

# SECTION : 205-02A Rear Drive Axle / Differential — Beam Axle

**VEHICLE APPLICATION :** 2008.0 Falcon

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## SPECIFICATIONS

### General Specifications

Description	Specification
<b>Rear Axle Lubrication</b>	
(Level with bottom of filler plug hole with vehicle at curb height.)	
<b>Model 80</b>	
CONVENTIONAL	
Grade	Mobil HD 80W-90
Ford Specification	ESW-M2C108-A
Capacity	1.90 litre
<b>Model 86</b>	
CONVENTIONAL	
Grade	Mobilube SHC ID
Ford Specification	ESZ-FM2C190-A
Capacity	1.9 litre
LIMITED SLIP	
Grade	Mobilube SHC ID
Ford Specification	ESZ-FM2C190-A
Capacity	1.80 litre + 100ml Sturaco 7098
<b>BEARING PRELOADS</b>	
<b>New Bearings Nm</b>	
Differential	
- Measured without axle shafts or pinion	0.6-1.9
Pinion	
- With oil seal	1.5-2.1
- Without oil seal	1.5-1.9
<b>Used Bearings</b>	
Differential	
- Measured without axle shafts or pinion	0.4-1.1
Pinion	
- With oil seal	0.7-1.2
- Without oil seal	0.7-1.0
<b>ADJUSTMENTS</b>	
Pinion bearing preload adjustment.	Collapsible spacer
Differential bearing preload adjustment.	Selective spacer
Pinion depth of mesh adjustment.	Selective shim
Backlash between ring gear and pinion.	0.13 to 0.18 mm
Backlash variation between teeth.	0.05 mm max.
Maximum ring gear run out (assembled)	0.13 mm (measured on the back face of the ring gear)
<b>Limited slip differential torque</b>	
Model 86	New: 100-300 Nm
(plate clutch type)	Used: 50-150 Nm

### Torque Specifications

Description	Nm
Ring gear bolts (L.H. Thread)	140
Bearing cap bolts	55
Differential case bolts (L.S.D.)	40



**SPECIFICATIONS (Continued)**

Description	Nm
Rear cover bolts	30
Axle bearing retainer plate bolts	45
Spring 'U' bolt nuts (Wagon)	60
* Track arms to body	75
* Track arms to pivot link	75
* Pivot link to axle housing cover	15
* Suspension arms to axle housing	75
* Suspension arms to body	75
* Shock absorber to spring plate	75
Caliper to bracket pin nuts	20
Splash shield screws	10
Shock absorber to spring plate nut	45
Stabiliser bar clamp bolt	20
Universal joint bolts	10
Vent - Rear axle housing	15
Pinion flange nut	-
Filler Plug	35
Drain Plug	27

\* Items marked thus are to be tightened with the vehicle in the curb load position.



## DESCRIPTION AND OPERATION

### Rear Drive Axle / Differential - Beam Axle

#### Beam Axle Final Drive Identification

A label identifying the beam axle assembly part number, serial number, and final drive ratio is fixed to the axle tube adjacent to the rear cover.

Two different model beam axles are used on utility vehicles:

1. M80 beam axles are fitted with 2.73, 3.27 or 3.45 8" (205mm) diameter gear sets, with or without ABS and without LSD's. All M80 beam axles should be filled with lubricant as per the Specifications.
2. M86 beam axles are fitted with 2.73, 3.23, 3.45 or 3.73 8.6" (220mm) diameter gear sets, with or without ABS and with or without LSD's. M86 axles are fitted to all vehicles powered by a V8 or turbo I6 engine. All M86 beam axles should be filled with lubricant as per the Specifications.

#### Conventional Differential

This axle is a hypoid type of unitised carrier construction. The two pinion differential case and the drive pinion are mounted in opposed tapered roller bearings in the carrier. Differential bearing preload adjustment is provided by varying shim thicknesses behind the bearing cups. Pinion bearing preload is regulated by a collapsible spacer and adjusted using the pinion nut.

Torque is transferred from the propshaft to the final drive assembly via the companion flange that is splined to the hypoid pinion. The torque is then transferred from the pinion through the ring gear, differential case, differential pinion cross shaft, differential pinions and side gears to the axle shafts for conventional differentials.

The axle shafts are mounted using tapered roller bearings and held by retainer plates at the outer ends of the axle housing. Axle shaft end play is pre-set and is not adjustable. Oil seals are located between the retainer plates and the bearing.

#### Limited Slip Differential

This axle is a hypoid type of unitised carrier construction. The two pinion differential case and the drive pinion are mounted in opposed tapered roller bearings in the carrier. Differential bearing preload adjustment is provided by varying shim thicknesses behind the bearing cups. Pinion bearing preload is regulated by a collapsible spacer and adjusted using the pinion nut.

Torque is transferred from the propshaft to the final drive assembly via the companion flange that is splined to the hypoid pinion. Torque is then transferred from the pinion through the ring gear, differential case, differential pinion cross shaft, differential pinions and side gears to the axle shafts.

M86 LSDs have that a multiplate oil bath type design is utilised where alternate plates are splined to the differential case and side gear. Preloading of the plates provides frictional resistance to rotation, providing torque transfer to the rear wheel with the greatest traction.

The axle shafts are mounted using tapered roller bearings and held by retainer plates at the outer ends of the axle housing. Axle shaft end play is pre-set and is not adjustable. Oil seals are located between the retainer plates and the bearing.

With the conventional differential, when the rear wheels are subject to highly unbalanced tractive conditions such as one wheel on dry road and the other in mud or ice, wheel spin will occur if over acceleration is attempted. However, with the limited slip differential, when the tendency for wheel spin occurs, the friction generated between the friction plates transfers a portion of the driving torque to the non-spinning wheel.

#### Differential Assembly and Pinion Bearings

This bearing is a single row, pre-set tapered roller bearing capable of accepting thrust loads and radial loads in any combination.

The tapered roller bearing consists of four basic parts: the cup or outer race, the cone or inner race, the tapered rollers which roll freely between the cup and cone, and the cage which serves as a retainer to maintain the proper spacing between the tapered rollers grouped around the cone.

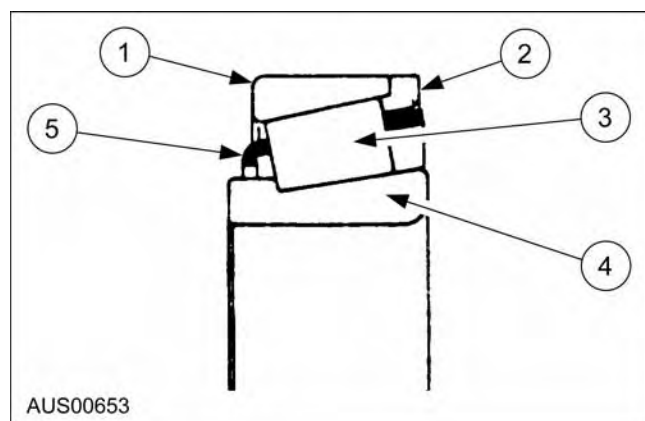
#### Wheel Bearings

This bearing is a single row, pre-set tapered roller bearing capable of accepting thrust loads in either direction and radial loads in any combination.

The tapered roller bearing consists of five basic parts: the cup or outer race, the cup rib ring, the cone or inner race, the tapered rollers which roll freely between the cup and cone, and the cage which serves as a retainer to maintain the proper spacing between the tapered rollers grouped around the cone.

When the bearing is manufactured, the cup and rib ring are bonded together with an adhesive to facilitate bearing handling and installation. Since the cup and rib ring are clamped together in the axle housing, there is no need for a permanent bond. When the bearing is serviced the cup will usually be separated from the rib ring.



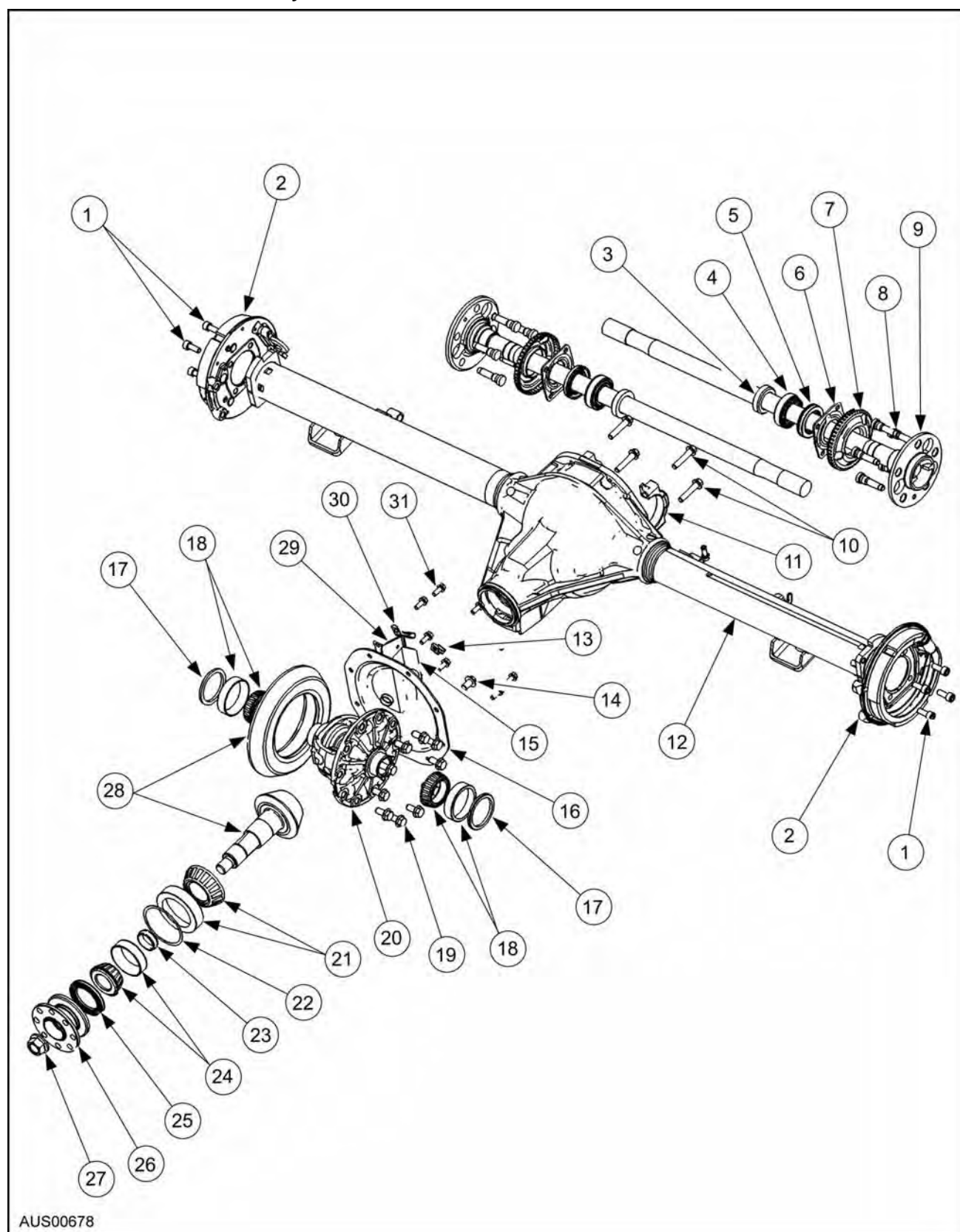
**DESCRIPTION AND OPERATION (Continued)**

Item	Description
1	Cup
2	Cup rib ring
3	Rollers
4	Cone
5	Cage



**DESCRIPTION AND OPERATION (Continued)**

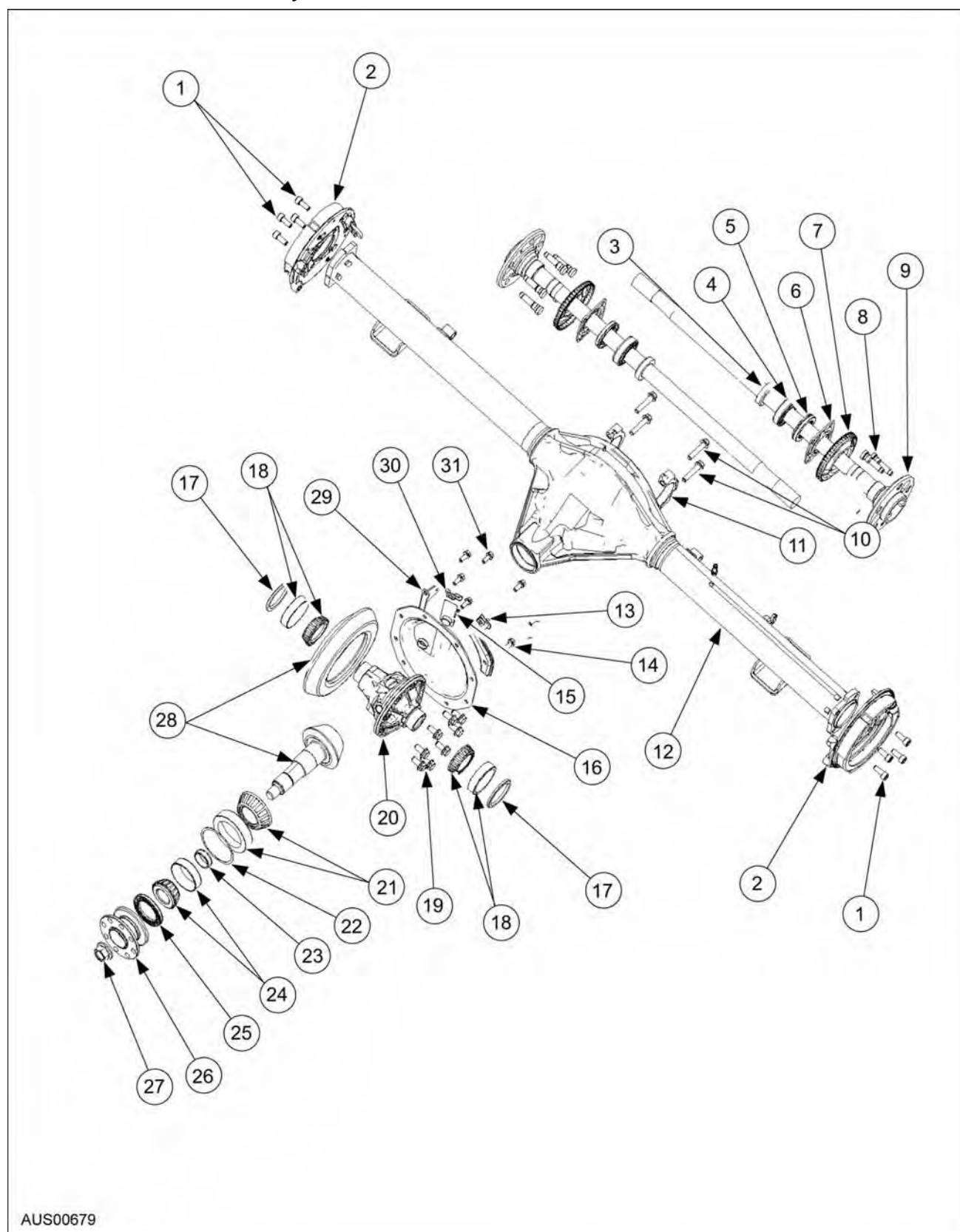
## M86 Beam Rear Axle Assembly



**DESCRIPTION AND OPERATION (Continued)**

Item	Description
1	Axle & brake retaining bolt (8 off)
2	Park brake assembly
3	Inner bearing retainer
4	Axle shaft oil seal
5	Axle shaft wheel bearing
6	Outer bearing retainer
7	ABS tone wheel
8	Wheel Stud (5 off each side)
9	Axle shaft
10	Differential bearing cap bolts (4 off)
11	Differential bearing caps (2 off)
12	Carrier and tube assembly
13	Filler plug & gasket
14	Drain Plug
15	Lubricant tag
16	Rear cover
17	Differential position shim
18	Differential bearing (cup and cone)
19	Ring gear bolt (8 off)
20	Differential case
21	Rear pinion bearing (cup & cone)
22	Pinion position shim
23	Collapsible preload control spacer
24	Front pinion bearing (cup & cone)
25	Pinion oil seal
26	Companion flange assembly
27	Pinion nut
28	Hypoid gear set (Ring gear & pinion)
29	Load level bracket
30	Park brake cable clips (2 off)
31	Rear cover bolts



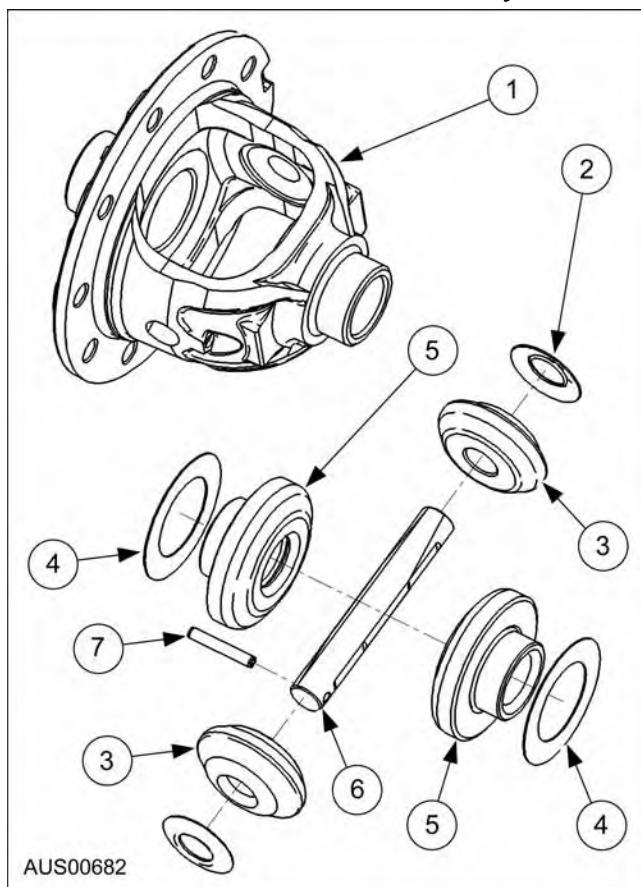
**DESCRIPTION AND OPERATION (Continued)****M80 Beam Rear Axle Assembly**



**DESCRIPTION AND OPERATION (Continued)**

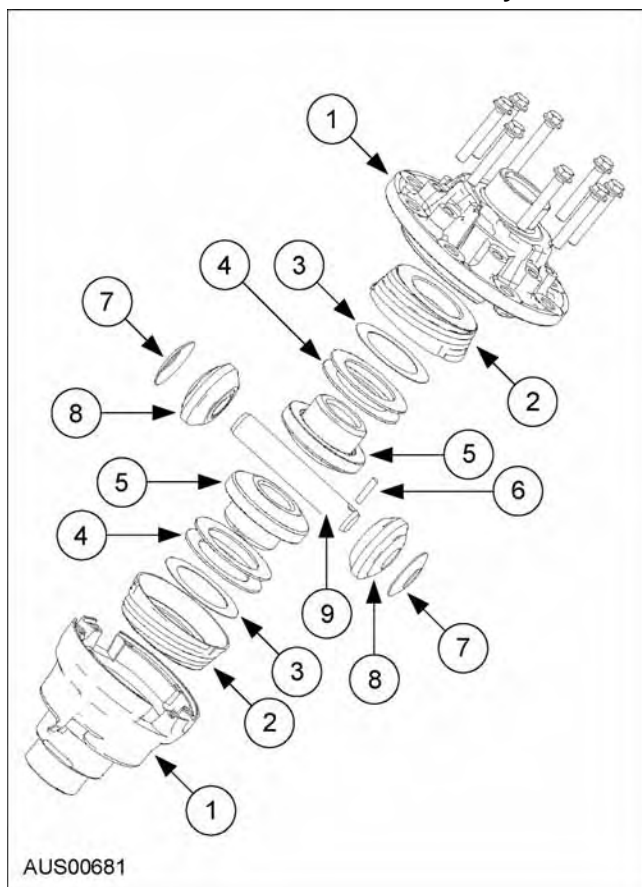
Item	Description
1	Axle & brake retaining bolt (8 off)
2	Park brake assembly
3	Inner bearing retainer
4	Axle shaft oil seal
5	Axle shaft wheel bearing
6	Outer bearing retainer
7	ABS tone wheel
8	Wheel Stud (5 off each side)
9	Axle shaft
10	Differential bearing cap bolts (4 off)
11	Differential bearing caps (2 off)
12	Carrier and tube assembly
13	Filler plug & gasket
14	Drain Plug
15	Lubricant tag
16	Rear cover
17	Differential position shim
18	Differential bearing (cup and cone)
19	Ring gear bolt (8 off)
20	Differential case
21	Rear pinion bearing (cup & cone)
22	Pinion position shim
23	Collapsible preload control spacer
24	Front pinion bearing (cup & cone)
25	Pinion oil seal
26	Companion flange assembly
27	Pinion nut
28	Hypoid gear set (Ring gear & pinion)
29	Load level bracket
30	Park brake cable clips (2 off)
31	Rear cover bolts



**DESCRIPTION AND OPERATION (Continued)****M86 Conventional Differential Assembly**

Item	Description
1	Case
2	Differential pinion thrust washer
3	Differential Pinion
4	Side gear thrust washer
5	Side gears
6	Differential shaft
7	Lock pin



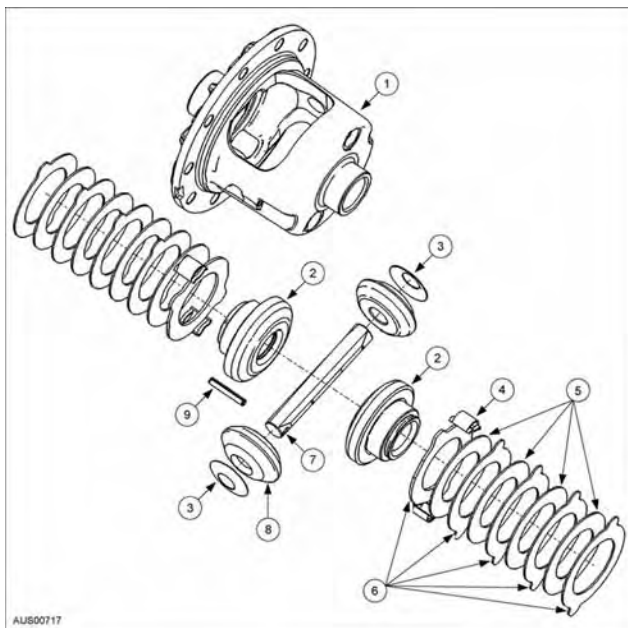
**DESCRIPTION AND OPERATION (Continued)****M80 Conventional Differential Assembly**

Item	Description
1	Case
2	Adjustment Screw
3	Side Gear Thrust Washer
4	Spacers
5	Side Gear
6	Lock Pin
7	Differential Pinion Thrust Washer
8	Differential Pinion
9	Differential Shaft



## DESCRIPTION AND OPERATION (Continued)

### M86 Limited Slip Differential Assembly



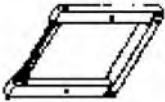
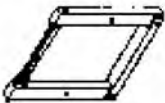




Item	Description
1	Case
2	Side Gear
3	Pinion mate spherical washers
4	Retainer Clip
5	Clutch Disc
6	Clutch Plate
7	Differential Shaft
8	Differential Pinion
9	Roll pin




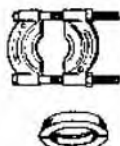

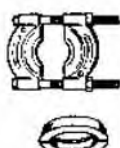



**DIAGNOSIS AND TESTING****Rear Drive Axle / Differential - Beam Axle**

Refer to Section 205-00

**Special Tool(s)**


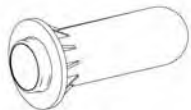


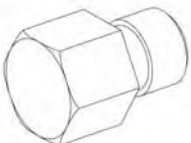
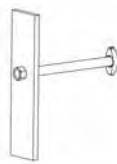
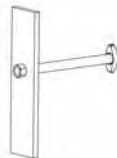
 SSTE9255	<b>Differential Housing Spreader E9255</b>
 SSTE9255	<b>Adaptors differential Housing Spreader E9040</b>
 SST205-406	<b>Kit drive pinion setting gauge 205-406 (E9300A)</b>
 SST205-408	<b>Press bolster 205-408 (E1673MT)</b>
 SST205-408	<b>Push - Puller, includes 6 1/4" (158mm) legs 205-408 (927)</b>
 SST666-777	<b>Stepped plug-remover differential side brg. 666-777 (E1673C16)</b>

**Special Tool(s)**

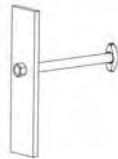

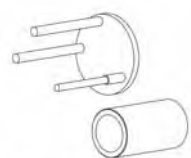

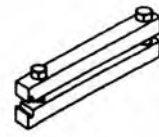
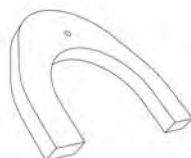
 SST205-408-01	<b>Jaw remover drive pinion rear bearing 205-408-01(E1673A15)</b>
 SST205-410	<b>Knife edge puller 205-410 (1123)</b>
 SST205-411	<b>Installer drive pinion rear bearing 205-411 (E3C10AER)</b>
 SST205-410	<b>Jaw remover differential side bearing 205-410 (E1673H15)</b>
 SST205-412	<b>Installer differential side bearing spline axle 205-412 (E3C25)</b>
 SST205-412	<b>Installer differential side bearing 28 spline axle 205-412 (E9277)</b>
 SST888-300	<b>Base plate remove replace axle bearing 888-300 (E1721)</b>



**DIAGNOSIS AND TESTING (Continued)****Special Tool(s)**

 SST888-300	<b>Remove installer axle bearing and bearing retainer (Alternate)</b>
 SST205-414	<b>Installer drive pinion oil seal 205-414 (E9055)</b>
 SST666-500	<b>Kit - installer drive pinion bearing cups 666-500 (E9271)</b>
 SST888-200	<b>LSD torque check tool 888-200 (7372)</b>
 SST666-000	<b>LSD torque check tool 666-000 (E6662B)</b>
 SST205-415	<b>LSD spline alignment 205-415 (E9293)</b>
 SST205-415	<b>Remover drive pinion bearing cup 205-415 (E9293)</b>

**Special Tool(s)**

 SST205-415	<b>Remover pinion/flange (E9258B)</b>
 SST777-111	<b>Companion flange holder 777-111 (EN1205B)</b>
 SST205-466	<b>IRS wheel bearing and hub remover installer 205-446</b>
 SST205-294	<b>IRS differential plugs 205-294</b>
 SST205-343	<b>Constant velocity boot clamp remover 205-343</b>
 SST205-465	<b>Half shaft removal tool 205-465</b>



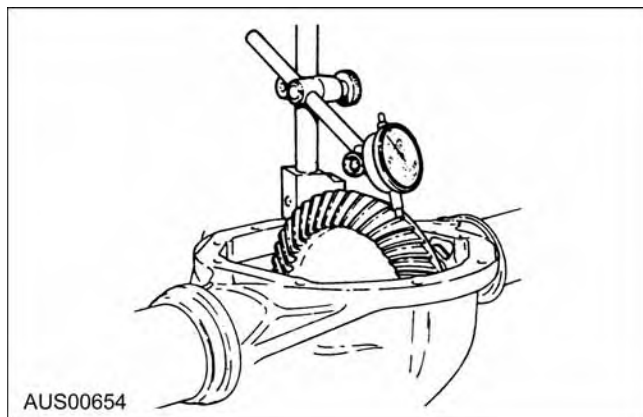
## GENERAL PROCEDURES

### In Vehicle Inspection

**NOTE:** The differential case assembly and the drive pinion should be inspected before they are removed from the housing. These inspections can help to find the cause of the trouble and to determine the corrections needed.

1. Raise the vehicle on a hoist.
2. Check for any external oil leaks. Note location and replace oil seals, gaskets or breather hoses as required to fix the leak(s).
3. Drain the lubricant by carefully removing the lower cover bolt which is the drain plug. Clean the area immediately around the rear cover of all loose dirt and contaminants.  
**NOTE:** When replacing the drain plug, clean the thread of old thread sealant (Loctite Dri-Loc 202 or similar) and reapply to ensure that the plug seals correctly.
4. Remove the rear cover. Scrap the rear cover gasket off the carrier cover mounting surface, making sure that no dirt is allowed to enter the carrier housing.
5. Wipe the lubricant from the internal working parts, and visually inspect the parts for wear or damage.
6. Rotate the gears to see if there is any roughness that would indicate defective bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear.
7. Check the differential case and the drive pinion for end play.
8. Set up dial indicator and check points around drive gear. Backlash should be 0.10 to 0.18 mm at tightest point.

#### Ring Gear Backlash Check (Typical)

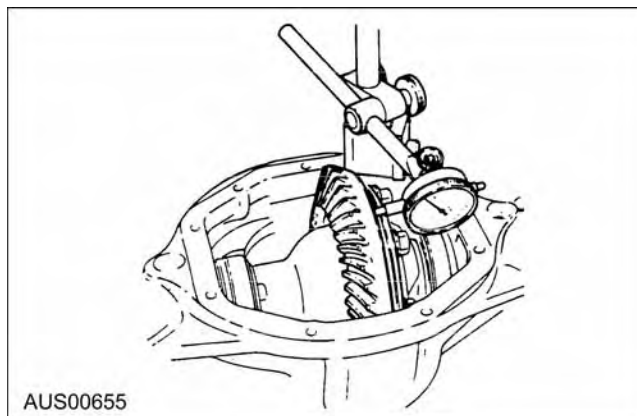


9. If no obvious defect is noted, check the gear tooth contact. Paint the gear teeth with suitable gear marking compound, such as a Henkel 39SY201 Yellow Gear Marking Compound or similar. Too dry a mixture cannot be pressed out from between the teeth. Wrap a cloth around the companion flange to act as a brake. Rotate the ring gear back and forth (use a box wrench on the drive gear attaching bolts for a lever) until a clear tooth contact pattern is obtained (approximately three full revolutions in both directions).

**NOTE:** A mixture that is too wet will run and smear.

10. Certain types of gear tooth contact patterns on the drive gear indicate incorrect adjustment. Noise caused by incorrect adjustment can often be corrected by re-adjusting the gears. Typical patterns and the necessary corrections are explained in Section 308-03.
11. Gear tooth runout can sometimes be detected by an erratic pattern on the teeth. However, a dial indicator should be used to measure the runout of the back face of the ring gear, as shown. This runout should not exceed 0.13 mm.

#### Ring Gear Runout Check (Typical)



### Beam Axle Oil Change

1. Raise the vehicle so that it remains completely level.
2. Remove the bottom rear cover flanged bolt from the beam axle to drain oil.  
**NOTE:** It is preferable to drain the oil while it is warm so that any wear debris can drain out more easily.
3. Apply thread sealant compound (eg. Loctite Dri-Loc 211 or 202) to the cover bolt, refit and tighten to 23-31 Nm.
4. Remove the filler plug located on the rear cover.
5. Fill the beam axle with the appropriate lubricant (Refer to Specifications section).
6. Replace filler plug and tighten to 35-40 Nm. Use an appropriate thread sealant required.



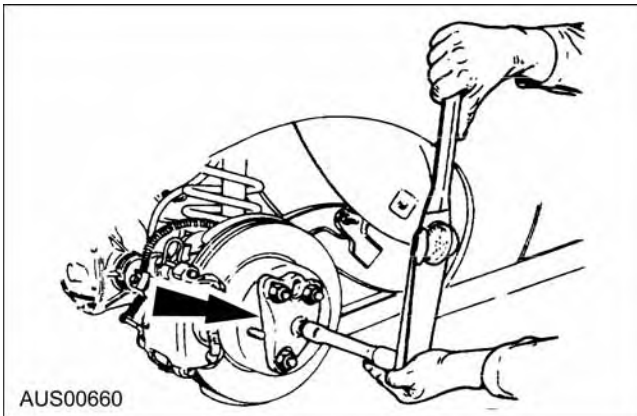
## GENERAL PROCEDURES (Continued)

### Flange Runout Check

1. Raise the vehicle on a hoist with the wheels unsupported. Disconnect the drive shaft from the drive pinion flange after marking the drive shaft and pinion flange to ensure correct radial positioning on re-assembly. (Refer Section 205-01.)
2. Using a dial indicator mounted in the carrier housing, check the mounting face runout and the radial runout of the drive pinion flange. Refer to Specifications section for applicable runout limits.

### In Vehicle Torque Check

1. To test the Limited Slip Differential (LSD) for correct operation proceed as follows:
  - Drive vehicle 10 km to warm up axle oil.
  - Chock the front wheels.
  - Raise the rear of the vehicle, remove one rear wheel and attach the Special Tool No. E6662B.
  - Lower the rear of the vehicle to simulate normal ride height.
  - Place the transmission in neutral and release the park brake.
  - Ensure that there is no brake drag affecting wheel rotation.
  - Attach a torque meter to the special tool, and rotate the axle.
2. The torque required to rotate the axle shaft for a used LSD unit is detailed in the Specifications section.



3. If the torque required to continuously rotate the wheel is outside the specification check the differential for improper assembly and/or rework.

### Limited Slip Differential - M86 Check

**⚠ CAUTION:** Never place the transmission in gear with the engine running when only one wheel of a limited slip differential equipped vehicle is raised. The vehicle might drive itself off the jack and cause damage or injury.

1. The LSD construction permits differential action when required for turning corners and transmits equal torque to both wheels when driving straight ahead. However, when one wheel tries to spin due to leaving the ground, a patch of ice, etc., the clutch packs automatically provide more torque to the wheel which is not trying to spin.
2. The LSD differential resists wheel spin on bumpy roads and provides more pulling power when one wheel tries to slip. In many cases of differences in traction, pulling power will be automatically provided until both wheels start to slip.
3. In diagnosis of vehicle operators' complaints, it is important to recognise two things:
  1. If, with unequal traction, both wheels slip, the LSD has done all it can possibly do.
  2. In extreme cases of differences in traction, the wheel with the least traction may spin after the LSD has transferred as much torque as possible to the non-slipping wheel.
4. If noises or roughness, such as chatter, are present during cornering, the probable cause is incorrect or contaminated lubricant (Refer Specification section for recommended axle lubricants and additive). Before any differential is removed and disassembled for chatter complaints, the correctness of lubricant can and should be determined.
5. To confirm the problem, warm up the axle for ten (10) kms under normal driving conditions and then make a minimum of ten (10) figure 8 turns. If the unit chatters then replace the axle lubricant with new lubricant. If after changing the lubricant and repeating the above figure 8 procedure, the chatter continues, a complete lubricant drain, flush and refill is required.
6. The following procedure is recommended to ensure flushing the system of old lubricant.
  1. Warm the axle lubricant for ten (10) kms under normal driving conditions.
  2. Drain lubricant while warm.
  3. Refill axle with specified Limited Slip Differential lubricant and/or additive.
  4. Drive the vehicle for approximately ten (10) kms, making at least ten (10) figure 8 turns to flush the old lubricant out of the differential.
  5. Repeat Steps 2, 3, and 4.
  6. It is possible that slight chatter, requiring additional vehicle operation may remain after Step 5. If chatter still persists after one hundred (100) kms of vehicle operation, or remains severe after Step 5 above, disassembly and repair will be necessary. Follow procedures for disassembly and assembly as illustrated in the manual.

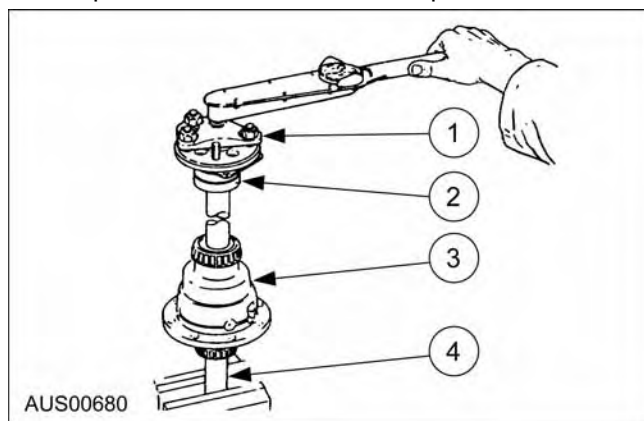




## GENERAL PROCEDURES (Continued)

### Limited Slip Differential Torque Check

1. Clamp Special Tool or an axle shaft in a vice with approximately 75mm of the splined end extending above the vice jaws.
2. Place the differential unit on its end with the flange section above the cap section. Place over the extended tool/ axle shaft spline.
3. Install the remaining part of Special Tool or an axle shaft, into the flange section of the case.
4. Using Special Tool E6662 check that the torque required to continuously rotate the side gears is as per the values listed in the Specifications.

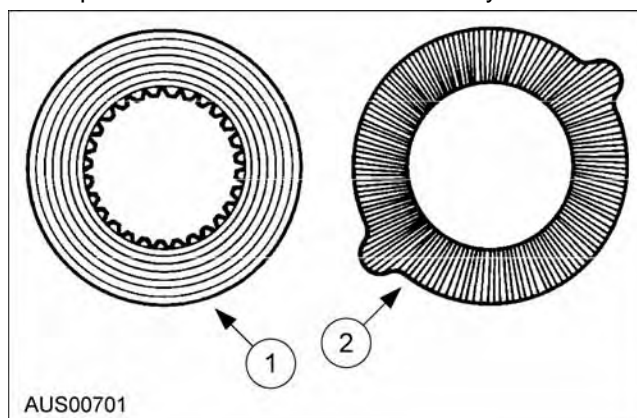


Item	Description
1	Tool E6662-LSO Torque check
2	Axle shaft bearing
3	Differential assembly
4	Axle shaft

**NOTE:** LSD units that operate smoothly but with excessively low torque should be checked as per the Inspection for Wear sections.

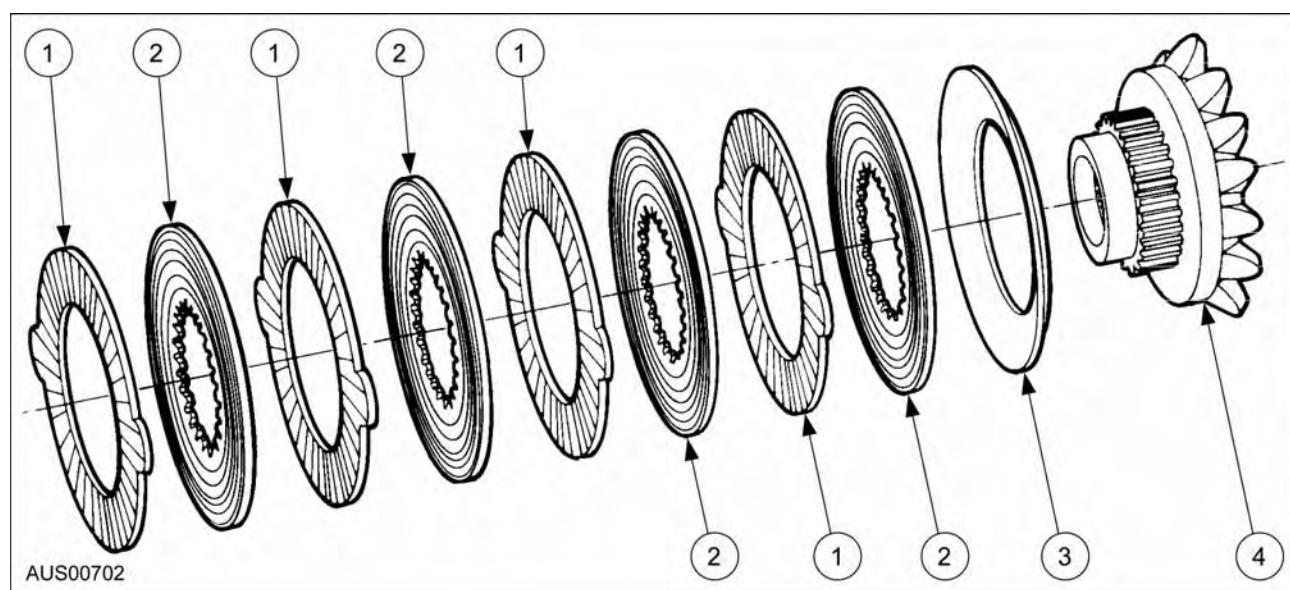
### Limited Slip Differential - M86 Inspection for Wear

1. Plates and discs - If any one member of either stack shows evidence of excessive wear or scoring, the complete stack is to be replaced on both sides.
2. Side gears and pinion mate gears - The gear teeth of these parts should be checked for extreme wear and possible cracks. The external teeth of the side gear, which retain the concentric groove discs, should also be checked for wear or cracks.
3. If replacement of one gear is required due to wear, etc., then both side gears, pinion mate gears, and washers are to be replaced.
4. Cross Pin - If excessive wear is evident, the cross pin should be replaced.
5. Clutch Retainer Clips - If wear is evident on any one of the retainer clips, all four clips must be replaced.
6. Differential Case - If scoring, wear or metal pick-up is evident on the machined surfaces, then replacement of the case is necessary.



Item	Description
1	Concentric groove disc
2	Radial groove plate



**GENERAL PROCEDURES (Continued)**

Item	Description
1	Plate
2	Disc
3	Dished spacer
4	Side gear



## IN-VEHICLE REPAIR

### Pinion Oil Seal Replacement

**NOTE:** Refer to Special Tools in this section.

#### Removal

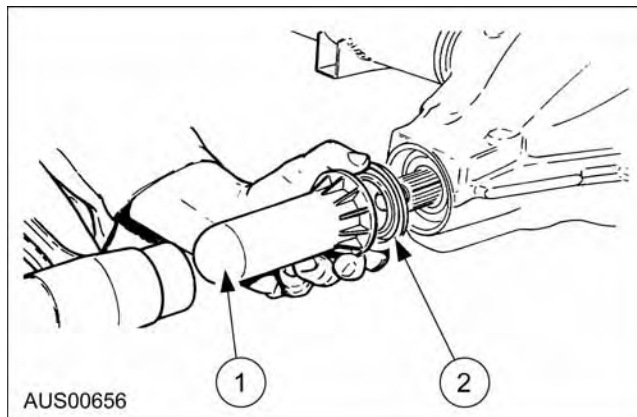
1. Raise the vehicle on a hoist. Disconnect the drive shaft from the drive pinion flange after marking the drive shaft and pinion flange to ensure correct radial positioning on re-assembly. (Refer to Section 205-01.)
2. Mark the pinion flange and the pinion nut to establish bearing preload on re-assembly.
3. Hold the pinion flange using tool EN1205B and remove the self locking nut. As Loctite is used on the pinion nut, the torque required to release the nut will be greater than 200Nm.
4. Place a drain pan beneath the pinion housing.
5. Mark the ends of the pinion shaft and a pinion flange spline for correct re-alignment during installation.
6. Clean the pinion bearing housing around the oil seal to remove loose dirt and oil so that it does not fall into the front of the carrier housing during the removal or replacement procedure.
7. Remove the pinion flange using tool number E9258B. Under no circumstances should a hammer be used.
8. Remove the pinion oil seal by carefully prying it out with a suitable tool.

#### Installation

**NOTE:** All hardware must be correctly installed and torqued to specification.

1. Check the mating splines on the pinion shaft and pinion flange for burrs and if necessary clean up with fine crocus cloth. Wipe the flange and shaft clean. Remove any Loctite thread locking compound from the pinion nut of flange thread.
2. Clean the oil seal seat. The lubricant return passage in the axle housing must be clear.
3. Lubricate the seal lips and the outside diameter with oil and install the seal, using the correct special tool. Seal location is from flush to 0.25 mm below the machined carrier face.
4. Align the pinion flange spline mark with the pinion shaft spline mark and start the flange onto the pinion splines by hand. A smear of lubricant on the pinion splines will assist in installation.
5. Install the pinion nut onto the pinion thread (without Loctite) and wind the nut down to pull the flange onto the pinion spline until no axial end play can be detected by hand in the pinion assembly. Remove the pinion nut.
6. Apply Loctite 262 Liquid Threadlocker to the pinion thread and reinstall the nut, tightening to 100Nm.

7. Continue to tighten the nut until the marks previously made on the pinion flange and the nut are in alignment to re-establish the pinion bearing preload.
8. Install the driveshaft with the marking on the drive shaft and the pinion flange in alignment. (Refer to Section 205-1.)
9. Check axle lubricant level and top up if necessary with specified lubricant.
10. Remove the vehicle from the hoist.



Item	Description
1	Oil seal installation Tool E9055
2	Drive pinion oil seal

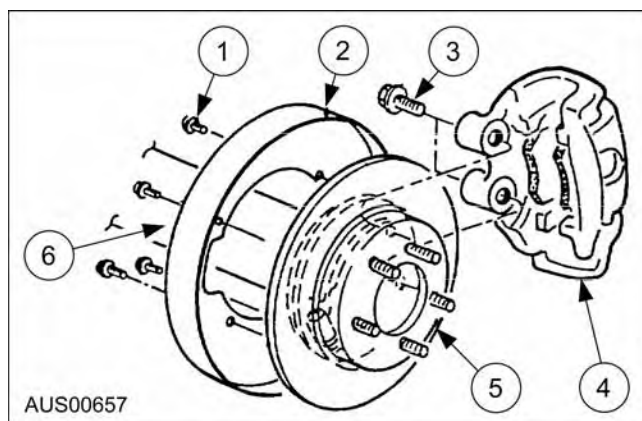


## REMOVAL AND INSTALLATION

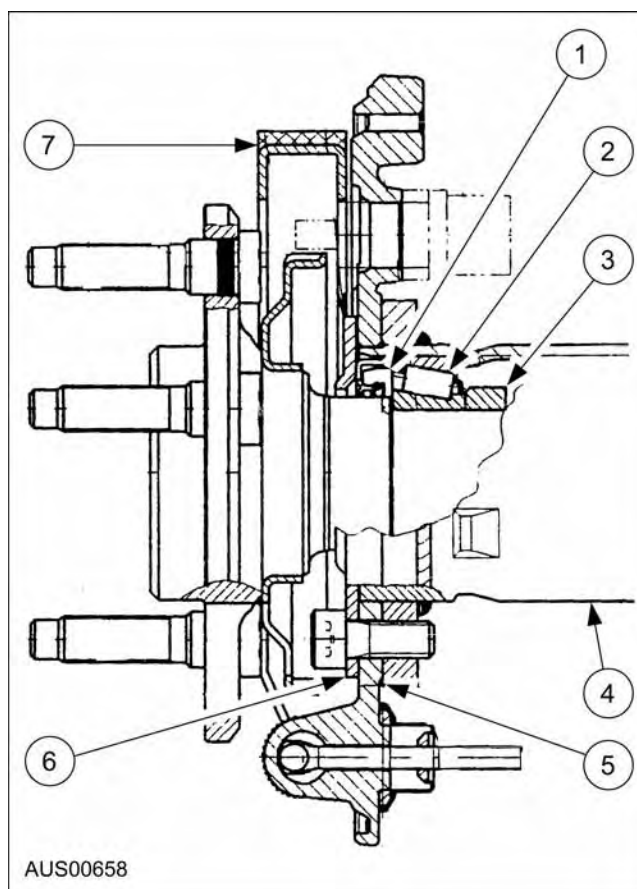
### Axle Shaft Assembly

#### Removal

1. Raise the vehicle and remove the road wheel.  
(Refer to Section 100-02.)
2. Disconnect the park brake cable from the park brake and remove from axle. (Refer to Section 206-05.)  
Remove the caliper.  
Remove ABS sensor (if ABS fitted).  
Remove the disc from the axle flange.  
**NOTE:** If ABS is fitted, take care not to damage tone wheel.
3. Working through the access hole in the axle flange using an allen key to remove the four bearing retainer plate bolts.
4. Withdraw the axle shaft and bearing assembly.  
**NOTE:** The bearing cup typically may be loose in the axle housing or may fall out on axle disassembly. Friction surfaces of brake parts must be kept contamination free.



Item	Description
1	Score - M6
2	Shield
3	Bolt - M12
4	Caliper
5	Rotor
6	Asle Assy.



Item	Description
1	Seal
2	Bearing assembly
3	Bearing retaining collar
4	Axle housing
5	Brake anchor bracket
6	Bearing retainer plate
7	Tone wheel (ABS)

#### Installation

**NOTE:** All hardware must be correctly installed and torqued to specification.

**NOTE:** Friction surfaces of brake parts must be kept contamination free.

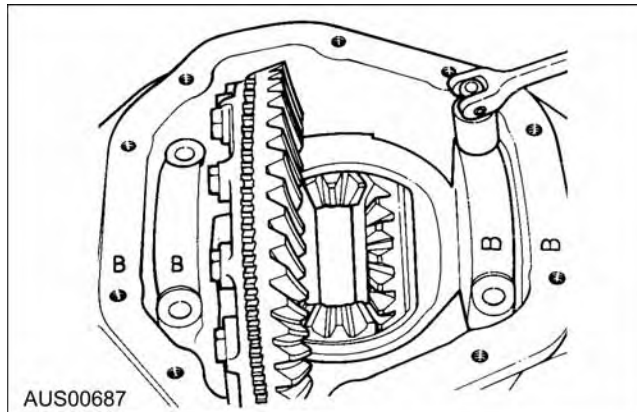
1. If the bearing cup was previously removed install the bearing cup in the axle housing.  
**NOTE:** A new bearing should always be used if the axle oil seal, retaining collar, retaining plate or tone wheel have been replaced. Ensure that the cup back face is seated against the back shoulder in the housing. The bearing must be lubricated with axle lubricant before installation. Also, apply a film of MIC75B Grease to the outside diameter of the seal prior to installation. Refer to Rear Axle Bearing And Seal Replacement section for how to service the axle assembly once removed from the tube housing.



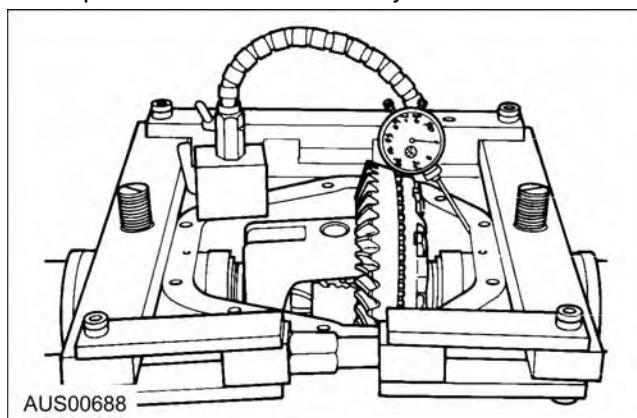
## REMOVAL AND INSTALLATION (Continued)

2. Start the splined end of the shaft into the differential and start the bearing cone assembly and seal into the housing.
3. Line up the retaining plate to the retaining plate bolts and push the axle into the housing as far as possible.
4. Start the bolts onto the tube flange holes and tighten to finger tight only. Then tighten the bolts to 20 Nm in a diagonal sequence. The bolts should be tightened in such a manner to assure that the seal and bearing cone assembly are drawn evenly against the cup in the housing. Refer to Specifications section for tightening torque required on retaining plate bolts.
5. Install the disc on the axle flange. Install the brake caliper. Route the park brake cable and connect to park brake. (Refer to Section 206-05.) Replace ABS sensor (if fitted).
6. Replace the road wheel and lower the vehicle.
7. Tighten the wheel nuts. (Refer to Section 204-04.)
8. Check the park brake adjustment. (Refer to Section 206-05.)

3. Remove cover plate screws, cover plate. Clean sealant from cover faces.

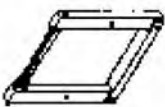


4. Remove differential bearing caps. Note letters stamped on the bearing caps and the cover face of the housing. Letters are to correspond in horizontal and vertical positions. This is very important at time of assembly.



## M86 Limited Slip Differential

### Special Tool(s)

 <p>SSTE9255</p>	<p><b>Spreader E9255</b></p>
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Indicator Set or Equivalent

### Removal

**NOTE:** On Dana Spicer axles it is recommended that the complete axle assembly be removed from the vehicle when it becomes necessary to remove the M86 LSD from the housing.

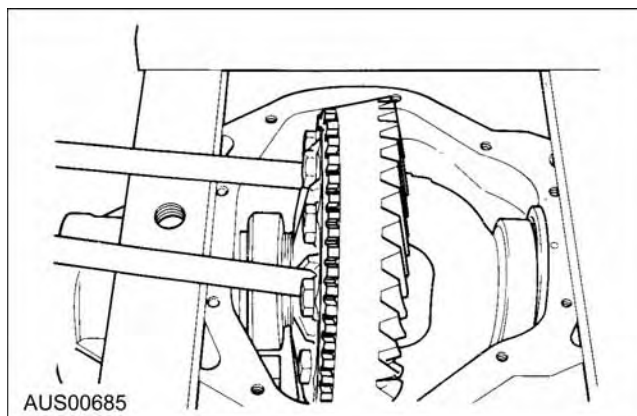
1. Remove wheels, brake drums, brake backing plate screws and axle shafts. Brake backing plates can normally be wired to frame without loosening the hydraulic brake line connection at the wheel cylinder if desired. Use caution to avoid damage to brake line.
2. Remove axle assembly and place in rack or stand to serve as a holding device.

5. Mount spreader to housing. Locate a dial indicator with a magnetic base on cover face as shown. Locate tip of indicator on housing as shown.
6. Set dial indicator at zero ("0"). Turn forcing screw of spreader until indicator records .015" (.38 mm).



**CAUTION: Do not spread carrier in excess of .015" (.38 mm).**

7. Remove Indicator.



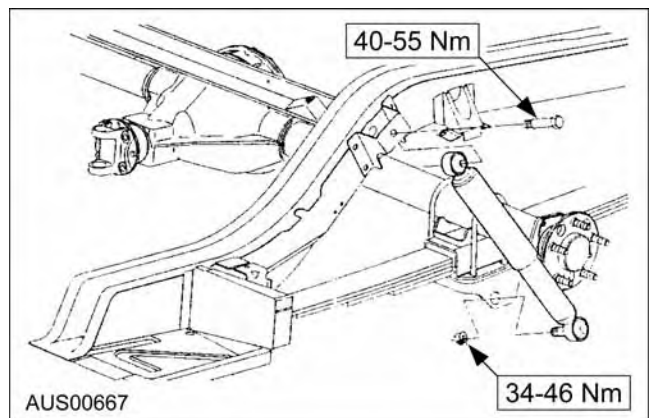
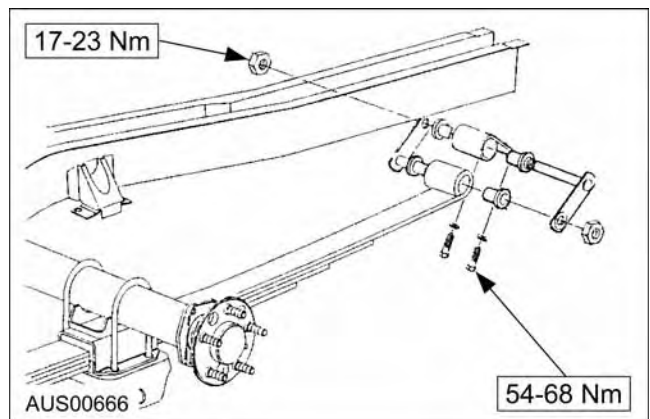
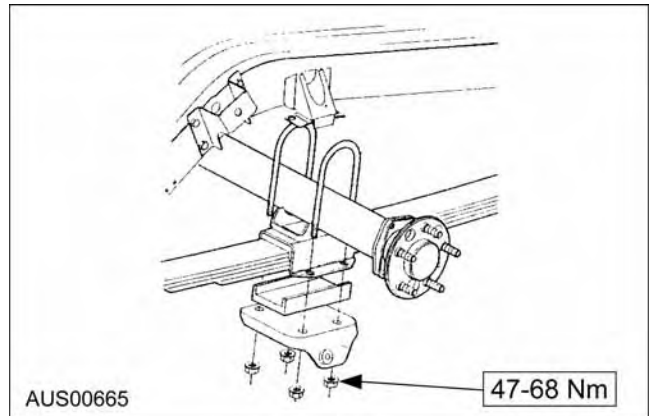
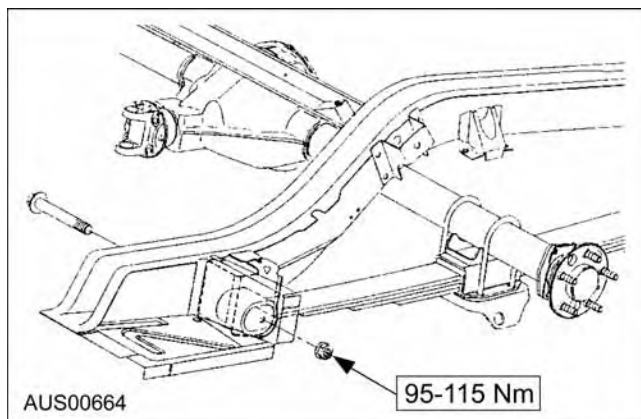
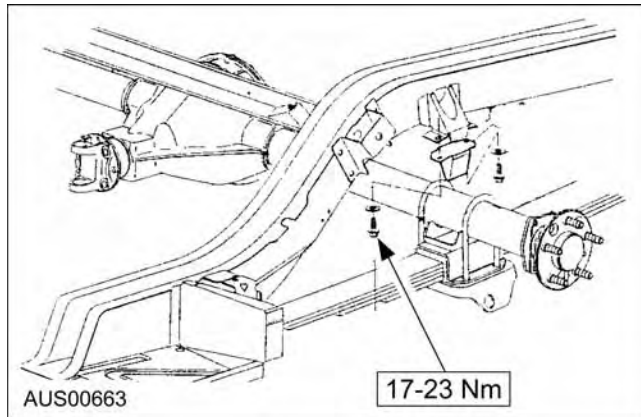
## REMOVAL AND INSTALLATION (Continued)

8. Remove differential using two pry bars as shown. Use caution to avoid damage to ring and pinion. It will not be necessary to remove the differential bearings at this time, however, the bearing cups should be marked or tagged to indicate from which side of the case they were removed. After differential case has been removed, remove spreader.

### Axle Housing and Differential Assembly

#### Removal

1. Loosen the rear wheel nuts.
2. Raise the vehicle and support it on the axle.
3. Remove the rear wheels.
4. Support the vehicle on the underbody. Refer to Section 100-02.
5. Detach the shock absorbers from the spring plates as follows.



6. Mark the relationship of the driveshaft and the pinion flange and disconnect the driveshaft from the pinion. Refer to Section 205-01.
7. Detach the park brake cable from the drum (park) brake and remove from rear axle. Refer to section 206-05.
8. Remove the callipers and suspend from the underbody. Leave hydraulic lines attached. Refer to Section 206-04.
9. Remove the rear discs. Refer to Section 206-04.
10. Remove the ABS sensor (if fitted). Refer to Section 206-09.
11. Remove the splash shields. Refer to Section 206-04.



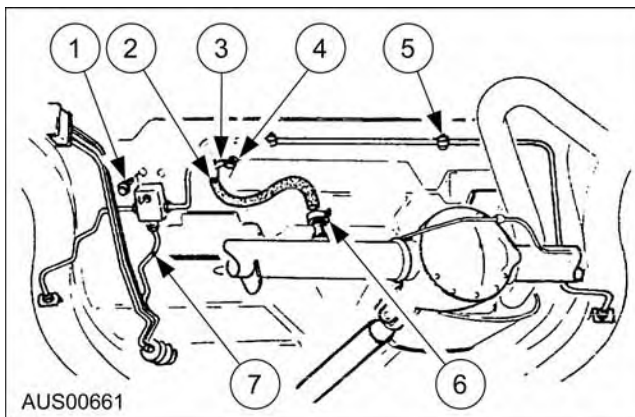
## REMOVAL AND INSTALLATION (Continued)

12. Remove the axle shafts as described in this chapter.
- NOTE:** Do not strain the brake lines and/or hoses.
13. Remove the "U" bolts, spring plates and lower spring insulator. Refer to Section 204-02B.
14. Remove the axle housing from the vehicle.
15. Drain the oil from the axle housing through an axle tube.

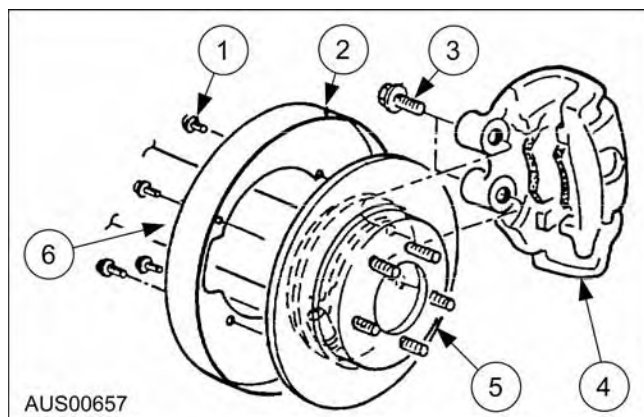
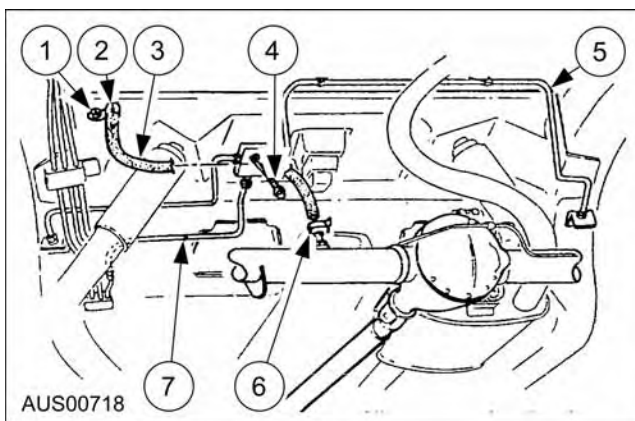
### Installation

1. Position the axle housing on the springs. Ensure that the insulator are correctly located on the springs. Install the "U" bolts, spring plates and lower spring insulator. Refer to Section 204-02B.
2. Install the axle shafts as described in this section.
3. Install the splash shields. Refer to Section 206-04.
4. Install the ABS sensor (if fitted). Refer to Section 206-09.
5. Install the rear discs. Refer to Section 206-04.
6. Install the rear callipers. Refer to Section 206-04.
7. Route the park brake cable and connect to the rear drum (park) brake. Refer to Section 206-05.
8. Align the marks of the driveshaft and pinion flanges and connect the driveshaft. Refer to Section 205-01.
9. Raise the rear axle and install the lower shock absorber to the spring plate. Refer to Section 204-02B.
10. Install the rear wheels.
11. With the vehicle in the curb load position fill the axle to the bottom of the filler plug hole with the correct oil.
12. Lower the vehicle and tighten the wheel nuts. Refer to Section 204-04.
13. Check park brake adjustment. Refer to Section 206-05.

Item	Description
4	Caliper
5	Rotor
6	Axle Assy.

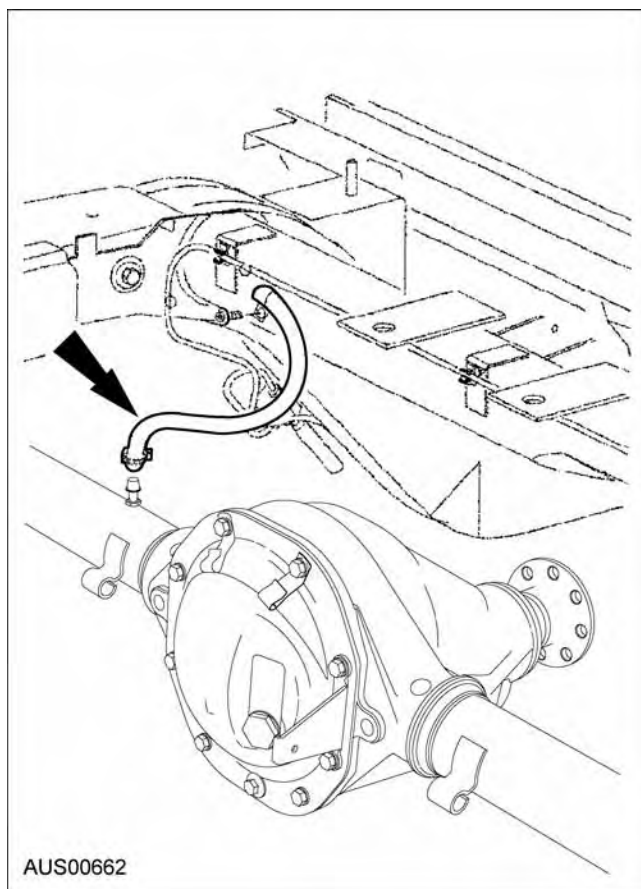


Item	Description
1	Screw (Torque to 6Nm)
2	Tube - Rear axle housing vent
3	Clip
4	Screw
5	Clip
6	Clamp
7	Tube assy. - Brake fluid



Item	Description
1	Screw - M6
2	Shield
3	Bolt - M12



**REMOVAL AND INSTALLATION (Continued)**

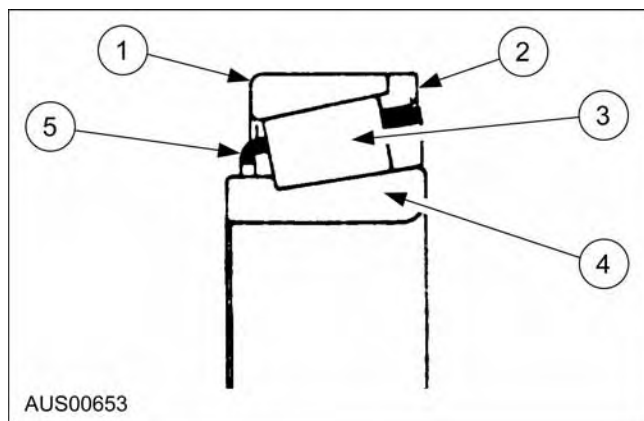


## DISASSEMBLY AND ASSEMBLY

### Rear Axle Wheel Bearing and Seal Replacement

**NOTE:** Refer to special tools in this section.

**NOTE:** When a bearing is replaced a complete assembly must be installed. Bearings are manufactured with a built-in adjustment of 0.25 to 0.53 mm "bench" end play or axial clearance. This "bench" end play is reduced when the bearing is pressed on the axle shaft. The final assembled end play on the shaft of 0.04 to 0.5 mm is dependent on the dimensions of the interference fit between the cone and the axle shaft. The standard recommended cone fit is 0.025 to 0.055 mm tight. The cups are a snug fit in the housing. Used bearings may have a maximum of 0.7 mm end play.



Item	Description
1	Cup
2	Cup rib ring
3	Rollers
4	Cone
5	Cage

1. The bearing is held on the shaft by the interference fit of the bearing cone and the retaining collar. The cup and rib ring are clamped together in the axle housing through the seal by the retaining plate. The axle seal wipes on the rotating axle shaft and at the same time functions as a static seal to prevent lubricant from escaping between the housing and seal outside diameter.
2. It is important to note that the seal also acts as a "spacer" in the clamp up of the bearing in the axle housing. It is imperative that the specified seal is used.
3. The bearing cone assembly should not be pulled from the axle shaft unless:
  1. The seal is to be replaced.
  2. The retaining plate has to be replaced due to damage or distortion.
  3. The bearing is to be replaced.

4. A used bearing assembly should have all parts completely covered with rear axle oil prior to re-installation into the axle housing. Quarter fill the cavity between the seal lips with grease.

#### Disassembly

1. Remove the retaining collar. This can be easily achieved by drilling a 6 mm hole in the outside diameter of the collar to a depth approximately three-quarters of the thickness of the collar. Do not drill all the way through the collar as the drill could damage the axle shaft, necessitating replacement of the shaft. After drilling the retaining collar, position a chisel across the drilled hole and strike sharply to break the collar. Support the shaft on the collar opposite the drilled hole.

**NOTE:** Retaining collars are not reusable after having once been installed and must be scrapped after removal even if some removal method is used which does not cause obvious damage to the collar.

2. Slide the retaining plate and seal toward the axle flange.
3. Using special tools, press the bearing from the shaft. The special tools support the bearing behind the bearing cone face and prevent damage to the bearing and the seal surface of the shaft.

**NOTE:** Do not heat or cut the bearing assembly as damage to the axle shaft will result.

4. Likewise, using special tools, press the tone wheel from the shaft being careful to avoid damaging the tone wheel location diameter shaft surface.

#### Assembly

1. When installing new bearings, new seals and retaining collars must be used.
2. Check the retaining plate for damage or distortion with a straight edge. If the plate is distorted, replace it.
3. Clean the axle shaft, ensuring that there are no burrs or nicks on the tone wheel location diameter surface, bearing seat, seal surface, cone backing shoulder and chamfer leading to the seal seat. Sharp edges or nicks on the chamfer leading to the seal surface will damage the seal lips during installation of the seal on the shaft. To avoid damage to the wheel studs, place the axle shaft flange face on a support.

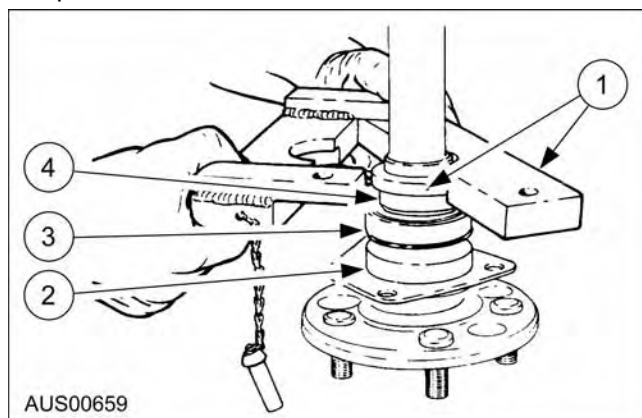


## DISASSEMBLY AND ASSEMBLY (Continued)

4. Using Special Tools, press the tone wheel onto the axle shaft so that it is seated hard against the flange shoulder.

**NOTE:** Ensure that the large access hole in the tone wheel is aligned with the large access hole in the axle shaft flange before pressing to ensure tool access for installation of the retaining plate bolts during reassembly of the axle shaft assembly into the tube assembly is maintained. Refer to Figure for tone wheel orientation for pressing. Check for proper seating of the tone wheel on the axle shaft by checking with feeler gauges.

5. Install the retaining plate on the axle shaft, ensuring that it is positioned with the clamping face of the plate towards the bearing. Apply grease to the cavity between the seal lips and carefully slide the seal into position on the seal seat. When installed, the outer face of the seal must be toward the axle flange.
6. Do not wash a new bearing prior to installation. The new bearing has protective grease that provides initial lubrication until the rear axle lubricating oil reaches the bearing. If the new bearing has to be washed for any reason, it must then be completely lubricated with rear axle oil prior to installation.



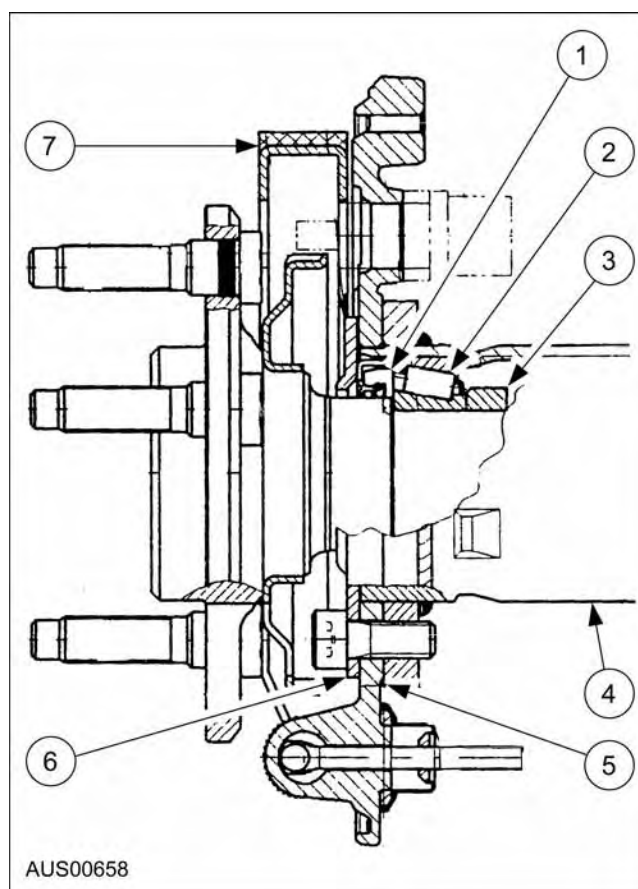
Item	Description
1	Tool E1721 - Remove/Installer axle bearing and bearing retainer (Collar)
2	Seal
3	Bearing
4	Bearing retainer (Collar)

7. Place the lubricated bearing on the axle shaft ensuring the cup rib ring is facing toward the axle flange and that the bearing is in hard contact with the axle shaft shoulder.
8. Clean the journal diameter of any grease that may have been left on the shaft during the pressing of the bearing.

9. Install a new retaining collar on the axle shaft and press it down to ensure it is in contact with the bearing cone assembly.

10. Press the bearing and the retaining collar on the axle shaft simultaneously using the relevant special tool. Apply sufficient load to assure the proper seating of all parts. Check for proper seating of the bearing cone assembly against the shaft shoulder and the retaining collar against the cone face by using feeler gauges.

**NOTE:** When pressing the bearing and retaining collar on to the axle shaft, be sure all faces of the installation tubes are square, parallel and free from any burrs. Installing the retaining collar in a skewed manner can reduce its holding ability by as much as 50%.



Item	Description
1	Seal
2	Bearing Assembly
3	Bearing Retaining Collar
4	Axle Housing
5	Brake Anchor Bracket
6	Bearing Retaining Plate
7	Tone Wheel (ABS)



## DISASSEMBLY AND ASSEMBLY (Continued)

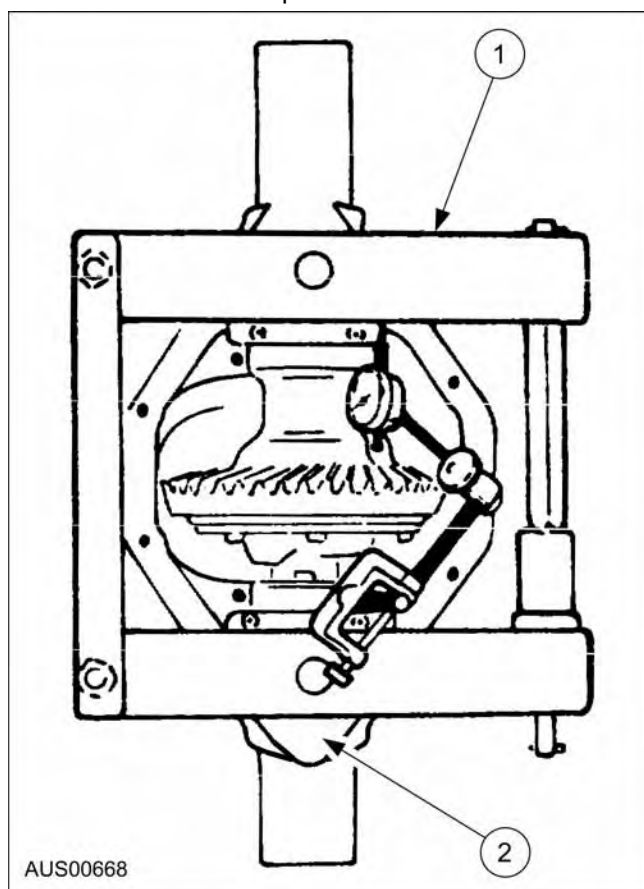
### Differential and Drive Pinion

**NOTE:** Refer to special tools in this section.

#### Disassembly

**NOTE:** All hardware must be correctly installed and torqued to specification.

1. Remove the axle shafts as described previously in this section.
2. Loosen the cover plate attaching bolts and drain the oil. The lowest cover bolt is a drain plug. Remove the cover plate.



Item	Description
1	Tool E9255 - Differential housing spreader
2	Tool E9255 - Adaptor Differential housing spreader

3. Refer to General Procedures for Inspection before removal.
4. Identify the bearings, caps and remove the bearing cap bolts and bearing caps.

5. Use the differential housing special spreading tool to facilitate the removal of the differential case, bearings and spacers. Spread the carrier the minimum amount which will allow the removal of the differential assembly. Usually 0.1 to 0.2 mm will be adequate. (Spread is measured across the carrier adjacent to the bearings.)



**CAUTION:** Under no circumstances should the carrier be spread more than 0.5 mm.

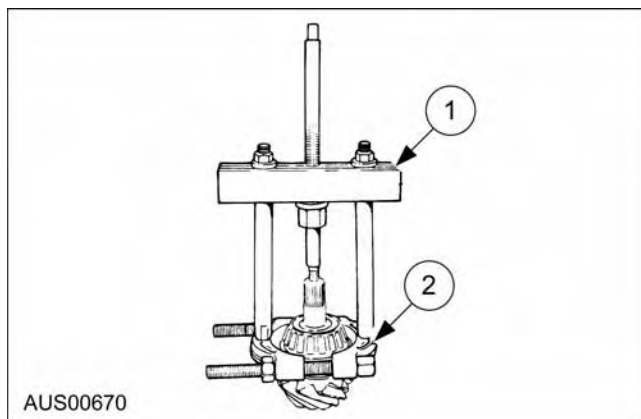
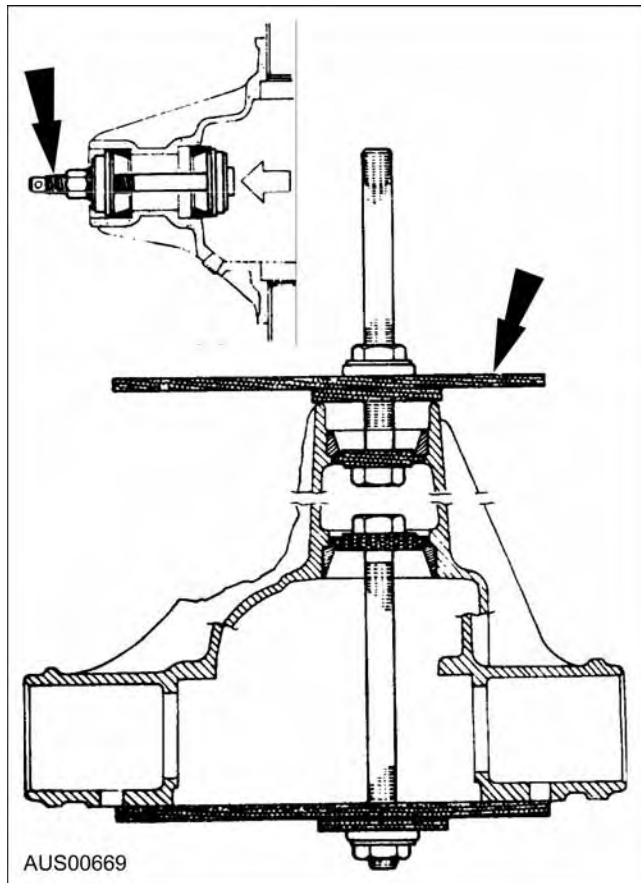
6. Mark the relationship of the driveshaft and the pinion flanges and disconnect the driveshaft. (Refer to Section 205-01.)
7. Mark the relationship of the pinion flange to the pinion shaft. Hold the pinion flange and remove the pinion nut.
8. Remove the pinion flange.
9. With a soft-faced hammer, drive the pinion out of the front bearing cone and remove it through the rear of the carrier casting.
10. Drive the pinion flange seal and the bearing cone out of the carrier casting.
11. If the pinion bearing cups are to be replaced, remove them from the carrier using the special tool.

**NOTE:** It is essential to renew the cups one after the other so that in each instance the other cup serves as a guide for the replacer tool.

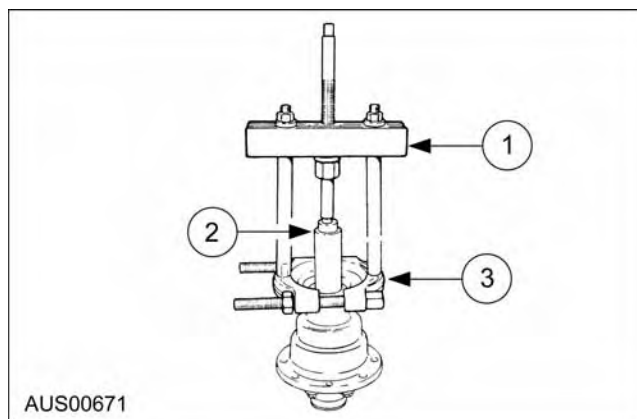


## DISASSEMBLY AND ASSEMBLY (Continued)

12. If the pinion rear bearing cone and roller is to be replaced, lubricate the pinion shaft and remove the bearing cone from the pinion. Discard the bearing whenever it has been removed from the pinion.



Item	Description
1	Tool - Push/puller with legs
2	Tool - Knife edge puller

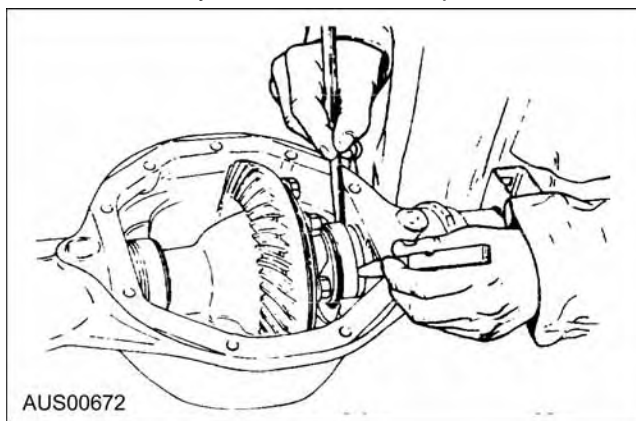


Item	Description
1	Tool - Push/puller with legs
2	Tool - Stepped plug
3	Tool - Knife edge puller

### Differential Bearing Preload Spacer Selection

**NOTE:** Refer to special tools in this section.

1. Select any two spacer washers and place one against each of the differential bearing cups. Place the cups on the bearing cones and install the differential assembly in the carrier. When installed, there should be a small amount of end play.
2. With the differential held firmly against one side of the carrier, use a feeler gauge on each side of the centre line of the case to measure the end play between the cup and the spacer. Rotate the carrier to seat the bearing with the feeler gauges in position, and check to see that the end play has not been increased by this procedure. Remove the assembly and measure the spacers.

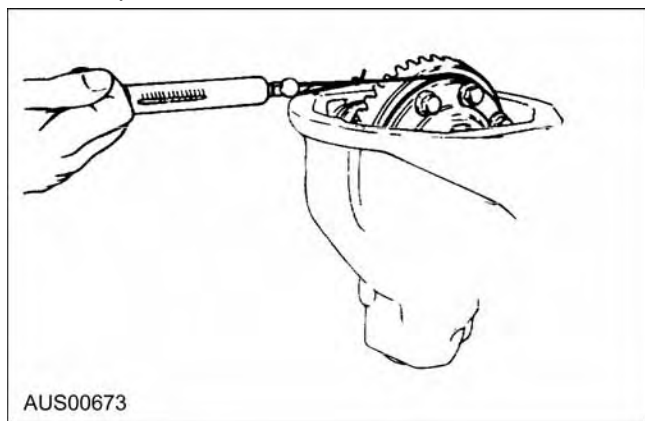


3. To establish the thickness of the spacers required:- Total the thickness of the two spacers - Add the gap measured with the feeler gauges. Add 0.15 mm when using new bearings or 0.1 mm when using used bearings to preload the bearings.



## DISASSEMBLY AND ASSEMBLY (Continued)

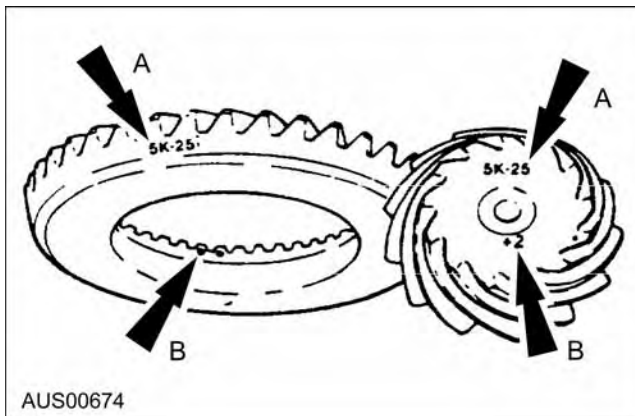
4. Select two spacers, each half the thickness of the value determined in Step 3.
5. Fit the carrier spreader adaptors and the spreader to the carrier, together with a dial indicator positioned over the carrier differential opening, as close as possible to the centre line of the axle shafts. This may be done by using a pilot stud screwed into the side bearing lower stud hole, with the dial indicator plunger in contact with the opposite side of the carrier opening.
6. Use the spreader to expand the case until the differential assembly with bearings and selected spacers will fit into the carrier. A spread of 0.25 to 0.3 mm is usually sufficient. **Under no circumstances should the carrier be spread more than 0.50 mm.**
7. The differential assembly, with bearing cups and selected spacers held against the bearing cones, may now be fitted to the carrier, after removing the dial indicator.
8. Release and remove the spreader tool leaving adaptors in position.
9. Fit the bearing cups in their original positions, tightening the bolts to 55 Nm torque.
10. Rotate the differential assembly at least six full turns to seat the bearing rollers in the bearing cups.
11. Check the preload using a spring balance. Measure the tension required to revolve the assembly when a string is wrapped around the differential case on the larger diameter, just behind the drive gear. Balance readings must be within the following limits: New bearings  $25 \pm 10$  N. Used bearings  $13 \pm 5$  N. These balance readings are equivalent to the preload torques in the Specifications.



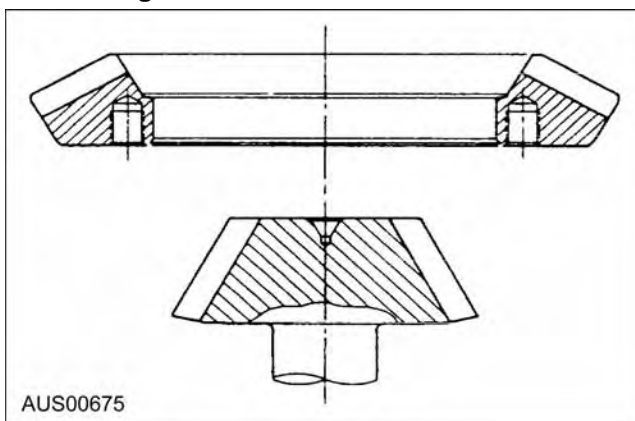
12. Remove the assembly from the carrier using the spreader. If the preload is correct, tie the selected spacers to the bearing cups to have them available for use in determining gear backlash. If correct preload is not obtained, a variation of 0.025 mm on spacers will alter preload 8 N for new bearings and approx. 4 N for used bearings. Repeat steps 5-12.

## Drive Pinion Position - Shim Selection

**NOTE:** The drive pinion and ring gear set identification marking (number 5K-25) is the matching number that appears on both the drive pinion and the ring gear. When a new gear set is being installed in an axle, be sure that the same matching number appears on both the drive pinion and the ring gear.



## Pinion/Ring Gear Identification



**NOTE:** The ring gear and pinion are manufactured within a tolerance of a specified distance. On the end of each pinion, there is marked a plus (+) number, a minus (-) number, or a zero (0) number which indicates the best running position for each particular gear set. This dimension is controlled by the shimming behind the rear pinion bearing cup. When the shim thickness is decreased, the pinion gear is moved away from the ring gear. When the shim thickness is increased, the pinion is moved closer to the ring gear. A positive (+) number on the drive pinion means that a thinner shim should be installed to move the pinion away from the ring gear. A negative (-) number means that a thicker shim should be used to move the drive pinion closer to the ring gear.

To select the correct shim thickness follow these steps:

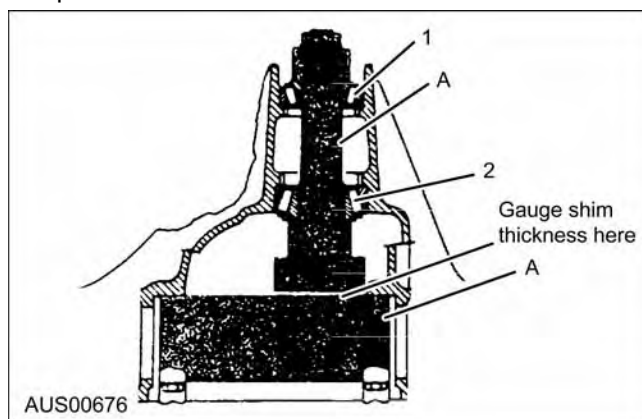


## DISASSEMBLY AND ASSEMBLY (Continued)

**NOTE:** Lubricate all differential parts with the recommended rear axle lubricant, before they are installed.

**NOTE:** The exact same rear pinion bearing that is to be used in the vehicle, is to be installed when using the dummy pinion.

1. Install the front and rear pinion bearing cups into the axle housing. Fit the pinion bearing cone and rollers to the dummy pinion tool. Install the dummy pinion to the axle housing. Fit the pinion front cone and roller to the dummy pinion. Install the tool thrust collar and the nut to the dummy pinion.



2. Tighten the nut until a bearing preload of 1.4 to 2.4 Nm (new bearing), 0.7 to 1.2 Nm (used bearing) is achieved while rotating the dummy pinion back and forth to ensure correct seating of the bearing rollers.
3. Position the depth gauge cylinder in the carrier and fit the bearing caps, tightening lightly.
4. Determine the size of pinion shim that will pass between the depth gauge and the dummy pinion head. Examine the drive pinion installation marking. The size of the pinion shim should then be altered as follows:
  - A positive (e.g. +0.002 inch) marking means that this pinion has to be set at this number of thousandths of an inch further from the drive gear, i.e. a shim this amount thinner must be used.
  - A negative (e.g. - 0.002 inch) marking means that a shim this size thicker must be used. A zero (0) marking indicates that the shim selected with the gauge is the correct one for this carrier/pinion combination. Position shims are available in .001 in (0.025 mm) increments from .008 to .030 in (0.2 to 0.75 mm)

**NOTE:** The marking on the pinion is in Imperial measurement.

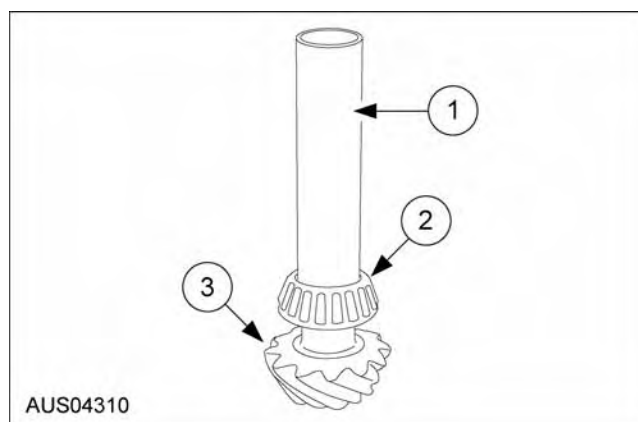
5. Remove the tools from the carrier.
6. Remove the rear pinion bearing cup from the housing.

## Drive Pinion and Bearings

**NOTE:** Refer to special tools in this section.

**NOTE:** All hardware must be correctly installed and torqued to specification.

1. Place the pinion rear bearing cone on the pinion shaft. Press the bearing against the pinion shaft shoulder.
2. Install the shims (previously established), between the rear bearing cup and the housing and install the new cups using the Special Tool. Make sure the cups are properly seated in their bores. If a 0.025 mm feeler gauge can be inserted between a cup and the bottom of its bore at any point around the cup, the cup is not properly seated.



Item	Description
1	Tool - E3C10AER Installer Drive pinion rear bearing
2	Bearing cone and roller
3	Drive pinion

3. Lubricate the pinion rear bearing with axle lubricant.
4. Position the pinion in the carrier and install a new collapsible pinion spacer.
5. Lubricate the front pinion bearing and install the bearing onto the pinion while supporting the pinion under the head.
6. Lubricate the seal lips and the seal outside diameter, and install the seal from flush to 0.25 mm below the carrier surface.
7. Install the pinion flange and nut. Tighten the nut while rotating the pinion backwards and forwards to seat the bearings. Check the bearing preload frequently while tightening the nut. Tighten the nut until the specified bearing preload is achieved. 1.4 Nm to 2.4 Nm with new bearings. 0.7 Nm to 1.2 Nm with used bearings.

**NOTE:** If the preload is exceeded the collapsible spacer must be replaced.



## DISASSEMBLY AND ASSEMBLY (Continued)

### Differential Installation and Backlash Check

**NOTE:** All hardware must be correctly installed and torqued to specifications.

1. Install the differential assembly with the tentatively selected spacers in the carrier, following the procedure in Differential Bearing Preload Spacer Selection steps 4 to 9 inclusive.
2. Measure the backlash as detailed in this section. Measure the backlash on several teeth around the ring gear to find the minimum position. Backlash here should be 0.13 to 0.18 mm. If the backlash is not within the range, decrease the thickness of one differential bearing spacer and increase the other by the same amount. The amount of change of each spacer is approximately equal to the amount of change required to correct the backlash reading. It is most important that the total thickness of both spacers be the same after backlash adjustment as before, so that correct preload is retained.
3. Check the gear tooth contact pattern as detailed in Section 308-03.
4. Fit the rear cover to the carrier using silicone rubber sealant. Fit the park-brake cable clips. On Wagon models fit the protection bracket to the differential cover.
5. Install the axle shafts as described in this Section.
6. Align the marks on the driveshaft and pinion flanges and connect the driveshaft. (Refer to Section 205-01.)
7. With the vehicle in the curb load position fill the axle to the bottom of the filler plug hole with the correct lubricant.

### Differential Case - Conventional Type M80 and M86

**NOTE:** Refer to special tools in this section.

#### Disassembly

1. Remove the bolts that attach the ring gear to the differential case.
 

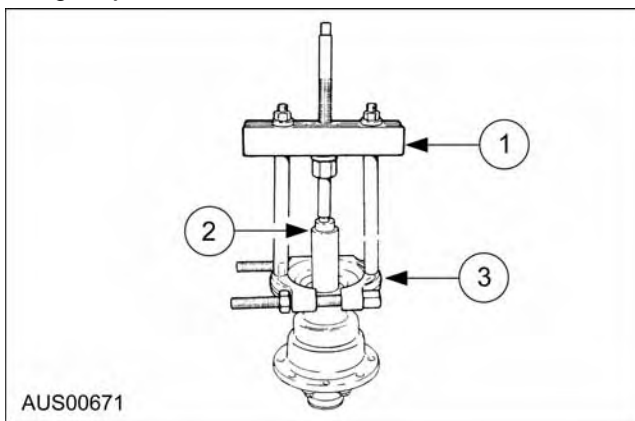
**CAUTION:** All axles use LH thread ring gear bolts - identified by L on bolt head. Press the ring gear from the case or tap it off with a soft faced hammer.
2. With a suitable drift, drive out the differential pinion cross shaft retainer pin.
3. For M80 use a soft drift to separate the two piece differential case.
4. Drive out the differential pinion cross shaft from the larger section of the case. Lift the pinion gears and thrust washers from the case.

5. Remove the side gears and thrust washers from each section of the case.
6. Remove the differential bearings. Discard bearings whenever they have been removed from the carrier.
7. For inspection after removal and dismantling refer to Section 204-02b.

#### Assembly

**NOTE:** All hardware must be correctly installed and torqued to specification.

1. Lubricate all the differential parts with the recommended rear axle lubricant, before installation.
2. Place the side gear thrust washers over the side gear journals.



Item	Description
1	Tool - Push/puller with legs
2	Tool - Stepped plug
3	Tool - Knife edge puller

3. Position a side gear in the larger section of the differential case.
4. Position the two differential pinions and the thrust washers in the large section of the case.
5. Drive the pinion cross shaft into position. Ensure that the retainer pin hole is in line with the hole in the case. Take care not to damage the differential pinion thrust washers.
6. Drive the pinion locking pin through the differential case and pinion shaft. Ensure the pin does not protrude from the underside of the larger differential case.
7. Install the second side gear and thrust washer in the smaller section of the case.
8. Holding the side gear in position through the case bore; push the two sections of the case together locating on the retaining pin. Rotate the side gear, if necessary, to ensure that the gear and pinions are meshing correctly.

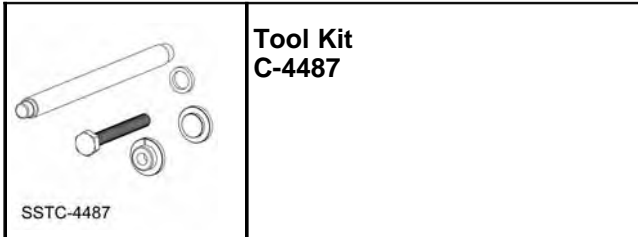


## DISASSEMBLY AND ASSEMBLY (Continued)

9. Place the ring gear in position on the case. Install and torque the bolts.
10. Press the differential side bearings onto the case journals.

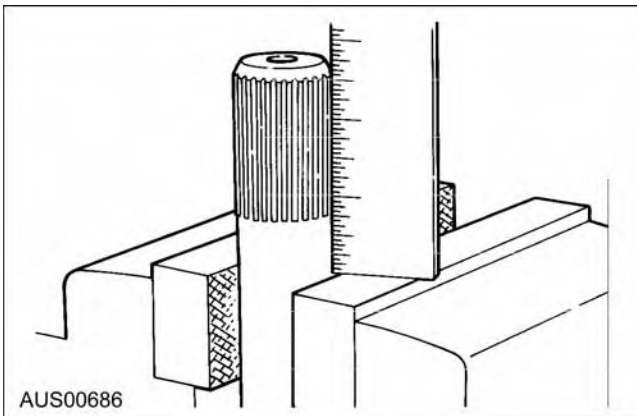
### Limited Slip Differential - M86

#### Special Tool(s)

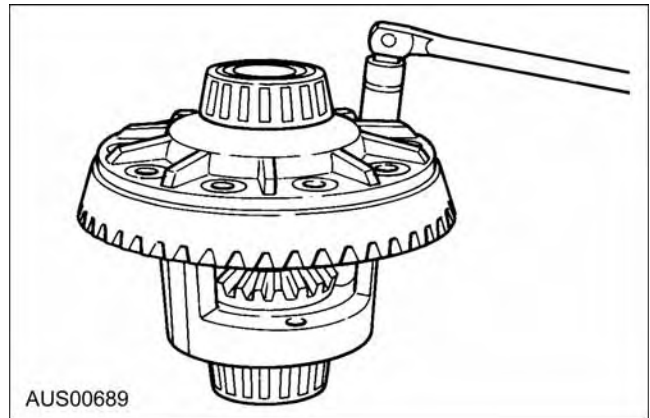


#### Disassembly

1. Place one of the axle shafts, which was removed from the assembly, into a vise. Tighten shaft in vise firmly. The spline end of the shaft is not to exceed 2.750" (69.85 mm) above the top of the vise. This will prevent the shaft from fully entering into the side gear and causing interference with the step plate during disassembly of the pinion mate gears, etc. Caution should be used that the vise jaws do not locate on axle splines or any machined surfaces.

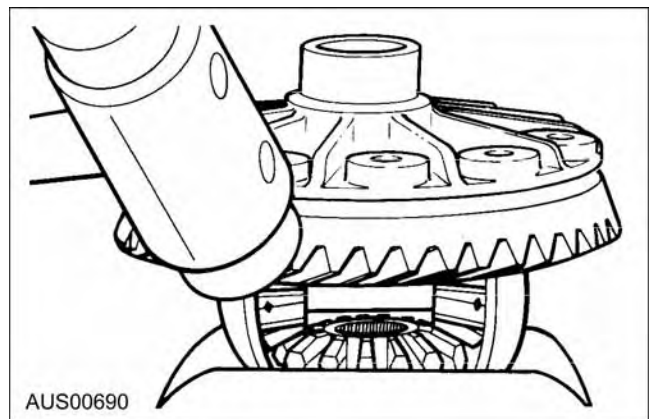


2. Place a few shop towels over vise to prevent any damage during disassembly of ring gear: Assemble the differential on the axle shaft with the ring gear screw heads up. Assembling the differential onto the shaft will serve as a holding device to remove the ring gear and to disassemble the internal parts of the case. Remove the ring gear screws.



3. Remove ring gear. It will be necessary to remove the ring gear to allow clearance for the removal of the cross pin. Tap ring gear with rawhide hammer to free it from case.

**NOTE:** It is recommended that on spicer axles whenever the ring gear screws are removed they are to be replaced with new ones.

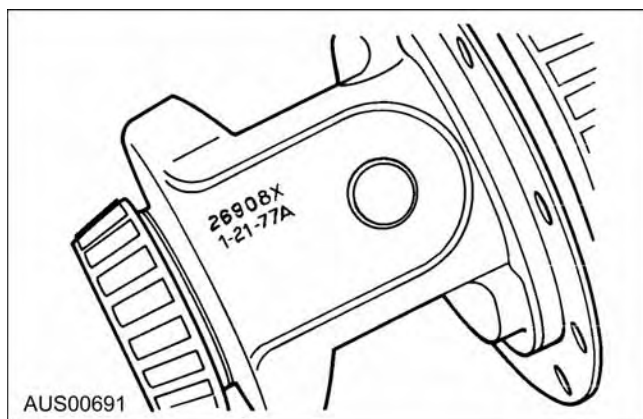


4. Remove differential case from the axle shaft and remove ring gear.
5. All Spicer Trac-Loks are identified with a manufacturing date and the complete part number stamped on the barrel of the case. If the axle assembly is equipped with a Trac-Lok Limited Slip Differential a special tag will be located on the bottom right hand side of the cover plate specifying the use of limited slip lubricant. In this figure the Trac-Lok is identified with 0.125" (3.17 mm) high numbers stamped on the case. For example:



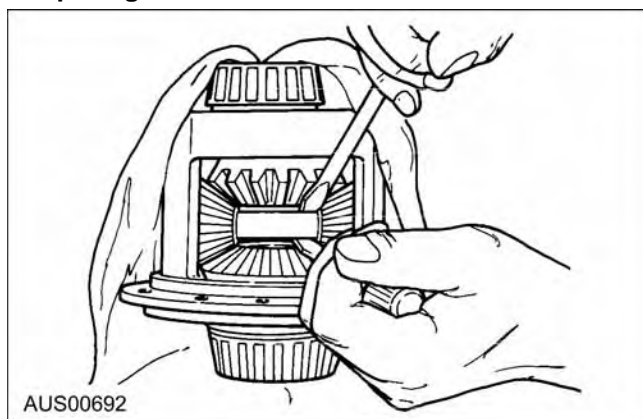


## DISASSEMBLY AND ASSEMBLY (Continued)



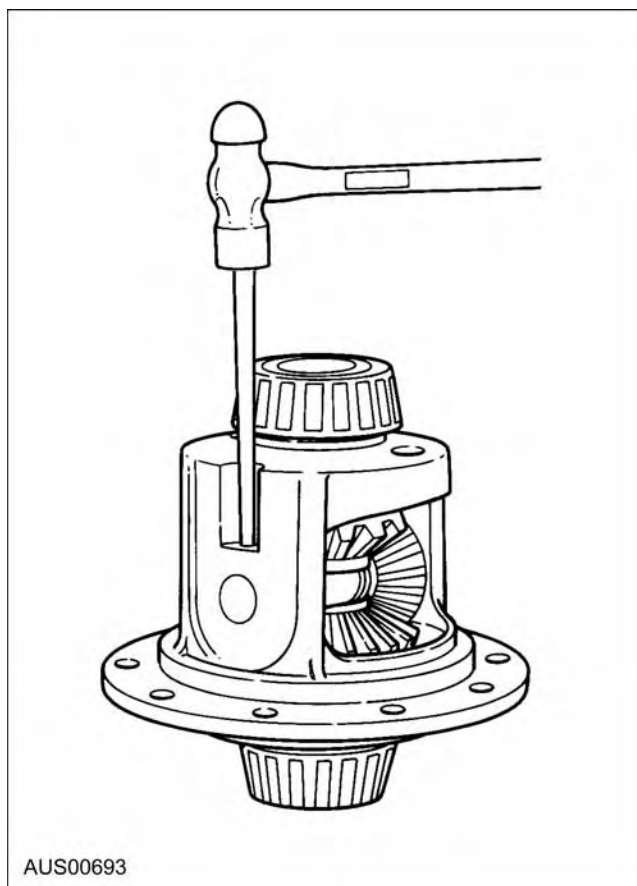
- The number 1-21-77A is the manufacturing or build date of the Trac-Lok and is interpreted as follows. The first number is the month, second number is the day of the month, third number is the year, the letter is the shift. For example: Jan. 21, 1977 first shift. The number stamped above the manufacturing date is the complete Trac-Lok assembly part number.
- 6. It is recommended that when referring to the Trac-Lok, obtain the complete part number and build date. To do this it will be necessary to wipe off the lubricant from the case.
- 7. Reposition differential case onto axle shaft as shown. Remove the two snap rings from the cross pin. Use two screwdrivers and push the rings free from the cross pin. Place a shop towel behind the case to prevent the snap rings from flying out of the case.

### Snap Ring Retained Version

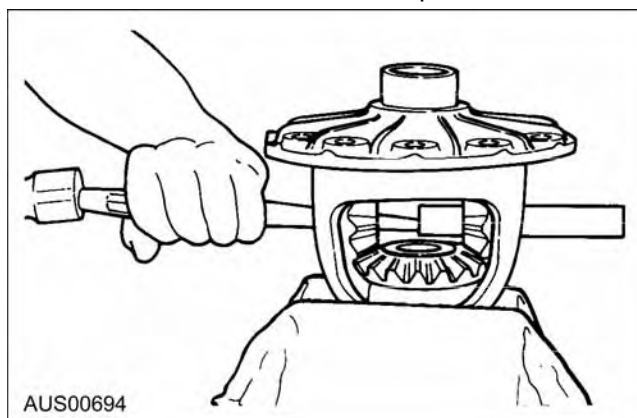


8. For roll pin retainer version, use a small drift to remove the roll pin retaining the cross shaft.

### Roll Pin Retained Version

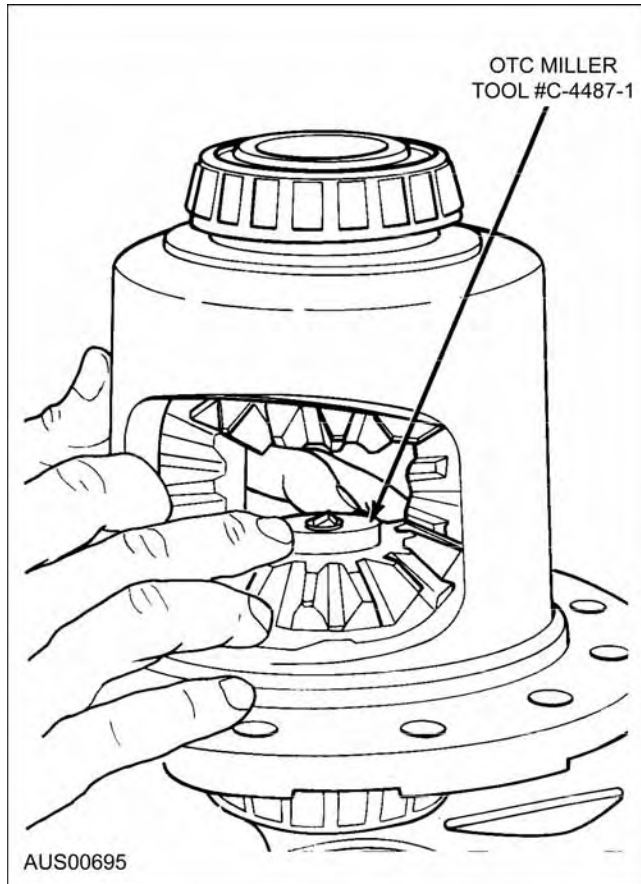


9. Remove the cross pin. Use a hammer and punch as shown to remove the cross pin from the case.

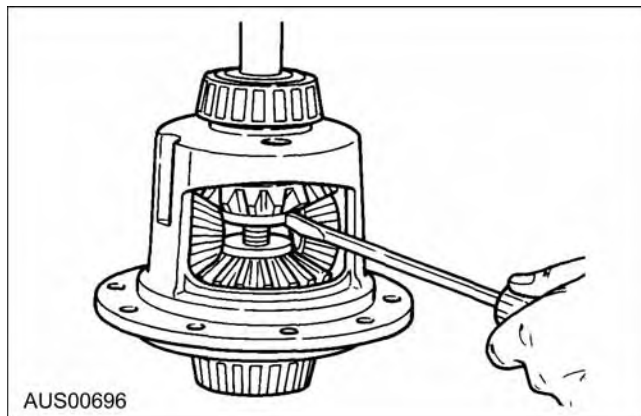


**DISASSEMBLY AND ASSEMBLY (Continued)**

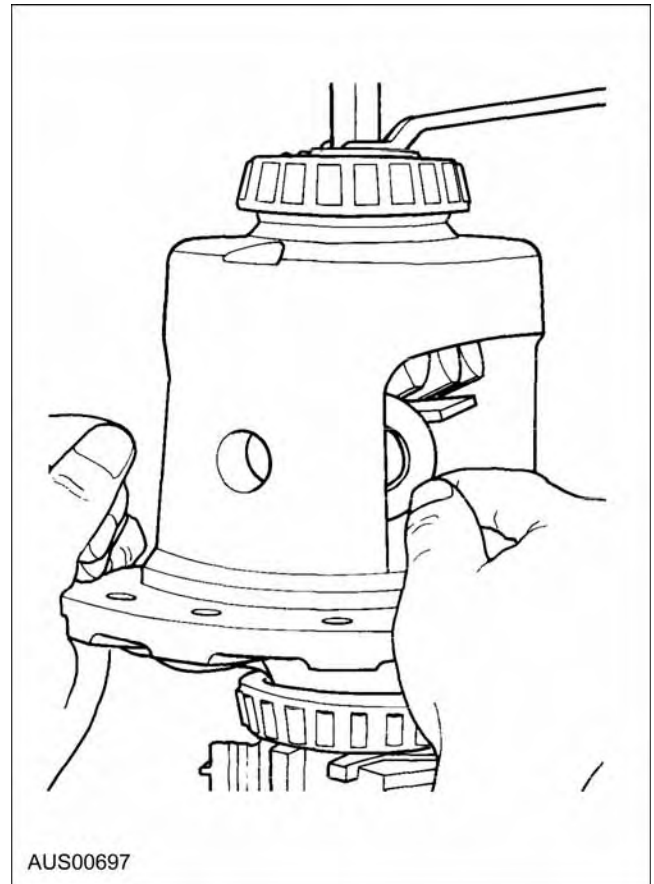
10. Assemble the adapter plate into the bottom side gear. Apply a small amount of grease to the centering hole of the adapter plate. Tool #C-4487-1 (adapter plate).



11. Lubricate threads of threaded adapter and forcing screw.



12. Assemble threaded adapter into top side gear. Thread forcing screws into threaded adapter until it becomes centred into adapter plate.



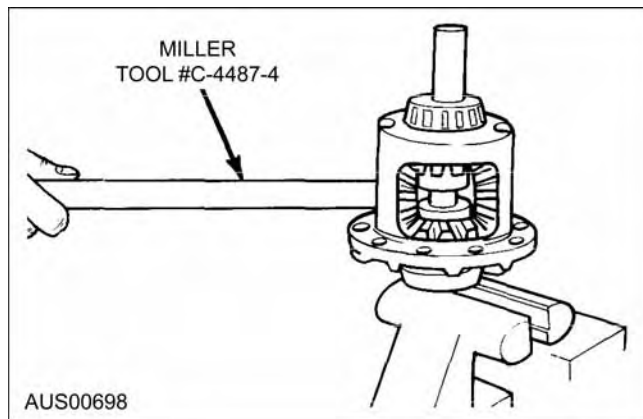
- Use a small screwdriver, position it in slot of threaded adapter. This will prevent the adapter from turning. Tools #C-4487-3 (threaded adapter), C-4487-2 (forcing screw).
13. Torque forcing screw until it becomes slightly tight. This will collapse the Belleville plates and allow a loose condition between the side gears and pinion mate gears.
14. Remove both pinion mate spherical washers. Use a shim stock of .030" (.76 mm) thickness or an equivalent tool to push out the spherical washers.
15. Relieve the tension of the Belleville springs by loosening the forcing screw.



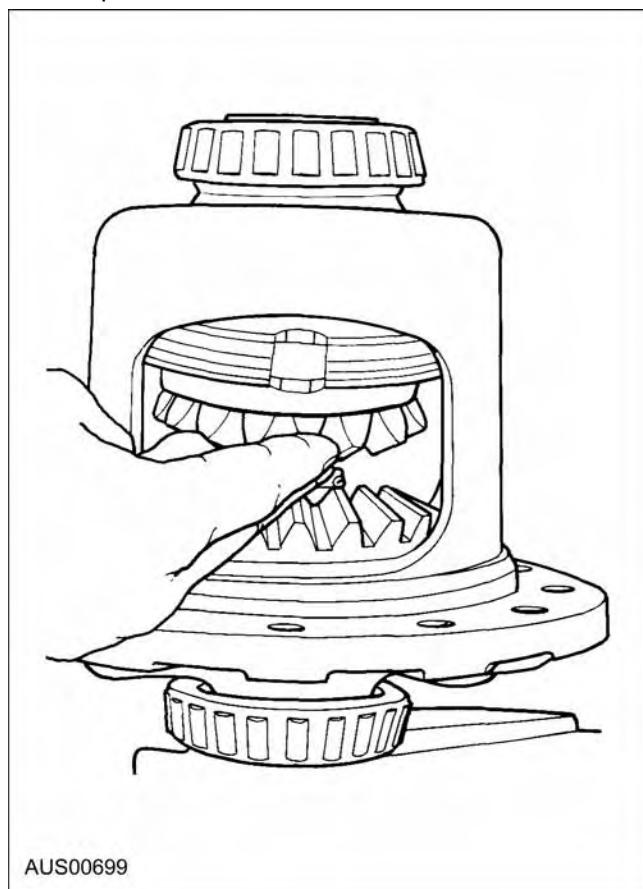
## DISASSEMBLY AND ASSEMBLY (Continued)

16. Insert small O.D. end of turning bar into cross pin hole of case. Pull on bar and the case will rotate until the pinion mate gears can be removed from opening.

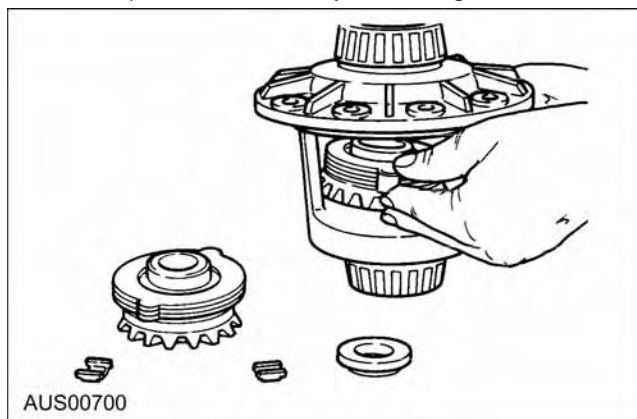
**NOTE:** It might be necessary to adjust the forcing screw slightly to allow the case to rotate. Tool #C-4487-4 (turning bar).



17. Hold top clutch pack with one hand and remove tools. It might be necessary to hold threaded adapter with screwdriver.



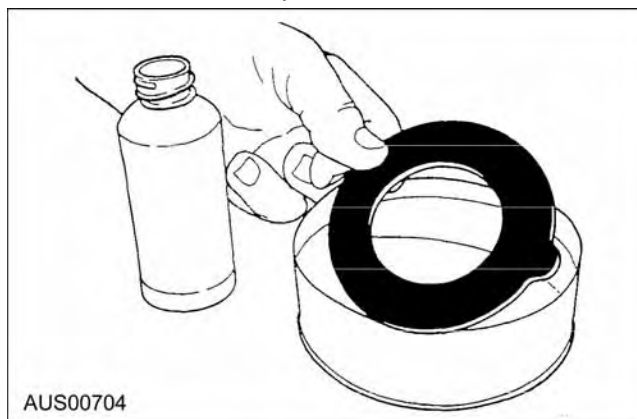
18. Remove top side gear and clutch pack. Keep the stack of plates and discs intact in exactly the same position while they are being removed.



19. Remove the case from the axle shaft. Turn case with the flange or ring gear side up and allow the step plate, side gear and clutch pack to be removed from the case. Remove the retainer clips from both clutch packs to allow separation of the plates and discs. Keep the stack of plates and discs exactly as they were removed.

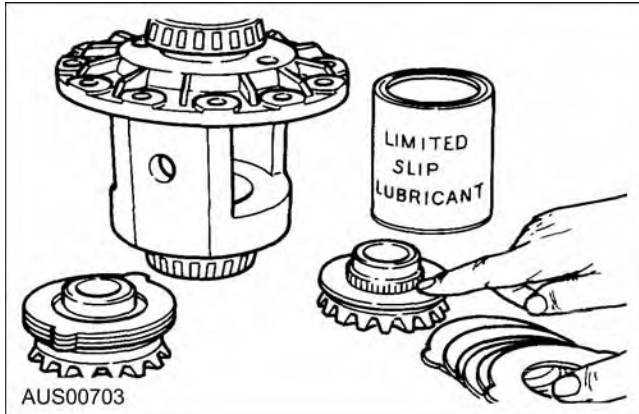
### Assembly

1. Prior to assembly, prelubricate each disc and plate with Friction Modifier by presoaking for a minimum of 20 minutes.
2. After assembly into carrier housing, fill axle assembly with the proper amount and specified lubricant, refer to Specifications section.



## DISASSEMBLY AND ASSEMBLY (Continued)

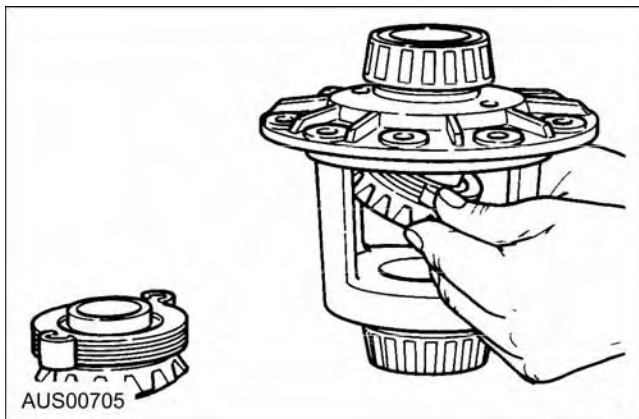
3. Prelubricate the thrust face of the side gears and the plates and discs.



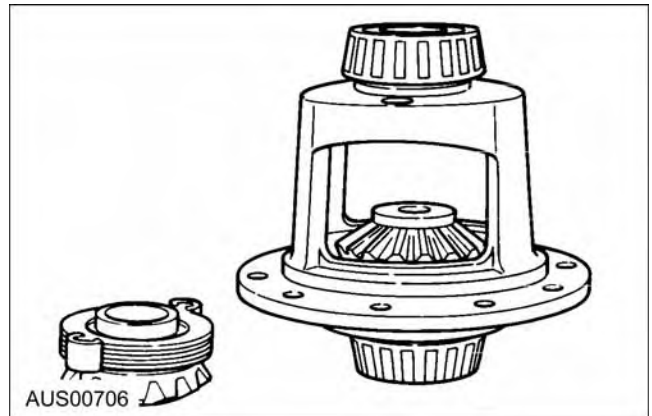
4. Assemble plates and discs in exactly the same position as they were removed, regardless of whether they are new parts or the original parts. Be sure lubricant that is used is of the specified lubricant.

**NOTE:** Your unit may be equipped with the new design limited slip disc and plates or your replacement unit may contain them. If so follow directions below. The new design can be identified by a smooth surface. Older designs have radial grooves in plates and discs.

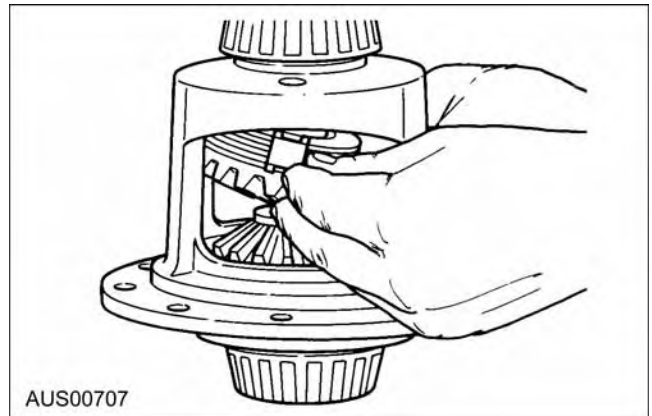
5. Assemble the retainer clips to the ears of the plates. Make sure both clips are completely assembled or seated onto the ears of the plates.



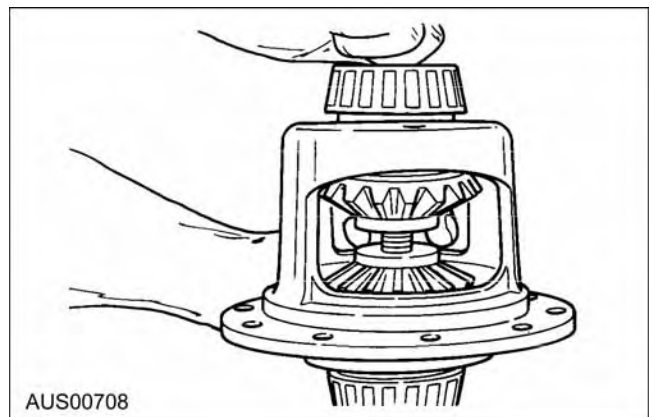
6. With the differential case positioned as shown, assemble the clutch pack and side gear into the case. Make sure the clutch pack stays assembled to the side gear splines, and that the retainer clips are completely seated into the pockets of the case. To prevent pack from falling out of the case, it will be necessary to hold them in place by hand while repositioning case on bench.



7. Reposition case on bench as shown. Assemble the adapter plate into the side gear. Apply a small amount of grease into the centering hole of the step plate.



8. Assemble the other clutch pack and side gear as shown. Make sure the clutch pack stays assembled to the side gear splines, and that the retainer clips are completely seated into the pockets of the case.

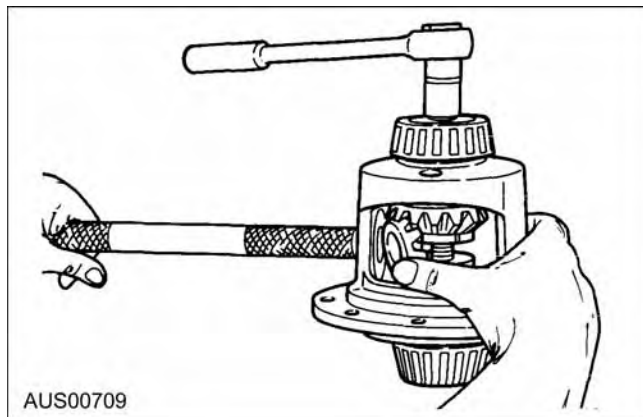


9. Hold the clutch pack in position and insert the threaded adapter into top side gear, insert forcing screw. Tighten forcing screw into bottom plate. This will hold both clutch packs in position.

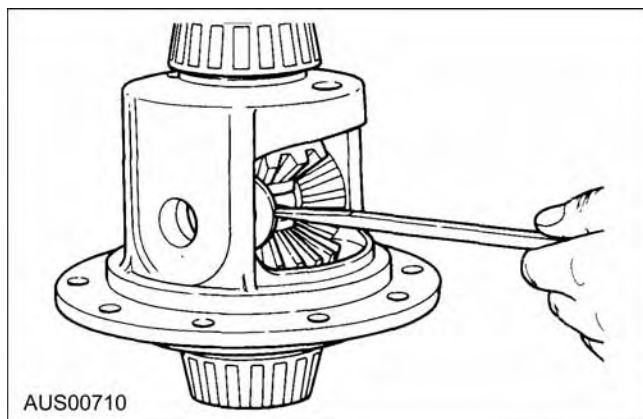


## DISASSEMBLY AND ASSEMBLY (Continued)

10. With tools assembled into the case, position case onto the axle shaft by aligning the splines of the side gear with those of the shaft.



11. Loosen forcing screw slightly. Assemble both pinion mate gears as shown. Hold gears in position by hand.
12. While holding gears in place, insert turning bar into case. Pull on bar to rotate case allowing gears to turn. Make absolutely sure that the holes of the pinion mate gears are in alignment with holes of the case.



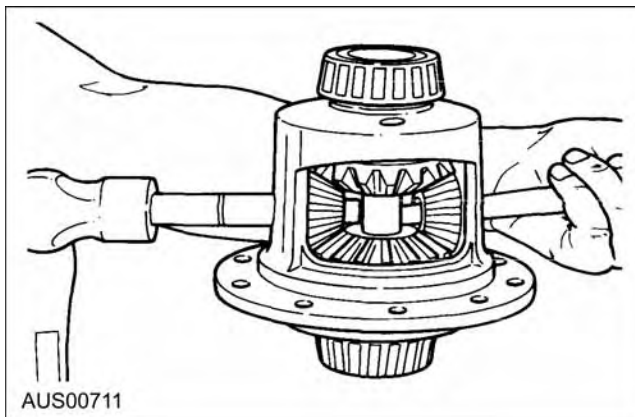
13. Prelubricate spherical washers. Torque forcing screw until it is tight. This will collapse the Belleville plates and allow clearance between gears. Assemble spherical washers into case. Use a small screwdriver to push washers into place.



**CAUTION:** Be sure the holes of the washers and gears are lined up exactly with those of the case.

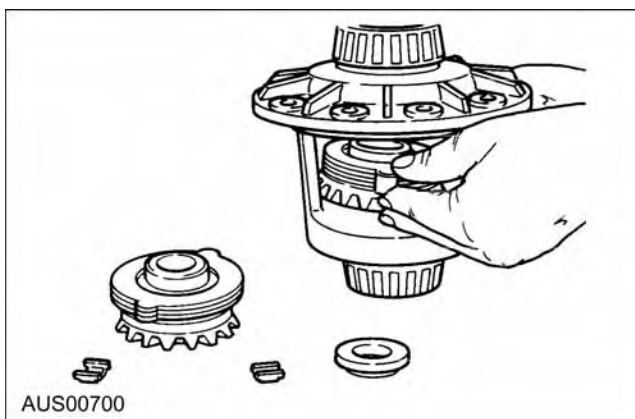
14. Remove tools.

15. For snap ring retained versions, be sure the snap ring grooves of the cross pin shaft are exposed to allow assembly of the snap rings. Assemble snap rings.



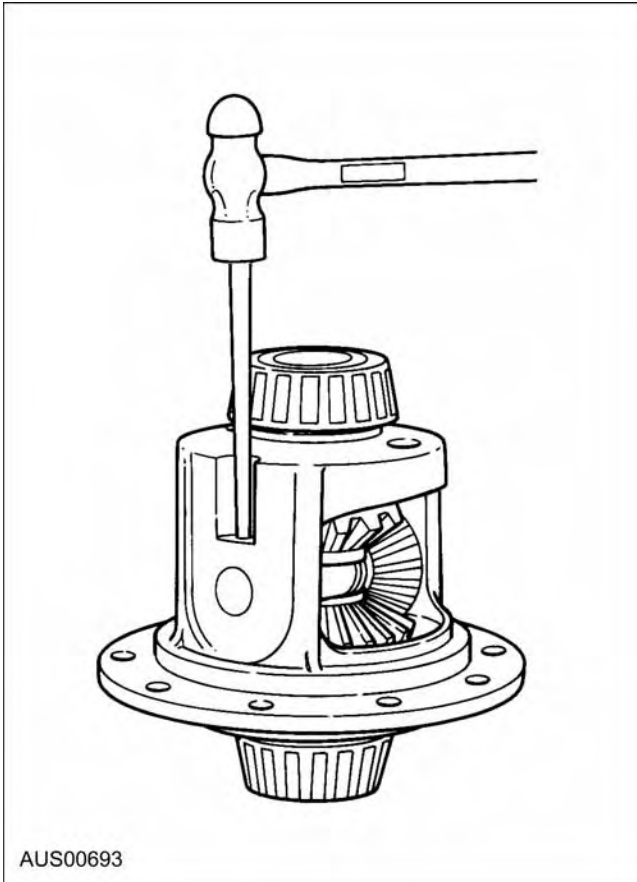
16. Remove case from axle shaft. Assemble ring gear to case. Line up the ring gear screw holes with those of the case.

**NOTE:** Use new ring gear screws. Assemble new ring gear screws finger tight.

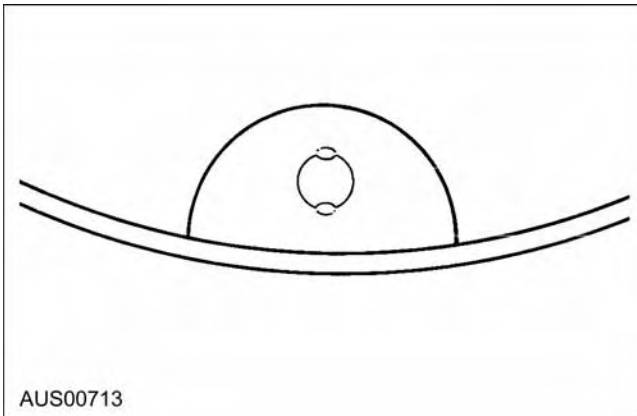


**DISASSEMBLY AND ASSEMBLY (Continued)**

17. For roll pin retainer version, use a small drift to replace the roll pin that retains the cross shaft.

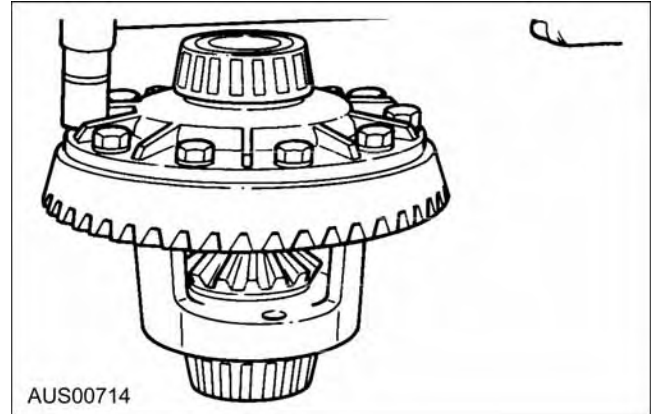


18. When roll pin bottoms out, stake (peen) a little metal over the edges in two places 180° degrees apart.



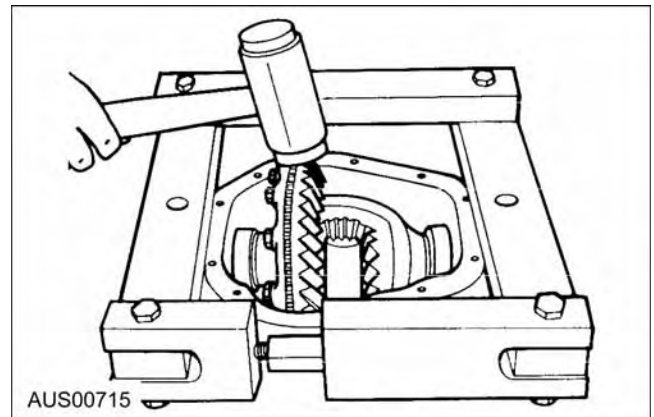
19. Reposition case onto axle shaft as shown. Torque screws alternately and evenly. Torque grade 8 screws to 45-65 lb. ft. (61-88 Nm).

**NOTE:** If grade 9 screws are used (special for high strength), torque 75-85 Lb. Ft. (102-115 Nm).



20. Mount spreader onto housing. Locate a dial indicator with a magnetic base on cover face as shown. Locate tip of indicator on housing as shown. Set dial indicator at zero. Turn forcing screw of spreader until indicator records .015" (.38 mm).

**CAUTION:** Do not spread housing over .015"



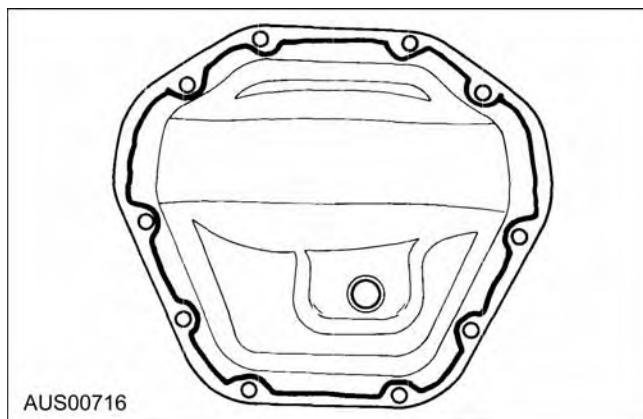
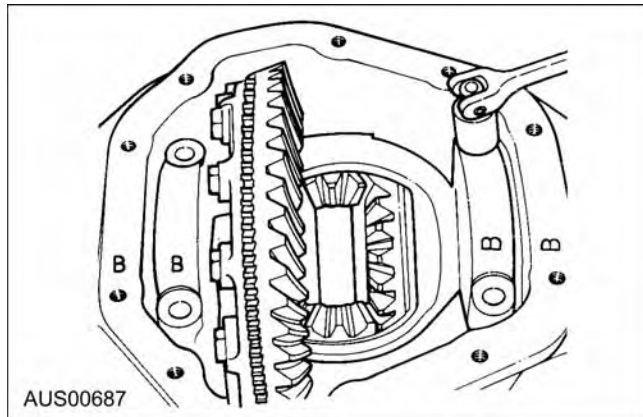
21. Remove dial indicator.
22. Prelubricate differential bearings with the specified lubricant. Assemble differential bearing cups to differential cones.
23. Install differential assembly into housing. Make sure teeth of ring gear are meshed with those of pinion.
24. Use a rawhide hammer to seat differential assembly into cross bore of housing. Care should be taken to avoid nicking the teeth of the ring gear and pinion during assembly.
25. Remove spreader.



**DISASSEMBLY AND ASSEMBLY (Continued)**

26. Install bearing caps. Make sure the letters stamped on the caps correspond with those stamped on the housing in horizontal and vertical position.

**NOTE:** Torque cap screws to 55 Nm.



27. The cover face of the carrier and the flat surface of the rear cover must be free from any oil or foreign material. Fit the rear cover to the carrier using silicone rubber sealant.
- NOTE:** Ensure that the sealant bead is laid on the inside of the cover screw holes. The bead is not to pass through the holes or outside of the holes.

