

## 1998-99 DRIVE AXLES

### Differentials & Axle Shafts - Corvette

## DESCRIPTION & OPERATION

A Getrag 625 model differential is used on both the automatic and manual transmissions. Differential carrier and case assembly are aluminum.

## AXLE RATIO & IDENTIFICATION

Axle identification and serial numbers are found on carrier housing.

## LUBRICATION

### CAPACITY

Differential lubricant refill is 3.2 pts. (1.5L). Add 3.4 ounces (.1L) of axle friction modifier additive. When topping off differential, fill to bottom of filler hole.

### FLUID TYPE

Fill differential with 80W-90 GL-5 Gear Lubricant (GM P/N 12345977) and add friction modifier additive (GM P/N 1052358).

## TROUBLE SHOOTING

**NOTE:** See appropriate table in TROUBLE SHOOTING - BASIC PROCEDURES article in GENERAL INFORMATION.

## REMOVAL & INSTALLATION

**NOTE:** Some of the following procedures require servicing suspension components near differential assembly. For more detailed information on suspension components, see REAR - CORVETTE article in SUSPENSION.

**CAUTION:** DO NOT use corrosive cleaning agents, engine degreasers, solvents, or similar agents on or near fiberglass transverse leaf spring. These materials could cause extensive damage to spring. Use care not to scratch fiberglass transverse leaf spring.

### AXLE BEARINGS

#### Removal & Installation

For inner axle (side yoke shaft) bearings, remove and disassemble differential assembly to remove axle bearings. For outer (hub axle) bearings, see **REAR - CORVETTE** article in SUSPENSION.

## **AXLE SHAFTS**

### **Removal & Installation**

1. Raise and support vehicle. Apply parking brake. Remove wheels. Insert a drift punch through caliper opening and into brake rotor cooling fins to prevent rotor from turning. Remove spindle nut from axle shaft. Remove drift punch.
2. Release parking brake. Compress transverse leaf spring using Transverse Leaf Spring Compressor (J-33432-A) and Adapter (J-33432-97). Remove nuts, bolts, and insulators to lower control arm and crossmember. Remove spring.
3. Disconnect outer rear axle tie rod end from knuckle using Linkage Puller (J-24319-01). Remove upper suspension control arm from frame rail. Install Rear Hub Spindle Remover (J-42129) onto hub. Tilt suspension knuckle toward rear of vehicle and remove axle shaft from hub. Remove spindle remover.
4. Support axle shaft. Install Axle Shaft Remover (J-42128) and Extension (J-29794) with Slide Hammer (J-2619-01) into axle shaft, and remove axle shaft from differential.
5. To install, reverse removal procedure.

## **DIFFERENTIAL ASSEMBLY**

### **Removal**

1. Disconnect battery terminals. Disconnect fuel vapor return line from fuel rail. Remove and reposition PCV valve. Remove PCV valve grommet by turning counterclockwise.
2. On manual transmission models, remove left side lower instrument panel insulator. Remove clutch master cylinder rod retainer from clutch pedal. Remove instrument panel accessory trim plate and console, and remove shift control assembly.
3. Raise and support vehicle. Remove clutch actuator cylinder hose from hose retaining clip. Using Clutch Line Separator (J-36221), depress White circular release ring in actuator hose while pulling lightly on master cylinder hose. Disconnect actuator hose.
4. On all models, remove front and rear wheels (to maintain balance when differential is removed).
5. On automatic transmission models, remove bellhousing access plug. Place match mark on flexplate and torque converter through access hole. Remove flexplate-to-torque converter mounting bolts. Shift transmission to Park. Remove transmission shift cable from shift lever on transmission. Disconnect rear transmission oil cooler from junction fittings.
6. On all models, remove intermediate exhaust pipe and driveline tunnel closeout panel. Disconnect all harness connectors. Disconnect Electronic Brake Traction Control Module (EBTCM) ground lead. Remove transmission harness from differential and rear crossmember.
7. Disconnect brakeline retainers from crossmember. Remove muffler assemblies. Remove EBTCM from crossmember, and wire to underbody. Using Transmission Support (J-42055) on transmission jack, position jack under transmission. Remove rear crossmember assembly. Disconnect transmission harness clip to differential.

8. Remove transmission mount bracket from differential. Slowly lower rear of transmission to gain access to remainder of transmission wiring harness. On manual transmission models, tie down shift rod to driveline support assembly.
9. On all models, lower rear of transmission to access driveline support assembly-to-bellhousing mounting bolts. Support engine using another jack. Remove harness retainers from transmission and bellhousing.
10. Position wiring harnesses aside. Remove remaining bolts mounting driveline support assembly to bellhousing. Mark drive shaft position for installation reference.
11. Using an assistant, slowly lower and, at the same time, move driveline rearward to separate from engine. Support driveline and differential, and move assembly from under vehicle. Remove transmission-to-differential mounting bolts. Slowly slide differential from transmission.

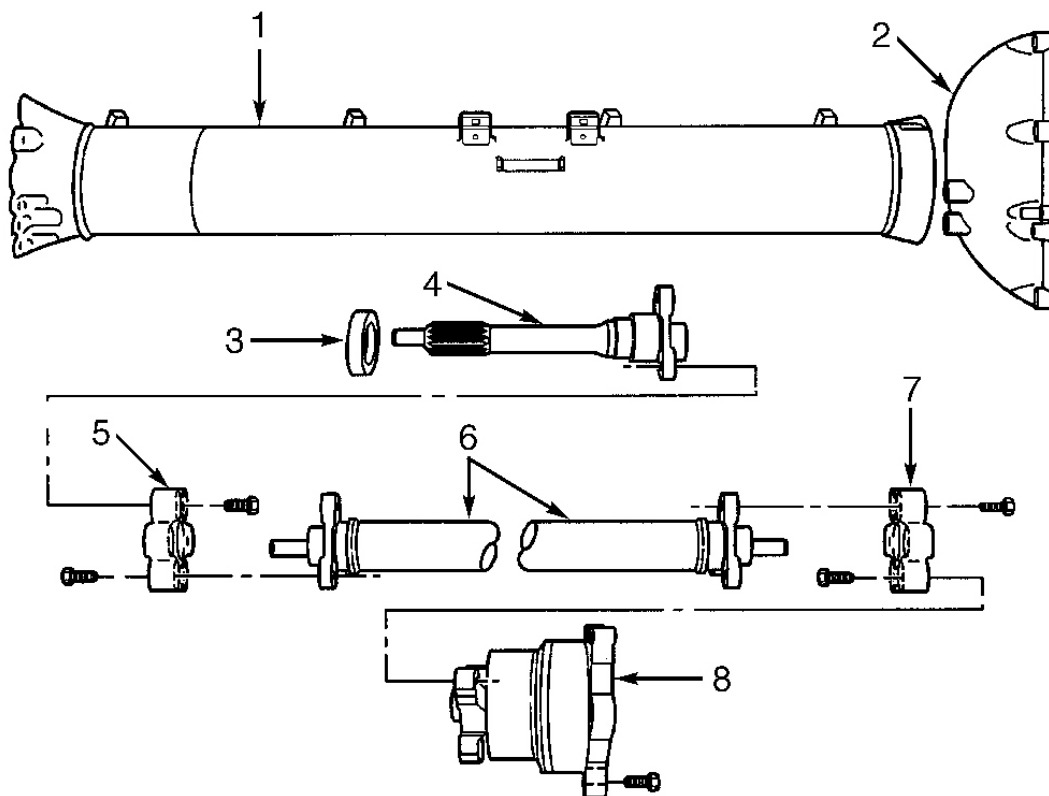
### **Installation**

1. To install, reverse removal procedure. When installing driveshaft and torque converter (A/T models), align marks made during removal. Reconnect all electrical harness connectors.
2. Fill differential. On manual transmission models, bleed clutch hydraulic system. On all models, align rear suspension as necessary. See appropriate **SPECIFICATIONS & PROCEDURES** article in WHEEL ALIGNMENT.

## **DRIVE SHAFT**

### **Removal & Installation**

For drive shaft removal and installation, see **DIFFERENTIAL ASSEMBLY** . See **Fig. 1** .



1. Driveline Support Tube
2. Rear Bellhousing
3. Front Bearing
4. Input Shaft

5. Front Coupler
6. Driveshaft
7. Rear Coupler
8. Rear Bearing Assembly

G97H03672

**Fig. 1: Exploded View Of Drive Shaft Case Assembly**  
 Courtesy of GENERAL MOTORS CORP.

## REAR AXLE OUTPUT SHAFT SEALS

### Removal & Installation

1. Raise and support vehicle. Remove rear wheels. Remove appropriate axle shaft. See **AXLE SHAFTS** . Remove axle shaft seal.
2. Install axle shaft seal using Output Shaft Seal Installer (J-36797). To complete installation, reverse removal procedure.

## OVERHAUL

## DISASSEMBLY

**NOTE:** Overhaul assumes differential assembly has been removed. See DIFFERENTIAL ASSEMBLY under REMOVAL & INSTALLATION.

### Differential Case

1. Remove differential drain and fill plugs. Drain lubricant. Remove Vehicle Speed Sensor (VSS). Remove right side axle cover. Remove mounting studs. Remove snap ring from side output shaft. Using Differential Housing Lifting Tool (J-42155), remove differential case assembly from differential carrier.
2. Remove rear axle cover. Remove pinion cartridge bolts. Using a heat gun, heat differential carrier around pinion cartridge and remove pinion cartridge from differential carrier. See **Fig. 2** and **Fig. 3** . Tag shim pack for installation reference. Remove left side axle cover.

### Ring Gear & Differential Case

1. Use Ring Gear Holder (J-42173) to support differential case. Remove ring gear bolts. Remove Ring Gear Holder (J-42173). Using a punch and hammer, unseat ring gear from differential case assembly.
2. Install Differential Bearing Remover (J-42159) and Side Gear Compressor (J-42162) to right side differential bearing. Using press, remove bearing from differential case.
3. Remove differential case assembly bolts, and remove right differential case from left differential case. Remove left output shaft from left differential case. See **Fig. 2** .

**NOTE:** Keep stack of plates and discs intact and in exact position for reinstallation.

4. Remove left clutch pack from left differential case. Inspect and replace complete clutch plates and discs on both sides if either side shows signs of wear or scoring. Tag clutch pack for installation reference.
5. Using Side Gear Compressor (J-42162) and hydraulic press, remove left differential side bearing. Remove "C" clip from left output shaft. Remove left output shaft from left side gear.
6. Remove cross pin from right differential case using Side Gear Compressor (J-42162) and hydraulic press. Remove spider gears and output shaft from right differential case.

**NOTE:** Keep stack of plates and discs intact and in exact position when being removed.

7. Remove right clutch pack from right differential case. Inspect and replace complete clutch plates and discs on both sides if either side shows signs of wear or scoring. Tag clutch pack for installation reference.

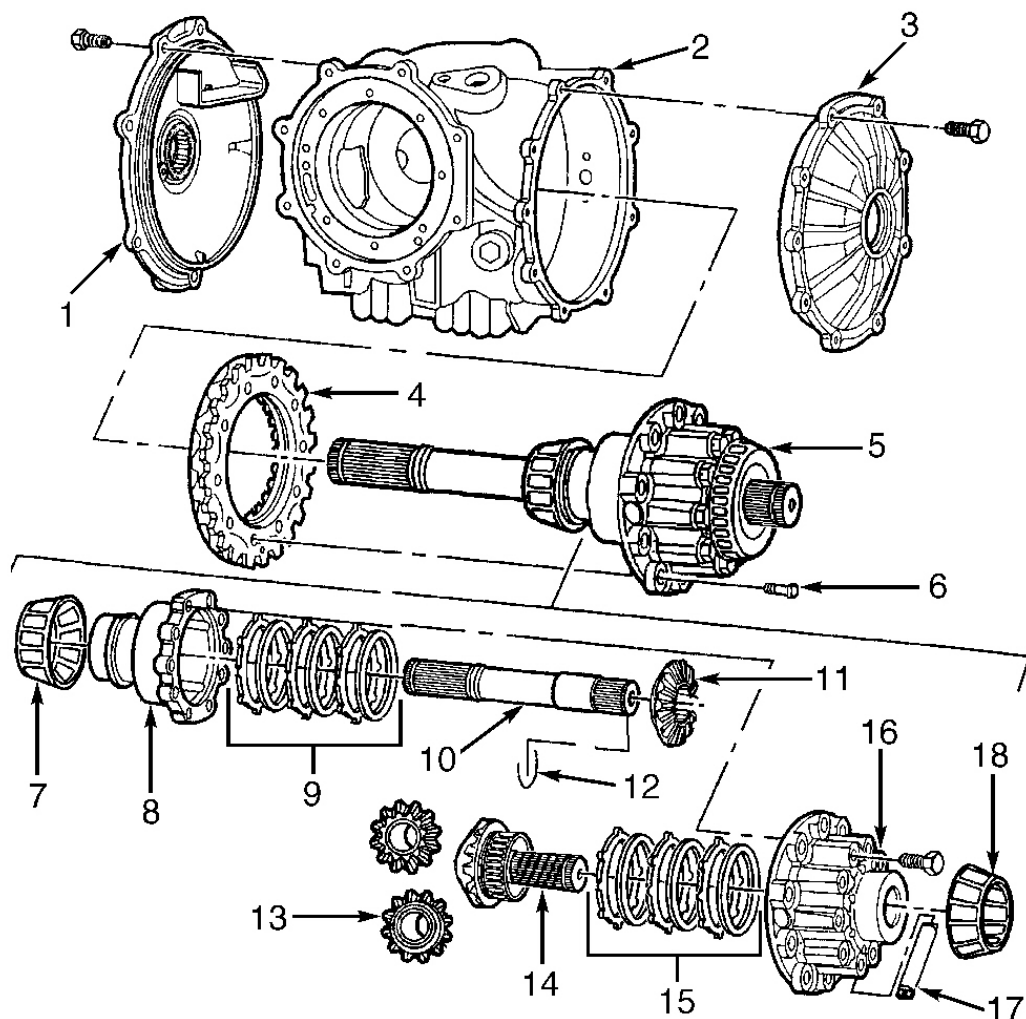
### Side Bearing Race & Shim

1. Remove right differential side bearing outer race from right differential carrier cover using Bearing Race Remover (J-42194) and hydraulic press. Discard bearing race. Remove right side shim pack from right differential carrier cover. Tag shim pack for installation reference. See **Fig. 2** .

2. Remove output shaft bearing from left carrier cover and discard.
3. Remove left differential side bearing outer race using Bearing Race Remover (J-42194) and hydraulic press. Discard bearing race. Remove right side shim pack from right differential carrier cover. Tag shim pack for installation reference.

#### **Drive Pinion Cartridge**

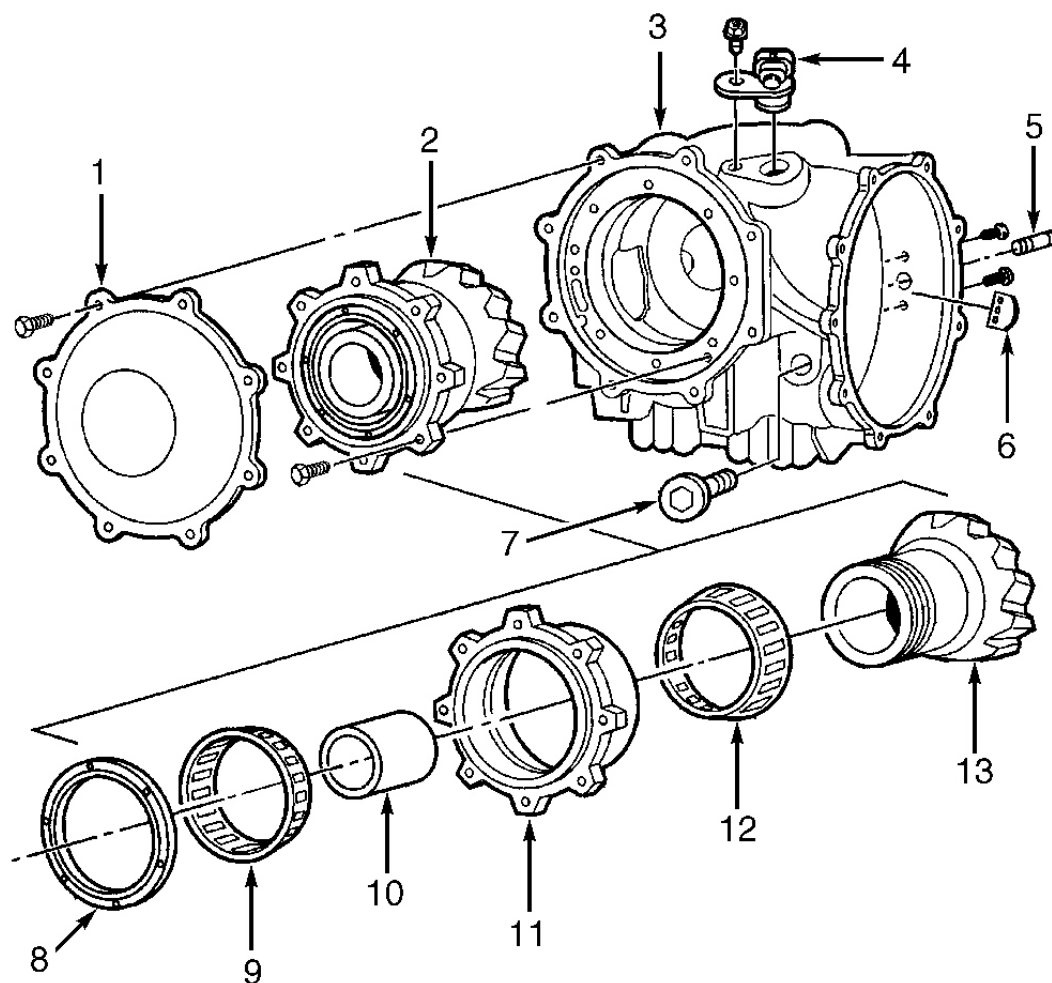
1. Remove drive pinion nut from drive pinion using Spanner Wrench (J-42163) and Pinion Gear Holder (J-42164). Remove rear drive pinion cartridge bearing spacer from drive pinion using Side Gear Compressor (J-42162) and hydraulic press. Discard bearing.
2. Press front drive pinion bearing from drive pinion using Front Pinion Bearing Remover (J-42166) and Side Gear Compressor (J-42162). Discard bearing. See **Fig. 3** .
3. Remove front drive pinion bearing outer race from drive cartridge using Bearing Race Remover (J-42194) and hydraulic press. Discard bearing race.
4. Remove rear drive pinion bearing outer race from drive cartridge using Bearing Race Remover (J-42194) and hydraulic press. Discard bearing race.



- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| 1. Left Differential Carrier Cover  | 10. Left Output Shaft               |
| 2. Differential Carrier             | 11. Left Side Gear                  |
| 3. Right Differential Carrier Cover | 12. "C" Clip                        |
| 4. Ring Gear                        | 13. Spider Gear                     |
| 5. Differential Case Assembly       | 14. Right Output Shaft & Side Gear  |
| 6. Ring Gear Bolt                   | 15. Right Clutch Pack               |
| 7. Left Differential Case Bearing   | 16. Right Differential Case         |
| 8. Left Differential Case           | 17. Pin                             |
| 9. Left Clutch Pack                 | 18. Right Differential Case Bearing |

G97J03673

**Fig. 2: Exploded View Of Differential Carrier & Case Assembly**  
 Courtesy of GENERAL MOTORS CORP.



- |                                    |                               |
|------------------------------------|-------------------------------|
| 1. Differential Carrier Rear Cover | 8. Drive Pinion Nut           |
| 2. Drive Pinion Cartridge          | 9. Drive Pinion Front Bearing |
| 3. Differential Carrier            | 10. Drive Pinion Spacer       |
| 4. Vehicle Speed Sensor (VSS)      | 11. Drive Pinion Cartridge    |
| 5. Transmission Mounting Stud      | 12. Drive Pinion Rear Bearing |
| 6. Transmission Stud Mount         | 13. Drive Pinion              |
| 7. Oil Fill Plug                   |                               |

G97B03674

**Fig. 3: Exploded View Of Drive Pinion Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

## INSPECTION

**Differential Carrier Seal Plate (A/T Only)**



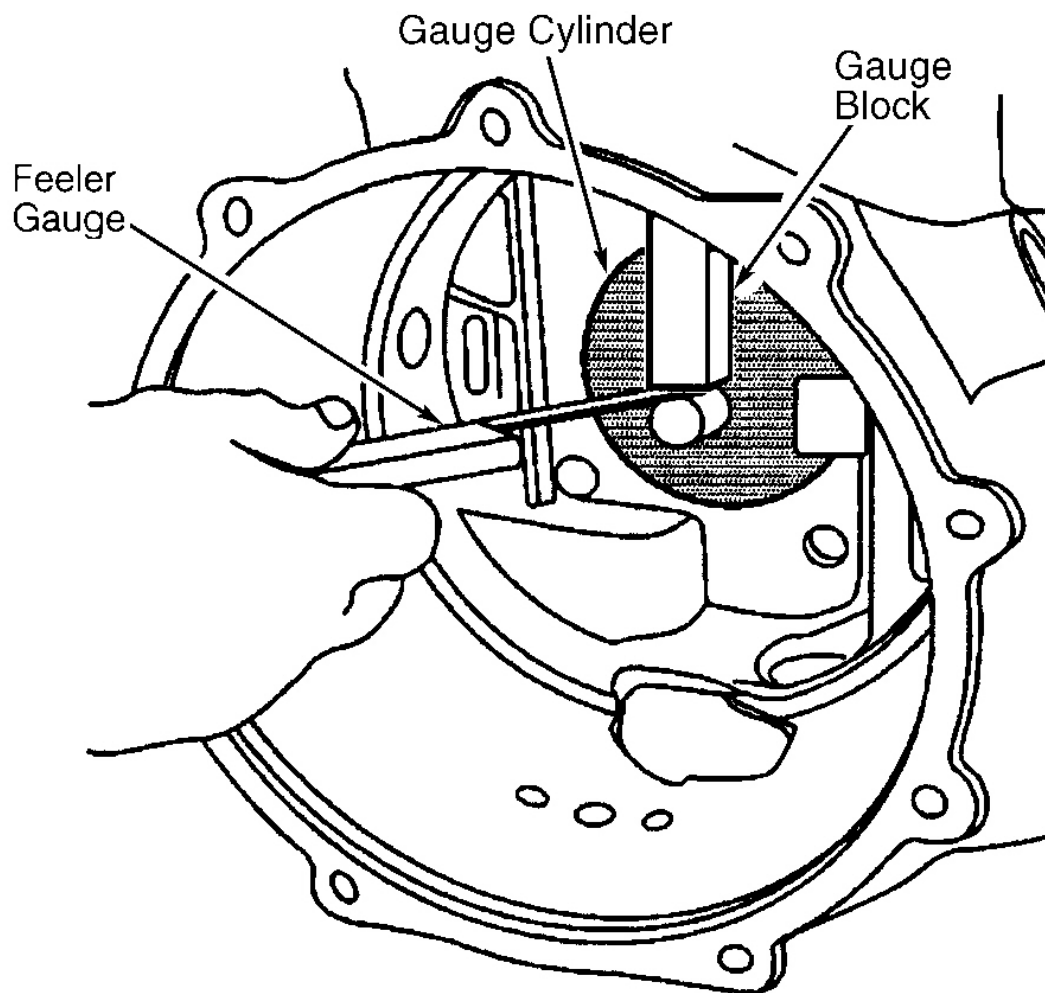
1. Remove "O" ring seal from outer edge of seal plate. Remove transmission output shaft seal from center of seal plate. Clean and inspect seal plate.
2. Install NEW "O" ring seal on outer edge of seal plate. Install NEW transmission output shaft seal using Seal Installer (J-36797).

#### **Drive Pinion Shim Selection**

1. Install Gauge Cylinder (J-42168-1) and Strap (J-42168-9) in differential carrier in left side bearing race location. See **Fig. 4**.
2. Install Gauge Block (J-42168-2) and Plug (J-42168-12) in differential carrier in drive pinion cartridge location. See **Fig. 4**.

**NOTE:**        **If pinion gear has a + or - number stamped on end, shim thickness must be adjusted by that amount.**

3. Using feeler gauge, measure distance from tip of gauge cylinder and gauge block. See **Fig. 4**. Subtract 0.1083" (2.75 mm) from measured value. This is the shim thickness required if pinion gear has a zero stamped on end of pinon. Shim sizes are available in .002" (.05 mm) increments.



G97E03675

**Fig. 4: Drive Pinion Shim Selection**  
 Courtesy of GENERAL MOTORS CORP.

## REASSEMBLY

### Drive Pinion Cartridge

1. Using Bearing Race Installer (J-42172), press front drive pinion outer race into drive pinion cartridge. Press in rear drive pinion bearing outer race in pinion cartridge using Bearing Race Installer (J-42170).
2. Install front drive pinion bearing onto drive pinion using Pinion Bearing Installer (J-42160), Pinion Gear Holder (J-42164) and hydraulic press.
3. Install drive pinion cartridge onto drive pinion. Install drive pinion bearing spacer onto drive pinion. Using Pinion Bearing Installer (J-42160), Pinion Gear Holder (J-42164) and hydraulic press, install rear

drive pinion bearing on drive pinion.

4. Place drive pinion and Pinion Gear Holder (J-42164) in vise. Install drive pinion nut on drive pinion using a 3/4" drive torque wrench. Tighten nut to 392 ft. lbs. (531 N.m).

### **Ring Gear & Differential Case**

1. Install right clutch pack into right differential case. Install right output shaft and spider gears into right differential case. See **Fig. 1**.
2. Using Side Gear Compressor (J-42162) and hydraulic press, install cross pin into right differential case. Install left output shaft into left side gear. Install "C" clip onto left output shaft.
3. Using Bearing Installer (J-42160), press left differential side bearing. Install clutch pack into left differential case. Install left output shaft and left side gear into left differential case.
4. Install left differential case to right differential case. Tighten differential bolts to 41 ft. lbs. (56 N.m). Install right gear onto differential case. A soft punch and hammer may be used to help seat ring gear onto differential case. Tighten ring gear bolts to 144 ft. lbs. (195 N.m). Install differential side bearing using Bearing Installer (J-42160).

### **Side Bearing Race**

1. Install Gauge Block (J-42168-2) and Plug (J-42168-12) into drive pinion location in differential carrier. Place Depth Gauge (J-42168-7) onto flat side of Gauge Block (J-42168-2).
2. Place tip of depth gauge plunger on bottom of bearing bore in differential carrier. Tighten set screw to lock plunger in place. Install Gauge Plate (J-42168-5) in vise.
3. Place ring gear and case assembly onto Gauge Plate (J-42168-5) with left side bearing facing down. Remove depth gauge from differential case, and position on top of ring gear.

**NOTE:**        **If ring gear has a + or - number stamped on the side, shim thickness must be adjusted by that amount.**

4. Using a feeler gauge, measure distance between plunger tip of depth gauge and top of gauge block. Measured value is the shim thickness required if ring gear has a zero stamped on the side.
5. Remove depth gauge and gauge block. Install left side shim pack. Press in left side outer bearing race using Bearing Race Installer (J-42172). Install ring gear and case assembly in differential carrier.
6. Place right side outer bearing onto right side bearing. Place Gauge Assembly (J-42168-11) on differential right side cover surface with plunger tip touching the right side bearing outer race. Tighten plunger set screw to lock plunger in place.
7. Remove gauge assembly. Press right side outer bearing race using Bearing Race Installer (J-42172). Remove ring gear and case assembly from differential carrier.

### **Rear Axle Assembly**

1. Apply Loctite Sealant (1052942) onto left side axle cover lubrication reservoir. Install left side axle cover. Tighten left side axle cover bolts to 18 ft. lbs. (24 N.m).
2. Reuse pinion cartridge shims removed during disassembly if drive pinion cartridge has not been

disassembled. If pinion cartridge has been disassembled, select proper size shims.

- 3. Install drive pinion shim pack into differential carrier. Using a heat gun, heat differential carrier around drive pinion cartridge opening. Install drive pinion cartridge into differential carrier. Tighten drive pinion cartridge bolts to 41 ft. lbs. (55 N.m). Check pinion rotating torque. Rotation torque should not be greater than 22 INCH lbs. (2.5 N.m).
- 4. Install rear axle cover. Tighten rear axle cover bolts to 89 INCH lbs. (10 N.m). Install differential case assembly into differential carrier. Install "C" clip onto right output shaft. Install right side transmission stud mount and bolts. Install right side transmission mounting stud to differential carrier.
- 5. Install right side axle cover. Tighten right axle cover bolts to 18 ft. lbs. (24 N.m). Install VSS. Tighten VSS bolt to 10 ft. lbs. (14 N.m). Install drain plug, and refill differential. See **LUBRICATION** .

**TORQUE SPECIFICATIONS**

**TORQUE SPECIFICATIONS**

Application	Ft. Lbs. (N.m)
Axle Cover Bolt	18 (24)
Differential Drain & Fill Plug	26 (35)
Differential Housing Bolt	41 (56)
Differential-To-Transmission Bolt	37 (50)
Drive Axle Spindle Nut	118 (160)
Drive Pinion Cartridge Bolt	41 (56)
Drive Pinion Nut	392 (531)
Driveline Support Assembly-To-Bellhousing Bolt	37 (50)
Flexplate Spindle-To-Driveline Support Assembly Bolt (A/T)	37 (50)
Input Shaft-To-Front Drive Shaft Coupler Bolt	52 (70)
Rear Bearing Assembly-To-Driveline Support Tube Bolt	48 (65)
Rear Bearing-To-Rear Drive Shaft Coupler Bolt	52 (70)
Rear Crossmember Mounting Bolt	81 (110)
Rear Shock Absorber Lower Mounting Bolt	162 (220)
Ring Gear Bolt	144 (195)
Shift Control Mounting Bolt	22 (30)
Shift Control Rod Clamp Bolt	22 (30)
Trans. Mount Bracket-To-Differential Bolt	37 (50)
Transmission Mount-To-Bracket Nut	43 (58)
Transmission Mounting Stud	31 (42)
Transmission-To-Driveline Support Assembly Bolt	37 (50)
Transmission-To-Rear Crossmember Nut	37 (50)
Vehicle Speed Sensor (VSS) Bolt	10 (14)
INCH Lbs. (N.m)	
Rear Axle Cover Bolt	89 (10)