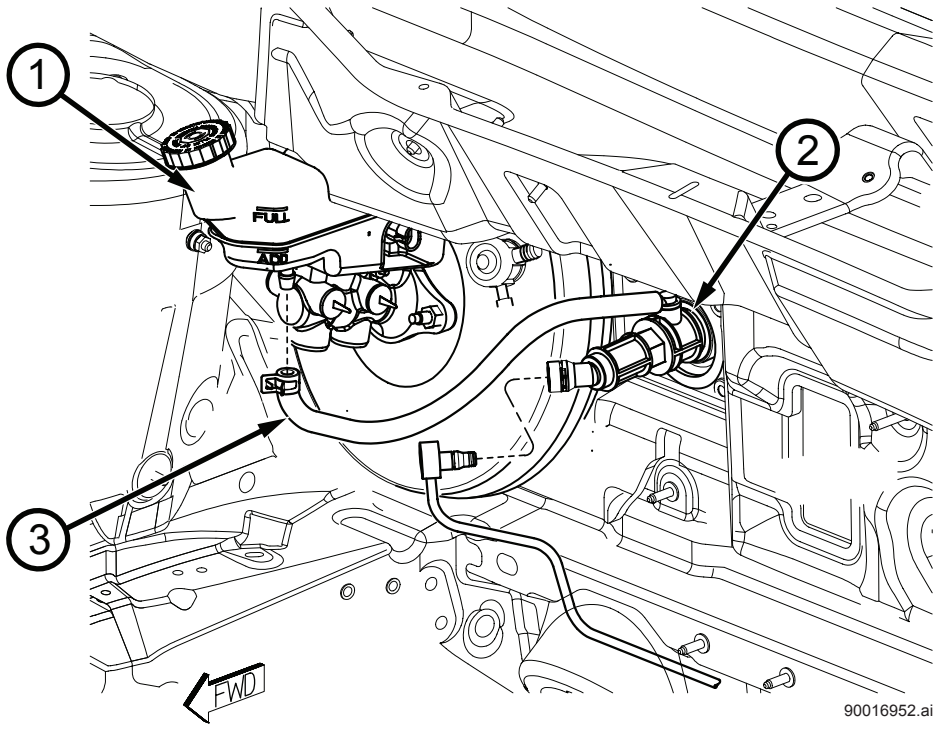
T355 Clutch Release System

The principles used to actuate the clutch in the T355 are the same as the T350, but the process is slightly different. The T355 utilizes a slave cylinder of a concentric design, having all components fixed about the same axis.

The Concentric Slave Cylinder (CSC) is mounted to the inside of the bellhousing and is serviced only as an assembly. It is shaped like a sleeve that expands and eliminates the need for a clutch fork.

The concentric design permits high efficiency, resulting in low and consistent pedal effort, as well as automatic adjustment to compensate for clutch disc wear.

The CSC is a self-contained unit, consisting of a main body, piston, spring, integrated release bearing, and a rubber boot. The spring-loaded piston holds tension against the pressure plate spring fingers. When the clutch pedal is depressed, the push rod forces fluid from the master cylinder, through a fluid line, to the CSC. The fluid pushes against the spring-loaded piston and the piston exerts increased force on the pressure plate spring fingers to release the clutch.



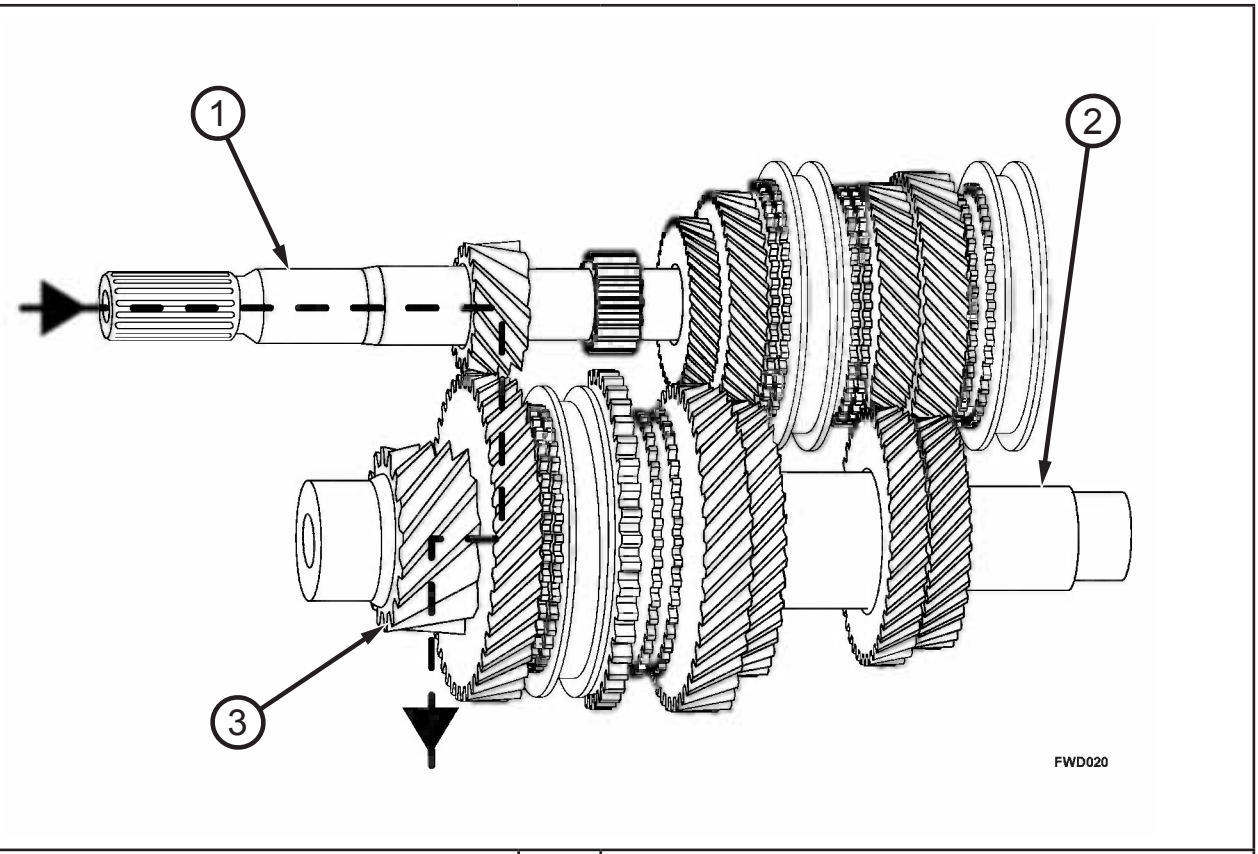
1	Brake System Fluid Resevoir	3	Clutch System Fluid Supply Line
2	Clutch Master Cylinder		

Figure 53 355 Clutch Release System

T350/T355 POWER FLOW

T350/T355 First Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft first drive gear is integral to the input shaft, and is in constant mesh with the output shaft first driven gear. When the 1-2 synchronizer is locked to first gear, which locks first gear to the output shaft, power is transferred through the output shaft to the differential.

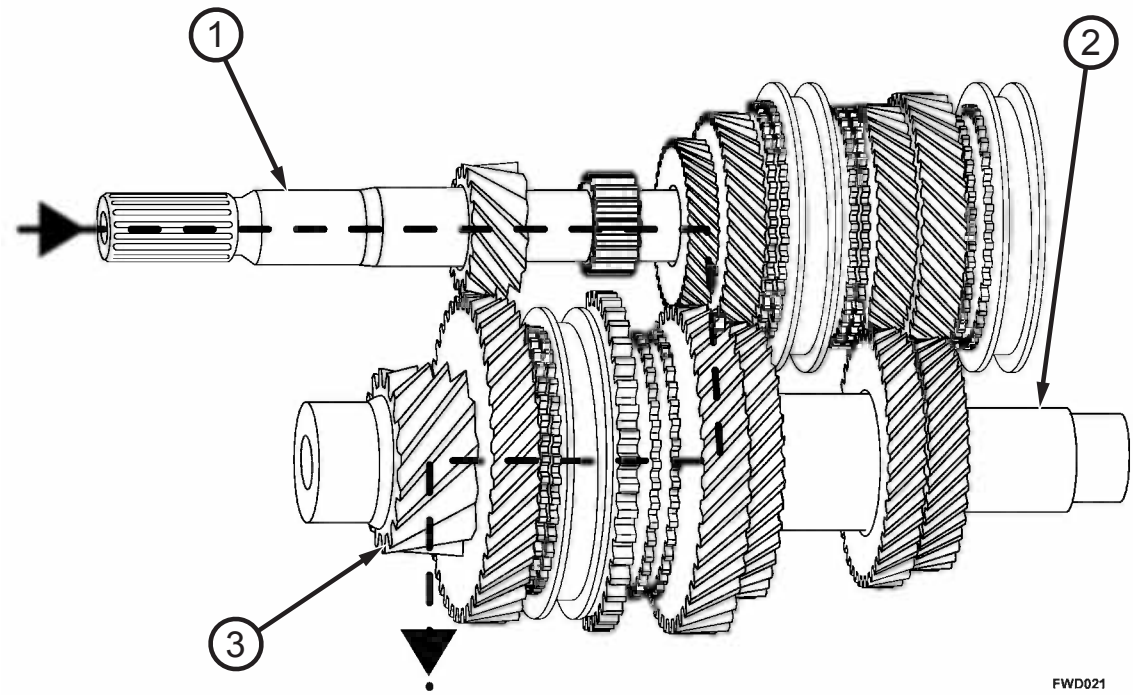


1	Input Shaft	3	To the Differential Ring Gear
2	Output Shaft		

Figure 54 T350/T355 First Gear

T350/T355 Second Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft second drive gear is integral to the input shaft, and is in constant mesh with the output shaft second driven gear. When the 1-2 synchronizer is locked to second gear, which locks second gear to the output shaft, power is transferred through the output shaft to the differential.

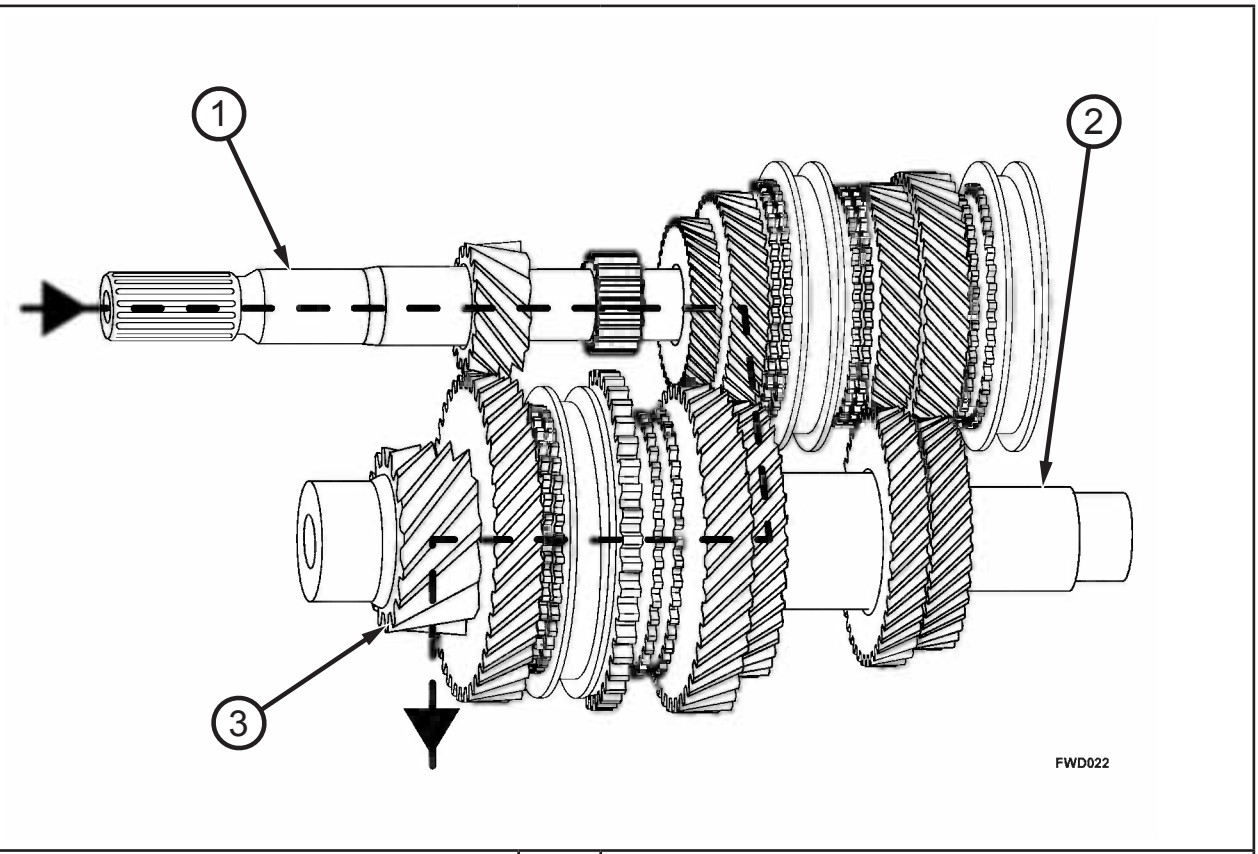


1	Input Shaft	3	To the Differential Ring Gear
2	Output Shaft		

Figure 55 T350/T355 Second Gear

T350/T355 Third Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft third drive gear is in constant mesh with the output shaft third driven gear, which is fixed to the output shaft. When the 3-4 synchronizer is locked to third gear, which locks third gear to the input shaft, power is transferred through the output shaft to the differential.

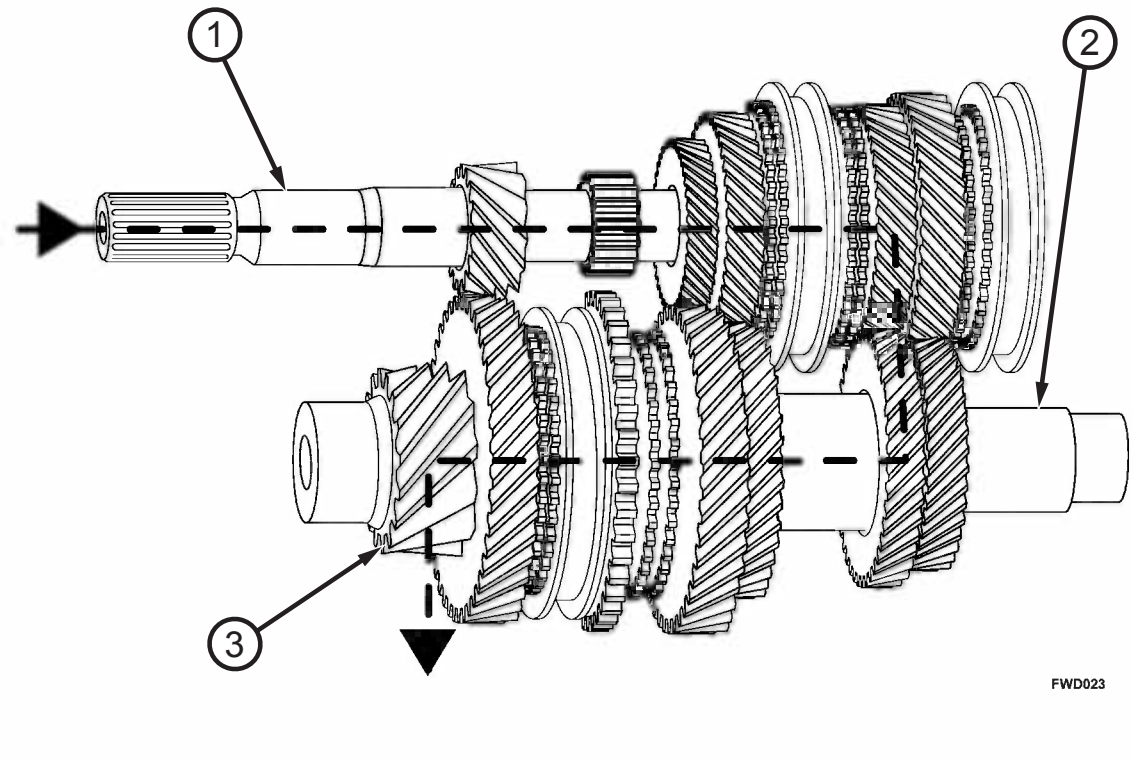


1	Input Shaft	3	To the Differential Ring Gear
2	Output Shaft		

Figure 56 T350/T355 Third Gear

T350/T355 Fourth Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft fourth drive gear is in constant mesh with the output shaft fourth driven gear, which is fixed to the output shaft. When the 3-4 synchronizer is locked to fourth gear, which locks fourth gear to the input shaft, power is transferred through the output shaft to the differential.

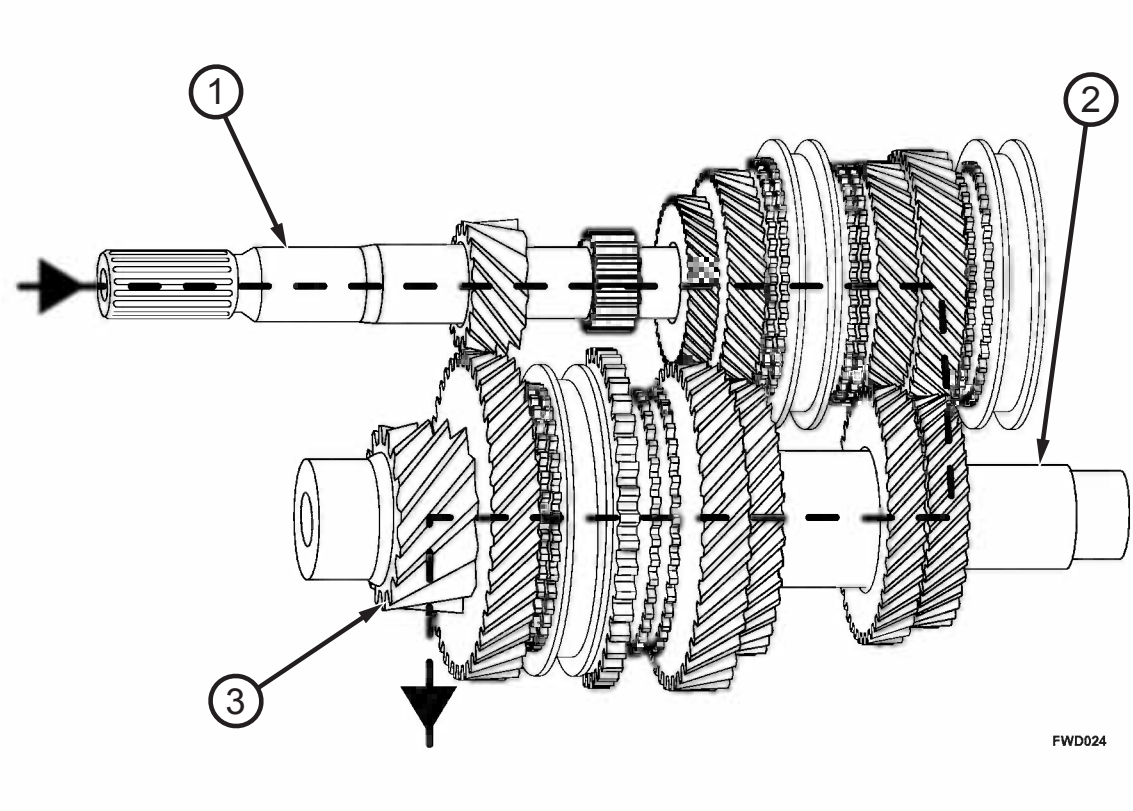


1	Input Shaft	3	To the Differential Ring Gear
2	Output Shaft		

Figure 57 T350/T355 Fourth Gear

T350/T355 Fifth Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft fifth drive gear is in constant mesh with the output shaft fifth driven gear, which is fixed to the output shaft. When the 5-R synchronizer is locked to fifth gear, which locks fifth gear to the input shaft, power is transferred through the output shaft to the differential.

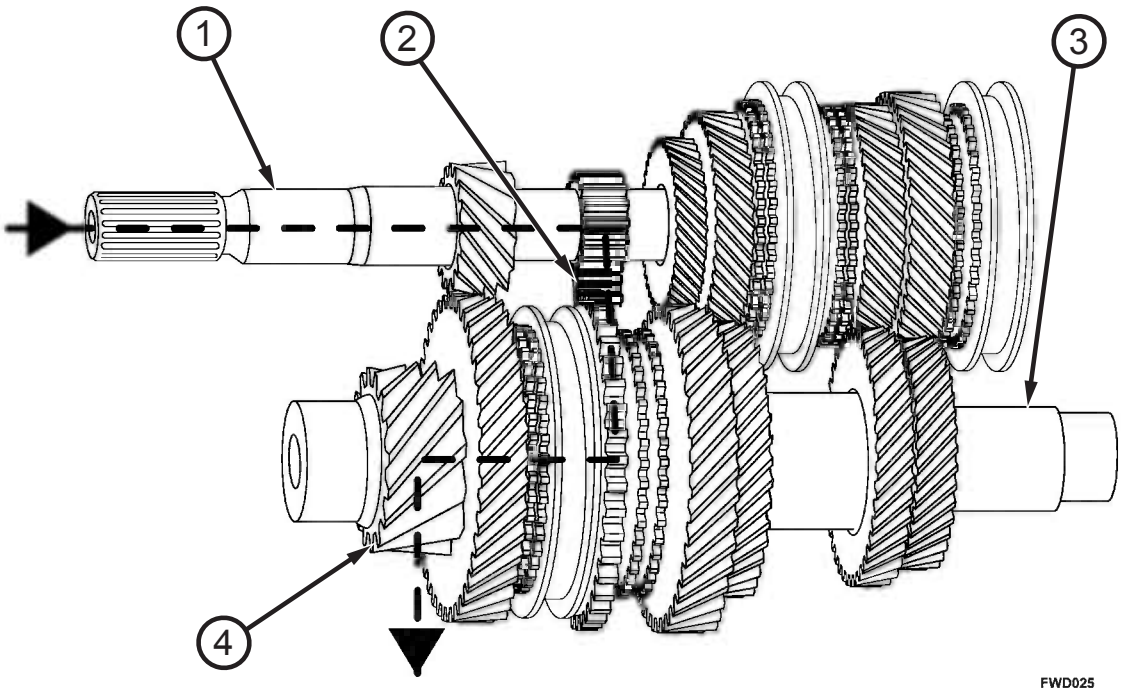


1	Input Shaft	3	To the Differential Ring Gear
2	Output Shaft		

Figure 58 T350/T355 Fifth Gear

T350/T355 Reverse Gear

When reverse gear is selected, the 5-R synchronizer engages the reverse brake to stop input shaft rotation. The sliding spindle idler shaft moves the reverse idler gear in mesh with both the reverse drive gear and the reverse driven gear. The reverse drive gear is integral to the input shaft. The reverse driven gear is integral to the 1-2 synchronizer on the output shaft. When the reverse idler gear is moved into place it causes the output shaft to turn the opposite direction of the input shaft. Power is transferred through the output shaft to the differential.



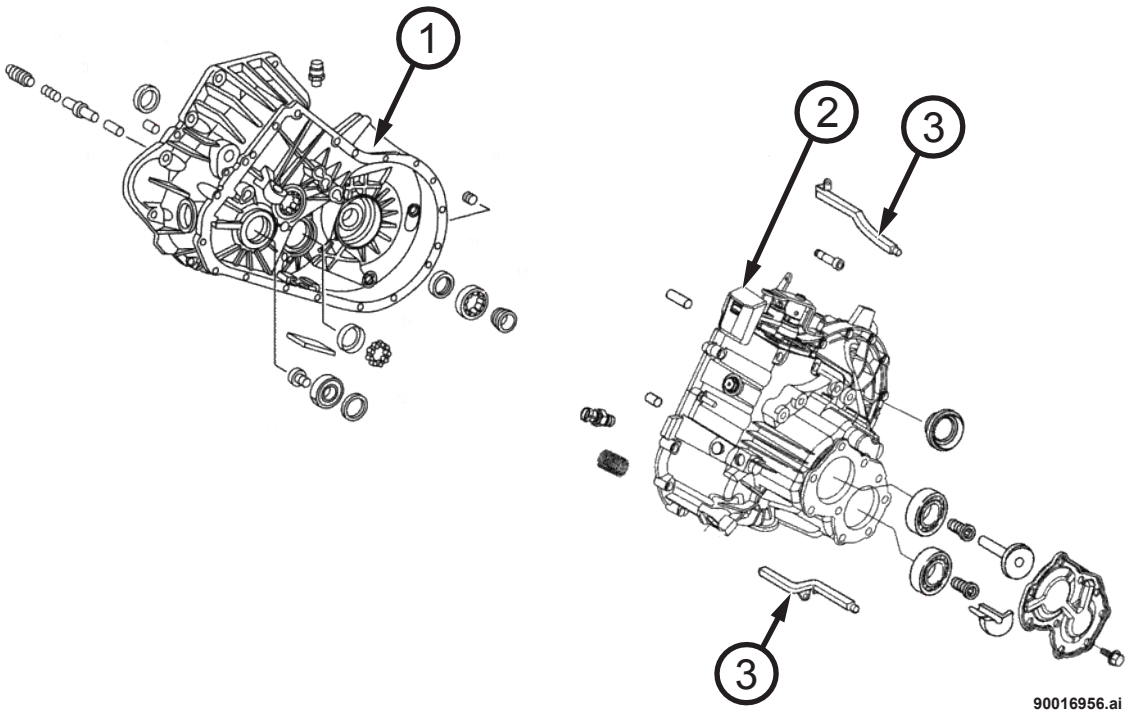
1	Input Shaft	3	Output Shaft
2	Reverse Idler Gear	4	To the Differential Ring Gear

Figure 59 T350/T355 Reverse Gear

Notes:

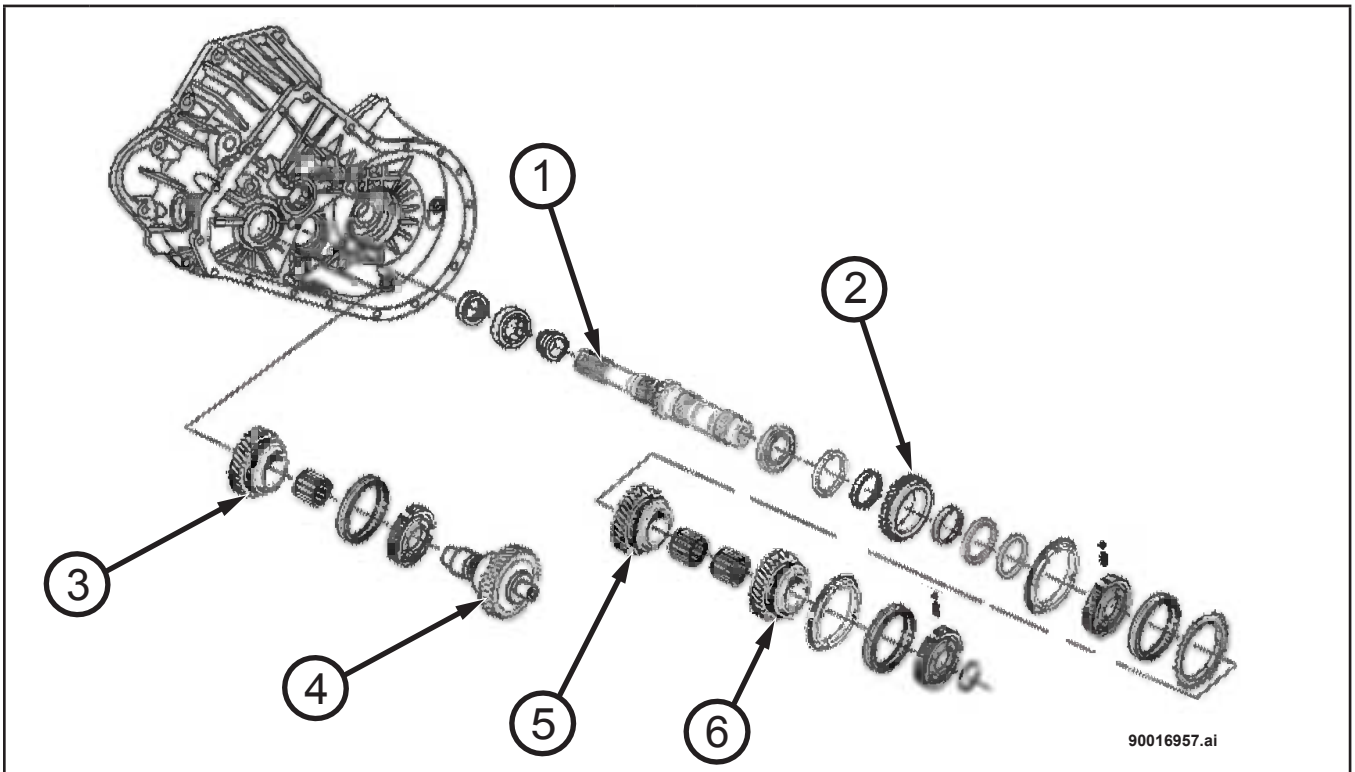
MODULE 5 G288 MANUAL TRANSAXLE

G288 MANUAL TRANSAXLE DISASSEMBLED VIEWS



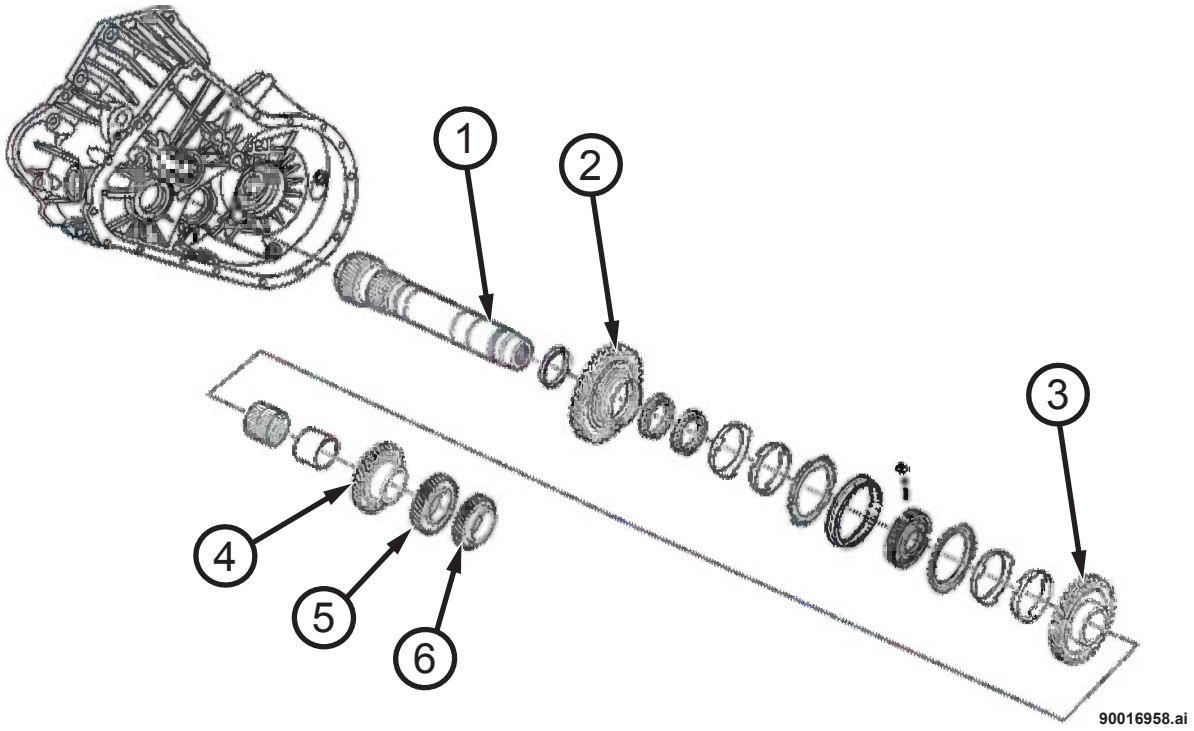
1	Clutch Bellhousing	3	Oil Troughs
2	Gear Housing		

Figure 60 G288 Transaxle Cases



1	Input Shaft	4	Reverse Gear (Fixed)
2	Third Drive Gear	5	Fourth Drive Gear
3	Reverse Gear (Freewheeling)	6	Fifth Drive Gear

Figure 61 G288 Input and Reverse Idler Shafts Disassembled View



1	Output Shaft	4	Third Driven Gear
2	First Driven Gear	5	Fourth Driven Gear
3	Second Driven Gear	6	Fifth Driven Gear

Figure 62 G288 Output Shaft

G288 MANUAL TRANSAXLE GEAR RATIOS

The transaxle shift system consists of a mechanical shift mechanism, shift rails and forks, and gear shift cables. The unique design of this shift system provides a higher mechanical advantage, resulting in less friction, and lower shift cable loads for smoother, more positive operation. The table below shows the gear ratios used depending on the engine.

Table 12 G288 Gear Ratios

Gear	PT Cruiser 2.2L Diesel*	PT Cruiser 2.4L Turbo
1st	4.25	3.92
2nd	2.35	2.21
3rd	1.46	1.46
4th	1.03	1.11
5th	0.79	0.88
Reverse	3.81	3.62
Final Drive	3.29	3.29

* BUX models

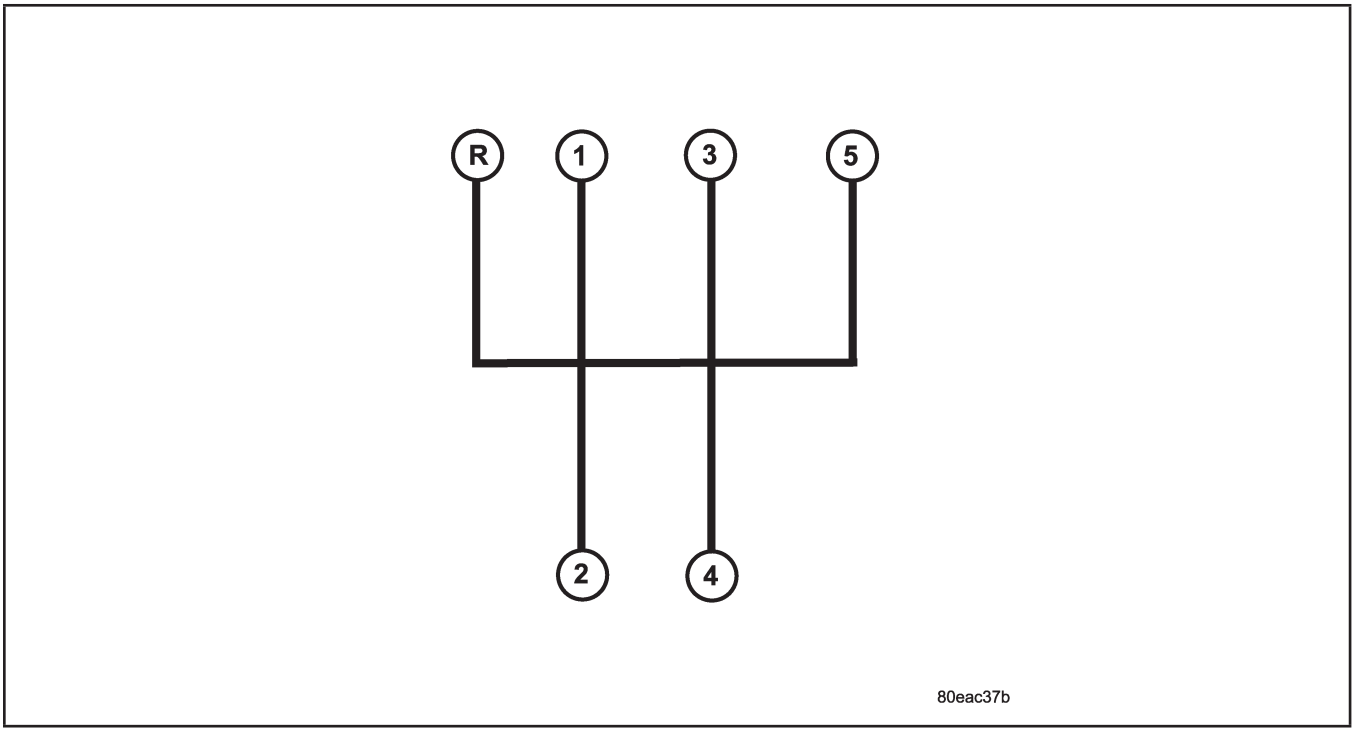


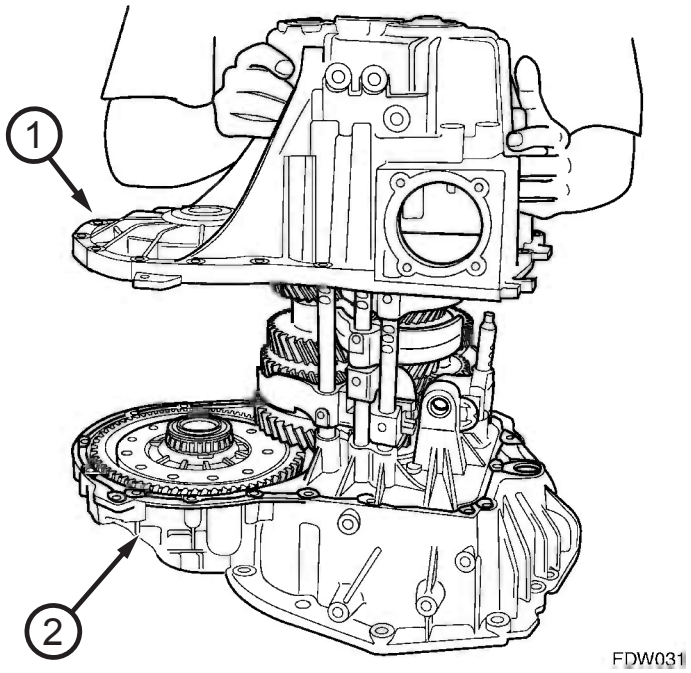
Figure 63 G288 Shift Pattern

COMPONENTS OF THE G288

Bellhousing Case Half and Transaxle Housing

On the G288 transaxle the internal components can be serviced only by separating the clutch bellhousing from the gear housing. The clutch bellhousing encloses the concentric slave cylinder and conventional or modular clutch assembly. The reverse shaft assembly is pressed into the clutch bellhousing. To remove or install the reverse shaft, a heat gun is used to heat and expand the area around the shaft.

The gear housing is bolted to the clutch bellhousing and contains the input shaft, output shafts, and the shift mechanism.



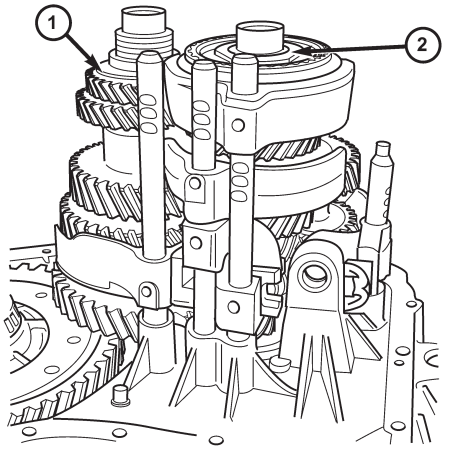
1	Gear Housing	2	Clutch Bellhousing

Figure 64 G288 Clutch Bellhousing and Gear Housing

Shift System

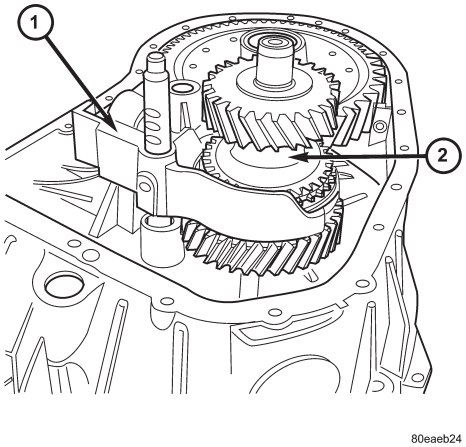
The G288 transaxle has a conventional shift system design. A centrally-located shift shaft assembly and a reverse shift shaft assembly interface with shift rod/fork assemblies. The fork/rod assemblies operate synchronizer sleeves, selecting the desired gear position.

The assembly on the input and output shafts is comprised of three shift rails and three shift forks. The other shift shaft assembly is on the reverse shaft and is comprised of one shift rail and one shift fork. Mounting holes cast into the bellhousing support both shift shaft assemblies.



1	Output Shaft	2	Input Shaft

Figure 65 G288 Input and Output Shift Shaft Assembly



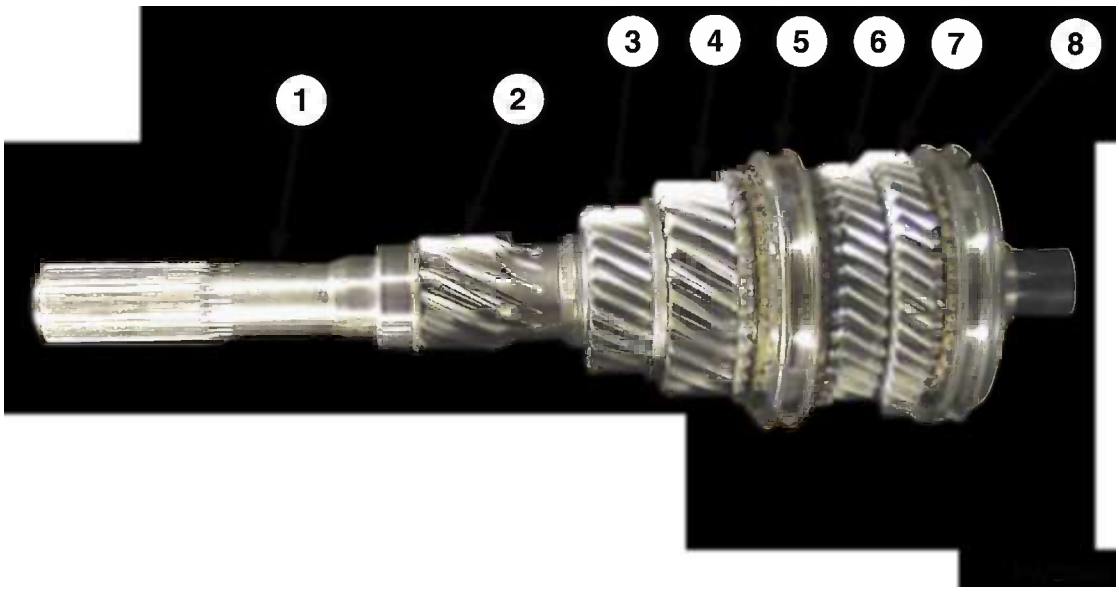
1	Fork/Rod Assembly	2	Reverse Shaft Assembly

Figure 66 288 Reverse Shift Shaft Assembly

Input Shaft

The input shaft assembly is driven by the clutch assembly, and meshes with the output shaft assembly. All gears on the input shaft are drive gears. The input shaft consists of the following major components:

- Input mainshaft
- First gear (fixed)
- Second gear (fixed)
- Third gear (freewheeling)
- Fourth gear (freewheeling)
- Fifth gear (freewheeling)
- 3-4 synchronizer
- Fifth gear synchronizer



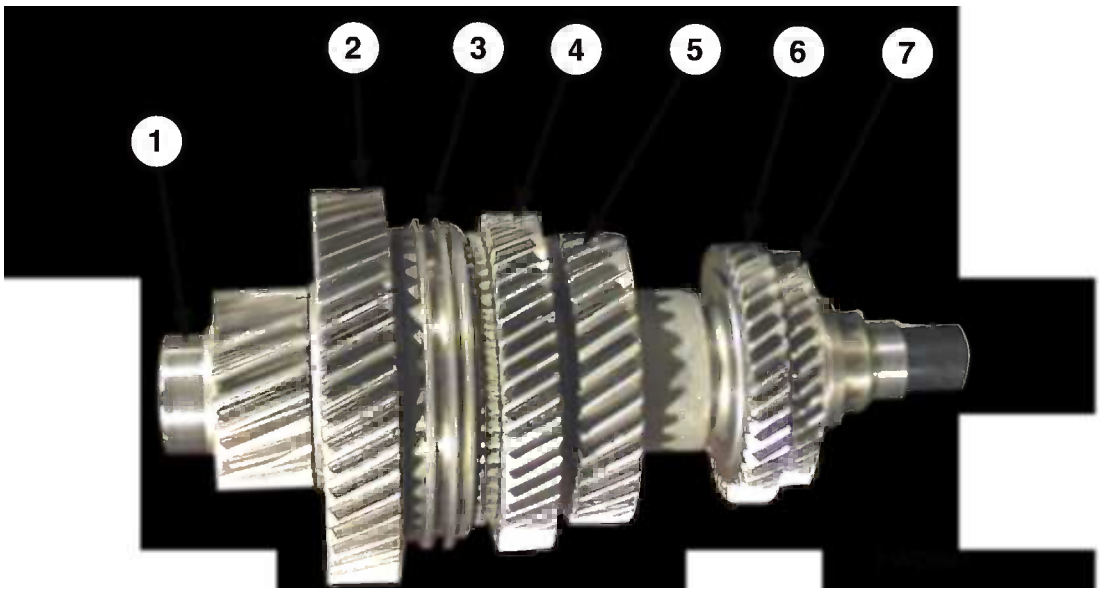
1	Input Shaft	5	3-4 Synchronizer
2	First Gear (fixed)	6	Fourth Gear (freewheeling)
3	Second Gear (fixed)	7	Fifth Gear (freewheeling)
4	Third Gear (freewheeling)	8	Fifth Gear Synchronizer

Figure 67 G288 Input Shaft

Output Shaft

The output shaft assembly meshes with and is driven by the input shaft. All gears on the output shaft are driven gears. The output shaft drives the differential via an integrated pinion gear, and the output shaft consists of the following components:

- Output mainshaft
- First gear (freewheeling)
- Second gear (freewheeling)
- Third gear (fixed)
- Fourth gear (fixed)
- Fifth gear (fixed)
- 1-2 synchronizer



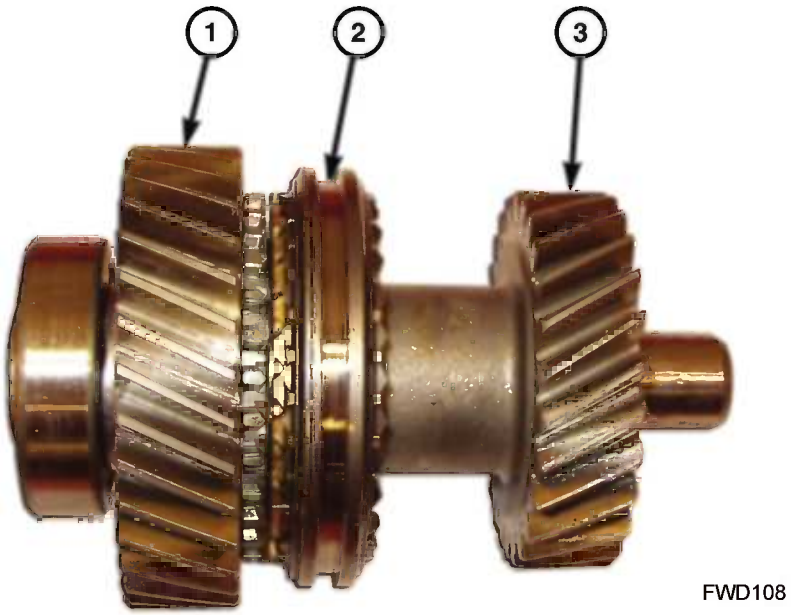
1	Output Shaft	5	Third Gear (fixed)
2	First Gear (freewheeling)	6	Fourth Gear (fixed)
3	1-2 Synchronizer	7	Fifth Gear (fixed)
4	Second Gear (freewheeling)		

Figure 68 G288 Output Shaft

Reverse Shaft

The reverse shaft assembly consists of a sealed roller bearing, one fixed gear, the reverse synchronizer, and a freewheeling gear that rotates around two needle bearings.

Note: The sealed roller bearing is held in place by a bearing retaining screw. The retaining screw is sealed with a thread locking compound.



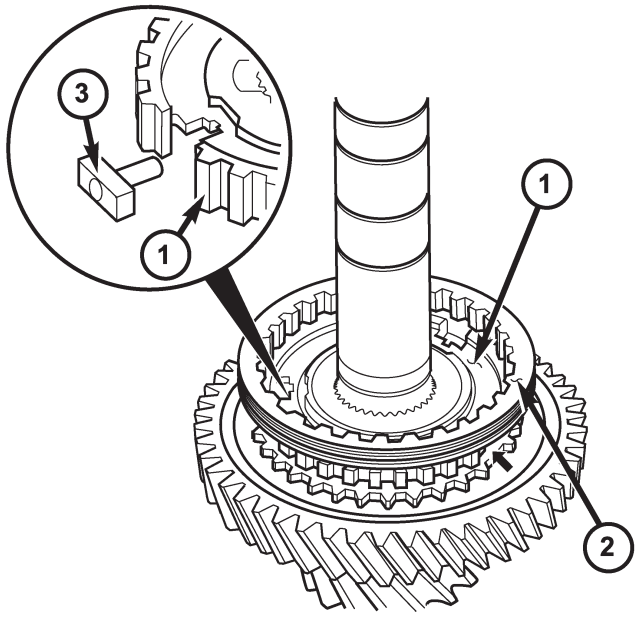
1	Reverse Gear (freewheeling)	3	Reverse Gear (fixed)
2	Reverse Synchronizer		

Figure 69 G288 Reverse Shift Shaft Assembly

Synchronizer Assembly

The G288 transaxle is fully synchronized, using synchronizers in all gear positions. Like the T350 and DMT6, the G288 uses both dual-cone and conventional synchronizers. The 1-2 synchronizer is a dual-cone synchronizer, and is located on the output shaft assembly. The 3-4 and fifth gear synchronizers are located on the input shaft assembly and are of conventional design, using only one friction element for each gear position. The reverse synchronizer is also conventional in its design and is located on the reverse shaft.

The G288 transaxle strut assembly is a one-piece design with the ball and spring contained within the strut. The assembly can be easily removed from the synchronizer hub.

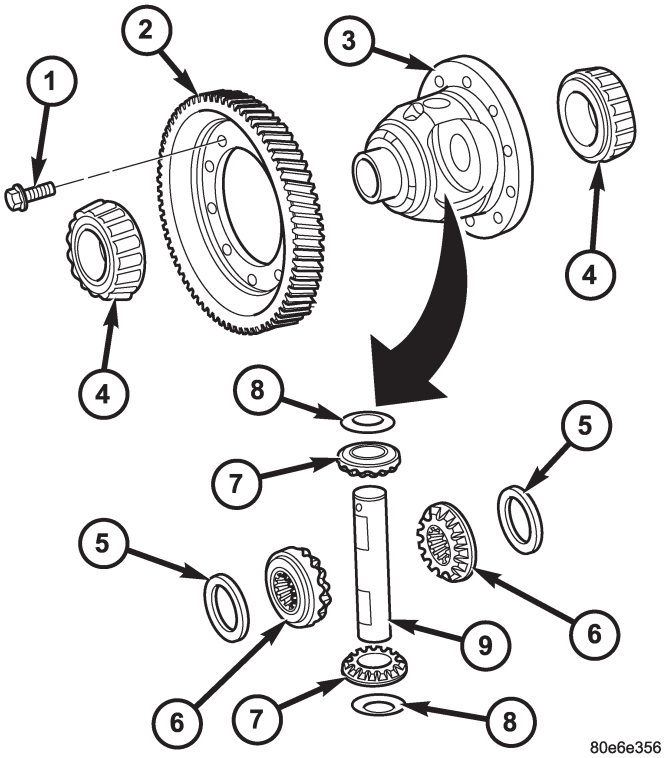


1	Synchronizer Hub	3	Strut Assembly
2	Synchronizer Sleeve		

Figure 70 G288 Synchronizer Assembly

Differential Assembly

The G288 differential is a conventional open design, and is integral to the transaxle. It consists of a single-piece case, which houses pinion and side gears. A floating pinion shaft is retained by the differential ring gear.



1	Bolt	6	Side Gear (2)
2	Ring Gear	7	Pinion Gear (2)
3	Case	8	Washer (2)
4	Bearing (2)	9	Pinion Shaft
5	Washer (2)		

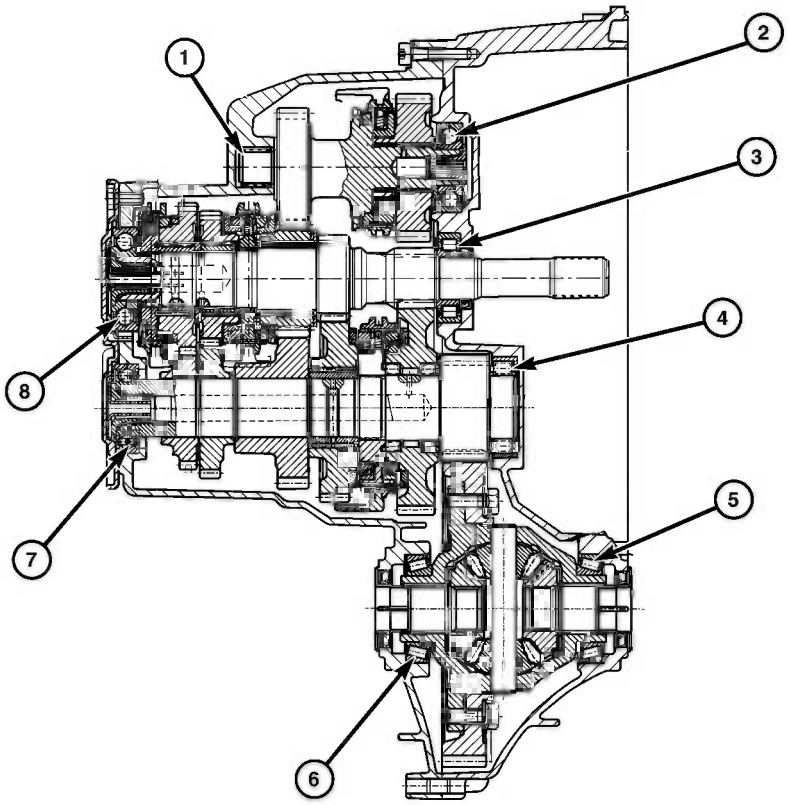
Figure 71 G288 Differential

Bearings

Bearings support the input shaft, output shaft, reverse shaft, and differential. Needle bearings are present under each of the freewheeling gears. Bearings on the G288 transaxle do not require preload adjustment.

The bearings required to support the input shaft, output shaft, reverse shaft, and differential are as follows:

- The input shaft assembly is supported by a caged roller bearing at the front of the transaxle, and a sealed roller bearing at the rear of the transaxle.
- The output shaft is supported by a caged cylindrical roller bearing at the front of the transaxle, and a sealed ball bearing at the rear of the transaxle.
- The reverse shaft is supported on one end (clutch bellhousing) by a sealed roller bearing, and a needle bearing at the other end (geartrain housing).
- The differential case is supported in the transaxle by tapered roller bearings.



1	Reverse Shaft Rear Bearing	5	Differential Bearing
2	Reverse Shaft Front Bearing	6	Differential Bearing
3	Input Shaft Front Bearing	7	Output Shaft Rear Bearing
4	Output Shaft Front Bearing	8	Input Shaft Rear Bearing

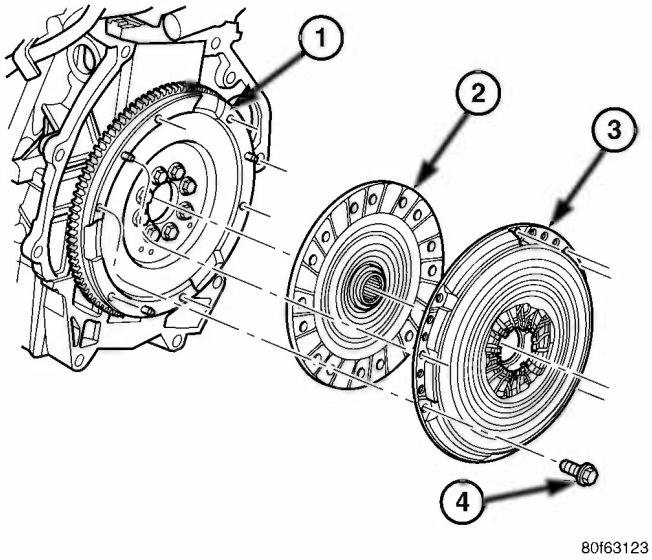
Figure 72 G288 Bearing Locations

Clutch

The G288 utilizes either a conventional or a modular clutch design. The conventional clutch is used on the 2.2L diesel engine. The modular clutch is used on the 2.4L turbo gasoline engine.

The components of a conventional clutch are all individually replaceable. The clutch system consists of the following components:

- Flywheel
- Clutch disc
- Pressure plate assembly



1	Flywheel	3	Pressure Plate Assembly
2	Clutch Disc	4	Bolt

Figure 73 Conventional Clutch

The modular clutch assembly consists of a single dry-type clutch disc, a diaphragm style clutch cover, and an integrated flywheel. The clutch cover is riveted to the flywheel, containing the clutch disc within. The modular clutch can only be serviced as an assembly.

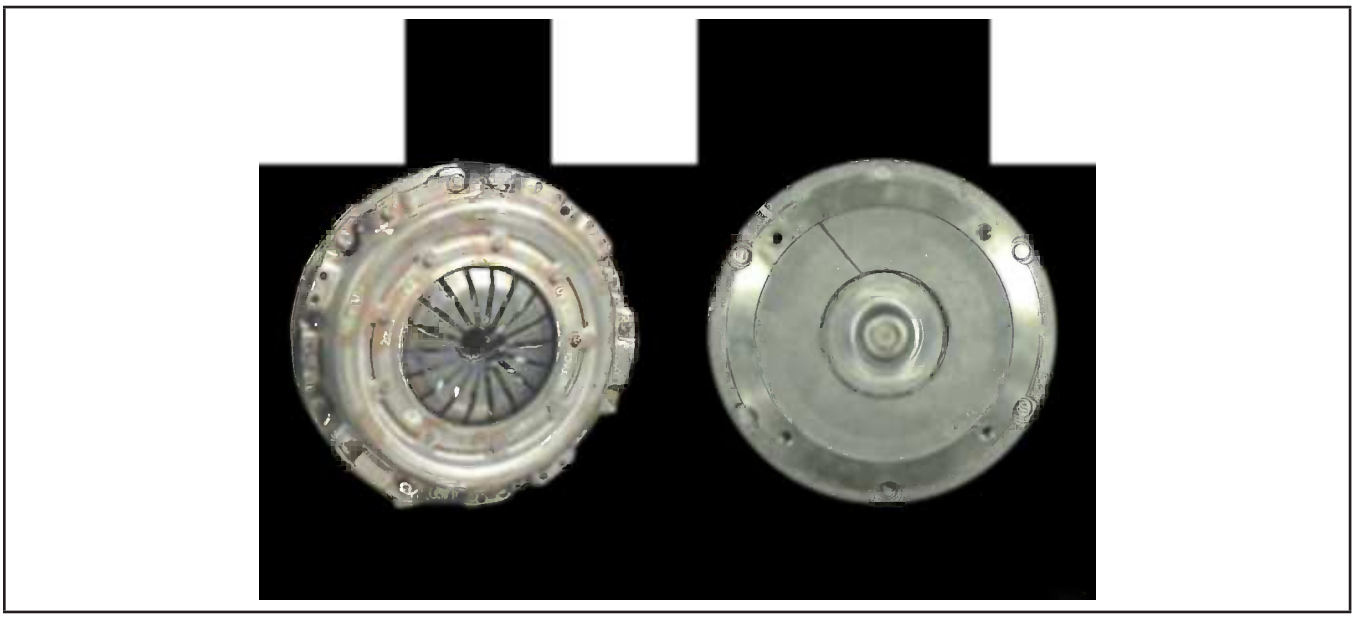


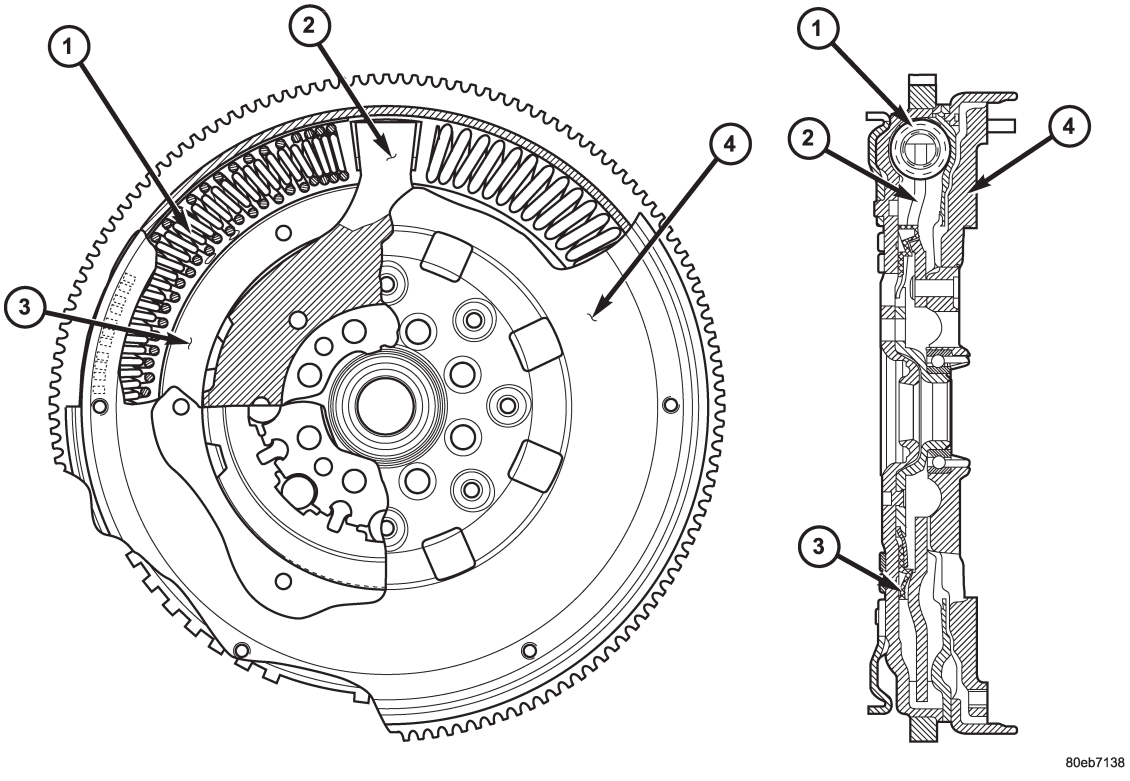
Figure 74 Front and Back of the Modular Clutch

Dual Mass Flywheel

The Dual Mass Flywheel (DMF) is used on both the 2.2L diesel engine and on the 2.4L turbo gasoline engine. The DMF consists of two decoupled masses (primary and secondary mass) that are connected via a spring/damping system. The primary flywheel side is bolted to the crankshaft. The secondary flywheel face serves as the driving member to the clutch disc. Internal springs between the flywheels are used to couple the masses while dampening energy. The flywheel also incorporates the ring gear around the outer circumference to mesh with the starter to permit engine cranking.

On a DMF the additional secondary mass coupled to the transaxle lowers the natural frequency of the transaxle rotating elements. This decreases the transaxle gear rattle. The damper springs between the two flywheel masses replace the clutch disc damper springs and assist in a smooth transfer of torque to the transaxle.

Caution: The Dual Mass Flywheel is serviced as an assembly only and should never be disassembled.

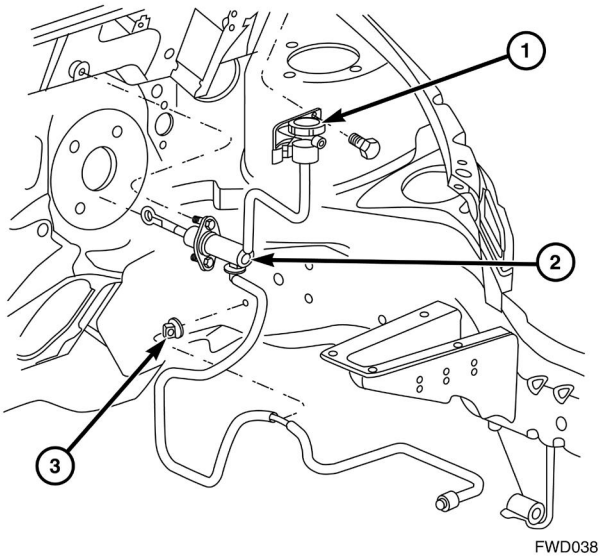


1	Thrust Spring	3	Primary Mass
2	Flange/Diaphragm Spring	4	Secondary Mass

Figure 75 Dual Mass Flywheel

Master Cylinder

The clutch master cylinder mounts to the bulkhead and consists of an adjustable push rod, a piston and cylinder housing, an integral fluid reservoir, and an interconnecting hydraulic tube. When the clutch pedal is depressed, the push rod forces fluid pressure from the master cylinder through a fluid line to the slave cylinder.



1	Reservoir	3	Retainer
2	Master Cylinder		

Figure 76 G288 Master Cylinder

Note: Due to the angle and design of the G288 transaxle hydraulic system components, gravity and pedal bleeding are less effective and less efficient than the reverse fluid injection method (reverse bleeding). Reverse bleeding is recommended for this system, and requires the use of commercially available injection bleeding equipment.

Slave Cylinder

The clutch release system utilizes a slave cylinder of a concentric design, having all components fixed about the same axis. The Concentric Slave Cylinder (CSC) is mounted to the inside of the bellhousing and is only serviced as an assembly. It is shaped like a sleeve that expands and eliminates the need for a clutch fork.

The concentric design permits high efficiency, resulting in low and consistent pedal effort, as well as automatic adjustment to compensate for clutch disc wear.

The CSC is a self-contained unit, consisting of a main body, piston, spring, integrated release bearing, and a rubber boot. The spring-loaded piston holds tension against the pressure plate spring fingers. When the clutch pedal is depressed, the push rod forces fluid pressure from the master cylinder through a fluid line to the CSC. The fluid pushes against the spring-loaded piston and the piston exerts increased force on the pressure plate spring fingers to release the clutch.

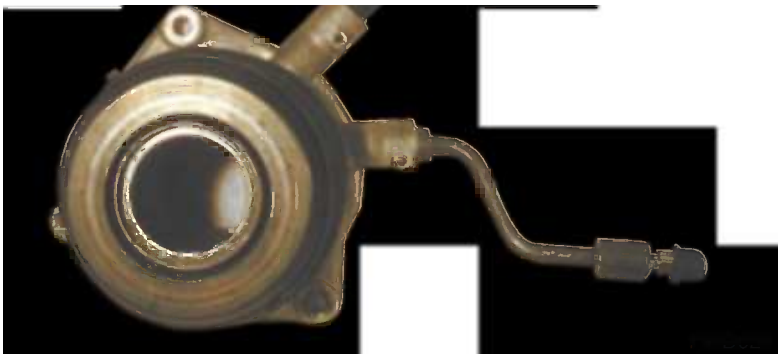
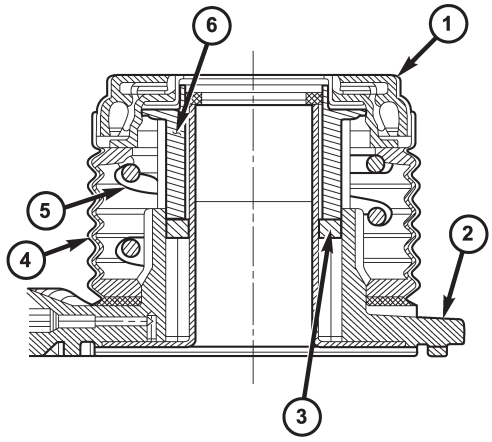


Figure 77 G288 Concentric Slave Cylinder



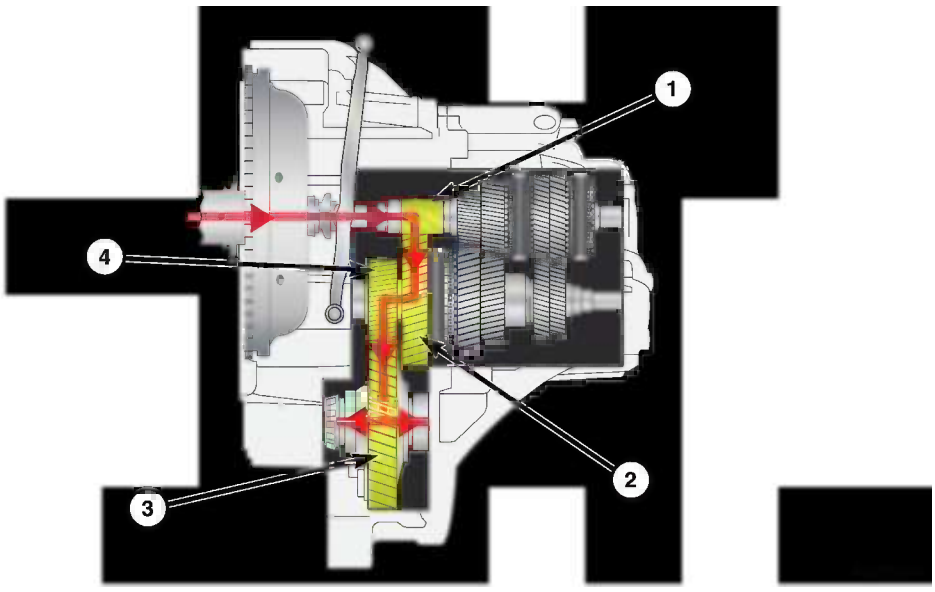
1	Release Bearing	4	Boot
2	Body	5	Spring
3	Seal	6	Piston

Figure 78 G288 Concentric Slave Cylinder Components

G288 POWER FLOW

G288 First Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft drive first gear is integral to the input shaft, and is in constant mesh with the output shaft first driven gear. When the 1-2 synchronizer is locked to first gear, which locks first gear to the output shaft, power is transferred through the output shaft to the differential.

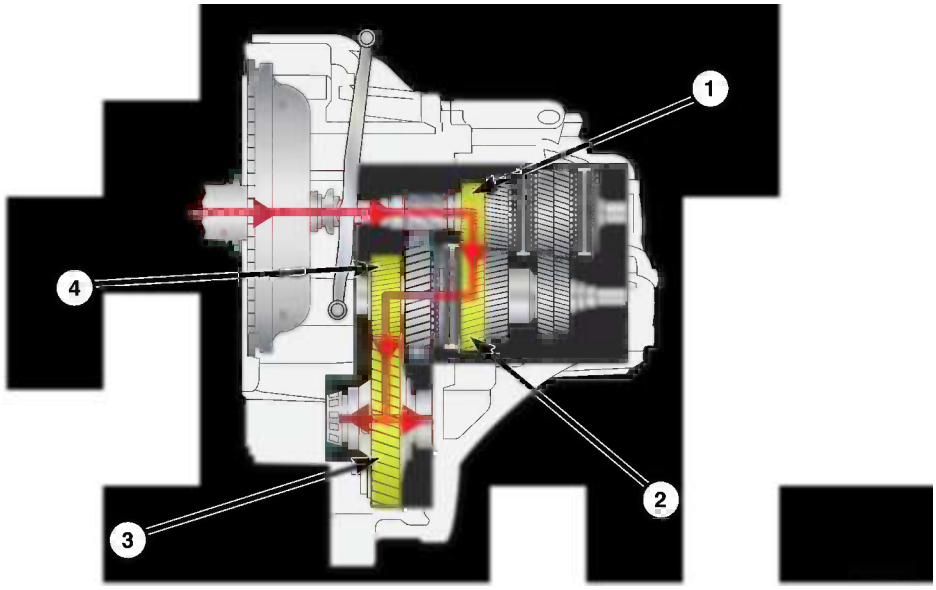


1	First Drive Gear	3	Differential Ring Gear
2	First Driven Gear	4	Pinion Gear

Figure 79 G288 First Gear

G288 Second Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft second drive gear is integral to the input shaft, and is in constant mesh with the output shaft second driven gear. When the 1-2 synchronizer is locked to second gear, which locks second gear to the output shaft, power is transferred through the output shaft to the differential.

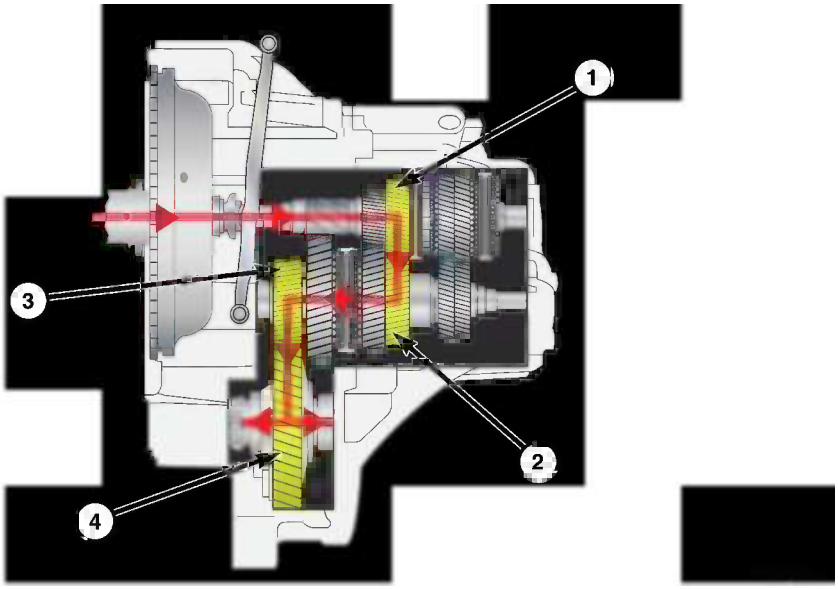


1	Second Drive Gear	3	Differential Ring Gear
2	Second Driven Gear	4	Pinion Gear

Figure 80 G288 Second Gear

G288 Third Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft third drive gear is in constant mesh with the output shaft third driven gear, which is fixed to the output shaft. When the 3-4 synchronizer is locked to third gear, which locks third gear to the input shaft, power is transferred through the output shaft to the differential.

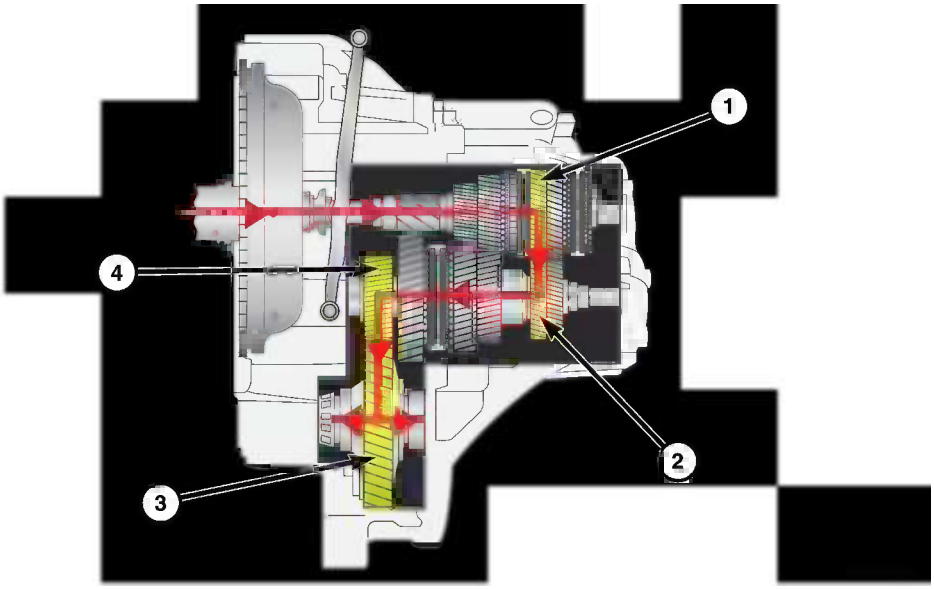


1	Third Drive Gear	3	Differential Ring Gear
2	Third Driven Gear	4	Pinion Gear

Figure 81 G288 Third Gear

G288 Fourth Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft fourth drive gear is in constant mesh with the output shaft fourth driven gear, which is fixed to the output shaft. When the 3-4 synchronizer is locked to fourth gear, which locks fourth gear to the input shaft, power is transferred through the output shaft to the differential.

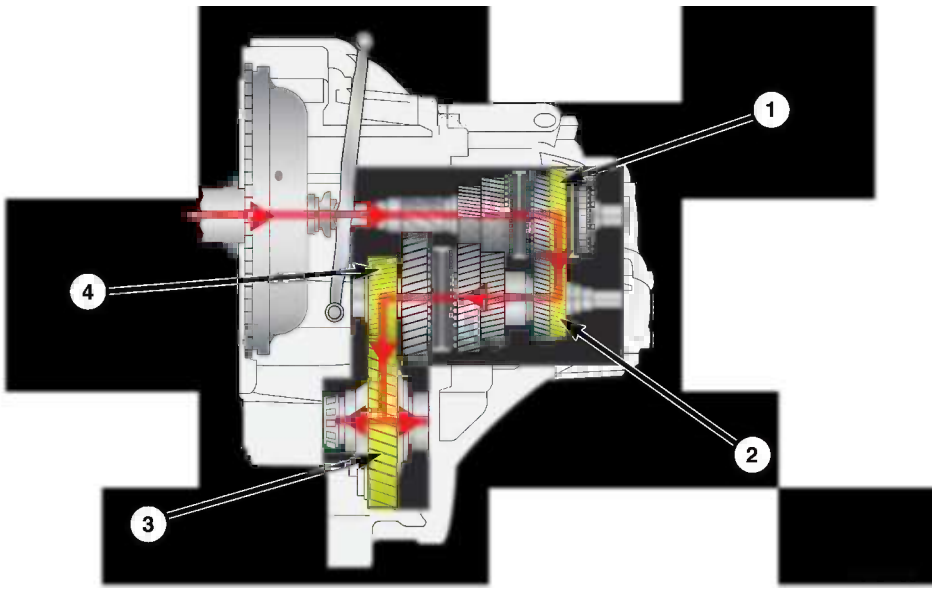


1	Fourth Drive Gear	3	Differential Ring Gear
2	Fourth Driven Gear	4	Pinion Gear

Figure 82 G288 Fourth Gear

G288 Fifth Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft fifth drive gear is in constant mesh with the output shaft fifth driven gear, which is fixed to the output shaft. When the 5-R synchronizer is locked to fifth gear, which locks fifth gear to the input shaft, power is transferred through the output shaft to the differential.

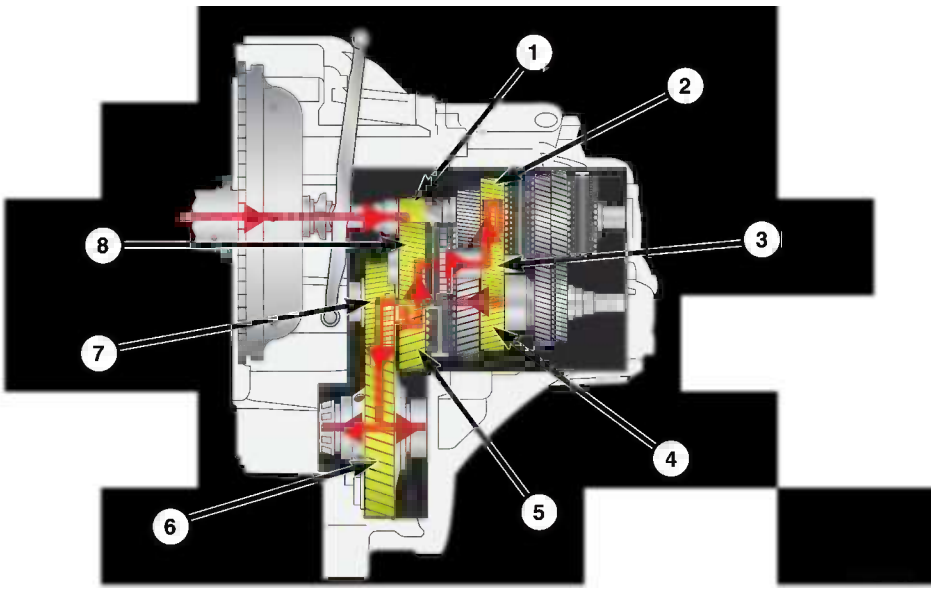


1	Fifth Drive Gear	3	Differential Ring Gear
2	Fifth Driven Gear	4	Pinion Gear

Figure 83 G288 Fifth Gear

G288 Reverse Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft first fixed gear is in constant mesh with the output shaft first freewheeling gear, which is in constant mesh with the reverse shaft freewheeling gear. As reverse gear is selected, the reverse fork moves the reverse synchronizer towards the reverse shaft freewheeling gear. The synchronizer sleeve engages the reverse gear clutch teeth, locking the shaft into one rotating assembly. The reverse shaft fixed gear is in constant mesh with the input shaft third freewheeling gear. The input shaft third freewheeling gear, which acts as an idler and reverse output shaft direction, is in constant mesh with the output shaft third fixed gear.



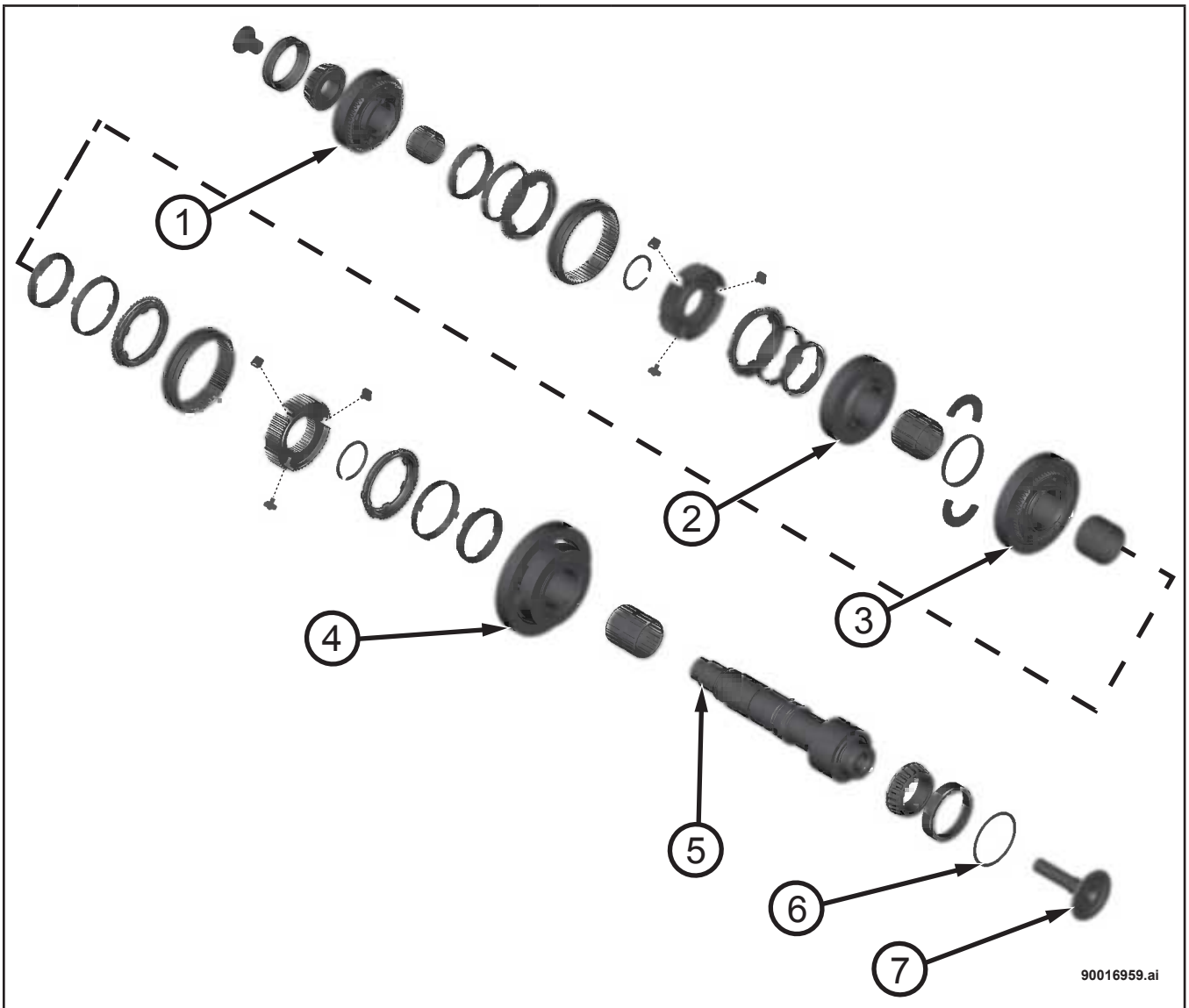
1	First Drive Gear	5	Third Idler Gear
2	First Idler Gear	6	Third Driven Gear
3	Reverse Driven Gear	7	Pinion Gear
4	Reverse Drive Gear	8	Differential Ring Gear

Figure 84 G288 Reverse Gear

Notes:

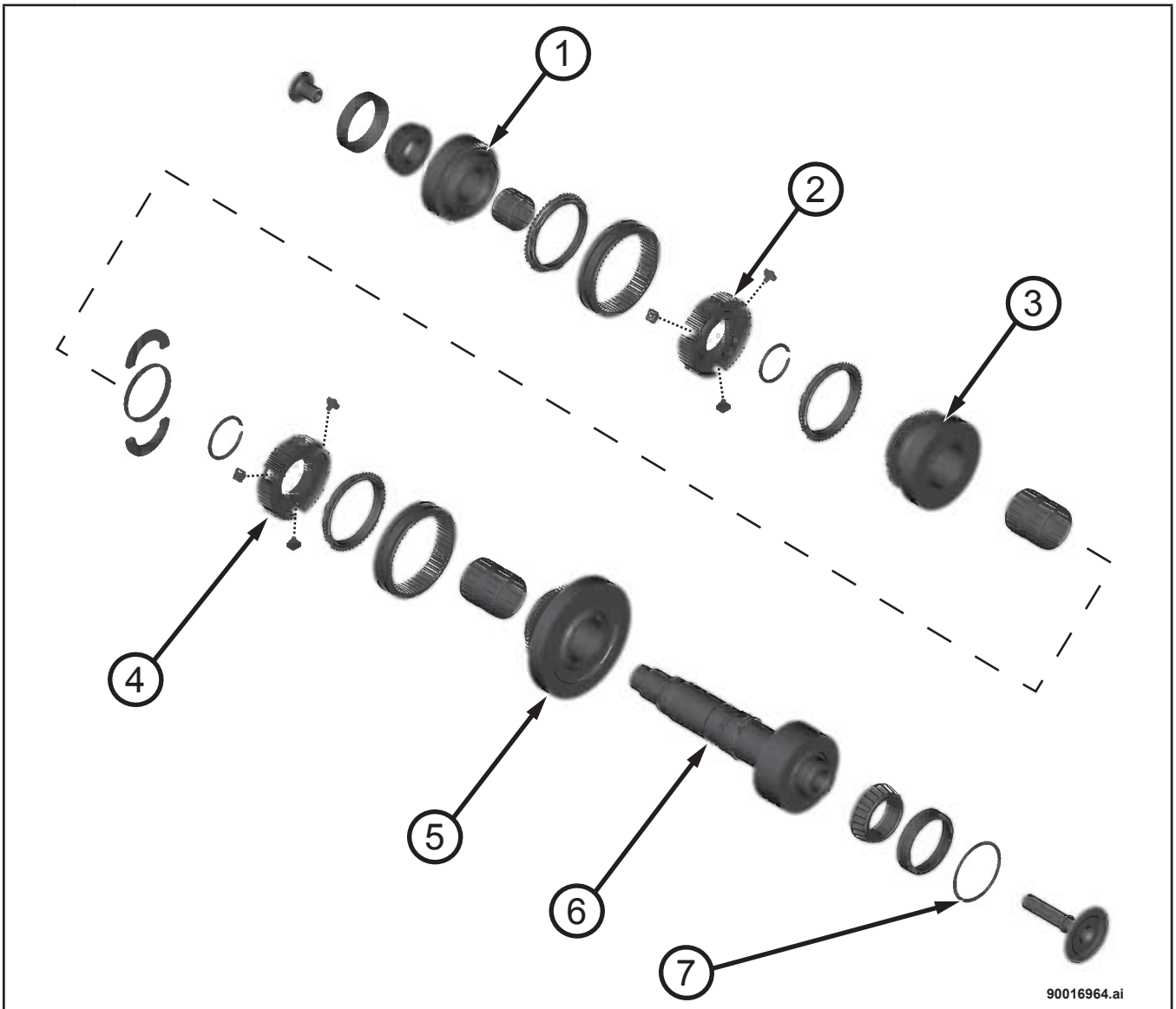
MODULE 6 DMT6 MANUAL TRANSAXLE COMPONENTS

DMT6 MANUAL TRANSAXLE OVERVIEW



1	Fourth Driven Gear	5	Output Shaft
2	Third Driven Gear	6	Bearing Preload Shim
3	Second Driven Gear	7	Oil Tube
4	First Driven/Reverse Idler Gear		

Figure 85 DMT6 1-4 Output Shaft Exploded View



1	Sixth Driven Gear	5	Reverse Driven Gear
2	5-6 Synchronizer Hub	6	Output Shaft
3	Fifth Driven Gear	7	Bearing Preload Shim
4	Reverse Synchronizer Hub		

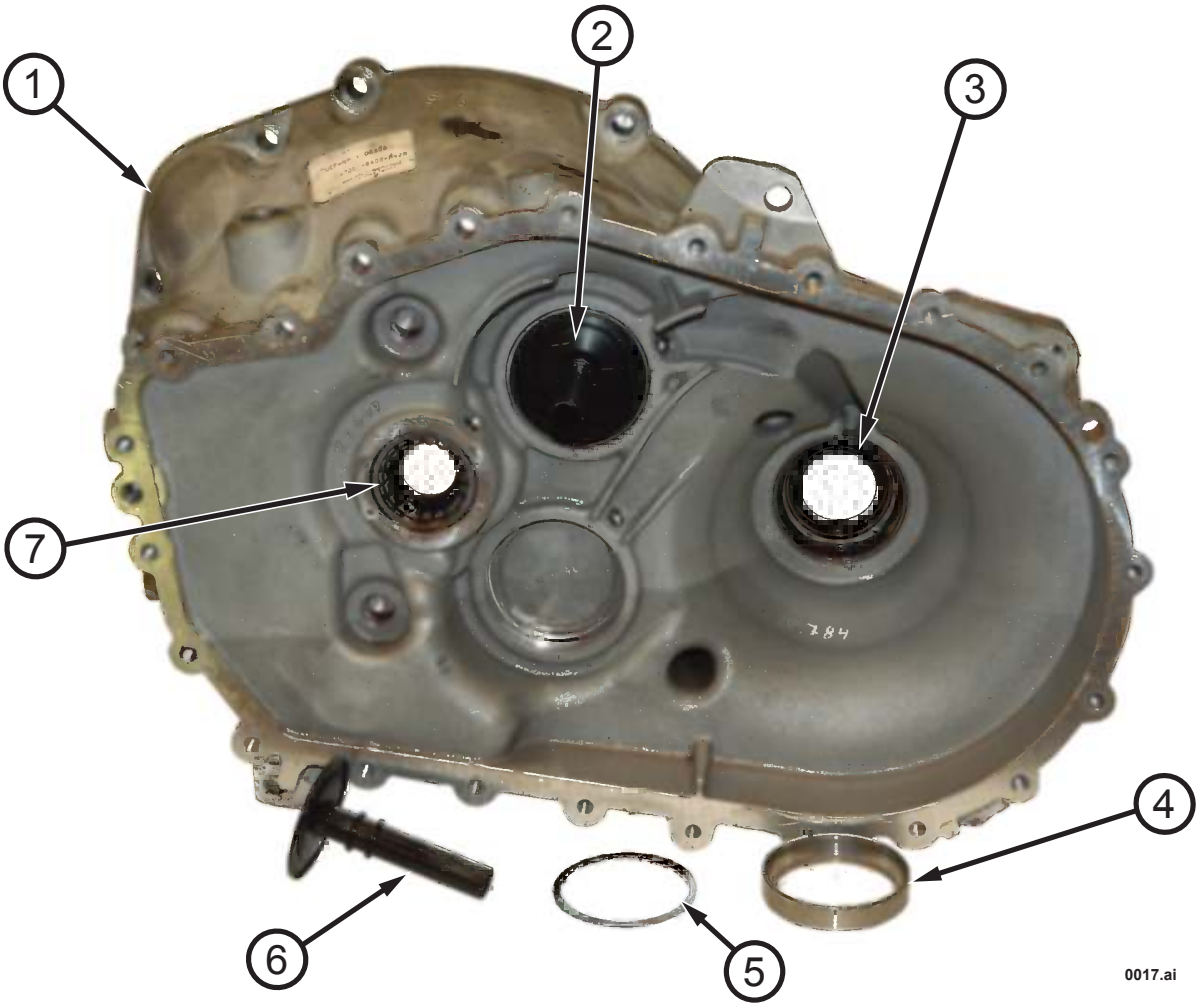
Figure 86 DMT6 5-6-R Output Shaft Exploded View

DMT6 CASE

The clutch housing half of the DMT6 case contains the output shaft oil tubes, bearing cups, and selectable spacers for the 1-4 and 5-6-R output shafts. The input shaft roller bearing, pinion gear bearing cup, and the right half shaft oil seal are also pressed into this half of the case.

Oil channels are cast into the case, directing oil to the bearings and to the output shafts via the oil tubes.

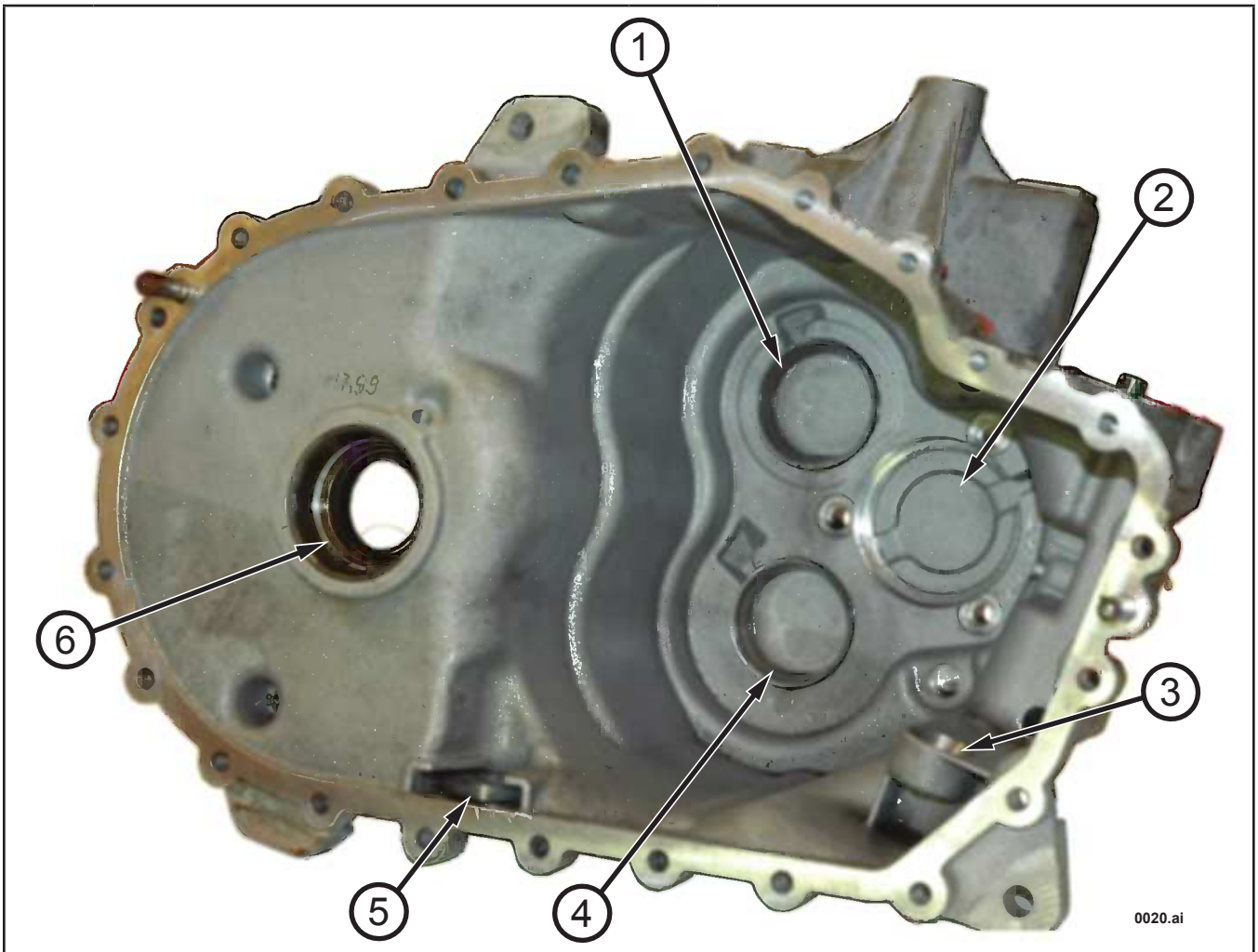
The input shaft roller bearing is staked to the case for production and may be re-staked for service.



1	Transaxle Case	5	5-6-R Output Shaft Bearing Selectable Spacer
2	1-4 Output Shaft Oil Tube	6	5-6-R Output Shaft Oil Tube
3	Output Shaft Seal	7	Input Shaft Bearing
4	5-6-R Output Shaft Bearing Cup		

Figure 87 DMT6 Clutch Housing Side

The gear housing half of the DMT6 case contains the stationary bearing cups for the 1-4 and 5-6-R output shafts, the stationary bearing cup for the pinion gear, and machined areas to accept the input shaft roller bearing and the shift mechanism. A magnet is held in a pocket at the bottom of the case.



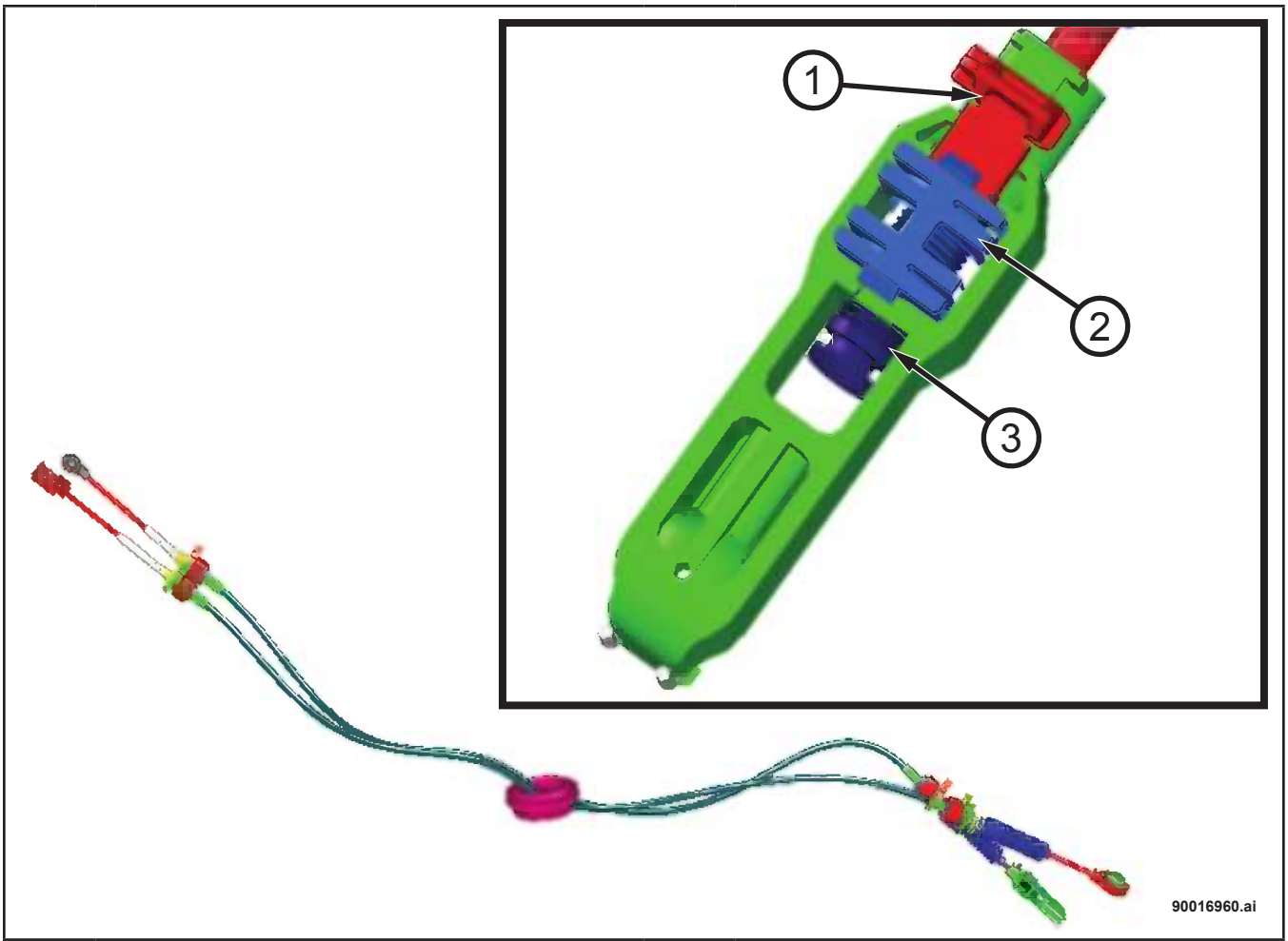
1	1-4 Output Shaft Bearing Cup	4	5-6-R Output Shaft Bearing Cup
2	Input Shaft Ball Bearing Cavity	5	Magnet
3	Machined Area for Shift Mechanism	6	Pinion Bearing Cup

Figure 88 DMT6 Gear Housing Side

DMT6 SHIFT MECHANISMS AND PATTERN

DMT6 Shift System

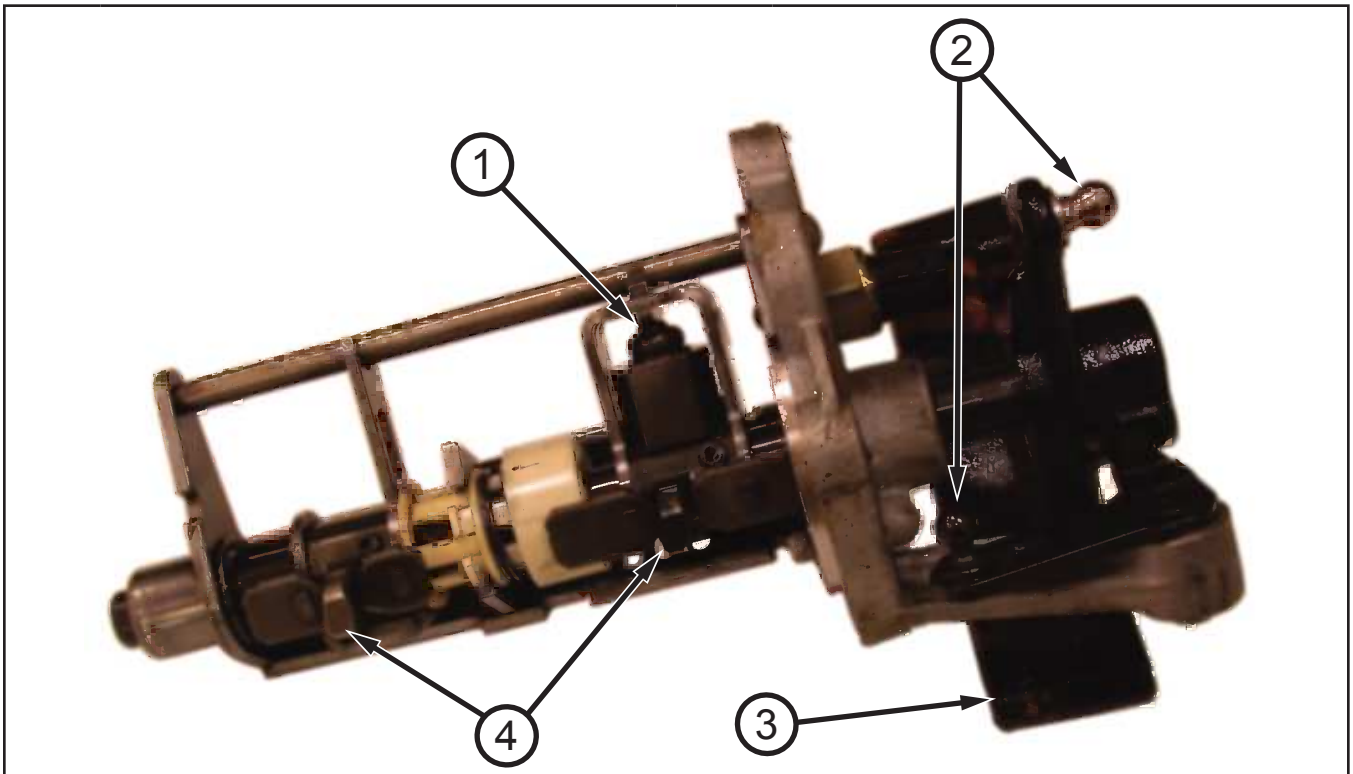
The shift system consists of the shift knob, lever, selector cable, crossover cable, and transaxle shift mechanism. The selector cable is non-adjustable. The crossover cable is adjustable for alignment purposes following installation. If either cable is worn or damaged, both cables must be replaced.



1	Cable Position Lock	3	Shift Cable End
2	Locking Tab		

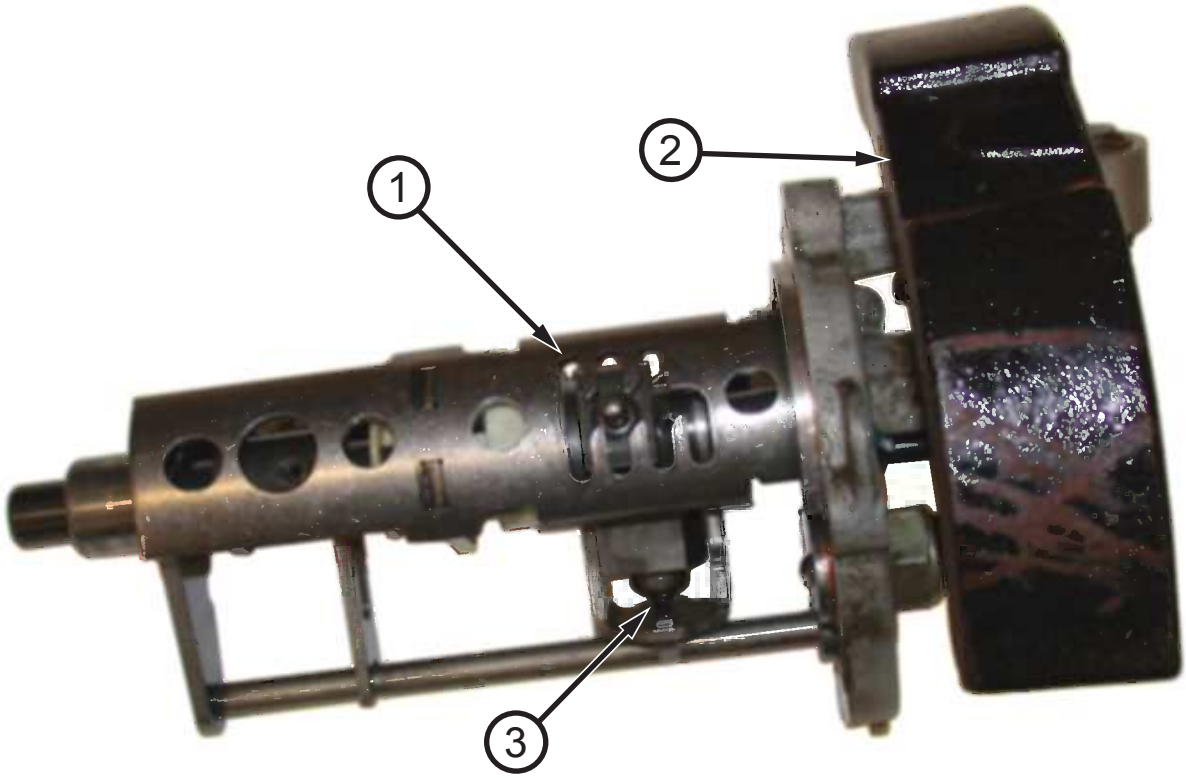
Figure 89 DMT6 Shifter and Cable Assembly

One detent ball and spring serves all gear positions. The shift gate prevents accidental shifting into two gears at once. The counterweight on the shift mechanism facilitates smoother gear shifts.



1	Detent Spring and Ball	3	Counterweight
2	Shift Cable Connections	4	Shift Fingers

Figure 90 DMT6 Shift Mechanism



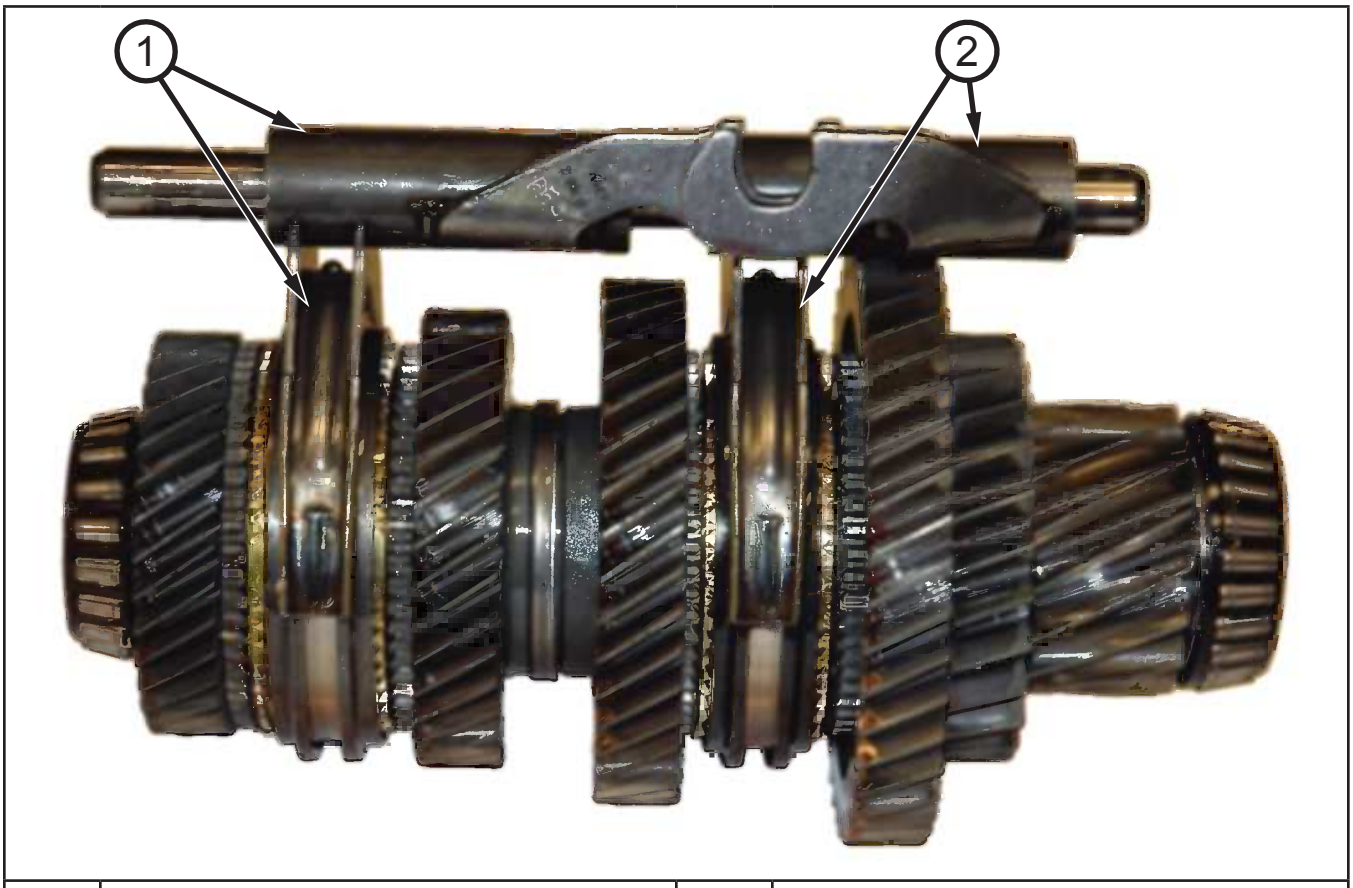
1	Shift Gate	3	Detent Spring and Ball
2	Counterweight		

Figure 91 DMT6 Shift Mechanism, Showing Shift Gate

DMT6 Shift Forks

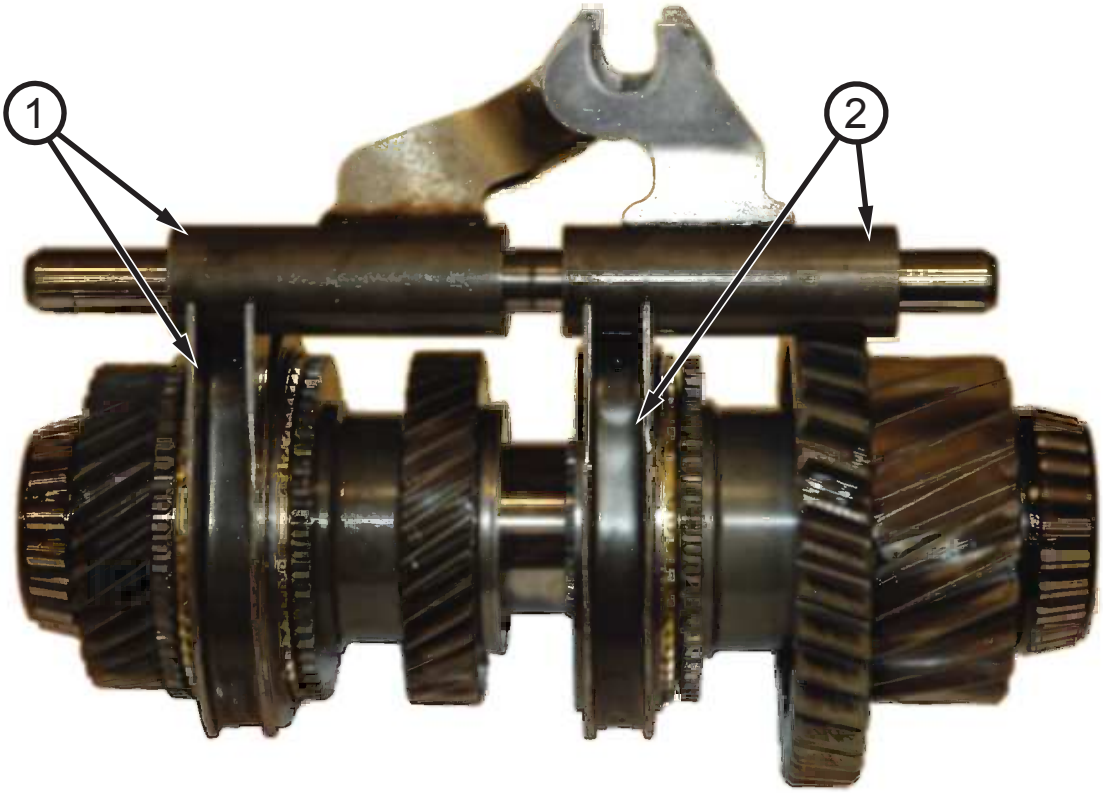
The DMT6 utilizes two shafts to support the four shift forks. Each shift fork assembly is equipped with pads that fit into the synchronizer sleeve groove.

The shift fork tubes are each supported by two ball bearing assemblies, ensuring smooth movement on the shafts and reducing shift effort.



1	3-4 Gear Shift Fork	2	1-2 Gear Shift Fork

Figure 92 DMT6 1-4 Shift Forks



1	5-6 Gear Shift Fork	2	Reverse Gear Shift Fork

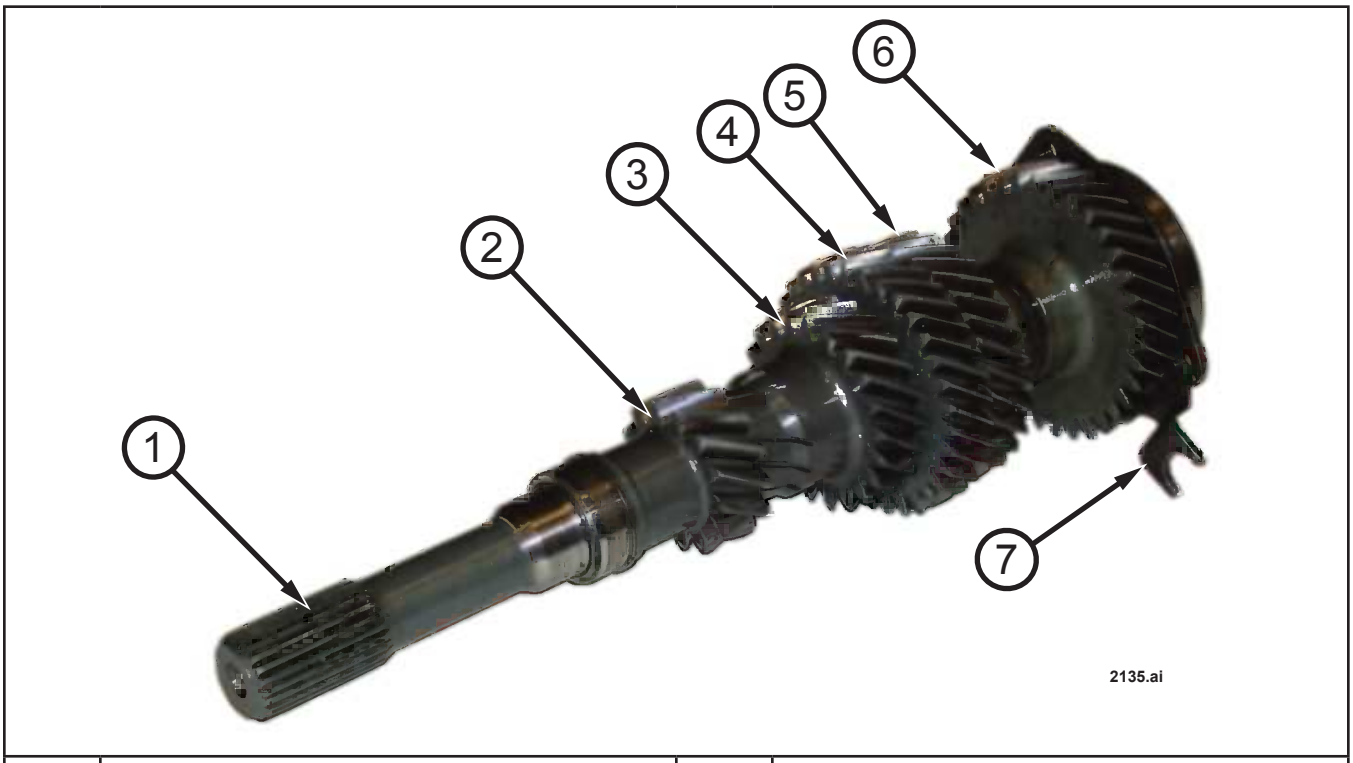
Figure 93 DMT6 5-6-R Shift Shaft

DMT6 INPUT SHAFT

All drive gears of the transaxle are fixed to the input shaft. Due to the absence of any freewheeling gears, the input shaft does not require internal oil passages. The input shaft is supported by one ball bearing and one roller bearing which are splash lubricated. This bearing arrangement requires no preload and needs no adjusting shims. The input shaft seal is pressed into the clutch housing.

Defective input shaft bearings can be pressed off and replaced.

The input shaft is serviceable only as a complete unit.



1	Clutch Disc Splines	5	Third Gear
2	First Drive Gear	6	4-6 Drive Gear
3	Second Drive Gear	7	Ball Bearing Retainer
4	Fifth Drive Gear		

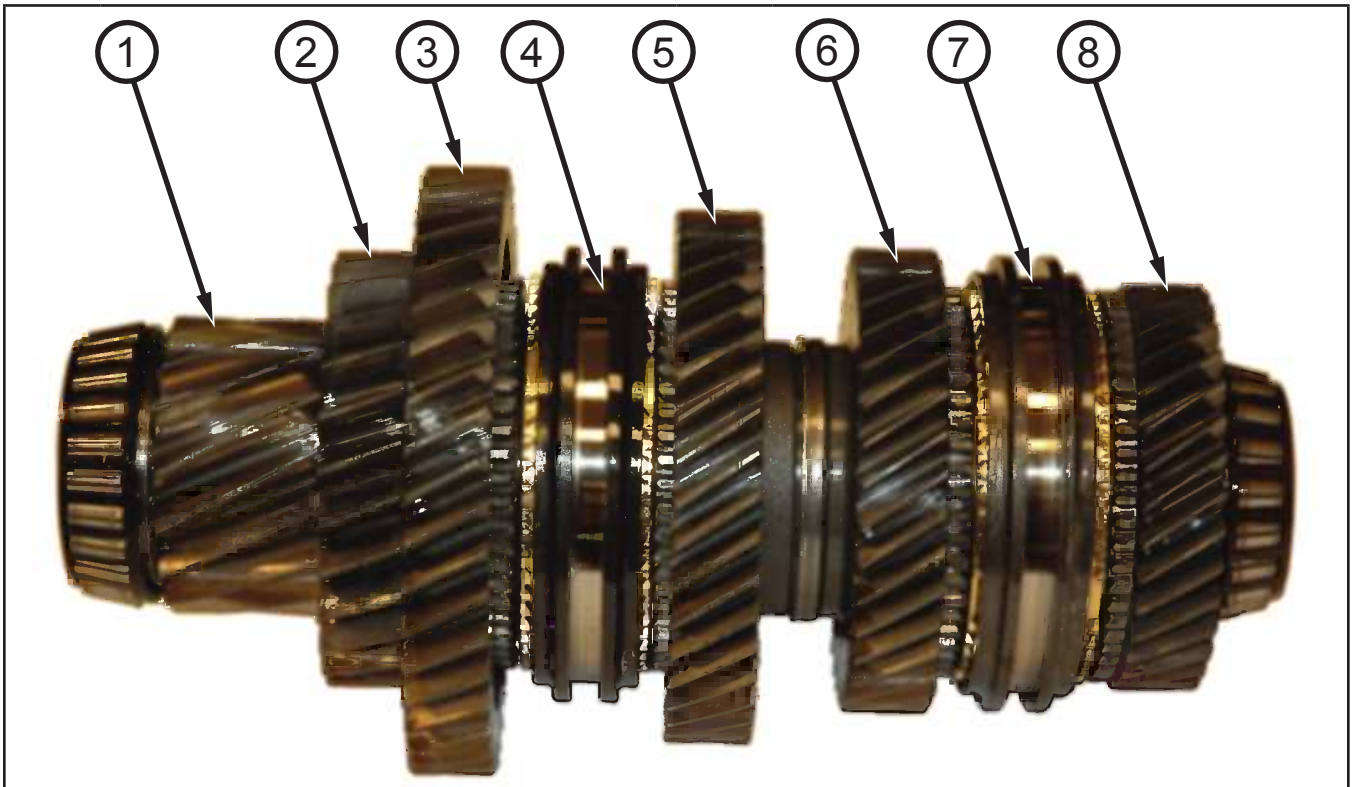
Figure 94 DMT6 Input Shaft

DMT6 1-4 OUTPUT SHAFT

The 1-4 output shaft is supported by tapered roller bearings. This bearing arrangement requires the shaft to be preloaded through the use of selectable shims. Refer to Service Information for preload measuring and adjustment procedures. The output pinion of the 1-4 output shaft is an integral part of the shaft. The 1-2 and 3-4 synchronizer assemblies are located on the 1-4 output shaft.

The Reverse idler gear is welded to the 1st driven gear.

Oil passages are drilled into the 1-4 output shaft to provide lubrication to the bearings and synchronizer assemblies.



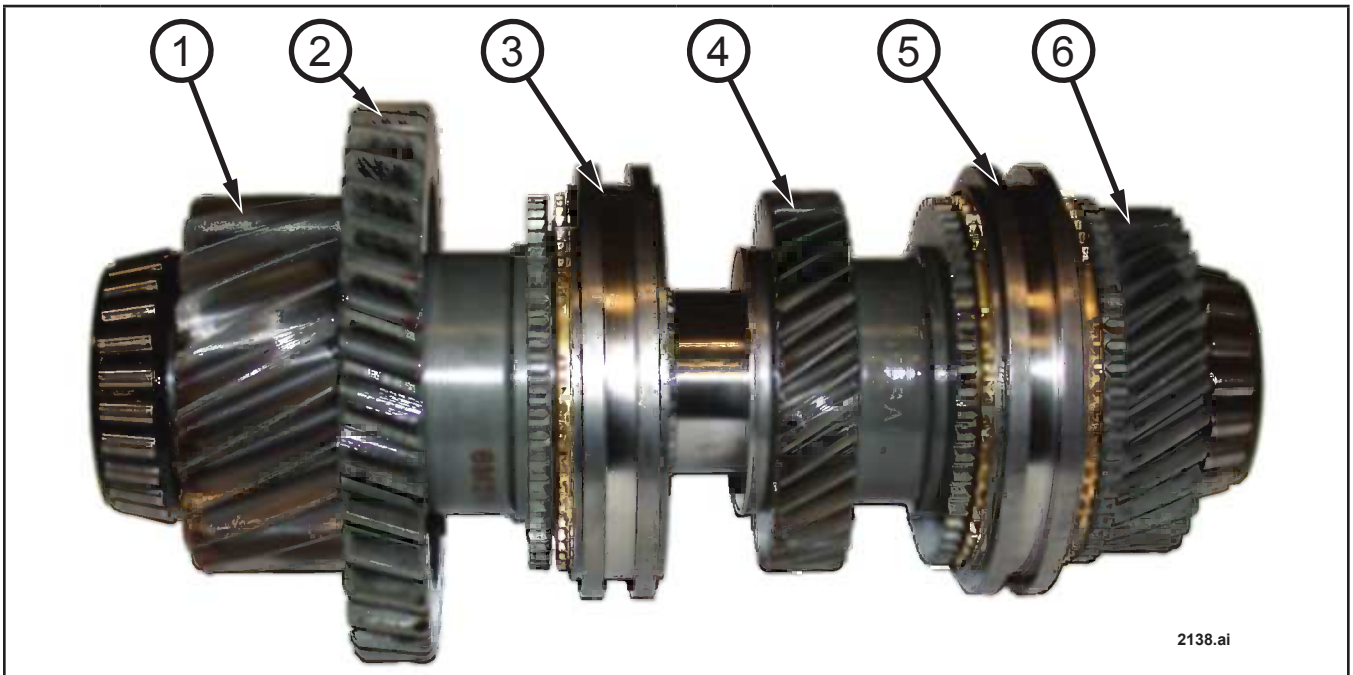
1	16-Tooth Output Pinion	5	Second Driven Gear
2	Reverse Gear Idler	6	Third Driven Gear
3	First Driven Gear	7	3-4 Gear Synchronizer
4	1-2 Gear Synchronizer	8	Fourth Driven Gear

Figure 95 DMT6 1-4 Output Shaft and Synchronizers

DMT6 5-6-R OUTPUT SHAFT

As with the 1-4 output shaft, the 5-6-R output shaft is supported by tapered roller bearings which are preloaded through the use of selectable shims. Refer to Service Information for preload measuring and adjustment procedures. The output pinion of the 5-6-R output shaft is an integral part of the shaft. The 5-6 and Reverse synchronizer assemblies are located on the 5-6-R output shaft.

Oil passages are drilled into the shaft to provide lubrication to the bearings and synchronizer assemblies.



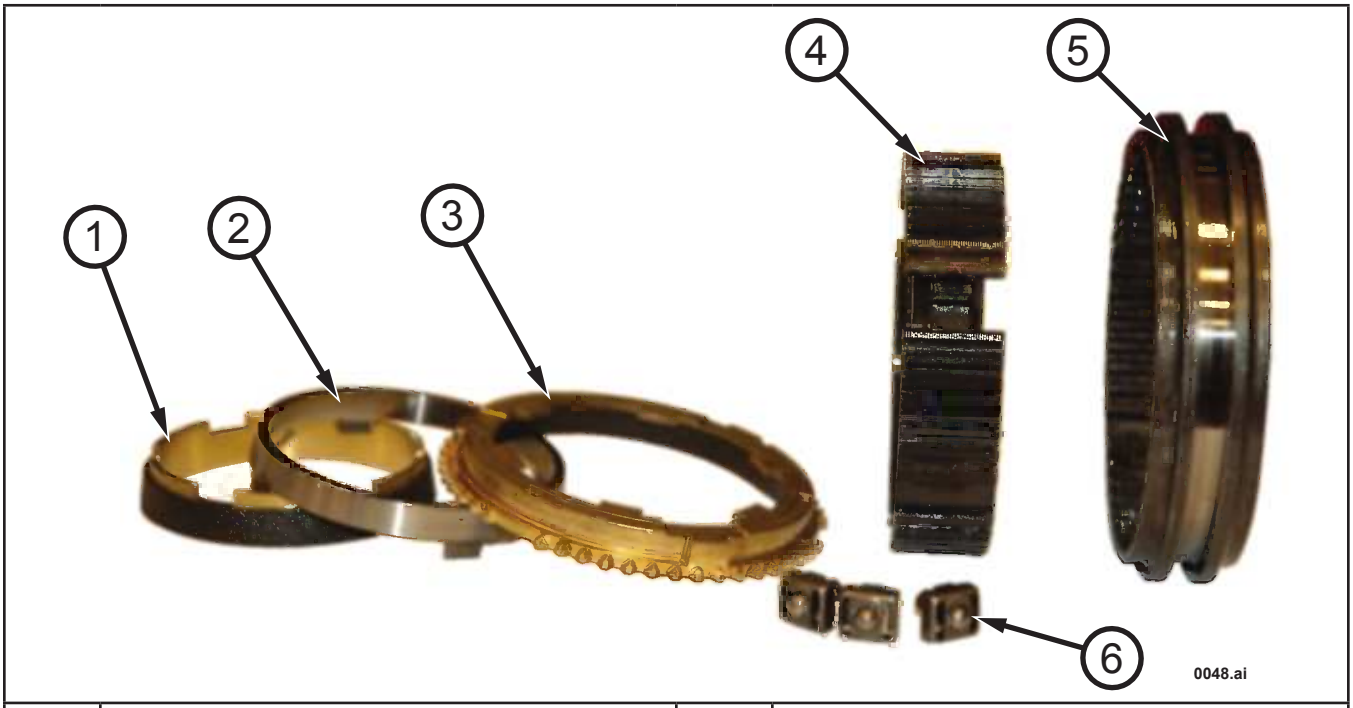
1	22-Tooth Output Pinion	4	Fifth Driven Gear
2	Reverse Driven Gear	5	5-6 Gear Synchronizer
3	Reverse Gear Synchronizer	6	Sixth Driven Gear

Figure 96 DMT6 5-6-R Output Shaft and Synchronizers

DMT6 SYNCHRONIZER

The DMT6 utilizes two types of synchronizer assemblies. The 1-2 and 3-4 synchronizers are double cone type, while the 5-6 and Reverse synchronizers are single cone. Detent balls, springs, and sliding blocks are contained in the strut assemblies, allowing easier synchronizer service.

All synchronizer hubs are splined to the output shafts and held in place with snap rings.

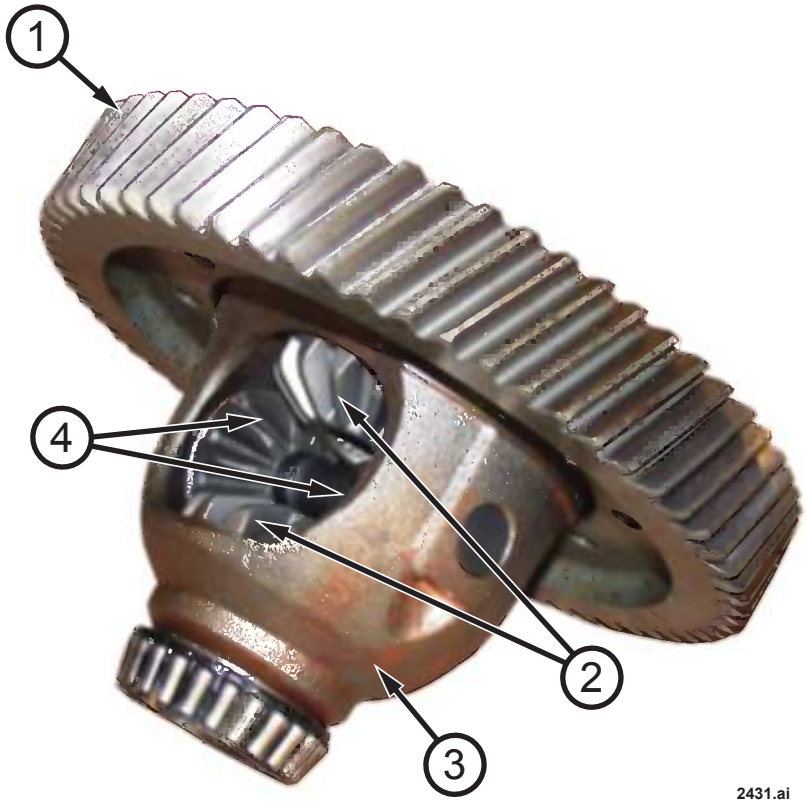


1	Synchronizer Friction Ring	4	Synchronizer Hub
2	Synchronizer Cone	5	Synchronizer Sleeve
3	Synchronizer Blocker Ring	6	Strut Assembly

Figure 97 DMT6 Double Cone Synchronizer Exploded View

DMT6 DIFFERENTIAL ASSEMBLY

The DMT6 differential is an open type, supported by preloaded tapered roller bearings. Refer to Service Information for preload measuring and adjustment procedures.



1	Ring Gear	3	Differential Housing
2	Side Gears	4	Pinion Gears

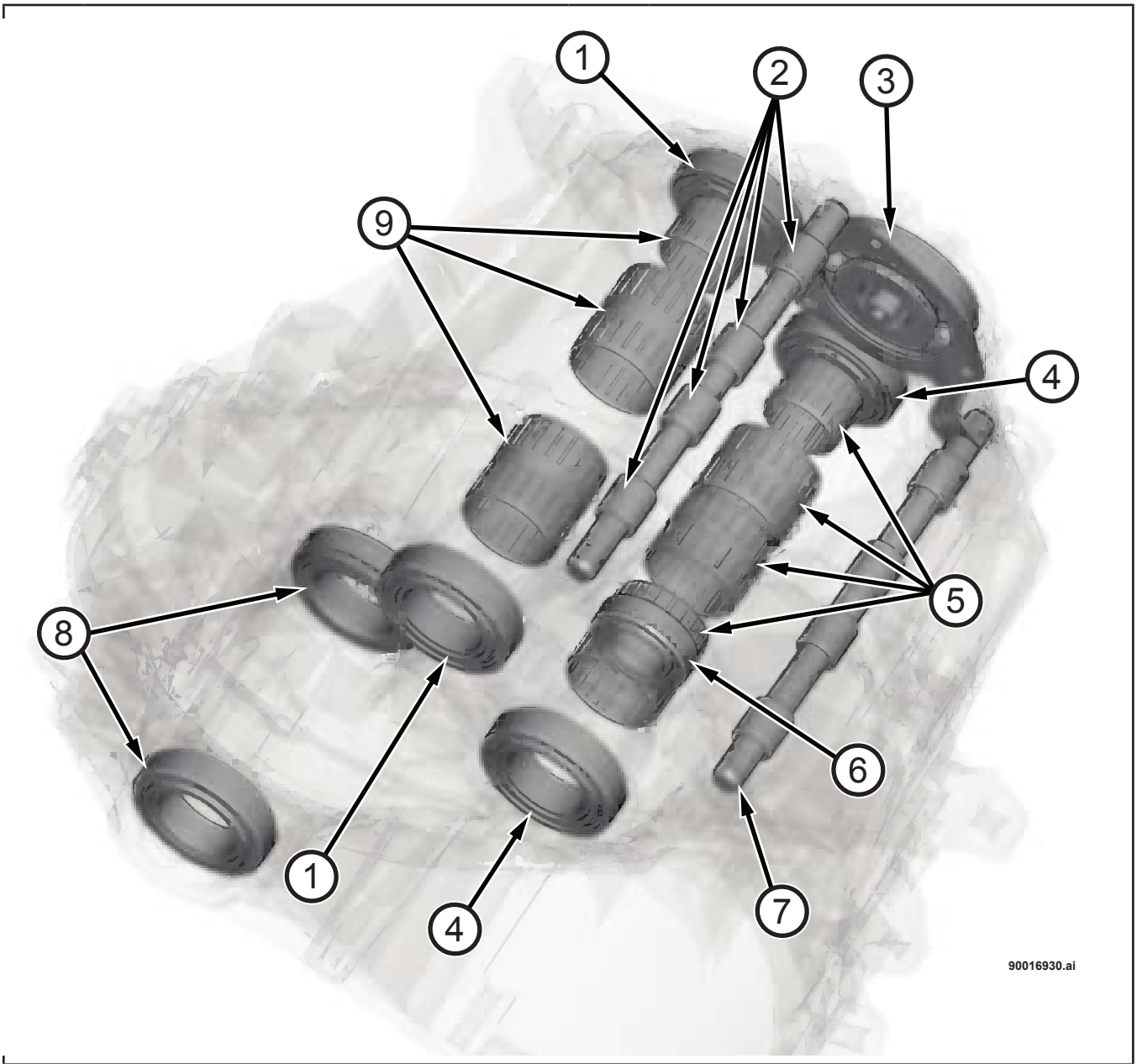
Figure 98 DMT6 Differential Assembly

DMT6 BEARINGS

The DMT6 utilizes several bearing types to support the moving components of the transaxle. Tapered roller bearings contained in plastic cages support the differential and the 1-4 and 5-6-R output shafts. Double row needle bearings, also contained in plastic cages, support the freewheeling gears on the output shafts.

The tapered roller bearings are an interference fit to the output shafts and the differential. Heating these bearings is not recommended. Always refer to the appropriate Service Information.

The shift shaft ball bearings are not serviceable.



1	5-6-R Output Shaft Tapered Roller Bearings	6	Input Shaft Roller Bearing
2	5-6-R Shift Shaft Ball Bearings	7	1-4 Shift Shaft
3	Input Shaft Ball Bearing	8	Differential Tapered Roller Bearings
4	1-4 Output Shaft Tapered Roller Bearings	9	5-6-R Freewheeling Gear Needle Bearings
5	1-4 Freewheeling Gear Needle Bearings		

Figure 99 DMT6 Bearings

DMT6 CLUTCH

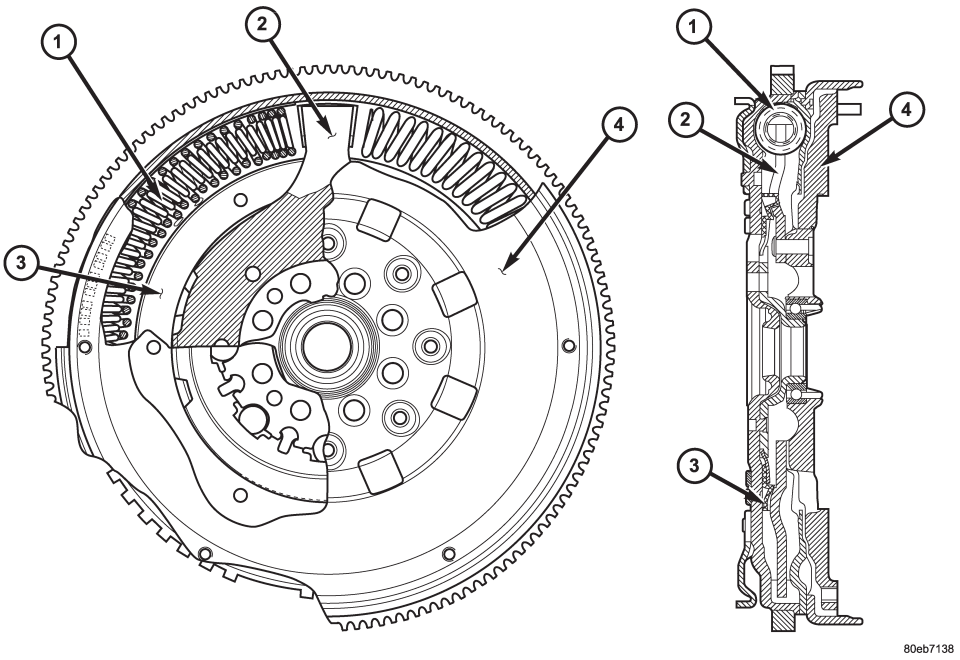
The DMT6 non-adjustable clutch is coupled to a Dual Mass Flywheel (DMF). The modular design allows the clutch, pressure plate, and DMF to be assembled on the workbench and installed as a unit. The pressure plate is secured to the DMF with bolts rather than the rivets of a typical modular clutch, allowing service of the clutch disc and pressure plate.

Dual Mass Flywheel

The DMF used with the DMT6 consists of two decoupled masses (primary and secondary mass) that are connected via a spring/damping system. The primary flywheel side is bolted to the crankshaft. The secondary flywheel face serves as the driving member to the clutch disc. Internal springs between the flywheels are used to couple the masses while dampening energy. The flywheel also incorporates the ring gear around the outer circumference to mesh with the starter to permit engine cranking.

The additional secondary mass coupled to the transaxle lowers the natural frequency of the transaxle rotating elements. This decreases the transaxle gear rattle. The damper springs between the two flywheel masses replace the clutch disc damper springs and assist in a smooth transfer of torque to the transaxle.

Caution: The Dual Mass Flywheel is serviced as an assembly only and should never be disassembled.



1	Thrust Spring	3	Primary Mass
2	Flange/Diaphragm Spring	4	Secondary Mass

Figure 100 Dual Mass Flywheel

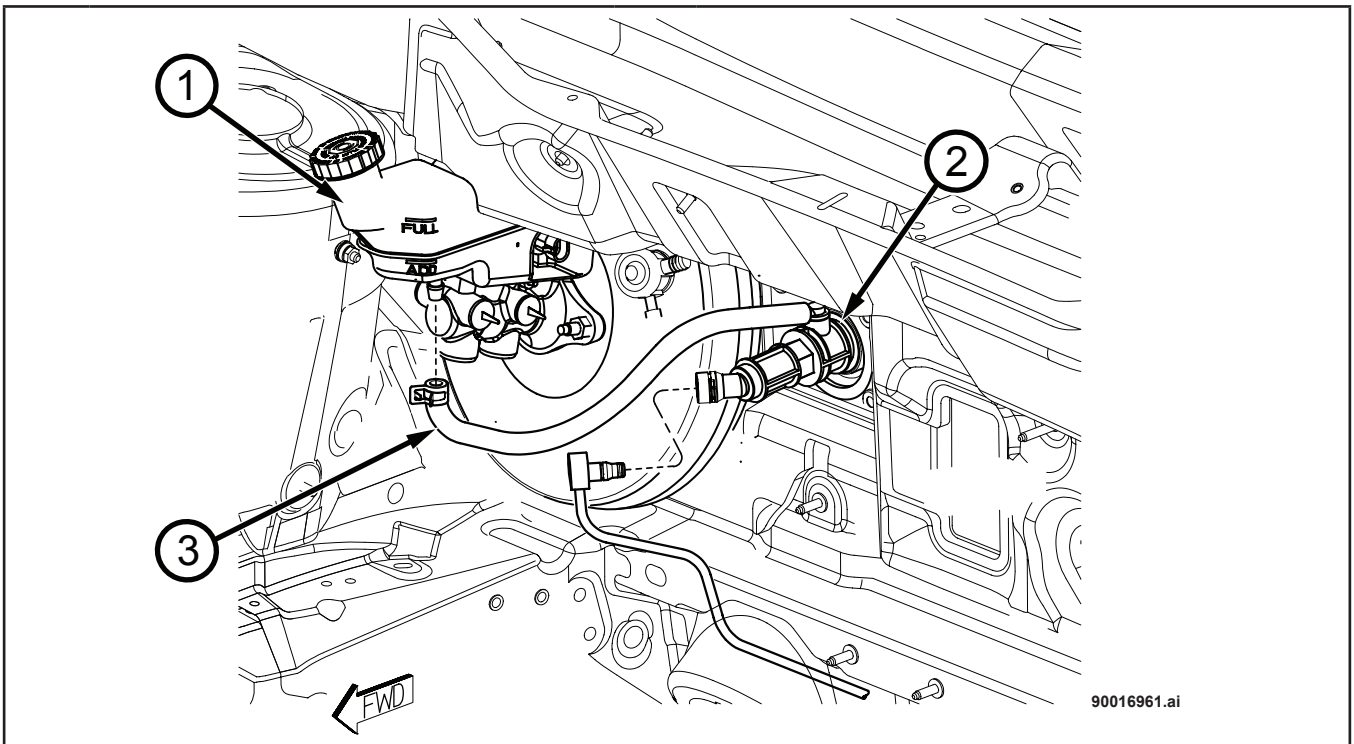
DMT6 Clutch Release System

The DMT6 clutch release system in the Caliber SRT4 is the same as that used in the Caliber with the T355. The system utilizes a slave cylinder of a concentric design, having all components fixed about the same axis.

The Concentric Slave Cylinder (CSC) is mounted to the inside of the bellhousing and is serviced only as an assembly. It is shaped like a sleeve that expands and eliminates the need for a clutch fork.

The concentric design permits high efficiency, resulting in low and consistent pedal effort, as well as automatic adjustment to compensate for clutch disc wear.

The CSC is a self-contained unit, consisting of a main body, piston, spring, integrated release bearing, and a rubber boot. The spring-loaded piston holds tension against the pressure plate spring fingers. When the clutch pedal is depressed, the push rod forces fluid from the master cylinder, through a fluid line, to the CSC. The fluid pushes against the spring-loaded piston and the piston exerts increased force on the pressure plate spring fingers to release the clutch.



1	Brake System Fluid Resevoir	3	Clutch System Fluid Supply Line
2	Clutch Master Cylinder		

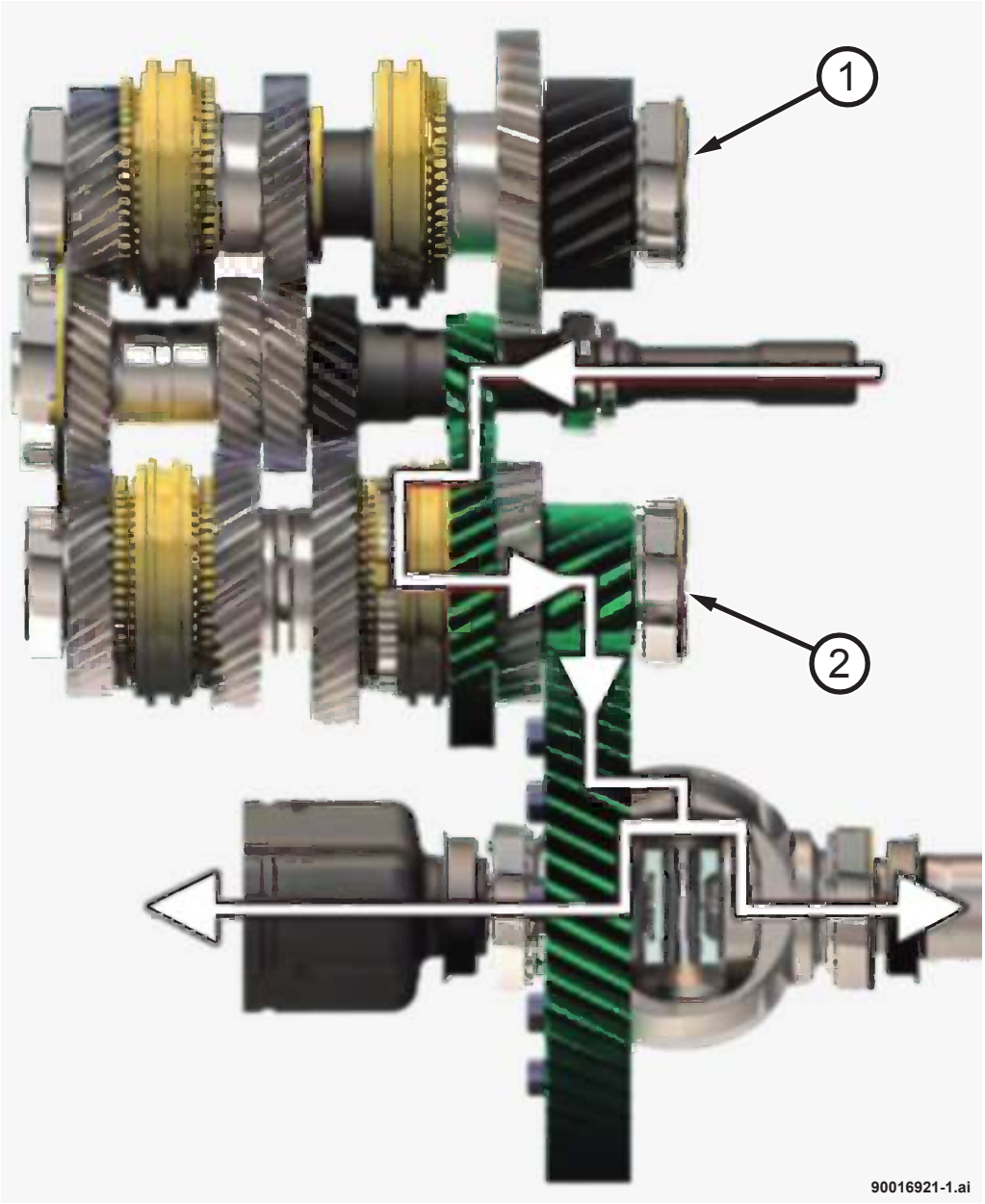
Figure 101 DMT6 Clutch Release System

DMT6 POWER FLOW

Power flow through the DMT6 enters at the input shaft and is transferred to the differential via one of two output shafts. The output shafts have different size pinion gears, enabling one gear on the input shaft to be utilized for both 4th and 6th gears. The ring gear is in constant mesh with both pinion gears.

1st Gear

When the clutch is engaged (clutch pedal up), power is transmitted to the input shaft. The input shaft first drive gear is in constant mesh with the 1-4 output shaft first driven gear. When the 1-2 synchronizer is locked to first gear, which locks first gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

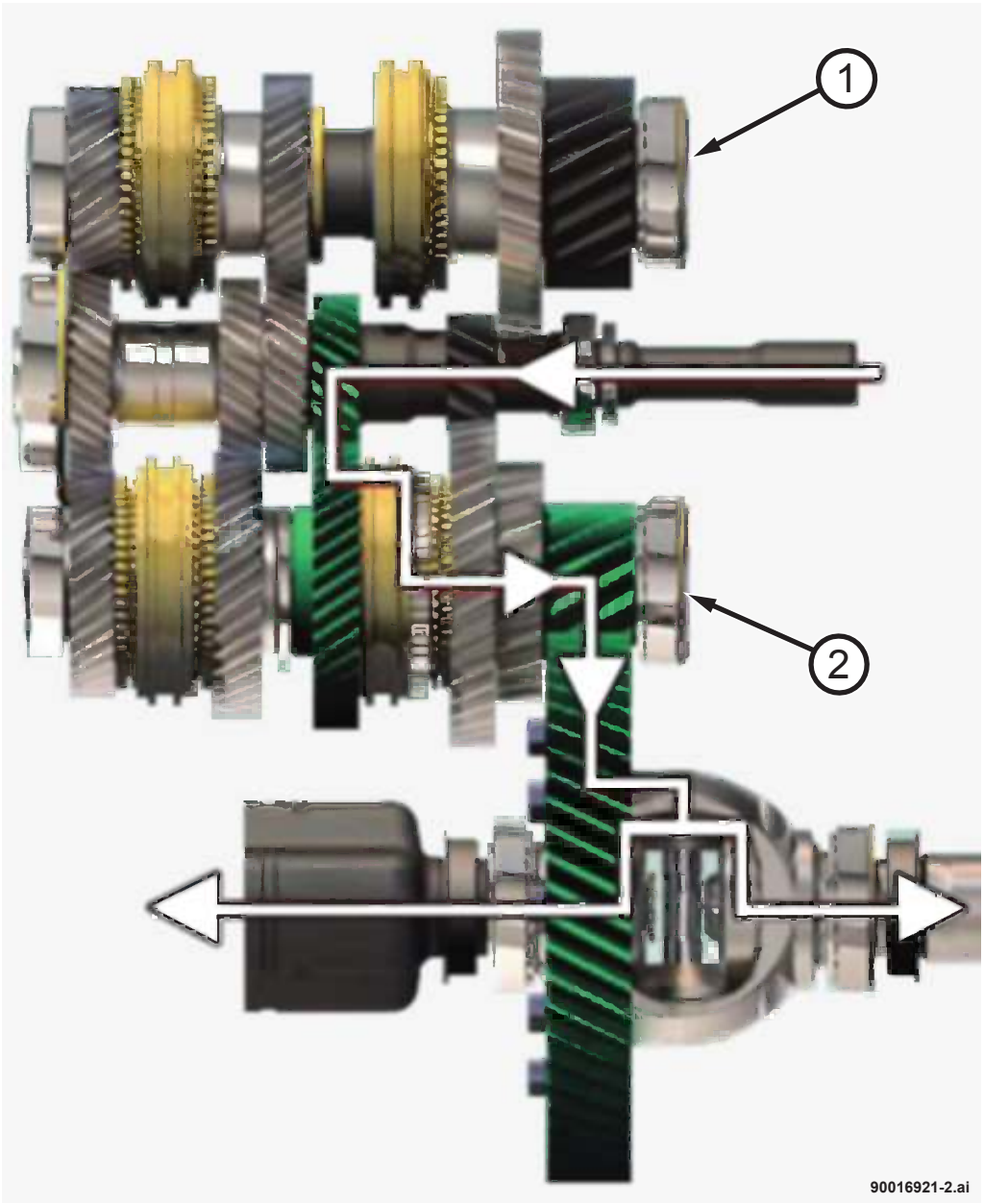


1	5-6-R Output Shaft	2	1-4 Output Shaft

Figure 102 DMT6 1st Gear Power Flow

2nd Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft second drive gear is in constant mesh with the 1-4 output shaft second driven gear. When the 1-2 synchronizer is locked to second gear, which locks second gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

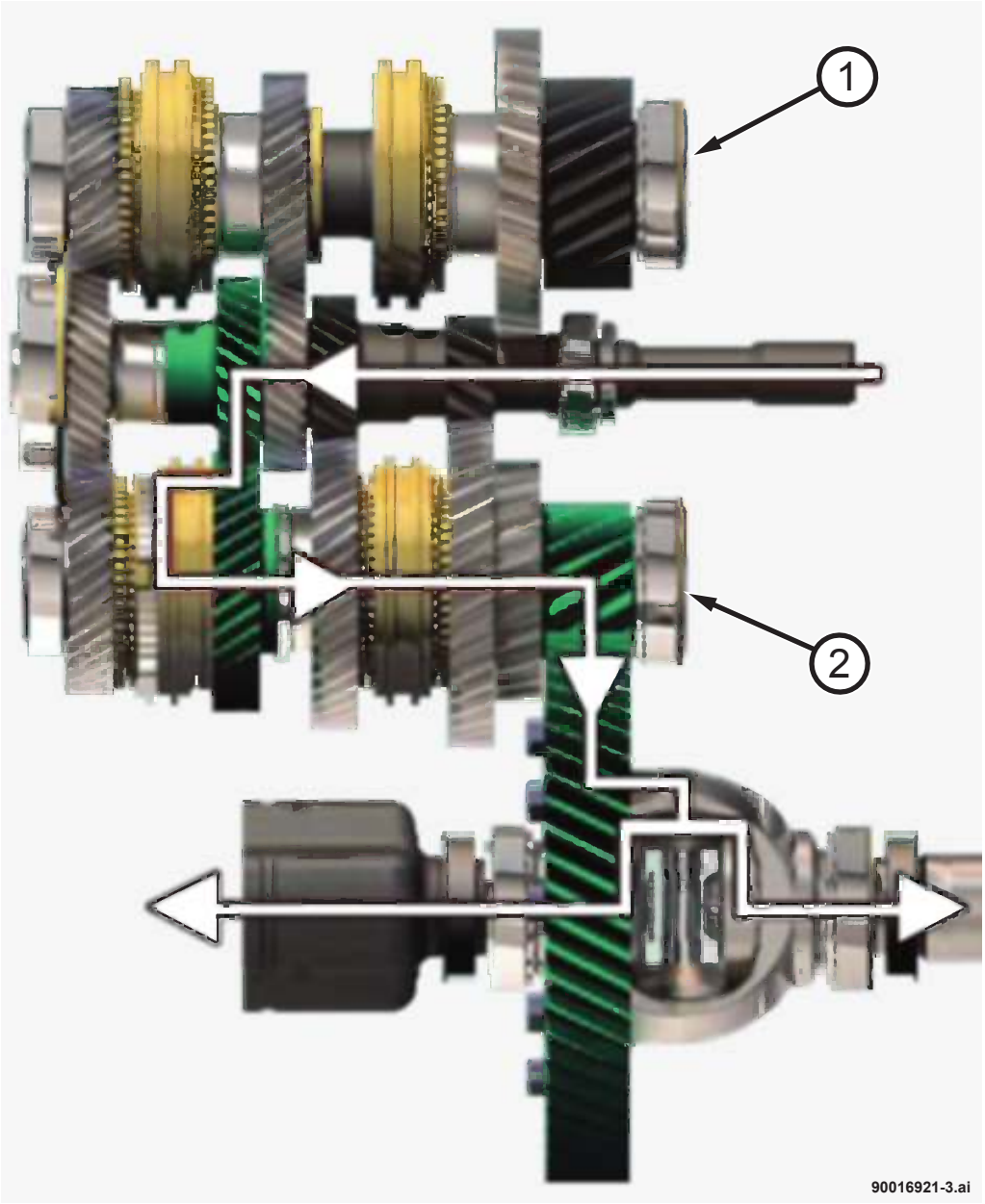


1	5-6-R Output Shaft	2	1-4 Output Shaft

Figure 103 DMT6 2nd Gear Power Flow

3rd Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft third drive gear is in constant mesh with the 1-4 output shaft third driven gear. When the 3-4 synchronizer is locked to third gear, which locks third gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

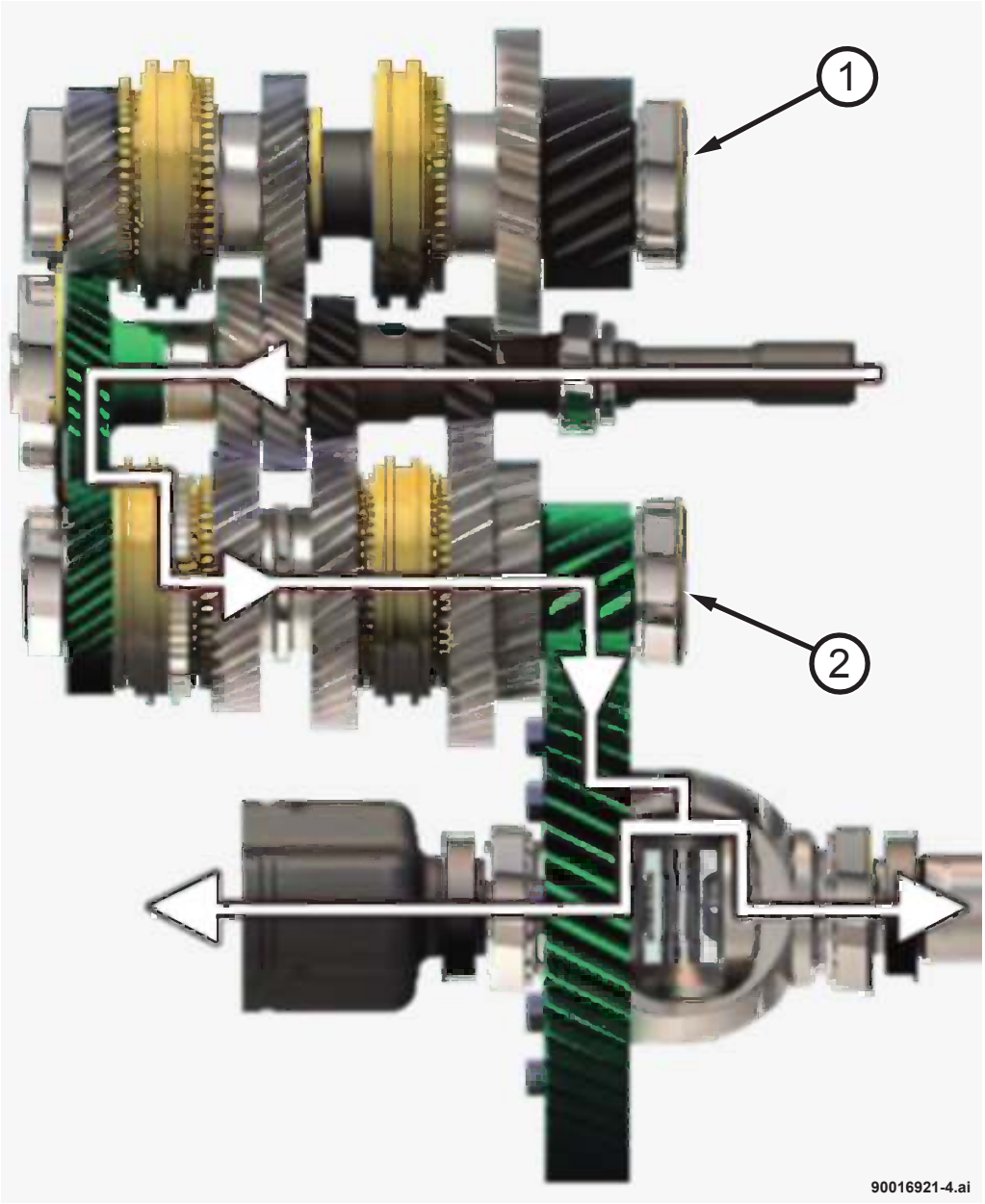


1	5-6-R Output Shaft	2	1-4 Output Shaft

Figure 104 DMT6 3rd Gear Power Flow

4th Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft 4-6 drive gear is in constant mesh with the 1-4 output shaft fourth driven gear. When the 3-4 synchronizer is locked to fourth gear, which locks fourth gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

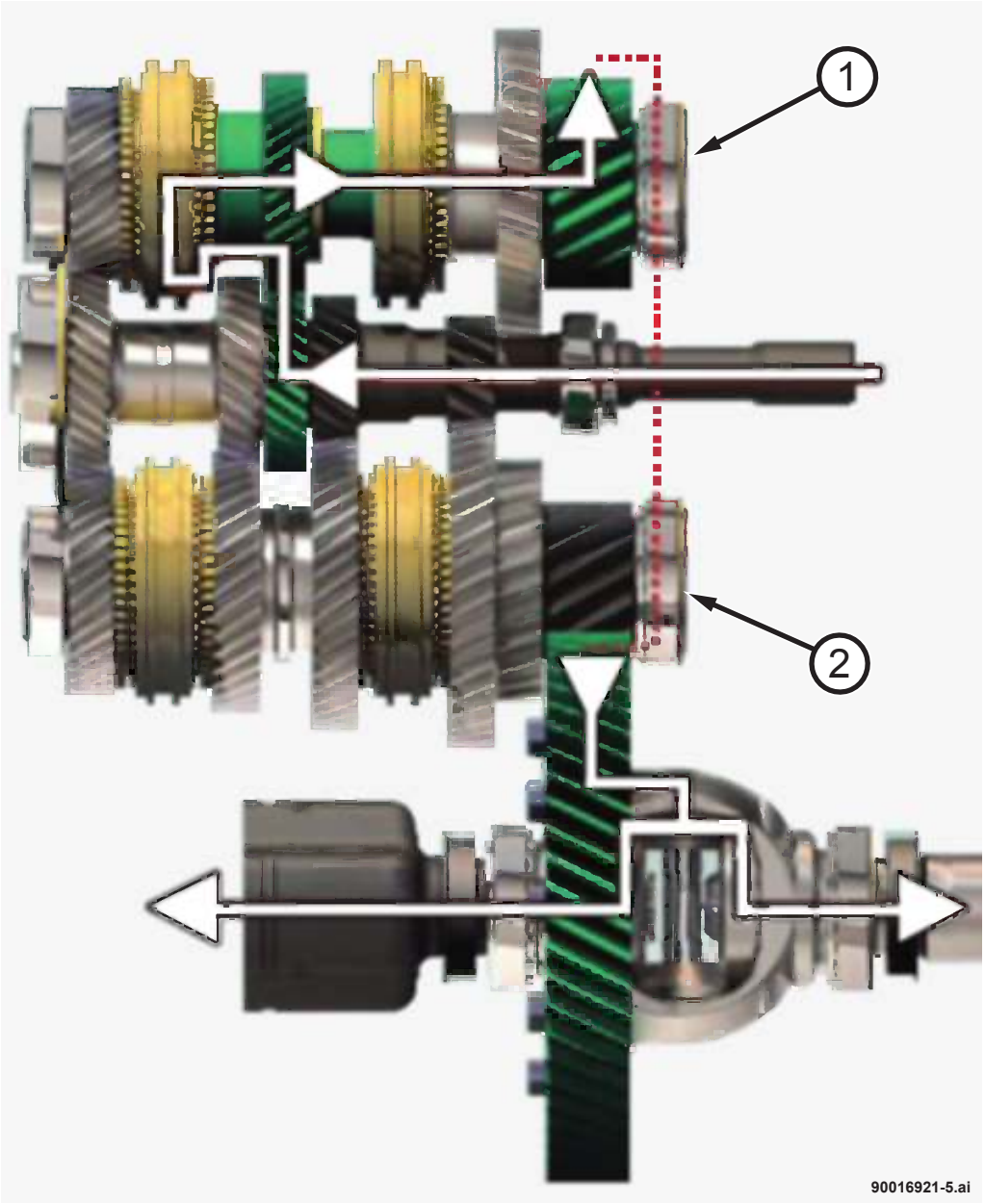


1	5-6-R Output Shaft	2	1-4 Output Shaft

Figure 105 DMT6 4th Gear Power Flow

5th Gear

When the clutch is engaged (clutch pedal up), power is transmitted to the input shaft. The input shaft fifth drive gear is in constant mesh with the 5-6-R output shaft fifth driven gear. When the 5-6 synchronizer is locked to fifth gear, which locks fifth gear to the 5-6-R output shaft, power is transferred through the 5-6-R output shaft to the differential.

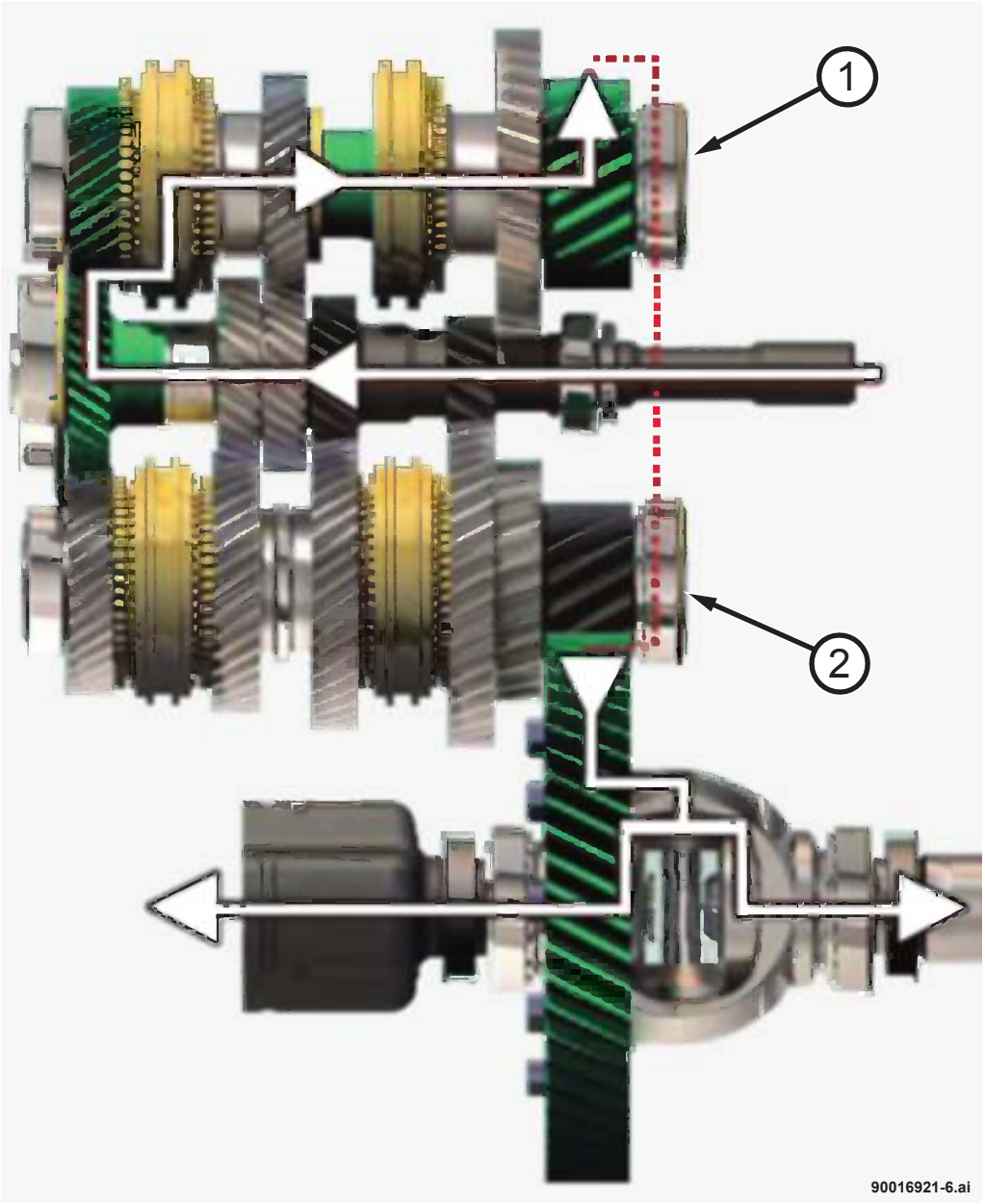


1	5-6-R Output Shaft	2	1-4 Output Shaft

Figure 106 DMT6 5th Gear Power Flow

6th Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft 4-6 drive gear is in constant mesh with the 5-6-R output shaft sixth driven gear. When the 5-6 synchronizer is locked to sixth gear, which locks sixth gear to the 5-6-R output shaft, power is transferred through the 5-6-R output shaft to the differential.



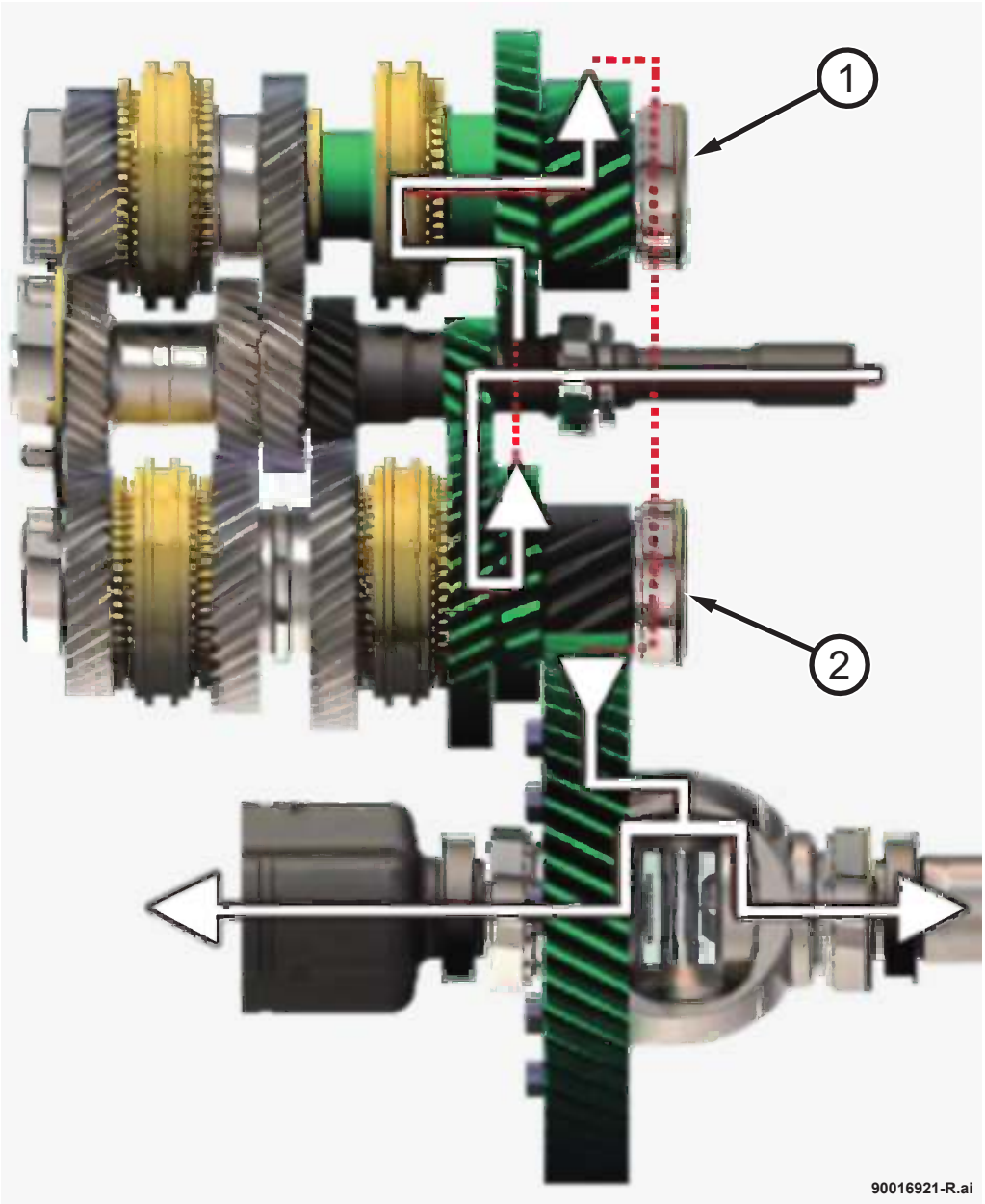
1	5-6-R Output Shaft	2	1-4 Output Shaft

Figure 107 DMT6 6th Gear Power Flow

Reverse Gear

When the clutch is engaged (clutch pedal up), power is transmitted to the input shaft. The input shaft first drive gear is in constant mesh with the 1-4 output shaft first driven gear. The reverse idler gear is welded to the first driven gear.

The reverse idler gear drives the reverse driven gear, which is locked to the 5-6-R output shaft by the reverse gear synchronizer. Power is then transferred through the 5-6-R output shaft to the differential.



1	5-6-R Output Shaft	2	1-4 Output Shaft

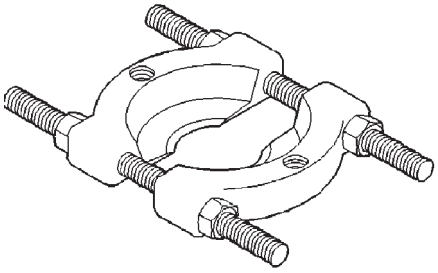
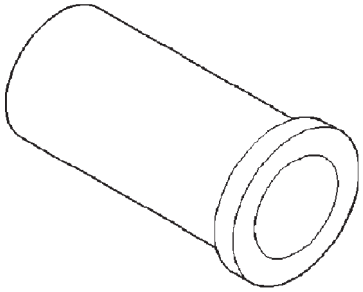
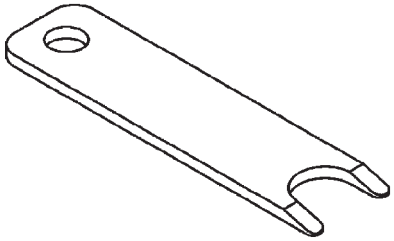
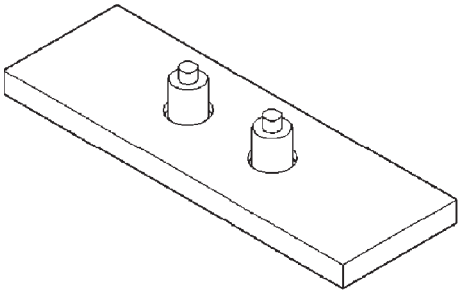
Figure 108 DMT6 Reverse Gear Power Flow

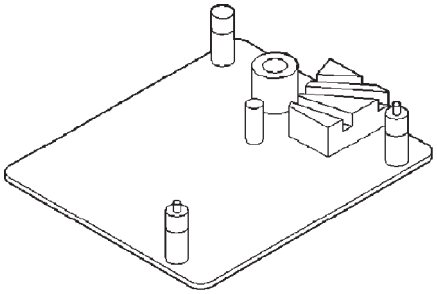
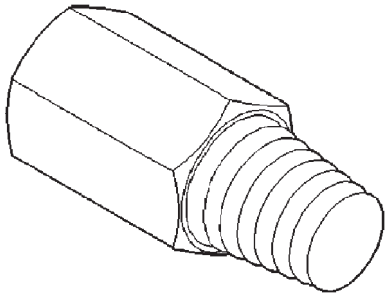
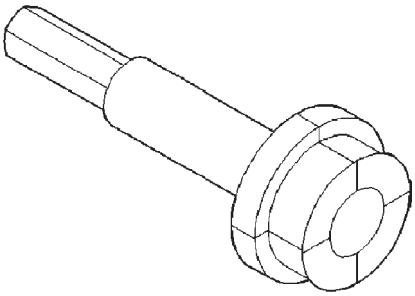
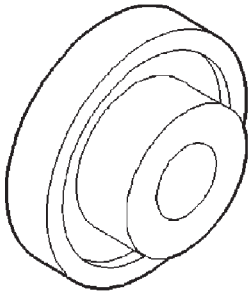
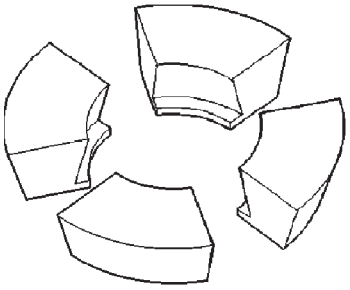
Notes:

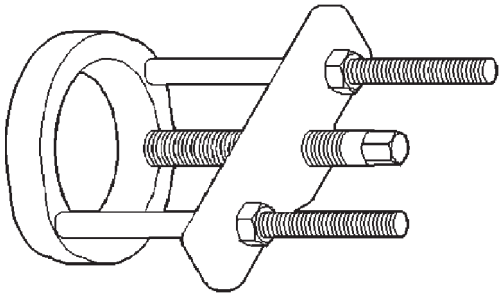
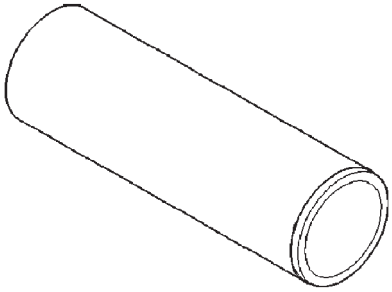
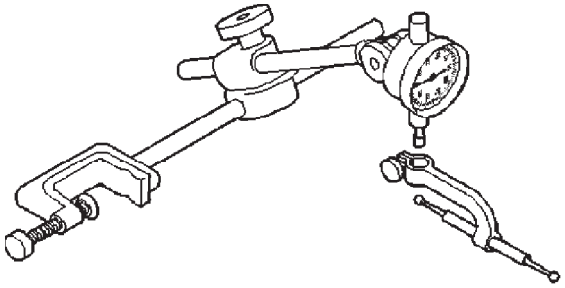
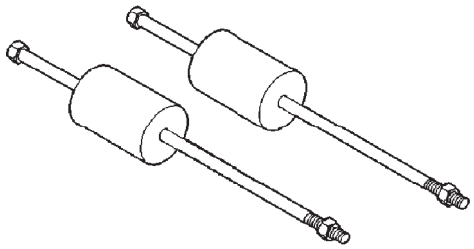
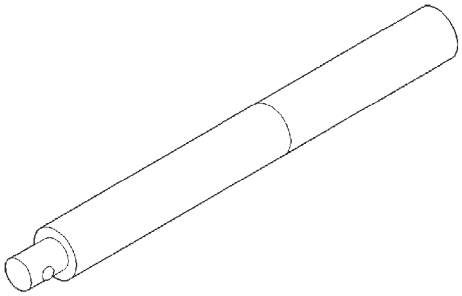
Notes:

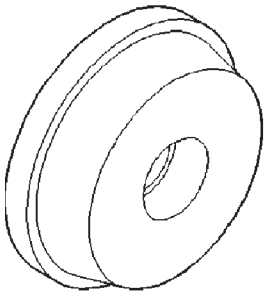
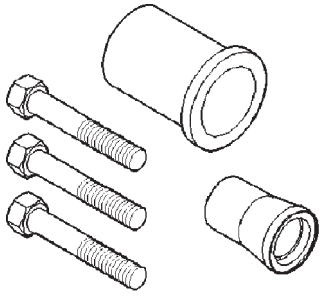
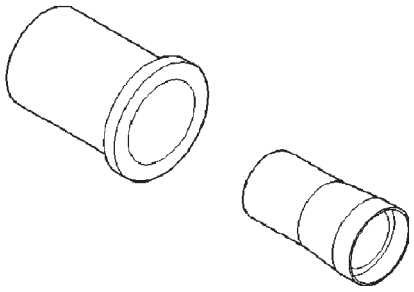
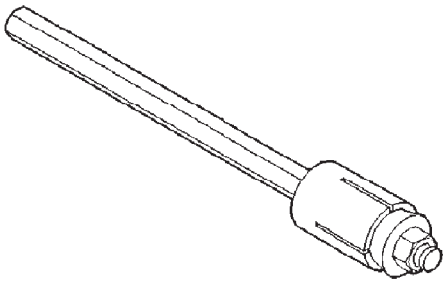
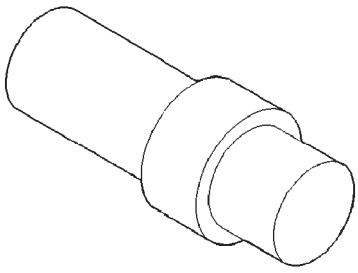
SPECIAL SERVICE TOOLS

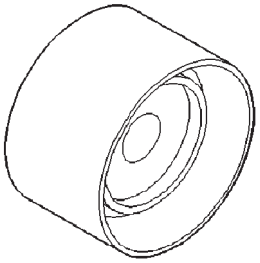
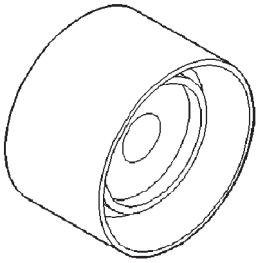
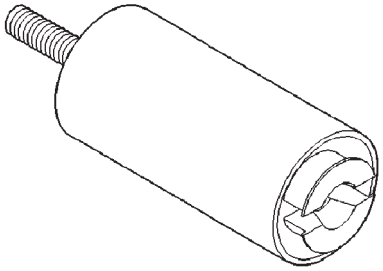
T350 SPECIAL TOOLS

NUMBER	Name	DESCRIPTION
1130	Bearing Splitter	
6342	Driver	
6638A	Disconnect Tool	
6768	Bearing Remover	

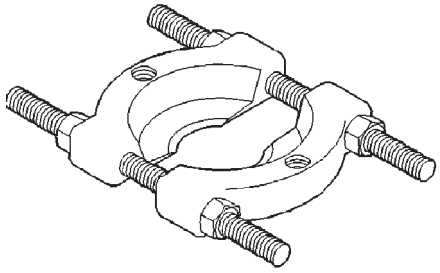
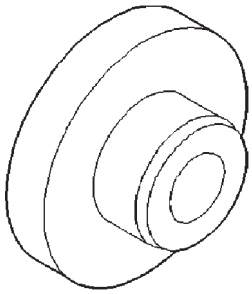
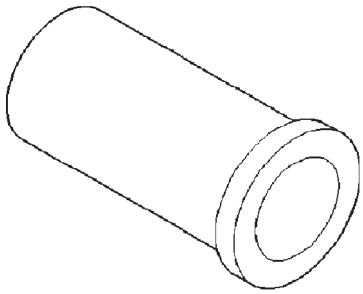
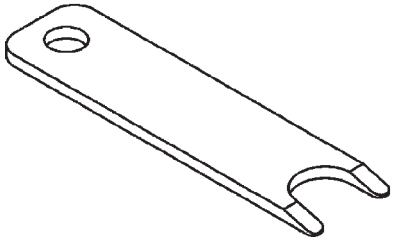
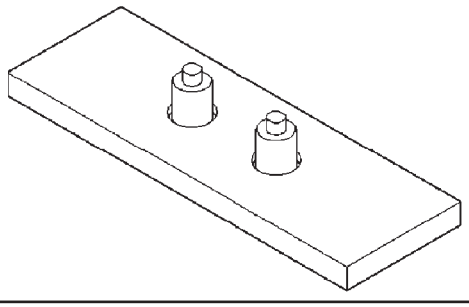
NUMBER	Name	DESCRIPTION
6785	Bench Fixture	
6786	Remover	
6787	Remover	
9928	Seal Installer	
C-293-45	Adaptor Blocks	

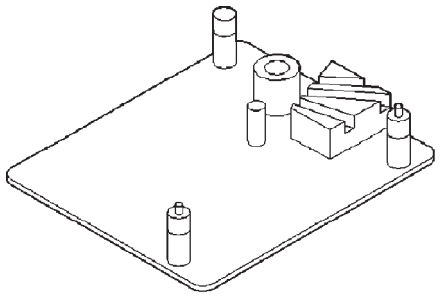
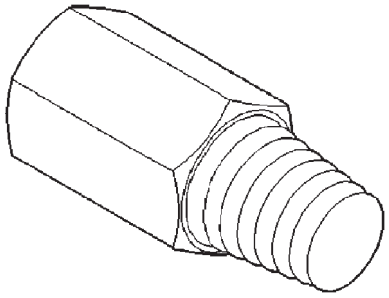
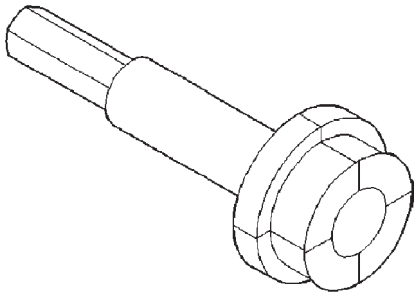
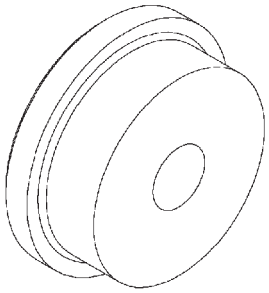
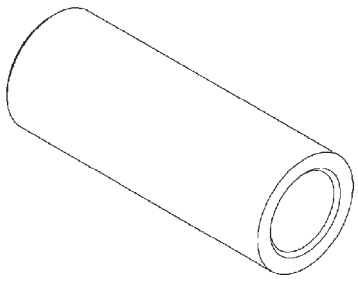
NUMBER	Name	DESCRIPTION
C-293-PA	Puller	
C-3717	Sleeve	
C-3339	Dial Indicator	
C-3752	Slide Hammer	
C-4171	Handle	

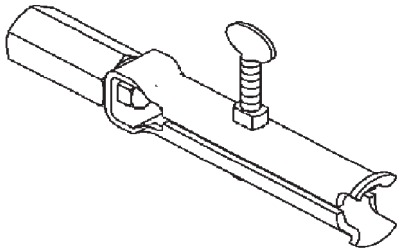
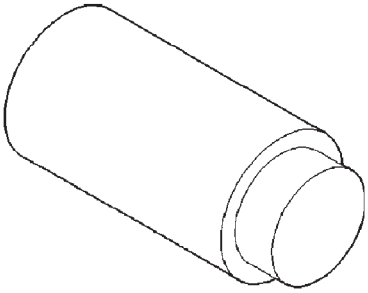
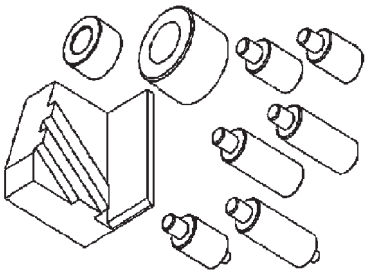
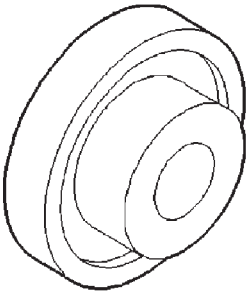
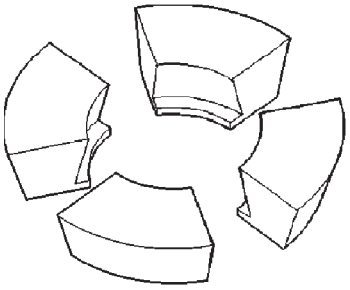
NUMBER	Name	DESCRIPTION
C-4628	Bearing Installer	
C-4680	Seal Remover	
C-4992	Seal Installer	
C-4995	Torque Tool	
C-4996	Adapter	

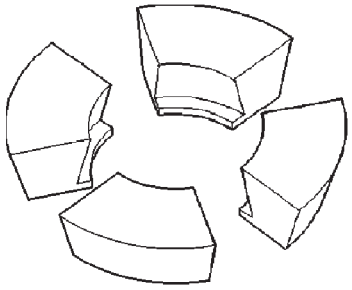
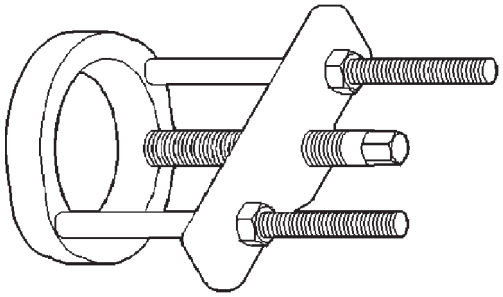
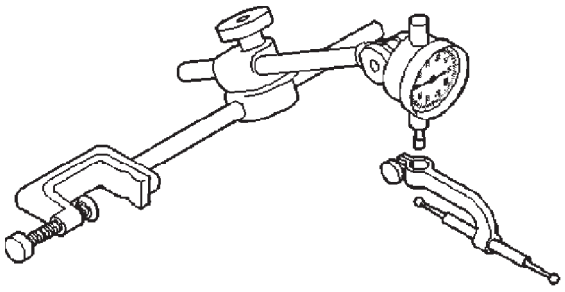
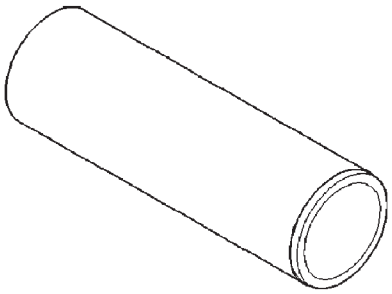
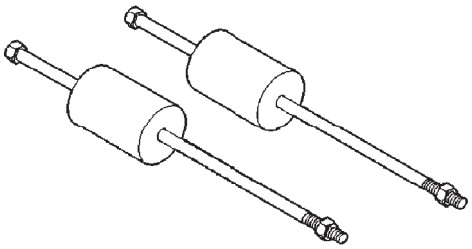
NUMBER	Name	DESCRIPTION
L-4410	Installer	
L-4440	Installer	
L-4518	Puller	

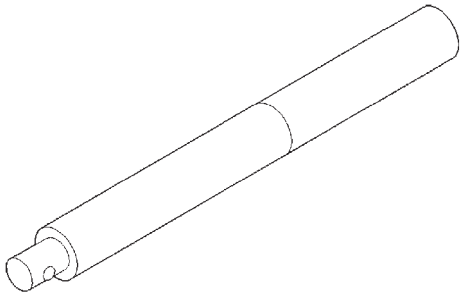
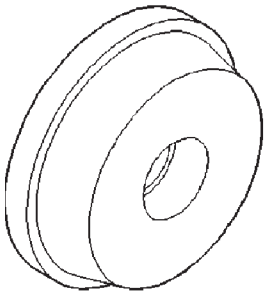
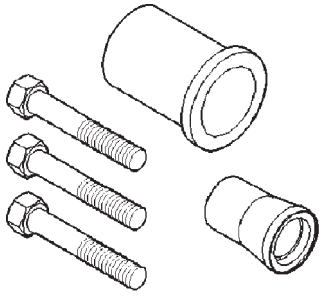
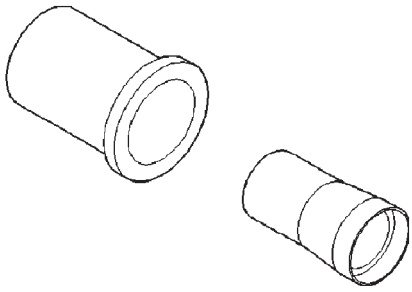
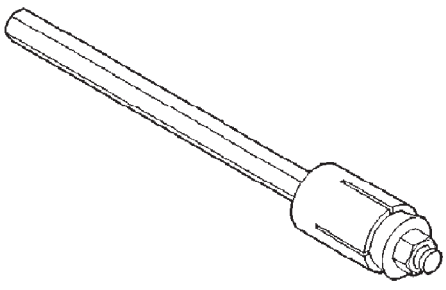
T355 SPECIAL TOOLS

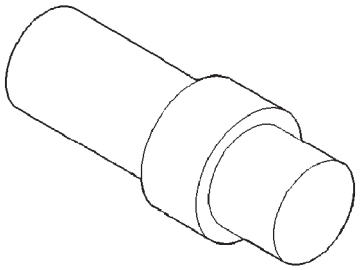
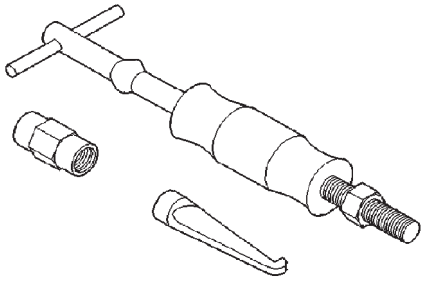
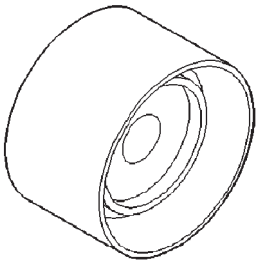
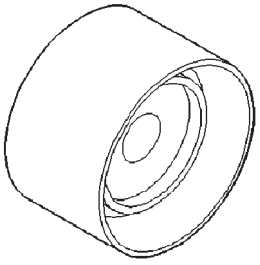
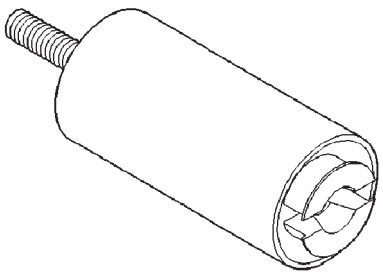
NUMBER	Name	DESCRIPTION
1130	Bearing Splitter	
5064	Bearing Installer	
6342	Driver	
6638A	Disconnect Tool	
6768	Bearing Remover	

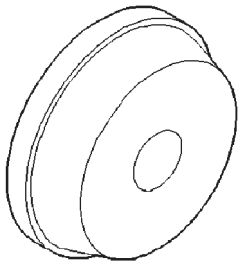
NUMBER	Name	DESCRIPTION
6785	Bench Fixture	
6786	Remover	
6787	Remover	
8692	Installer	
8864	Installer	

NUMBER	Name	DESCRIPTION
9585	Puller	
9678	Plug Or Insert	
9761	Adaptors	
9928	Seal Installer	
C-293-37	Adapters	

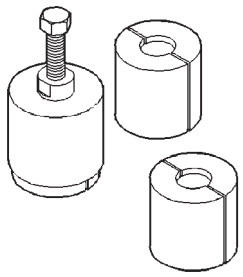
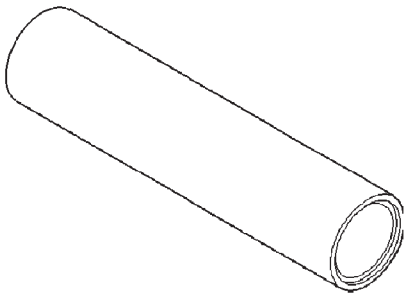
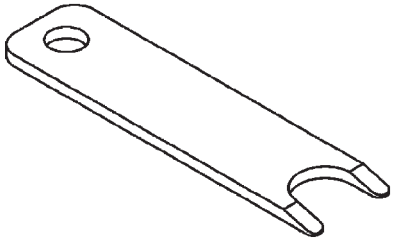
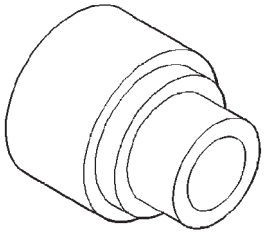
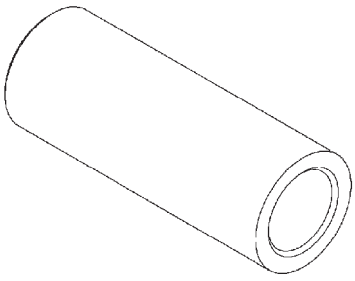
NUMBER	Name	DESCRIPTION
C-293-45	Adaptor Blocks	
C-293-PA	Puller	
C-3339	Dial Indicator	
C-3717	Sleeve	
C-3752	Slide Hammer	

NUMBER	Name	DESCRIPTION
C-4171	Handle	
C-4628	Bearing Installer	
C-4680	Seal Remover	
C-4992	Seal Installer	
C-4995	Torque Tool	

NUMBER	Name	DESCRIPTION
C-4996	Adapter	
C-637	Slide Hammer	
L-4410	Installer	
L-4440	Installer	
L-4518	Puller-	

NUMBER	Name	DESCRIPTION
L-4520	Installer	

G288 SPECIAL TOOLS

Number	Name	Description
5048	Puller Set	
6448	Installer	
6638A	Disconnect Tool	
6954	Remover	
8864	Installer	

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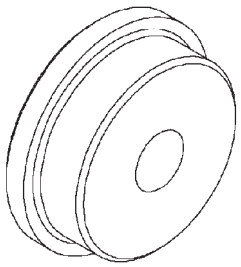
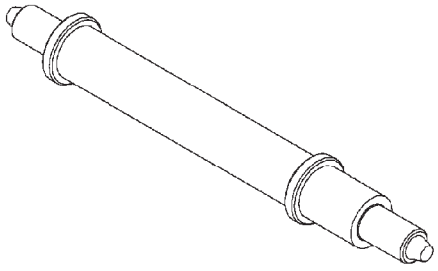
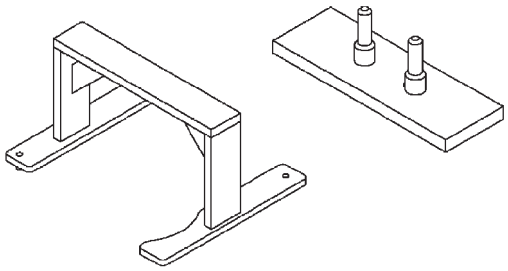
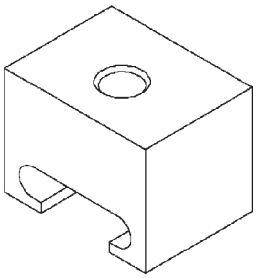
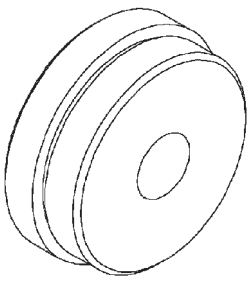
8866	Installer	
8868	Remover/Installer	
8869	Fixture	
8870	Remover	
8871	Installer	

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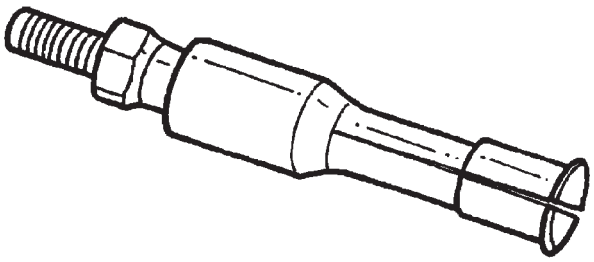
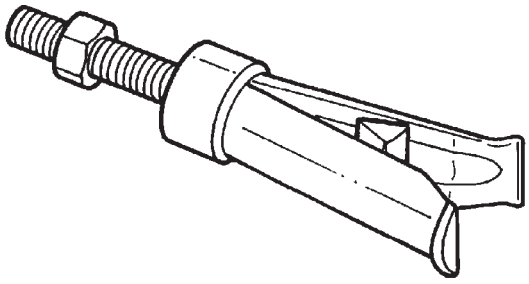
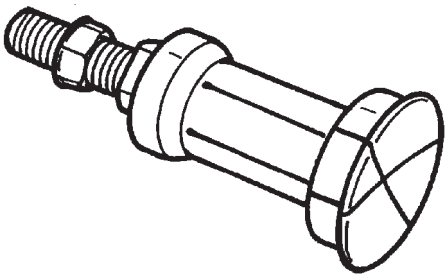
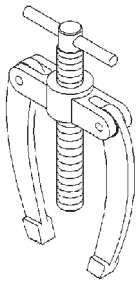
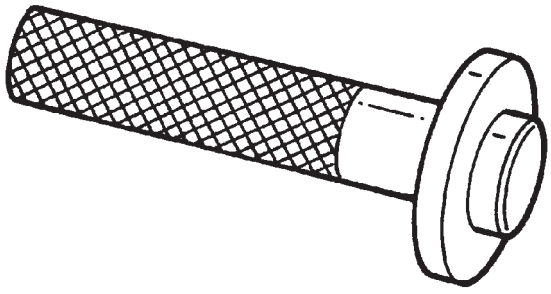
8911	Remover	
8912	Remover	
8913	Remover	
8915	Brace Tool	
8916	Installer	

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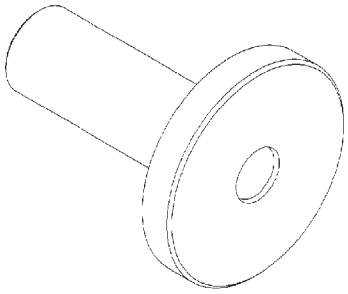
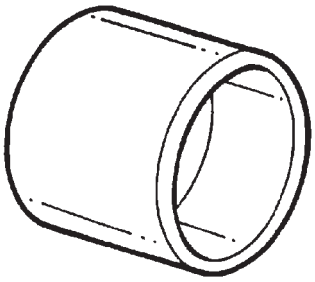
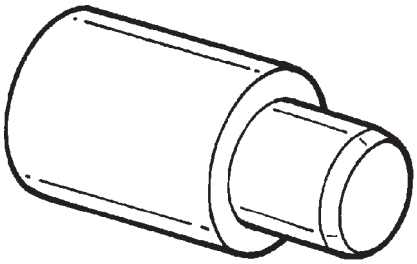
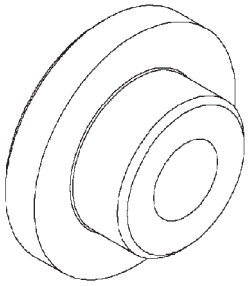
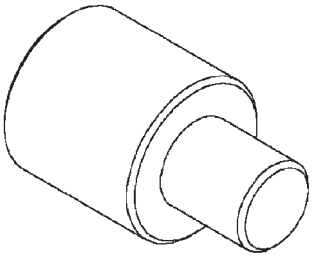
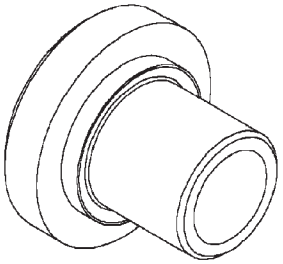
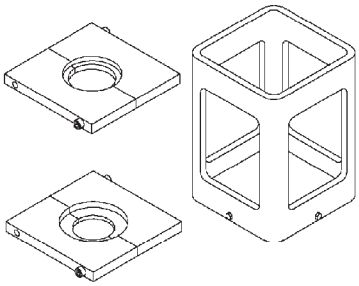
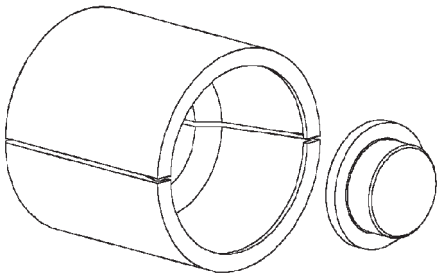
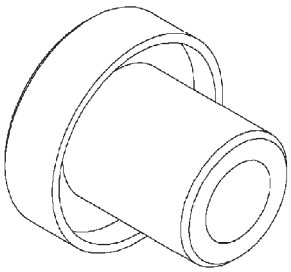
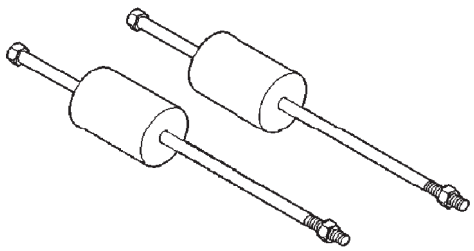
8917	Support Base	
8918	Protect Sleeve	
8919	Protect Button	
8921	Installer	
8923	Protector	

Number	Name	Description
8924	Installer	
8925	Fixture	
8926	Remover	
8953	Installer	
C-3752	Puller/Slide Hammer	

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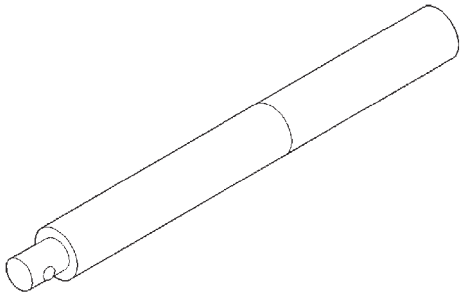
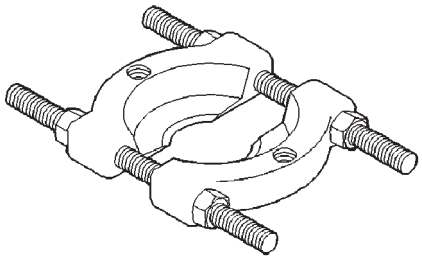
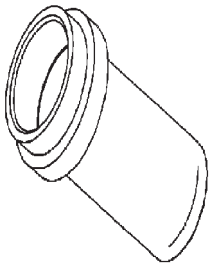
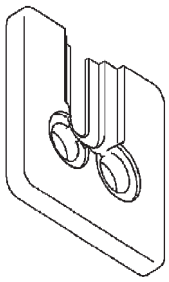
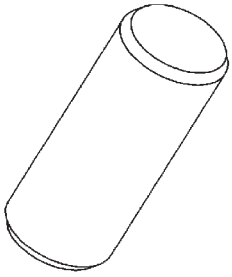
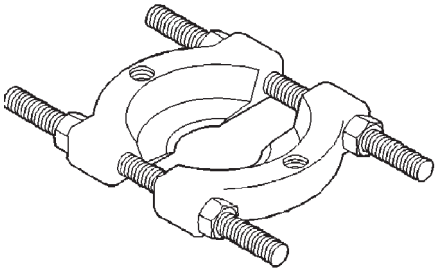
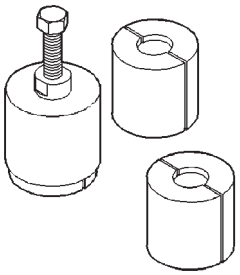
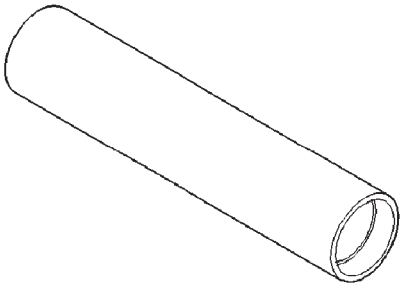
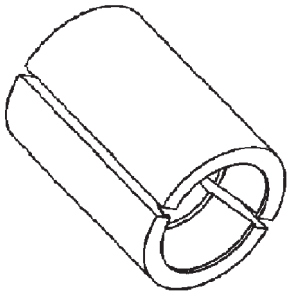
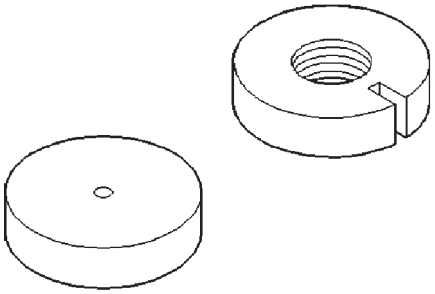
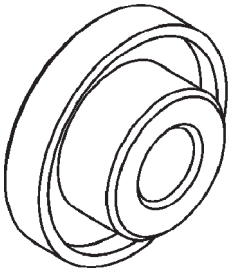
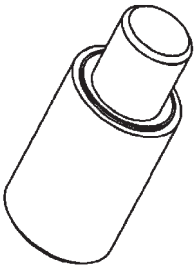
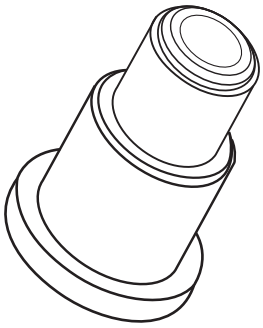
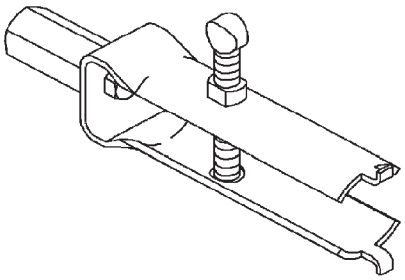
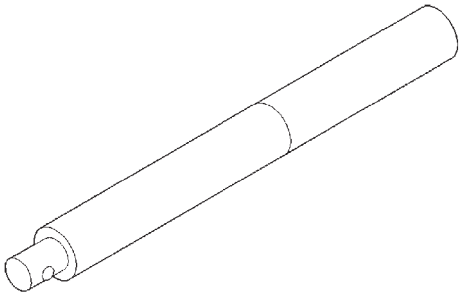
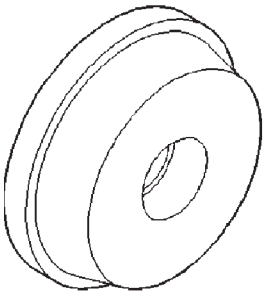
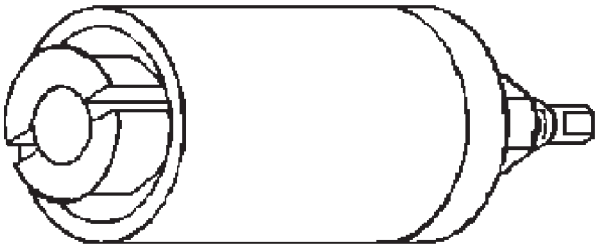
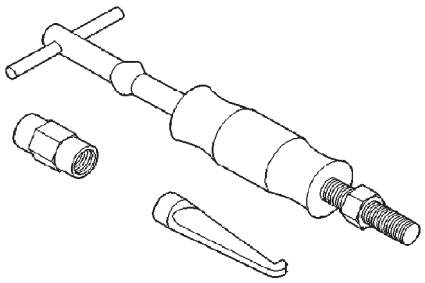
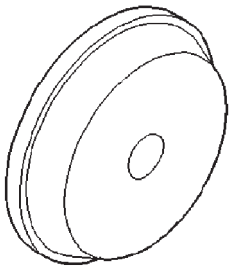
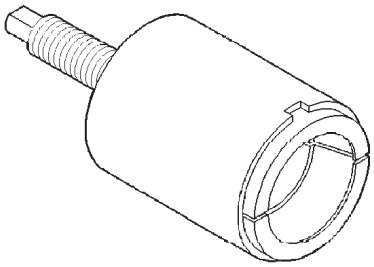
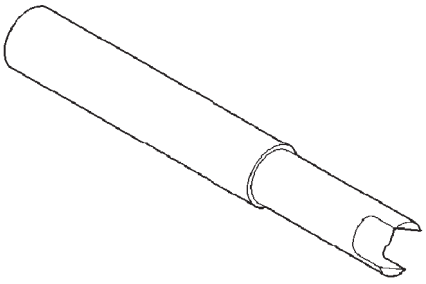
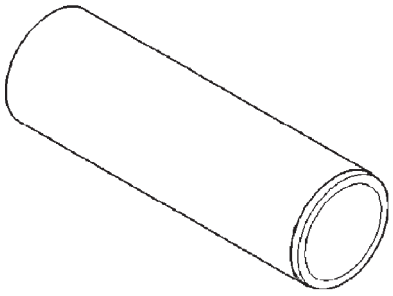
C-4171	Handle	
P-334	Bearing Splitter	

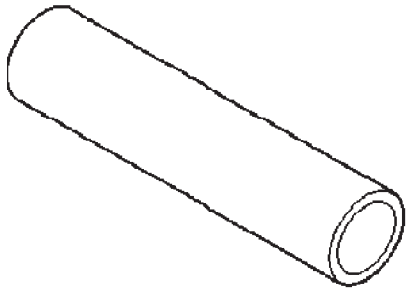
DMT6 SPECIAL TOOLS

Number	Name	Description
10036	Installer	
10037	Fixture	
10038	Plug	
1130	Bearing Splitter	
5048	Puller Set	

Number	Name	Description
6052	Installer	
6545	Puller Jaws	
8140-2	Trac-lok Tools	
8476	Installer	
8590	Plug	

Number	Name	Description
9045	Installer	
9664	Remover	
C-4171	Handle Drive	
C-4628	Bearing Installer	
C-4660A	Bearing Remover	

Number	Name	Description
C-637	Slide Hammer	
D-129	Installer	
L-4406A	Remover Kit	
L-4436A	Differential Tool	
L-4507	Installer	

Number	Name	Description
MD-998323	Installer	

Notes:

APPENDIX: BG6 MANUAL TRANSAXLE (BUX)

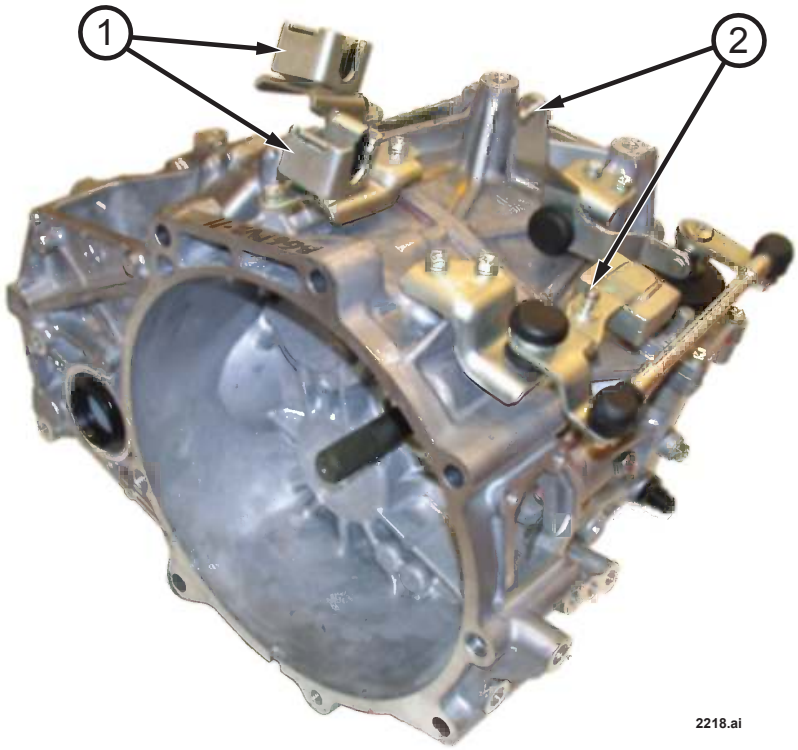
INTRODUCTION

The Aisin BG6 6-speed is a constant-mesh transaxle that is synchronized in all gear ranges. The BG6 transaxle is contains one input shaft, two output shafts, and a reverse idler shaft. Ratios 1-4 are on one output shaft, ratios 5, 6 and Reverse are on the second output shaft. Each output shaft has a different final drive ratio, similar to the DMT6. All ratios are synchronized.

Synchronizers are mounted on the output shafts. Double cone synchronizers are used on first through fourth gears while single cone synchronizers are used on fifth, sixth, and Reverse.

The shift mechanism is cable operated and incorporates a pull-up ring on the shift lever that must be lifted to engage Reverse. This prevents unintentional selection of Reverse when attempting to select First gear. Rubber isolation of the shift system at the transaxle minimizes noise carried along the cables to the vehicle interior.

The BG6 weighs 64.4 kg (142 lb) dry.



1	Rubber-isolated Shift Cable Brackets	2	Shift Cable Attaching Points

Figure 109 BG6 Transaxle

Applications

The BG6 6-speed automatic transaxle is used in the following vehicles:

Table 13 BG6 Applications (BUX Only)

Vehicle	Model Years	Engine
Caliber	2006 to Current	2.0L Turbo Diesel
Compass/Patriot	2007 to Current	2.0L Turbo Diesel
Sebring/Avenger	2007 to Current	2.0L Turbo Diesel
Sebring Convertible	2007 to Current	2.0L Turbo Diesel

Gear Ratios

Table 14 BG6 Gear Ratios

Gear Position	Gear Ratio	Final Drive	Overall Gear Ratio
1st	3.538	4.059	14.362
2nd	2.045	4.059	8.302
3rd	1.367	4.059	5.547
4th	0.974	4.059	3.955
5th	0.897	3.450	3.096
6th	0.791	3.450	2.728
Reverse	3.831	3.450	13.218

BG6 Identification

The transaxle identification label is affixed to the bellhousing. The label consists of the transaxle part number, as well as a 12-character alpha-numeric code.

In this code, the first character will always be a T for Traceability. Characters 2 and 3 identify the component and manufacturer (JA = Aisin BG6). Digits 4-6 represent the day of the year the transaxle was built (Julian date). The seventh digit represents the calendar year of build, and the remaining five digits are the build sequence code.

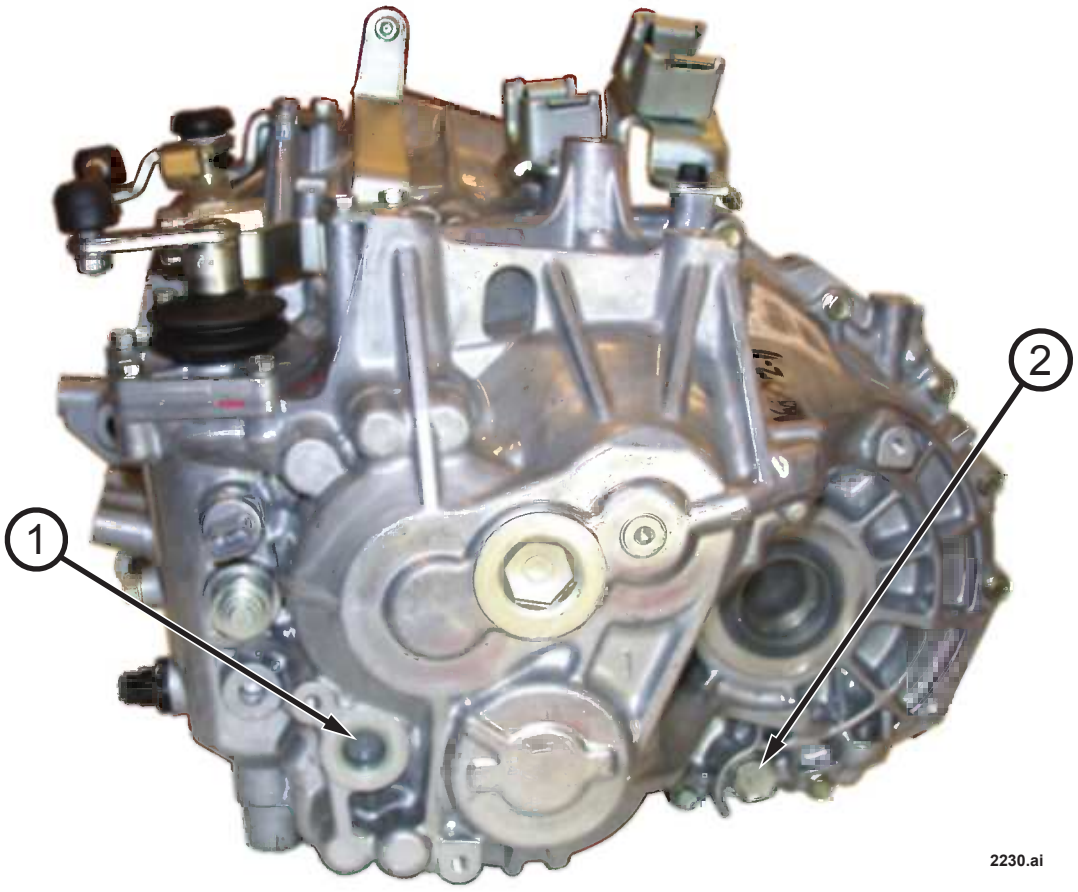
1	Component Identifier	3	Build Sequence Code
2	Date Code (Julian)	4	Full Part Number

Figure 110 BG6 Identification Tag

BG6 Fluid, Lubrication, and Maintenance

The BG6 manual transaxle is splash lubricated. The transaxle gears and differential assembly splash oil from the gears to provide lubrication to all the mechanical components of the transaxle. The splashed oil flows down the removable trough to the rear of the housing end cover. Holes in the shafts direct the fluid to the bearings, synchronizers, and gears by centrifugal force.

The BG6 is factory filled with ATF+4. The drain and fill plugs on the BG6 are located on the gear case. Refer to Service Information for fluid level checking procedures.



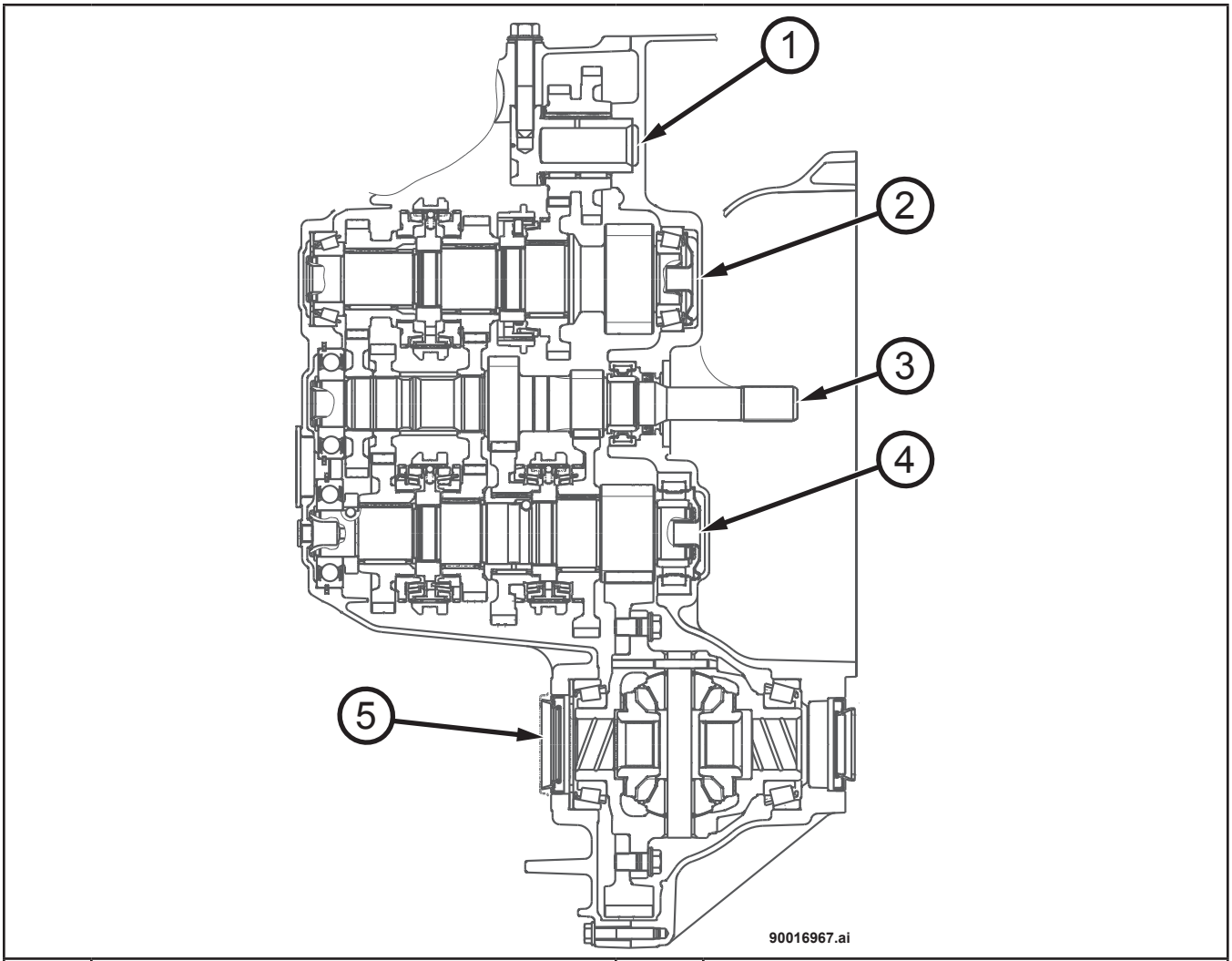
1	Fill Plug	2	Drain Plug

Figure 111 BG6 Case Drain and Fill Plugs

BG6 CASE

The BG6 case is a two-piece, cast aluminum design. Internal components can be serviced only by separating the clutch bellhousing from the gear housing. The clutch bellhousing encloses the concentric slave cylinder and conventional or modular clutch assembly.

The gear housing is bolted to the clutch bellhousing and contains the input shaft, output shafts, reverse idler shaft, and the shift mechanism.

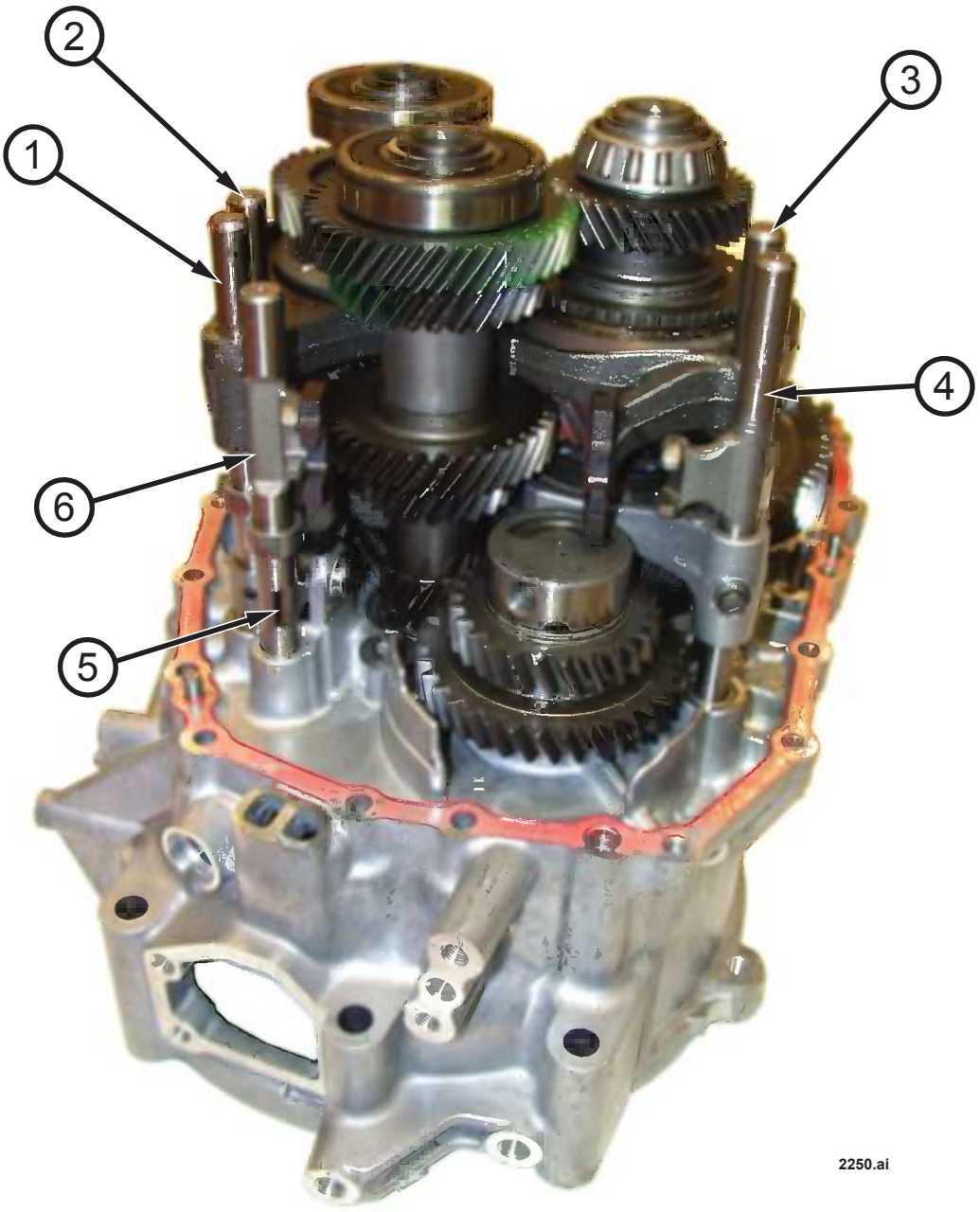


1	Reverse Idler Shaft	4	1-4 Output Shaft
2	5-6-R Output Shaft	5	Differential
3	Input Shaft		

Figure 112 BG6 Cutaway View

BG6 SHIFT SHAFTS

The shift shafts of the BG6 are supported by ball bearing assemblies located in the cases. The shift shafts support the shift forks, which are either pinned or bolted to the shafts.

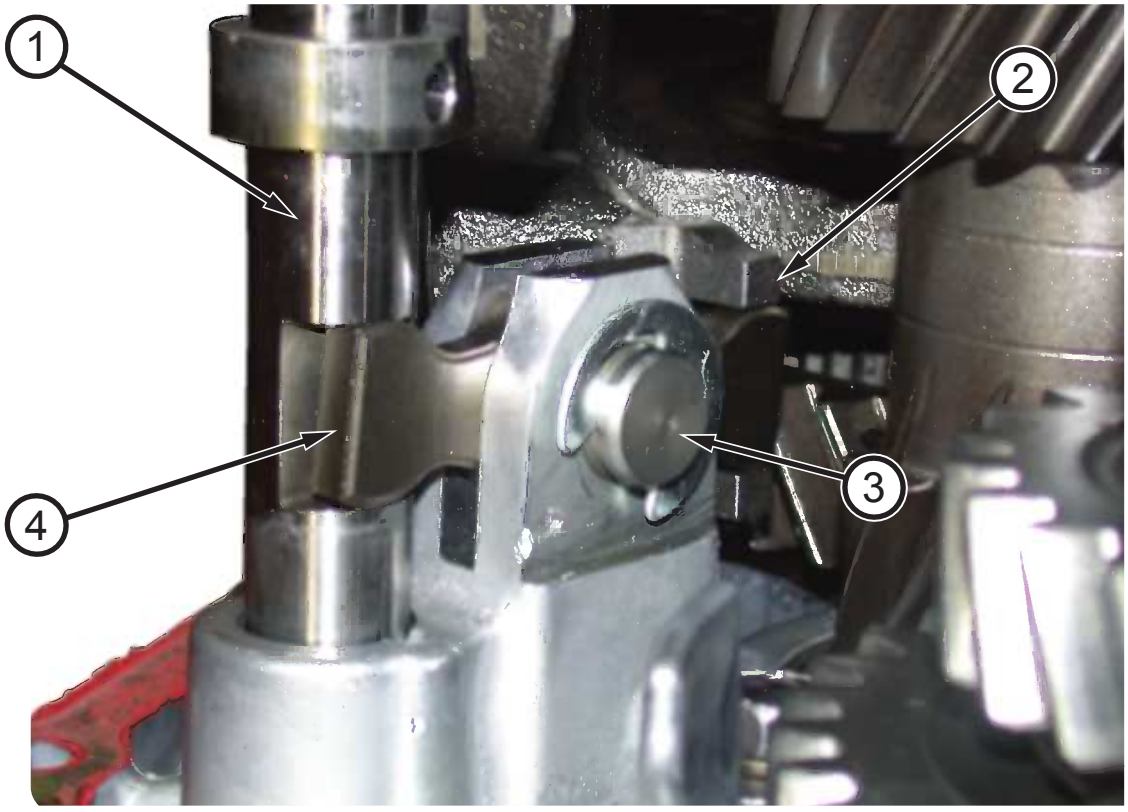


1	1-2 Shift Shaft	4	Reverse Shift Shaft
2	3-4 Shift Shaft	5	Shift Rail Arm
3	5-6 Shift Shaft	6	3-4 Pivot Shaft

Figure 113 BG6 Shift Shafts

The 3-4 pivot shaft reverses the direction of travel from the shift mechanism. When the driver selects third or fourth gear, input force from the shift mechanism moves the 3-4 pivot shaft. This force is transferred to the shift rail arm, which in turn moves the 3-4 shift shaft in the opposite direction.

This design maintains the normal shift progression at the gearshift lever.



1	3-4 Pivot Shaft	3	Pivot Pin
2	3-4 Shift Shaft	4	Shift Rail Arm

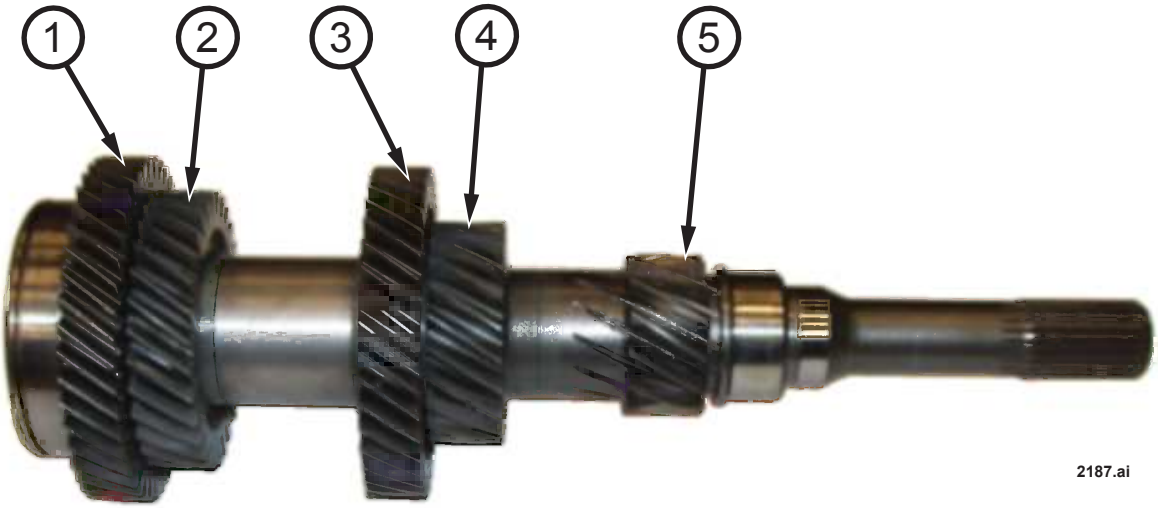
Figure 114 BG6 Shift Rail Arm

BG6 INPUT SHAFT

All drive gears of the transaxle are fixed to the input shaft. Due to the absence of any freewheeling gears, the input shaft does not require internal oil passages. The input shaft is supported by one ball bearing and one roller bearing which are splash lubricated. This bearing arrangement requires no preload and needs no adjusting shims.

The input shaft seal is pressed into the clutch housing.

First and Second drive gears are integral with the shaft. Sixth, Third, and the 4-5 drive gears are pressed and splined to the shaft and are serviceable separately. Defective input shaft bearings can be replaced.



1	Sixth Drive Gear	4	Second Drive Gear
2	Third Drive Gear	5	First Drive Gear
3	4-5 Drive Gear		

Figure 115 BG6 Input Shaft

BG6 1-4 OUTPUT SHAFT

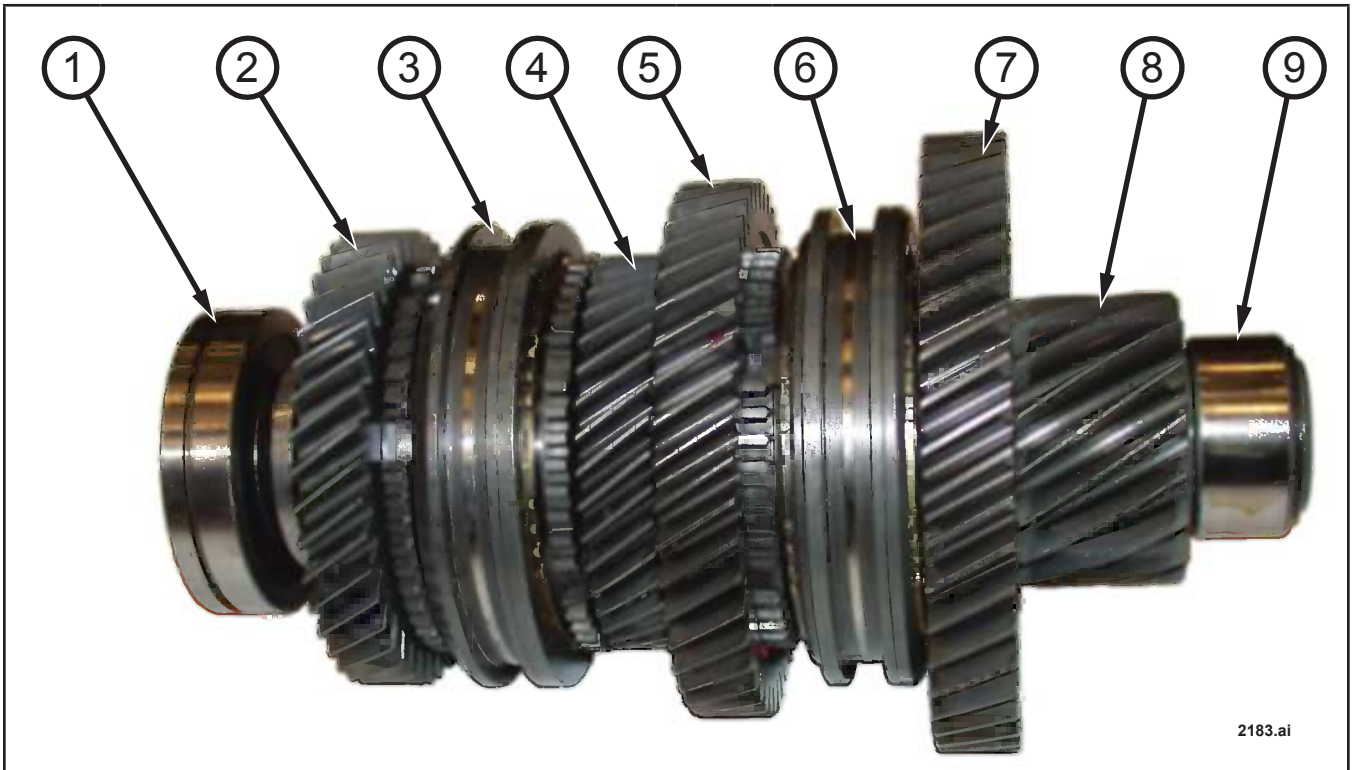
The 1-4 output shaft is supported by a roller bearing on the pinion end and a ball bearing on the gear case end. The roller bearing inner race is pressed to the shaft and retained with a snap ring. The roller bearing is pressed into the clutch bellhousing case.

The ball bearing is pressed to the shaft and retained with a snap ring. It is held to the gear case with a snap ring on the outer race.

This bearing arrangement requires no preload.

The output pinion is an integral part of the shaft. All other gears are freewheeling. The 1-2 and 3-4 synchronizer assemblies are located on the 1-4 output shaft.

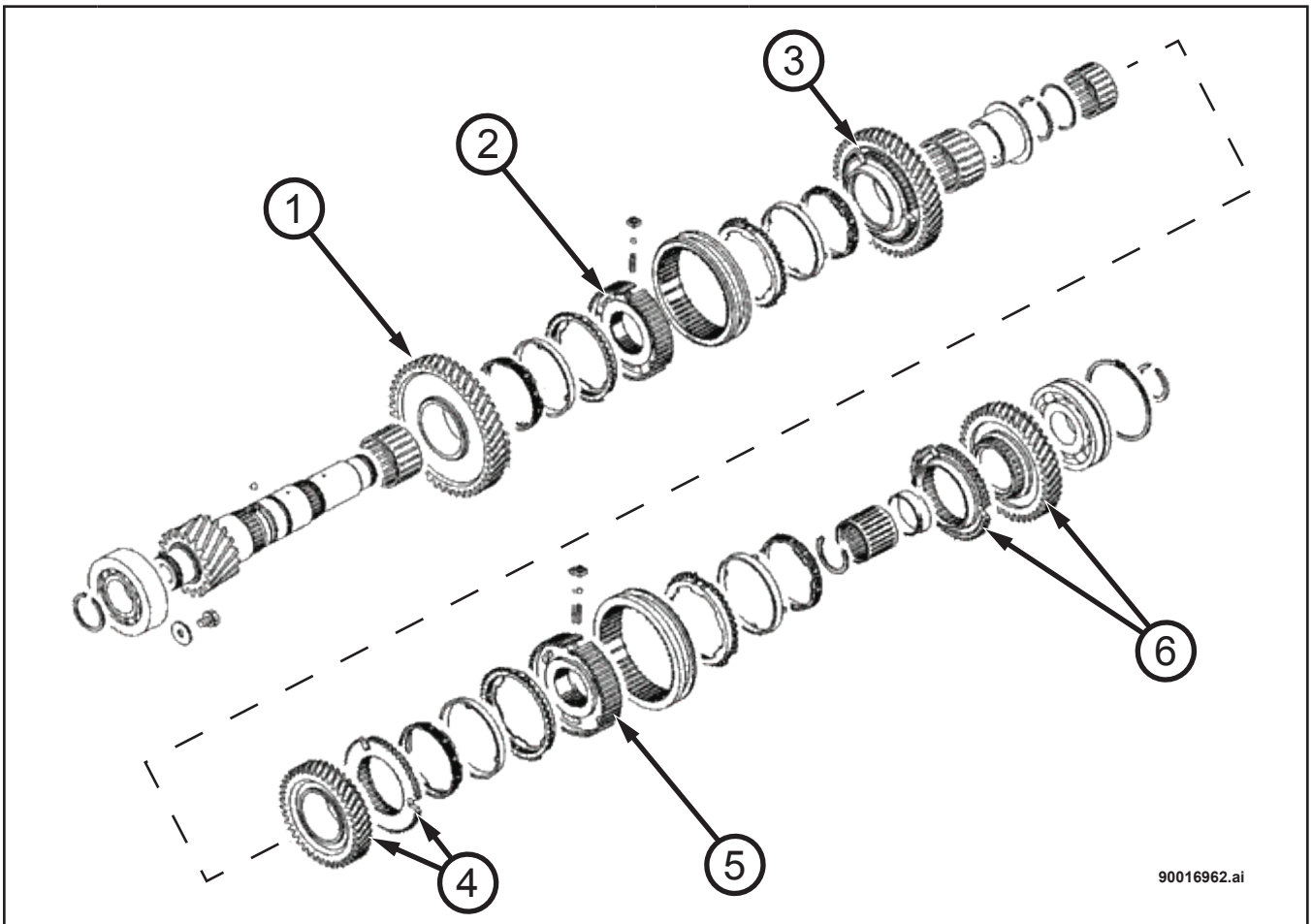
Oil passages are drilled into the 1-4 output shaft to provide lubrication to the bearings and synchronizer assemblies.



1	Ball Bearing	6	1-2 Synchronizer
2	Third Driven Gear	7	First Driven Gear
3	3-4 Synchronizer	8	Pinion Gear
4	4-5 Driven Gear	9	Roller Bearing Inner Race
5	Second Driven Gear		

Figure 116 BG6 1-4 Output Shaft

Note: The figure below shows the third and the 4-5 driven gears as two-piece assemblies. While this is true, the synchronizer gear teeth rings are welded to their respective gears and are not serviceable separately.



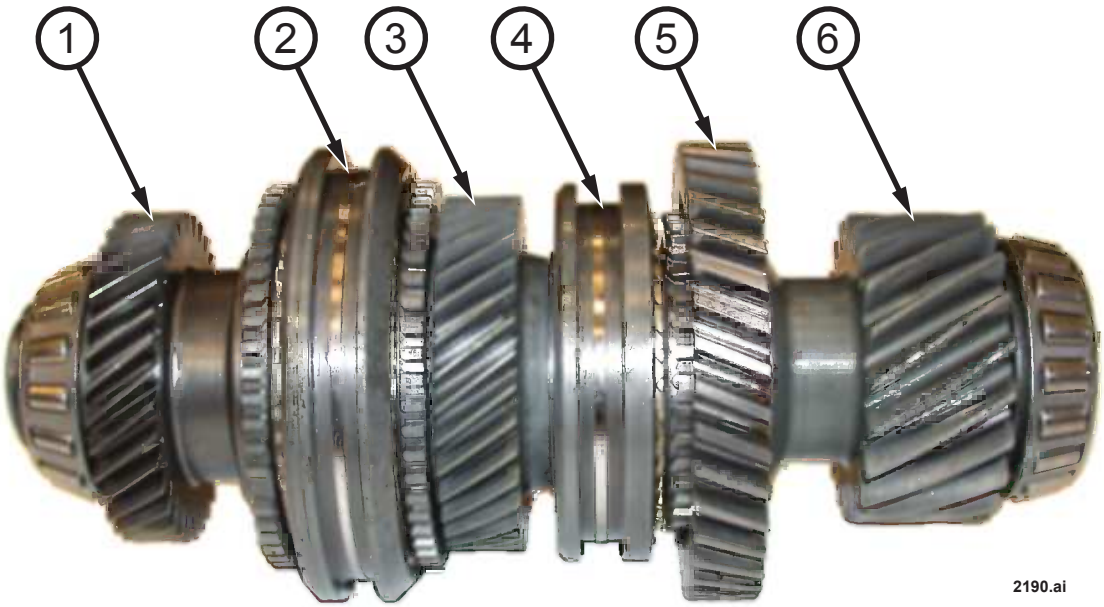
1	First Driven Gear	4	Third Driven Gear
2	1-2 Synchronizer	5	3-4 Synchronizer
3	Second Driven Gear	6	4-5 Driven Gear

Figure 117 BG6 1-4 Output Shaft Exploded View

BG6 5-6-R OUTPUT SHAFT

The 5-6-R output shaft is supported by tapered roller bearings which are preloaded through the use of selectable shims. Refer to Service Information for preload measuring and adjustment procedures. The output pinion of the 5-6-R output shaft is an integral part of the shaft. The 5-6 and Reverse synchronizer assemblies are located on the 5-6-R output shaft.

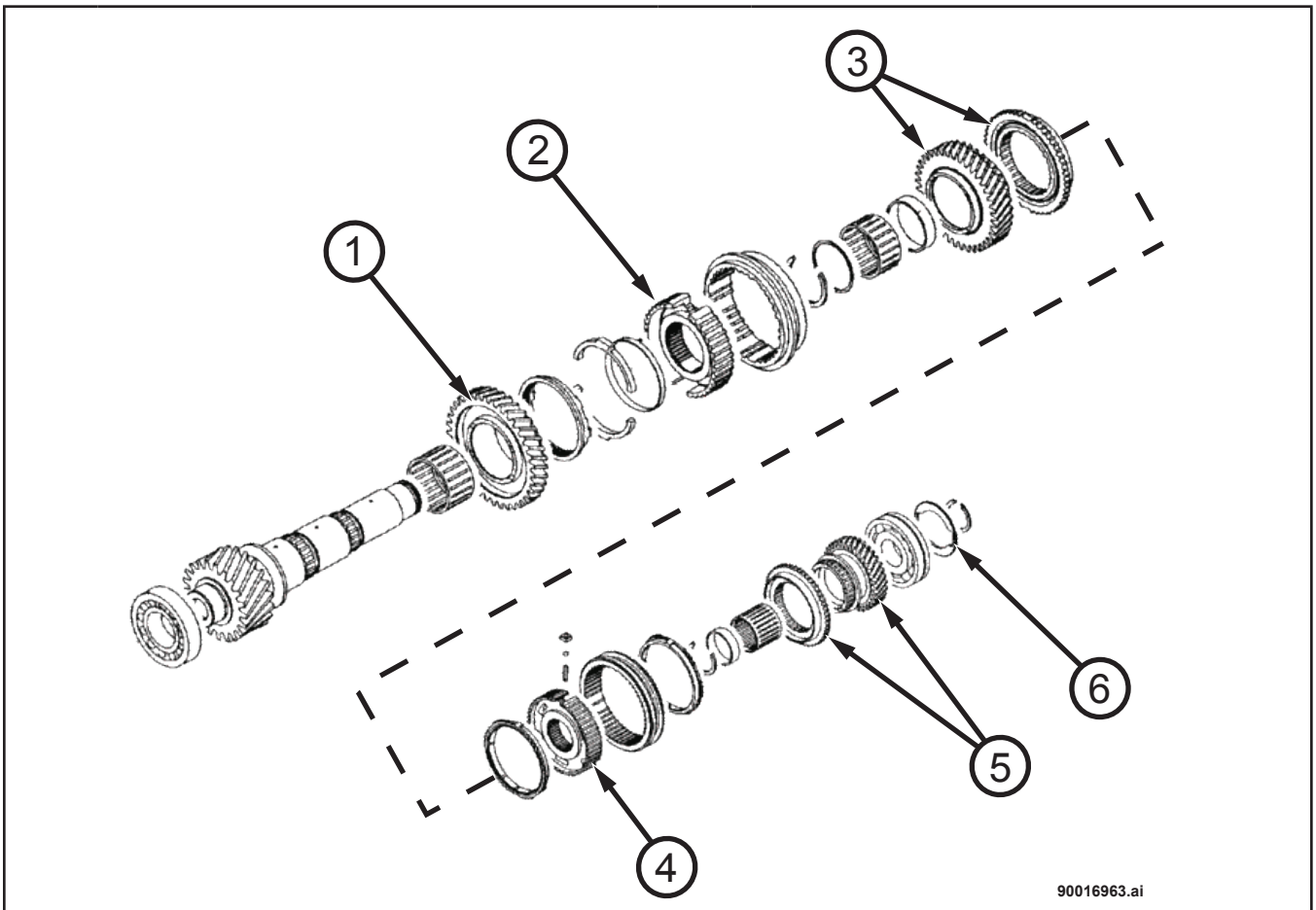
Oil passages are drilled into the shaft to provide lubrication to the bearings and synchronizer assemblies.



1	Sixth Driven Gear	4	Reverse Synchronizer
2	5-6 Synchronizer	5	Reverse Driven Gear
3	Fifth Driven Gear	6	Pinion Gear

Figure 118 BG6 5-6-R Output Shaft

Note: As with the 1-4 output shaft, the fifth and sixth driven gears are shown below as two piece assemblies. The synchronizer gear teeth rings are welded to their respective gears and are not serviceable separately.



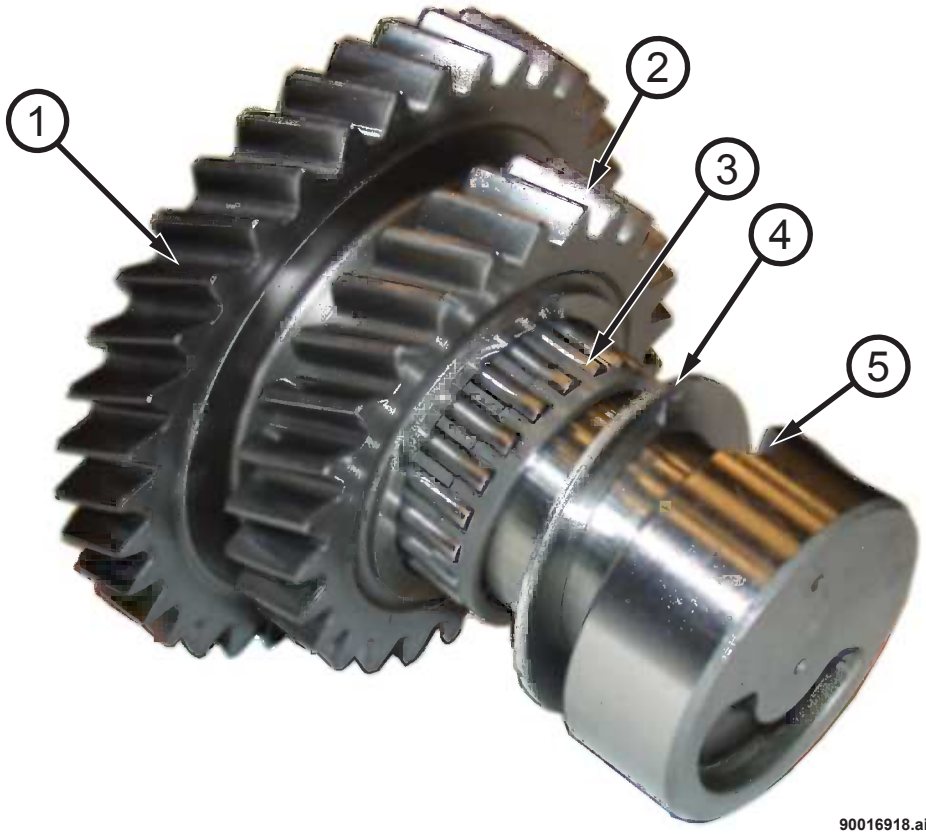
1	Reverse Driven Gear	4	5-6 Synchronizer
2	Reverse Synchronizer	5	Sixth Driven Gear
3	Fifth Driven Gear	6	Adjusting Shim

Figure 119 BG6 5-6-R Output Shaft Exploded View

BG6 REVERSE IDLER GEAR CLUSTER

The reverse idler gear cluster is supported by a needle bearing assembly on a separate shaft. A thrust washer is used between the gear cluster and the shoulder of the reverse idler shaft.

The reverse idler shaft is secured to the case with a tapered bolt.

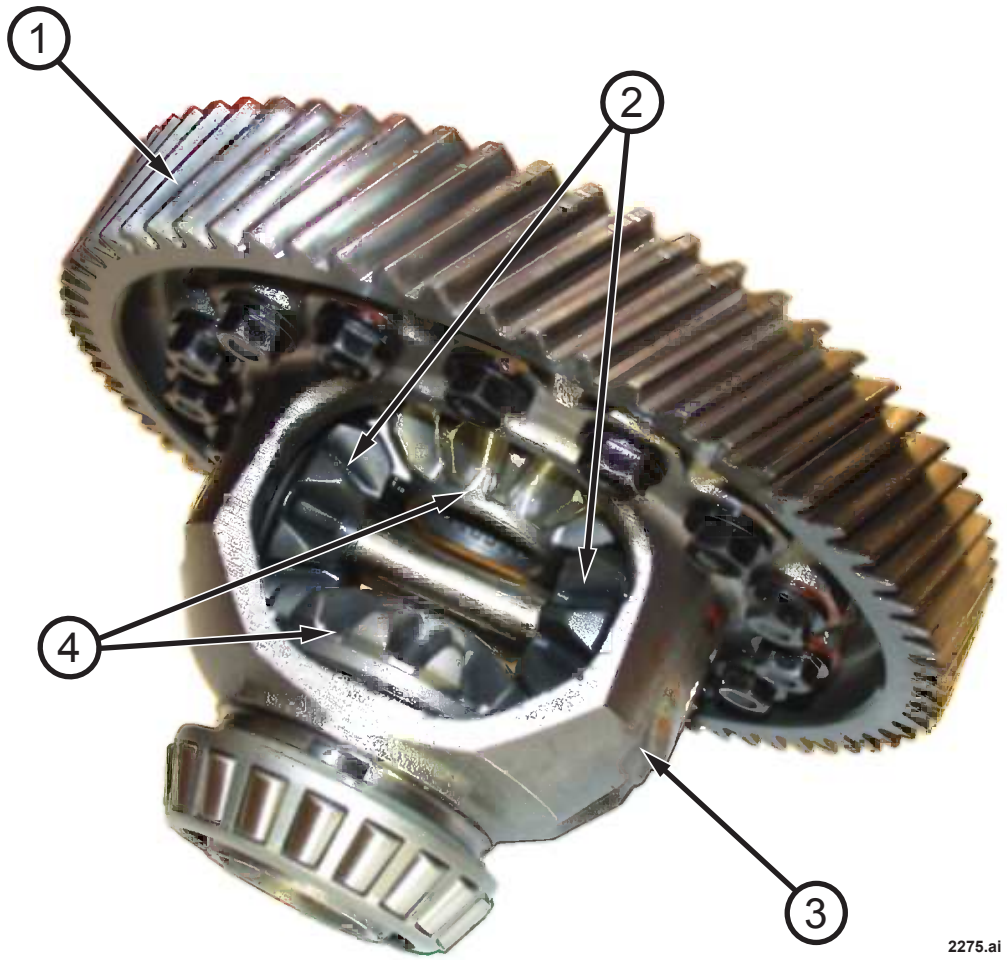


1	Reverse Idler Driven Gear	4	Thrust Washer with Tab
2	Reverse Idler Drive Gear	5	Reverse Idler Shaft
3	Needle Bearings		

Figure 120 BG6 Reverse Idler Gear

BG6 DIFFERENTIAL ASSEMBLY

The BG6 differential is an open type, supported by preloaded tapered roller bearings. Refer to Service Information for preload measuring and adjustment procedures.



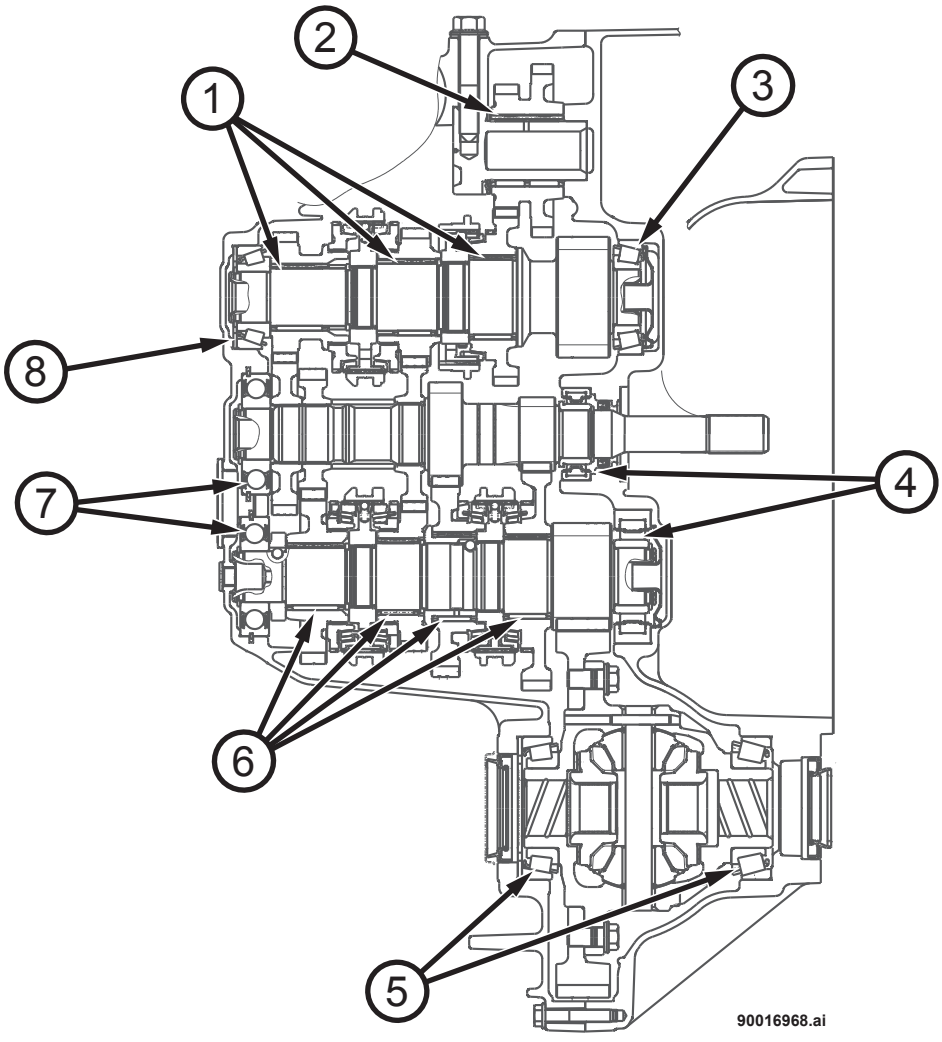
1	Ring Gear	3	Differential Housing
2	Pinion Gears	4	Side Gears

Figure 121 BG6 Differential Assembly

BG6 BEARINGS

The BG6 utilizes several bearing types to support the moving components of the transaxle:

- The input and the 1-4 output shafts are supported by a caged roller bearing at the front of the transaxle, and a caged ball bearing at the rear of the transaxle.
- The 5-6-R output shaft and the differential carrier are supported by tapered roller bearings.
- Needle bearings support all of the freewheeling gears.



1	5-6-R Needle Bearings	5	Differential Carrier Tapered Roller Bearings
2	Reverse Idler Needle Bearing	6	1-4 Needle Bearings
3	5-6-R Tapered Roller Bearing	7	Roller Bearings
4	Roller Bearings	8	5-6-R Tapered Roller Bearing

Figure 122 BG6 Bearings

BG6 CLUTCH

The modular clutch assembly used in the BG6 consists of a single dry-type clutch disc, a diaphragm style clutch cover, and an integrated flywheel. The clutch cover is riveted to the flywheel, containing the clutch disc within. The modular clutch can only be serviced as an assembly.

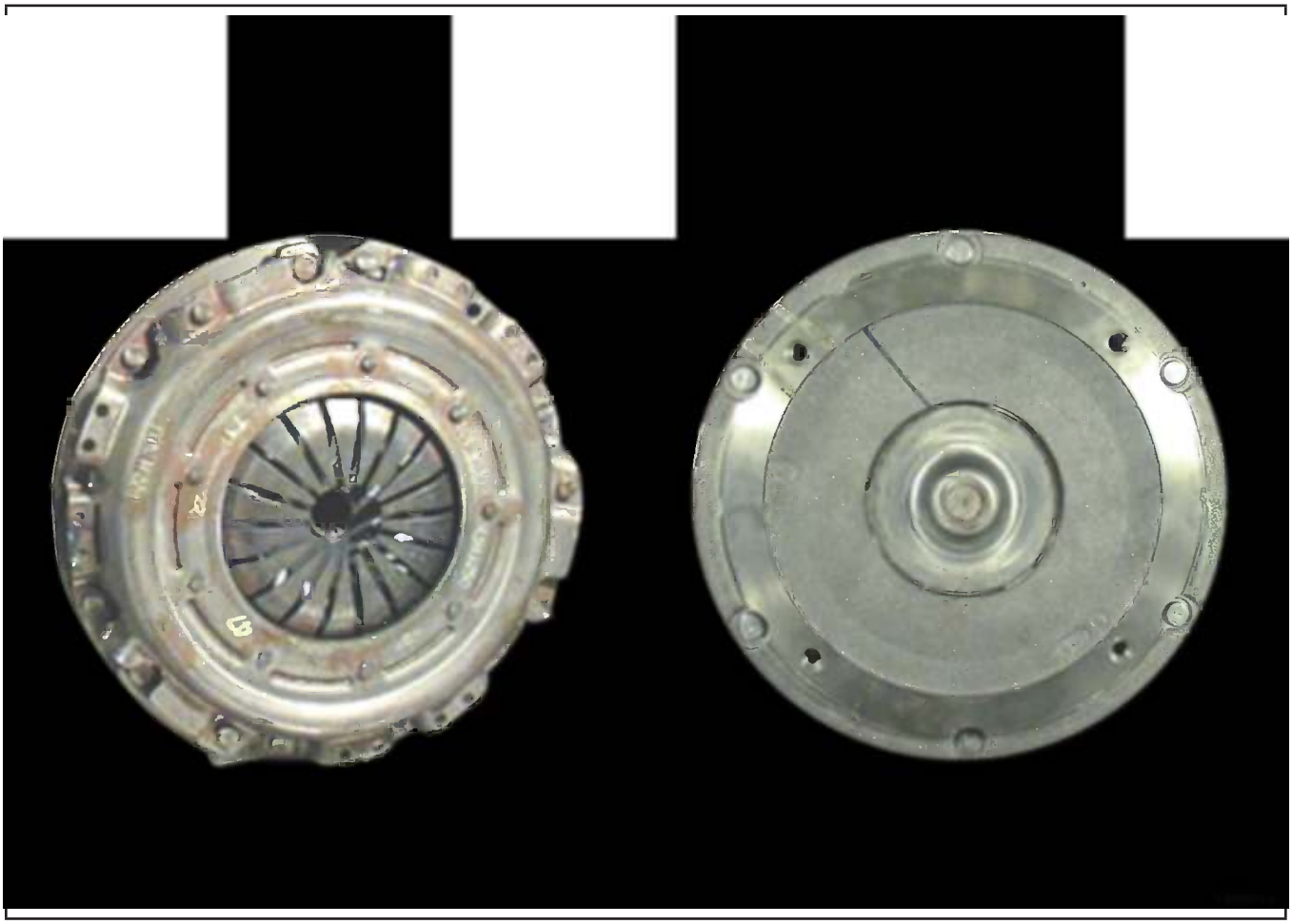
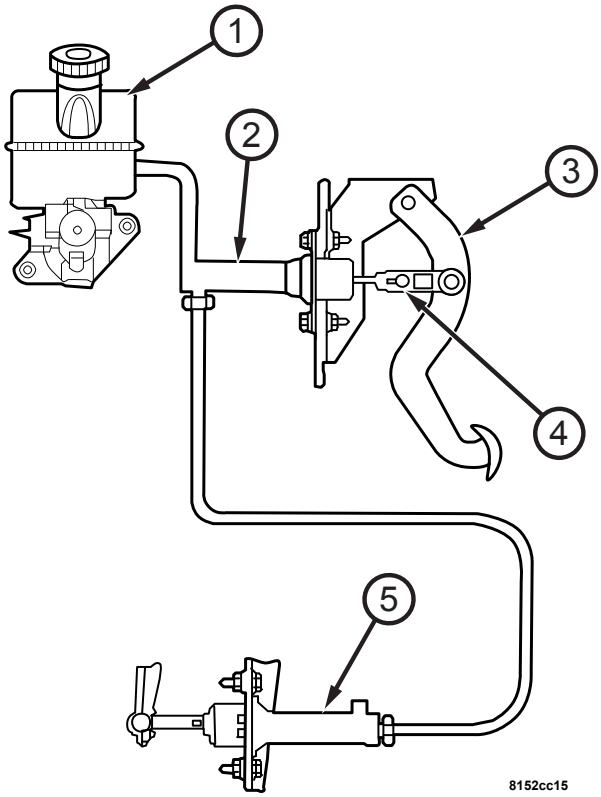


Figure 123 BG6 Clutch Assembly

Clutch Release System

Depressing the clutch pedal develops fluid pressure in the clutch master cylinder. This pressure is transmitted to the Concentric Slave Cylinder (CSC) through a connecting line. In turn, the CSC presses the diaphragm spring fingers inward on the fulcrums. This action moves the pressure plate rearward, relieving clamp force on the disc.



1	Brake Reservoir	4	Master Cylinder Push Rod
2	Clutch Master Cylinder	5	Slave Cylinder
3	Clutch Pedal		

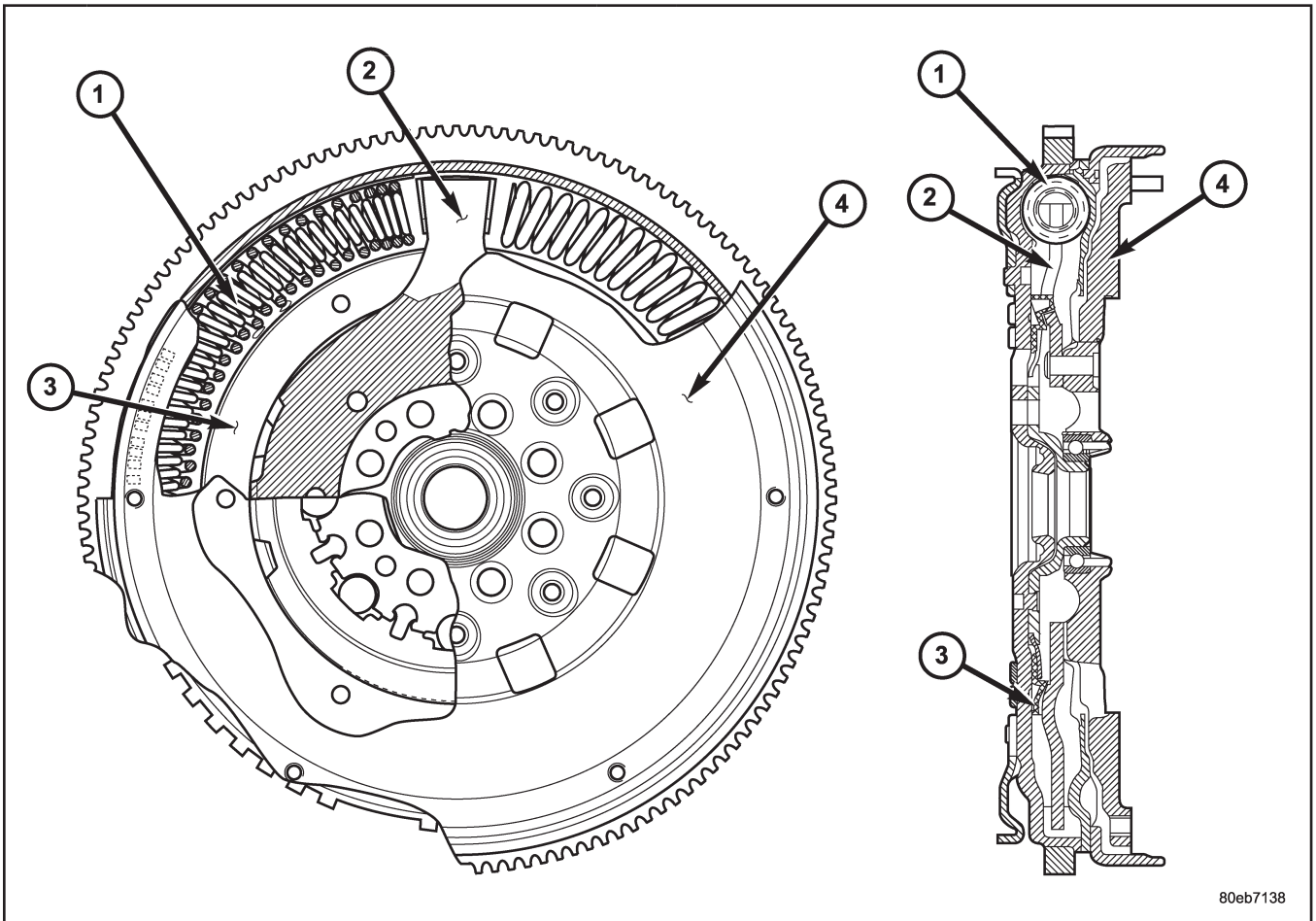
Figure 124 BG6 Clutch Release System

BG6 Dual Mass Flywheel

The DMF consists of two decoupled masses (primary and secondary mass) that are connected via a spring/damping system. The primary flywheel side is bolted to the crankshaft. The secondary flywheel face serves as the driving member to the clutch disc. Internal springs between the flywheels are used to couple the masses while dampening energy. The flywheel also incorporates the ring gear around the outer circumference to mesh with the starter to permit engine cranking.

On a DMF, the additional secondary mass coupled to the transaxle lowers the natural frequency of the transaxle rotating elements. This decreases the transaxle gear rattle. The damper springs between the two flywheel masses replace the clutch disc damper springs and assist in a smooth transfer of torque to the transaxle.

Caution: The Dual Mass Flywheel is serviced as an assembly only and should never be disassembled.



1	Thrust Spring	3	Primary Mass
2	Flange/Diaphragm Spring	4	Secondary Mass

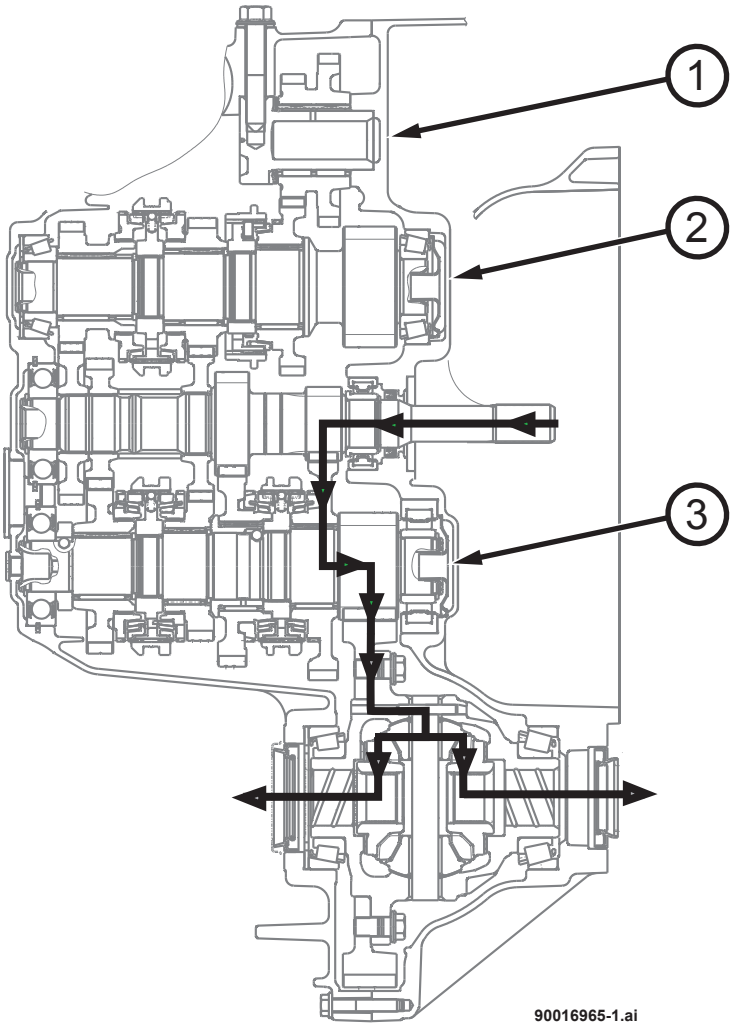
Figure 125 BG6 Dual Mass Flywheel Cutaway

BG6 POWER FLOW

Power flow through the BG6 enters at the input shaft and is transferred to the differential via one of two output shafts. The output shafts have different size pinion gears, enabling one gear on the input shaft to be utilized for both fourth and fifth gears. The ring gear is in constant mesh with both pinion gears.

1st Gear

When the clutch is engaged (clutch pedal up), power is transmitted to the input shaft. The input shaft first drive gear is in constant mesh with the 1-4 output shaft first driven gear. When the 1-2 synchronizer is locked to first gear, which locks first gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

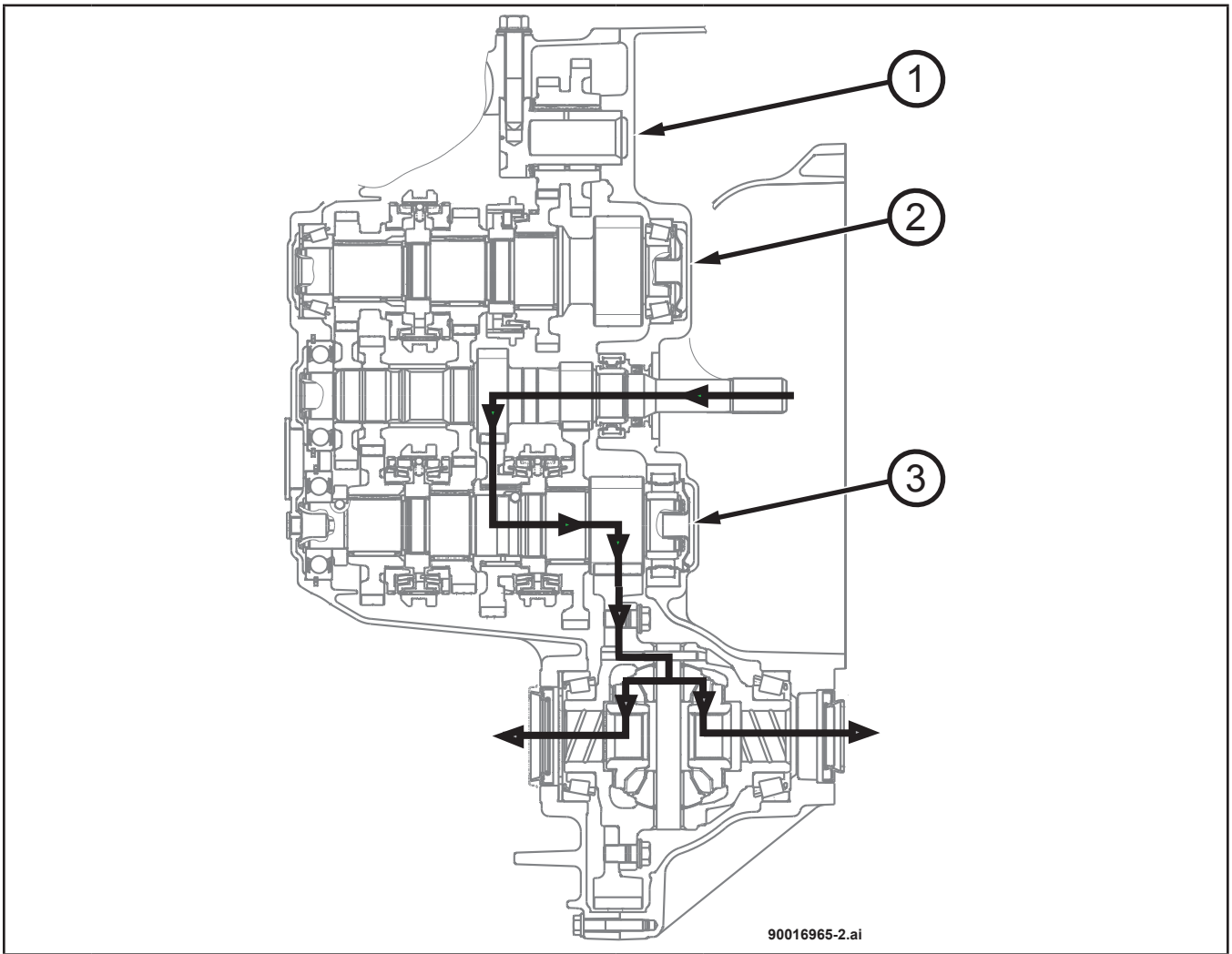


1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

Figure 126 BG6 1st Gear Power Flow

2nd Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft second drive gear is in constant mesh with the 1-4 output shaft second driven gear. When the 1-2 synchronizer is locked to second gear, which locks second gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

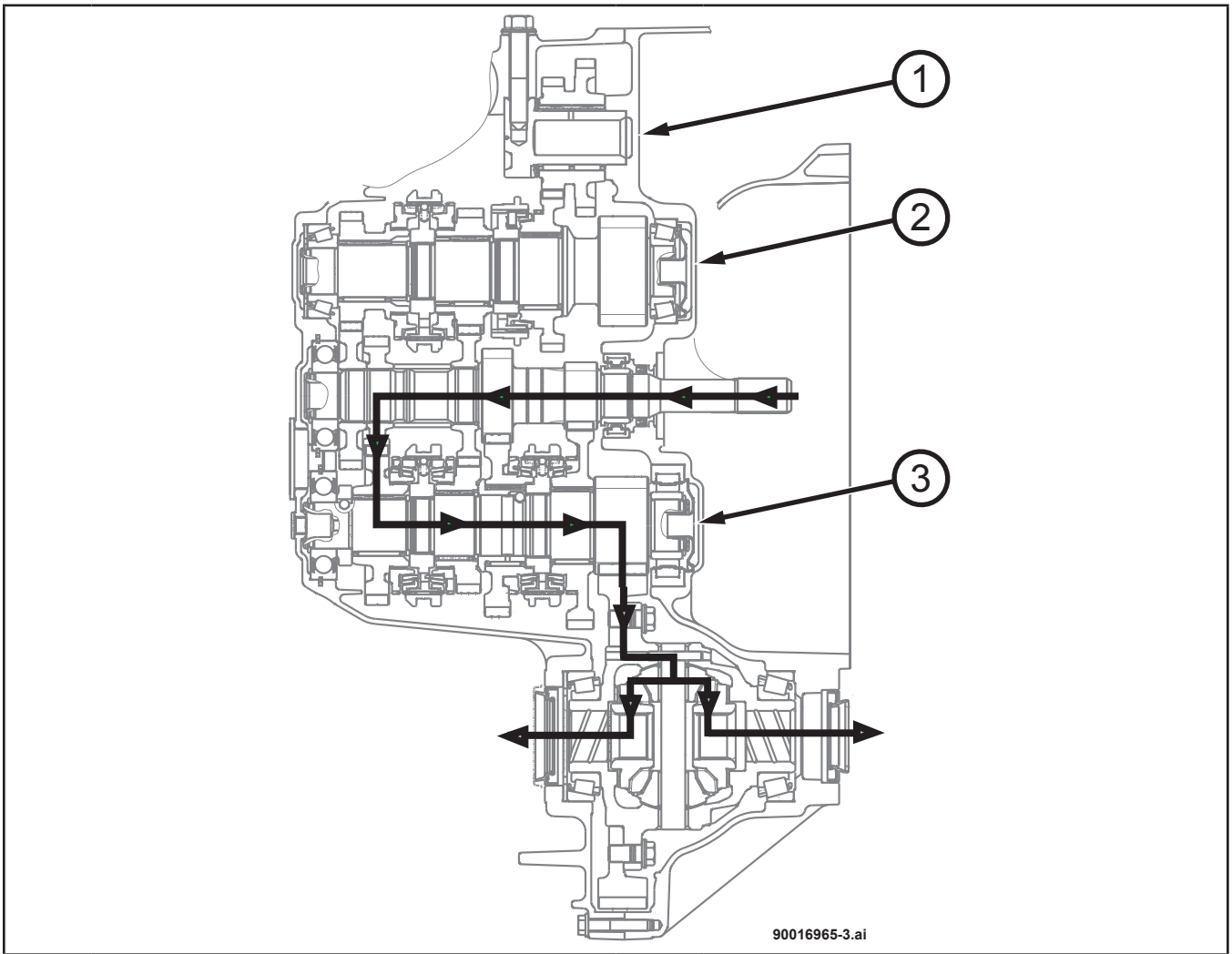


1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

Figure 127 BG6 2nd Gear Power Flow

3rd Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft third drive gear is in constant mesh with the 1-4 output shaft third driven gear. When the 3-4 synchronizer is locked to third gear, which locks third gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

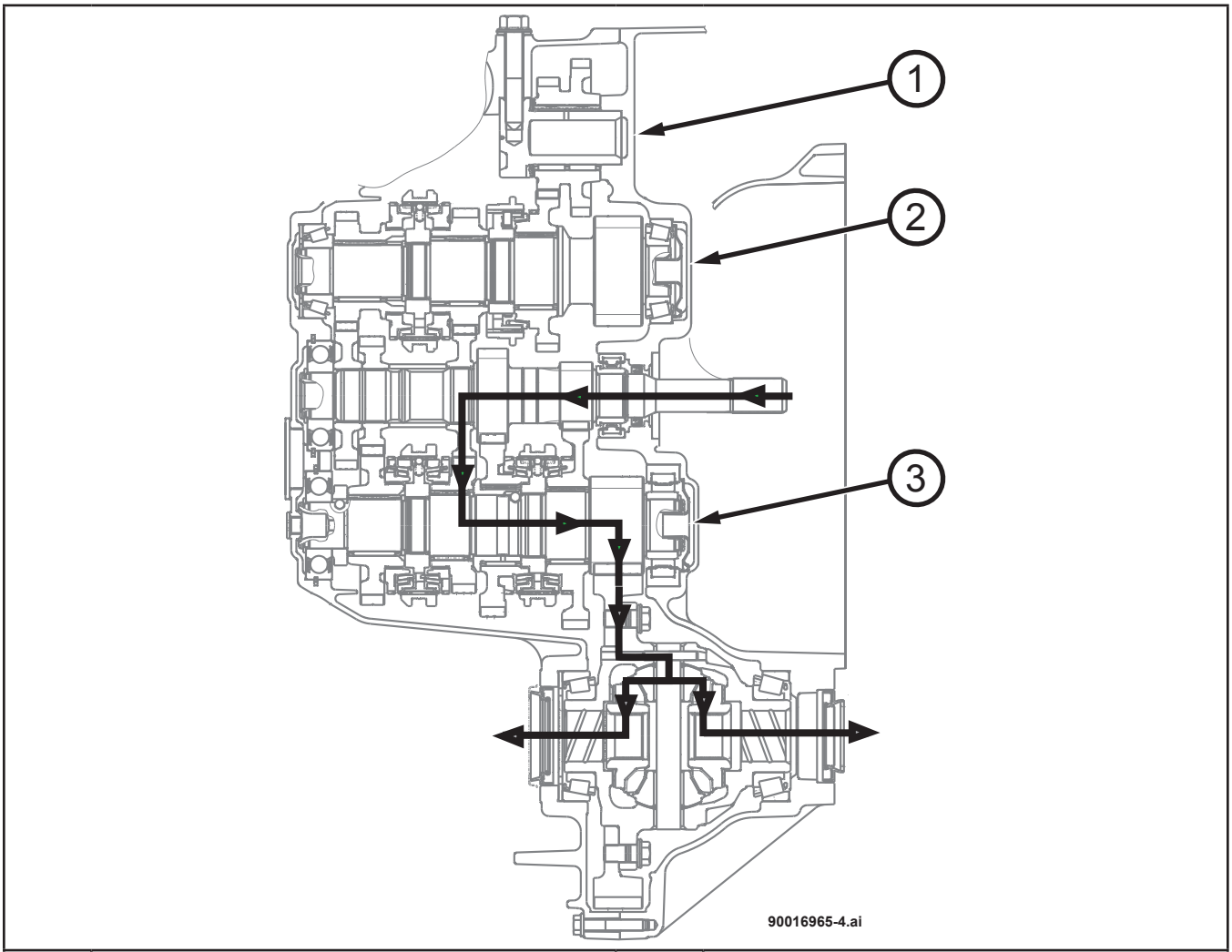


1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

Figure 128 BG6 3rd Gear Power Flow

4th Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft 4-5 drive gear is in constant mesh with the 1-4 output shaft fourth driven gear. When the 3-4 synchronizer is locked to fourth gear, which locks fourth gear to the 1-4 output shaft, power is transferred through the 1-4 output shaft to the differential.

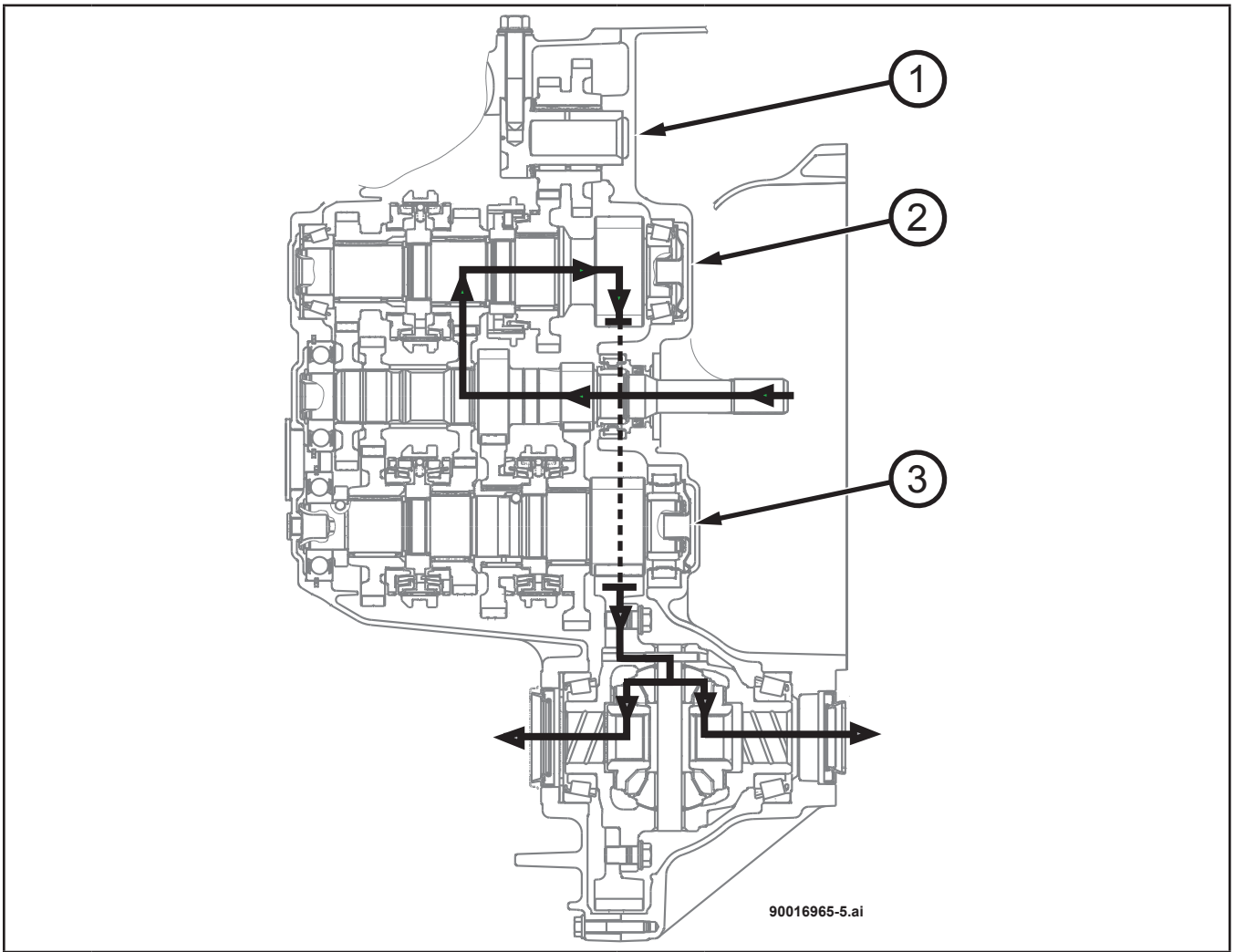


1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

Figure 129 BG6 4th Gear Power Flow

5th Gear

When the clutch is engaged (clutch pedal up), power is transmitted to the input shaft. The input shaft 4-5 drive gear is in constant mesh with the 5-6-R output shaft fifth driven gear. When the 5-6 synchronizer is locked to fifth gear, which locks fifth gear to the 5-6-R output shaft, power is transferred through the 5-6-R output shaft to the differential.

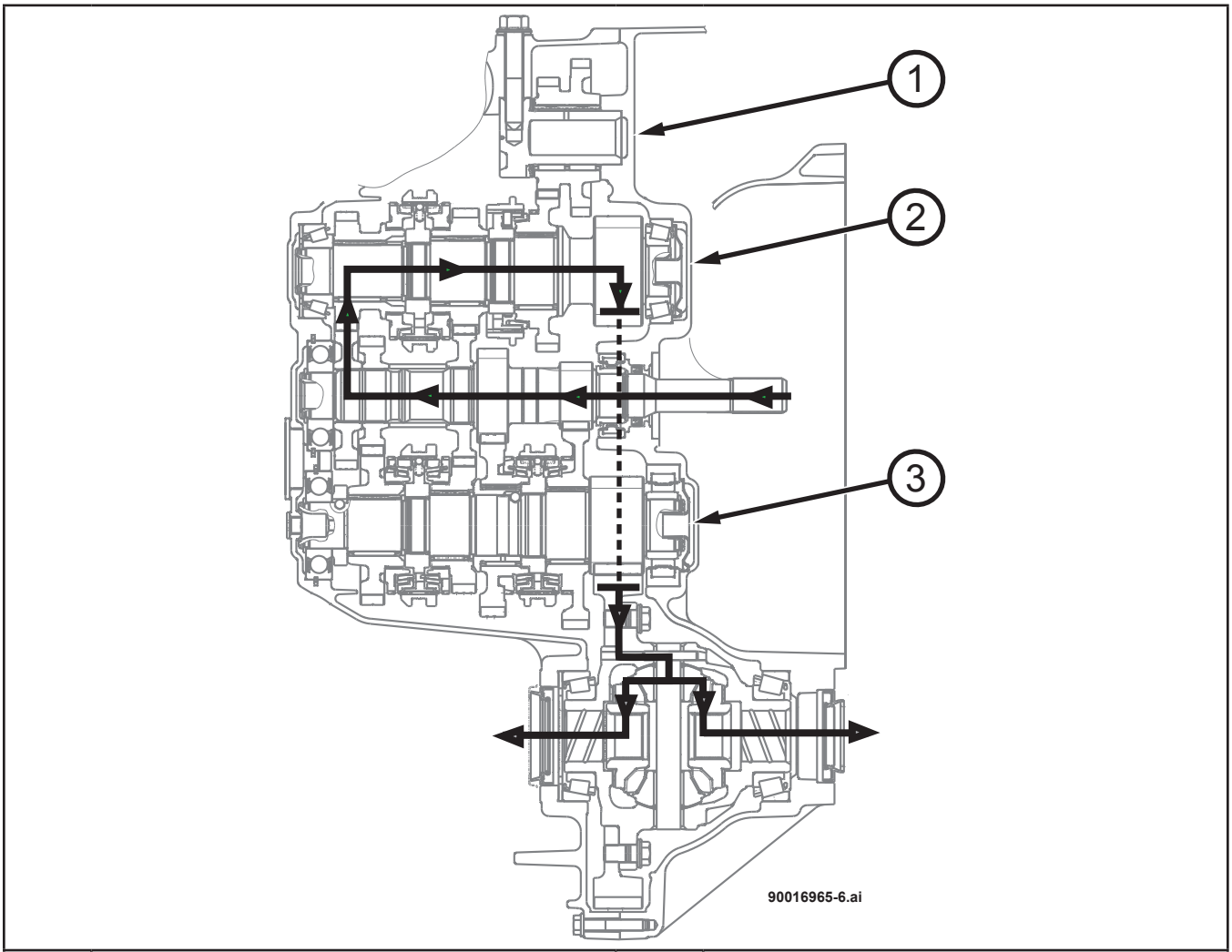


1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

Figure 130 BG6 5th Gear Power Flow

6th Gear

When the clutch is engaged (clutch pedal up) power is transmitted to the input shaft. The input shaft 4-6 drive gear is in constant mesh with the 5-6-R output shaft sixth driven gear. When the 5-6 synchronizer is locked to sixth gear, which locks sixth gear to the 5-6-R output shaft, power is transferred through the 5-6-R output shaft to the differential.



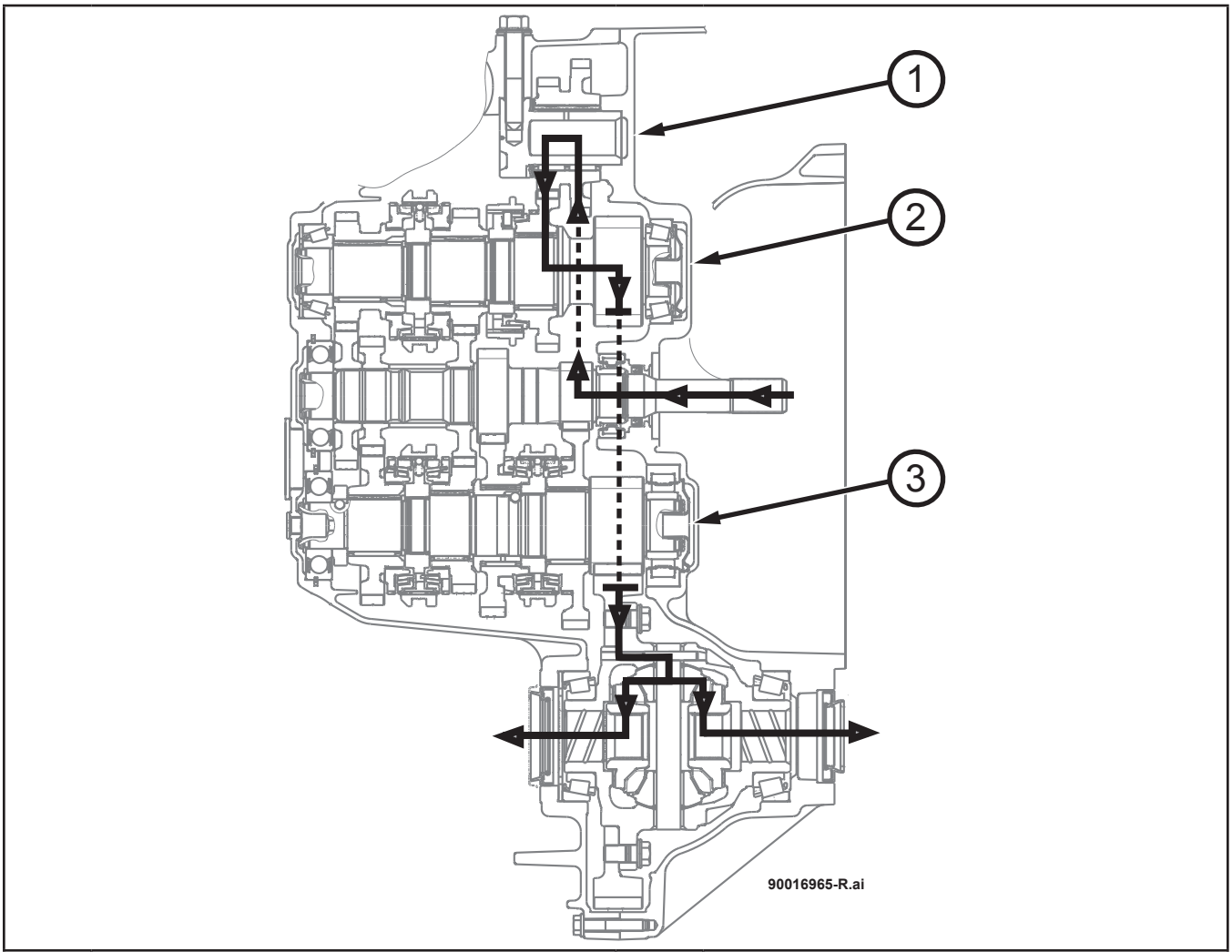
1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

Figure 131 BG6 6th Gear Power Flow

Reverse Gear

The reverse idler gear is a cluster gear with a larger (driven) gear and a smaller (drive) gear. The driven gear is in constant mesh with the input shaft first drive gear. The drive gear is in constant mesh with the 5-6-R reverse driven gear.

When the clutch is engaged (clutch pedal up), power is transmitted to the input shaft. The input shaft first drive gear is in constant mesh with the reverse idler cluster driven gear. The reverse idler cluster gear drives the reverse driven gear, which is locked to the 5-6-R output shaft by the reverse gear synchronizer. Power is then transferred through the 5-6-R output shaft to the differential.



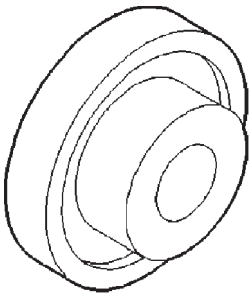
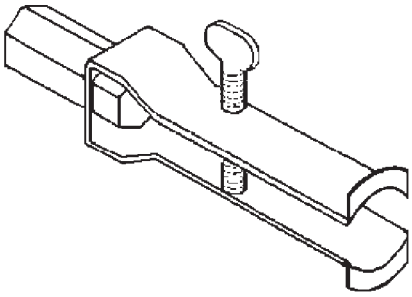
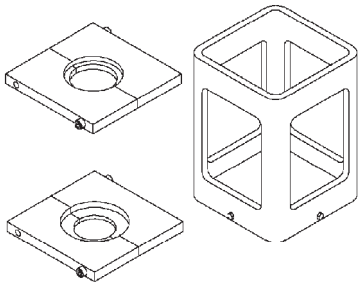
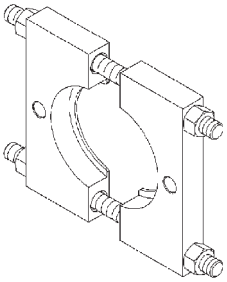
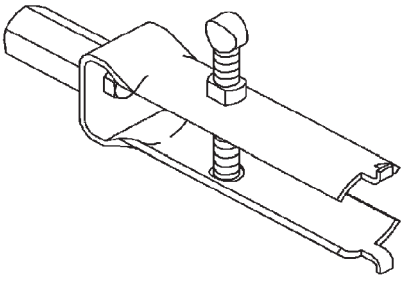
1	Reverse Idler Shaft	3	5-6-R Output Shaft
2	1-4 Output Shaft		

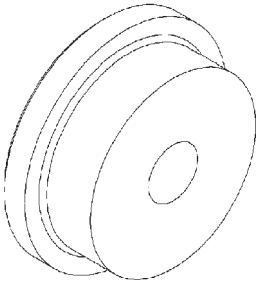
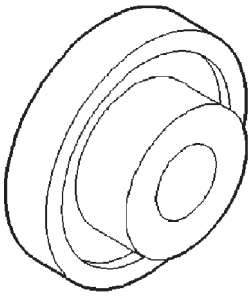
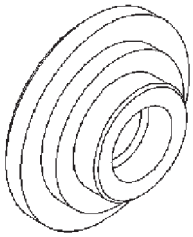
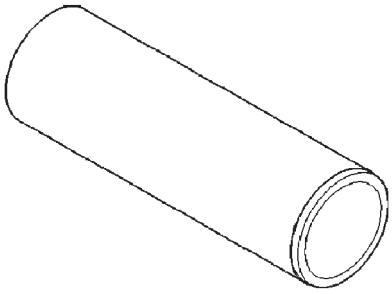
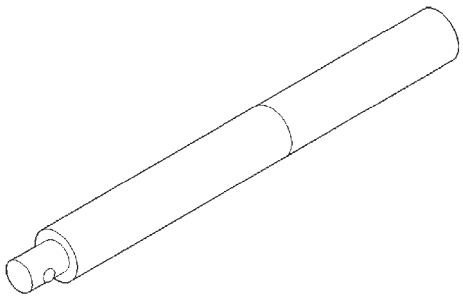
Figure 132 BG6 Reverse Gear Power Flow

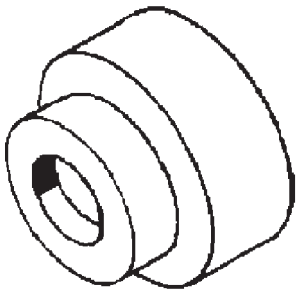
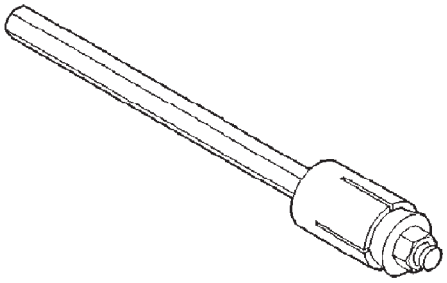
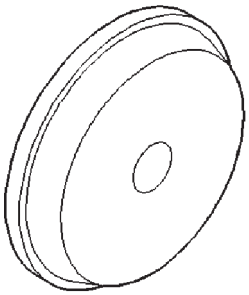
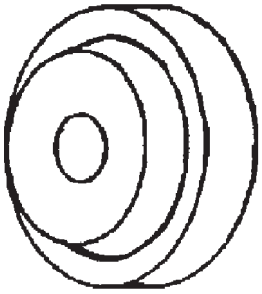
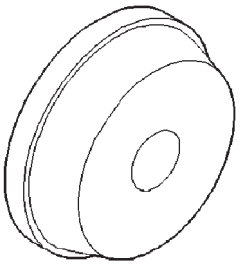
Notes:

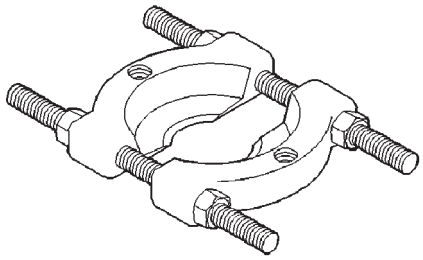
Notes:

BG6 SPECIAL TOOLS

Tool Number	Description	Image
6709	Seal Installer	
7794-A	Puller	
8925	Fixture	
9647	Puller	
9664	Remover	

Tool Number	Description	Image
9859	Installer	
9928	Installer	
9935	Installer	
C-3717	Sleeve	
C-4171	Universal Handle	

Tool Number	Description	Image
C-4657	Seal Installer	
C-4995	Torque Tool	
D-111	Installer	
D-144	Cup Installer	
L-4520	Installer	

Tool Number	Description	Image
P-334	Bearing Splitter	

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GLOSSARY OF TERMS

Axle	A shaft that transfers torque to the driving wheels.
Backlash	The clearance between the teeth of two gears, such as ring and pinion.
Bearing Retainer	A device used to hold a bearing in position.
Clutch	A device used to link the engine and powertrain together.
Clutch Chatter	A vibration or shuddering of the clutch during operation.
Clutch Housing	An area between the transaxle and the engine where the clutch is installed. Also called “Bellhousing.”
Clutch/Starter Interlock	A safety device used to prevent starter engagement until the clutch pedal is fully depressed.
Clutch Spin Time	Amount of time required to stop the clutch after it is disengaged.
Constant Mesh	A condition where gears are always engaged with each other.
Detent	A device that holds a component into a position.
Differential	A set of gears that allows the driving wheels to turn at different speeds while turning.
End Play	The in–and–out movement, or lateral clearance, of an installed shaft.
Facings	A friction material attached to at least one side of a clutch disc.
Final Drive Ratio	The ratio of the differential ring gear to the intermediate or output pinion.
Freewheel	To turn without transferring torque.
Gear	A wheel with teeth that engages another wheel with teeth.
Gear Ratio	The ratio of two meshed gears. To calculate gear ratio, divide the number of teeth on the driven gear by the number of teeth on the driving gear.
Helical Gear	A gear with curved or spiral cut teeth.

Overall Gear Ratio	The ratio any gear multiplied by the final drive ratio.
Overall Top Gear Ratio	The top gear (Fifth or Sixth gear) ratio multiplied by the final drive ratio.
Preload	An amount of force present on a bearing at all times.
Roller Bearing	A bearing using cylindrical rollers with an inner and outer race.
Spline	A raised area on a shaft that engages another component.
Spline Mesh Angle	The angle of the splines on a shaft.
Spur Gear	A gear with straight cut teeth.
Synchronizer	A device used to bring two rotating components to the same speed.
Tapered Roller Bearing	A tapered or coned bearing using long, round rollers between two races.
Thermal Expansion	The expansion and contraction of metal components due to temperature changes.
Torque	A turning force produced by the engine.
Torque Multiplication	Increasing the torque output through the use of gears.
Transaxle	A combination of the transmission and differential.

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