SECTION 4B - FINAL DRIVE AND DRIVE SHAFTS

CAUTION:

This vehicle will be equipped with a Supplemental Restraint System (SRS). An SRS will consist of either seat belt pre-tensioners and a driver's side air bag, or seat belt pre-tensioners and a driver's and front passenger's side air bags. Refer to CAUTIONS, Section 12M, before performing any service operation on or around any SRS components, the steering mechanism or wiring. Failure to follow the CAUTIONS could result in SRS deployment, resulting in possible personal injury or unnecessary SRS system repairs.

CAUTION:

This vehicle may be equipped with LPG (Liquefied Petroleum Gas. In the interests of safety, the LPG fuel system should be isolated by turning OFF the manual service valve and then draining the LPG service lines, before any service work is carried out on the vehicle. Refer to the LPG leaflet included with the Owner's Handbook for details or LPG Section 2 for more specific servicing information.

CAUTION:

Whenever any component that forms part of the ABS or ABS/ETC (if fitted), is disturbed during Service Operations, it is vital that the complete ABS or ABS/ETC system is checked, using the procedure as detailed in 4. DIAGNOSIS, ABS or ABS/ETC FUNCTION CHECK, in Section 12L ABS & ABS/ETC.

1. GENERAL DESCRIPTION

Independent rear suspension is fitted as standard equipment on all VT Series vehicles and all are fitted with a final drive assembly, production option GU4. This assembly has a four pinion type rear differential assembly. The ring gear diameter for V6 engined models, is 190.5 mm and for V8 and V6 supercharged, engined models, is 205 mm. The final drive ratio for V6 engined models is 3.08:1 and for V8 and V6 supercharged, engined models, is 3.07:1.

Production option G80, Limited Slip Differential (LSD), (also referred to as Spin Resistant Differential - SRD) is available on all models. While the majority of illustrations shown in this Section relate to vehicles fitted with the ABS braking system, service procedures are the same for vehicles equipped with standard brakes, unless noted.

The final drive assembly is mounted directly to a crossmember which is rubber mounted to the vehicle underbody. The differential case and drive pinion are mounted in opposed taper roller bearings in the carrier. Differential case side bearing pre-load adjustment is provided by screw adjusters in the sides of the case. Pinion bearing pre-load is provided by a collapsible spacer. Torque is transferred from the propeller shaft to the final drive assembly via the pinion flange which is splined to the hypoid pinion. The torque is then transferred from the pinion through the ring gear, differential case, differential pinion cross shafts, differential pinions, side gears and then via splines, to the inner axle shafts and drive shafts.

The Limited Slip Differential performs the same functions as the conventional type differential but in addition, transfers driving force to the wheel with traction, should the opposite wheel begin to spin.

The differential case houses two cone type clutches behind the side gears that, with V6 models, are splined to the inner axle shafts and their tapered faces contact corresponding faces in the differential case.

The cones for V8 and V6 supercharged models however, form an integral part of the side gears. The four pinion type Limited Slip Differential has three pre-load springs enclosed in the centre of the pinion cross shaft. The Limited Slip Differential directs the major driving force to the wheel with the greater amount of traction, but will not interfere with steering characteristics or differential action. The partial locking action, due to the spring load on the cones, is automatically increased by the inherent separating forces between the side gears and pinions, which progressively increases the resistance in the differential as applied torque is increased.

When the rear wheels are under extremely unbalanced conditions, such as a wheel on a dry road and the other in mud or ice, with the standard differential, wheel spin easily occurs if over-acceleration is attempted. However, with a Limited Slip Differential, when the tendency for wheel spin occurs, the friction generated inside the case, transfers the major driving force to the non-spinning wheel. In the event of continued spinning, a whirring sound from the over-running cones is produced but this condition/sound does not indicate failure of the unit.

The final drive assembly should be removed from the vehicle for all service operations other than for the removal of the inner axle shafts, inner axle shaft oil seals, pinion oil seal or the rear cover. Two drive shaft assemblies are used, each consisting of a shaft which is splined at each end into a ball type constant velocity joint. The inner constant velocity joint is bolted to the inner axle shaft flange at the differential carrier, with the outer joint bolted to the trunnion flange at the rear trailing arm.

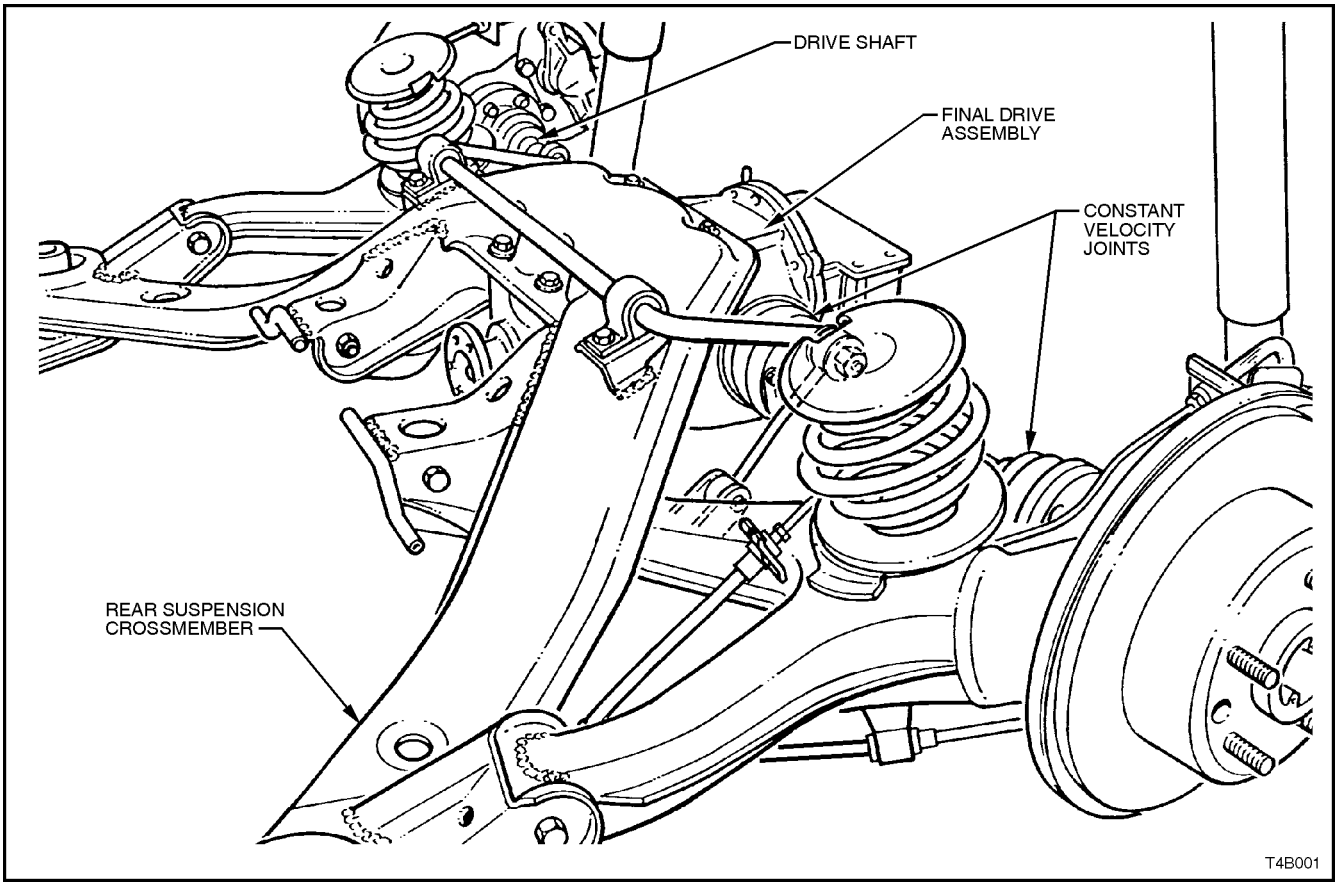
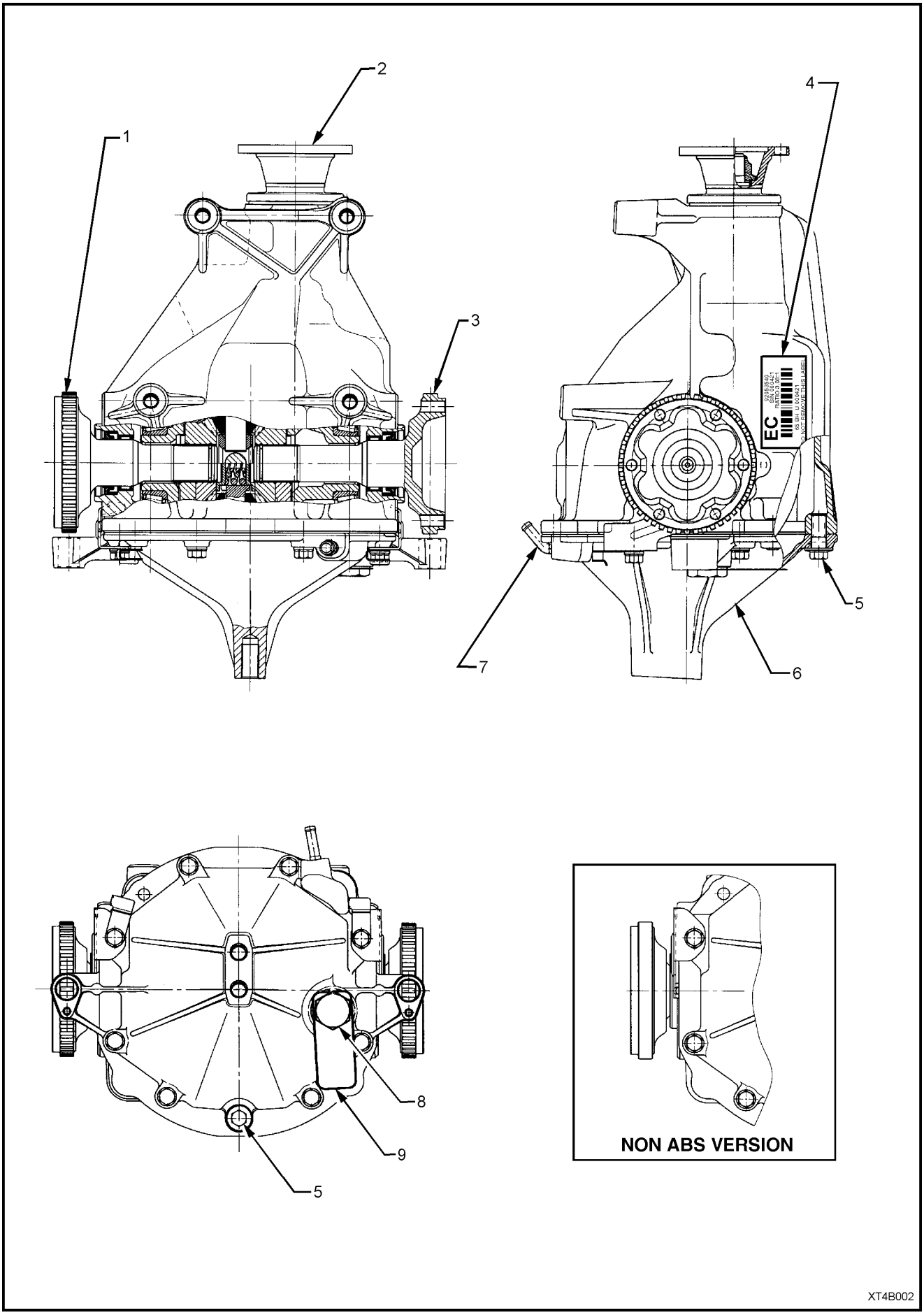


Figure 4B-1



1. LH Inner Axle Shaft
2.. Pinion Flange
3. RH Inner Axle Shaft
4. Identification Label
5. Frain Plug
6. Rear Cover
7. Breather
8. Filler Plug
9. Lubrication Tag

Figure 4B-2

1. 1 FINAL DRIVE ASSEMBLY IDENTIFICATION

The type of differential fitted to this final drive assembly can be identified by referring to either the identification label attached to the RHS of the carrier housing and from the lubrication tag under the filler plug on the rear cover.

The location of the label and tag are as shown, in **Figure 4B-2**. The identification tag carries the Holden's part number for the final drive assembly, final drive ratio and the serial number of the assembly.

The code number and bar code is used for production identification of the final drive assembly.

CODE TAG LETTERING		FINAL DRIVE ASS'Y TYPE
STD. BRAKES	ABS	
EF	EC	CONVENTIONAL - V6
ED	EE	LSD - V6
EA	EJ	CONVENTIONAL - V8 V6 Supercharged and Wagon with manual transmission
EB	EH	LSD - V8, V6 Supercharged and Wagon with manual transmission

When fitted, the information on the lubrication tag under the filler plug, (see Figure 4B-3), will be;

With V6 and LSD; "SPIN RESISTANT DIFF. USE APPROVED LUBRICANT ONLY"

With V8 (or V6 supercharged) and conventional differential; "HIGH PERFORMANCE. USE APPROVED LUBRICANT ONLY"

With V8 (or V6 supercharged) and LSD; "LSD - HIGH PERFORMANCE. USE APPROVED LUBRICANT ONLY"

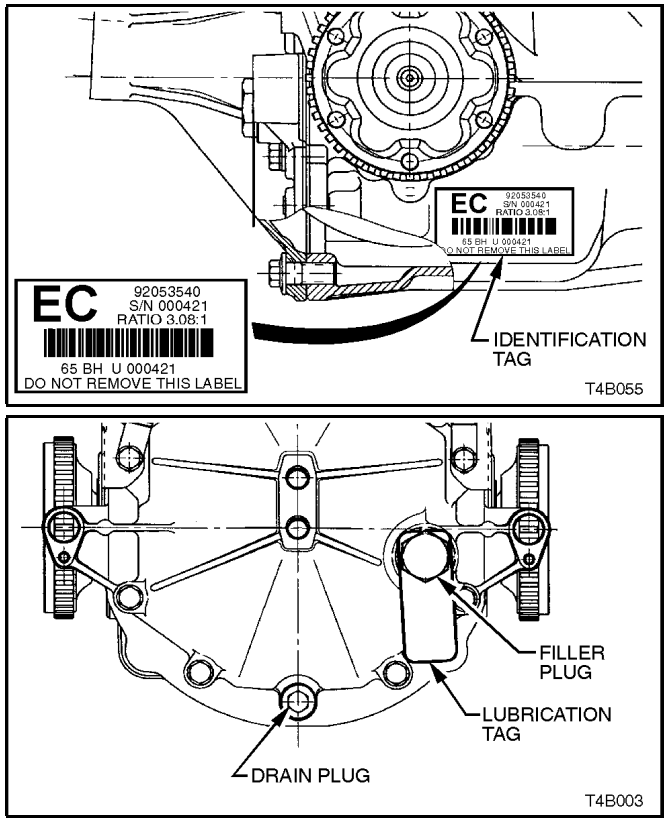


Figure 4B-3

1. 2 FINAL DRIVE ASSEMBLY MAINTENANCE

MAINTENANCE

Drive Shaft Bearings and Constant Velocity Joints

The drive shaft outer bearings and constant velocity joints are lubricated for life and therefore require no periodic maintenance.

The constant velocity joint boots are to be inspected at every maintenance service. If there is any evidence of damage to boots, remove drive shaft and inspect constant velocity joints, refer to **2.6 DRIVE SHAFT ASSEMBLY** and to **2.7 DRIVE SHAFT AND/OR CONSTANT VELOCITY JOINTS** in this Section.

Differential Carrier Assembly

Check for lubricant leaks at every maintenance service. If there is evidence of leakage, correct leak and add lubricant as necessary. (Refer to **2 MINOR SERVICE OPERATIONS** in this Section).

At the time or distance interval specified in the VT Series Owner's Handbook, check to ensure that the lubricant level is to the bottom of the filler plug hole when the differential carrier assembly is COLD.

Final Drive Assembly Breather

The breather hose should be checked regularly to ensure that it is correctly routed and not kinked.

The top end of the breather hose should be inserted at least 25 mm into the vehicle underbody crossmember hole.

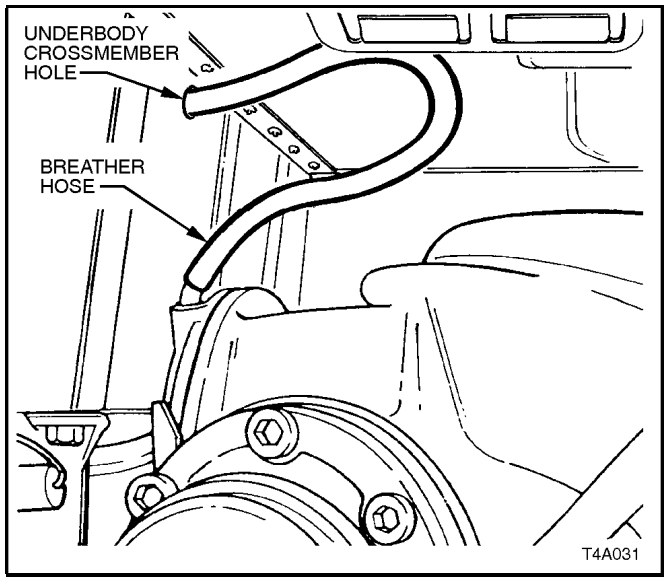


Figure 4B-4

LIMITED SLIP DIFFERENTIAL PRECAUTIONS

CAUTION:

When servicing a vehicle fitted with a Limited Slip Differential, never run the engine with the transmission in gear and one wheel raised. The driving force to the wheel on the ground may cause the vehicle to move.

NOTE:

'On Car' type wheel balancers are not recommended for use on the rear wheels of cars equipped with a Limited Slip Differential. One rear wheel will drive if in contact with the ground when the opposite wheel is raised and rotated.

This type of balancer may be used by removing the road wheel opposite to the one being spun, the vehicle raised and supported on safety stands. Refit wheel nuts, reversed, to retain brake disc.

LUBRICATION

The lubricant level should be checked and topped up, if required at the time or distance intervals outlined in the VT Series Owner's Handbook with the differential carrier COLD; refer to **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** in this Section. At this temperature, the lubricant should be level with the bottom of the filler plug hole. Operation 2.1 also details the recommended lubricants for all final drives fitted to VT Series vehicles.

NEVER USE ANY OTHER THAN THE RECOMMENDED LUBRICANT.

NOTE 1:

The lubricant for vehicles with the V6 engine and either the standard or Limited Slip Differential (LSD) differential, is a mineral based oil. With LSD final drives however, an approved LSD compatible lubricant MUST be used. Using a straight run mineral oil in an LSD final drive assembly, will cause 'stick-slip' chatter to occur when turning corners.

Alternatively, if a synthetic type lubricant is used in any rear axle of a V6 engined, VT Series vehicle, oil seal deterioration with the possibility of lubricant leakage may occur.

NOTE 2:

The lubricant used in the rear axles of all V8 and V6 supercharged engined vehicles, is a synthetic product. The oil seals of the V8 type rear axle assemblies have been specially formulated to tolerate this lubricant. It must also be noted that, using a mineral type lubricant in any final drive fitted to a V8 or V6 supercharged engined vehicle, may cause gear set and/or bearing damage under high load driving conditions.

NOTE 3:

If the incorrect lubricant is accidentally used in the rear axle of any VT Series vehicle, then the rear axle should be drained, flushed (with the recommended lubricant) and then refilled with the correct lubricant.

The procedure for this operation is detailed in **2.2 CHANGING/FLUSHING REAR AXLE LUBRICANT**, in this Section.

2. MINOR SERVICE OPERATIONS

2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL

1. Ensure vehicle is level.
2. Clean area around filler plug.
3. Remove filler plug from right hand side of differential carrier (do not lose the lubrication tag from the plug, if fitted).
4. The lubricant level is to be maintained at the bottom edge of the filler plug hole, WHEN COLD. Use only the recommended lubricant.

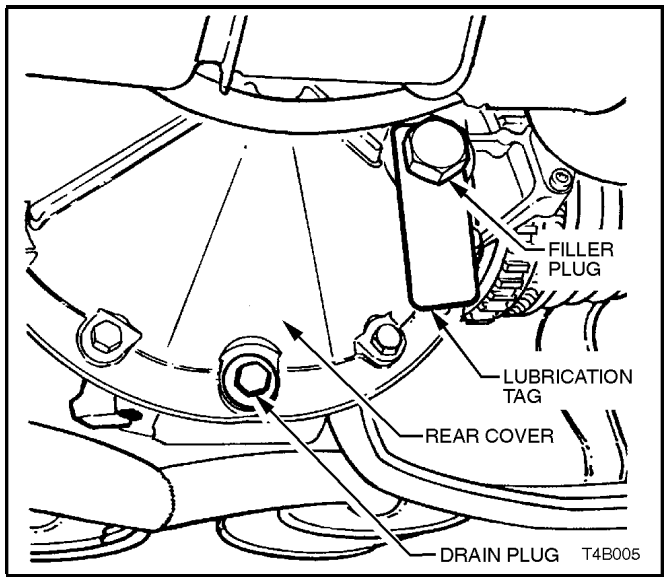


Figure 4B-5

ENGINE & AXLE TYPE	RECOMMENDED LUBRICANT
All V6 excluding V6 Wagon with manual Transmission & V6 Supercharged Vehicles	Mineral Hypoid Gear Oil, such as AMPOL Gearlube SRD90, BP Limslip 90, CALTEX Gear Oil LSD, CASTROL LSX90 MOBIL Lubrite LS90, SHELL XD90LS VALVOLINE HP Gear Oil LS90 or equivalent lubricant to Holden Specification HN 1561
All V8, V6 Wagon with Manual Transmission & V6 Supercharged Vehicles	Synthetic Hypoid Gear Oil, such as AMPOL Synthetic Gear Oil 80W/140 CALTEX Synstar GL 80W-140 CASTROL SAF-XA MOBIL Mobilube SHC 80W-140 ID VALVOLINE Synthetic Gear 75W-140 or equivalent lubricant to Holden's Specification HN 2040

5. Inspect filler plug for damage, if OK, refit in carrier (including the lubrication tag). If damaged, replace plug.
6. Tighten filler plug to the correct torque specification.

FILLER PLUG TORQUE SPECIFICATION	23 - 31 Nm

2.2 CHANGING/FLUSHING REAR AXLE LUBRICANT

To drain lubricant from differential carrier assembly, remove filler and drain plugs (see **Figure 4B-5**) and allow (preferably warm) lubricant to drain into a suitable container.

If flushing is required, use an undiluted quantity of the recommended lubricant for the operation.

When the draining and flushing (if required), operation is completed, apply thread sealing tape to rear cover drain plug thread. Install and tighten attaching plug to the correct torque specification.

REAR AXLE DRAIN PLUG TORQUE SPECIFICATION	23 - 31 Nm

Fill the final drive assembly with 1.65 litres of the recommended lubricant, install the filler plug and lubrication tag (if fitted) and tighten to the correct torque specification.

REAR AXLE FILLER PLUG TORQUE SPECIFICATION	23 - 31 Nm

2.3 TRAILING ARM TRUNNION ASSEMBLY HUB

CHECK FOR RUN-OUT

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle, then place safety stands under trailing arms to support weight of vehicle.
2. Remove rear wheel cover (steel wheels) or centre cap (alloy wheels) on that side of the vehicle where the trunnion is to be checked.
3. Mark relationship of wheel to mounting flange. Remove road wheel attaching nuts and remove wheel.
4. Disconnect rear shock absorber lower mounting bolt from trailing arm, and pull lower end of shock absorber from trailing arm.

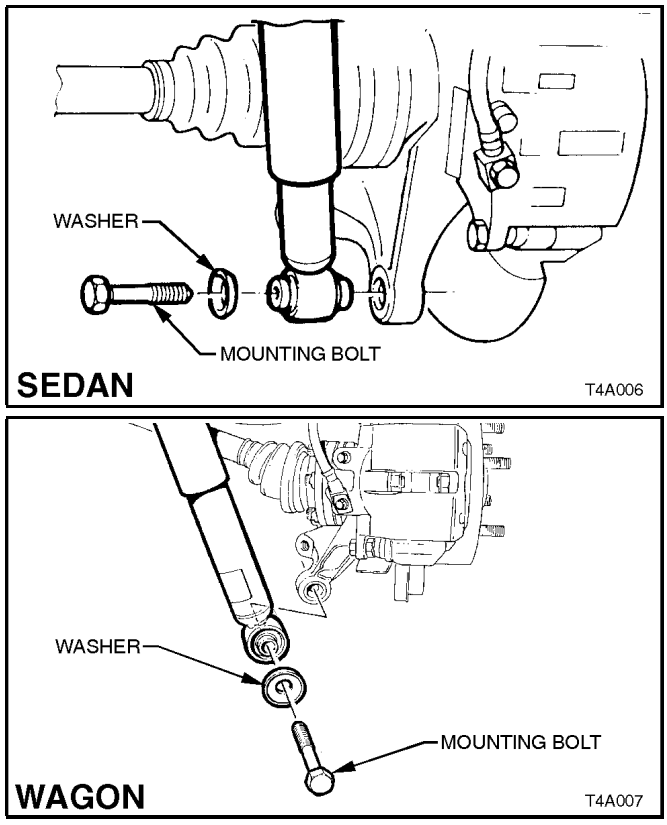


Figure 4B-6

5. Remove brake caliper anchor plate to trailing arm attaching bolts, remove caliper from disc.

   Using wire, tie up caliper to lower end of shock absorber upper mounting. DO NOT ALLOW CALIPER TO HANG BY BRAKE HOSE.
6. Remove brake disc.

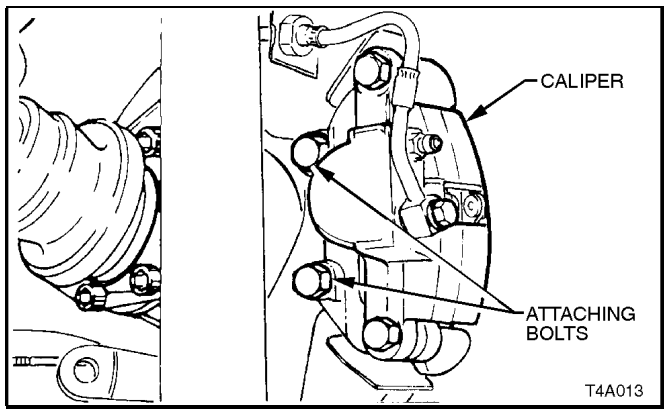


Figure 4B-7

7. Mount a dial indicator with magnetic base to rear brake backing plate, and stylus of gauge perpendicular to outside of trunnion assembly hub flange.
8. Rotate trunnion assembly hub and read lateral run-out.

TRUNNION ASSEMBLY HUB, TOTAL INDICATED RUN-OUT SPECIFICATION	0.060 mm

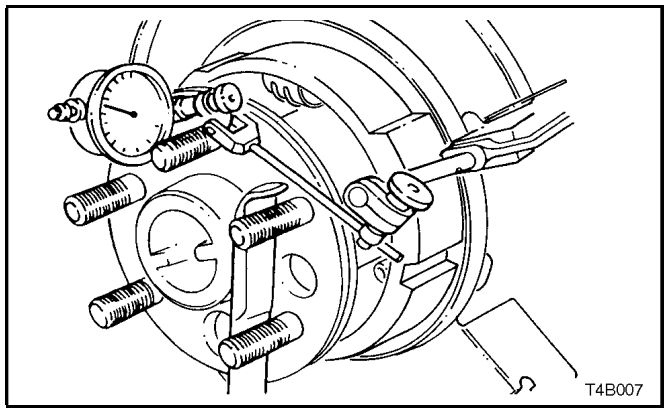


Figure 4B-8

If Run-out is Within Specification:

9. Install brake disc and brake caliper. Install brake caliper anchor plate to trailing arm attaching bolts and tighten to the correct torque specification.

BRAKE CALIPER ANCHOR PLATE TO TRAILING ARM ATTACHING BOLT TORQUE SPECIFICATION	70 - 100 Nm

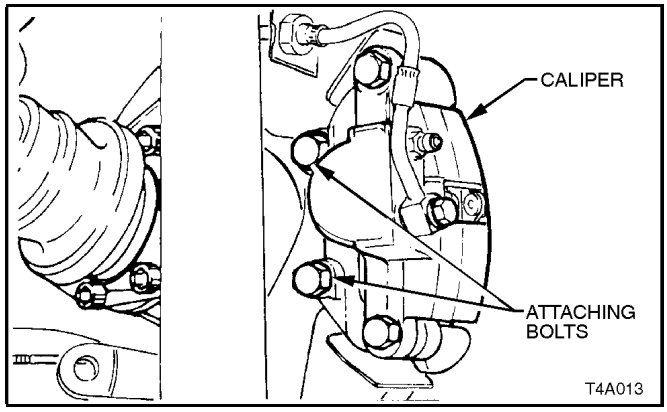


Figure 4B-9

10. Install shock absorber to trailing arm, fit washer to the lower mounting bolt, install bolt and tighten to the correct torque specification.

SHOCK ABSORBER LOWER MOUNTING BOLT TORQUE SPECIFICATION	105 - 125 Nm

NOTE:

Vehicle must be at curb weight and on all four wheels before this torque is applied.

11. Install road wheel and tighten attaching nuts.

NOTE:

When installing the wheel, align the marks made prior to removal.

12. Remove safety stand and lower vehicle.
13. Tighten road wheel attaching nuts to the correct torque specification.

ROAD WHEEL ATTACHING NUT TORQUE SPECIFICATION	110 - 140 Nm

14. Refit wheel cover/centre cap.

If the Run-out Check, Exceeds Specification:

15. The trunnion assembly must be replaced, refer to **3.1 TRAILING ARM TRUNNION FLANGE, TRUNNION ASSEMBLY AND/OR WHEEL BEARING** in this Section.

NOTE:

The trunnion shaft for VT Series vehicles is 1 mm shorter than previous models and is identified by a circumferential groove on the outside diameter of the flange (see Figure 4B-8).

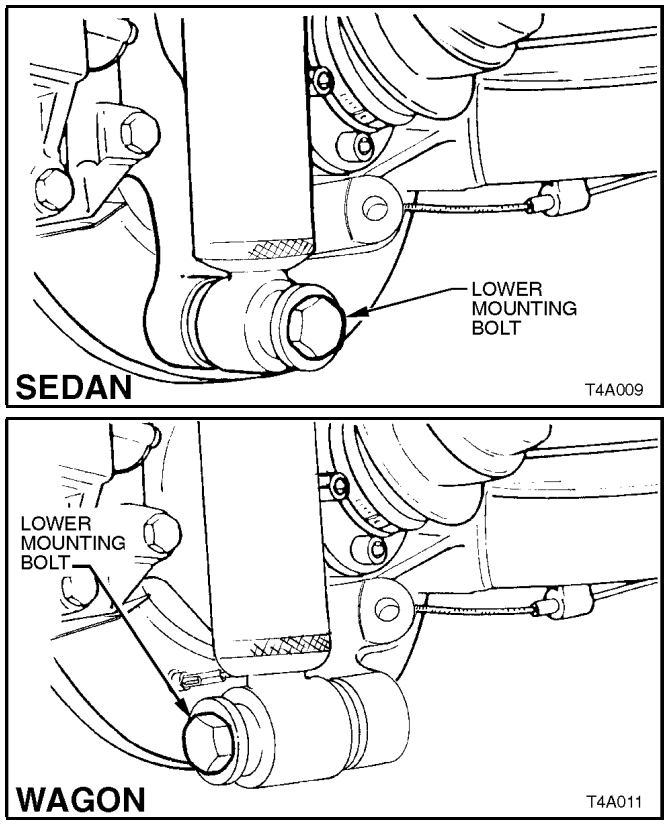
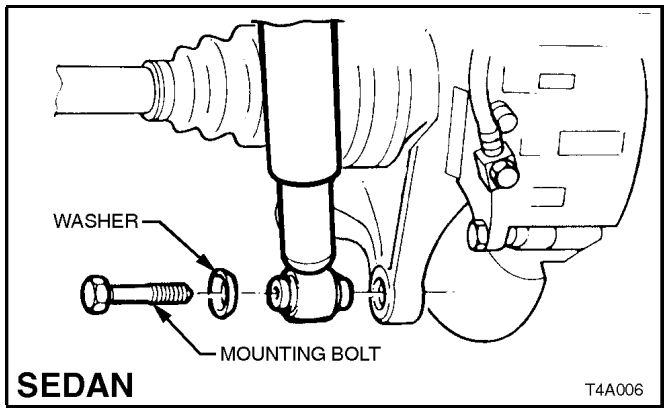


Figure 4B-10

2.4 TRAILING ARM TRUNNION ASSEMBLY HUB STUDS

REPLACE

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle, then place safety stands under trailing arms to support weight of vehicle.
2. Remove rear wheel cover (steel wheels) or centre cap (alloy wheels) on that side of the vehicle where the stud/s are to be replaced.
3. Mark relationship of wheel to mounting flange. Remove road wheel attaching nuts and remove wheel.
4. Disconnect rear shock absorber lower mounting bolt from trailing arm and pull lower end of shock absorber from trailing arm.



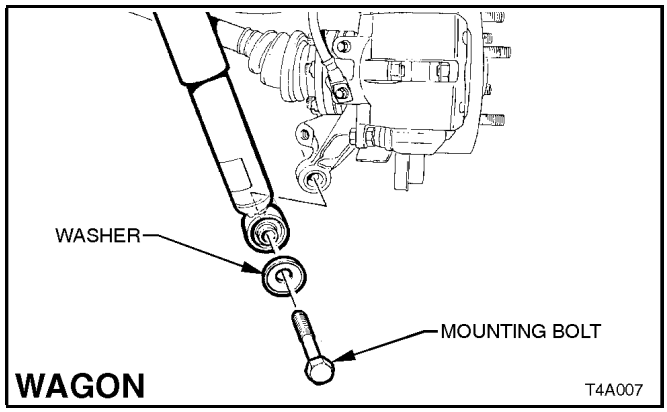


Figure 4B-11

5. Remove brake caliper anchor plate to trailing arm attaching bolts and remove caliper from disc.

   Using wire, tie up caliper to lower end of shock absorber upper mounting. DO NOT ALLOW CALIPER TO HANG BY BRAKE HOSE.
6. Remove brake disc.

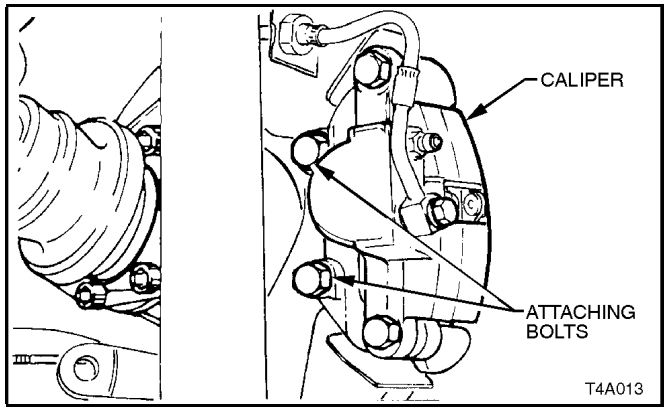


Figure 4B-12

7. Using Tool No. AJ24292-C or equivalent, press stud/s from hub.

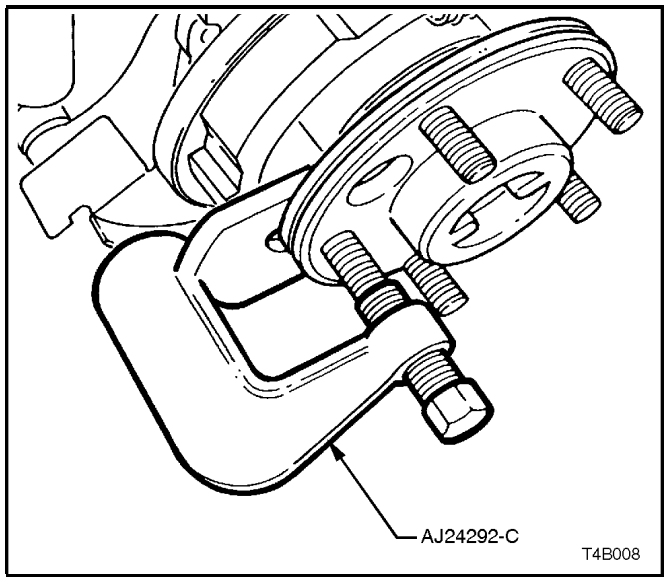


Figure 4B-13

8. Install Tool No. KM-468 holding bar, with two wheel nuts to the trunnion assembly hub studs. Install new stud into hub. Assemble some suitable size washers and a reversed wheel nut, onto stud. Tighten wheel nut to draw in stud. When stud is fully installed, remove wheel nut and washers.

   Install any remaining studs in the same manner.
9. Remove Tool No. KM468.

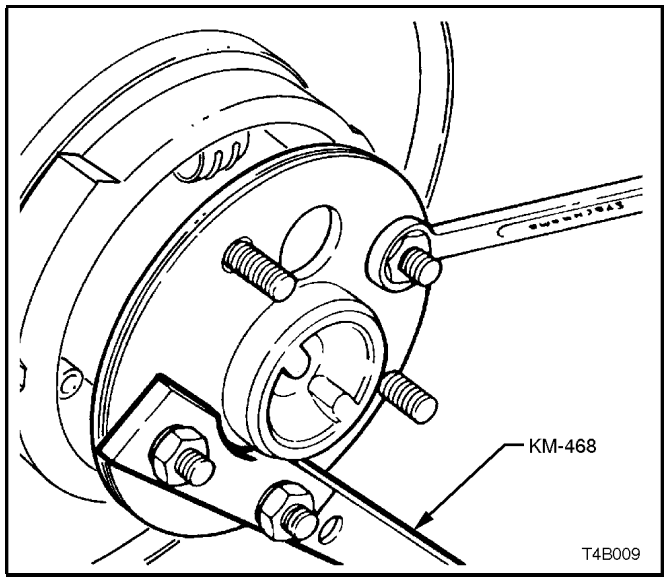


Figure 4B-14

10. Install brake disc and brake caliper. Install brake caliper anchor plate to trailing arm attaching bolts and tighten to the correct torgue specification.

BRAKE CALIPER ANCHOR PLATE TO TRAILING ARM ATTACHING TORQUE SPECIFICATION	70 - 100 Nm

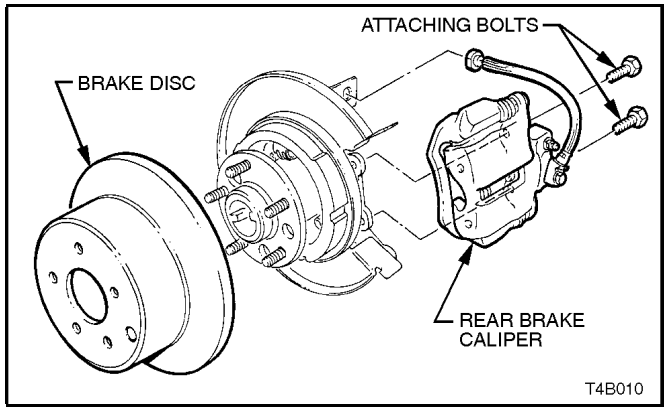


Figure 4B-15

11. Install shock absorber to trailing arm, install and tighten lower mounting bolt to the correct torque specification.

SHOCK ABSORBER LOWER MOUNTING BOLT TORQUE SPECIFICATION	105 - 125 Nm

NOTE:

Vehicle must be at curb weight and on all four wheels before this torque is applied.

12. Install road wheel and tighten attaching nuts.

NOTE:

When installing the wheel, align the marks made prior to removal.

13. Remove safety stand and lower vehicle.
14. Tighten road wheel attaching nuts to the correct torque specification.

ROAD WHEEL ATTACHING NUT TORQUE SPECIFICATION	110 - 140 Nm

15. Refit wheel cover/centre cap.

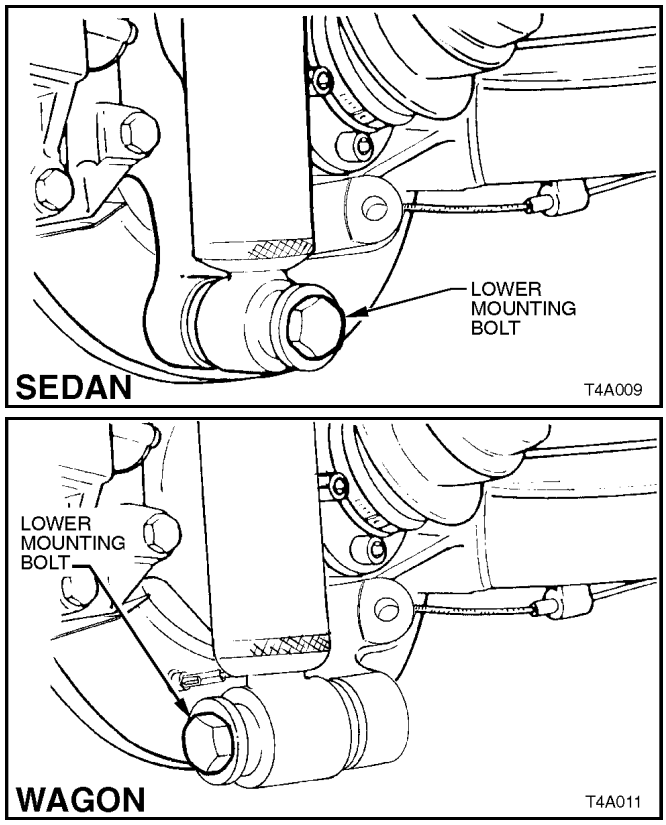
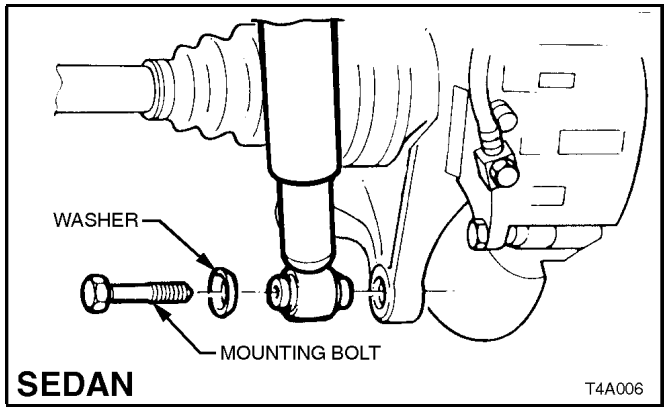


Figure 4B-16

2.5 LIMITED SLIP DIFFERENTIAL

TORQUE CHECK

1. Place transmission in neutral with engine turned OFF.
2. Jack up one rear wheel and support trailing arm on a safety stand. Release park brake lever to fully OFF position.
3. Remove wheel cover (steel wheels) or centre cap (alloy wheels).
4. Mark relationship of road wheel to mounting flange. Remove road wheel attaching nuts and remove wheel.
5. Disconnect rear shock absorber lower mounting bolt from trailing arm, and pull lower end of shock absorber from trailing arm.



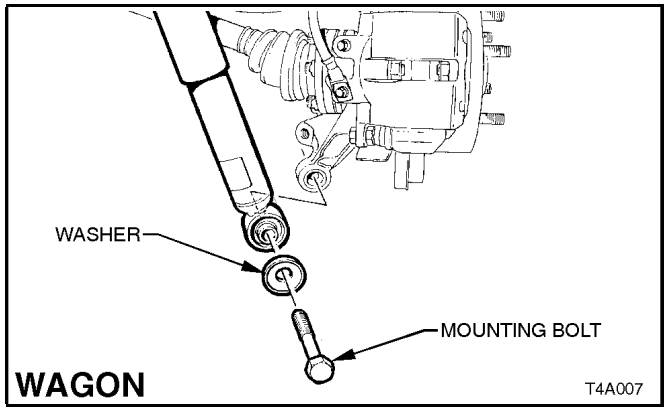


Figure 4B-17

6. Remove brake caliper anchor plate to trailing arm attaching bolts, remove caliper from disc.

   Using wire, tie up caliper to lower end of shock absorber upper mounting. DO NOT ALLOW CALIPER TO HANG BY BRAKE HOSE.
7. Remove brake disc.

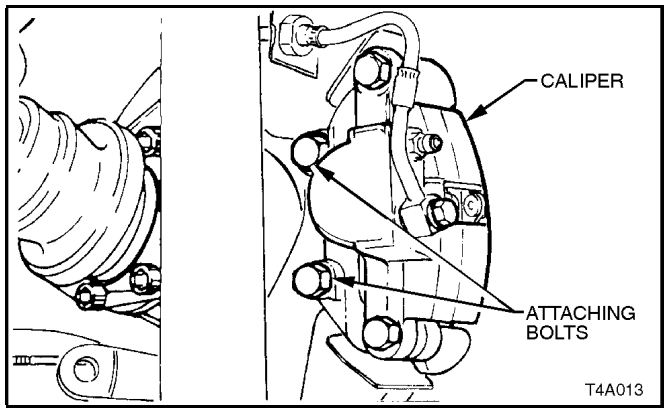


Figure 4B-18

8. Using a torque wrench in conjunction with adaptor, Tool No. 7208, and torque wrench adaptor E6662B, rotate trunnion assembly in a forward direction. If the unit is operating satisfactorily, a torque reading of approximately 70 Nm should be obtained while turning the trunnion assembly, with the opposite wheel remaining stationary.

   If a torque reading of less than 45 Nm is obtained, remove differential case and inspect case internal components and repair as necessary, refer to **3.4 LIMITED SLIP DIFFERENTIAL** in this Section.

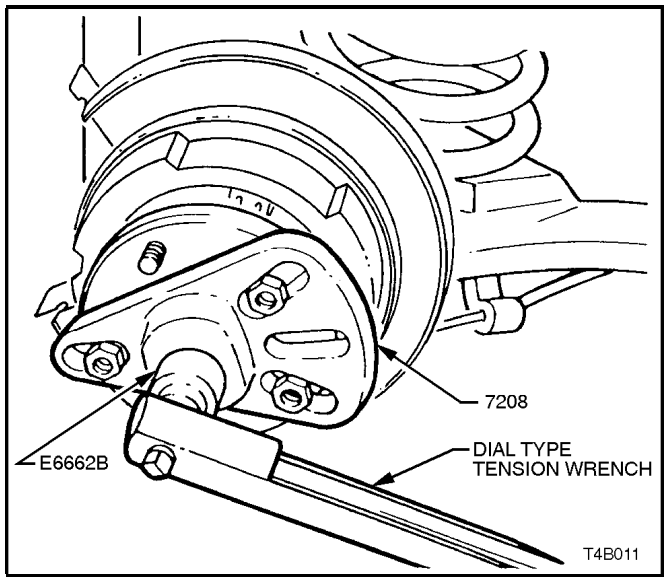


Figure 4B-19

9. Install brake disc and brake caliper. Install brake caliper anchor plate to trailing arm attaching bolts and tighten to the correct torque specification.

BRAKE CALIPER ANCHOR PLATE TO TRAILING ARM ATTACHING BOLT TORQUE SPECIFICATION	70 - 100 Nm

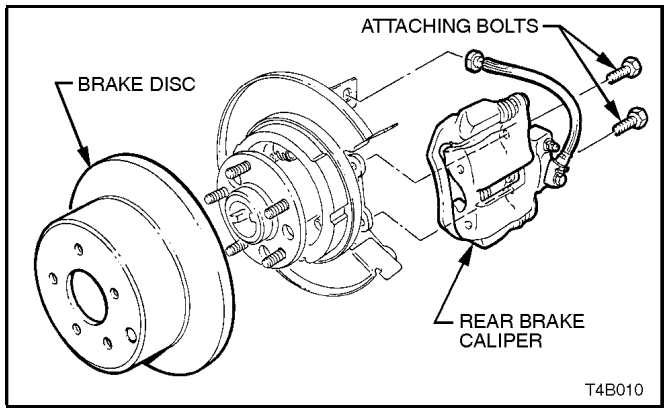


Figure 4B-20

10. Install shock absorber to trailing arm, install and tighten lower mounting bolt to the correct torque specification.

SHOCK ABSORBER LOWER MOUNTING BOLT TORQUE SPECIFICATION	105 - 125 Nm

NOTE:

Vehicle must be at curb weight and on all four wheels before this torque is applied.

11. Install road wheel and tighten attaching nuts.

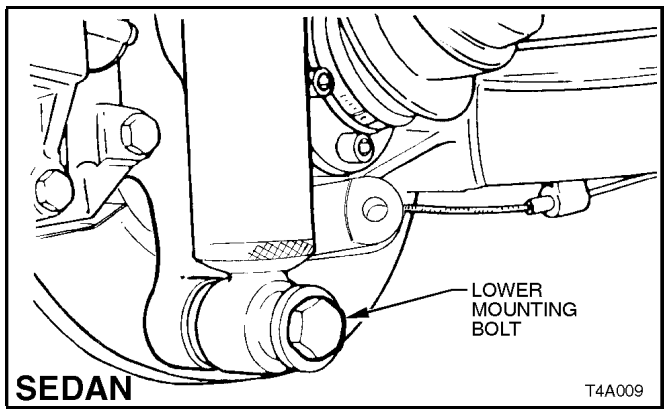
NOTE:

When installing the wheel, align the marks made prior to removal.

12. Remove safety stand and lower vehicle.
13. Tighten road wheel attaching nuts to the correct torque specification.

ROAD WHEEL ATTACHING NUT TORQUE SPECIFICATION	110 - 140 Nm

14. Refit wheel cover/centre cap.



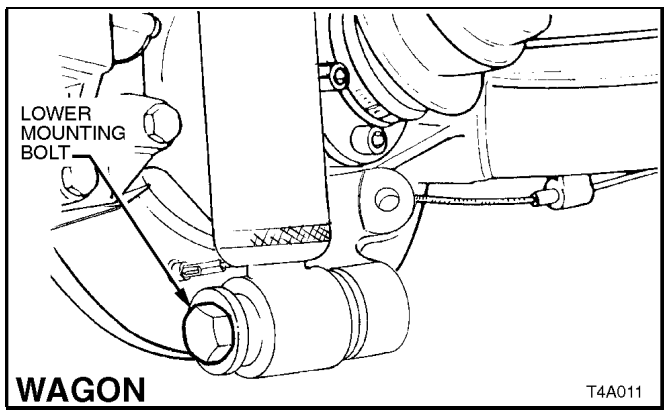


Figure 4B 21

2.6 DRIVE SHAFT ASSEMBLY

REMOVE

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under trailing arms.
2. Using an 8 mm Allen key socket, remove drive shaft inner constant velocity joint to inner axle shaft and outer constant velocity joint to trunnion flange attaching bolts and plates, remove drive shaft.

NOTE 1:

As it is only the inner, constant velocity joint that is a plunge joint, it is important that which end is which, is remembered for correct installation.

NOTE 2:

During drive shaft removal and installation, keep drive shaft supported so that it does not hang on one end because drive shaft joint deflection must be kept to within the angular movement of an installed drive shaft.

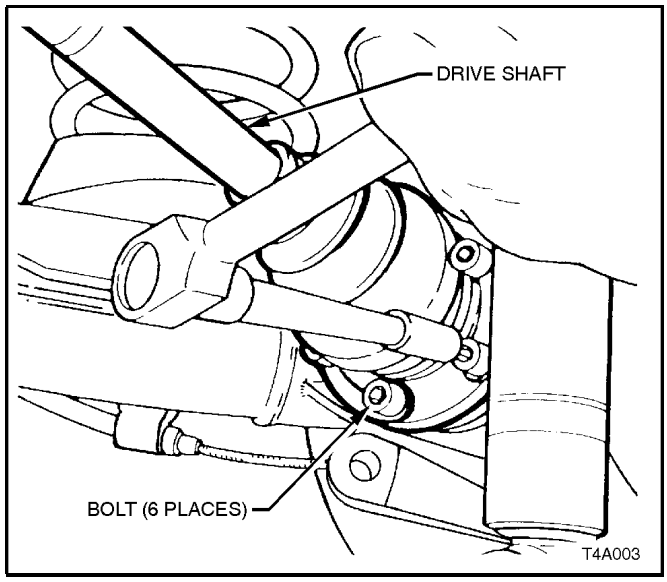


Figure 4B-22

REINSTALL

Installation of the drive shaft is reversal of the removal procedure, noting the following points.

NOTE:

The outer CV joint is marked with two grooves, while the inner, plunge joint has only one groove. It is important that the drive shaft is installed

correctly.

1. Tighten drive shaft to trunnion flange and inner axle shaft attaching bolts to the correct torque specification.

DRIVE SHAFT CONSTANT VELOCITY JOINT TO TRUNNION FLANGE AND INNER AXLE SHAFT ATTACHING BOLT TORQUE SPECIFICATION	50 Nm, then 60° - 75° turn angle

2.7 DRIVE SHAFT AND/OR CONSTANT VELOCITY JOINTS

There are three repair kits available for drive shaft constant velocity joint repairs.

The first kit is a BOOT KIT, which consists of a boot, boot clamps, snap ring and two tubes of grease.

The second kit is a CONSTANT VELOCITY JOINT KIT, which contains the same items as the BOOT KIT plus the inner, constant velocity joint.

The Third kit is a CONSTANT VELOCITY JOINT KIT, which contains the same items as the BOOT KIT plus the outer, constant velocity joint.

DISASSEMBLE

1. Remove drive shaft assembly, refer to **2.6 DRIVE SHAFT ASSEMBLY** in this Section.
2. Clean outside of assembly with a suitable solvent before disassembling.
3. Clamp assembly, by drive shaft, in a vice fitted with soft metal jaws.
4. Using tin snips or other suitable cutting tool, cut boot clamps in raised crimped area and remove clamps.

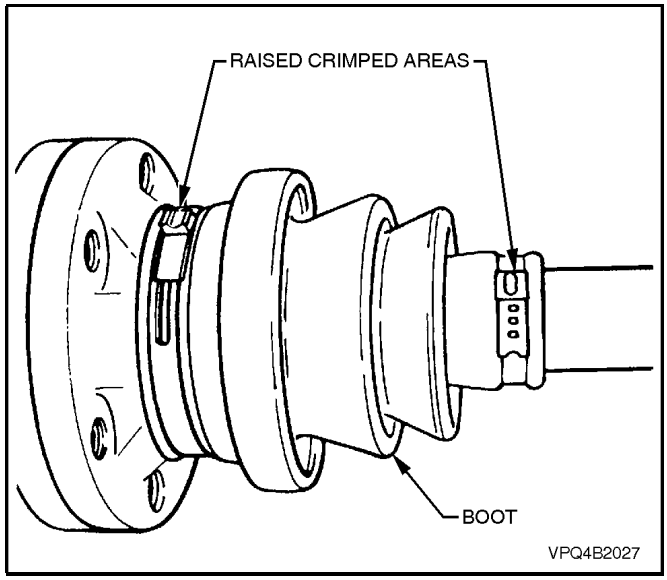


Figure 4B-23

5. Using a suitable drift and hammer, tap dust shields and caps from both sides of constant velocity joints.

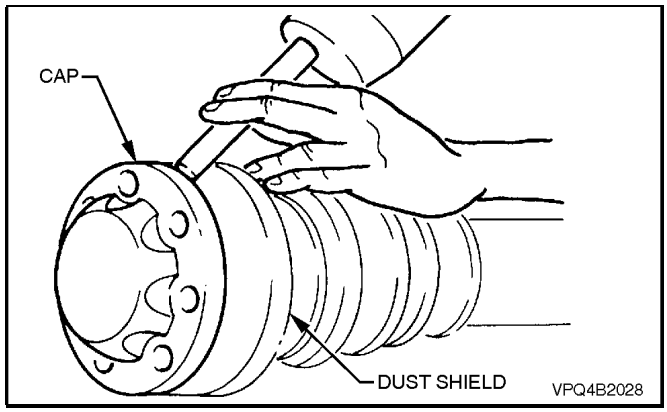


Figure 4B-24

6. Remove snap rings from each end of drive shaft and discard.

NOTE:

Do not use snap rings once they have been removed. Always use new snap rings on reassembly.

7. Remove assembly from vice. Slide dust shield and boots towards centre of shaft.

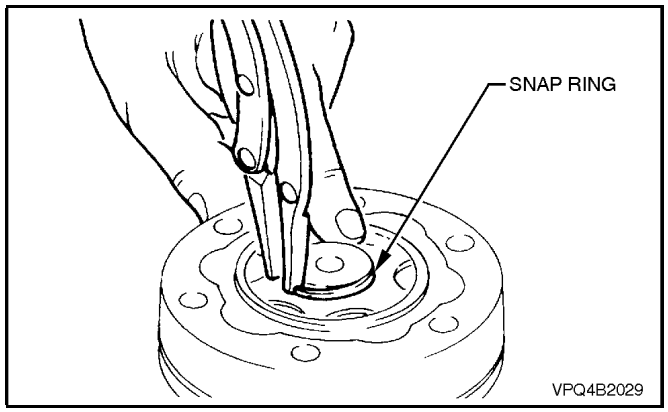


Figure 4B-25

8. Using suitable press plates (such as Tool No. E1312), supporting inner race, press drive shaft from constant velocity joint.

   Repeat process to remove remaining constant velocity joint.

9. Remove boots and dust shields from drive shaft, ensuring boots are not damaged on edges of shaft.

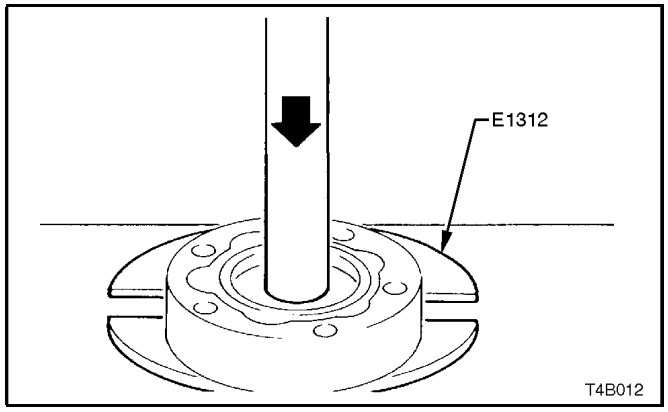


Figure 4B-26

INSPECT

Drive Shaft and Boots

1. Clean shaft and boots in a suitable cleaning solvent.
2. Inspect drive shaft for twisting, cracking or excessive spline wear.

NOTE:

Because the drive shaft is not serviced separately, if the drive shaft is found to be defective, then it must be replaced as an assembly.

3. Inspect boots and replace if split, fatigued, cracked or worn.

Constant Velocity Joints

NOTE:

Complete disassembly of the constant velocity joints is not recommended. The internal components are a precision fit and develop their own characteristic wear patterns. Intermixing components could result in looseness, binding and/or premature failure of the joint.

1. Inspect grease in joint, and if obviously contaminated with and/or been subjected to dirt ingress, the joint has in all likelihood suffered damage and should be replaced.

   If inspection reveals that the joint has not been contaminated, clean joint by soaking in a suitable cleaning solvent.
2. Once grease has been removed, inspect internal components by tilting inner race to one side to expose each ball.

   Replace joint assembly if there is severe pitting, galling, play between balls and the cage windows, any cracking or damage to cage, pitting or galling or chips in raceways.

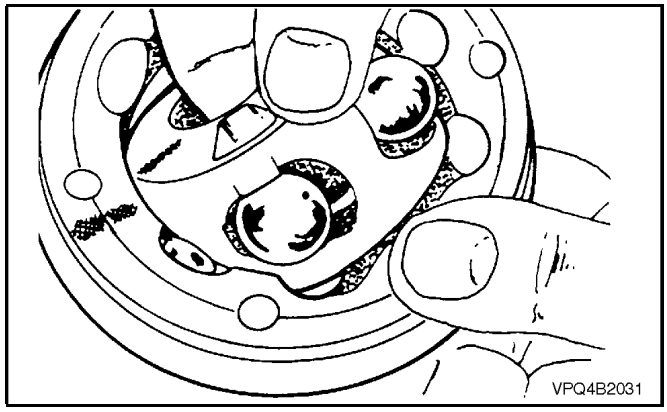


Figure 4B-27

REASSEMBLE

Constant Velocity Joints

NOTE 1:

During the removal, cleaning, inspection or replacement of a constant velocity joint, it is possible for the joint to become disassembled. Should an inadvertent disassembly of a constant velocity (CV) joint occur, and notwithstanding the earlier recommendation, it is possible to reassemble the CV joint, provided the following procedure is followed EXACTLY.

NOTE 2:

Ideally, the inner race and cage, together with the individual balls, should be maintained in their original locations to minimise the creation of a noisy joint.

NOTE 3:

Under no circumstances are components from one constant velocity joint to be mixed with components from another CV joint.

Shown are exploded views of each constant velocity joint; view “A” is the inner joint, while view “B” shows the outer. Note the single identification groove on the outer race and the identification step on the inner race for the inner joint and the two grooves and recess on the outer joint.

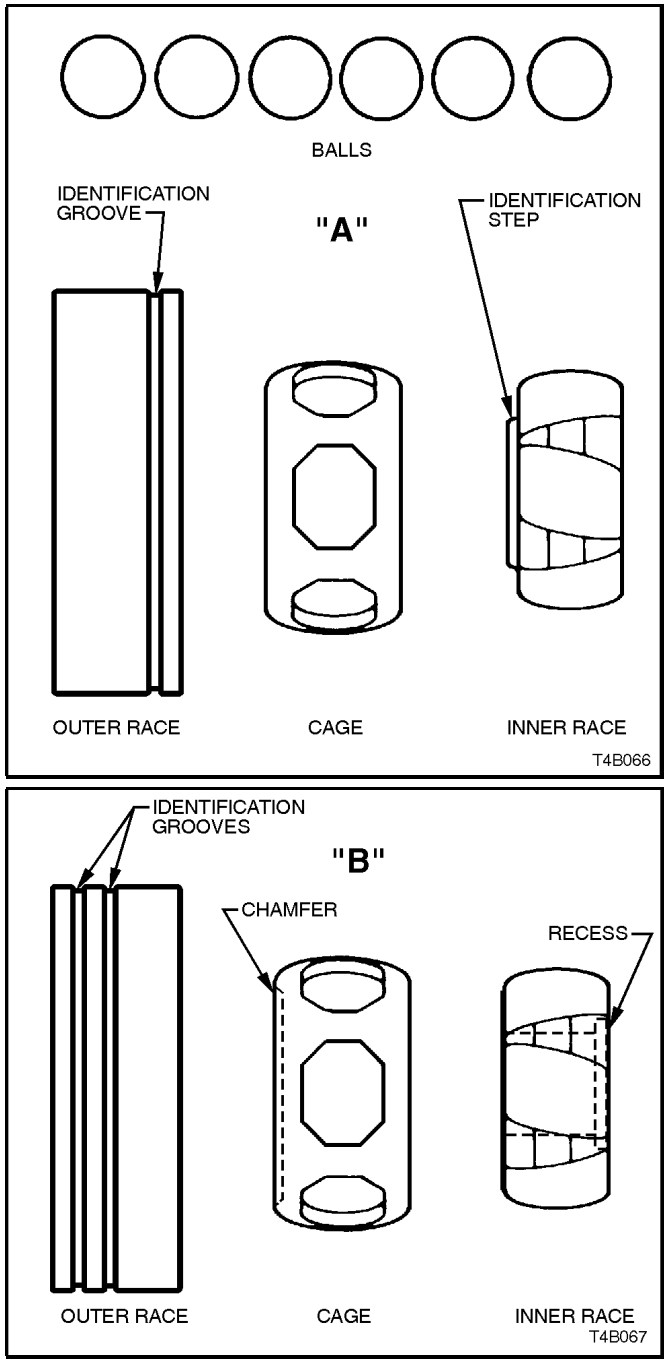


Figure 4B-28

1. Place the inner race into the cage and position centrally within the cage.

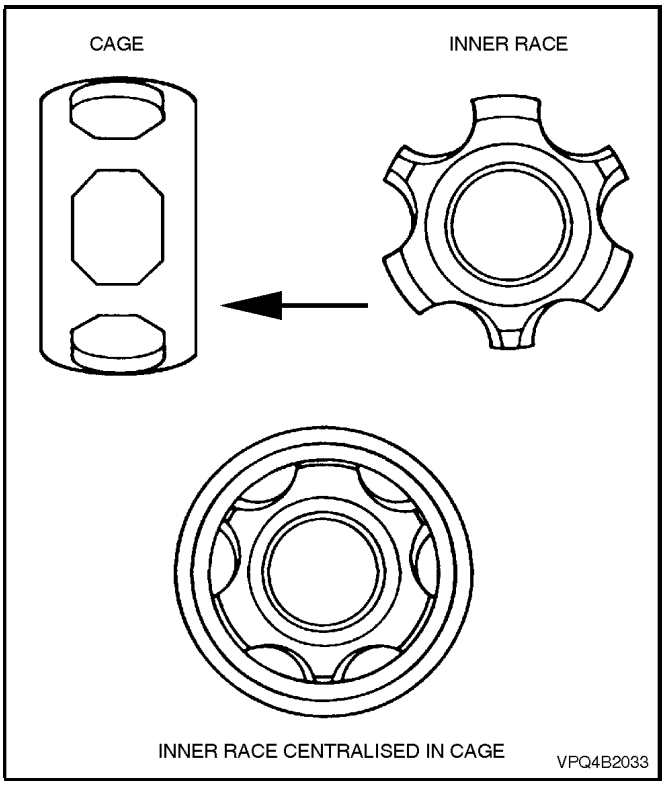


Figure 4B-29

2. Place the inner race and cage into the outer race. Make sure that the identification markings on both the inner and outer races are on opposite sides of the assembly, as shown.

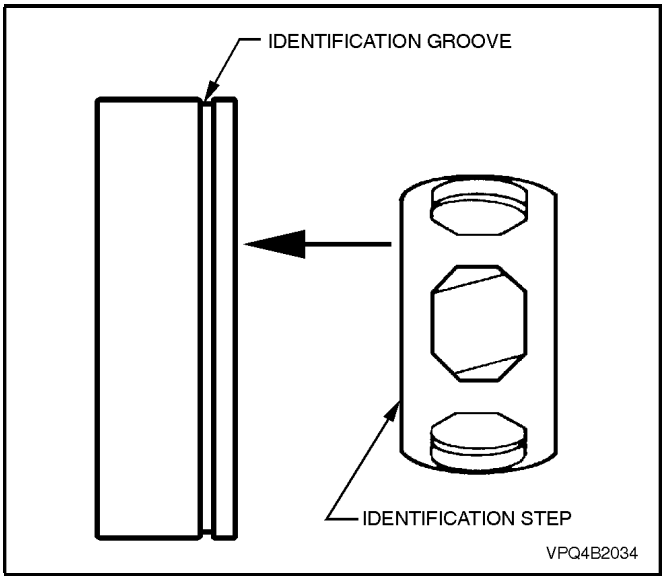


Figure 4B-30

3. Align the thick sections on the outer race, with the narrow ones on the inner race.

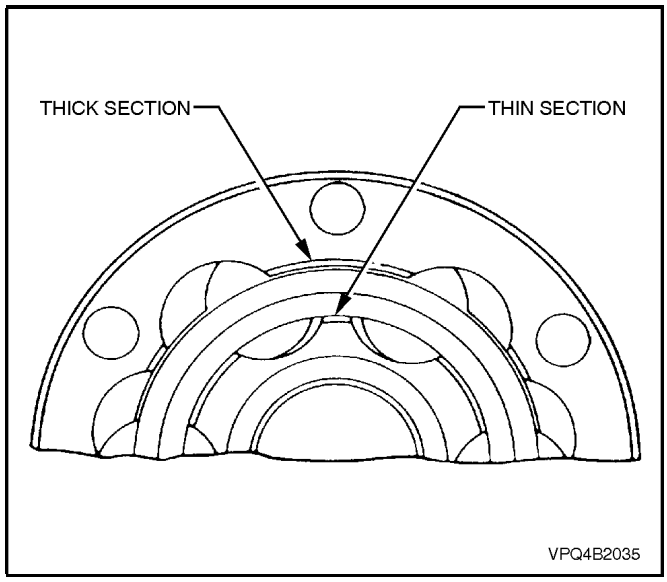


Figure 4B-31

4. Tilt the cage and inner race, as shown and fit one ball.

   Repeat this process for the remaining five balls.

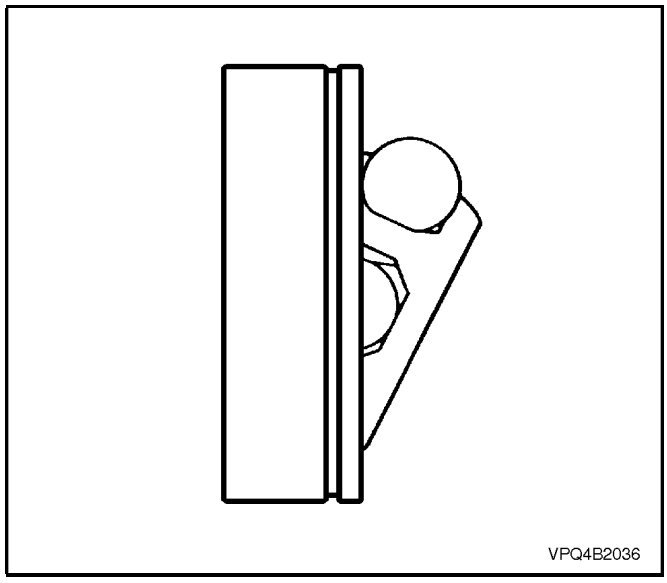


Figure 4B-32

5. When assembly of the CV joint is complete, check for plunge movement as shown. **If NO plunge movement can be achieved,** then the constant velocity joint **has been incorrectly assembled.**

   If such a situation occurs, the CV joint must be disassembled and the assembly process repeated until such time that the required plunge movement is achieved.

NOTE:

This check only applies to the inner plunge joint. The outer CV joint should have no plunge movement.

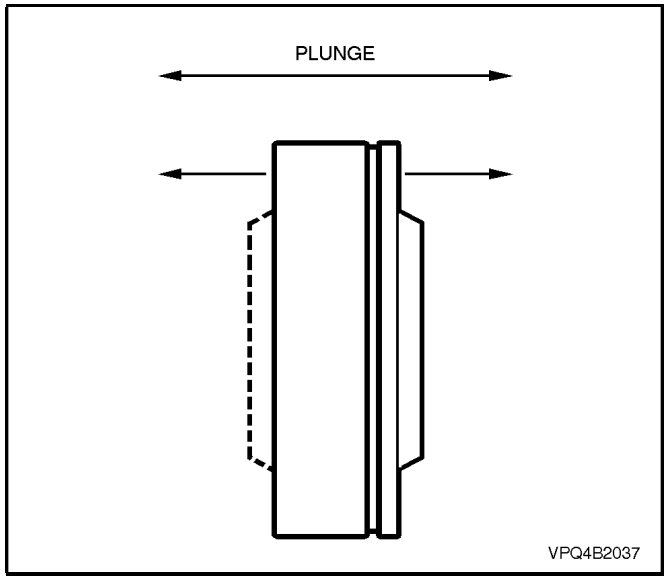


Figure 4B-33

Drive Shaft and Boots

1. Remove old sealing bead of silicon from dust shields, dust caps and constant velocity joints.
2. Position new large boot clamp over boot and place boot over dust shield. Using Tool No. E1896, securely crimp boot clamp, ensuring crimp is in correct location.

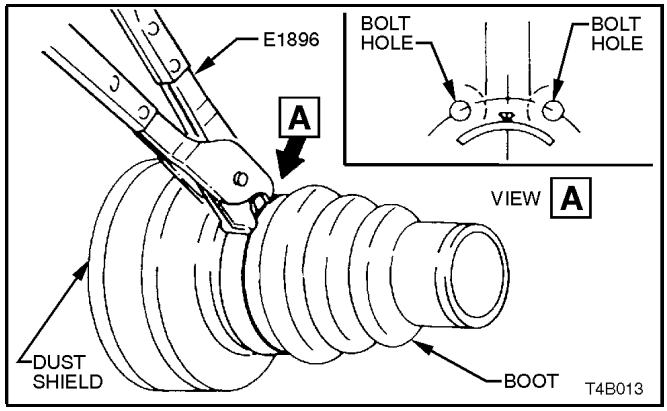


Figure 4B-34

3. Apply a 2 mm diameter bead of RTV 732 sealant (Holden's Specification HN1373) to dust caps/shields as shown and allow approximately one hour to cure.
4. Place new small boot clamps onto drive shaft.
5. Place both dust shield and boot assemblies onto drive shafts, ensuring that boots are not damaged by sharp edges on each end of shaft.

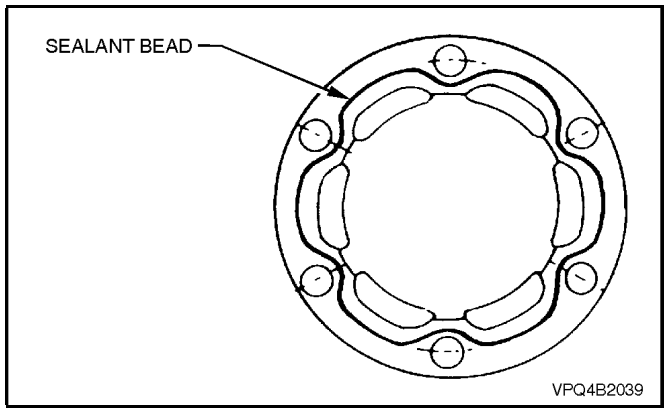


Figure 4B-35

6. Install *inner*, constant velocity joint onto shaft with ***step*** on the inner race facing toward the shoulder on the shaft, as shown.

NOTE:

The ***recess*** on the inner race of the *outer* CV joint, also faces the drive shaft.

7. Press constant velocity joints onto shaft and install NEW circlips.

NOTE:

When pressing joints onto shaft, ensure that the joint inner races take the press load.

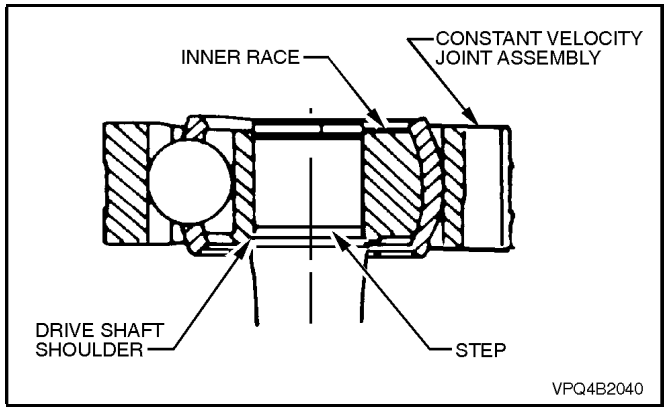


Figure 4B-36

8. Pack inside section of joint and boot with one tube of grease (40 grams) and pack half tube (20 grams) to outside section of joint.
9. Position dust caps and dust shields onto constant velocity joints, ensuring that all bolt holes align.
10. Using a suitable punch and hammer, tap caps and shields into place.

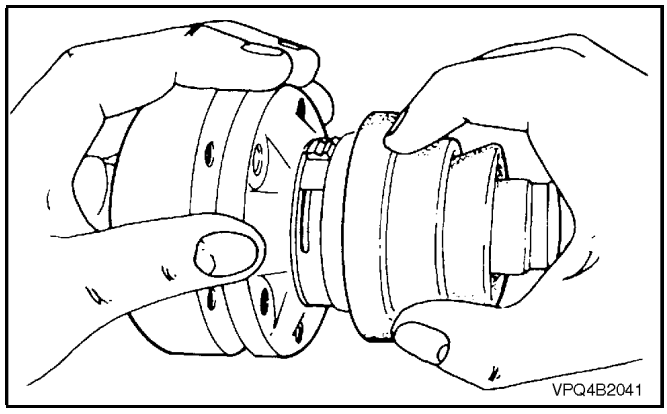


Figure 4B-37

11. Locate small ends of boots into boot grooves on drive shafts, ensuring that boots are not twisted.

    With both joint, pry up small ends of boots from shaft to equalise air pressure inside and outside of boots and work out any dimples before applying new small clamps.

IMPORTANT:

The location distance shown, ONLY applies to the inner, plunge joint and should be set before applying the small clamp.

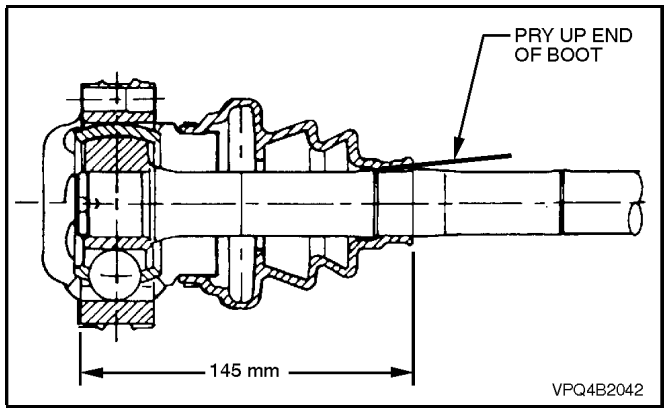


Figure 4B-38

12. Position small clamps over ends of boots and using Tool No. E1896, crimp ends of clamps.
13. Reinstall drive shaft, refer **2.6 DRIVE SHAFT ASSEMBLY - REINSTALL** in this Section.

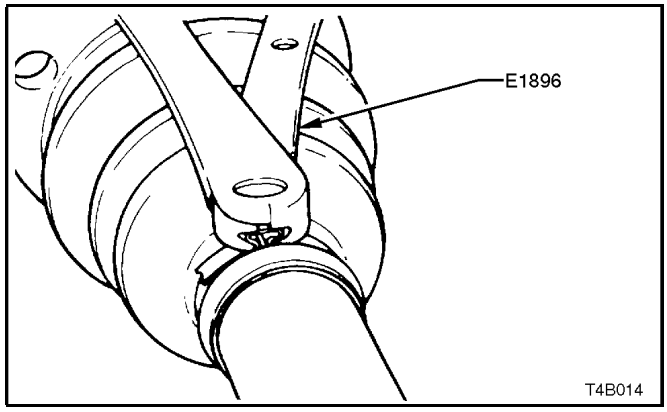


Figure 4B-39

2.8 INNER AXLE SHAFT SEAL

REPLACE

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under body rear jacking points. Refer to **Section 0A GENERAL INFORMATION** for location of jacking points.
2. Remove drive shaft from side of vehicle which seal is to be replaced, refer to **2.6 DRIVE SHAFT ASSEMBLY** in this Section.

NOTE 1:

During drive shaft removal, keep drive shaft supported so that it does not hang on one end.

NOTE 2:

Drive shaft joint deflection should be kept to a minimum.

3. Remove inner axle shaft by installing a slide hammer, Tool No. 09520-32012 with three suitable size bolts to axle flange. Use slide hammer to release axle shaft spring clip.

   As the axle shaft is removed, a small amount of lubricant may leak from differential carrier.

CAUTION:

If V6 engined vehicle is fitted with LSD, do not rotate the opposite axle shaft, as side gear and clutch cone splines will become misaligned. Then the axle shaft cannot be reinstalled without removing differential case, dismantling and realigning gear and cone splines.

NOTE:

The above 'Caution' does not apply to the V8 or V6 supercharged engine final drives, because the side gear and LSD cone is an integrated component.

4. Clean around seal bore and housing area to make sure that no foreign matter enters axle shaft needle bearing in the screw adjuster.
5. Using a suitable screwdriver and a block of wood, lever seal from screw adjuster bore.

NOTE:

Take care not to damage the screw adjuster's aluminium housing with the screwdriver blade, as this could cause oil leaks to occur, after a new oil seal was fitted.

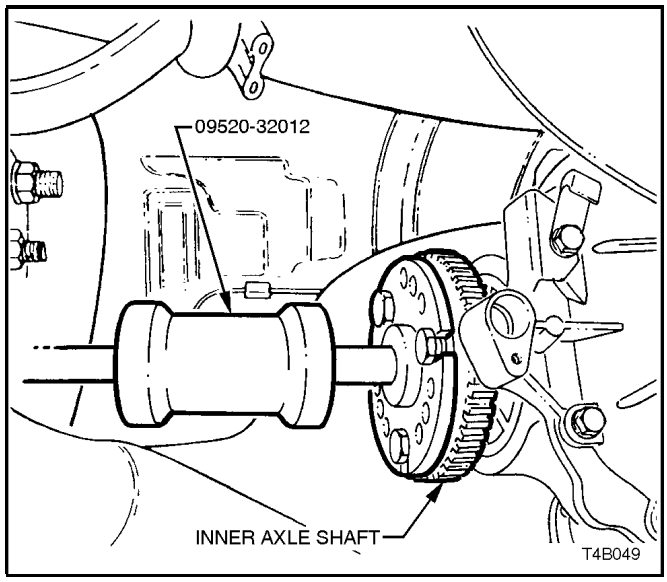


Figure 4B-40

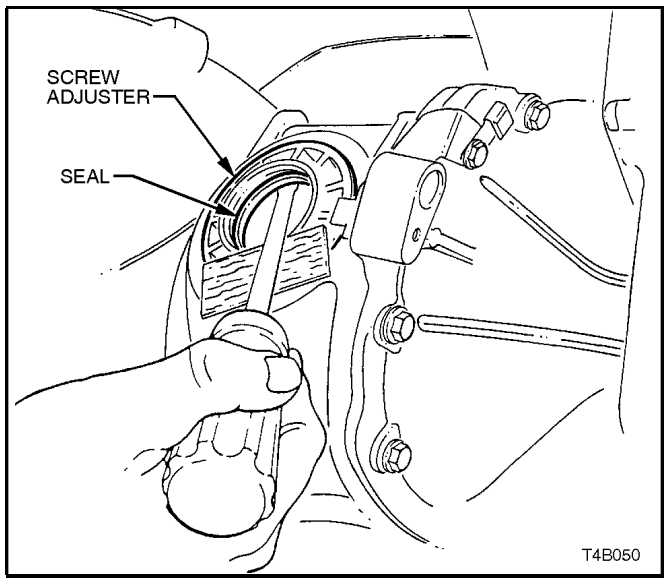


Figure 4B-41

6. Before installation of new seal, examine seal surface of inner axle shaft and remove any nicks or burrs. Should this inspection show that the surface is marked, a new inner axle shaft should be fitted.

NOTE 1:

The left hand inner axle shaft is shorter in length than the right hand shaft.

NOTE 2:

If vehicle is equipped with ABS, the inner axle shafts are unique for this application.

NOTE 3:

Check spring clip in end of axle shaft to ensure that it is not damaged and moves freely in groove. Replace spring clip if necessary, by expanding ends of clip and removing from shaft. Only expand the ends of a new clip sufficiently to allow installation into shaft groove.

7. Examine seal bore in screw adjuster and remove any nicks or burrs.
8. Lubricate seal lips and outside diameter with lithium soap grease (Holden's Specification HN1147). Install seal using Tool No. AU410, until seal bottoms in bore.

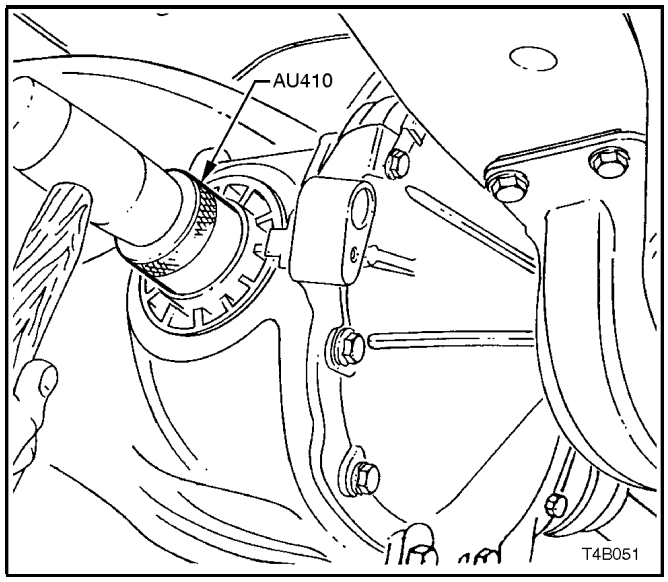


Figure 4B-42

9. Install inner axle shaft, aligning splines with clutch cone (if fitted with a Limited Slip Differential) and side gear.

NOTE:

To avoid premature seal failure, ensure axle shaft splines or securing clip do not score or damage the seal lips during installation.

10. Lightly hit on end of axle shaft flange with a soft faced hammer to compress spring clip on shaft into clutch cone and side gear splines. Fully engage shaft until clip snaps into side gear groove.

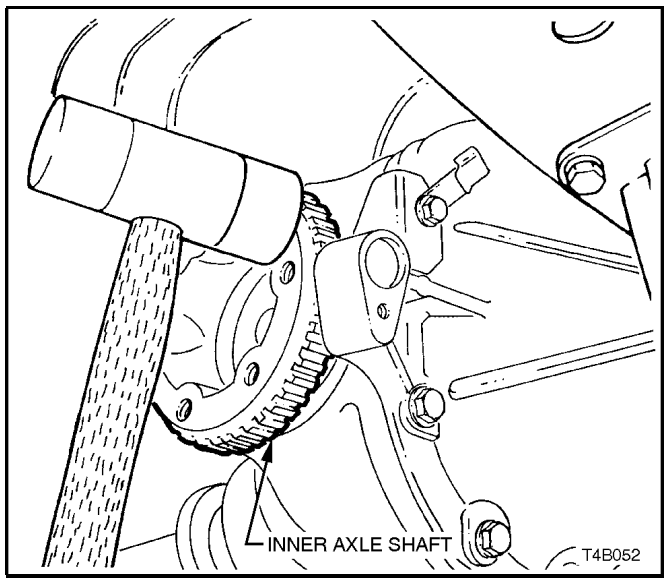


Figure 4B-43

11. Reinstall drive shaft, refer to **2.6 DRIVE SHAFT ASSEMBLY** in this Section.
12. Remove safety stands and low r vehicle.
13. Check and fill differential carrier to correct level with specified lubricant. Refer to **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** in this Section.

2.9 PINION OIL SEAL

REPLACE

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under trailing arms.
2. Mark the position of the propeller shaft rear flange to pinion flange then remove propeller shaft, refer to **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**. This operation will also mean that the exhaust system has to be removed.

NOTE:

If the paint alignment marks on the rear universal joint and pinion flanges are not visible, then lightly scribe a mark on both flanges so they can be installed in their original positions during reassembly.

3. Lightly centre-punch alignment marks on the pinion flange nut, pinion flange and pinion end as an aid for reassembly.

   By reassembling in the original position, the flange run-out will be minimised and the pinion bearing preload will be maintained.

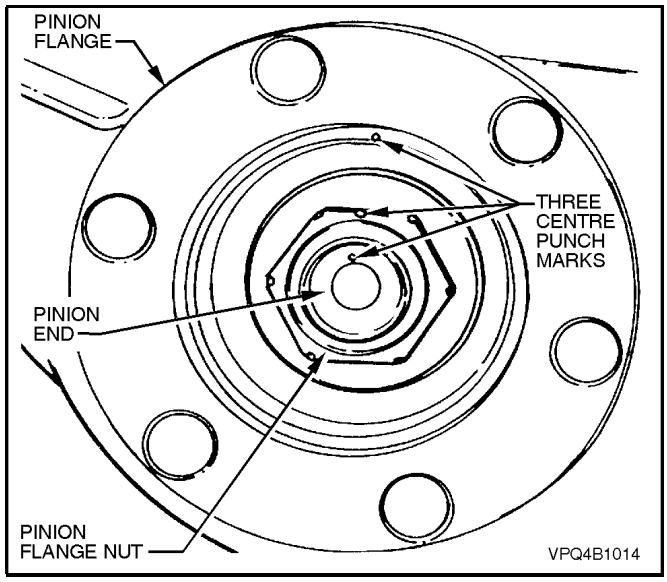


Figure 4B-44

4. Using Tool No. J8614-10 with two suitable bolts and nuts to hold pinion flange, remove flange retaining nut.

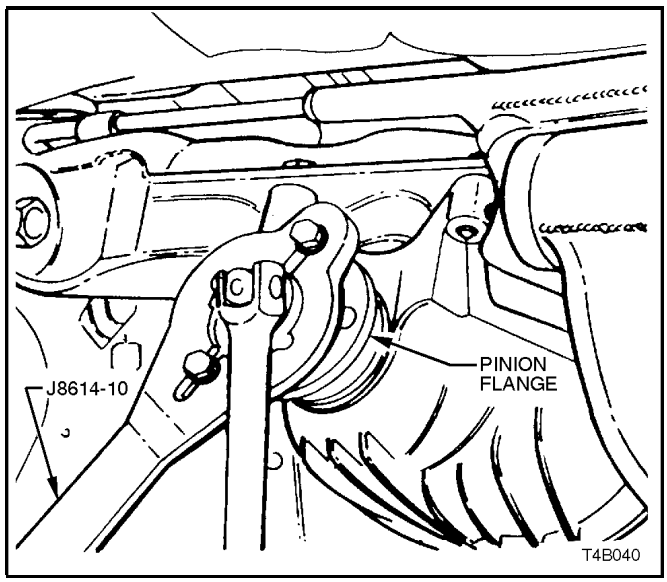


Figure 4B-45

5. Withdraw pinion flange using the three component parts of Tool No. J8614-01, assembled as shown. Place a drain tray beneath differential carrier housing.

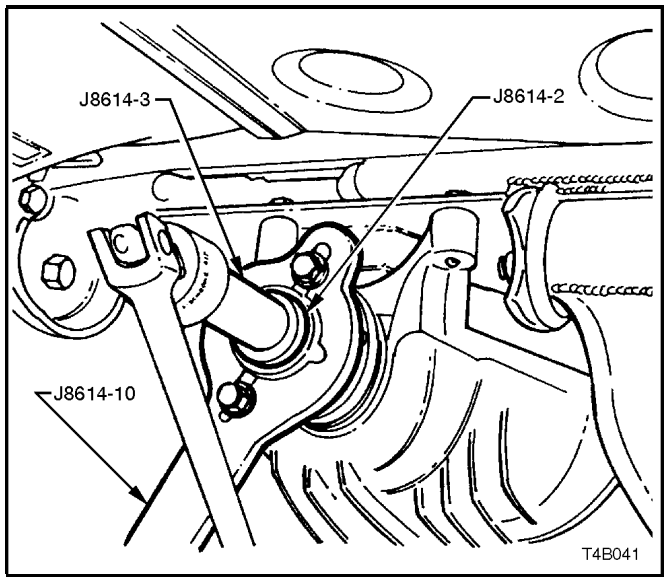


Figure 4B-46

6. Prise pinion oil seal from carrier bore using Tool No. 56750 or a universal seal removing tool.
7. Lubricate new pinion oil seal lips with the recommended rear axle lubricant. Lightly coat the outside of the replacement seal with a non-hardening gasket cement.

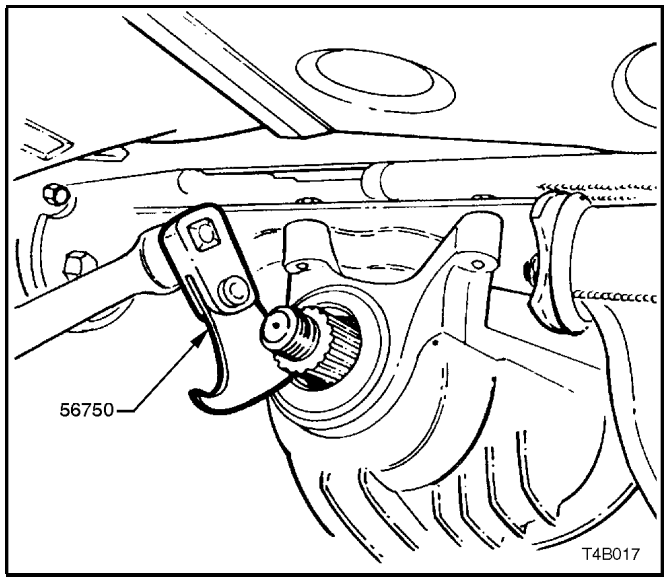


Figure 4B-47

8. Start oil seal into differential carrier housing and drive seal squarely into position using Tool No. 17-010A. Seal fits flush to 0.25 mm below carrier housing surface.

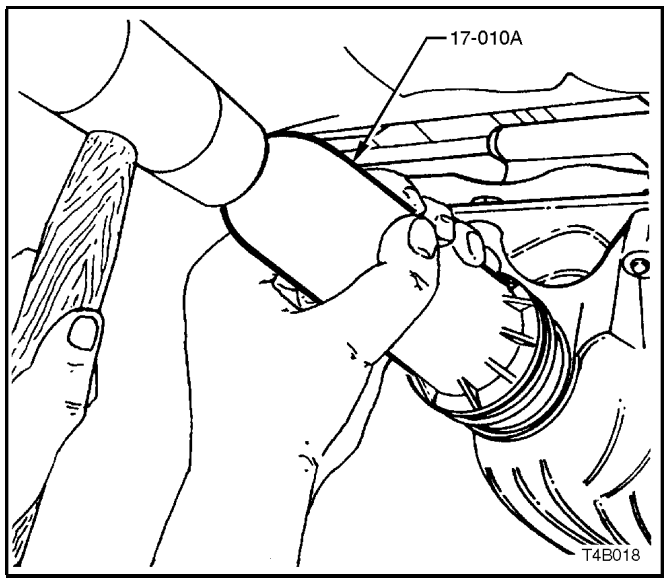


Figure 4B-48

9. Ensure that pinion shaft is free from burrs and that flange oil seal surface is free from damage.

10. Coat splines and seal surface of pinion flange with differential gear lubricant, and install flange onto pinion shaft splines. Ensure that centre-punch marks align.
11. Install flange retaining nut and tighten nut until centre-punch marks align, then tighten nut carefully to a position not more than 5° past aligned setting.

NOTE:

The pinion flange is an interference fit on pinion shaft splines and should only be pulled into place by tightening retaining nut. DO NOT, UNDER ANY CIRCUMSTANCES, USE FORCE OR HAMMER FLANGE DURING INSTALLATION ONTO PINION FLANGE.

CAUTION:

Should the retaining nut be overtightened and pre-load exceeded, it will be necessary to remove the pinion from the carrier and install a new collapsible spacer. Under no circumstances must the retaining nut be backed off to decrease the pre-load reading.

12. Reconnect propeller shaft rear universal joint flange to pinion flange, refer **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**.
13. If removed previously, reconnect exhaust system, in the reverse to the removal procedure. Refer to **3.2 FINAL DRIVE ASSEMBLY**, in this Section, for details.
14. Remove safety stands and lower vehicle.
15. Check lubricant level and top up as necessary. Refer to **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** in this Section, for details.
16. Start vehicle and check for exhaust leaks.

2.10 PINION FLANGE

REPLACE (USING OLD OIL SEAL)

NOTE 1:

Due to production tolerances in the length of the pinion flange, it is essential that the following method be used when installing a new pinion flange and/or pinion nut.

NOTE 2:

For this operation, new dual muffler support to rear crossmember retainers must be used on reassembly.

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under trailing arms.
2. Remove propeller shaft, refer to **2.1 PROPELLER SHAFT** in Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS.
3. Remove both drive shafts, refer **2.6 DRIVE SHAFTS** in this Section.
4. Check and record pre-load at pinion flange as follows:
   a. Fit a pulley to pinion flange and attach a cord around pulley and to a spring scale.

NOTE:

For pulley details, refer to **7 SPECIAL TOOLS** at end of this Section.

   b. Start rotation of pulley and whilst in motion (approximately 50-60 rpm) note and record reading of spring balance.

   This pre-load reading includes pinion bearings, side bearings, meshing effect of gear set and pinion oil seal.

   To determine pre-load, multiply reading on spring balance by radius of pulley.

EXAMPLE:

With a pulley diameter of 152 mm, the radius is 76 mm, which equals 0.076 m. With a spring balance reading of 25 N, the pre-load equals 0.076 m x 25 N = 1.9 Nm.

5. Remove pulley from pinion flange.

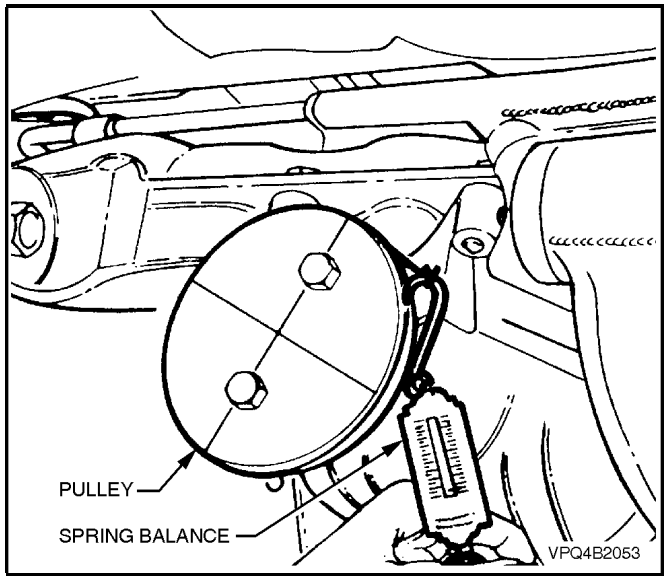


Figure 4B-49

6. Using Tool No. J8614-10 with two suitable bolts and nuts, hold pinion flange and remove flange retaining nut.

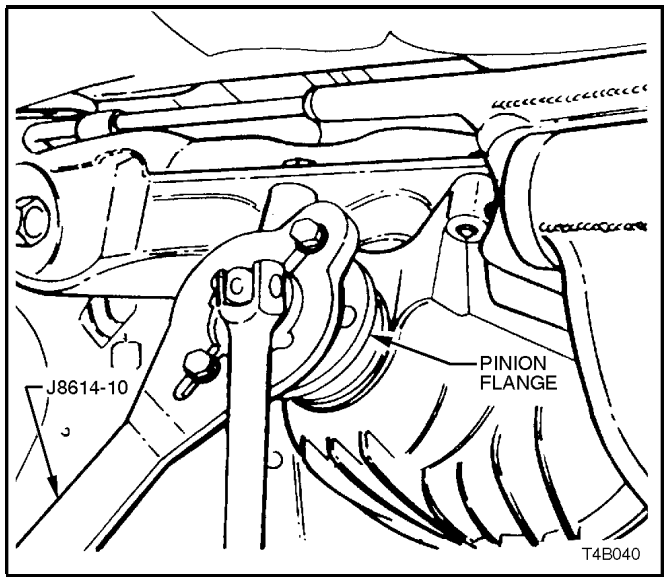


Figure 4B-50

7. Place drain tray beneath differential carrier.
8. Remove holder from pinion flange and assemble the three component parts of Tool No. J8614-01, as shown. Install assembly to pinion flange using two suitable bolts and nuts. With the holder J8614-10 secured, tighten screw J8614-3 and remove the pinion flange.

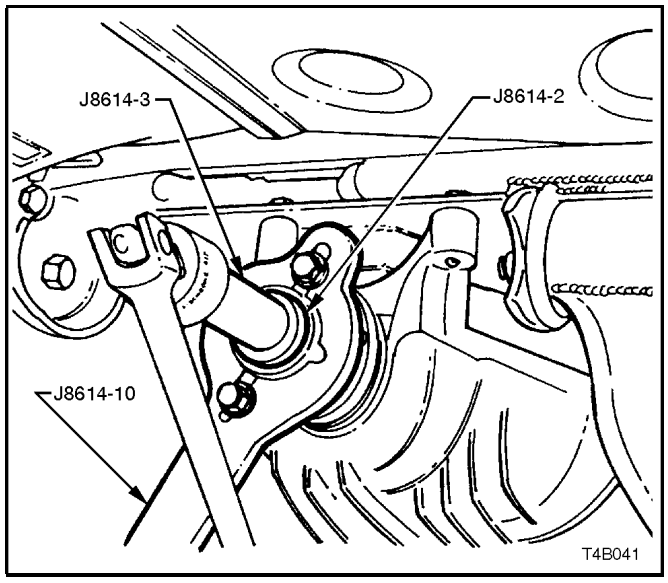


Figure 4B-51

9. Ensure that pinion shaft thread is free from burrs, then coat splines and seal surface of pinion flange with the recommended rear axle lubricant.
10. Install pinion flange and retaining nut.

NOTE:

The new flange will be an interference fit on pinion shaft splines and should only be pulled into place by tightening retaining nut. DO NOT, UNDER ANY CIRCUMSTANCES, USE FORCE OR HAMMER FLANGE DURING INSTALLATION ONTO PINION FLANGE.

11. Tighten flange retaining nut gradually until pinion shaft end play is reduced to approximately 0.50 mm.

12. Attach pulley to pinion flange and using spring balance, check pre-load. Continue tightening nut while alternatively turning pinion to seat bearings, until the pre-load figure recorded previously (Step 4b) is reached. Further increase this original pre-load reading by 0.5 Nm.

    ROTATE PINION AN EXTRA 30-40 TURNS AND RE-CHECK THE PRE-LOAD TO ENSURE THAT NO CHANGE HAS OCCURRED.

CAUTION:

Should the retaining nut be overtightened and the pre-load exceeded, it will be necessary to remove the differential carrier assembly and install a new collapsible spacer. Under no circumstances must the retaining nut be backed off to decrease the pre-load setting.

13. Reinstall drive shafts, refer to **2.6 DRIVE SHAFTS** in this Section.
14. Reinstall propeller shaft, refer to **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**.
15. If removed previously, reconnect exhaust system, in reverse to the removal procedure.
16. Remove safety stands and lower vehicle.
17. Check lubricant level and top up as necessary with the recommended lubricant, refer to **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** in this Section.
18. Start vehicle and check for exhaust leaks.

REPLACE (USING NEW OIL SEAL)

For this operation, new dual muffler support to rear crossmember retainers must be used on reassembly.

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under trailing arms.
2. Remove propeller shaft, refer to **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**.
3. Remove both drive shafts, refer to **2.6 DRIVE SHAFTS** in this Section.
4. Check and record pre-load at pinion flange as follows:
   a. Fit a pulley to pinion flange and attach a cord around pulley and to a spring balance.

NOTE:

For pulley details, refer to **7 SPECIAL TOOLS** at end of this Section.

   b. Start rotation of pulley and whilst in motion (approximately 50-60 rpm), note and record the spring balance reading.

   This pre-load reading includes pinion bearings, side bearings, meshing effect of gear set and pinion oil seal.

   To determine pre-load, multiply reading on spring balance by radius of pulley.

EXAMPLE:

With a pulley diameter of 152 mm, the radius is 76 mm which equals 0.076 m. With a spring balance reading of 25 N, the pre-load equals 0.076 m x 26 N = 1.9 Nm.

5. Remove pulley from pinion flange.
6. Using Tool No. J8614-10 with two suitable bolts and nuts, hold pinion flange and slacken flange retaining nut until end play can be felt in pinion shaft. Check oil seal and differential side bearing pre-load, using spring scale as outlined in steps 4a and 4b and record oil seal and side bearing pre-load for later use.

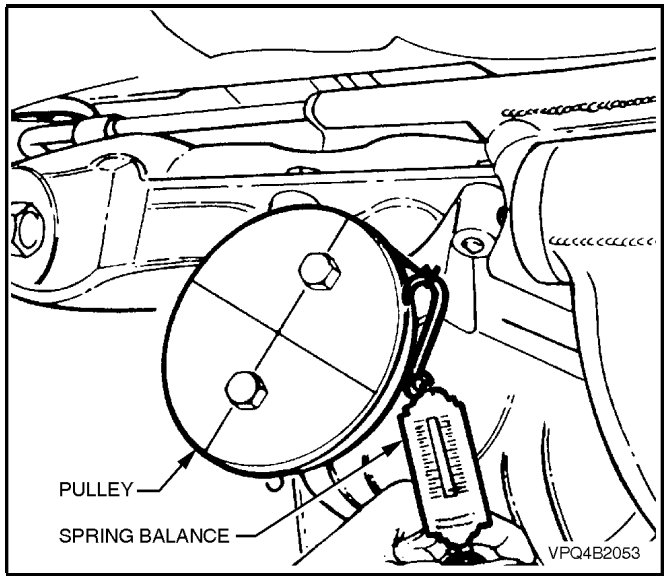


Figure 4B-52

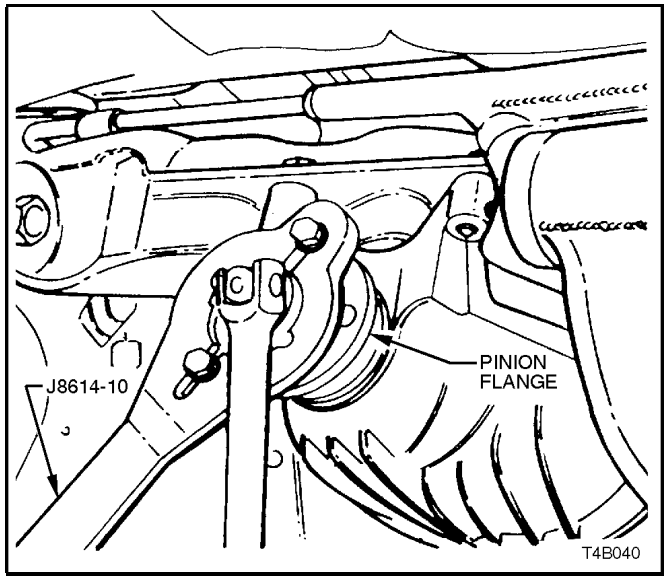


Figure 4B-53

7. Place drain tray beneath differential carrier housing.
8. Withdraw pinion flange using the three component parts of Tool No. J8614-01, as shown.

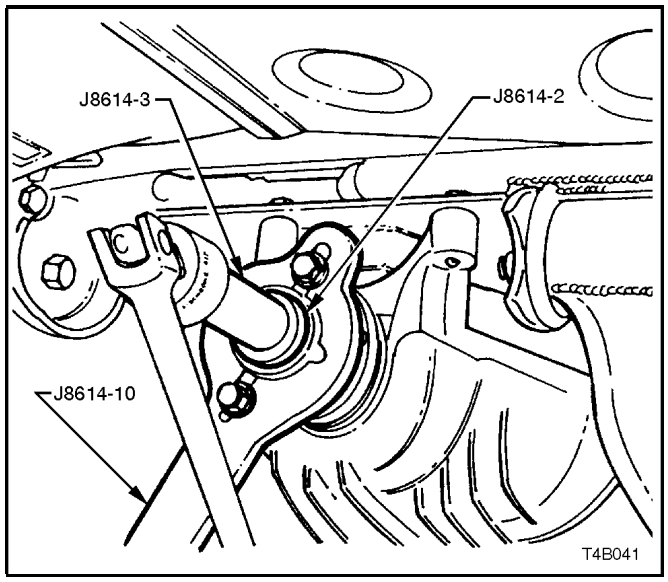


Figure 4B-54

9. Prise pinion oil seal from carrier bore using Tool No. 56750 or a universal seal removing tool.

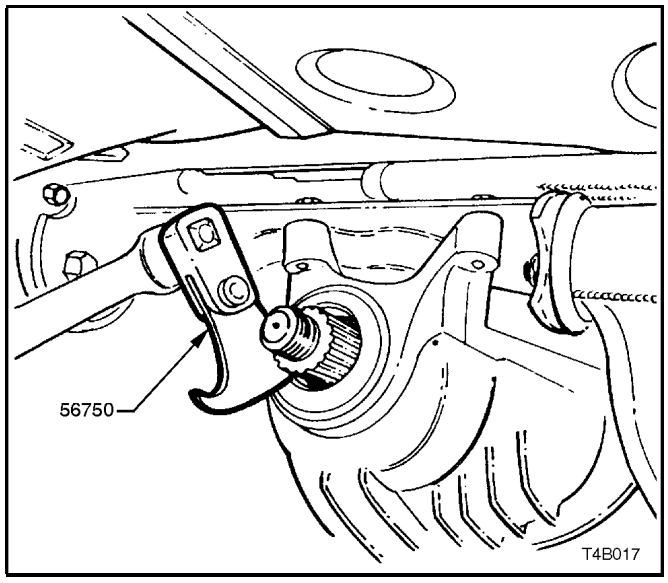


Figure 4B-55

10. Examine carrier seal bore and remove any nicks or burrs.
11. Lubricate new pinion oil seal lips with the recommended rear axle lubricant. Lightly coat outside of seal shell with a non-hardening gasket cement.
12. Start oil seal in differential carrier and drive seal squarely into position using Tool No. 17-010A. Seal fits flush to 0.25 mm below carrier seal bore leading surface.
13. Ensure that pinion shaft threads are free from burrs, then coat splines and seal surface of pinion flange with differential gear lubricant.
14. Coat splines and sealing surface of the pinion flange with the recommended lubricant and install flange on pinion shaft splines.

NOTE:

The new flange will be an interference fit on pinion shaft splines and should only be pulled into place by tightening the retaining nut. DO NOT, UNDER ANY CIRCUMSTANCES, USE FORCE OR HAMMER FLANGE DURING INSTALLATION ONTO PINION FLANGE.

15. Tighten flange retaining nut gradually until pinion shaft end play is reduced to approximately 0.5 mm.
16. Check new oil seal and differential assembly pre-load using spring balance as previously outlined in steps 4a and 4b. Record pre-load for reassembly reference.
17. The pre-load reading for differential assembly obtained in step 6, is subtracted from pre-load reading obtained in step 16. The difference between these figures represents extra lip tension of new seal expressed as a Nm pre-load figure. The difference between the pre-load readings obtained in step 6 and 16 must be added to pre-load reading obtained in step 4b to obtain a total pre-load reading.

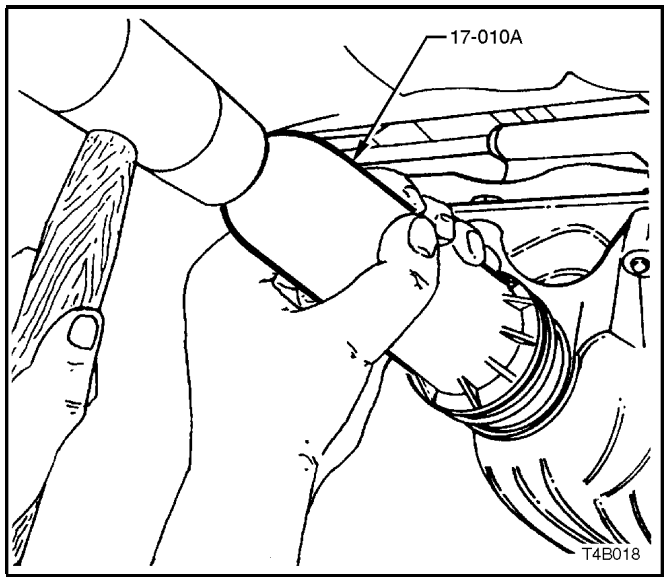


Figure 4B-56

THEORETICAL EXAMPLE

STEP 16	NEW OIL SEAL AND SIDE BEARING PRE-LOAD SETTING	1.47 Nm
STEP 6	OLD OIL SEAL AND SIDE BEARING PRE-LOAD READING	1.02 Nm
SUBTRACT STEP 6 FROM STEP 16		0.45 Nm
STEP 4b	COMPLETE DIFFERENTIAL ASSEMBLY PRE-LOAD READING	1.47 Nm
THE PRE-LOAD READING COMBINATION WILL BE THE SUM OF:-		1.47 Nm plus 0.45 Nm
WHICH GIVES A TOTAL PRE-LOAD READING OF:-		1.92 Nm

CAUTION:

Should the retaining nut be overtightened and the pre-load exceeded, it will be necessary to remove the differential carrier assembly and install a new collapsible spacer. Under no circumstances must the retaining nut be backed off to decrease the pre-load setting.

18. Continue tightening retaining nut while alternately turning pinion to seat bearings until total pre-load figure obtained in step 17 is achieved, then increase this pre-load reading by 0.11 to 0.34 Nm. Further rotate pinion an extra 30-40 turns and recheck pre-load to ensure that no change has occurred.

NOTE:

It must be realised that the pre-load readings in the example are only theoretical. In practice, the figures could differ greatly, so the readings obtained when performing the actual operations, are the ones to use.

19. Reinstall drive shafts, refer to **2.6 DRIVE SHAFTS** in this Section.
20. Reinstall propeller shaft, refer to **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**.
21. If removed previously, reconnect exhaust system, reverse of the removal procedure.
22. Remove safety stands and lower vehicle.
23. Check lubricant level and top up as necessary, refer to **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** in this Section.
24. Start vehicle and check for exhaust leaks.

3. MAJOR SERVICE OPERATIONS

3.1 TRAILING ARM TRUNNION FLANGE, TRUNNION ASSEMBLY AND/OR WHEEL BEARING

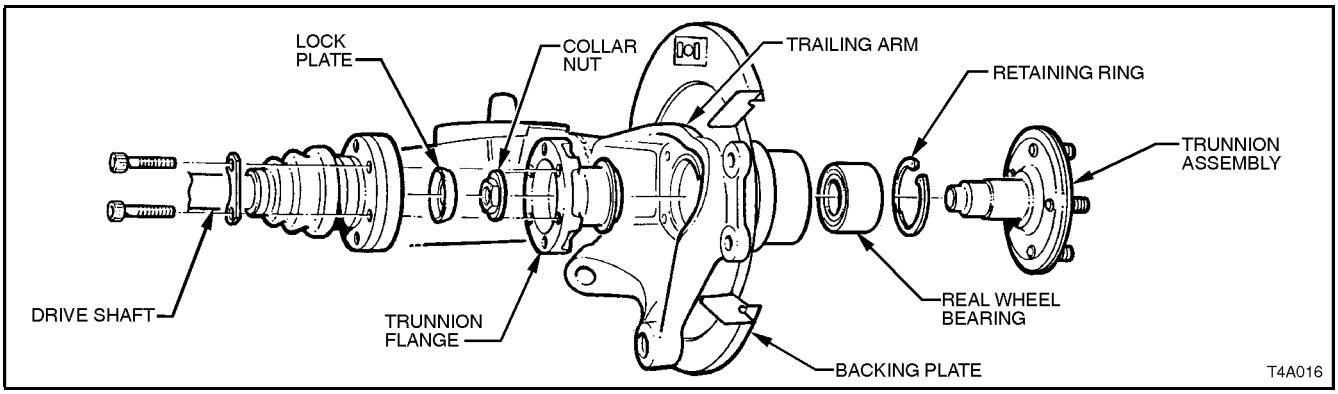


Figure 4B-57

The following procedure involves the removal of the trunnion flange, trunnion and/or wheel bearing **with the trailing arm installed on the vehicle**. A similar procedure is included in **Section 4A REAR SUSPENSION**, involving the trailing arm removed from the vehicle.

For this operation, a new lock plate and collar nut must be used on reassembly.

NOTE 1:

The rear wheel bearing should only be removed if it is faulty, or if the trunnion assembly is removed.

NOTE 2:

The trunnion assembly for VT Series vehicles is 1 mm shorter than previous models and is identified by a circumferential groove on the outside diameter of the flange.

REMOVE

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under trailing arms.
2. Remove wheel cover (steel wheels) or centre cap (alloy wheels) from side of vehicle which component/s are to be removed.
3. Mark relationship of wheel to mounting flange. Remove road wheel attaching nuts and remove wheel.
4. Using holding bar, Tool No. KM468 to hold trunnion assembly from rotating, loosen and remove drive shaft constant velocity joints to inner axle shaft and trunnion flange attaching bolts and plates, remove drive shaft.

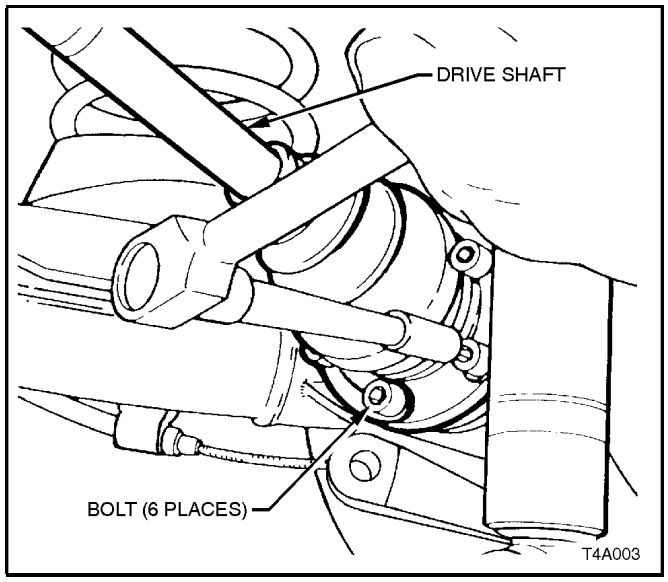
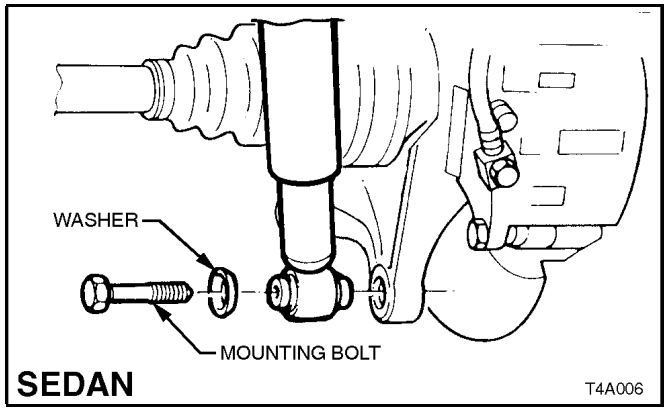


Figure 4B-58

5. Remove rear shock absorber lower mounting bolt from trailing arm, and pull shock absorber from trailing arm.



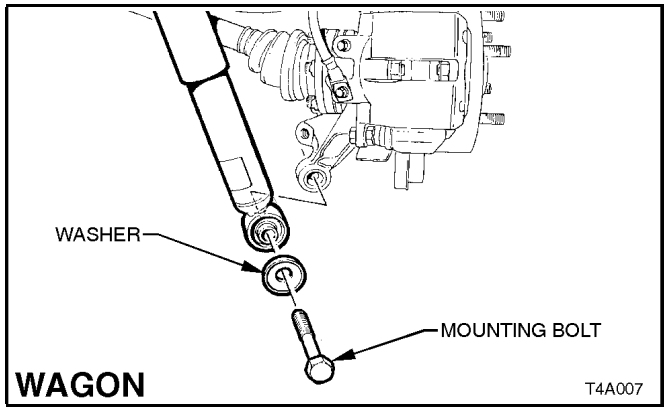


Figure 4B-59

6. Remove rear brake caliper anchor plate to trailing arm attaching bolts, remove caliper from disc.

   Using wire, tie up caliper to lower end of shock absorber upper mounting. DO NOT ALLOW CALIPER TO HANG BY BRAKE HOSE.
7. Remove rear brake disc.

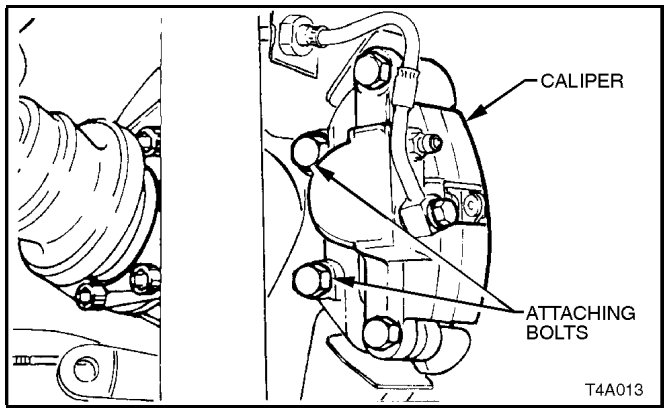


Figure 4B-60

8. Using Torx bit socket, Tool No. AU416, remove brake backing plate to trailing arm two upper rear bolts. Then remove the longer, hexagon headed, lower bolts

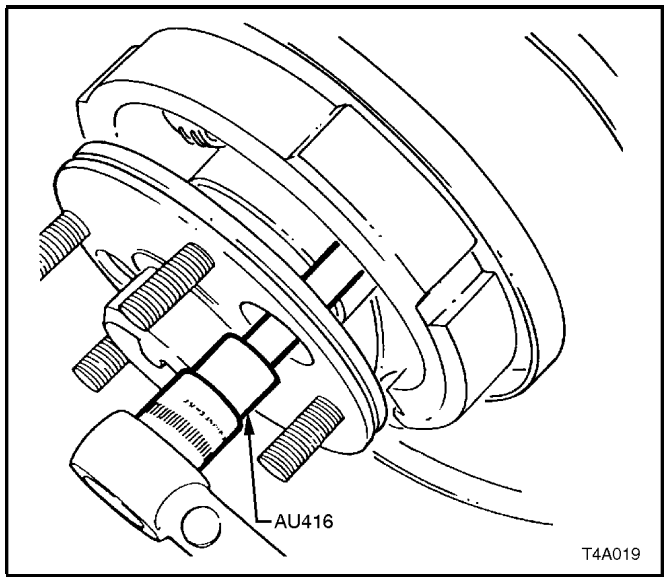


Figure 4B-61

9. Secure Tool Nos. KM620-1-A and KM620-2 to trunnion flange with three drive shaft constant velocity joint to trunnion flange attaching bolts.

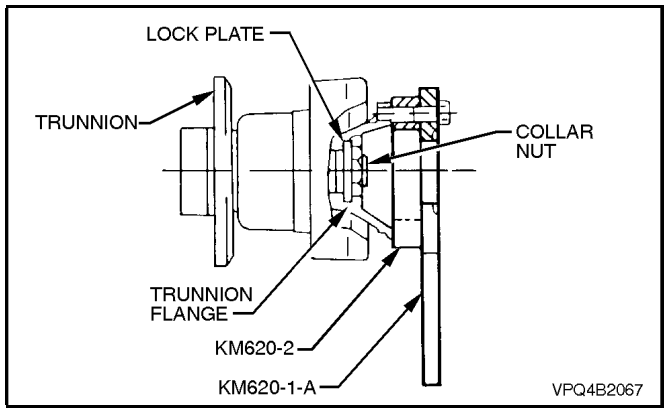


Figure 4B-62

NOTE:

Align holes marked 'B' on KM620-1-A and KM620-2 with holes in trunnion flange before installing bolts.

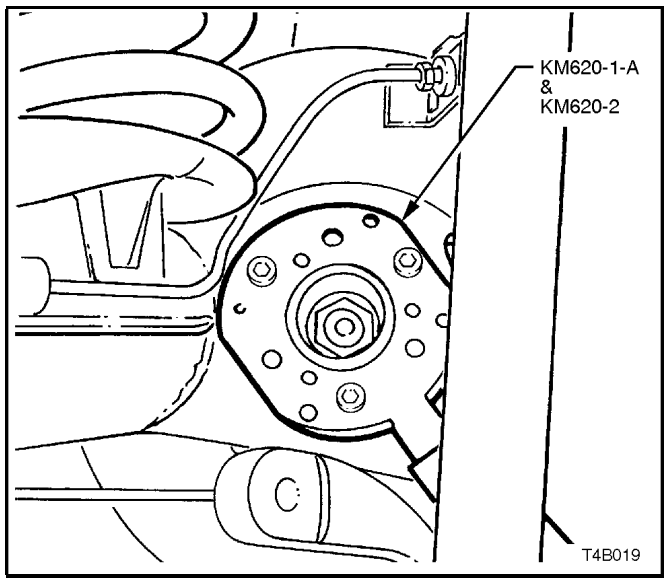


Figure 4B-63

10. Install a suitable length and diameter steel tube over handle of KM620-1-A, and while holding KM620-1-A from rotating, loosen and remove collar nut and lock plate.

NOTE:

Once collar nut and lock plate have been removed, they must be discarded as they are only to be used once.

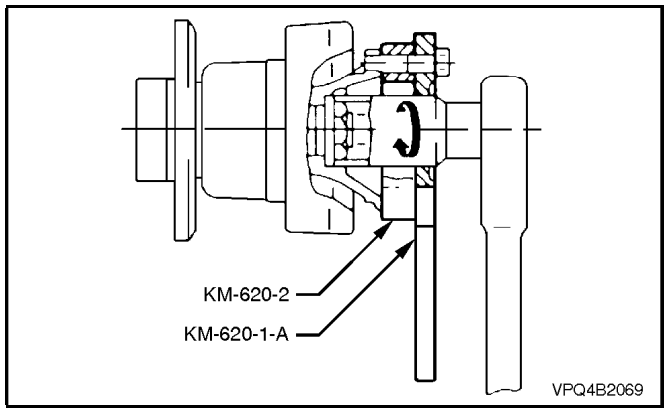


Figure 4B-64

11. Apply grease to ball of Tool No. KM620-5-B. Assemble KM620-3 to KM620-4-A and install KM620-5-B into KM620-3. Assemble bearing assembly (part of KM620-A) to KM620-4 and install KM620-4 to KM620-1-A using three bolts (part of KM620-A).

    Secure the assembled tool and spacer ring, Tool No. KM620-2, to the trunnion assembly, using three drive shaft constant velocity joint to trunnion flange attaching bolts.

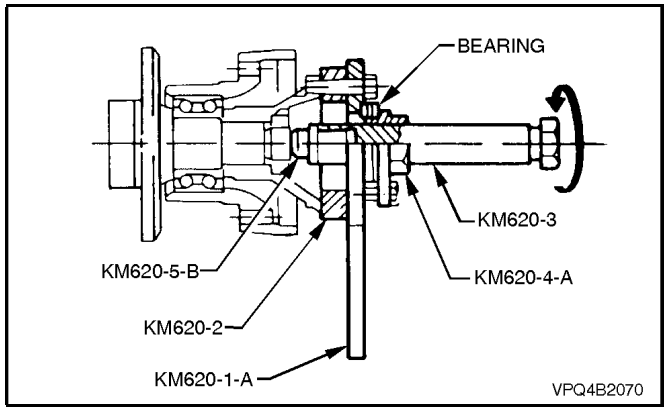


Figure 4B-65

12. While holding KM620-1-A from rotating, turn the screw KM620-3, forcing the flange free from the trunnion.

    Separate components from flange once it has been removed.

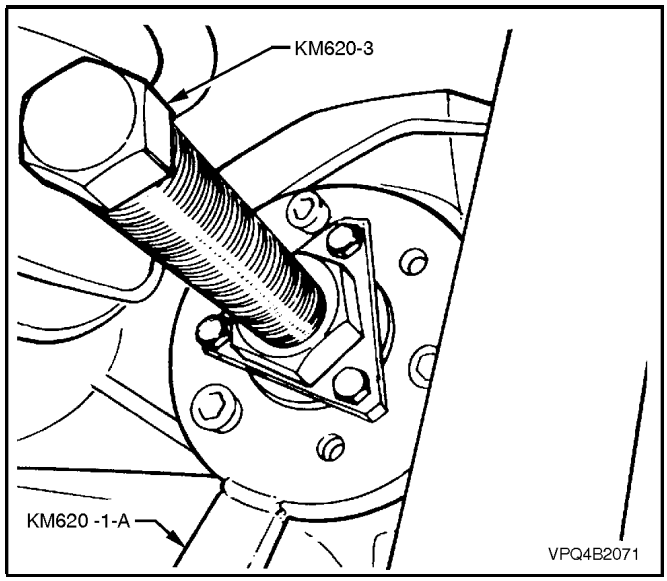


Figure 4B-66

13. Working from the rear of the backing plate, install the three distance pieces, KM620-7, to the backing plate to trailing arm bolt holes.

    Assemble KM620-4-A, KM620-3 and KM620-5-B with three bolts to KM620-1-A (as in step 10). Install and tighten attaching nuts (part KM620-A), to KM620-7.

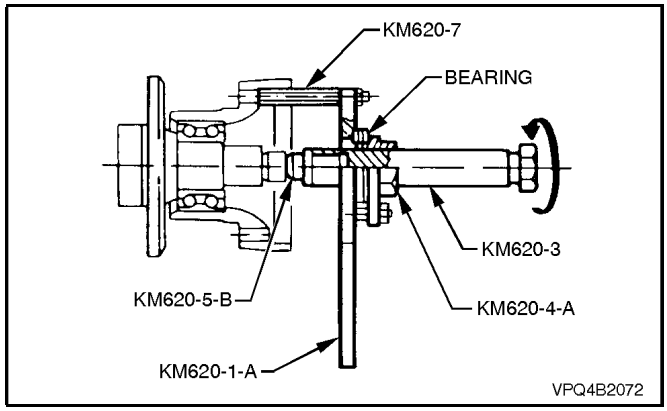


Figure 4B-67

14. While holding KM620-1-A from rotating, turn the screw KM620-3 to press trunnion from rear wheel bearing.

    Once trunnion has been removed, remove nuts holding KM620-1-A assembly to the distance pieces, KM620-7. Remove KM620-1-A, and remove KM620-5-B from KM620-3.

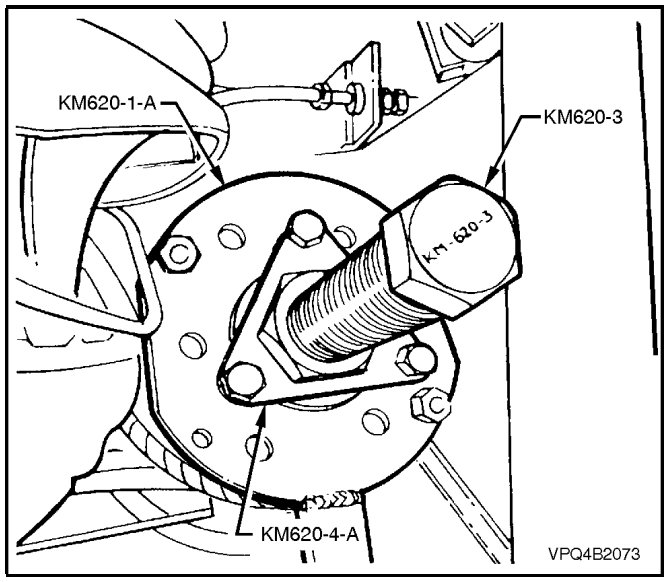


Figure 4B-68

15. Remove wheel bearing retaining ring from trailing arm.

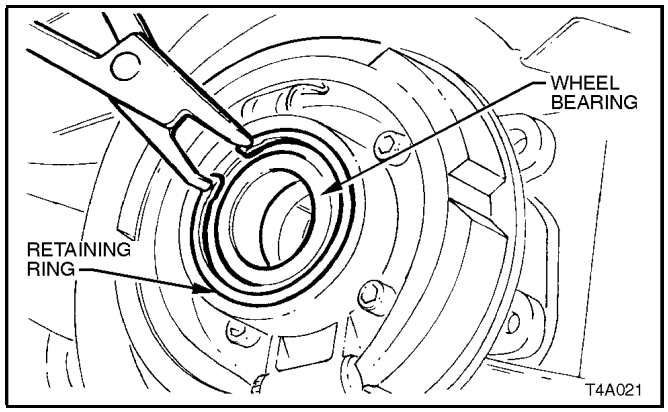


Figure 4B-69

16. Install KM620-6 to rear of bearing. Install KM620-1-A assembly and install attaching nuts, as shown.
17. While holding KM620-1-A, turn the screw KM620-3, to press wheel bearing from trailing arm.

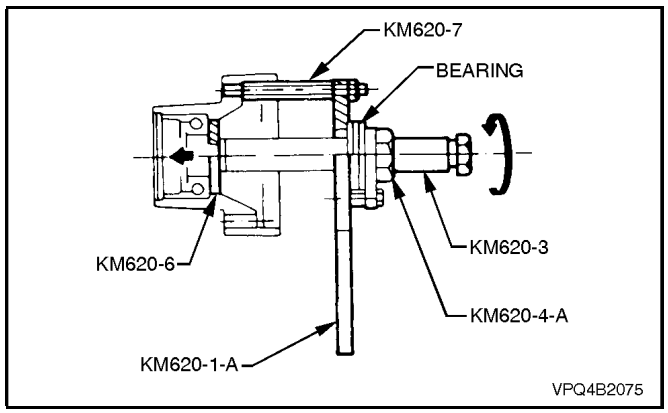


Figure 4B-70

REINSTALL

To install new bearing:

1. Ensure that bearing bore of trailing arm is clean and free of any foreign matter.
2. Coat outside diameter of new wheel bearing and bore of trailing arm with lubricant meeting Holden's Specification HN1326 (Molybond HE50, or equivalent).
3. Remove KM620-1-A from distance pieces KM620-7. Install sleeve KM620-9-A over KM620-3, with the stepped end facing away from the trunnion bearing.

   Install KM620-8-A to new bearing and insert into the bore of the trailing arm. Screw the threads of KM620-8-A and KM620-3 together.

   Reinstall KM620-1-A to KM620-7, tightening the attaching nuts. Then, while holding KM620-3 and KM620-1-A from turning, rotate KM620-4-A to draw bearing into position.

   When the bearing is fully installed, remove KM620-8-A and fit retaining ring into trailing arm, ensuring that it is seated correctly.

To reinstall trunnion:

1. Remove KM620-1-A from distance pieces, KM620-7. Install KM620-9-A over KM620-3, with the stepped shoulder facing away from the trunnion bearing. Reinstall KM620-1-A to KM620-7, tightening the attaching nuts.
2. Screw the threaded end of the trunnion into KM620-3. While holding KM620-3 and KM620-1-A from turning, rotate KM620-4-A to draw trunnion into wheel bearing.
3. Remove KM620-3 from trunnion and remove the three distance pieces of KM620-7 from trailing arm.
4. Assemble KM620-2 and KM620-1-A to trunnion flange using three drive shaft constant velocity joint to flange bolts.
5. Lubricate trunnion flange splines and trunnion threads with the recommended differential carrier lubricant.
6. With KM620-4-A, ball bearing assembly and KM620-3 assembled to KM620-1-A, screw thread of KM620-3 onto trunnion assembly.

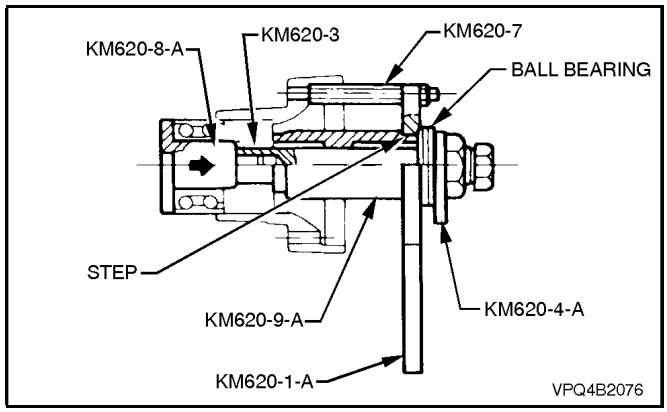


Figure 4B-71

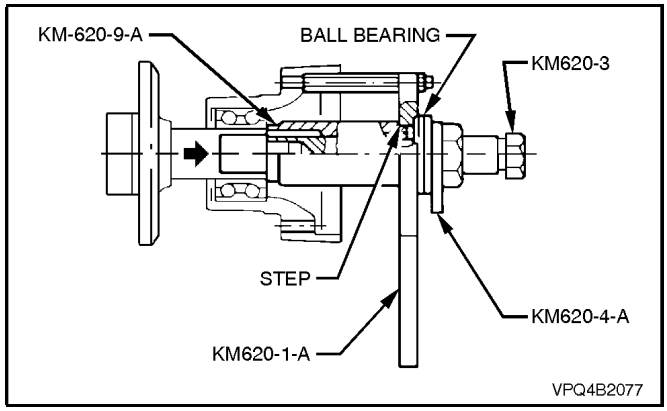


Figure 4B-72

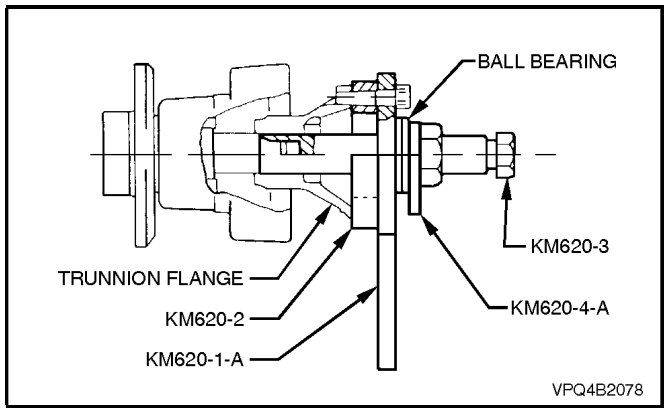


Figure 4B-73

7. While holding KM620-3 from turning, rotate KM620-4-A to draw trunnion flange onto trunnion.

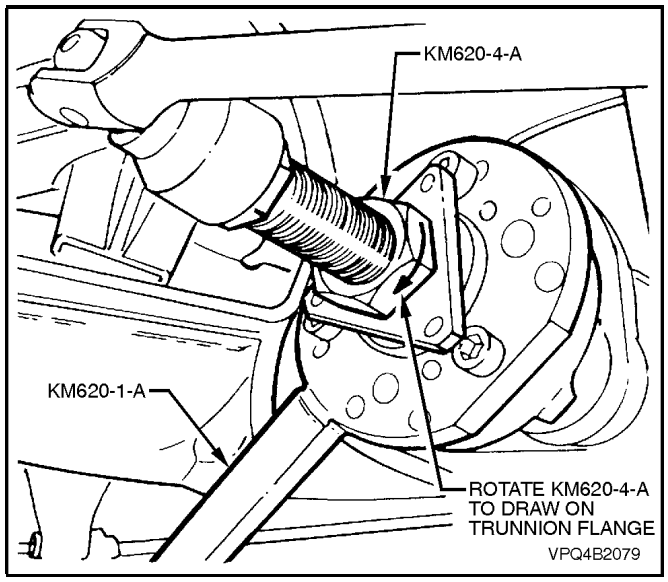


Figure 4B-74

8. Remove the components of KM620-A from trunnion and trunnion flange.
9. Install NEW collar nut to trunnion assembly and, using KM620-1-A and KM620-2 to hold trunnion assembly from turning, tighten collar nut to the correct torque specification.

COLLAR NUT TO TRUNNION ASSY TORQUE SPECIFICATION	295 - 305 Nm

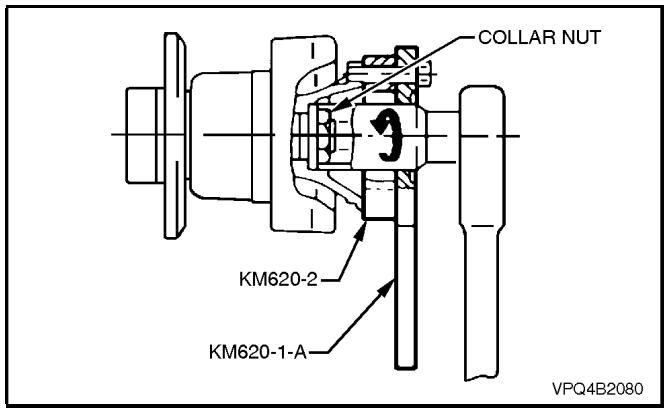


Figure 4B-75

10. Using a 1.25 inch socket, 150 mm socket bar and a soft faced hammer, install new lock plate over collar nut.

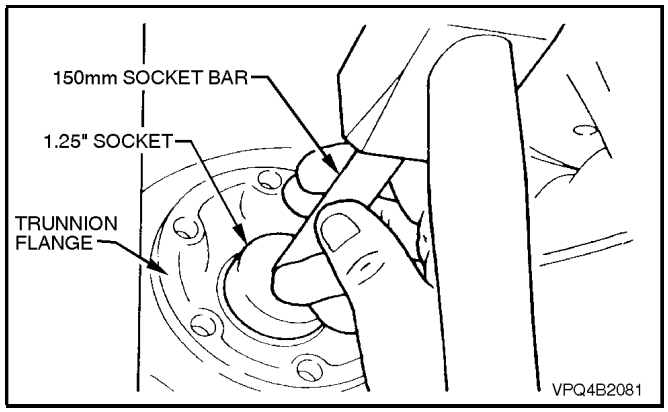


Figure 4B2-76

11. Assemble drive shaft outer constant velocity joint to trunnion flange, aligning bolt holes. Install attaching bolts with plates and tighten bolts to the correct torque specification.

DRIVE SHAFT CONSTANT VELOCITY JOINT TO TRUNNION FLANGE ATTACHING BOLT TORQUE SPECIFICATION	50 Nm, then 60° - 75 turn angle

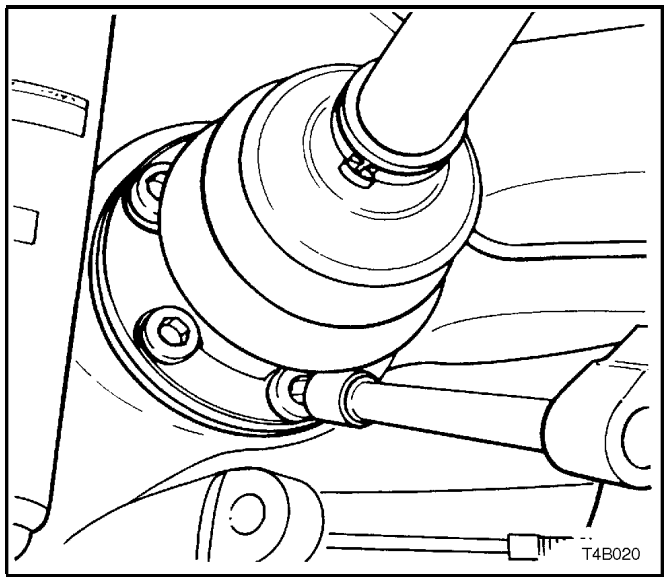


Figure 4B-77

12. Install rear disc brake shield to trailing arm bolts and tighten to the correct torque specification.

REAR DISC BRAKE SHIELD TO TRAILING ARM ATTACHING BOLT TORQUE SPECIFICATION	Upper: 70 - 80 Nm Lower: 85 - 90 Nm

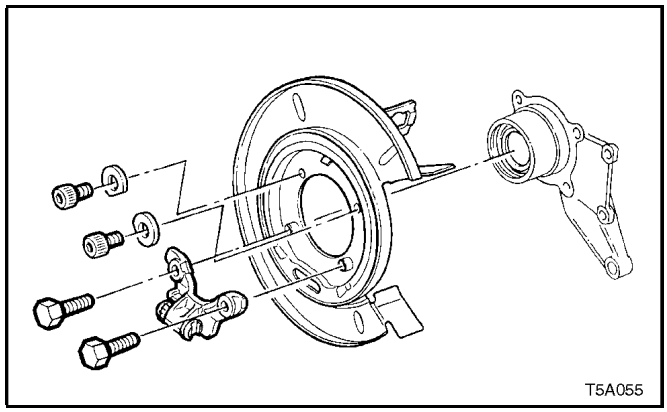


Figure 4B-78

NOTE 1:

The two upper bolts have washers. The washers are installed with the cut-out surface facing around the trailing arm hub outer surface.

NOTE 2:

Apply Loctite 242 thread sealant or equivalent (to Holden's Specification HN1256, Class 2 Type 1) to the threads of the two longer, lower hexagon headed bolts, before installation.

13. Install brake disc and brake caliper. Install brake caliper anchor plate to trailing arm attaching bolts and tighten to the correct torque specification.

BRAKE CALIPER ANCHOR PLATE TO TRAILING ARM ATTACHING BOLT TORQUE SPECIFICATION	70 - 100 Nm

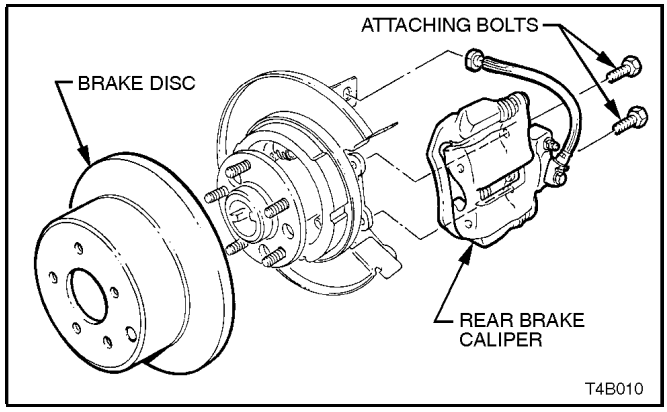


Figure 4B-79

14. Install shock absorber to trailing arm, install and tighten lower mounting bolt to the correct torque specification.

SHOCK ABSORBER LOWER MOUNTING BOLT TORQUE SPECIFICATION	105 - 125 Nm

NOTE:

Vehicle must be at curb weight and on all four wheels before this torque is applied.

15. Install road wheel and tighten attaching nuts.

NOTE:

When installing the wheel, align the marks made prior to removal.

16. Remove safety stands and lower vehicle.
17. Tighten road wheel attaching nuts to the correct torque specification.

ROAD WHEEL ATTACHING NUT TORQUE SPECIFICATION	110 - 140 Nm

18. Refit wheel cover/centre cap.

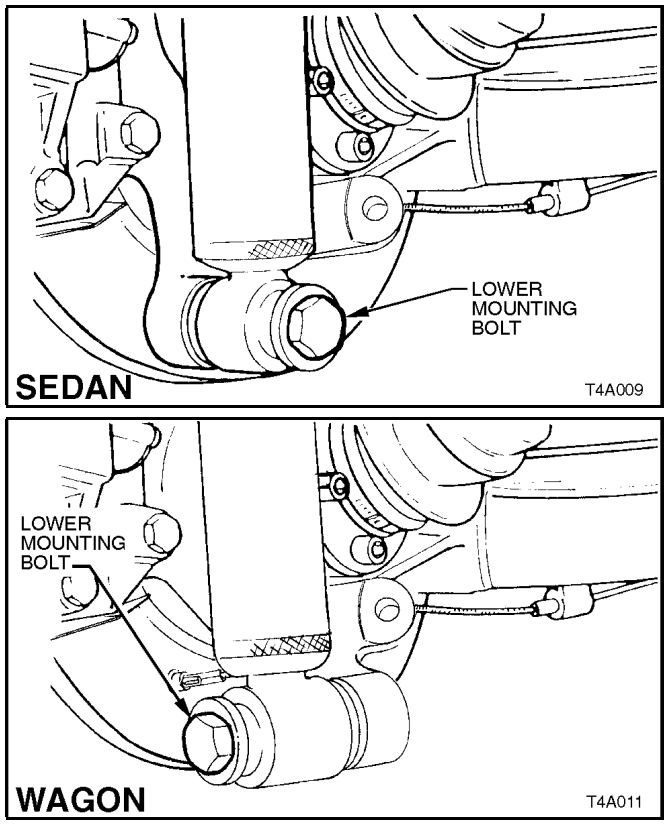


Figure 4B-80

CCP

3.2 FINAL DRIVE ASSEMBLY

IMPORTANT:

Before disturbing the rear suspension crossmember mounting bolts, an alignment procedure is required on installation and a special tool is required for this purpose. If this tool is not available, then the crossmember cannot be correctly aligned and steering and/or handling abnormalities will result.

CAUTION :

Whenever any component that forms part of the ABS (if fitted) is disturbed during Service Operations, it is vital that the complete ABS system be checked, using the procedure as detailed in DIAGNOSIS, ABS FUNCTION CHECK, in Section 12L ABS/Traction Control.

NOTE 1:

For this operation, NEW rear crossmember rear mount to vehicle underbody attaching bolts, differential carrier to crossmember attaching bolts and intermediate muffler support to rear crossmember retainers must be used on reassembly.

NOTE 2:

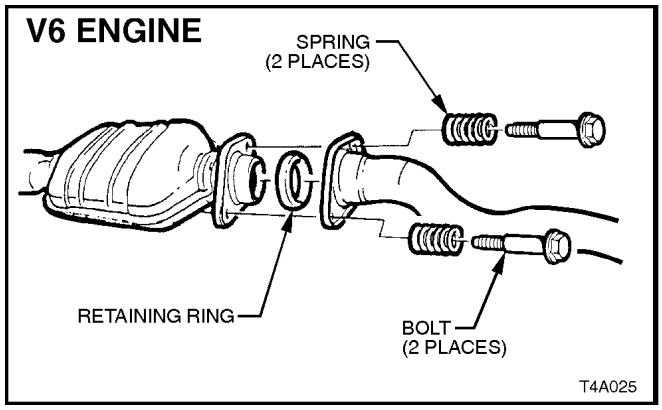
If rear mount is removed from rear cover, NEW bolts must also be installed on reassembly.

REMOVE CCP

1. Using a floor jack under centre of differential carrier, jack up rear of vehicle then place safety stands under body rear jacking points. Refer to **Section 0A GENERAL INFORMATION** for location of jacking points.
2. Remove rear wheel covers (steel wheels) or centre caps (alloy wheels).
3. Mark relationship of wheels to mounting flange. Remove road wheel attaching nuts and remove wheel.
4. Disconnect exhaust system from rear of catalytic converter (V6) or converters (V6 Supercharged and V8).

NOTE:

Only one side of the V6 Supercharged/V8 arrangement is shown.



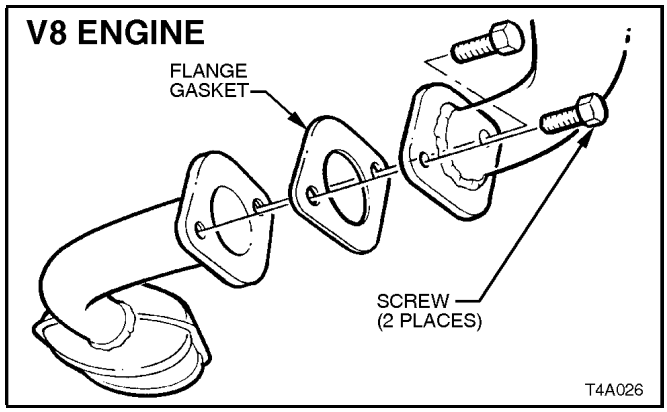


Figure 4B-81

5. Remove the two retainers from the top posts and discard. Disconnect exhaust system support rings from the rear hanger of the rear muffler. Both V6 and V8 arrangements are the same.

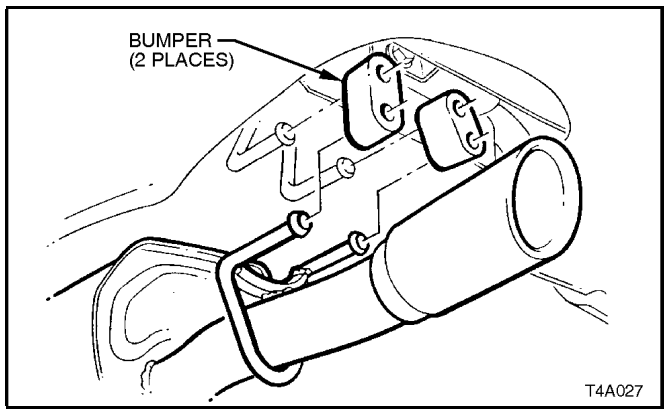


Figure 4B-82

6. Remove muffler support to rear crossmember hanger retainers (2 places - V6, 4 places - V6 Supercharged and V8) and discard.
7. Lift up intermediate section of exhaust system and remove intermediate muffler support rubbers. Remove intermediate and rear sections of exhaust system from vehicle.

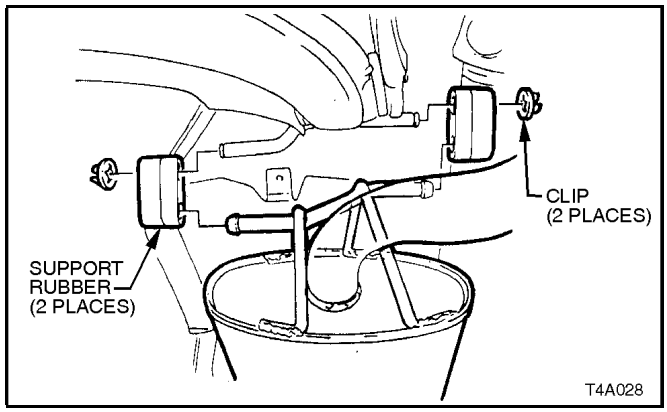


Figure 4B-83

8. Remove propeller shaft, refer to **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**.
9. Set park brake in fully released position.
10. Release each of the underbody to park brake cable retaining clips and free cables.

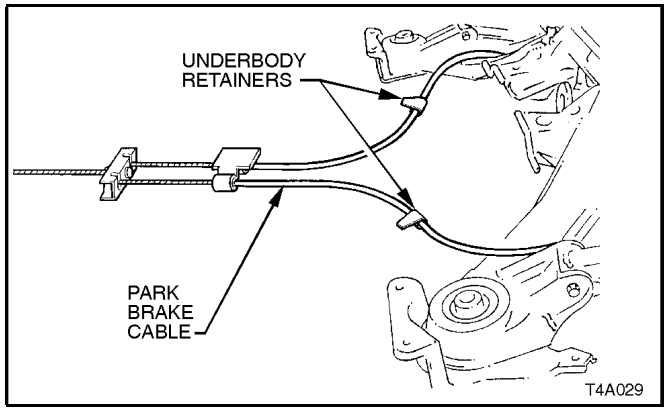


Figure 4B-84

11. Remove park brake outer cable retaining bracket bolt from the vehicle underbody.
12. Pull each park brake inner cable forward and up, (1) out of the cable retainer. Pull the cable rearwards (2) to remove from the retaining bracket.

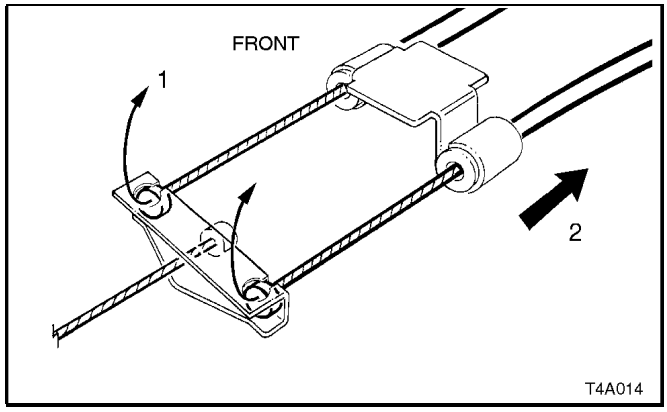


Figure 4B-85

13. Disconnect brake pipes from brake hoses at trailing arm brackets and remove brake hose retaining clips.

    Remove brake hoses from brackets.

    Cap ends of brake pipes to prevent the entry of foreign matter.

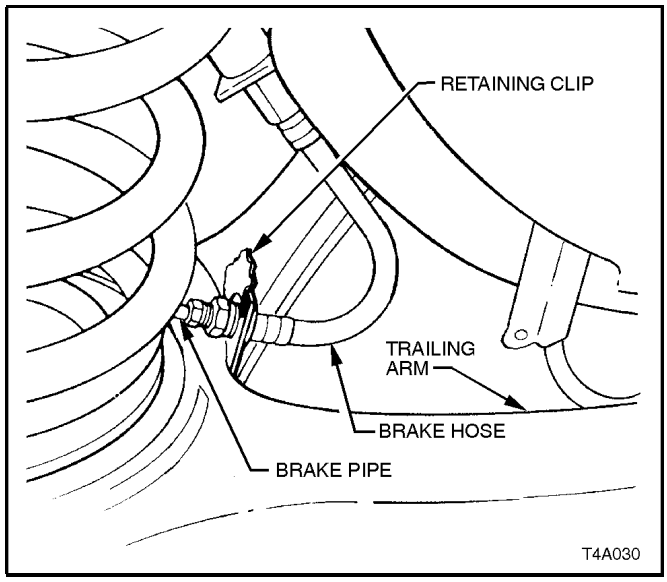


Figure 4B-86

14. Pull differential carrier breather hose from underbody crossmember hole.
15. If equipped with ABS, disconnect both sensor electrical connectors, as shown.

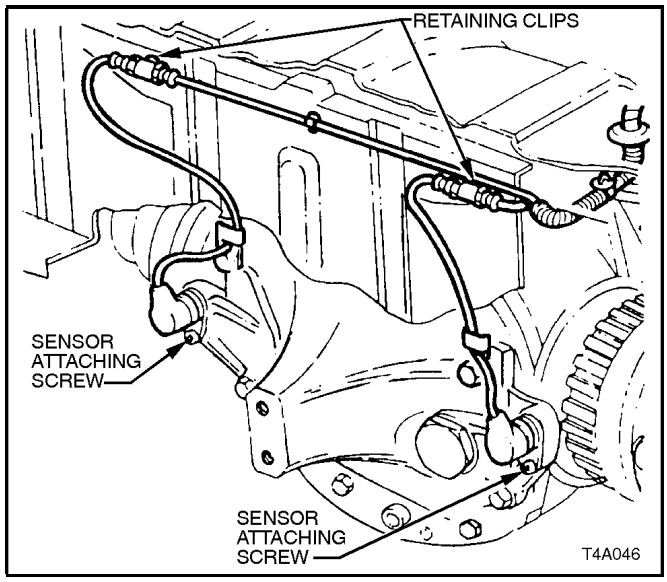


Figure 4B-87

16. Using a scriber, mark rear mount to vehicle under body location. This will aid in rear crossmember reinstallation and to ensure that rear end 'toe' setting is maintained.

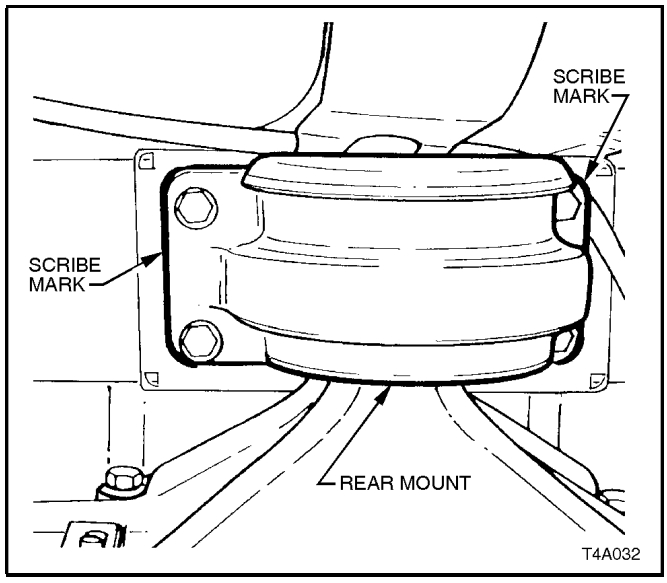


Figure 4B-88

17. Support weight of differential carrier with floor jack.
18. Remove rear mount to vehicle underbody attaching bolts and discard.

    Lower rear of differential carrier and rear crossmember assembly at least 60 mm.

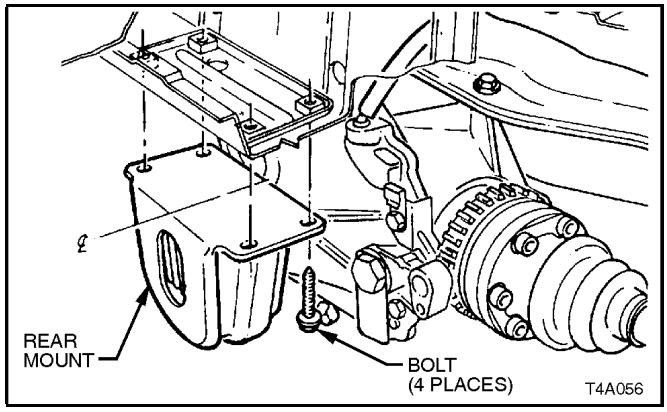
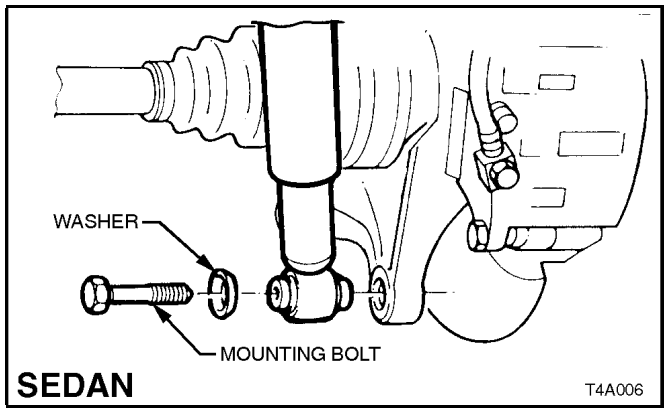


Figure 4B-89

19. Position a second floor jack under left and right trailing arms in turn and raise jack slightly to take spring load off trailing arms. Disconnect rear shock absorber lower mounting bolts from trailing arms, and pull shock absorber lower ends from lower trailing arms.

NOTE:

Bruising to the inside of the drive shaft constant velocity joint boots will occur if the shock absorber is disconnected from the trailing arm before the rear of the differential carrier and crossmember assembly has been lowered by at least 60 mm. This bruising will lead to premature failure of the boots and eventual failure of the joints if left unchecked.



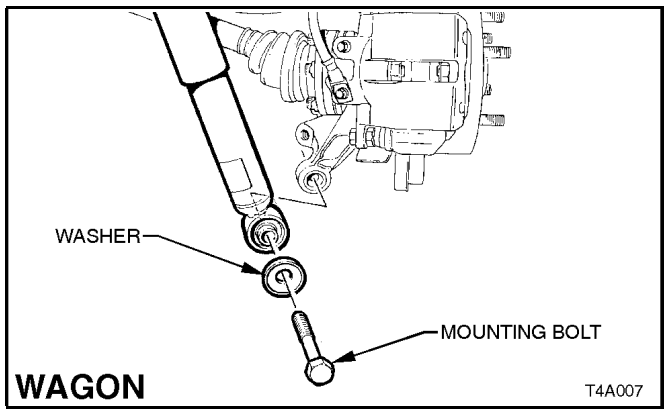


Figure 4B-90

20. Remove rear springs and insulators from vehicle underbody and trailing arms.

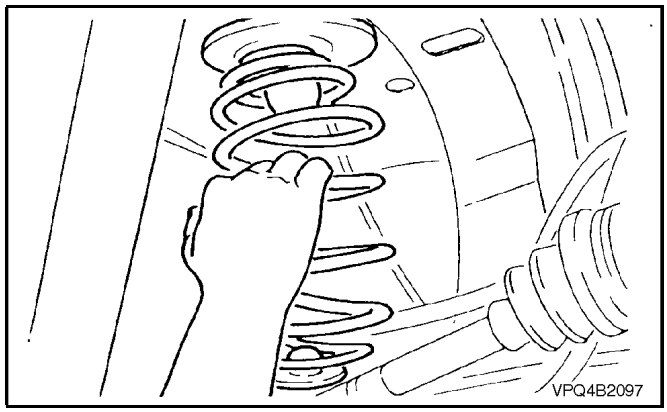


Figure 4B-91

21. If replacing differential carrier assembly, rear cover or rear mount, loosen rear mount to rear cover attaching bolts.

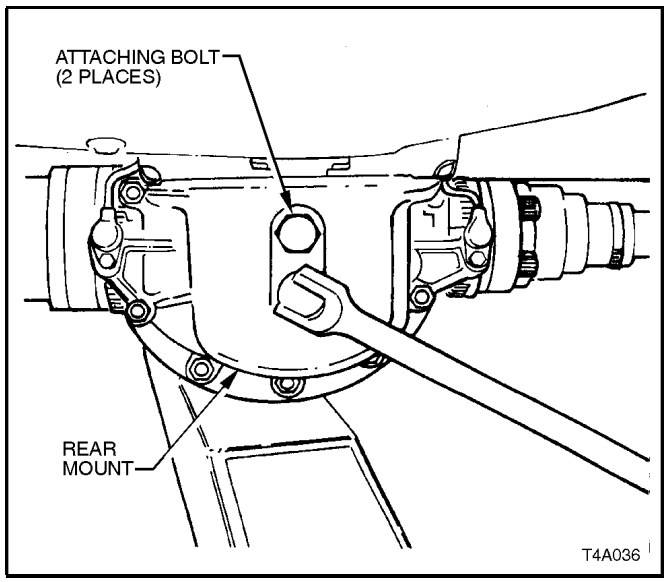


Figure 4B-92

22. Raise differential carrier and rear crossmember on floor jack until rear mount contacts underbody.

23. Remove brace to vehicle underbody attaching bolts.
24. With the aid of an assistant, remove rear crossmember to underbody bolts and braces.
25. With assistant supporting front end of rear crossmember, lower assembly on jack and remove from beneath vehicle.

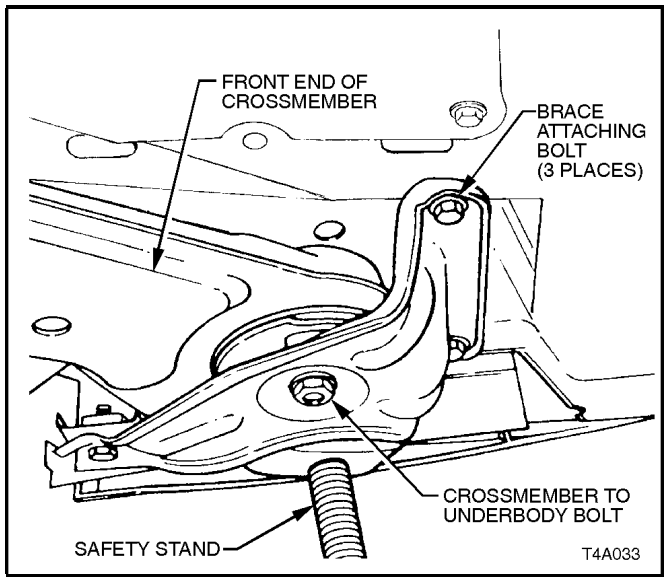


Figure 4B-93

26. Using an 8 mm Allen key socket, remove drive shaft inner constant velocity joint to inner axle shaft attaching bolts and plates.

    Disconnect joints from inner axle shafts.

NOTE:

Support drive shafts so that they do not hang on one end. Drive shaft joint deflection should be kept to within the angular movement of an installed drive shaft.

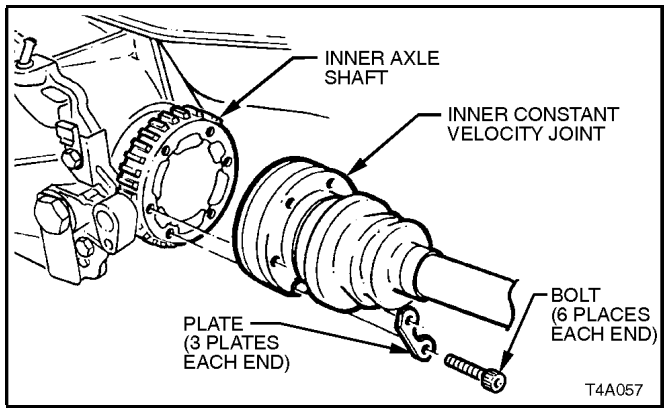


Figure 4B-94

27. Remove differential carrier to rear crossmember attaching bolts, remove rear crossmember assembly from differential carrier and discard attaching bolts.
28. If not carried out in step 21, remove rear mount to rear cover attaching bolts, remove mount and discard attaching bolts.

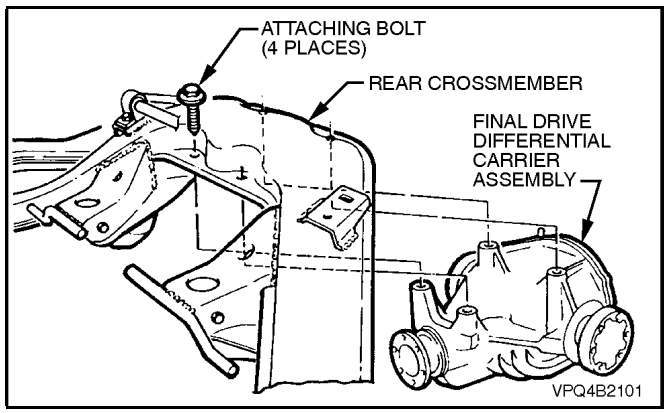


Figure 4B-95

REINSTALL

Installation is the reverse of removal procedure with attention to the following points:

1. If necessary, install NEW rear mount to rear cover but leave bolts finger tight at this stage.
2. Line up mounting holes in differential carrier and rear crossmember. Install new attaching bolts and tighten to the correct torque specification.

DIFFERENTIAL CARRIER TO REAR CROSSMEMBER ATTACHING BOLT TORQUE SPECIFICATION	90 Nm, then 30° - 45° turn angle

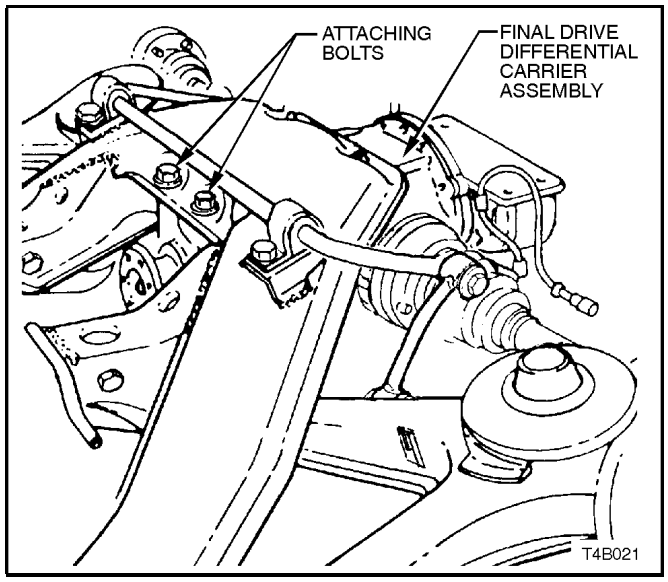


Figure 4B-96

3. Inspect drive shaft constant velocity joint boots for damage, replace as necessary.
4. Tighten drive shaft inner constant velocity joint to inner axle shaft attaching bolts to the correct torque specification.

DRIVE SHAFT CONSTANT VELOCITY JOINT TO TRUNNION FLANGE ATTACHING BOLT TORQUE SPECIFICATION	50 Nm, then 60° - 75° turn angle

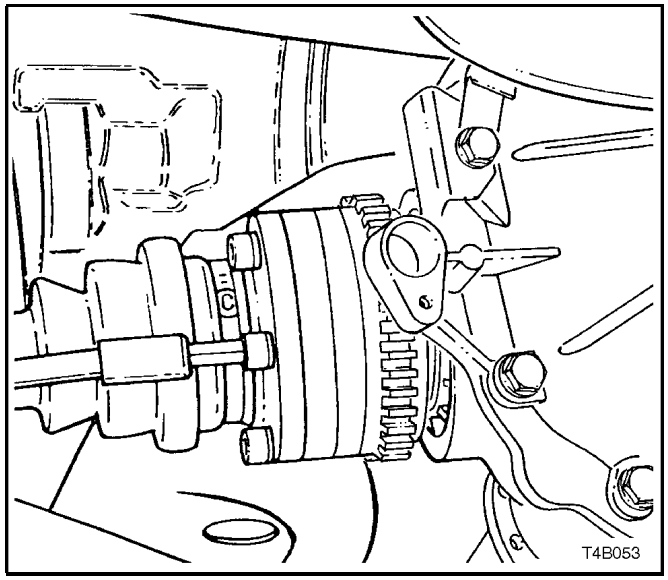


Figure 4B-97

5. With the aid of two assistants, place the differential carrier and rear crossmember assembly onto a floor jack.

   Position assembly under vehicle, and raise up assembly on jack with assistants guiding crossmember front mounting points into location.

NOTE:

When raising assembly, take care that the rear mount does not foul on fuel tank or fuel hose from sender unit.

6. Install crossmember front mounting braces and bolts but **do not tighten bolts at this stage.**

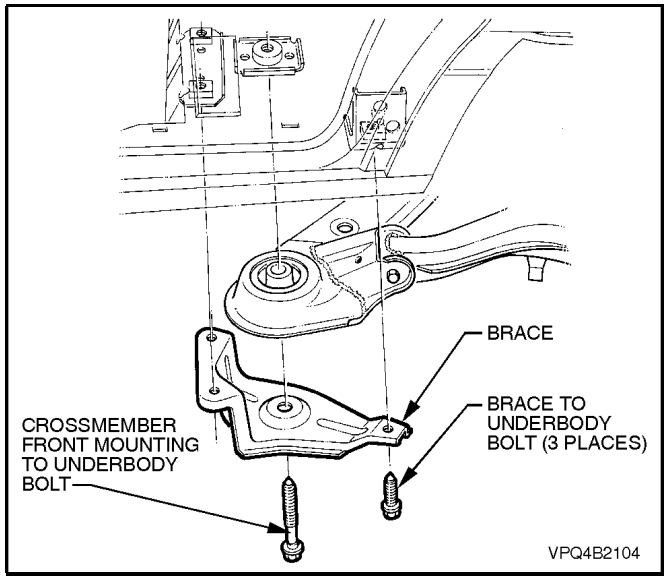


Figure 4B-98

7. Lower rear of assembly to allow access to rear mount-to-rear cover attaching bolts. Tighten NEW attaching bolts to the correct torque specification. At the same time, ensure that the mount does not twist (mount to vehicle underbody mating surface should be parallel to rear crossmember, as shown in Figure 4B-105).

NOTE:

Use a spirit level on rear mount to underbody and top surface of crossmember to ensure that both surfaces are parallel.

REAR MOUNT TO REAR COVER ATTACHING BOLT TORQUE SPECIFICATION	85 - 105 Nm

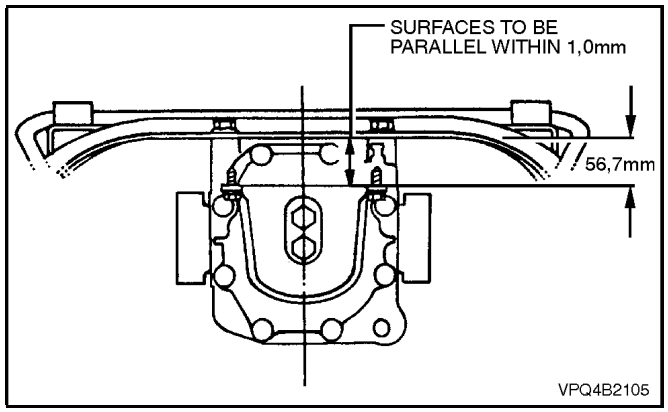


Figure 4B-99

8. Lower differential carrier and rear crossmember assembly on floor jack and safety stands. Install rear springs and insulators.

NOTE:

During this operation, the differential carrier and rear crossmember assembly rear mount must be lowered at least 60 mm from the vehicle underbody, or else damage to the drive shaft constant velocity joint boots will occur.

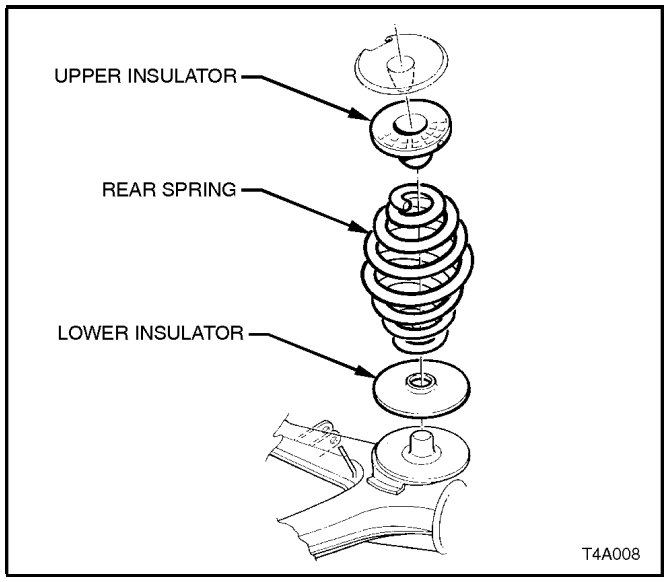


Figure 4B-100

9. Use a second floor jack to raise each trailing arm up far enough to allow shock absorber lower mounting to be installed.

   Install bolts and washers to shock absorber lower mounts and trailing arms. Tighten bolts to the correct torque specification.

SHOCK ABSORBER LOWER MOUNTING BOLT TORQUE SPECIFICATION	105 - 125 Nm

NOTE 1:

Vehicle must be at curb weight and on all four wheels before this torque is applied.

NOTE 2:

Sedan and station wagon torque specifications are the same.

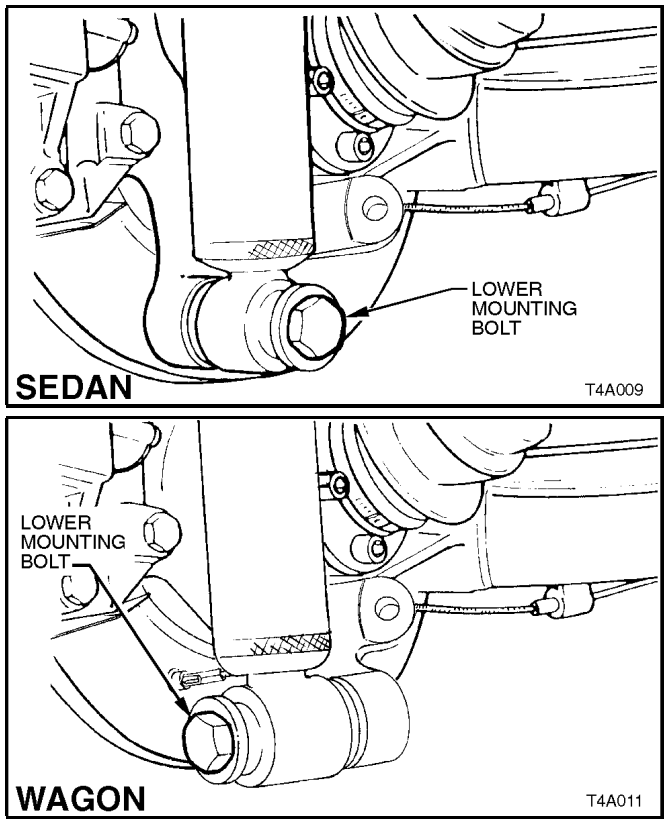


Figure 4B-101

10. Raise differential carrier and rear crossmember assembly until rear mount contacts vehicle underbody.
11. Align mount with marks on underbody, made on disassembly, and install and tighten new attaching bolts **but do not fully tighten at this stage.**
12. The rear crossmember MUST now be aligned to the vehicle centreline, using the special tool and procedure, as detailed in **Section 1A2 BODY DIMENSIONS**.

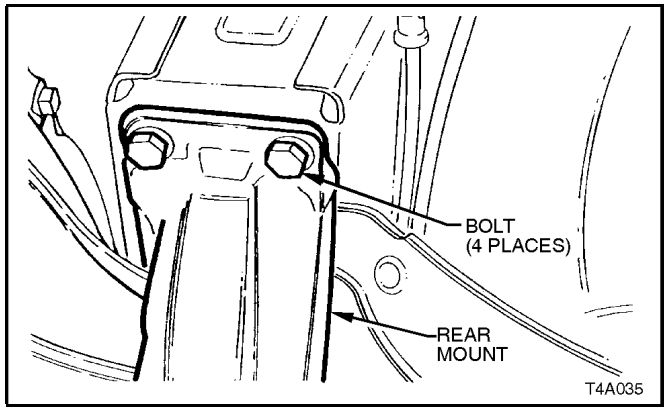


Figure 4B-102

IMPORTANT:

Failure to correctly align the rear crossmember to the centreline of the vehicle will result in steering abnormalities and uneven tyre wear!

14. Tighten all crossmember mounting fasteners to the correct torque specifications.

REAR MOUNT TO VEHICLE UNDERBODY ATTACHING BOLT TORQUE SPECIFICATION	30 Nm, then 60° turn angle

REAR CROSSMEMBER FRONT MOUNTING BOLT TORQUE SPECIFICATION	125 Nm, then 30° - 45° turn angle

CROSSMEMBER FRONT MOUNTING BOLT TORQUE SPECIFICATION	60 - 70 Nm

14. If vehicle is equipped with ABS, reconnect sensor wiring harness connectors.
15. Reinstall park brake inner cables to the front retainer, install and secure outer cables in the underbody retainers, then install the outer cable retaining bracket bolt to the vehicle underbody.
16. Check and fill differential carrier to correct level with specified lubricant, refer to **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** in this Section.
17. Check park brake adjustment and bleed brake hydraulic system, refer to **Section 5A, STANDARD BRAKES**.
18. Reinstall propeller shaft. Refer to **Section 4C PROPELLER SHAFT AND UNIVERSAL JOINTS**.
19. Reconnect exhaust system, in reverse to the removal procedure, ensuring that a new intermediate exhaust pipe to catalytic converter gasket is installed on V8 powered vehicles. Tighten the retaining bolts to the correct torque specification.

INTERMEDIATE EXHAUST PIPE TO CATALYTIC CONVERTER BOLT TORQUE SPECIFICATION	All Engines 40 - 50 Nm

20. Check exhaust clearances as detailed in **Section 8B EXHAUST SYSTEM**.
21. Start vehicle and check for exhaust leaks, repair as necessary.

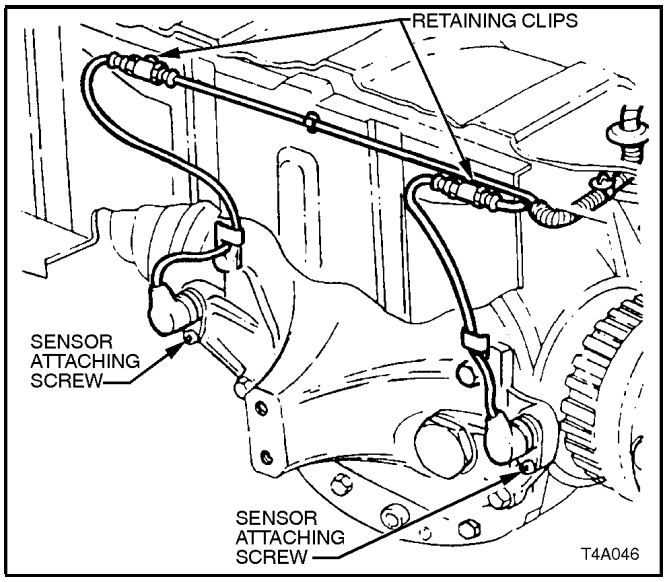


Figure 4B-103

3.3 REMOVED FINAL DRIVE ASSEMBLY

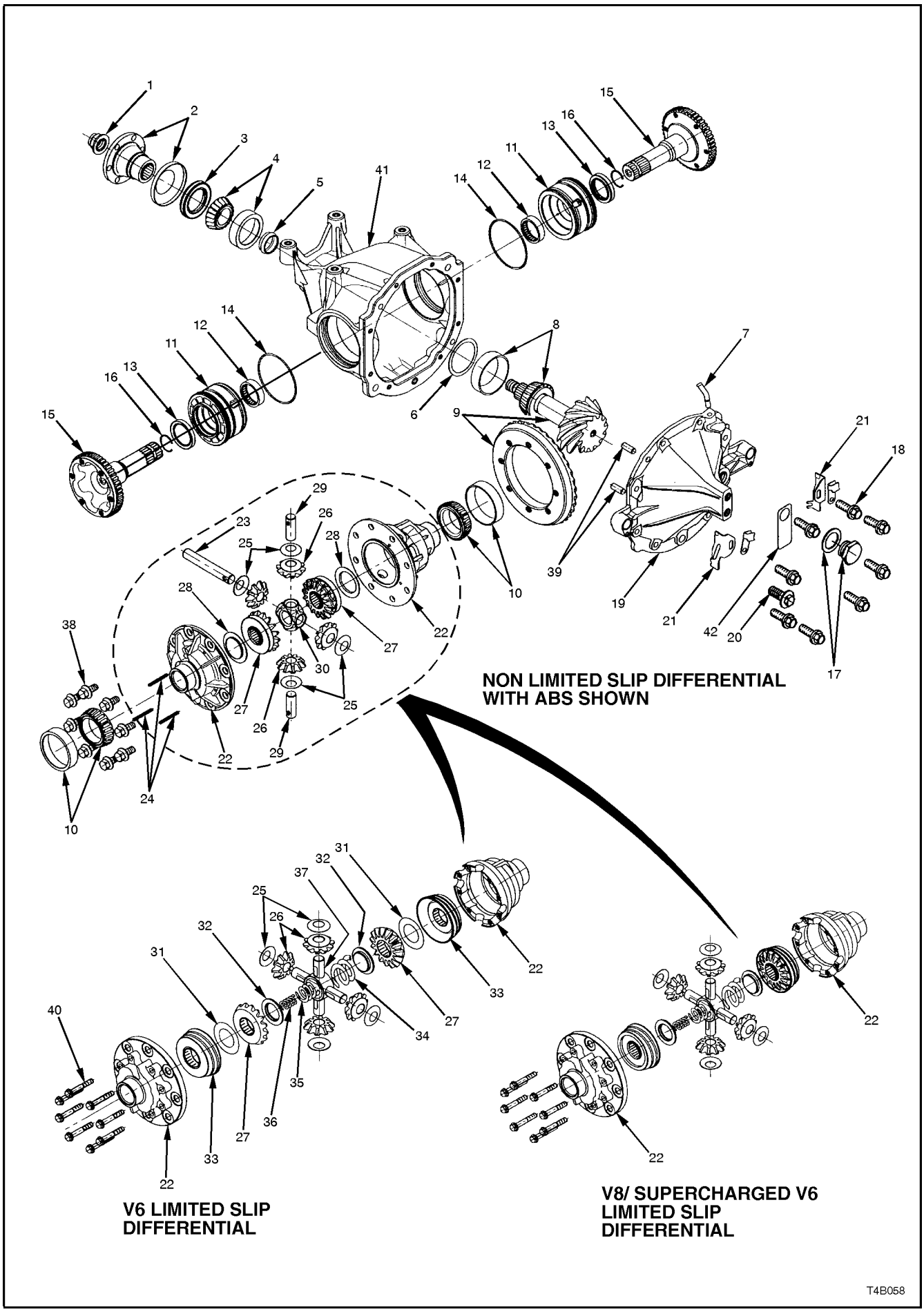


Figure 4B-104

REF. No.	PART NAME	REF No.	PART NAME
1	NUT - Pinion flange retaining	24	LOCK PIN - Differential pinion shaft
2	FLANGE ASSEMBLY - Differential pinion	25	WASHER - Differential pinion gear thrust
3	SEAL - Rear axle pinion oil	26	GEAR - Differential pinion
4	BEARING ASSEMBLY - Pinion front	27	GEAR - Differential side
5	SPACER - Pinion bearing	28	WASHER - Differential side gear thrust
6	SHIM - Pinion position adjusting	29	SHAFT - Differential pinion gear - short
7	BREATHER ASSEMBLY - Rear axle	30	BLOCK - Thrust
8	BEARING ASSEMBLY - Pinion Rear	31	SHIM - Differential side gear (LSD, V6 only)
9	RING GEAR AND PINION	32	PLATE - Thrust spring (LSD only)
10	BEARING ASSEMBLY - Differential side	33	CONE - Clutch (LSD, V6 only)
11	SCREW - Differential side bearing adjusting	34	SPRING - Differential pre-load - outer (LSD only)
12	BEARING ASSEMBLY - Inner axle shaft	35	SPRING - Differential pre-load -middle (LSD only)
13	SEAL - Inner axle shaft	36	SPRING - Differential pre-load -inner (LSD only)
14	'O' RING - Screw adjuster	37	SHAFT - Cross (LSD only)
15	SHAFT - Inner axle	38	BOLT - Ring gear to case
16	CLIP - Inner axle shaft	39	PIN - Dowel
17	SCREW PLUG & WASHER - Rear axle filler	40	BOLT - Case cap to cover
18	BOLT - Rear cover attaching	41	CARRIER
19	COVER - Rear axle housing	42	TAG - Lubrication
20	PLUG - Drain	43	LABEL - Rear axle identification (Not shown. See Figure 4B-2)
21	PLATE - Lock		
22	CASE - Differential		
23	SHAFT - Differential pinion gear - long		

DISASSEMBLE

1. Remove differential carrier assembly. Refer to **3.2 FINAL DRIVE ASSEMBLY** in this Section.
2. Secure holding tool (either fabricated or Tool No. KM480) to differential carrier using two of the discarded differential carrier to rear crossmember attaching bolts.

   For details of holding tool, refer to **7 SPECIAL TOOLS** at the end of this Section.
3. Install holding tool into bench mounted fixture base, Tool No. J-3289-20.

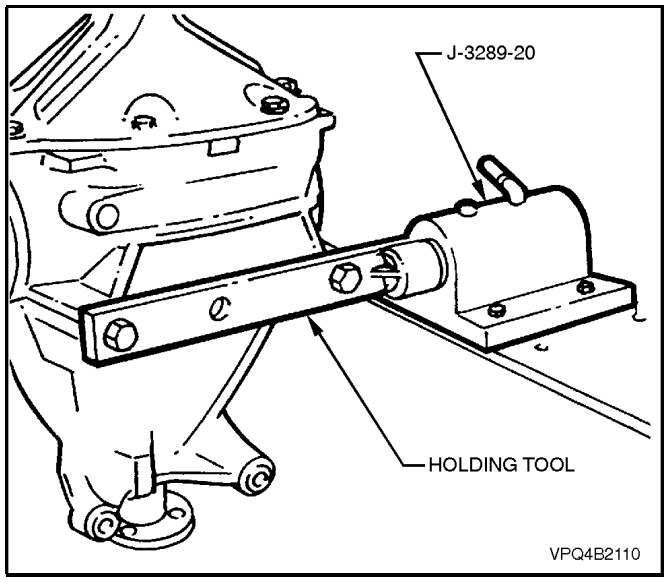


Figure 4B-105

4. Remove rear cover to differential carrier attaching bolts and screw adjuster lock plates. Using a soft faced hammer, tap rear cover at rear mount area to break rear cover to differential carrier seal. Remove rear cover and allow differential lubricant to drain into a suitable container.

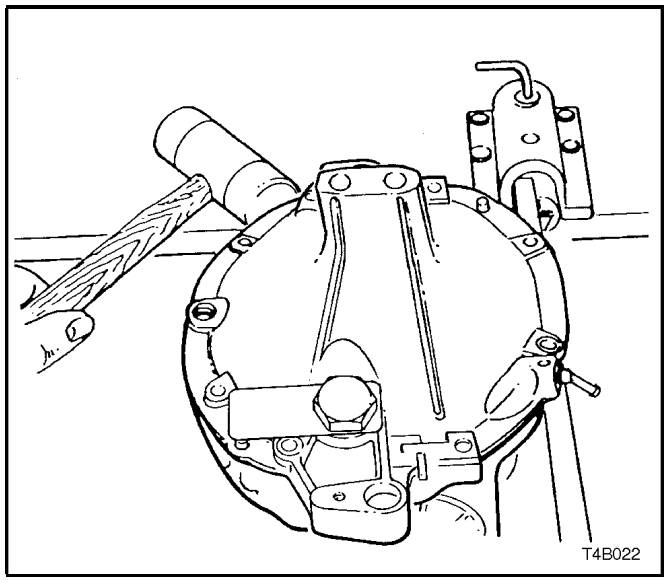


Figure 4B-106

5. Before removing differential case assembly and drive pinion from differential carrier, the following inspection procedures should be adopted. These inspections can help find the cause of final drive assembly noise and determine corrections needed.

   a. Visually inspect the moving parts for chipped or scuffed surfaces.

   b. Check the torque of the ring gear bolts and the pinion flange nut.

   NOTE:

   Ring gear bolts have a left hand thread.

   c. Mount a dial indicator to read from the rear face of the ring gear, then rotate the differential case through several turns to measure ring gear run-out.

RING GEAR FACE RUN-OUT SPECIFICATION	0.13 mm maximum

   d. Leave the dial indicator set up and push the ring gear hard one way, then hard the opposite way to measure side play. There should be no side play present.

   Check to ensure that there is no pinion end play.

   If end play is evident, then special attention should be made to the bearing inspection process, after disassembly.

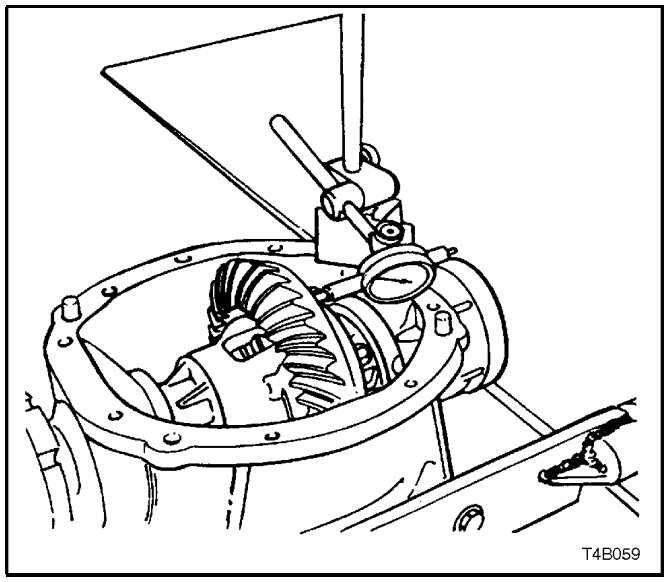


Figure 4B-107

e. Set up the dial indicator to measure ring gear backlash at three equally spaced positions.

BACKLASH SPECIFICATION	0.10 - 0.18 mm, at the tightest point

f. If no obvious faults are found, check the gear tooth contact pattern. Refer to Ring Gear and Pinion Contact Pattern in this Section.

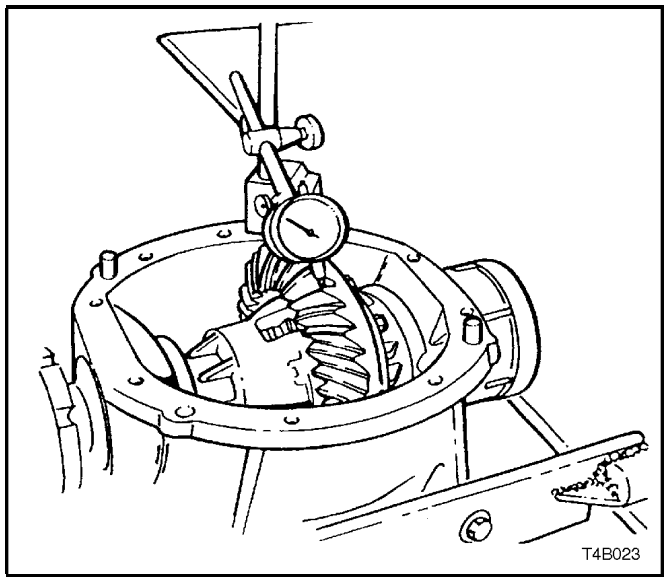


Figure 4B-108

6. Remove inner axle shafts by installing a slide hammer, Tool No. 09520-32012 and three suitable size bolts to each axle flange. Use slide hammer to release axle shaft spring clips.

NOTE:

The left hand inner axle shaft is shorter in length than the right hand shaft.

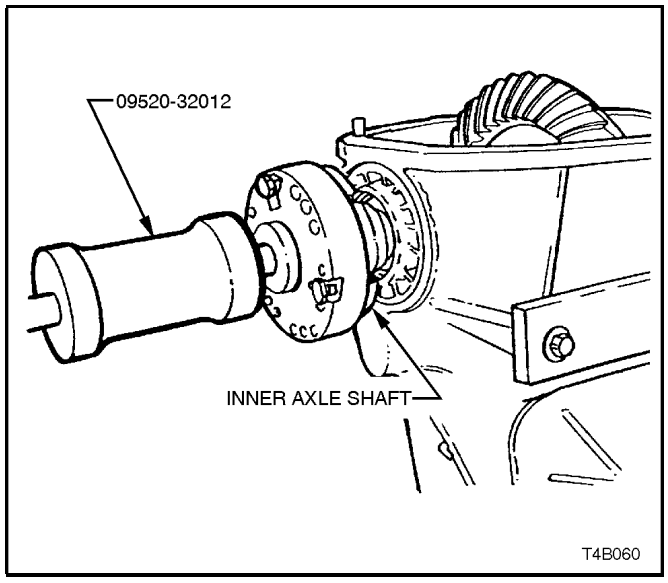


Figure 4B-109

7. If new screw adjuster seals are to be installed, use a suitable screwdriver and a block of wood to lever out seals from screw adjusters.

NOTE:

Take care not to damage the screw adjuster's aluminium housing with the screwdriver blade, as this could cause oil leaks to occur, after a new oil seal is fitted.

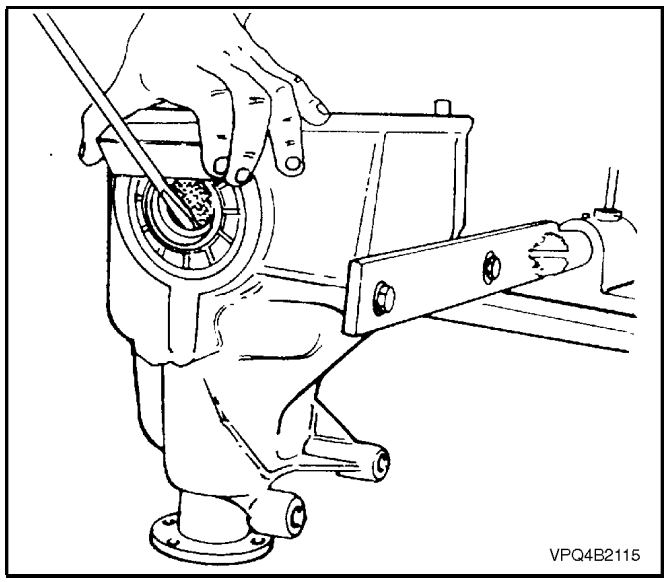


Figure 4B-110

8. Remove screw adjusters from housing using Tool No. AU407.
9. Remove differential case assembly from carrier housing.

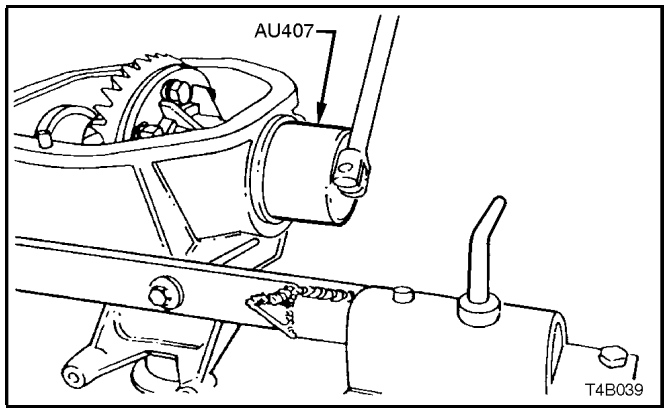


Figure 4B-111

10. To remove side bearing cups from screw adjusters, install screw adjusters, reversed, into differential carrier. Install adaptor, Tool No. AU412 onto screw adjuster. Using puller, Tool No. 1150, and forcing screw Tool No. E6661S, pull side bearing cups from screw adjusters and discard.

NOTE:

Side bearing cups are only to be removed if side bearing assemblies are to be replaced.

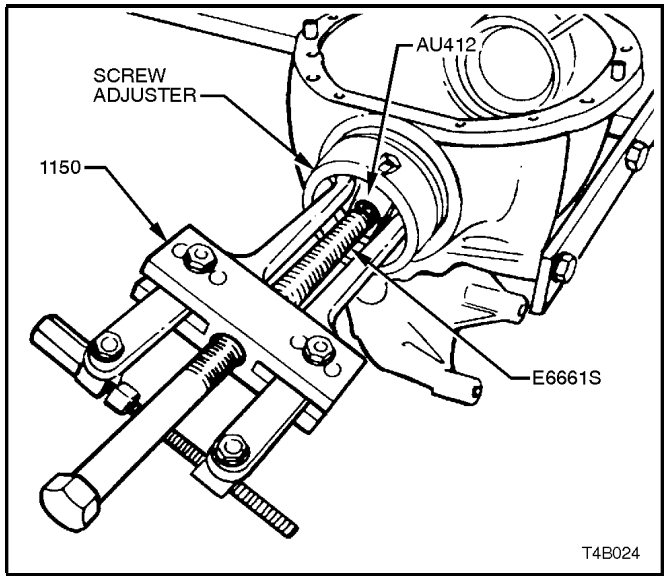


Figure 4B-112

11. Install Tool No. 4A39/1 to the pinion flange using two suitable bolts and nuts. While holding 4A39/1, loosen and remove pinion flange retaining nut.

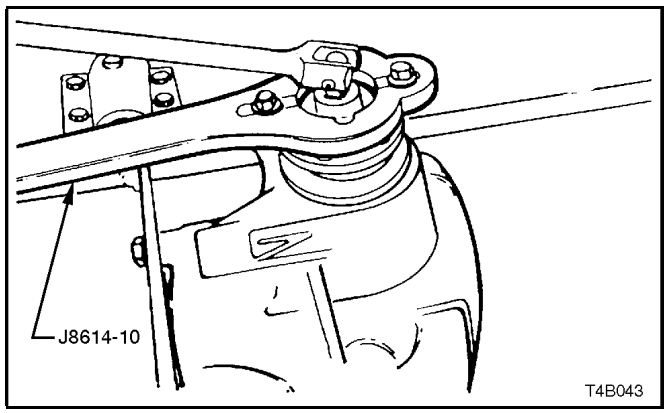


Figure 4B-113

12. Remove holder from pinion flange and assemble nut 4A39/2 and screw 4A39/3 to holder, 4A39/1. Install assembly to pinion flange using two suitable bolts and nuts. While holding 4A39/1, tighten screw 4A39/3 to remove pinion flange.

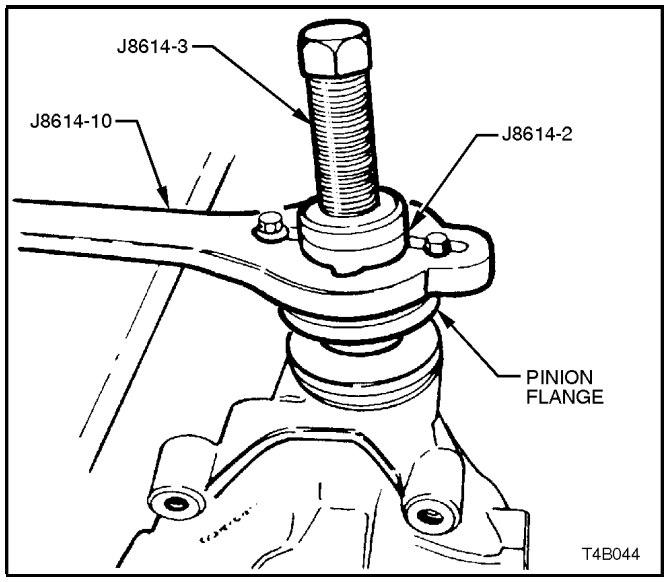


Figure 4B-114

13. Pry pinion oil seal out of carrier bore using Tool No. 56750 or a suitable seal extraction tool.

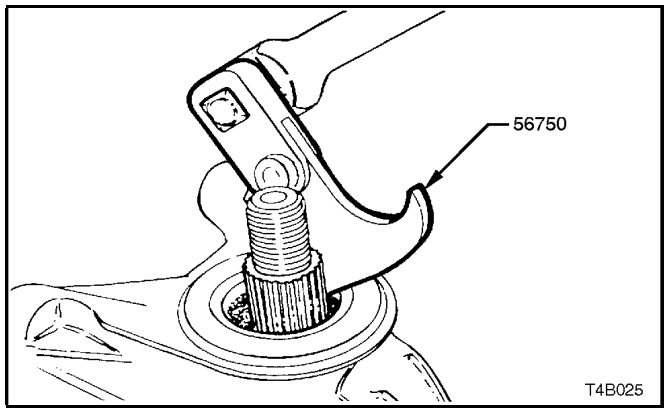


Figure 4B-115

14. Remove pinion by tapping on front end with a soft faced hammer and withdrawing it through rear of carrier. Remove pinion front bearing from carrier bore. Remove and discard pinion bearing spacer.

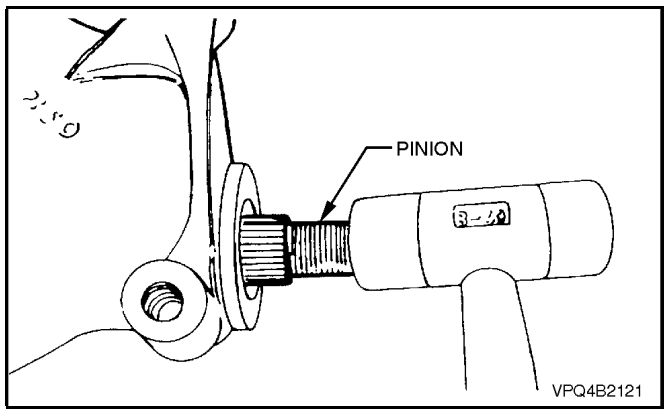


Figure 4B-116

15. If pinion bearings are to be replaced, remove bearing cups using Tool No. E9293. As shown in Figure 4B-123, Tool No. E9271 is used for installing new bearing cups.

    Figures 4B-122 and 4B-123 illustrate both the removal and installation of bearing cups.

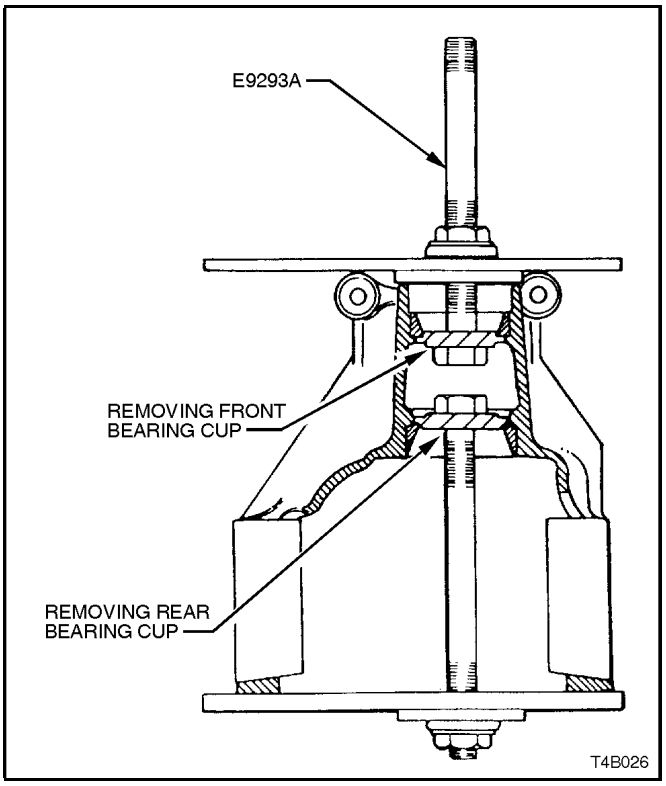


Figure 4B-117

NOTE:

It is essential to only replace one bearing cup at a time, as Tool No. E9271 relies on the remaining bearing cup as a guide.

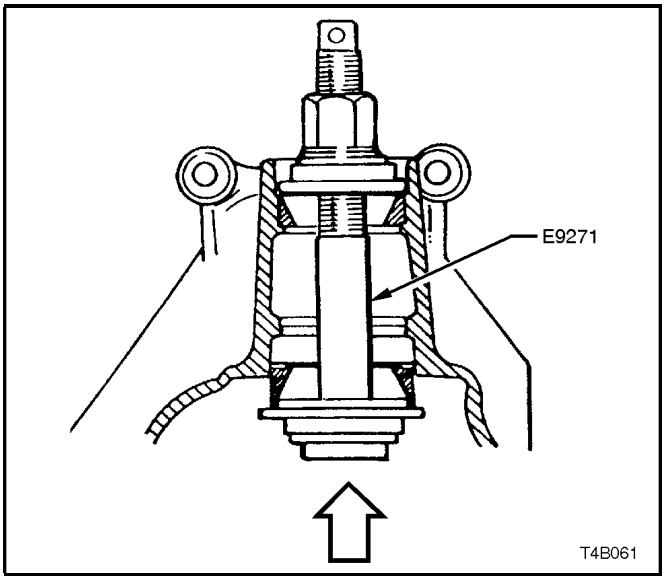


Figure 4B-118

16. To remove rear bearing from pinion, remove legs from the ring of Tool No. E1673MT.

    Place ring on suitable press plates. Install pinion and adaptors E1673A15 into ring. Press pinion from bearing.

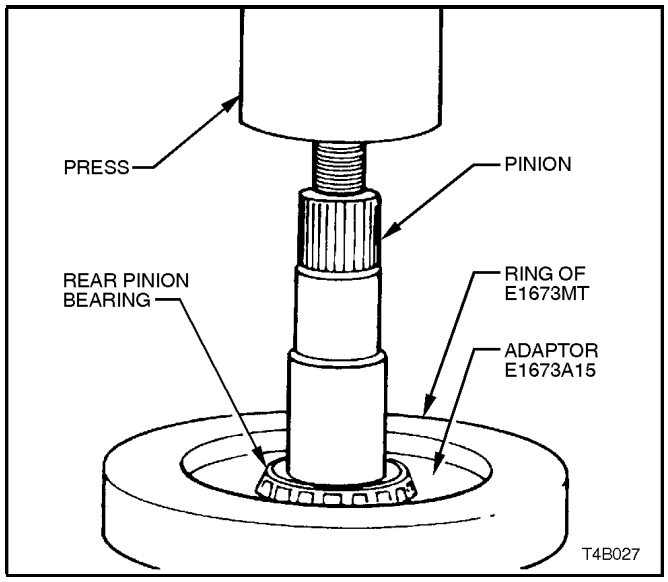


Figure 4B-119

Differential Case

The following procedures describe the standard type differential case assembly. For Limited Slip Differential case assembly, refer to **3.4 LIMITED SLIP DIFFERENTIAL** in this Section.

NOTE:

The differential for V8 and V6 supercharged engined vehicles is unique and parts are not interchangeable with the V6 engined unit. The general overhaul procedures however, remain the same for both types. The unique components for the V8 and V6 supercharged, are; differential case, differential pinions, side gears and thrust block.

1. Before disassembling differential case, inspect differential side bearings for any signs of damage.

NOTE:

Both side bearings and their cups are matched pairs. If either bearing is to be replaced, its matching cup must also be replaced.

2. If necessary, use Tool No. E1673MT, adaptors E1673N15 and stepped plug E1673B16 to remove side bearings from differential case, as shown.

   Discard side bearings once they are removed.

   To remove side bearing cups, refer to **3.3 REMOVED FINAL DRIVE ASSEMBLY - DISASSEMBLE** step 10.

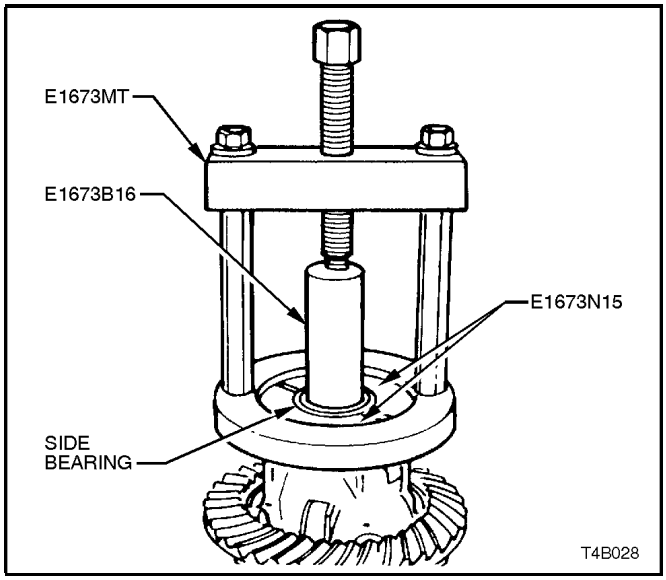


Figure 4B-120

3. Grip the differential case in a vice with soft jaws.
4. Remove ring gear attaching bolts.

NOTE:

Ring gear attaching bolts use a left hand thread and are identified by an 'L' on the bolt head.

5. Remove differential case from vice.

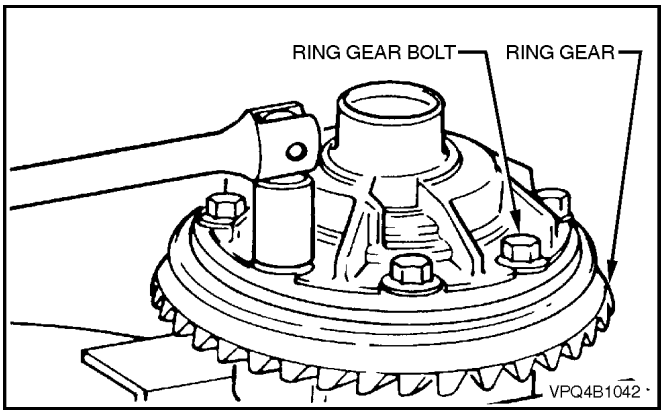


Figure 4B-121

6. Using a soft faced hammer, remove ring gear from differential case by hitting down on ring gear. Support ring gear during this operation so that it does not strike bench top as it comes free of case.

NOTE:

Do not use a screwdriver to pry between ring gear and case.

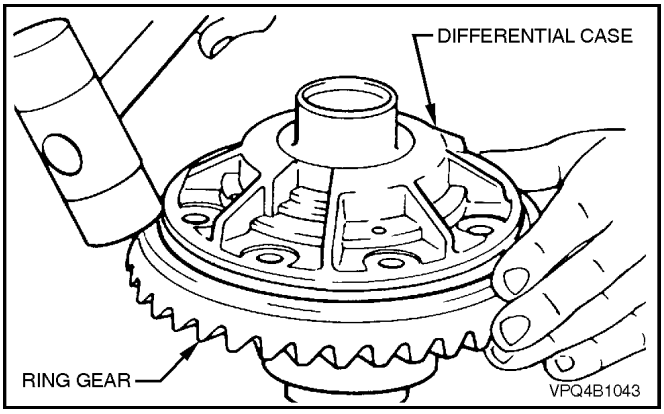


Figure 4B-122

7. Drive out differential pinion gear long shaft and short shafts retaining pins from differential case, using a suitable size pin punch and hammer.

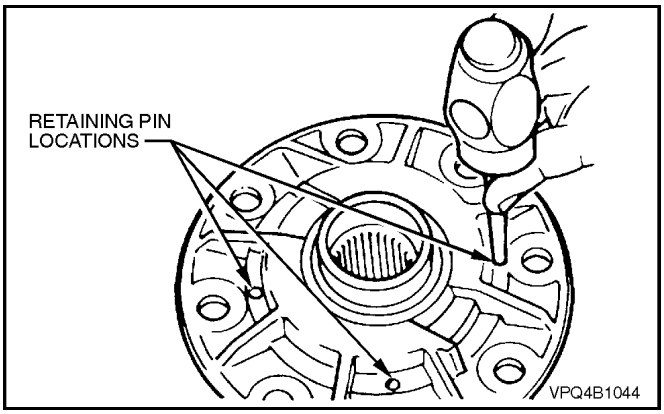


Figure 4B-123

8. Re-mount the differential case in vice with soft jaws. Using a brass drift and hammer, drive out pinion long shaft from differential case.

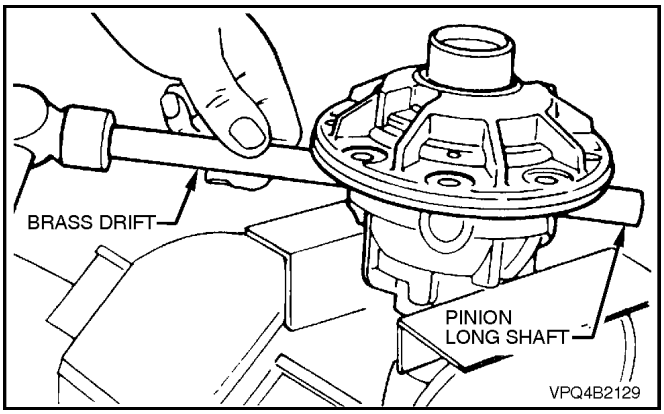


Figure 4B-124

9. Remove differential case from vice. Using a brass drift and hammer, separate two differential case halves by driving against thrust block.

NOTE:

Do not use a screwdriver to prise the differential case halves apart.

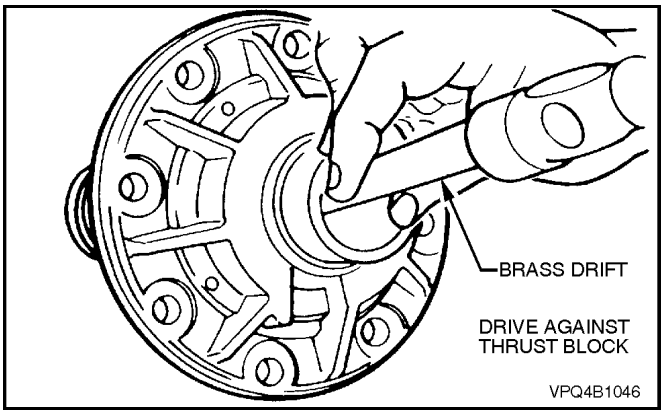


Figure 4B-125

10. Using a brass drift and hammer, drive out pinion gear short shafts from differential case.

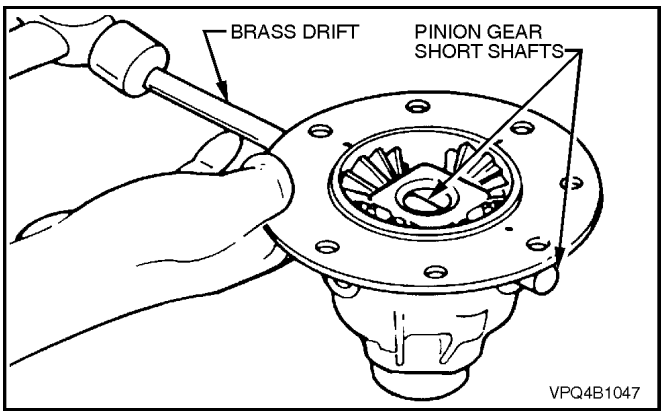


Figure 4B-126

11. Lift out pinion gears, thrust washers and thrust block from differential case.

    Remove differential side gears and thrust washers from differential case halves.

NOTE 1:

When removing the thrust block from a V8 or V6 supercharged differential, note that the pinion shafts are angled at 96° and not 90° as is usual.

NOTE 2:

Keep the gears with their respective thrust washers in pairs so they can be reinstalled in their original position.

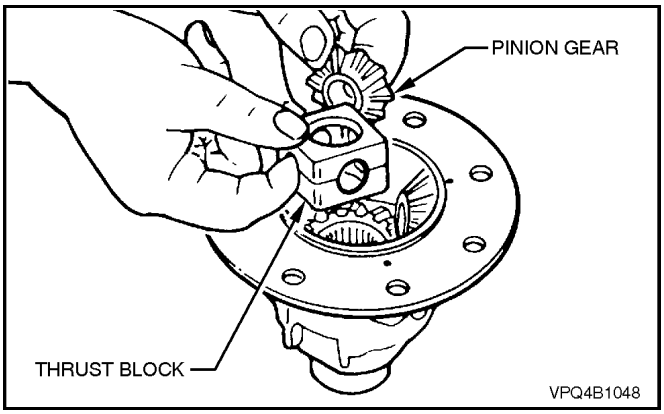


Figure 4B-127

INSPECT

All components should be thoroughly cleaned and dried, then inspected.

Differential Case

Check case for general soundness and pay particular attention to the following points;

1. If differential case side bearings have been removed, check case journals for damage and that bearing seating surfaces are free from dirt and burrs.
2. The ring gear spigot and mounting face should be clean and free from dirt and burrs.
3. The mating surfaces for differential case halves should be clean and free from burrs.
4. The thrust surfaces for differential side gears and pinions should be examined for excessive wear.
5. The differential side gear journal bores should be clean and free from scoring.

6. The case bores for differential pinion gear shafts should be checked for ovality.

Differential Side Gears and Pinion Gears

1. Examine all gear teeth for cracks and hard contact marks.
2. The differential side gear splines should be checked for excessive wear. Wear on splines can contribute to excessive driveline backlash.
3. Check differential side gear journals and back faces for scoring.
4. Check fit of differential side gears in differential case cap and cover. Wear on side gear hubs or in the case bores can cause a "clunking" noise in rear axle assembly when vehicle is driven at low speeds.
5. Inspect differential pinion bores and thrust surfaces for scoring. Also check differential pinion gear shafts are not bent and that surfaces where pinions run are not worn or scored.
6. Check thrust washers. They should be free from cracks, nicks and burrs. Excessive wear of thrust washers or pinion gear thrust surfaces can also contribute to excessive driveline backlash.
7. Check thrust block pinion gear shaft bores for ovality.

Ring Gear and Pinion

1. Inspect gear teeth for scoring or damage. Scoring of gear teeth is usually caused by excessive shock loading, use of incorrect lubricant or insufficient "run in" before towing a heavy load. (Refer VT Series Owner's Handbook). Scored gears must be replaced.
2. The ring gear bore and back face should be clean and free from burrs.
3. The rear bearing seating surface on the pinion should be clean and free from burrs.
4. Inspect pinion splines and flange splines for evidence of wear.
5. Inspect thread and bearing journals of pinion for damage.
6. If on reassembly, a new gear set is to be installed, ensure that the same matching number appears on both the pinion and ring gear, as shown.
7. On ring gear bolts, clean Durlok serrations under bolt flange.

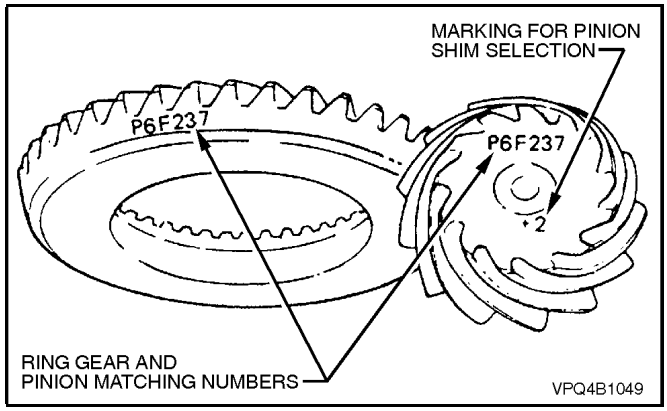


Figure 4B-128

Bearings

1. Bearing cups should have an even wear pattern and must be free from flaking or pitting. Ensure that seating surfaces are clean and free from burrs or raised metal.
2. The bearing assemblies should feel smooth when turned in their cups.
3. The assembly should be free from loose particles.
4. No cracks should be present in roller cages, and bores should show no evidence of flaking or pitting.

   Refer to **4.4 FINAL DRIVE BEARING DIAGNOSIS** in this Section, for identification of bearing failures.

Differential Carrier

1. Check casting all over for general soundness.
2. Examine oil passages and ensure they are free from obstructions and loose particles.
3. The bore for the pinion oil seal should be free from burrs.
4. Inspect rear cover face and bolt holes for damage.
5. Check rear cover seating surface for scoring or other damage.

Screw Adjusters and Inner Axle Shafts

1. Inspect inner axle shaft needle bearings inside screw adjusters for wear or damage.
2. If inner axle shaft needle bearings are to be replaced, reinstall screw adjusters into differential carrier and remove inner axle shaft seals, as detailed in steps 6 and 7 of **3.3 REMOVED FINAL DRIVE ASSEMBLY - DISASSEMBLE.**

   Remove screw adjusters from carrier and position each onto a block of wood. Then, using a 1.25 inch socket and bar or a 73 mm diameter tube, press the bearing from each of the screw adjusters.
3. Remove and discard O-rings from screw adjusters.
4. Examine adjuster seal bores for burrs, nicks or other damage. Examine oil passages and ensure they are free from obstructions and loose particles.

   Adjuster thread and bearing bores should be clean and free from burrs or other damage.

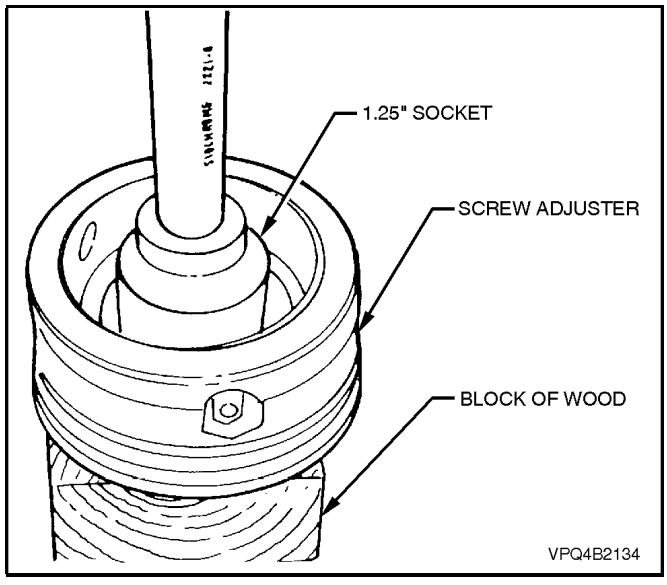


Figure 4B-129

5. To install new screw adjuster needle bearings, place screw adjuster onto Tool No. AU409 and press needle bearing into adjuster using Tool No. AU411. Repeat procedure for opposite screw adjuster.

NOTE 1:

Side bearing cups must be installed into screw adjusters before installing needle bearings. This is to ensure that needle bearings are located correctly into screw adjuster bores.

NOTE 2:

To install side bearing cups, refer to step 1, Differential Case Side Bearing Pre-Load Setting in this Section.

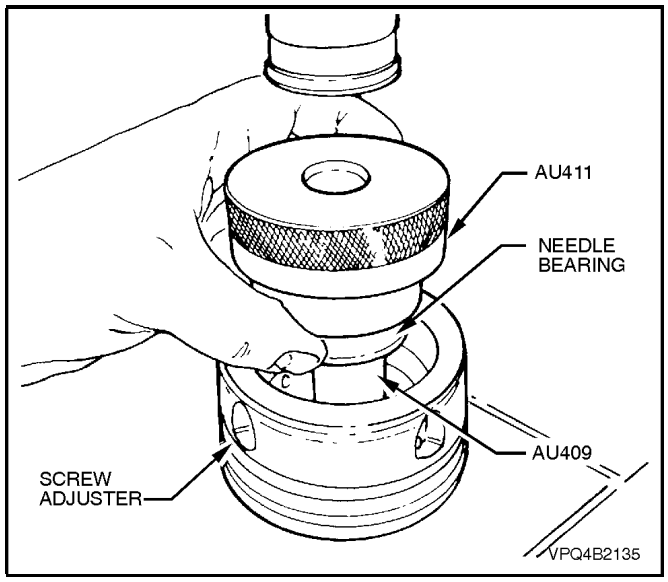


Figure 4B-130

6. Examine seal surface of inner axle shafts and carefully remove any nicks or burrs.

   Should this surface be irreparable on either axle shaft, a new axle shaft must be fitted.

7. Check spring clip in end of inner axle shafts to ensure that they are not damaged and move freely in grooves. Replace spring clips if necessary, by expanding ends of each clip and removing from inner axle shafts. Expand ends of new clips sufficiently to allow installation into axle shaft grooves.

Rear Cover

1. Clean sealant from rear cover sealing surface.
2. Inspect rear cover for cracks or damaged sealing surface.
3. Ensure breather passage is clean and free of obstructions.

REASSEMBLE

Differential Case

1. Lubricate all differential gears, bearings, thrust washers and differential pinion gear shafts with the recommended rear axle lubricant before assembly.
2. Position differential side gears with their thrust washers into differential case halves.

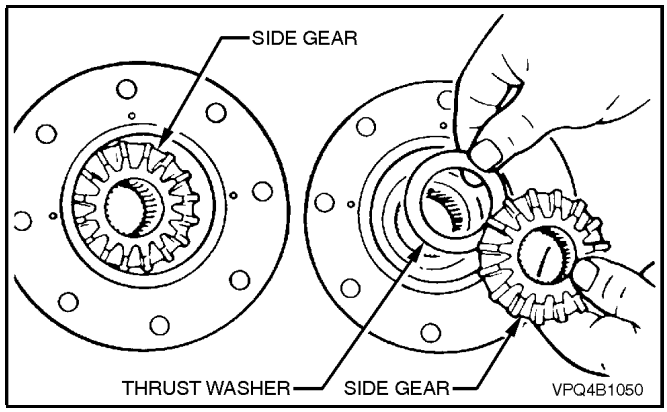


Figure 4B-131

3. Using a soft faced hammer, install pinion gear short shafts and long shaft into differential case, just enough to allow a pinion gear thrust washer to sit on the end of each shaft.

NOTE:

Ensure that the retaining pin holes in the differential case and pinion gear shafts are in alignment and with the chamfered edge of the holes in each shaft facing up.

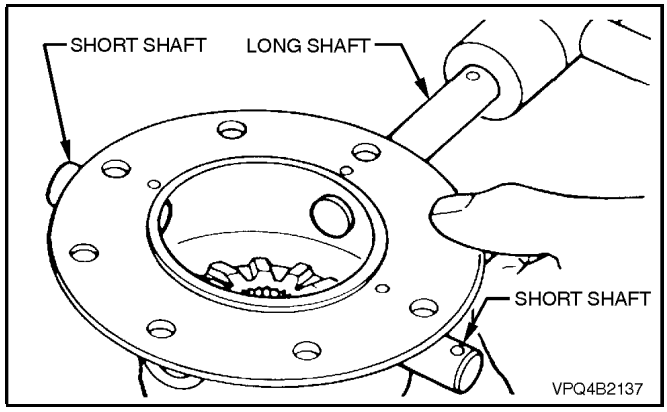


Figure 4B-132

4. Install one of the pinion gear thrust washers over inside end of one of the short shafts.
5. Position appropriate pinion gear next to thrust washer and knock short shaft in until it comes through centre of the gear.
6. Carry out steps 4 and 5 for second pinion gear short shaft.

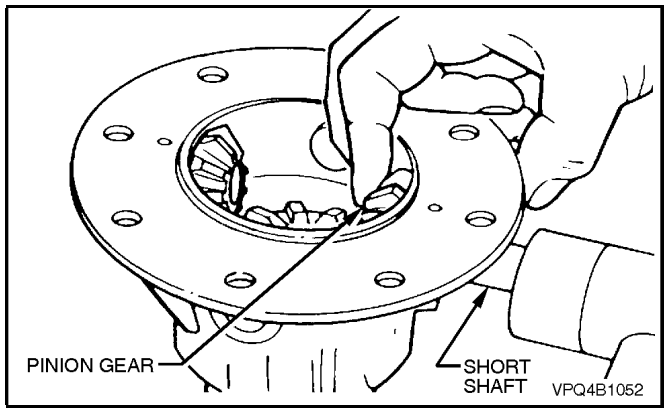


Figure 4B-133

7. Install thrust block between two installed pinion gears. Knock the two pinion gear short shafts into position, ensuring that retaining pin holes in the shafts line up with holes in differential case.

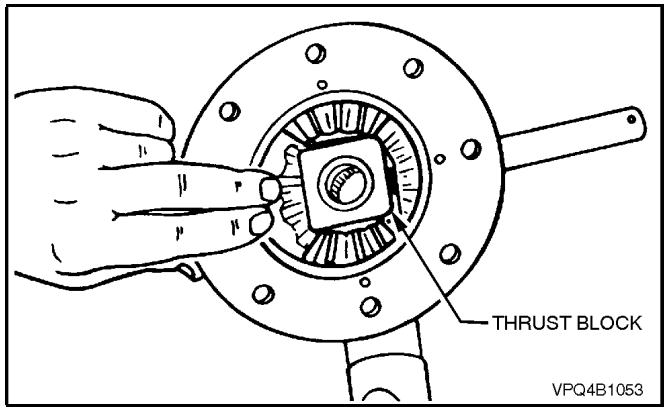


Figure 4B-134

8. Install pinion gear thrust washer and gear to long shaft. Knock cross shaft through gear and thrust block.

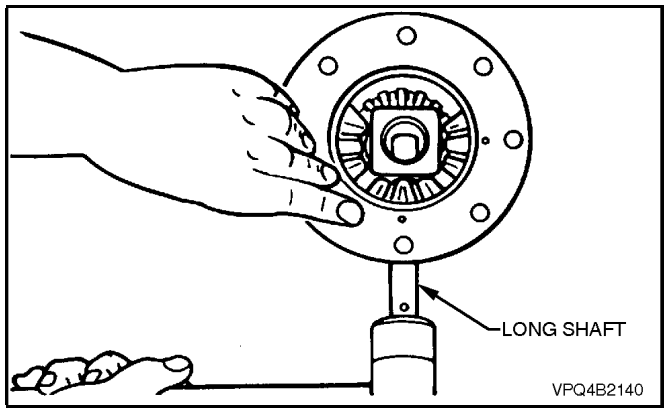


Figure 4B-135

9. Install remaining pinion gear and thrust washer. Knock long shaft through pinion gear, ensuring that thrust washer aligns with cross shaft. Knock cross shaft into differential case until retaining pin hole in shaft aligns with hole in differential case.

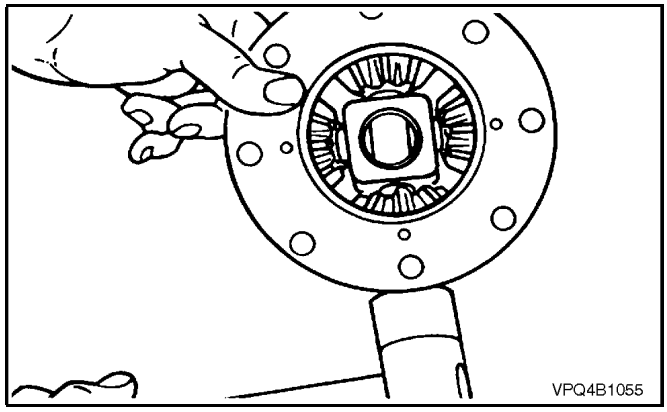


Figure 4B-136

10. Install pinion gear long shaft and short shaft retaining pins. Ensure that ends of retaining pins protrude 6 mm from differential case cap to cover mating surface. This is necessary to provide a positive location for the differential case cover to case cap.

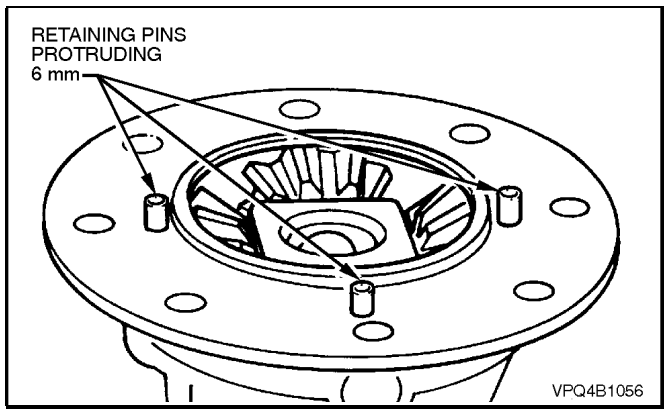


Figure 4B-137

11. Holding differential side gear in position with a finger through differential case cover bore as shown, push the two differential case halves together, locating on the protruding retaining pins.

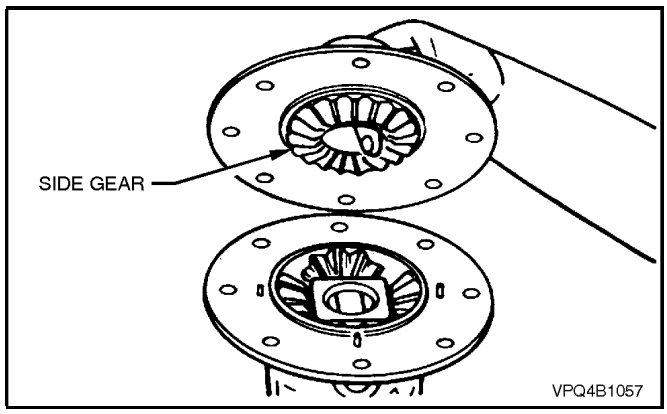


Figure 4B-138

12. Place ring gear into position on differential case cap and install ring gear attaching bolts.

NOTE 1:

For ease of assembly, it may be necessary to heat the ring gear on a hot plate until it is hot to the hand, prior to installing onto the differential case cap.

NOTE 2:

On no account must a flame be used to heat the ring gear.

NOTE 3:

Use left hand threaded guide pins to pilot the ring gear over the differential case spigot.

13. Install and gradually tighten NEW ring gear attaching bolts evenly, until gear face is flush with differential case spigot. Tighten all bolts to the correct torque specification.

DIFFERENTIAL RING GEAR BOLTS TORQUE SPECIFICATION	125 - 150 Nm

NOTE:

Ring gear attaching bolts use a left hand thread and are identified by an 'L' on the bolt head.

14. If installing new side bearings, use Tool No. E9277 to press on side bearings to differential case journals.

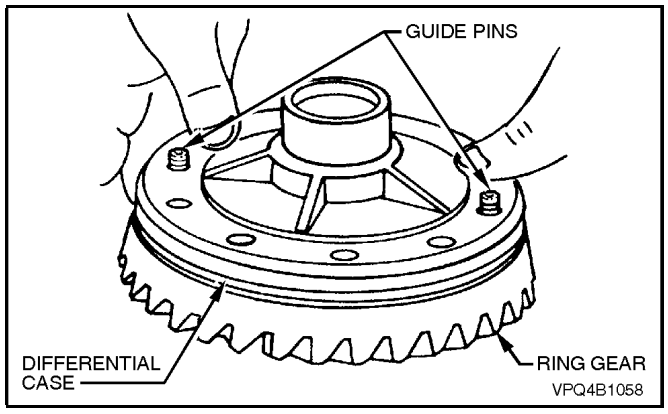


Figure 4B-139

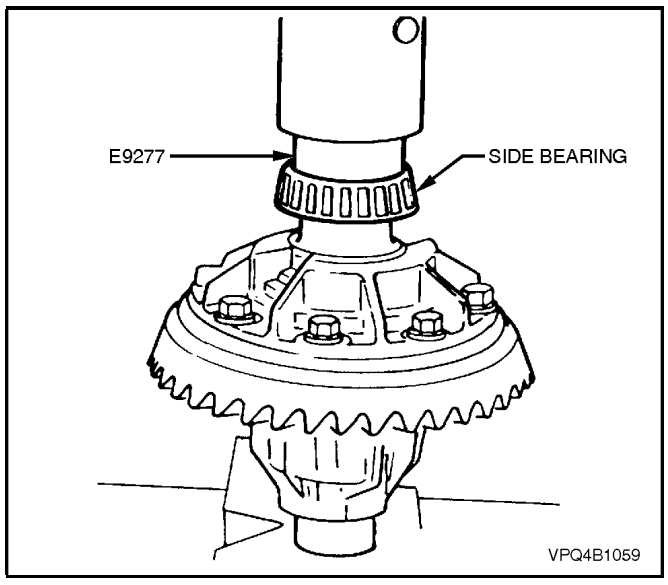


Figure 4B-140

Differential Case Side Bearing Pre-Load Setting

1. If removed during disassembly, press new bearing cups into screw adjusters firmly to the shoulder by positioning screw adjuster onto Tool No. AU409 and using Tool No. AU411 to press new cup into place. Repeat procedure for remaining screw adjuster.

NOTE 1:

Ensure that bearing side and cup matching is maintained.

NOTE 2:

The screw adjuster used on the V8 and V6 supercharged engine final drives is 1.9 mm deeper than the one used for V6. The deeper screw adjuster can be identified by a groove on the inner edge.

This depth change is necessary to accommodate the greater side bearing span used with the V8 and V6 supercharged axle assemblies.

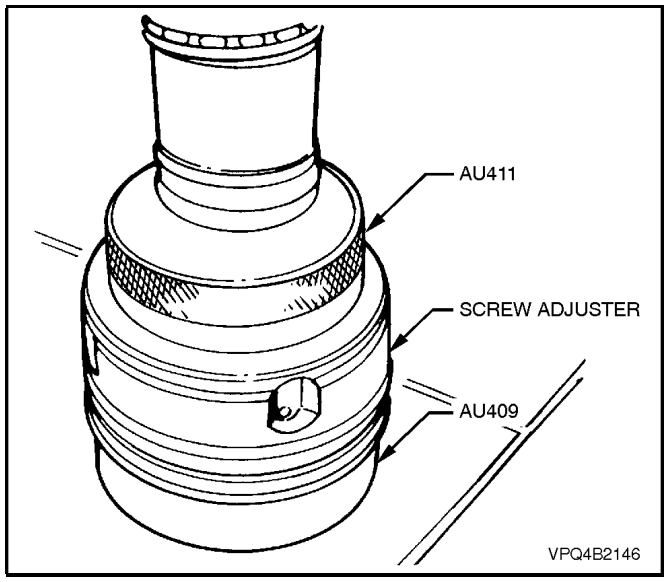


Figure 4B-141

2. Install new O-rings to screw adjusters and apply a lubricant such as rubber grease to each.
3. Holding differential case in carrier, fit screw adjusters to both sides of carrier. Continue tightening adjusters until case assembly is supported by side bearings.
4. Rotate differential case several times to ensure that side bearings are correctly seated.
5. Wrap a piece of string around differential case flange and check side bearing pre-load by pulling on end of string with a spring balance. Spring balance reading must be within specification.

   Tighten or loosen one of the screw adjusters until the correct pre-load is obtained.

SIDE BEARING PRE-LOAD SPECIFICATION	15 - 35 N (New Bearings) 8 - 18 N (Used Bearings)

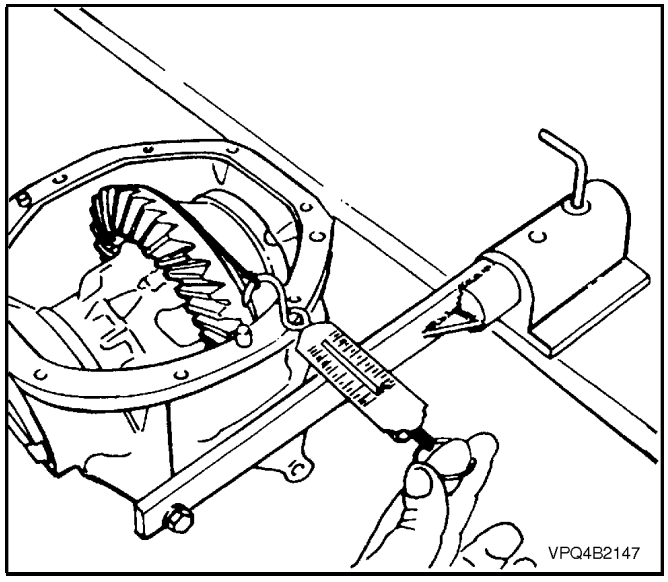


Figure 4B-142

6. Using Tool No. AU407 and a torque wrench, measure tightening torque of each screw adjuster (usually within the range of 50-60 Nm) and record.

   These torque readings will be used to set bearing pre-load on final assembly.

7. Using Tool No. AU407, loosen and remove screw adjusters, remove differential case assembly.

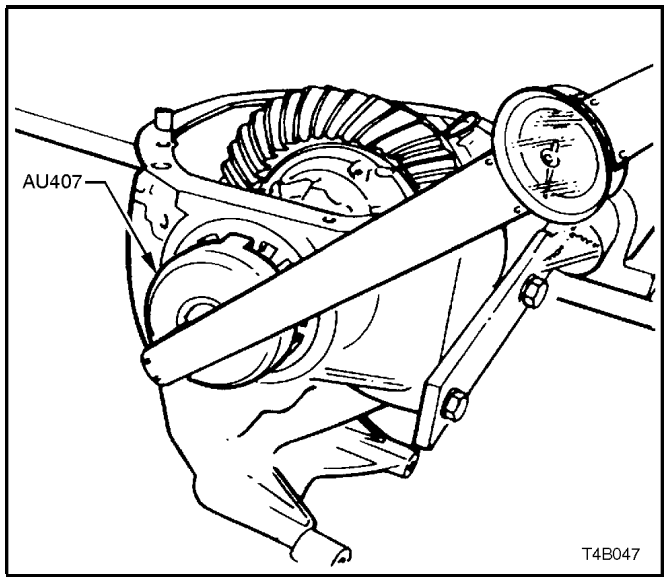


Figure 4B-143

Hypoid Pinion Positioning Shim Selection

The pinion positioning shim is located between pinion rear bearing cup and carrier housing.

If the ring gear and pinion or the pinion rear bearing assembly are replaced, pinion depth must be rechecked with pinion setting gauge, Tool No. E9300A (previously released as E9300) and dummy arbor Tool No. AU408.

The gauge and arbor provide a nominal or 'zero' pinion as a gauging reference.

NOTE 1:

If a new gear set is to be installed, ensure that the same matching number appears on both the pinion and the ring gear.

NOTE 2:

The V6 and V8/V6 supercharged pinions have different mounting distances (94.49 and 102.50 mm respectively). Also, as the V6 and V8/V6 supercharged assemblies have different rear pinion bearings, gear set sizes, differential case assemblies and screw adjusters, none of these parts are to be mixed.

1. Inspect pinion bearing cups/cones for nicks and burrs. Replace if damaged (refer to Step 16 of **3.3 REMOVED FINAL DRIVE ASSEMBLY - DISASSEMBLE**).
2. Lubricate pinion front and rear bearings with the recommended differential carrier lubricant. Do not use engine or other oils, as a misleading rotating torque can be obtained.

V6 Vehicles with the 3.08:1 Ratio Axle Assembly:

3a. Install the rear bearing onto dummy pinion after first installing the distance spacer Tool No. E9300-1 (part of Tool No. E9300A).

NOTE:

The spacer is not required when using E9300.

V8/V6 Supercharged Vehicles with the 3.07:1 Ratio Axle Assembly:

3b. Install the rear pinion bearing onto the dummy pinion, supplied as part of E9300A.

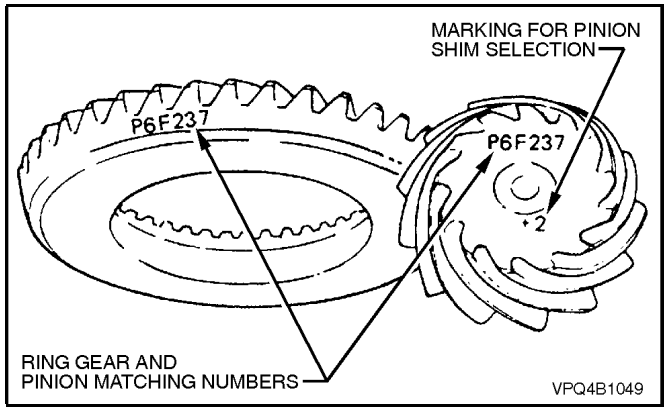


Figure 4B-144

4. Install dummy pinion and rear bearing into carrier housing. Fit front bearing to dummy pinion and then install dummy pinion thrust collar and nut.

NOTE:

Ensure that the rear pinion bearing that will be used for final reassembly of the pinion is used on the dummy pinion.

5. Tighten nut on end of dummy pinion until specified rotational torque is obtained.

DUMMY PINION, ROTATIONAL TORQUE SPECIFICATION	1.4 - 2.0 Nm (New Bearings) 0.7 - 1.0 Nm (Used Bearings)

6. Rotate dummy pinion back and forth during tightening to ensure that bearings settle in their cups.

NOTE 1:

Pinion bearing pre-load is very important because it retains pinion in its correct relationship to ring gear.

NOTE 2:

Bearings that are installed with insufficient or no pre-load, will, after a comparatively short period of running, develop end play, causing noisy operation on overrun and could be responsible for scuffing of ring gear and pinion teeth.

NOTE 3:

Bearings that have too much pre-load, may become pitted or flaked and result in ultimate failure.

NOTE 4:

It is therefore essential to ensure that bearings are pre-loaded to specified torque specification.

NOTE 5:

Rotate dummy pinion back and forth during tightening to ensure bearings settle.

7. Position arbor Tool No. AU408 in carrier assembly and install screw adjusters with side bearing cups. Adjust screw adjusters to lightly clamp arbor, using Tool No. AU407.

NOTE:

Ensure that arbor is free of burrs that may damage bearing cups.

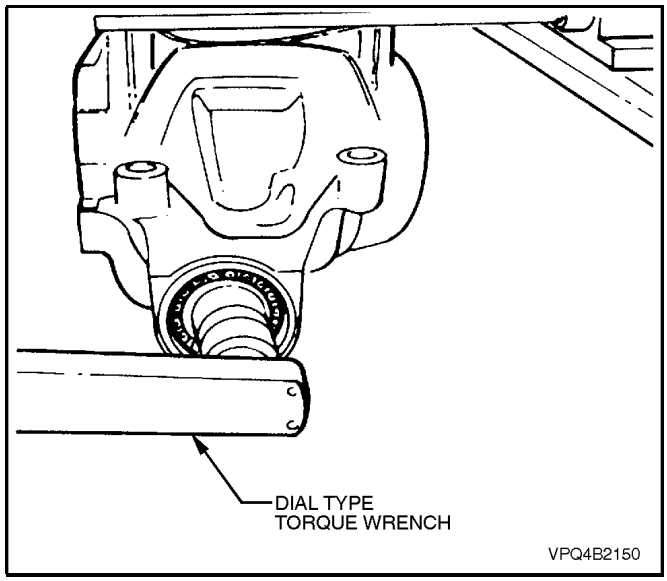


Figure 4B-145

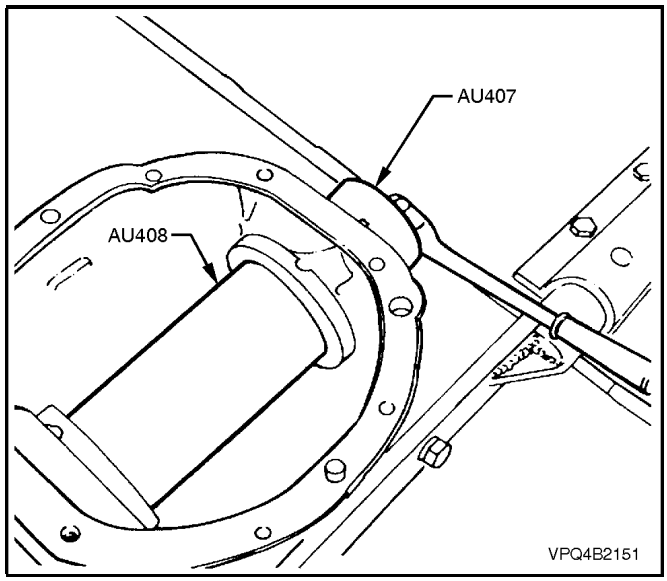


Figure 4B-146

8. Check clearance between arbor and head of dummy pinion with a feeler gauge. Record this dimension.

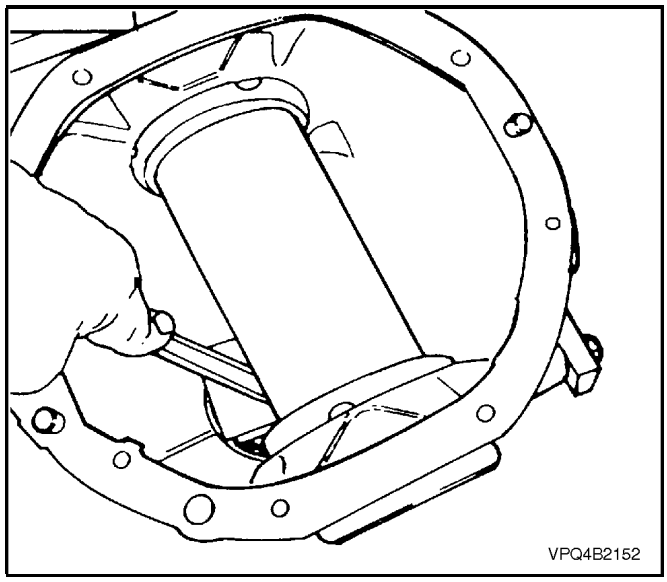


Figure 4B-147

9. On the end of the pinion, a drive pinion installation marking figure is etched. A zero marking ('0') indicates that shim size equal to the dimension measured in Step 7 is the correct size for this carrier/pinion combination.

   A positive marking, e.g. +3, means that a thickness measurement equivalent to this numerical marking must be ***subtracted*** from shim size measured in Step 7, refer to the following chart.

   A negative marking, e.g. -3, means that a thickness measurement equivalent to this numerical marking must be ***added*** to the shim size measured in Step 7. Refer to the following chart for specific details.

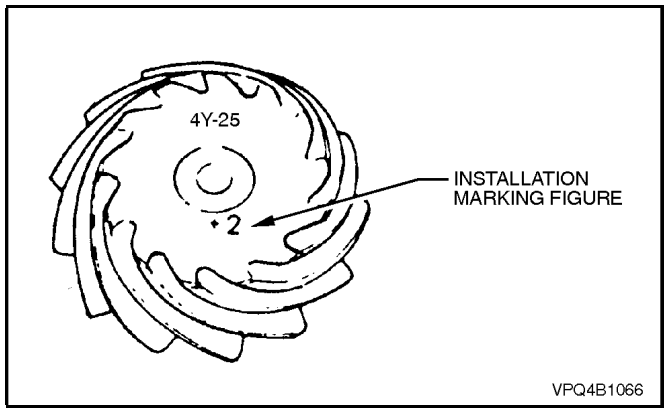


Figure 4B-148

PINION MARKING	SHIM THICKNESS REQUIRED
–4	Add 0.10 mm to measurement of step 7.
–3	Add 0.075 mm to measurement of step 7.
–2	Add 0.050 mm to measurement of step 7.
–1	Add 0.025 mm to measurement of step 7.
0	Size as measured in step 7.
+1	Subtract 0.025 mm from measurement of step 7.
+2	Subtract 0.050 mm from measurement of step 7.
+3	Subtract 0.075 mm from measurement of step 7.
+4	Subtract 0.10 mm from measurement of step 7.

NOTE:

Pinion positioning shims are serviced in thicknesses of 0.2 - to 0.75 mm in 0.25 mm increments. They are also dimensioned differently, depending on the pinion bearing used.

10. Remove dummy pinion and arbor from carrier assembly.

Pinion Installation

1. Select pinion positioning shim stack as determined in the Operation, Hypoid Pinion Positioning Shim Selection, in this Section.
2. Remove pinion rear bearing cup, using Tool No. E9293.

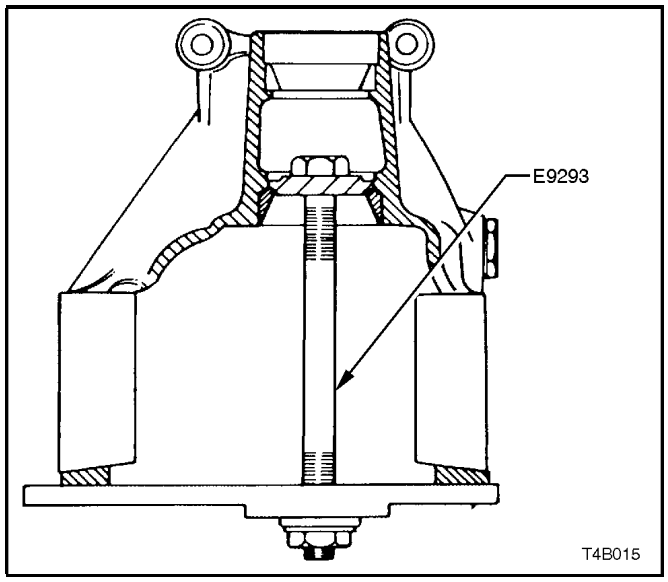


Figure 4B-149

3. Install pinion positioning shim/s into pinion rear bearing cup bore.

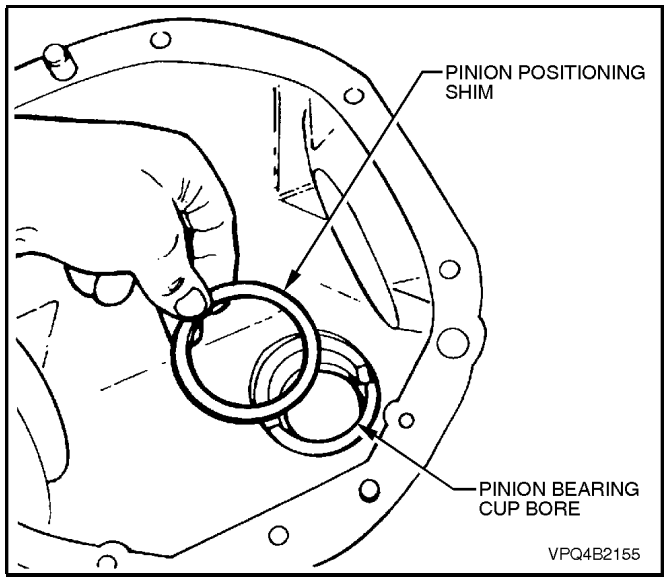


Figure 4B-150

4. Reinstall pinion rear bearing cup using Tool No. E9271. Ensure that cup is seated squarely in bore.

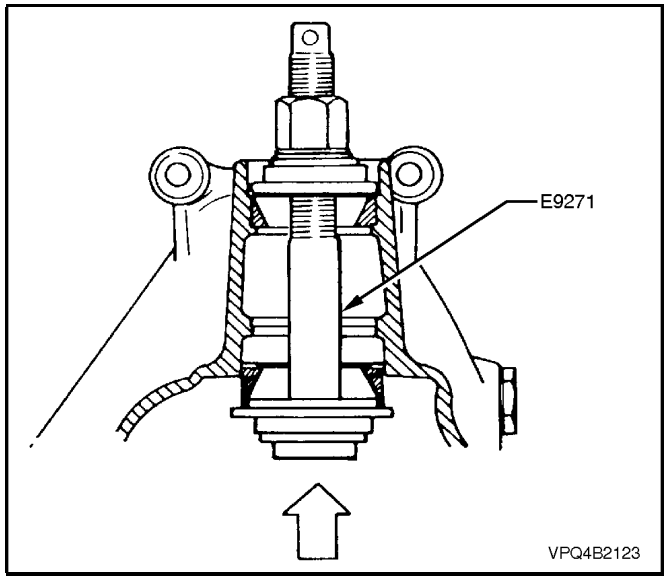


Figure 4B-151

5. Press rear bearing inner race against the shoulder of the pinion, using Tool No. E3C10AER.

NOTE 1:

To avoid possible damage to the pinion gear teeth when pressing the bearing on, ensure that the press plates are perfectly flat, free of burrs and foreign matter prior to installing the rear bearing.

NOTE 2:

Locate bearing inner race squarely on the pinion and press only on inner race surface.

NOTE 3:

Only lubricate the bearing with the recommended differential carrier lubricant.

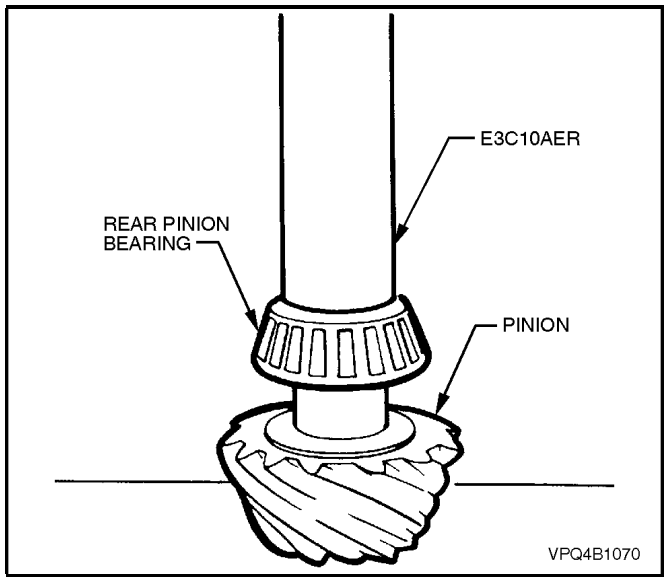


Figure 4B-152

6. Place the pinion in the carrier.
7. Lubricate pinion front bearing with the recommended differential carrier lubricant and assemble the collapsible pinion bearing spacer and front bearing onto pinion, while supporting pinion head.
8. Install pinion flange and the original pinion flange retaining nut.
9. Using Tool No. J8614-10 to hold pinion flange, tighten retaining nut until pinion front bearing starts on pinion shaft.
10. Remove pinion flange retaining nut and, using the three components of Tool No. J8614-01, assembled as shown, remove pinion flange.

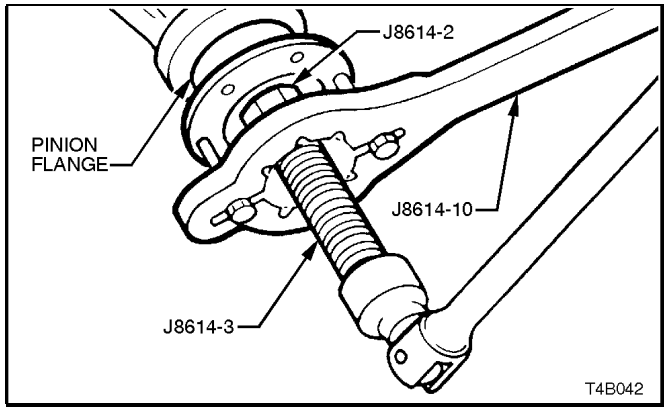


Figure 4B-153

11. Lubricate pinion oil seal lips with differential carrier lubricant. Lightly coat differential carrier seal bore with differential carrier lubricant to assist in seal installation. Install oil seal into carrier bore using Tool No. 17-010A. Seal fits flush to 0.25 mm below carrier housing surface.

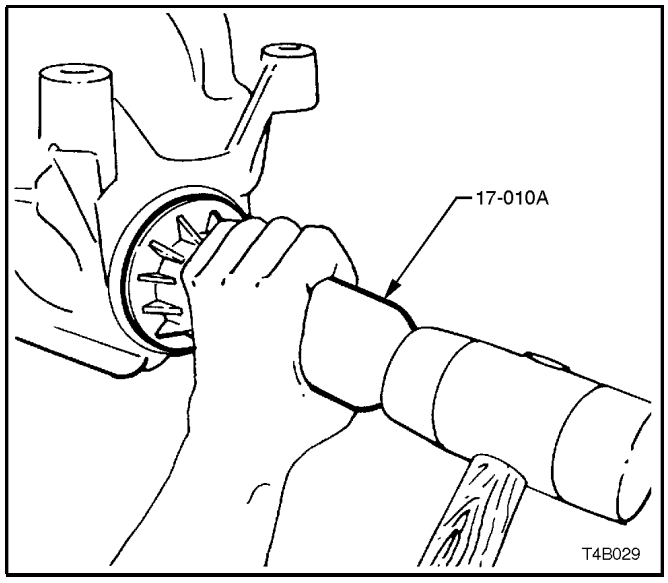


Figure 4B-154

12. Reinstall pinion flange and fit a NEW retaining nut. Hold pinion flange using Tool No. J8614-10 and gradually tighten retaining nut while rotating pinion in both directions to seat bearings.
13. Check bearing pre-load frequently by removing flange holding tool and installing a pulley to pinion flange. Refer to **7 SPECIAL TOOLS** at the end of this Section for pulley details.
14. Using a spring scale, measure rotational torque.
15. Tighten nut until specified torque is achieved.

PINION BEARING PRE-LOAD SPECIFICATION	1.4 - 2.4 Nm (New Bearings) 0.7 - 1.2 Nm (Used Bearings)

The torque figure is calculated by multiplying the radius of the pulley by the spring balance reading.

EXAMPLE:

If the pulley diameter is 152 mm, the radius is 76 mm which equals 0.076 m. The spring balance reading is 25 N. Therefore, the pre-load equals 0.076 m x 25 N = 1.9 Nm.

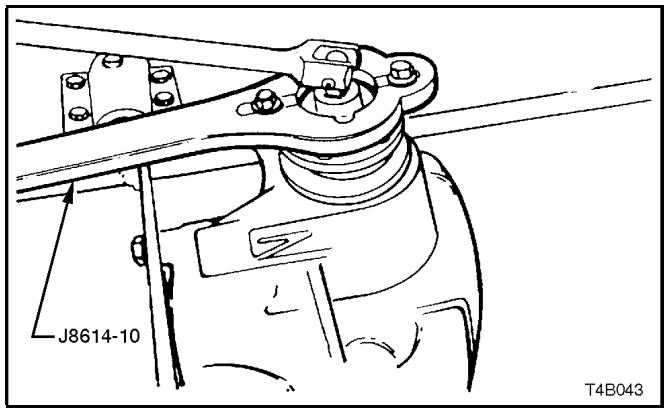


Figure 4B-155

CAUTION:

Should the retaining nut be overtightened and pre-load exceeded, it will be necessary to remove the pinion from the carrier and install a new collapsible spacer. Under no circumstances must the retaining nut be backed off to decrease the pre-load reading.

Differential Backlash Setting

1. Check threads of screw adjusters and ensure that they are free of damage.
2. Holding differential case in carrier, with ring gear in mesh with pinion, fit screw adjusters and side bearing cup assemblies to both sides of carrier. Using Tool No. AU407, continue tightening adjusters until case assembly is supported by side bearings.
3. Rotate differential case several times, to ensure that side bearings are correctly seated.
4. Tighten screw adjusters to the torque setting recorded in step 6, 'Differential Case Side Bearing - Pre-load Setting', in this Section.

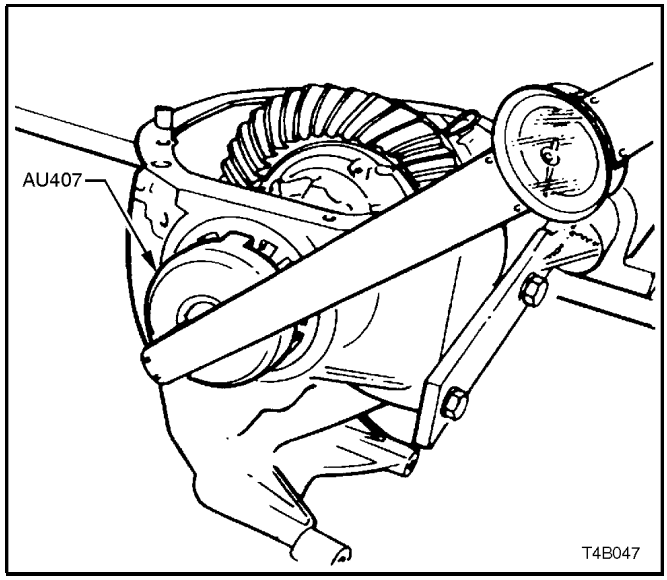


Figure 4B-156

5. Mount a dial indicator on carrier and check gear backlash between the ring gear and pinion. Backlash should be within the following specification.

   Check readings at four equally spaced positions around ring gear.

NOTE:

Position the dial indicator so that the indicator stylus is perpendicular to the ring gear tooth and in line with gear rotation.

BACKLASH SPECIFICATION	0.10 - 0.18 mm at the tightest point

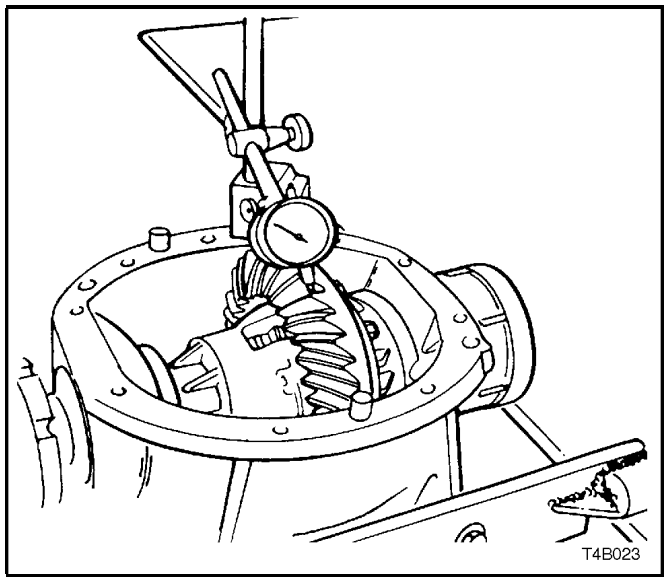


Figure 4B-157

6. If backlash is excessive or insufficient, adjust by slackening off screw adjuster on the side that the ring gear (differential case) needs to move towards. Re-tighten opposite screw adjuster and tighten both as per step 4.
7. With backlash correctly set, check gear contact pattern as detailed in the following instructions.

Ring Gear and Pinion Contact Pattern

1. Thoroughly clean ring gear and pinion teeth.
2. Paint ring gear teeth lightly and evenly with gear marking compound of a suitable consistency to produce a contact pattern.
3. Rotate pinion through several revolutions in both directions while lightly loading gear set.

   To load gear set, use a suitable bar to lever between ring gear outer diameter and differential carrier.

NOTE:

When rotating pinion, ensure that no metal swarf from contact with rotating ring gear and bar is allowed to enter gear teeth.

4. Inspect contact pattern produced by above procedure.
5. After a satisfactory contact pattern is produced, clean the ring gear and pinion gear teeth and pour a liberal quantity of the correct rear axle lubricant onto the gears and bearings. Turn the gear set to work the lubricant into all surfaces.

Tooth marking Nomenclature

The large end of the tooth is called the 'HEEL' and the small end the 'TOE', also the top of the tooth which is above the pitch line is called the 'FACE' while the area below the pitch line is called the 'FLANK'. The clearance between the pinion and ring gear teeth is referred to as 'BACKLASH'. Figure 4B-158 illustrates correct and incorrect contact patterns.

Contact pattern 'A' provides the ideal marking for quietness and long life. If the pattern shows a toe contact 'B', it indicates not enough backlash. To correct, move the ring gear away from the pinion by increasing the size of the shim on the pinion side of the ring gear and decreasing the ring gear side shim by an equal amount.

If the pattern shows a heel contact 'C', it indicates too much backlash. To correct, move the ring gear towards the pinion by increasing the size of the shim on the ring gear side and decreasing the size of the shim on the pinion side of the ring gear by an equal amount.

NOTE:

Make adjustment, increasing and decreasing shim thickness by 0.04 mm at a time. Check contact with gear marking compound and continue adjustment until tooth contact appears as in 'A'. Backlash must remain within specified limits.

To correct a pattern such as 'D', it will be necessary to install a thicker pinion positioning shim as described under HYPOID PINION POSITIONING SHIM SELECTION in this Section. A 0.025 mm thicker shim is recommended as a starting point. Continued changes may be necessary to obtain the correct setting. If the pattern shows a flank contact 'E', it indicates that the pinion is in too far. To correct, replace the pinion shim with a 0.025 mm thinner shim and recheck contact pattern.

In making pinion position adjustments, be sure backlash is correct before testing contact pattern. Moving the pinion 'IN' reduces backlash and moving pinion 'OUT' increases backlash.

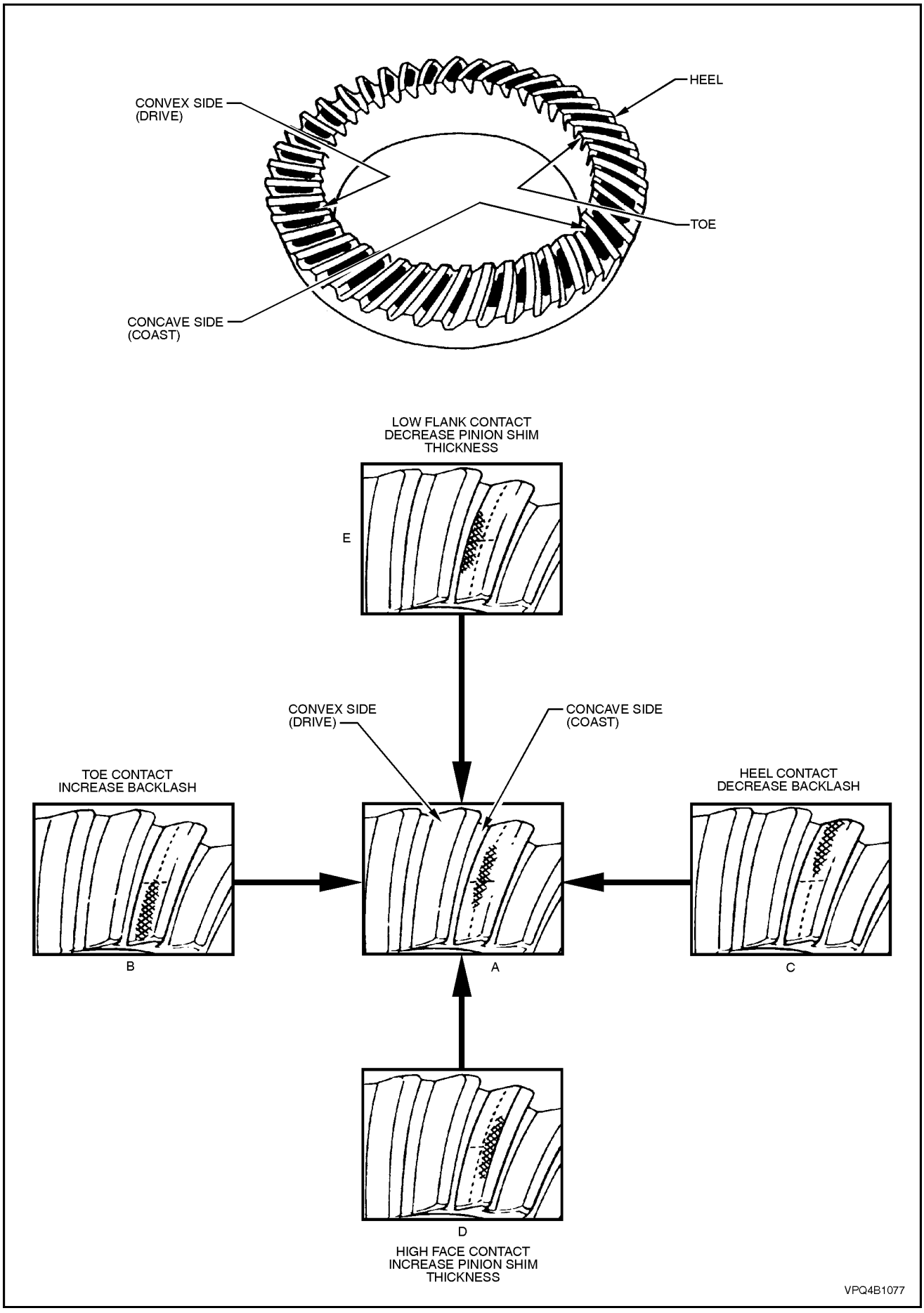


Figure 4B-158

IDEAL CONTACT

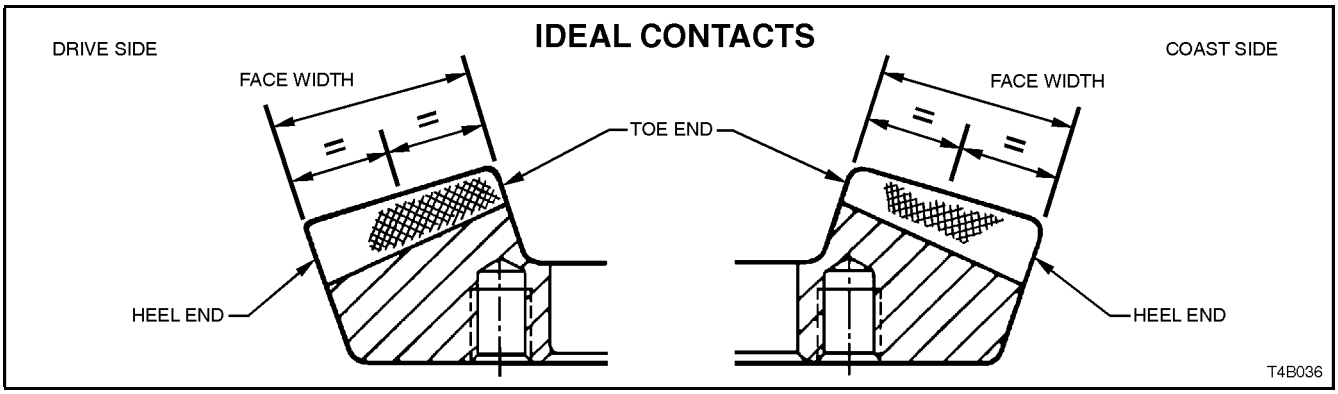


Figure 4B-159

Drive Side

A central toe contact marking, lengthwise in position and slightly low contact in the profile position.

Total length approximately 5/8 ths of the gear face width.

There should be clearance of about 1 mm between the contact marking and the toe and along the top face angle line.

Coast Side

A centrally located marking, lengthwise in position and slightly high in the profile position.

Total length approximately 5/8 ths of the gear face width.

There should be clearance between the contact and the face angle line of the gear.

ACCEPTABLE HEEL CONTACTS

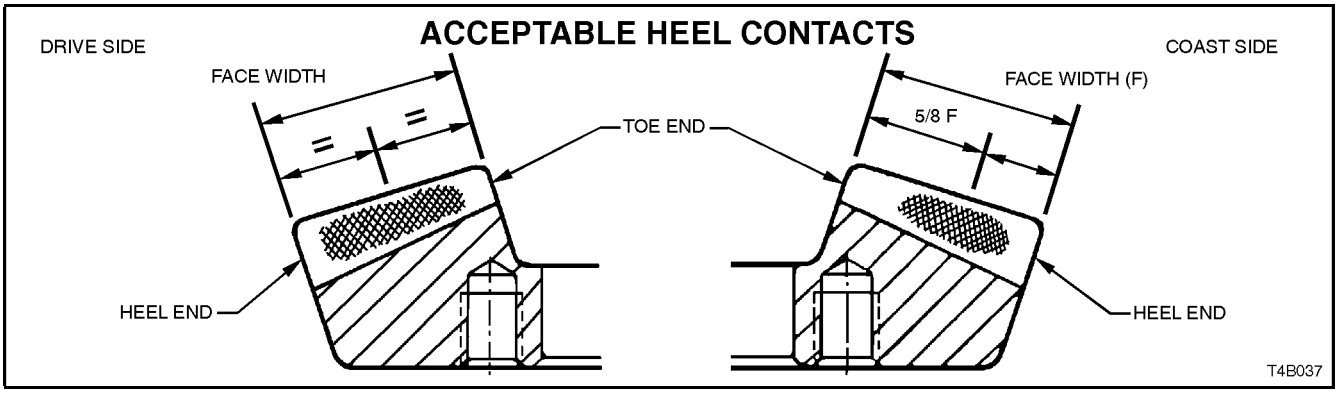


Figure 4B-160

Drive Side

A central face contact marking, lengthwise in position, is shown in Figure 4B-160. This represents the limit of acceptability of the contact marking towards the heel.

The marking should fade out at least 5 mm before the heel end.

A central profile marking position is shown and is acceptable, although low contact marking is preferred.

Coast Side

The centre of the contact marking is located at 5/8 ths of the face width from the toe and it does not approach the heel end by less than 5 mm.

A high contact marking, as shown in Figure 4B-160, is preferred for coast side contacts which tend to be toward the heel.

A central profile marking position is acceptable, providing the pinion face angle edge lines do not appear low on the gear.

ACCEPTABLE TOE CONTACTS

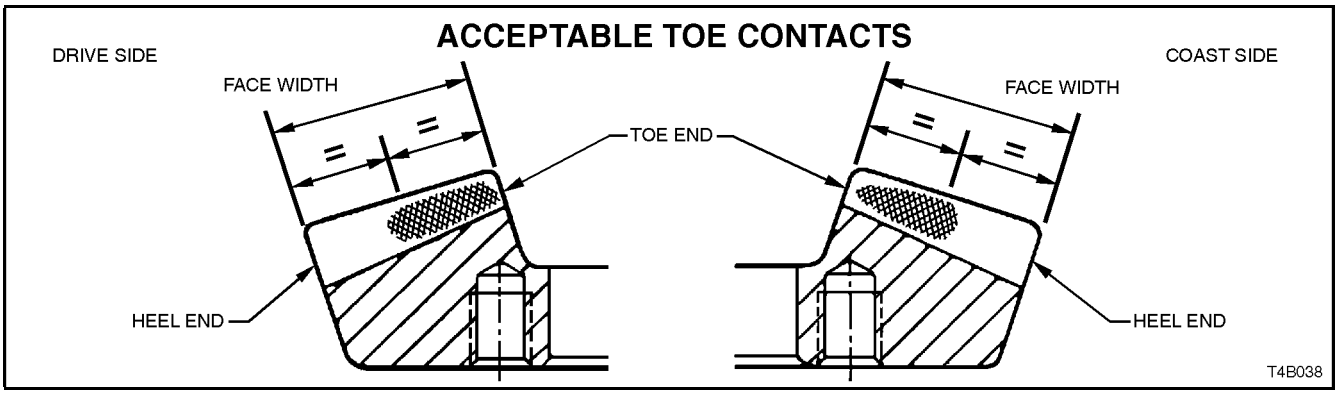


Figure 4B-161

Drive Side

The contact markings begin almost at the toe end face and extend in length by approximately half the face width.

A slightly low contact marking is shown in Figure 4B-161. This is preferable although a centrally located profile position is acceptable.

Coast Side

The contact marking being almost at the toe end face and may appear pointed as shown in Figure 4B-161. A square end is equally acceptable.

The total length of the contact marking is approximately 1/2 of the face width.

A high profile marking position is desirable, although a central profile is acceptable.

3.4 LIMITED SLIP DIFFERENTIAL

The overhaul procedures, ring gear and pinion positioning and tooth markings for the limited slip differential are the same as for the standard type of rear axle assembly, except for the servicing of the internal components of the limited slip differential assembly.

NOTE:

The differential for V8 and V6 supercharged engined vehicles is unique and parts are not interchangeable with the V6 engined unit. The general overhaul procedures however, remain the same for both types. The unique components for the V8 and V6 supercharged, are; differential case, differential pinions, side gears and thrust block.

DISASSEMBLE

1. Before disassembling differential case, inspect differential side bearings for any signs of damage.

NOTE:

Both side bearings and their cups are matched parts. If either bearing is to be replaced, its matching cup must also be replaced.

2. If replacing side bearings, use Tool No. E1673MT, adaptors E1673N15 and stepped plug E1673B16 to remove side bearings from differential case.

   Discard side bearings once they are removed.

   To remove side bearing cups, refer to **3.3 REMOVED FINAL DRIVE ASSEMBLY - DISASSEMBLE**, step 10 in this Section.

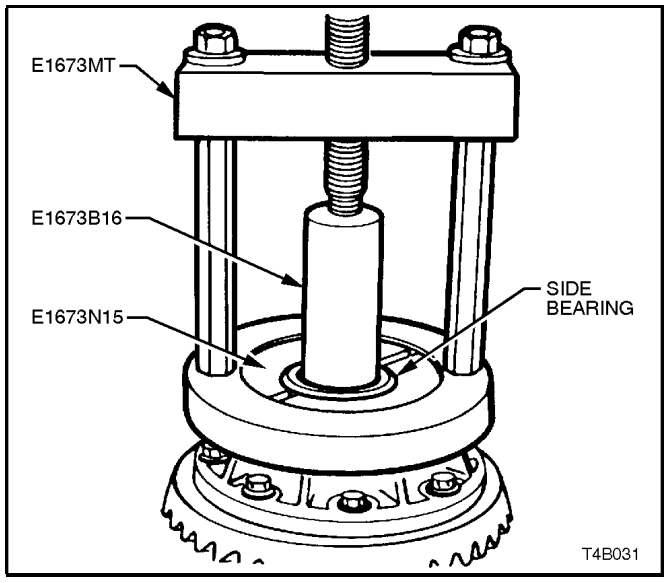


Figure 4B-162

3. Grip differential case in a vice with soft jaws.
4. Remove ring gear attaching bolts.

NOTE:

Ring gear attaching bolts use a left hand thread and are identified by an 'L' on the bolt head.

5. Remove differential case from vice.

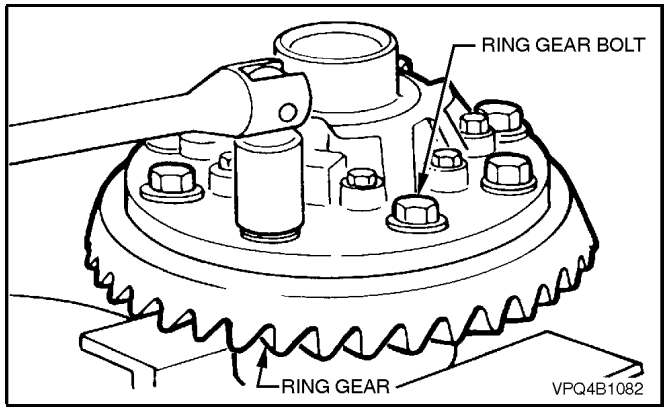


Figure 4B-163

6. Using a soft faced hammer, remove ring gear from differential case by hitting down on ring gear. Support ring gear during this operation so that it does not strike bench top as it comes free of case.

NOTE:

Do not use a screwdriver to pry between ring gear and case.

7. Place differential case in a vice equipped with soft jaws.

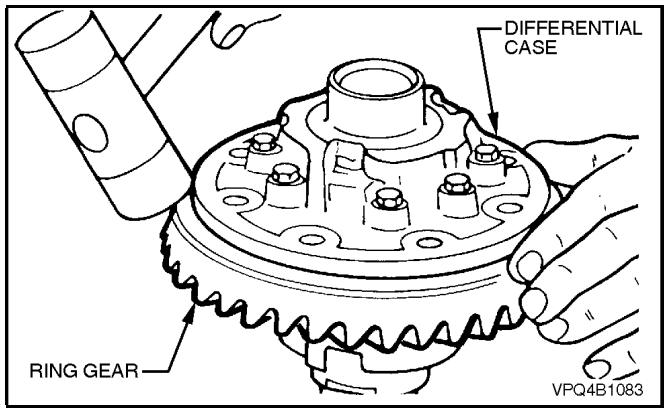


Figure 4B-164

8. Loosen and remove differential case cap to cover attaching bolts evenly. Lift off differential case cover. If necessary, remove clutch cup from cover (some-times the cone will remain inside the cover).

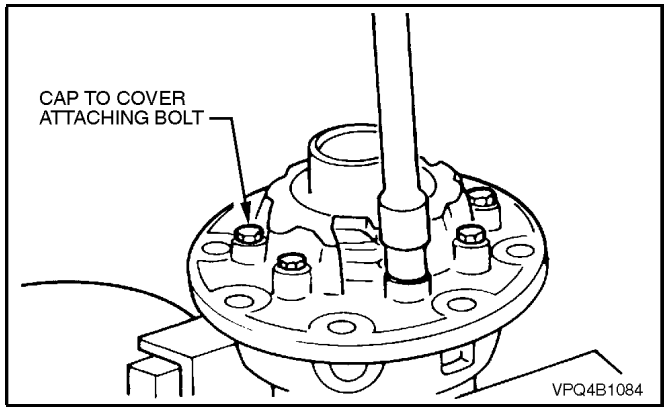


Figure 4B-165

9. Remove clutch cone, shim (if fitted), side gear and thrust spring plate from pinion cross shaft.

NOTE:

V8 and V6 supercharged vehicle clutch cone and side gears are an integral unit and must stay assembled to each other.

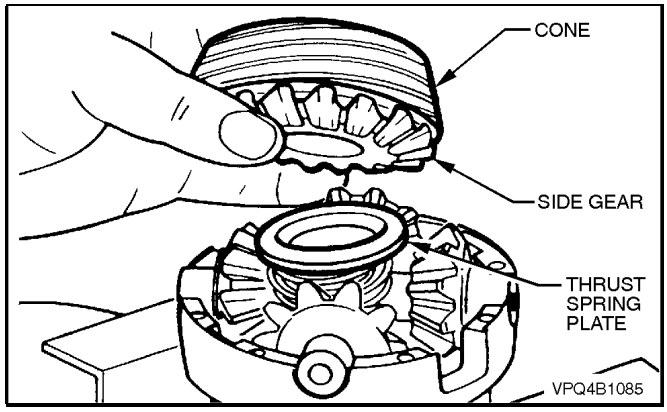


Figure 4B-166

NOTE:

To ensure that the clutch cones are not interchanged during reassembly, mark the cone and corresponding side of the differential case with a daub of paint. If shims are present, they must also be marked so that they can be reassembled into the correct case half.

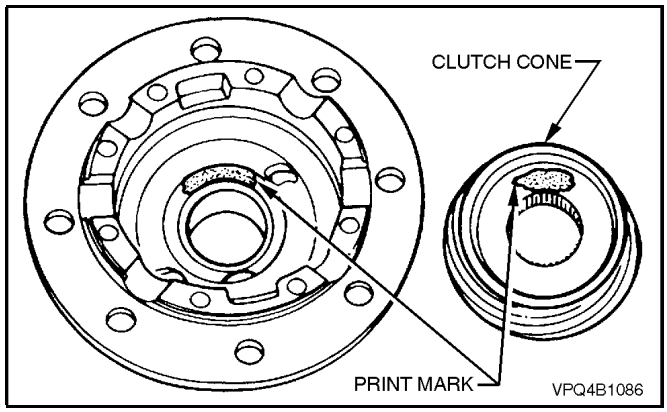


Figure 4B-167

10. Remove three concentric differential pre-load springs from centre of pinion cross shaft.

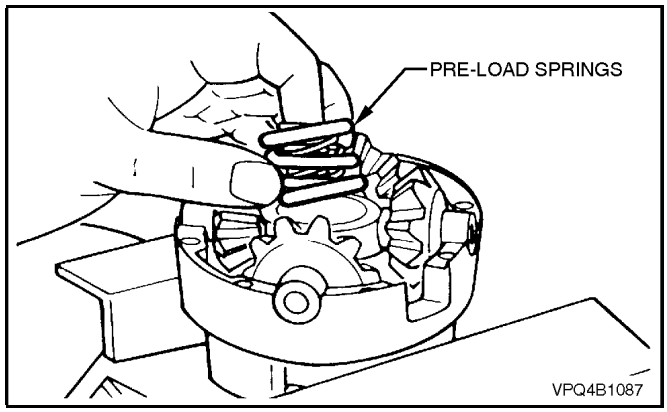


Figure 4B-168

11. Lift pinion cross shaft, pinion gears and thrust washers from case. Remove pinion gears and thrust washers from cross shaft.

NOTE:

Keep the pinion gears with their respective thrust washers in sets so they can be reinstalled in their original position.

12. Remove remaining thrust spring plate, side gear, shim (if fitted) and clutch cone from differential case cap.

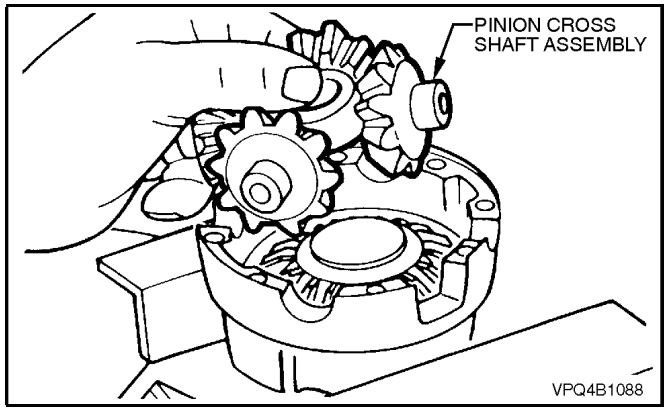


Figure 4B-169

INSPECT

All components should be thoroughly cleaned and dried, then inspected.

Differential Case

Check the case for general soundness and pay particular attention to the following points:

1. If differential case side bearings have been removed, check case journals for damage and that seating surfaces are free from dirt and burrs.
2. The ring gear spigot and mounting face should be clean and free from dirt and burrs.
3. The mating surfaces for differential case halves should be clean and free from burrs.
4. The thrust surfaces for the differential pinions should be examined for excessive wear.
5. The clutch cone seats in two housing halves should be smooth and free from any excessive scoring. Slight grooves and scratches are permissible and normal.

   The land surface of the heavy spirals on clutch cones will duplicate the housing surface condition. Excessive wear or damage on clutch cone surface will necessitate renewal of both clutch cones (V6 only) or the clutch cone/side gear assemblies (V8 and V6 supercharged models) and the housing
6. Inspect axle splines of the clutch cones for excessive wear.
7. Check thrust spring plates for excessive wear or damage.
8. If fitted, inspect side gear shims for damage.

9. Inspect pinion gear cross shaft bores for ovality.

Differential Side Gears and Pinion Gears

1. Examine all gear teeth for cracks or hard contact marks.
2. The differential side gear splines should be checked for excessive wear. Wear on splines can contribute to excessive driveline backlash.
3. The differential pinion bores and thrust surfaces should be smooth and free from scores. Inspect all thrust washers for cracks, nicks or burrs. Wear of thrust washers or thrust surfaces on gears can contribute to excessive driveline backlash.
4. Check that pinion gear cross shaft is not bent and that surfaces on which pinions run, are not scored or worn.

Ring Gear and Pinion

1. Inspect gear teeth for scoring or damage. Scoring of the gear teeth is usually caused by excessive shock loading, use of the incorrect lubricant or insufficient "run in" before towing a heavy load. (Refer VT Series Owner's Handbook). Scored gears must be replaced.
2. If on reassembly, a new gear set is to be installed, ensure that the same matching number appears on both the pinion and ring gear.

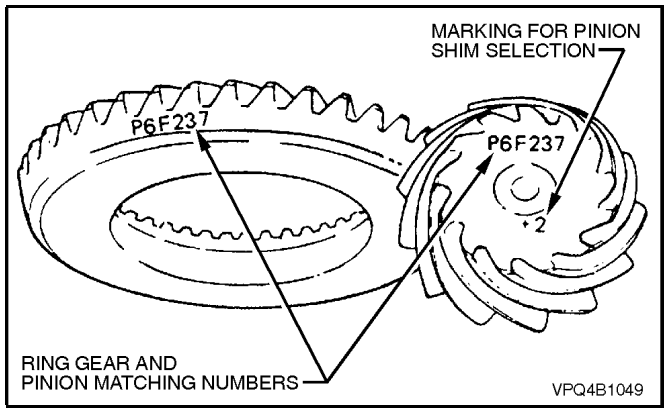


Figure 4B-170

3. On ring gear bolts, clean Durlok serrations under bolt flange.

Bearings

1. Bearing cups should have an even wear pattern and be free from flaking or pitting. Ensure the seating surfaces are clean and free from burrs or raised metal.
2. The bearing assemblies should feel smooth when turned in the cups.
3. The assembly should be free from loose particles.
4. There should be no cracks present in the roller cages and the bores should show no evidence of flaking or pitting.

   Refer to **4.4 FINAL DRIVE BEARING DIAGNOSIS** in this Section, for identification of bearing failures.

REASSEMBLE

1. Lubricate all gears, bearings, thrust washers and pinion gear cross shaft with rear axle lubricant before assembly.
2. With V6 engined models, install respective clutch cones and shims (if fitted) into differential case halves.

   To check if shims are required:

   a. Measure the distance from the case mating surface to the flat surface of the tightly seated clutch cone. Record this dimension.

   b. This measurement will indicate what size side gear positioning shim is required. Each case half and clutch cone must be measured for its own respective shim.

   c. With the measurement from "a", above, select the correct shim size as indicated by the following chart.

DISTANCE MEASURED	SHIM SIZE REQUIRED
32.0 - 31.84 mm	No shim required
32.14 - 32.04 mm	0.13 mm shim required
32.27 - 32.17 mm	0.25 mm shim required

3. Remove clutch cones and shims from differential case halves.

NOTE:

With V8 and V6 supercharged models, shimming is not required, as the side gear and cone are an integrated, single assembly.

4. If available, use an axle shaft from a VS Series vehicle, 5 link rear axle assembly and clamp it in a vice using soft jaws, allowing approximately 85 mm to extend above vice jaws.

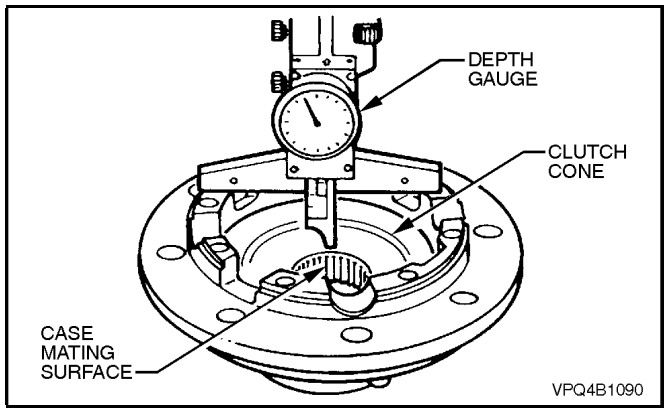


Figure 4B-171

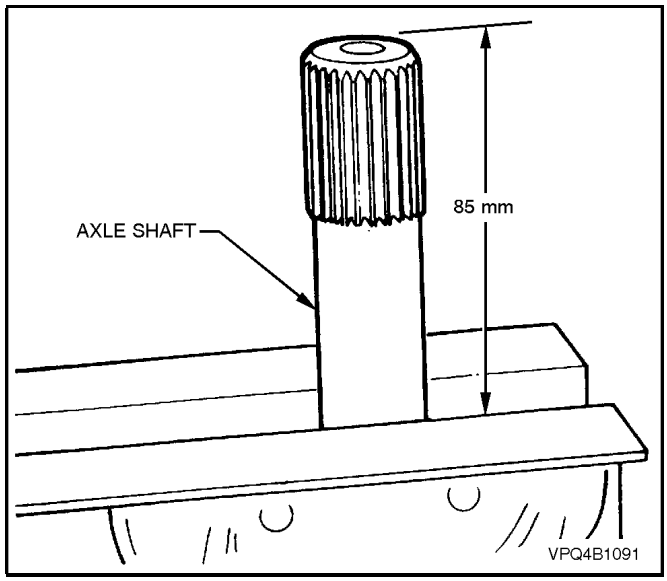


Figure 4B-172

If an axle shaft from a VS Series vehicle, 5 link rear axle assembly is not available, clamp the left hand inner axle shaft in a vice equipped with soft jaws.

NOTE:

The axle shaft (or inner axle shaft) is used as a mounting tool with V6 differentials, to ensure correct side gear and clutch cone spline alignment. Failure to follow this procedure will prevent installation of the inner axle shafts at final assembly.

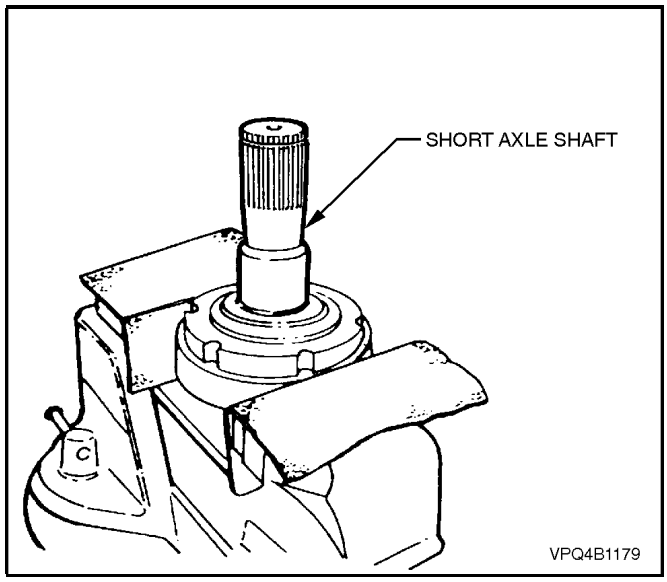


Figure 4B-173

5. Place differential case cap over axle shaft mounted in vice with interior of the housing facing upwards.
6. Paint a mixture of Molybdenum Disulphide grease and the recommended differential carrier lubricant onto faces of side gears and clutch cone surfaces.

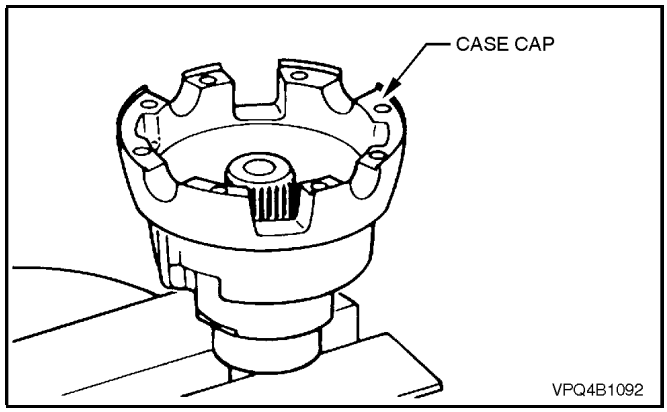
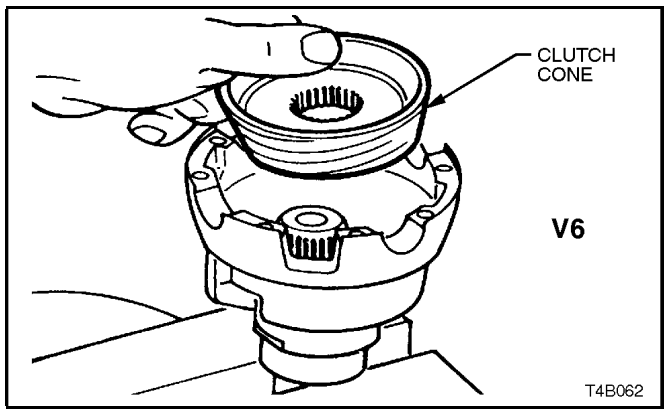


Figure 4B-174

7. For V6 differentials, install clutch cone over axle splines, seating it in position in housing followed by a shim (if required, refer Step 2) and side gear.

   With V8 and V6 supercharged differentials, install the clutch cone/side gear assembly to the housing.



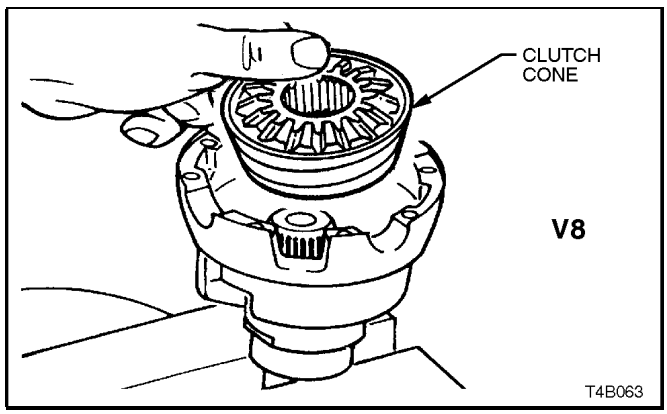


Figure 4B-175

8. Place a thrust spring plate, stepped side up on side gear.
9. Assemble the four pinions and thrust washers onto pinion cross shaft.
10. Install pinions and cross shaft assembly to case cap, ensuring that pinions mesh with side gear.

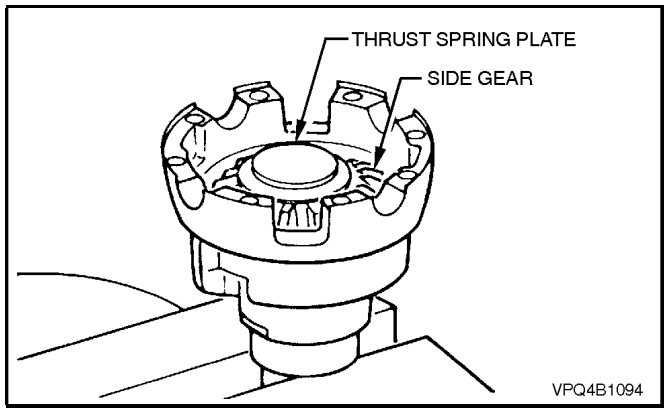


Figure 4B-176

11. Install three new concentric differential pre-load springs into centre of the pinion cross shaft.

NOTE:

NEW pre-load springs must always be installed on reassembly, DO NOT RE-USE OLD SPRINGS.

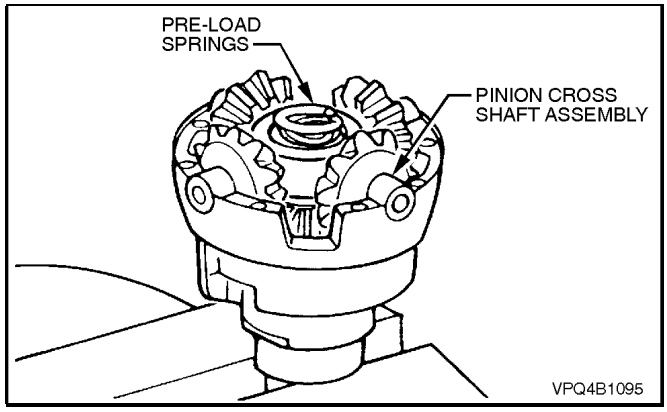


Figure 4B-177

12. Assemble second thrust spring plate, stepped side onto pre-load springs.

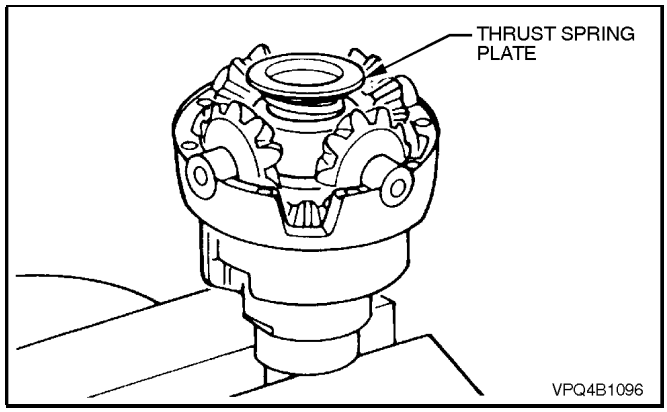
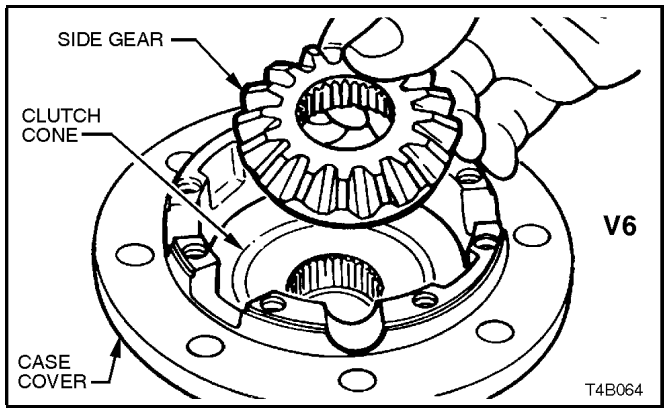


Figure 4B-178

13. For V6 differentials, install clutch cone, shim (if required) and side gear to case cover.

    With V8 and V6 supercharged differentials, install the clutch cone/side gear assembly to the housing.



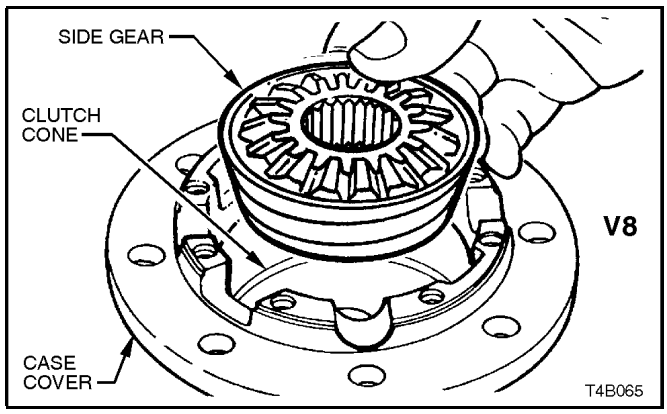


Figure 4B-179

14. Install case cover onto case cap.

NOTE:

Ensure that the cut out on each side of the case cover and cap align.

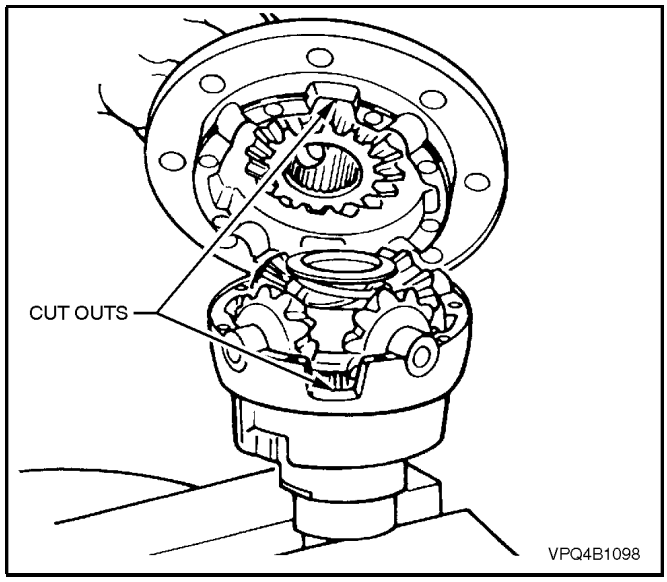


Figure 4B-180

15. Install two NEW differential case cap-to-cover attaching bolts in opposite bolt holes and finger tighten.
16. Install other axle shaft through case cover, rotating axle shaft to engage clutch cone splines and then side gear splines. Leave axle shaft in this position. Install remaining, NEW, cap-to-cover attaching bolts and tighten evenly to the correct torque specification.

DIFFERENTIAL CASE CAP TO COVER ATTACHING BOLT TORQUE SPECIFICATION	35 - 45 Nm

17. With V6 engined models, remove axle shafts from differential case assembly.

NOTE 1:

If the shafts bind on the clutch cone and side gear splines, a light tap with a soft metal hammer may be necessary to remove the axle shafts.

NOTE 2:

At no time must the side gears and clutch cones be rotated until the inner axle shafts are fully installed. Failure to observe this condition will result in side gear and clutch cone spline misalignment, thus preventing inner axle shaft installation.

Should splines become misaligned, loosen case cap to cover bolts and repeat steps 4, 5, 15 and 16 of REASSEMBLE procedure.

18. Place ring gear into position on differential case cap and install ring gear attaching bolts.

NOTE:

For ease of assembly, it may be necessary to heat the ring gear on a hot plate until it is hot to the hand, prior to installing onto the differential case cap.

NOTE

On no account must a flame be used to heat the ring gear.

NOTE:

Use left hand threaded guide pins to pilot ring gear over differential case spigot.

19. Install NEW ring gear attaching bolts evenly until gear face is flush with differential case spigot.

    Tighten bolts to the correct torque specification.

DIFFERENTIAL RING GEAR BOLTS TORQUE SPECIFICATION	125 - 150 Nm

NOTE:

Ring gear attaching bolts use a left hand thread and are identified by an 'L' on the bolt head.

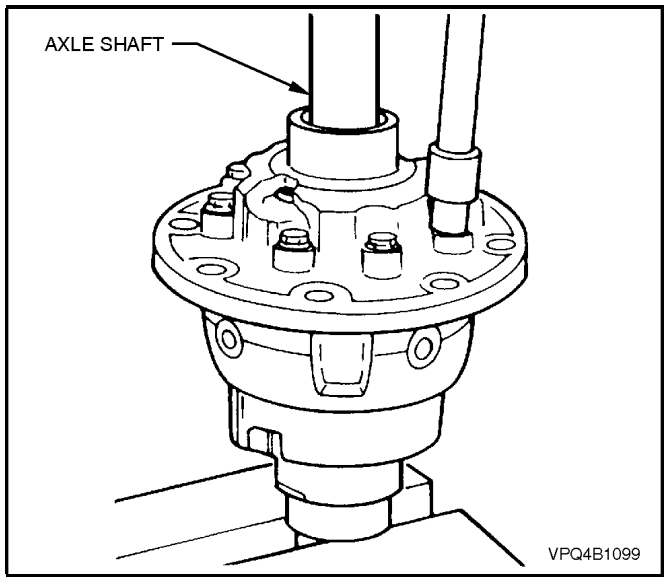


Figure 4B-181

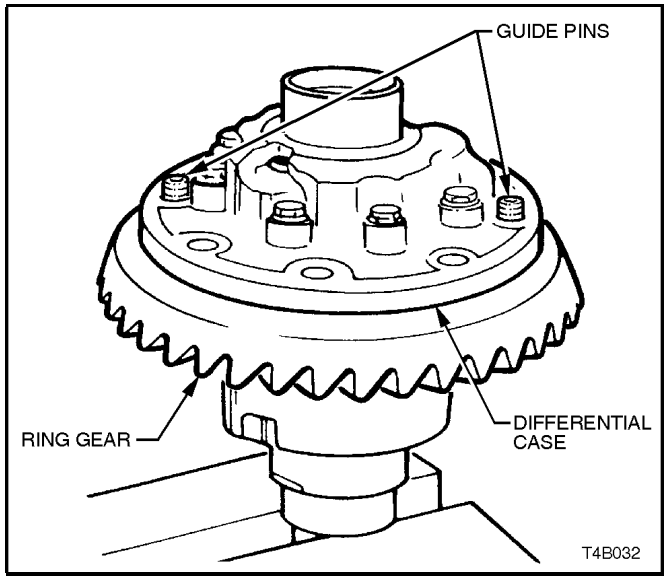


Figure 4B-182

20. If installing new side bearings, use Tool No. E9277 to press on side bearings to differential case journals.

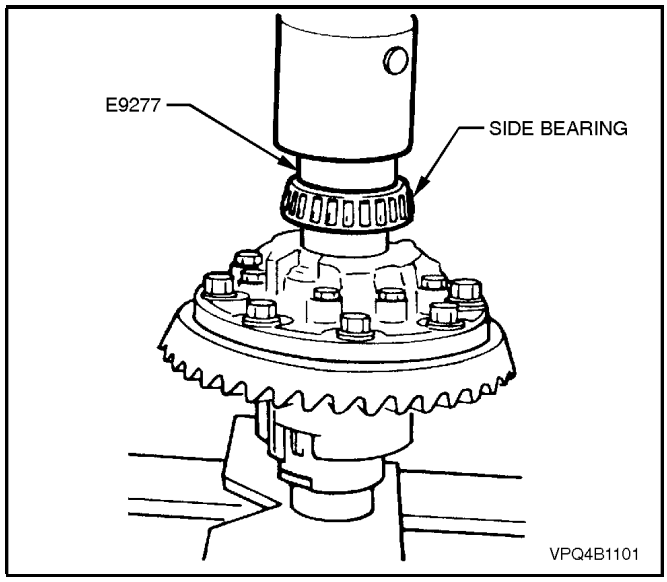


Figure 4B-183

21. Continue rear axle assembly, proceeding from **'Differential Case Side Bearing Pre-Load Setting'**, refer Figure 4B-141, in this Section.

Reassemble

1. Apply a 1.5 - 2.0 mm diameter continuous bead of sealant, such as Loctite 587 ('Ultra Blue') or equivalent (Holden's Specification HN1973) to inside edge of rear cover and bolt holes and completely around drain plug hole.
2. Install rear cover to differential carrier housing. Fit screw adjuster lock plates to rear cover, ensuring that lock plates fit over ribs or between ribs on screw adjusters.

   If equipped with ABS, install both sensors, ensuring that sensor wiring is securely held in the harness clip and that no chafing of the wire is possible. Install and tighten rear cover attaching bolts to the correct torque specification.

REAR COVER ATTACHING BOLT TORQUE SPECIFICATION	23 - 31 Nm

3. If equipped with ABS, check that sensor to toothed inner axle shafts air gap is to specification.

ABS SENSOR AIR GAP	0.4 - 1.5 mm

4. Install inner axle shafts, aligning splines with clutch cones (if a V6 and equipped with an LSD) and side gears.

NOTE 1:

To avoid premature seal failure, ensure axle shaft splines or securing clip do not score or damage the seal lips during installation.

NOTE 2:

With V6, LSD type differential assemblies, ensure that both inner axle shafts are installed fully before rotating either shaft. If rotation of one shaft occurs before both are fully installed, misalignment of opposite side gear and clutch cone will occur, thus preventing assembly of remaining shaft.

NOTE 3:

For vehicles equipped with ABS, the inner axle shafts are unique for this application.

5. Lightly hit on end of each shaft flange with a soft faced hammer to compress spring clip on shaft into clutch cup and side gear splines. Fully engage both shafts until clips snap into side gear grooves.
6. Reinstall differential carrier assembly. Refer to **3.2 FINAL DRIVE ASSEMBLY** in this Section.

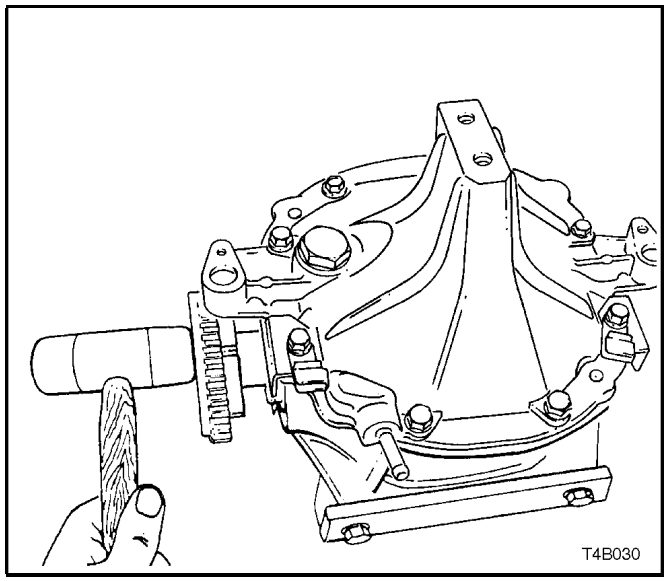


Figure 4B-184

4. DIAGNOSIS

4.1 GENERAL INFORMATION

Very often, final drive assemblies are considered as noisy, when in reality, the noise is emanating from some other source, such as tyres, front wheel bearings, rear wheel bearings, manual transmission rear bearings, engine noises, muffler roar, automatic transmission or power steering pumps.

All final drive assemblies have some slight humming noise. This will vary with the type of body construction, load and tyre pressure.

Noise which emanates from any one of these can quite easily be confused with a final drive assembly noise and unless a series of elimination tests are carried out to definitely confirm the real source of the noise, differential assemblies may be, and often are, dismantled unnecessarily.

Although not infallible, the following diagnosis guide will assist in locating and defining the different characteristics of the components which could be responsible for a noise.

Road Test

Ensure that the final drive assembly lubricant is correct and at the correct level. Drive at low speed until thoroughly familiar with vehicle noises by which time the final drive assembly should have warmed up. Accelerate gradually from the lowest practical speed in a direct ratio gear (1:1) to 100 km/h, noting any noises and the speeds at which they occur. Release the accelerator and without using the brakes, allow the vehicle to lose speed. Next, allow the vehicle to coast to rest from 100 km/h with the transmission in neutral position. Any noises common to earlier tests may be eliminated as final drive assembly gear noise, as the final drive assembly is not under load under these conditions. Engine noise is gauged by gradually accelerating the engine with the vehicle at rest.

NOTE:

Only drive at high speeds when it is legal and safe to do so.

Tyre Noise

Tyre noise can easily be mistaken for final drive assembly noise even though the noisy tyres may be operating on the front wheels. Tyre noise changes with different road conditions, but final drive assembly noise does not. Final drive assembly noise usually ceases when coasting with the transmission in neutral at speeds under 50 km/h. Tyre noise continues, but with a lower tone as vehicle speed is reduced.

Tyre noise naturally should be first eliminated; driving on a grass surface is ideal to check against this condition. It should be noted though, that dry grass can impose a fire hazard with the heat emanating from the catalytic converter and wet grass can cause excessive wheel spin. Inflating tyres temporarily to high pressures will change the contact with the road and assist in reducing tyre noise. Pressures up to 276 kPa may be used temporarily.

Tyres which have the surface of the non-skid divisions worn with one end higher than the other (saw-tooth wear) are usually noisy. Interchanging tyres can prove effective in reducing noise.

Front Wheel Bearings

Worn, brinelled, chipped or incorrectly adjusted front wheel bearings will cause a noise, very similar to tyre noise. It is a constant noise, does not vary on 'drive' or 'coast' and still persists when coasting with the transmission in neutral. This noise does not noticeably change on differing road surfaces to the same degree as does tyre noise.

Although not so pronounced, front wheel bearing noise can also be compared to a road surface noise, which is produced when the vehicle is travelling over a surface such as penetrated bitumen type road.

Transmission Rear Bearing (Manual Transmission)

A rough or pitted rear transmission bearing, usually produces a very definite bearing noise and sets up a distinct 'whirring' condition, which is most audible when accelerating from slow speed under a high throttle opening and tends to diminish as vehicle speed increases.

This noise is also prominent under a constant throttle opening, but disappears on over-run when coasting with the transmission in neutral.

When driven in second gear, noise can be amplified by lightly accelerating.

Backlash Clunk

Excessive clunk with acceleration and deceleration may be caused by worn differential pinion shafts, excessive clearance between inner axle shaft and side gear splines, drive shaft companion flange and wheel spindle flange splines, excessive clearance between side gear hub and counterbore in case, worn pinion and side gear teeth, worn thrust washers and excessive drive pinion and ring gear backlash. Remove worn parts and replace as required, selecting close fitting parts when possible. Adjust pinion and ring gear backlash.

Drive-Line Snap

A snap on sudden start, either forward or reverse, may be caused by a loose pinion flange. If loose, replace nut or flange as outlined under **2.10 PINION FLANGE** in this Section.

This condition may also be caused by incorrect lubricant in an LSD Drain and refill with correct lubricant.

Engine and Other Contributing Factors

Noises which emanate from the engine, transmission or muffler are occasionally confused with final drive assembly noises.

To isolate these noises, first carefully note the approximate vehicle speed and conditions where the supposed final drive assembly noise is most pronounced, then with the vehicle stationary and in a quiet place to avoid interfering noises (depress the clutch pedal on vehicles with manual transmission), run the engine up and down slowly through the engine speeds that correspond to the vehicle speeds at which the noise was prominent and observe whether there is any similarity to a final drive assembly noise.

For vehicles with manual transmission: With transmission still in neutral, again run the engine at similar speed while slowly letting the clutch engage, and listen for noises from the transmission.

Muffler noises are usually readily identified, possibly an exception being when a muffler emits a high-pitched periodic whistling noise, which could be confused with a bearing noise.

4.2 FINAL DRIVE ASSEMBLY NOISE

Final drive assembly noises fall into two categories:

- **a.** Gear related noises.
- **b.** Bearing related noises.

Before testing for final drive assembly noise, ensure that the lubricant is the correct type and at the correct level.

GEAR RELATED NOISE

Ring Gear and Pinion Noise

Noise produced by the ring gear and pinion set is of a cyclic nature and generally shows up as a 'drive noise', 'coast noise', or 'float noise'.

1. Drive noise is most pronounced on constant acceleration through the speed range of 50 to 90 km/h.
2. Coast noise is most pronounced when the vehicle is allowed to coast through the speed range from 90 to 50 km/h.
3. Float noise is most pronounced while the vehicle is kept at constant speed for periods between 50 to 90 km/h.

Final drive assembly noise will always change when comparing 'drive' and 'coast' and will usually cease when coasting with transmission in neutral at speeds under 50 km/h.

Differential Side Gear and Pinion Noise

Noise produced by these gears occurs when there is excessive wear between the side gear hubs and the differential case bores. This can cause a 'clunking' noise when the vehicle is driven at low speeds.

Noise produced due to excessive wear between the gear teeth will be most pronounced on turns.

Common Causes of Gear Related Noises

1. Low lubricant level or incorrect lubricant used.
2. Incorrect meshing of gear teeth (i.e. incorrect pinion positioning shim or backlash setting shims).
3. Scored gear teeth:- usually the result of incorrect lubricant type or level.
4. End play in bearings.
5. Bruised or chipped teeth.
6. Excessive runout of pinion head or ring gear backlash.
7. Ring gear creeping on differential case resulting from ring gear bolts loosening - noise from this source usually appears as a sharp metallic sound when shifting from reverse to first gear.

BEARING RELATED NOISE

Differential Pinion Gear Bearings

Worn, rough or loose bearings will tend to aggravate and magnify drive, float and coast noise, and result in heavy, irregular drive noise on constant acceleration and float, and also an irregular noise on deceleration.

Pinion bearings, if rough or brinelled, will produce a continuous whine, which will persist when coasting with transmission in neutral even to a low speed.

End play in the pinion bearings, even from natural wear, which permits the pinion to feed back into the ring gear, will cause a noise on over-run.

Drive Shaft Bearings

Drive shaft bearings that are rough or pitted can be responsible for a growling noise which on first impression could be likened to a final drive noise.

The noise, however, does not vary on 'drive' or 'coast' and still persists when coasting with transmission in neutral.

Frequently this noise can be readily identified by the sound being conveyed in an eccentric form. It can also be intermittent as the noise may fade for a short period.

To confirm the diagnosis of a drive shaft bearing noise:

1. Support the rear of the vehicle on safety stands and remove both rear wheels and brake discs.
2. Start the engine and, with top gear engaged, speed engine up to a fast idle.
3. If a stethoscope is available, it is ideal to compare the noise of one bearing against the other. To obtain the best results with a stethoscope, keep the volume adjustment down low.
4. A difference in the noise of the drive shaft bearings can also be discerned by placing a steel-shafted screwdriver to the ear and in close proximity to each bearing in turn.

With practice, a noticeable difference in noise can, at most times, be observed between a good and not so good bearing.

Differential Side Bearings

Side bearings will produce a constant grinding noise of a slower nature than pinion bearings (side bearing noise cannot be determined by the diagnosis procedure for drive shaft bearing noise), but will be in the same frequency as drive shaft bearings.

Common Causes of Bearing Related Noises

1. Low lubricant level or incorrect lubricant used.
2. Foreign matter in the lubricant.
3. Incorrect pre-load setting.
4. Bearings incorrectly mounted e.g. dirt trapped behind abutment faces during assembly.

4.3 LSD NOISE

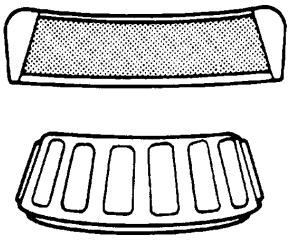
If LSD stick-slip chatter is diagnosed, the differential carrier lubricant should be drained immediately after a run to warm up the lubricant. This is to remove as much old lubricant and wear debris as possible. Refill carrier with the specified lubricant and re-evaluate LSD operation for a minimum of 20 km. Chatter will usually disappear within this time.

Should chatter still occur, remove carrier and overhaul LSD. Refer to **3.4 LIMITED SLIP DIFFERENTIAL** in this Section.

4.4 FINAL DRIVE BEARING DIAGNOSIS

CONSIDER THE FOLLOWING FACTORS WHEN DIAGNOSING BEARING CONDITION:

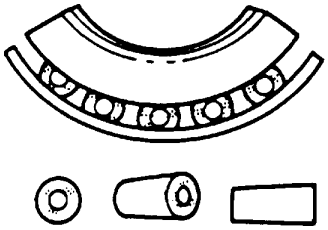
1. GENERAL CONDITION OF ALL PARTS DURING DISASSEMBLY AND INSPECTION.
2. CLASSIFY THE FAILURE WITH THE AID OF THE FOLLOWING ILLUSTRATIONS.
3. DETERMINE THE CAUSE.
4. MAKE ALL REPAIRS FOLLOWING RECOMMENDED PROCEDURES.



ABRASIVE ROLLER WEAR

PATTERN ON RACES AND ROLLERS CAUSED BY FINE ABRASIVES.

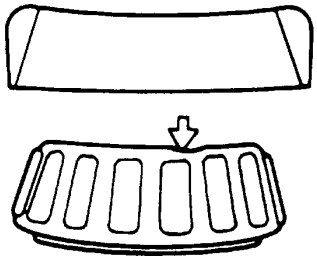
CLEAN ALL PARTS AND HOUSINGS. CHECK SEALS AND BEARINGS, REPLACING IF LEAKING, ROUGH OR NOISY.



GALLING

METAL SMEARS ON ROLLER ENDS DUE TO OVERHEATING, LUBRICANT FAILURE OR OVERLOAD.

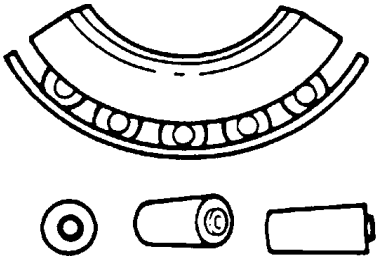
REPLACE BEARING. CHECK SEALS AND CHECK FOR PROPER LUBRICATION.



BENT CAGE

CAGE DAMAGE DUE TO IMPROPER HANDLING OR TOOL USE.

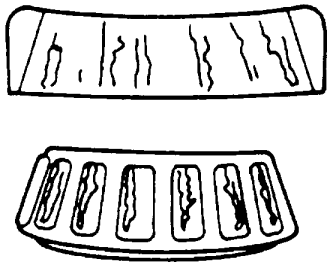
REPLACE BEARING.



ABRASIVE STEP WEAR

PATTERN ON ROLLER ENDS CAUSED BY FINE ABRASIVES.

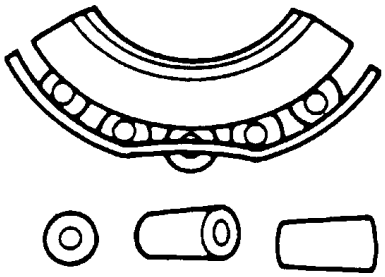
CLEAN ALL PARTS AND HOUSING. CHECK SEALS AND BEARINGS AND REPLACE IF LEAKING, ROUGH OR NOISY.



ETCHING

BEARING SURFACES APPEAR GREY OR GREYISH BLACK IN COLOUR WITH RELATED ETCHING AWAY OF MATERIAL, USUALLY AT ROLLER SPACING.

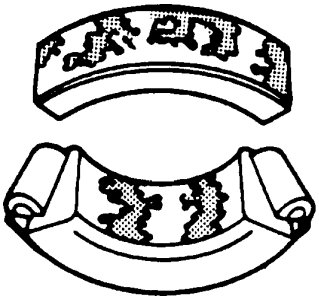
REPLACE BEARINGS. CHECK SEALS AND CHECK FOR PROPER LUBRICATION.



BENT CAGE

CAGE DAMAGE DUE TO IMPROPER HANDLING OR TOOL USE.

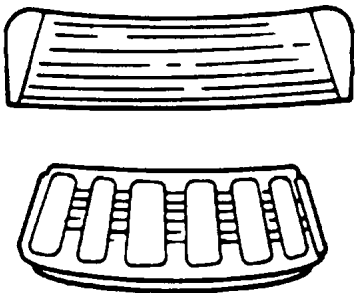
REPLACE BEARING.



INDENTATIONS

SURFACE DEPRESSIONS ON RACE AND ROLLERS CAUSED BY HARD PARTICLES OF FOREIGN MATERIAL.

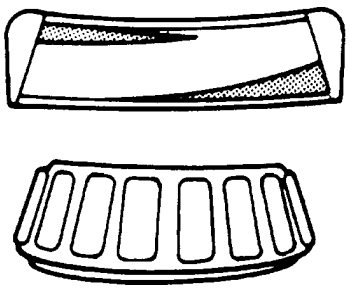
CLEAN ALL PARTS AND HOUSING. CHECK SEALS AND REPLACE BEARINGS IF ROUGH AND NOISY.



CAGE WEAR

WEAR AROUND OUTSIDE DIAMETER OF CAGE AND ROLLER POCKETS CAUSED BY ABRASIVE MATERIALS AND INEFFICIENT LUBRICATION.

REPLACE BEARINGS. CHECK SEALS AND CHECK FOR PROPER LUBRICATION.

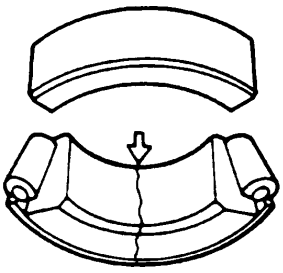


MISALIGNMENT

OUTER RACE MISALIGNMENT DUE TO FOREIGN OBJECT.

CLEAN RELATED PARTS AND REPLACE BEARING. MAKE SURE RACES ARE PROPERLY SEATED.

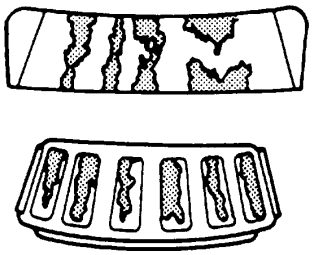
Figure 4B-185



CRACKED INNER RACE

RACE CRACKED DUE TO IMPROPER FIT, COCKING OR POOR BEARING SEATS.

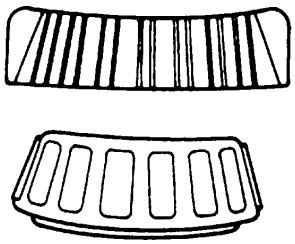
REPLACE BEARING AND CORRECT BEARING SEATS.



FATIGUE SPALLING

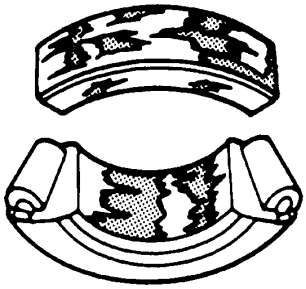
FLAKING OF SURFACE METAL RESULTING FROM FATIGUE.

REPLACE BEARING, CLEAN ALL RELATED PARTS.



BRINELLING

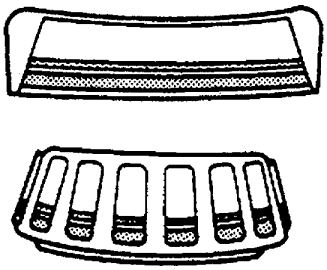
SURFACE INDENTATIONS IN RACEWAY CAUSED BY ROLLERS EITHER UNDER IMPACT, LOADING OR VIBRATION WHILE THE BEARING IS NOT ROTATING.
REPLACE BEARING IF ROUGH OR NOISY



FRETTAGE

CORROSION SET UP BY RELATIVE MOVEMENT OF PARTS WITH NO LUBRICATION.

REPLACE BEARING. CLEAN RELATED PARTS. CHECK SEALS AND CHECK FOR PROPER LUBRICATION.

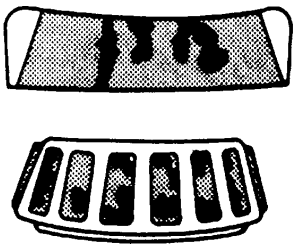


STAIN DISCOLOURATION

DISCOLOURATION CAN RANGE FROM LIGHT BROWN TO BLACK, CAUSED BY INCORRECT LUBRICATION OR MOISTURE.

RE-USE BEARING IF STAINS CAN BE REMOVED BY LIGHT POLISHING OR IF NO EVIDENCE OF OVERHEATING IS OBSERVED.

CHECK SEALS AND RELATED PARTS FOR DAMAGE.

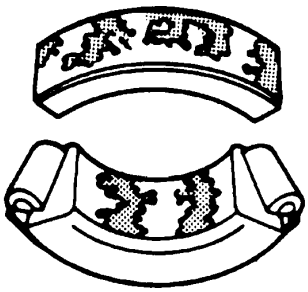


HEAT DISCOLOURATION

HEAT DISCOLOURATION CAN RANGE FROM FAINT YELLOW TO DARK BLUE, RESULTING FROM OVERLOAD OR IMPROPER LUBRICANT.

EXCESSIVE HEAT CAN CAUSE SOFTENING OF RACES OR ROLLERS.

TO CHECK FOR LOSS OF TEMPER ON RACES OR ROLLERS, A SIMPLE FILE TEST MAY BE MADE. A FILE DRAWN OVER A TEMPERED PART WILL GRAB AND CUT METAL, WHEREAS A FILE DRAWN OVER A HARD PART WILL GLIDE READILY WITH NO METAL CUTTING ACTION.
REPLACE BEARING IF OVERHEATING DAMAGE IS INDICATED. CHECK SEALS AND OTHER PARTS.



SMEARS

SMEARING OF METAL DUE TO SLIPPAGE THAT CAN BE CAUSED BY POOR FITS, LUBRICATION, OVERHEATING, OVERLOADS OR HANDLING DAMAGE.
REPLACE BEARINGS. CLEAN RELATED PARTS AND CHECK FOR PROPER FIT AND LUBRICATION.

Figure 4B-186

5. SPECIFICATIONS

		V6 Engine	V8 & V6 Supercharged Engine
GENERAL			
Rear Axle Assembly		BTRE - 76 Series	BTRE - 80 Series
Axle Type		Independent Housing	
STANDARD AND LSD AXLES			
Gear Type		Hypoid	
Gear Ratio		3.08:1.	3.07:1
		See I.D. tag attached to the carrier	
No. of Teeth:			
	Ring Gear	37	43
	Drive Pinion Gear	12	14
LUBRICANT			
Capacity		1.65 litres	
Type:			
With/Without LSD		Mineral Hypoid Gear Oil to Holden's Specification HN1561. Refer **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** for recommendations	Synthetic Hypoid Gear Oil to Holden's Specification HN2040. Refer **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL** for recommendations
DIFFERENTIAL GEARS			
Type		Straight Bevel	
No. Teeth:	Pinion Gears	10	10
	Side Gears	16	15
FINAL DRIVE PINION GEAR BEARINGS			
Bearing Type		Adjustable Taper Roller	
Bearing Adjustment		Collapsible Spacer	
Bearing Pre-Load:			
Dummy pinion - New bearings		1.4 - 2.0 Nm	
Dummy pinion - Used bearings		0.7 - 1.0 Nm	
New with oil seal		1.4 - 2.4 Nm	
New without oil seal		1.4 - 2.0 Nm	
Used with oil seal		0.7 - 1.2 Nm	
Used without oil seal		0.7 - 1.2 Nm	

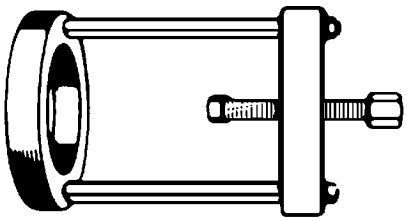
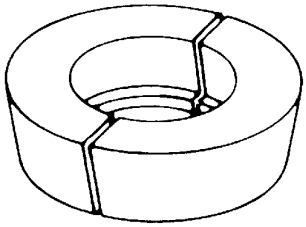
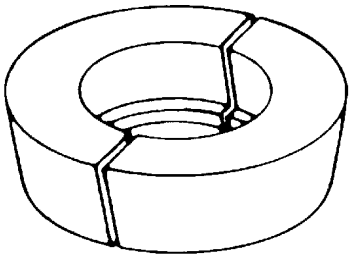
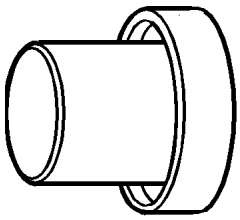
NOTE:
Use Synthetic Hypoid Gear Oil to Holden's Specification HN2040 for V6 Wagon with Manual Transmission, refer **2.1 CHECKING DIFFERENTIAL CARRIER LUBRICANT LEVEL**

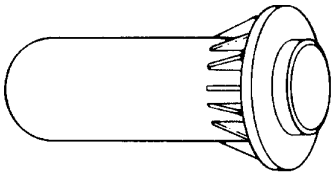
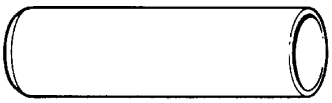
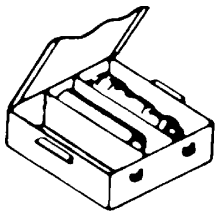
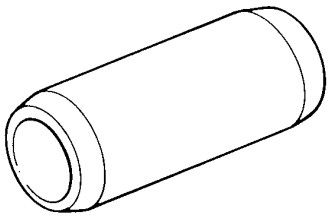
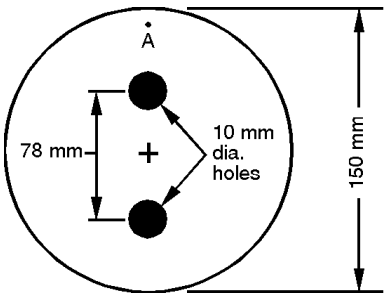
DIFFERENTIAL CARRIER SIDE BEARINGS		
Type	Adjustable Taper Roller	
Adjustment	Screw adjusters on each side of the carrier.	
Bearing Pre-Load		
New Bearings	15 - 35 N	Torque measured at the differential case, without inner axle shafts or final drive pinion installed.
Used Bearings	8 - 18 N	
RUN-OUT SPECIFICATIONS		
Trunnion Assembly Hub	0.060 mm Total Indicated Run-out	
Case Assembly (without ring gear attached)	0.05 mm (maximum)	
Ring Gear Rear Face (assembled onto case assembly)	0.13 mm (maximum)	
BACKLASH SPECIFICATIONS		
Ring Gear to Drive Pinion	0.10 - 0.18 mm (at the tightest point)	
LSD TORQUE CHECK		
Torque Check Specification	45 Nm (minimum)	
ABS SENSOR		
Air Gap (non-adjustable)	0.4 - 1.5 mm	
SEALANTS		
Drive Shaft Dust Caps/Shield	RTV 732 Sealant, to Holden's Specification HN1373	
Rear Cover to Carrier Housing	Loctite 587 ('Ultra Blue') or equivalent, to Holden's Specification HN1973	
As Required	Loctite 242 or equivalent, to Holden's Specification HN1256, Class 2, Type 1	
LUBRICANTS		
As Specified in Text	Molybond HE50 or equivalent, to Holden's Specification HN1326	
As Specified in Text	Lithium Soap Based Grease to Holden's Specification HN1147	

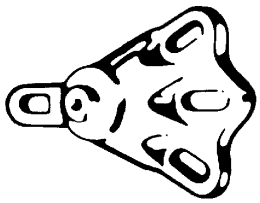
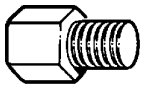
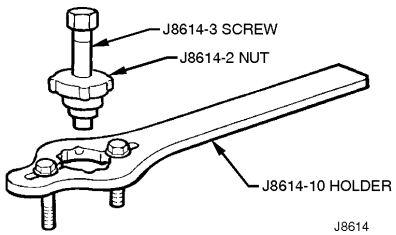
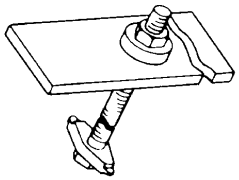
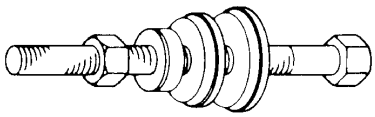
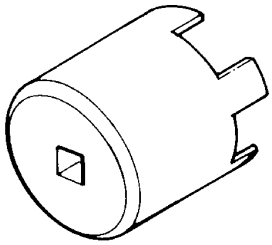
6. TORQUE WRENCH SPECIFICATIONS

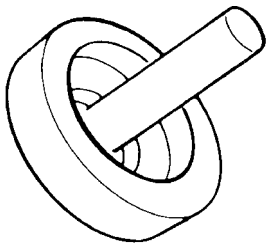
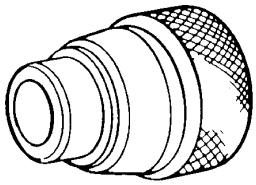
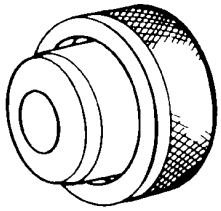
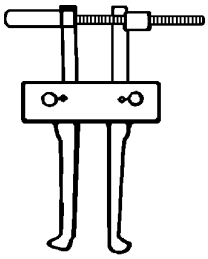
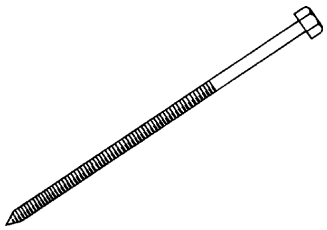
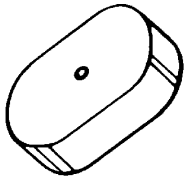
			Nm
	Rear cover attaching bolts		23 - 31
	Filler plug		23 - 31
	Drain plug		23 - 31
◆	Final drive ring gear bolts		125 - 150
◆	LSD case cap to cover attaching bolts		35 - 45
◆	Collar nut to trunnion assembly		295 - 305
	Drive shaft constant velocity joint to trunnion flange/inner axle shaft flange bolts		50 Nm, then 60 ° - 75° turn angle
	Road wheel attaching nut		110 - 140
	Brake caliper anchor plate to trailing arm bolts		70 - 100
	Rear disc brake shield to trailing arm.	Upper bolts	70 - 80
		Lower bolts	85 - 90
◆	Differential carrier to rear crossmember attaching bolts		90 Nm, then 30° - 45° turn angle
◆	Rear mount to vehicle underbody attaching bolts		30 Nm, then 60° turn angle
◆	Rear mount to differential carrier rear cover attaching bolts		85 - 105
	Shock absorber lower mounting bolt		105 - 125
	Crossmember front mounting brace to underbody bolts		60 - 70
	Crossmember front mounting bolt		125 Nm, then 30° - 45° turn angle
	Intermediate exhaust pipe to catalytic converter attaching bolts		40 - 50
◆	**New bolts and/or nuts MUST be used on reassembly.**		

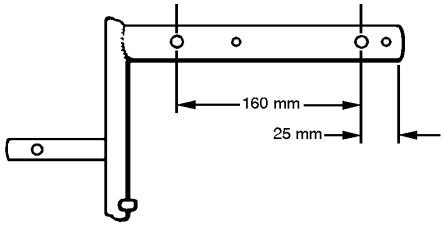
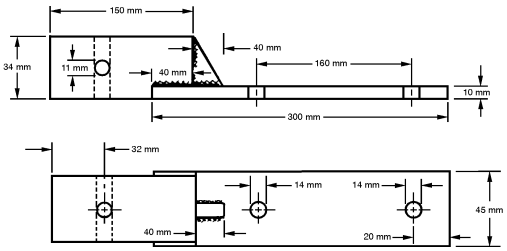
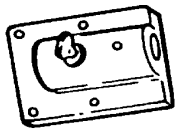
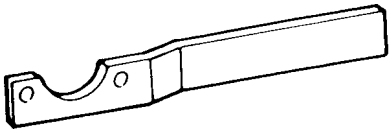
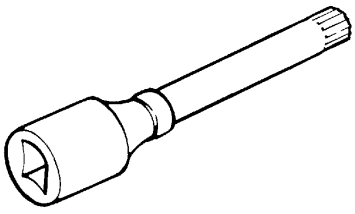
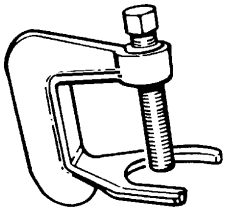
7. SPECIAL TOOLS

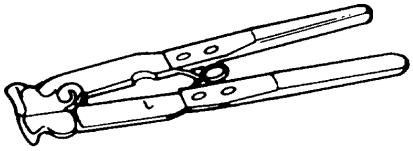
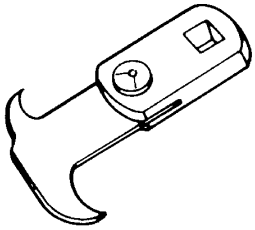
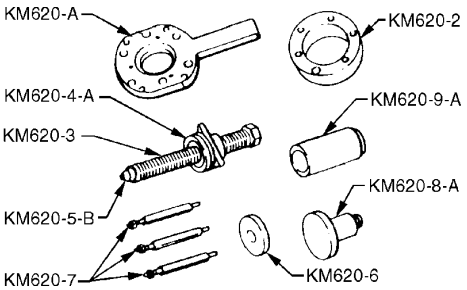
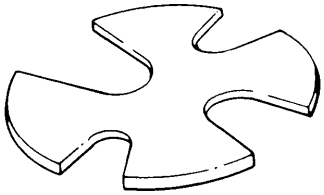
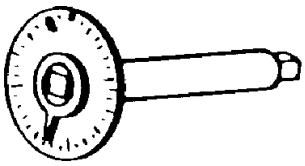
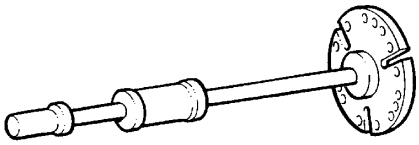
TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
E1673MT	BASIC PULLER  AU273	PREVIOUSLY RELEASED FOR "V" CAR.
E1673A15	ADAPTOR  E1673A15	PREVIOUSLY RELEASED FOR "V" CAR. USED WITH E1673MT.
E1673N15	ADAPTOR  E1673N15	PREVIOUSLY RELEASED FOR "V" CAR. USED WITH E1673MT.
E9277	SIDE BEARING INSTALLER  E9277	PREVIOUSLY RELEASED FOR "V" CAR.
E1673B16	STEPPED PLUG  E1673B16	PREVIOUSLY RELEASED FOR "V" CAR.

TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
17-010A	PINION OIL SEAL INSTALLER  E9055	PREVIOUSLY RELEASED FOR "V" CAR.
E3C10AER	PINION REAR BEARING CONE REPLACER  E3C10AER	PREVIOUSLY RELEASED FOR "V" CAR.
E9300A	PINION HEIGHT SETTING GAUGE SET  E9300A	PREVIOUSLY RELEASED AS E9300, FOR "V" CAR. THIS SET NOW HAS AN ADDITIONAL SPACER FOR THE DRIVE PINION USED ON THE V8 AND V6 SUPERCHARGED FINAL DRIVE ASSEMBLIES.
AU408	DUMMY ARBOR  AU408	USED WITH DUMMY PINION FROM E9300A
	PINION FLANGE PULLEY DETAILS 	DEALER FABRICATED: 1. MADE FROM A 13 MM THICK PIECE OF WOOD. 2. DRILL A SMALL HOLE AT 'A' AND ATTACH A ONE METRE LENGTH OF STRING AT THIS POINT. 3. DRILL TWO 10 MM HOLES AS SHOWN IN THE FIGURE.

TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
7208	REAR AXLE REMOVAL ADAPTOR  4A48	PREVIOUSLY RELEASED FOR "V" CAR. USED WITH E6662B FOR LSD TORQUE CHECK.
E6662B	TORQUE WRENCH ADAPTOR  E6662B	PREVIOUSLY RELEASED FOR "V" CAR. USED WITH 7208
J8614-01	PINION FLANGE HOLDER AND REMOVER  J8614	PREVIOUSLY RELEASED FOR "V" CAR.
E9293	PINION BEARING CUP REMOVER  E9293A	PREVIOUSLY RELEASED FOR "V" CAR.
E9271	PINION BEARING CUP INSTALLER  E9271	PREVIOUSLY RELEASED FOR "V" CAR.
AU407	SCREW ADJUSTER SOCKET  AU407	USED FOR CHECKING AND ADJUSTING SCREW ADJUSTERS.

TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
AU409	PRESS FIXTURE  AU409	USED FOR INSTALLING NEEDLE BEARINGS AND SIDE BEARING CUP INTO SCREW ADJUSTERS. USED WITH AU411
AU411	BEARING AND CUP REMOVER  AU411	AS ABOVE.
AU410	SEAL INSTALLER  AU410	USED FOR INSTALLING SEAL INTO SCREW ADJUSTERS.
1150	PULLER  E6659	USED WITH FORCING SCREW E6661S AND ADAPTOR AU412 TO REMOVE SIDE BEARING CUPS FROM SCREW ADJUSTERS.
E6661S	FORCING SCREW  E6661S	PREVIOUSLY RELEASED.
AU412	ADAPTOR  AU412	PREVIOUSLY RELEASED.

TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
KM480	HOLDING FIXTURE  KM480	PREVIOUSLY RELEASED FOR THM 125 AUTOMATIC TRANSAXLE. MODIFY BY DRILLING TWO 14 MM HOLES AS SHOWN IN THE ILLUSTRATION. USED FOR HOLDING DIFFERENTIAL CARRIER ASSEMBLY.
N/A	DIFFERENTIAL CARRIER HOLDING FIXTURE 	IF KM480 IS NOT AVAILABLE, FABRICATE A HOLDING FIXTURE AS SHOWN
J3289-20	HOLDING FIXTURE BASE  J3289-20	PREVIOUSLY RELEASED FOR "V" AND "J" CARS.
KM468	HOLDING BAR 	PREVIOUSLY RELEASED FOR "J" CAR. USED TO HOLD TRUNNION ASSEMBLY FROM ROTATING.
AU416	TORX BIT 	USED TO REMOVE AND INSTALL REAR BRAKE BACKING PLATE TO TRAILING ARM ATTACHING BOLTS.
AJ24292-C	PRESS TOOL  AJ24292-C	USED FOR REMOVING REAR WHEEL STUDS FROM TRUNNION ASSEMBLY

TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
E1896	CLAMP PLIERS  3A13	PREVIOUSLY RELEASED FOR "J" CAR. USED FOR SECURING DRIVE SHAFT CONSTANT VELOCITY JOINT BOOT CLAMPS.
56750	SEAL REMOVER  E308	PREVIOUSLY RELEASED FOR "V" CAR.
KM620-A	REMOVER/INSTALLER 	PREVIOUSLY RELEASED FOR "VQ". USED FOR REMOVING AND INSTALLING TRUNNION FLANGE, REAR WHEEL BEARING AND TRUNNION ASSEMBLY.
E1312	PRESS PLATES 	PREVIOUSLY RELEASED.
E7115	ANGLE WRENCH 	PREVIOUSLY RELEASED FOR "J" AND "V" CARS AS TOOL NO. 394. USED TO TIGHTEN COMPONENT FASTENERS WHEN ANGLE TORQUE IS REQUIRED.
09520-32012	SLIDE HAMMER  09520-32012	PREVIOUSLY RELEASED FOR "JK" APOLLO. USED TO REMOVE INNER AXLE SHAFTS FROM THE FINAL DRIVE ASSEMBLY.