



# REAR AXLE

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

	Vehicles with conventional differential	Vehicles with limited slip differential
Axle shaft		
Type	Semi-floating type	Semi-floating type
Shaft dimensions		
Bearing portion dia. mm (in.)	40 (1.57)	40 (1.57)
Center portion dia. mm (in.)	34.5 (1.36)	34.5 (1.36)
Overall length mm (in.)	700.5 (27.6)	700.5 (27.6)
Bearing		
O.D. x I.D. mm (in.)	80 x 40 (3.15 x 1.57)	80 x 40 (3.15 x 1.57)
Differential		
Reduction gear type	Hypoid gear	Hypoid gear
Reduction ratio		
Manual transmission	4.625	4.625
Optional for Federal (not available in California)	4.875	4.875
Automatic transmission	4.222	4.222
Optional for Federal (not available in California)	4.625	4.625
Differential lock type	—	Disc type
Differential gear type and configuration		
Side gear	Straight bevel gear x 2	Straight bevel gear x 2
Pinion gear	Straight bevel gear x 2	Straight bevel gear x 4
Number of teeth		
Drive gear		
Manual transmission	37	37
Optional for Federal (not available in California)	39	39
Automatic transmission	38	38
Optional for Federal (not available in California)	37	37
Drive pinion		
Manual transmission	8	8
Automatic transmission	9	9
Optional for Federal (not available in California)	8	8
Side gear	14	14
Pinion gear	10	10

# SPECIFICATIONS



## SERVICE SPECIFICATIONS

	Vehicles with conventional differential	Vehicles with limited slip differential
<b>Standard values</b>		
Limited slip differential preload		
Using special tool   Nm (ft.lbs.)	—	15 (11) or more
Without using special tool   Nm (ft.lbs.)	—	30 (22) or more
Final ring gear backlash   mm (in.)	0.13-0.18 (.005-.007)	0.13-0.18 (.005-.007)
Drive pinion preload		
With oil seal   Ncm (in.lbs.)	100-130 (8.7-11.3)	100-130 (8.7-11.3)
Without oil seal   Ncm (in.lbs.)	70-100 (6.1-8.7)	70-100 (6.1-8.7)
Clearance between the clutch plates and the differential case   mm (in.)	—	0.06-0.20 (.002-.008)
Axial clearance of the differential gear   mm (in.)	—	0.05-0.20 (.002-.008)
Differential gear backlash   mm (in.)	0.051-0.127 (.002-.005)	—
Clutch plate preload		
When equipped with new clutch plates   Nm (ft.lbs.)	—	60-100 (43-72)
When equipped with old clutch plates   Nm (ft.lbs.)	—	30-80 (22-58)
<b>Repair limits</b>		
Rear axle total backlash   mm (in.)	5 (.2)	5 (.2)
Ring gear runout   mm (in.)	0.05 (.002)	0.05 (.002)
Difference in total thickness between left and right clutch plates   mm (in.)	—	0.05 (.002) or less
Difference in distances from backs of left and right pressure rings to end of thrust washer   mm (in.)	—	0.05 (.002) or less
<b>Service limits</b>		
Axle shaft end play   mm (in.)	0.05-0.20 (.002-.008)	0.05-0.20 (.002-.008)
Axle shaft runout   mm (in.)	0.1 (.004)	0.1 (.004)
Axle shaft spline play   mm (in.)	0.6 (.024)	0.6 (.024)
Friction plate/disc warping		
Total deviation   mm (in.)	—	0.08 (.003) or less
Clutch plate wear		
Difference in thicknesses of friction surface and projections   mm (in.)	—	0.1 (.004) or less
Thrust washer thickness   mm (in.)	—	1.4 (.055) or more



## SPECIFICATIONS

### TORQUE SPECIFICATIONS

Nm (ft.lbs)


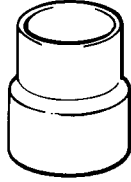
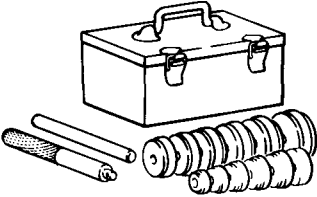


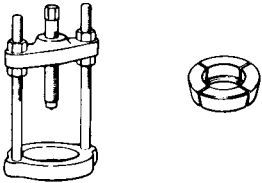
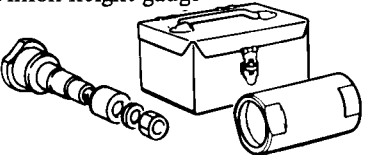

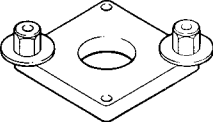
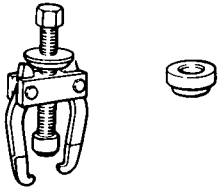
Rear axle bearing lock nut	180-220 (130-159)
Bearing case to rear axle housing	50-60 (36-43)
Companion flange to drive pinion	190-250 (137-181)
Filler plug	40-60 (29-43)
Drain plug	60-70 (43-51)
Bearing cap to gear carrier	55-65 (40-47)
Differential case to ring gear	80-90 (58-65)
Lock plate	15-22 (11-16)
Differential carrier to rear axle housing	25-30 (18-22)

### LUBRICANTS

	Specified lubricant	Quantity
Rear axle gear oil		
Conventional differential	Hypoid gear oil API classification GL-4 or GL-5 SAE viscosity No. 90	1.80 liter (1.90 U.S.qt., 1.58 Imp.qt.)
Limited slip differential	MITSUBISHI genuine gear oil Part No. 8149630EX, or Mopar Hypoid Gear Lubricant part No. 3744994 or 3744995 plus Mopar Hypoid Gear Oil Additive/Friction Modifier part No. 4057100, or equivalent	1.80 liter (1.90 U.S.qt., 1.58 Imp.qt.)
Axle housing grease	Multipurpose grease SAE J310a, NLGI grade #2EP	As required

# SPECIAL TOOLS

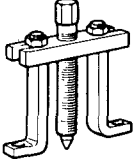
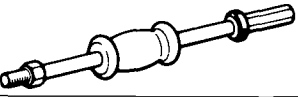
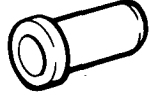
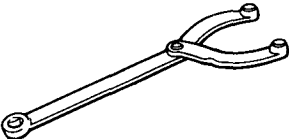
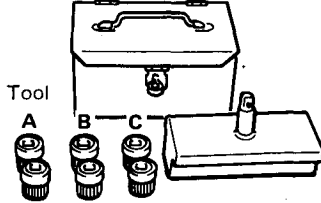


Tool (Number and name)	Use	Tool (Number and name)	Use
<b>MB990785 “*”</b> Lock nut special wrench 	Removal of the lock nut	<b>MB990799</b> Bearing inner race installer 	Pressing of the axle shaft bearing inner race
<b>MB990925</b> Bearing and oil seal installer set 	Pressing of the axle shaft bearing outer race and oil seal Insertion of the axle shaft oil seal Removing and pressing of the drive pinion bearing outer race	<b>MB990201 “*”</b> Side bearing special adjusting wrench 	Removal and adjustment of the side bearing nut
<b>MB990850 “D”</b> End yoke holder 	Removal of the companion flange	<b>MB990339 “*”</b> <b>MB990648 “*”</b> Bearing puller    Bearing remover 	Removal of the drive pinion rear bearing inner race
<b>MB990552 “*”</b> Pinion height gauge set <b>MB990819 “*”</b> Pinion height gauge 	Measurement of the pinion height	<b>MB990802</b> Bearing installer 	Pressing of the drive pinion rear bearing inner race Pressing of the side bearing inner race
<b>MB990787-A</b> Puller 	Removal of the axle shaft bearing and bearing case	<b>MB990810 “*”</b> <b>MB990811</b> Side bearing puller    Side bearing cup 	Removal of the side bearing inner race

“\*”, “D” see page 2 for instructions.



## SPECIAL TOOLS

Tool (Number and name)	Use	Tool (Number and name)	Use
MB990241 “*” Rear axle shaft puller  MB990211 Sliding hammer 	Removal of axle shaft	MB990031 “*” Drive pinion oil seal installer 	Pressing of the drive pinion oil seal
MB990767 “*” End yoke holder 	Measurement of the limited slip differential preload	MB990988 Side gear holding tool set 	Measurement of the clutch plate preload

“\*” see page 2 for instructions.

## TROUBLESHOOTING



Symptom	Probable cause	Remedy
<b>AXLE SHAFT, AXLE HOUSING</b>		
Noise while wheels are rotating	Brake drag Bent axle shaft Worn or damaged axle shaft bearing	Replace
Grease leakage	Worn or damaged oil seal Malfunction of bearing seal	Replace
<b>CONVENTIONAL DIFFERENTIAL</b>		
Constant noise	Improper final ring gear tooth contact adjustment Loose, worn or damaged side bearing Loose, worn or damaged drive pinion bearing	Correct or replace
	Worn ring gear, drive pinion Worn side gear thrust washer or pinion shaft Deformed ring gear or differential case Damaged gear	Replace
	Foreign material	Eliminate the foreign material and check; replace parts if necessary
	Insufficient oil	Replenish
Gear noise while driving	Poor gear engagement Improper gear adjustment Improper drive pinion preload adjustment	Correct or replace
	Damaged gear	Replace
	Foreign material	Eliminate the foreign material and check; replace parts if necessary
	Insufficient oil	Replenish
Gear noise while coasting	Improper drive pinion preload adjustment	Correct or replace
	Damaged gear	Replace
Bearing noise while driving or coasting	Cracked or damaged drive pinion rear bearing	Replace
Noise while turning	Loose side bearing Damaged side gear, pinion gear or pinion shaft	Replace



## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Heat	Insufficient gear backlash Excessive preload	Adjust
	Insufficient oil	Replenish
Oil leakage	Clogged breather hose	Clean or replace
	Cover insufficiently tightened Seal malfunction	Retighten, apply sealant, or replace the gasket
	Worn or damaged oil seal	Replace
	Excessive oil	Adjust the oil level
<b>LIMITED SLIP DIFFERENTIAL</b> Abnormal noise during driving or gear changing	Excessive final ring gear backlash Insufficient drive pinion preload	Adjust
	Excessive differential gear backlash	Adjust or replace
	Worn side gear spline	Replace
	Loose companion flange self-locking nut	Retighten or replace

### NOTE

In addition to a malfunction of the differential carrier components, abnormal noise can also be caused by the propeller shaft universal joint, the axle shafts, the wheel bearings, etc. Before disassembling any parts, take all possibilities into consideration and confirm the source of the noise.

Abnormal noise when cornering	Damaged differential gears Damaged pinion shaft Nicked and/or abnormally worn inner or outer clutch plates Inferior gear oil Abnormally worn or damaged thrust washer	Replace
	Insufficient gear oil quantity	Replenish
Gear noise	Improper final ring gear tooth contact adjustment	Adjust or replace
	Incorrect final ring gear backlash Improper drive pinion preload adjustment	Adjust
	Damaged, broken, or seized tooth surfaces of the ring gear and drive pinion Damaged, broken, or seized drive pinion bearings Damaged, broken, and/or seized side bearings Damaged differential case Inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
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### NOTE

Noise from the engine, muffler vibration, transmission, propeller shaft, wheel bearings, tires, body, etc., is easily mistaken as being caused by malfunctions in the differential carrier components. Be extremely careful and attentive when performing the driving test.

Test methods to confirm the source of the abnormal noise include: coasting, acceleration, constant speed driving, raising the rear wheels on a jack, etc. Use the method most appropriate to the circumstances.

Gear oil leakage	Worn or damaged front oil seal, or improperly installed oil seal Damaged gasket	Replace
	Loose companion flange self-locking nut	Retighten or replace
	Loose filler or drain plug	Retighten or apply adhesive
	Clogged or damaged breather hose	Clean or replace
Seizure	Insufficient final ring gear backlash Excessive drive pinion preload Excessive side bearing preload Insufficient differential gear backlash Excessive clutch plate preload	Adjust
	Inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish

### NOTE

In the event of seizure, disassemble and replace the parts involved, and also be sure to check all components for any irregularities and repair or replace as necessary.

Breakdown	Incorrect final ring gear backlash Insufficient drive pinion preload Insufficient side bearing preload Excessive differential gear backlash Insufficient clutch plate preload	Adjust
	Loose ring gear clamping bolts	Retighten
	Operational malfunction due to overloaded clutch	Avoid excessively rough operation

### NOTE

In addition to disassembling and replacing the failed parts, be sure to check all components for irregularities and repair or replace as necessary.

The limited slip differential does not function (on snow, mud, ice, etc.)	The limited slip device is damaged	Disassemble, check the functioning, and replace the damaged parts
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## SERVICE ADJUSTMENT PROCEDURES

### REAR AXLE TOTAL BACKLASH

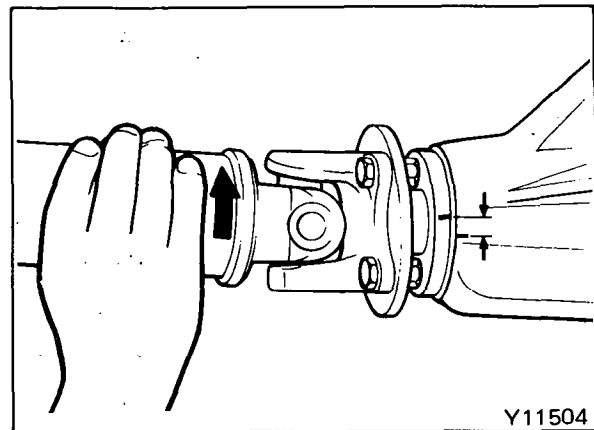
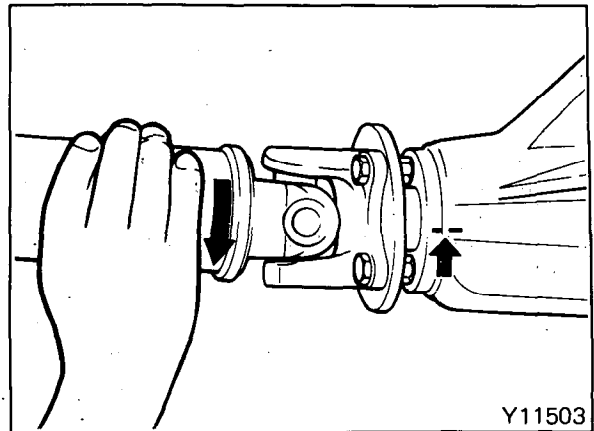
If the vehicle vibrates and produces a booming sound due to the unbalance of the drivetrain, use the following procedure to measure the rear axle total backlash to see if it is necessary to remove the differential carrier assembly.

- (1) Set the transmission control lever to the neutral position, set the transfer control lever to 2H, apply the parking brake and raise the vehicle.
- (2) Turn the companion flange clockwise far enough to remove all slack. Make mating marks on the dust cover of the companion flange and on the differential carrier. (Y11503)
- (3) Turn the companion flange fully counterclockwise to remove all slack, and measure the distance the mating marks moved. (Y11504)
- (4) If the backlash exceeds the repair limit, remove the differential carrier assembly and adjust it.

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Rear axle total backlash [Repair limit]	.....
	5mm (.2 in.)

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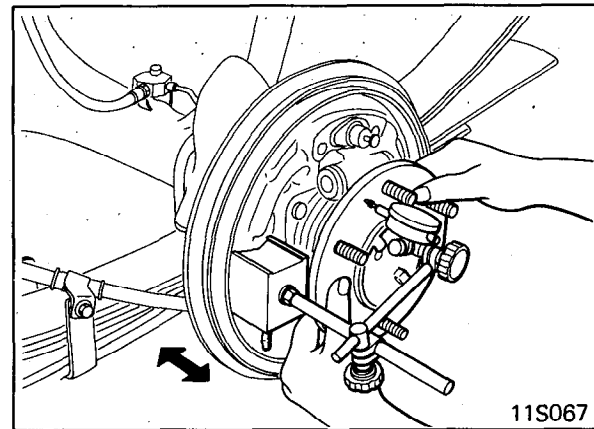
### AXLE SHAFT END PLAY

1. Measure the axle shaft end play with a dial indicator.
2. Push the axle shaft all the way in, and mount the dial indicator and set it to zero.
3. Pull the axle shaft all the way out and note the end play indication on the dial indicator. (11S067)
4. If the end play exceeds the service limit, replace the bearing.

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Axle shaft end play [Service limit]	.....
	0.05-0.20 mm (.002-.008 in.)

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### CHECKING GEAR OIL LEVEL

Remove the filler plug and check the oil level. (Refer to GROUP 2.)

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Distance from the lower end of the filler plug to the oil surface	.....
	Within 14 mm (.6 in.)

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### CHANGING GEAR OIL (Limited Slip Differential)

Remove drain plug and drain the lubricant from axle. Fill axle with 1.8 liter (1.90 U.S.qt., 1.58 Imp.qt.) of Mitsubishi genuine gear oil part No. 8149630EX, or 113 g (4 oz.) Mopar Hypoid Gear Oil Additive/Friction Modifier 4057100 plus 1.1 liter (1.16 U.S.qt., 0.97 Imp.qt.) of Mopar Hypoid Gear Lubricant part No. 3744994 or 3744995, or equivalent.



## LIMITED SLIP DIFFERENTIAL PRELOAD MEASUREMENT

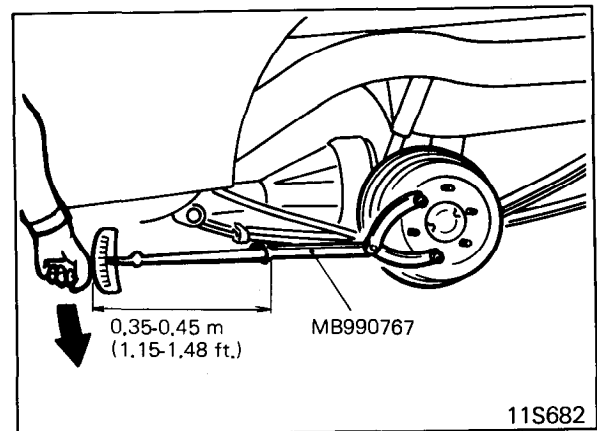
To measure the preload of the limited slip differential, set the shift lever of the transmission to the neutral position, lock the front wheels, and fully release the parking brake. One of the rear wheels should be maintained in contact with the ground surface, and the other should be raised up.

Measure the starting torque at the side on which the wheel is raised by using the following procedure:

- (1) Remove the wheel.
- (2) Mount the special tool to the hub bolts with the hub nuts.
- (3) Find the limited slip differential preload by measuring the axle shaft starting torque in the forward direction with a torque wrench. (11S682)

Limited slip differential preload .....  
15 Nm (11 ft.lbs.) or more

- (4) If the torque is less than the specified value, remove the limited slip differential from the vehicle and repair it.

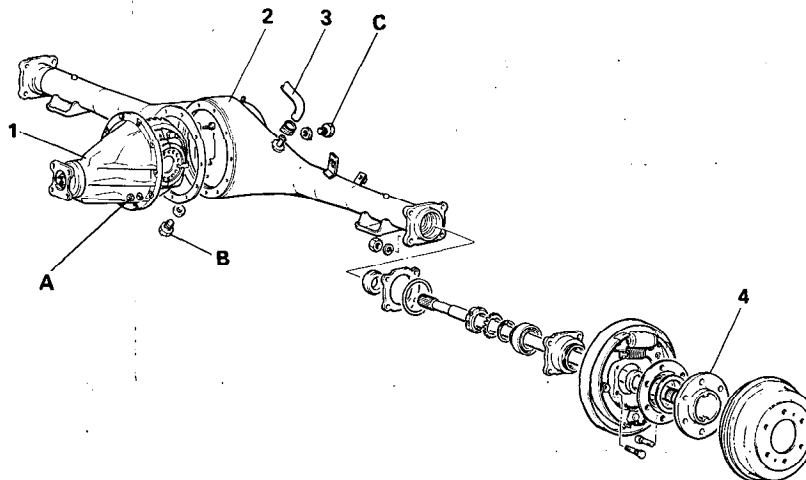




## COMPONENT SERVICE-AXLE ASSEMBLY

### COMPONENTS

1. Gear carrier
2. Axle housing
3. Breather hose
4. Axle shaft

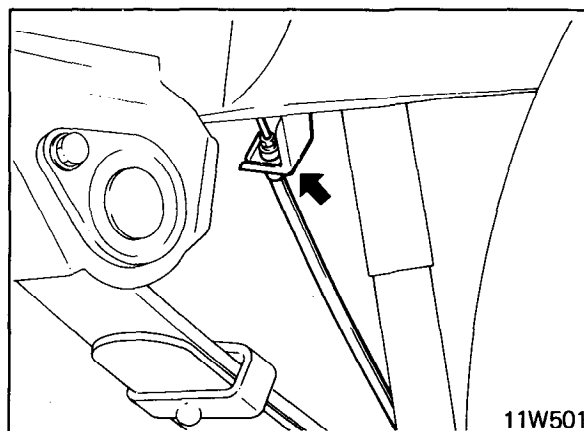


	Nm	ft.lbs.
A	25-30	18-22
B	60-70	43-51
C	40-60	29-43

11W046

### REMOVAL

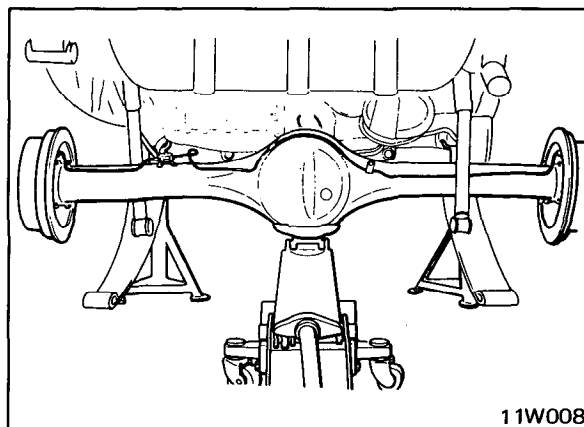
1. Support the vehicle with floor stands at the specified points.
2. Remove the parking brake cable and clips. (Refer to GROUP 5.) (11W501)
3. Completely drain the brake fluid and disconnect the brake hoses.
4. Detach the rear propeller shaft assembly from the differential carrier assembly. (Refer to GROUP 16.)



5. Raise the axle housing slightly on a jack.
6. Detach the shock absorbers from the U-bolt seats. (Refer to GROUP 17.)
7. Remove the U-bolts and the U-bolt seats. (Refer to GROUP 17.)
8. Remove the shackles to separate the spring assemblies from the side frame and lower the rear portions of the spring assemblies. (Refer to GROUP 17.)
9. Remove the axle assembly toward the rear of the vehicle. (11W008)

#### Caution

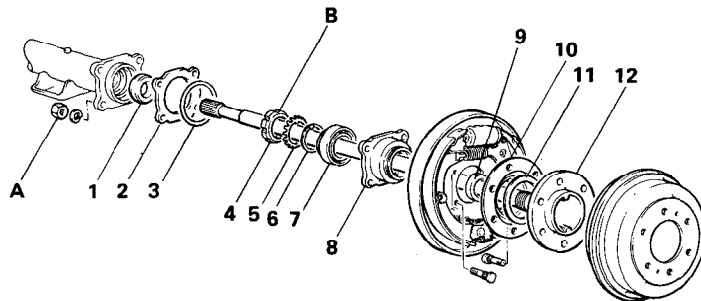
The axle assembly is unstable on the jack; be careful not to allow it to fall.





## COMPONENTS

1. Oil seal
2. Shim
3. O-ring
4. Lock nut
5. Lock washer
6. Washer
7. Bearing
8. Bearing case
9. Oil seal
10. Dust cover
11. Packing
12. Rear axle shaft



	Nm	ft.lbs.
A	50-60	36-43
B	180-220	130-159

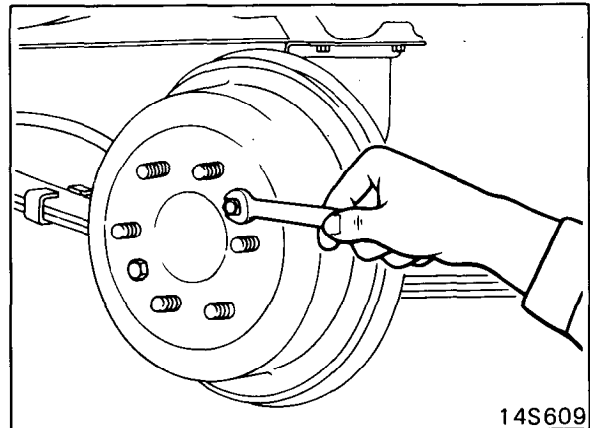
11W509

## REMOVAL

1. Disconnect the parking brake cables from the equalizer and then remove the clamps from the parking brake cables. (Refer to GROUP 5.)
2. Remove the brake drum.

### NOTE

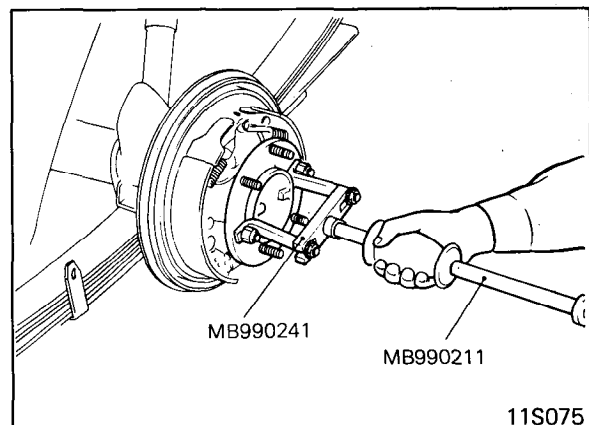
If it is hard to remove the brake drum, screw bolts (M8 x 1.25 ) into the threaded holes provided in the brake drum flange surface. (14S609)



3. Disconnect the Brake tubes from the rear wheel cylinder.
4. Detach the bearing case from the end of the rear axle housing.
5. Pull the wheel toward you with the rear axle shaft and rear brake assembly still attached. If the rear axle shaft is hard to remove, use the special tools to loosen it. (11S075)

### NOTE

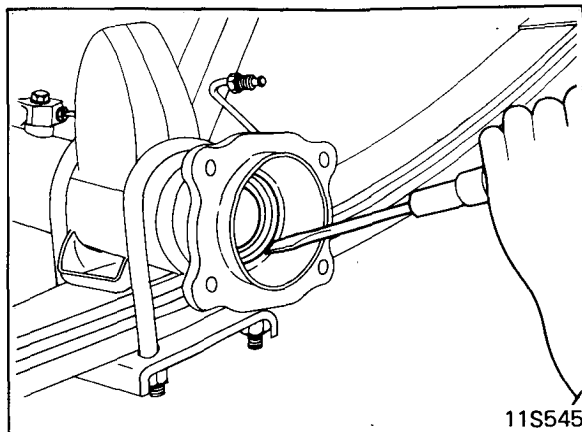
Do not damage the oil seal during removal of axle shaft.





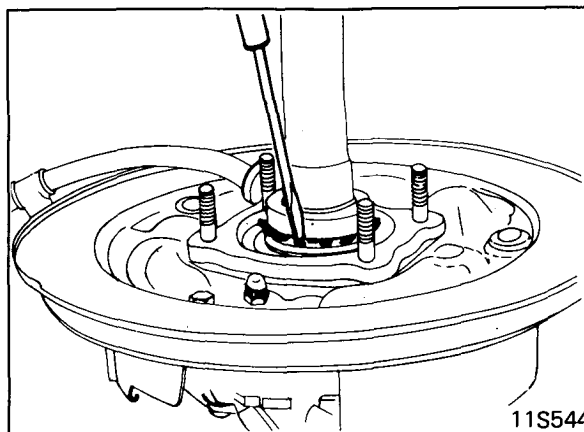
## COMPONENT SERVICE-AXLE SHAFT

6. Remove the oil seal from the end of the rear axle housing if necessary.

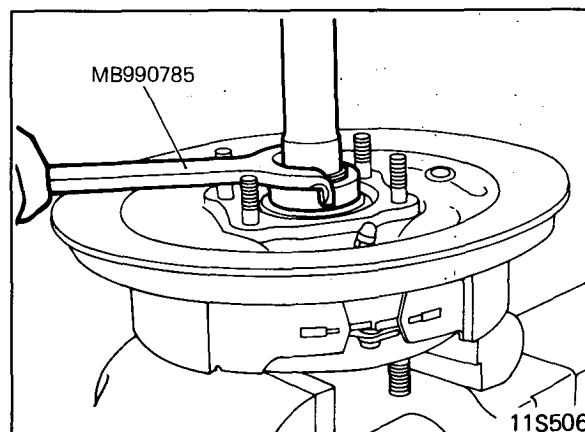


### DISASSEMBLY

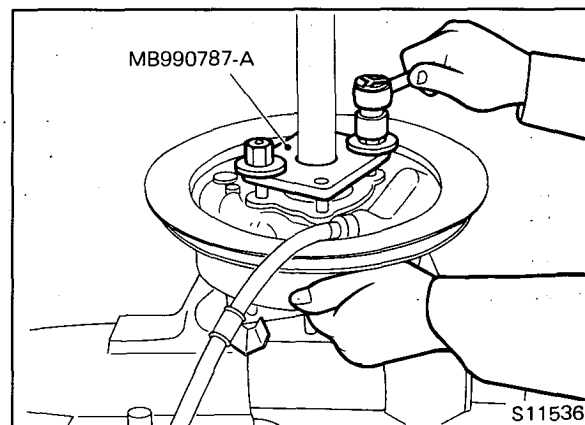
1. Straighten the bent tab of the lock washer.



2. Remove the lock nut with the special tool. (11S506)
3. Remove the lock washer and the washer.
4. Reinsert the lock nut on the axle shaft approximately three turns.



5. Using the special tool, push the axle shaft out of the bearing case. (S11536)
6. Apply equal pressure to nuts to ensure smooth removal of wheel bearing.
7. Using a hammer and drift, remove the bearing outer race from the bearing case.
8. Remove the oil seal from the bearing case.





## INSPECTION

1. Check dust cover for deformation and damage.
2. Check oil seal for damage.
3. Check inner and outer bearings for seizure, discoloration and rough raceway surface.
4. Check axle shaft for cracks, wear and damage.

## Checking of the Axle Shaft for Runout

With the axle shaft supported at the center holes on both ends, measure the axle shaft flange face for runout with a dial indicator.

Axle shaft runout [Service limit] .....  
0.1 mm (.004 in.)

## REASSEMBLY

1. Apply the specified wheel bearing grease to the outside circumference of the bearing outer race.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

2. Press the bearing outer race into the bearing case with the special tools. (11S020)
3. Apply the specified wheel bearing grease to the outside circumference of the new oil seal. (11S021)

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

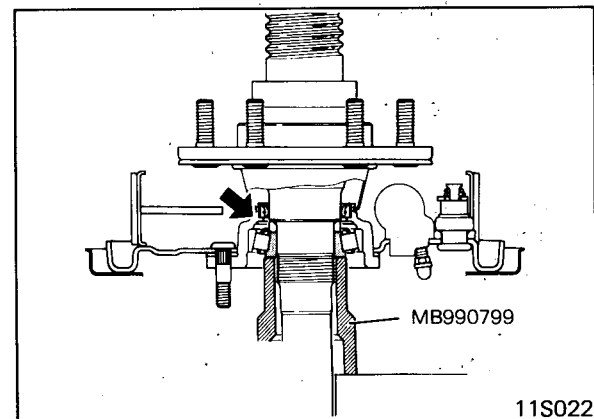
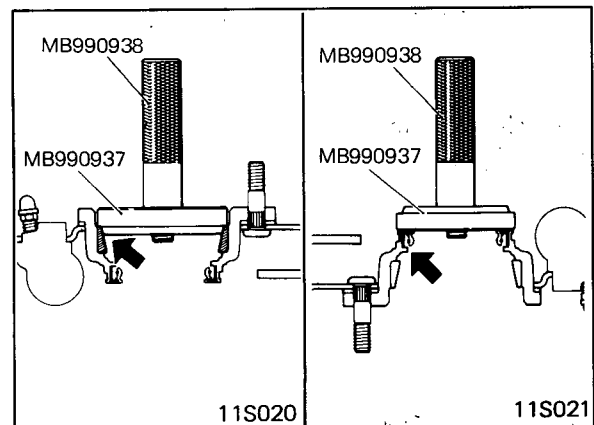
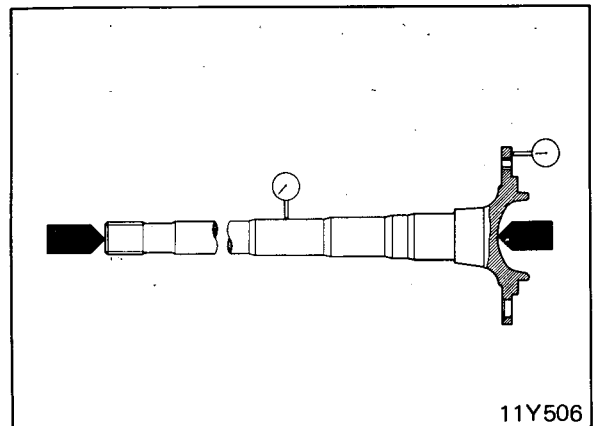
4. Press the new oil seal into the bearing case with the special tools until it is flush with the surface of the bearing cases. (11S021)
5. Apply the specified wheel bearing grease to the lip of the oil seal.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

6. Apply the specified wheel bearing grease to the roller surfaces of the bearing inner race.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

7. Install the rear brake assembly, the bearing case, and the bearing inner race in that order to the axle shaft.
8. Press the bearing inner race onto the axle shaft with the special tool. (11S022)





## COMPONENT SERVICE-AXLE SHAFT

9. Pack the bearing case with the specified wheel bearing grease.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

10. Install the lock washer and the lock nut with the chamfered side in the direction shown in the illustration. When installing the lock washer, align the tab of the lock washer with the slot in the axle shaft. (11S547)

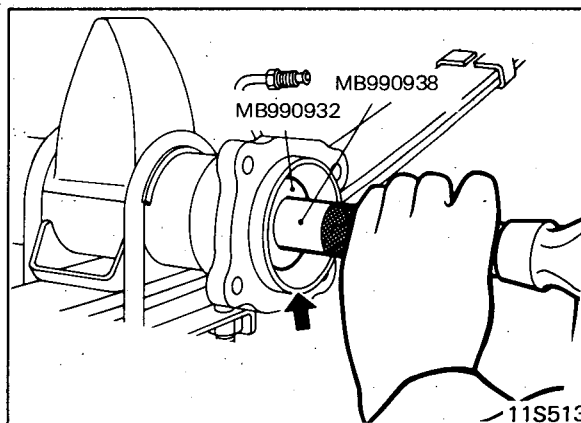
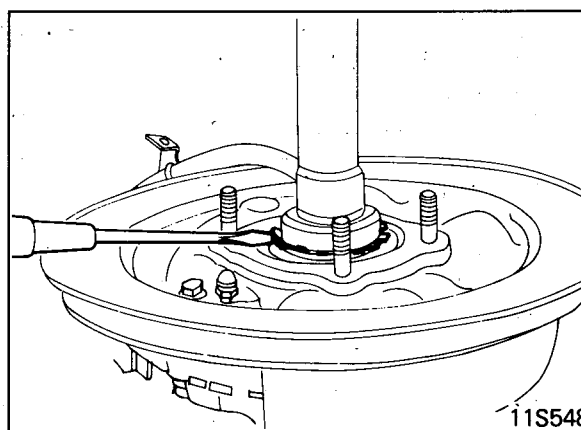
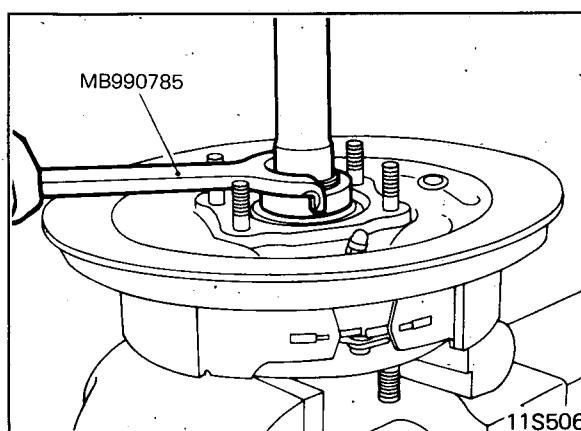
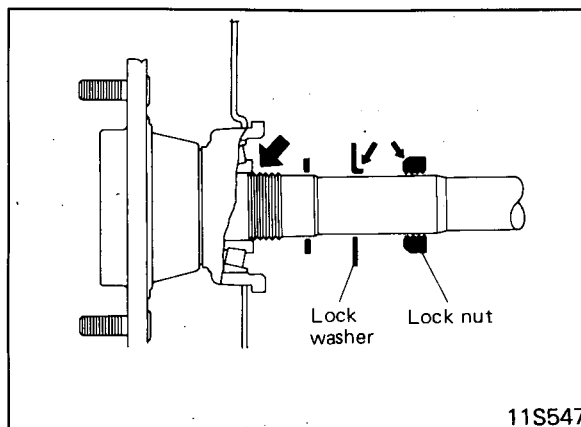
### NOTE

Apply the specified wheel bearing grease to the threaded portion of the axle shaft before installing the lock nut.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

11. Tighten the lock nut to the specified torque using the special tool.

Rear axle bearing lock nut tightening torque .....  
180-220 Nm (130-159 ft.lbs.)



12. Bend the tabs of the lock washer into the slots of the lock nut.

### NOTE

If the slots in the lock nut and the tabs of the lock washer are out of alignment, tighten the lock nut until they align.

## INSTALLATION

1. Apply the specified wheel bearing grease to the oil seal area of the rear axle housing.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

2. Drive the new oil seal into the end of the rear axle housing with the special tools. (11S513)
3. Apply the specified wheel bearing grease to the oil seal lip.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP





4. Adjust the clearance between the bearing case and rear axle housing as follows: (11D528)
  - (1) Insert a 1-mm (.04-in.) shim and the O-ring into the left rear axle housing.
  - (2) Apply semi-drying sealant to the mating surface of bearing case, install the left axle shaft into the rear axle housing and tighten the nuts to the specified torque.

Bearing case to rear axle housing torque . . . . .  
50-60 Nm (36-43 ft.lbs.)

## NOTE

Tighten the nuts diagonally.

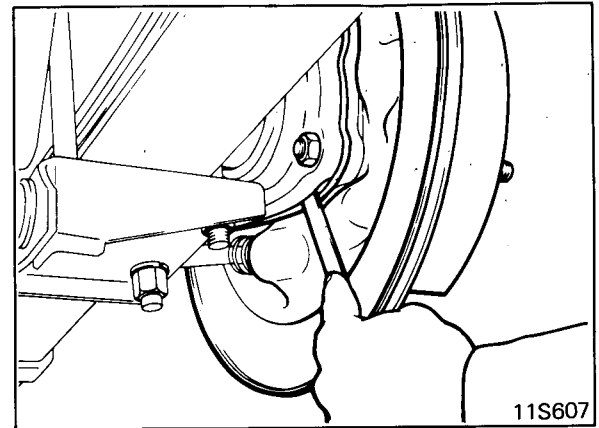
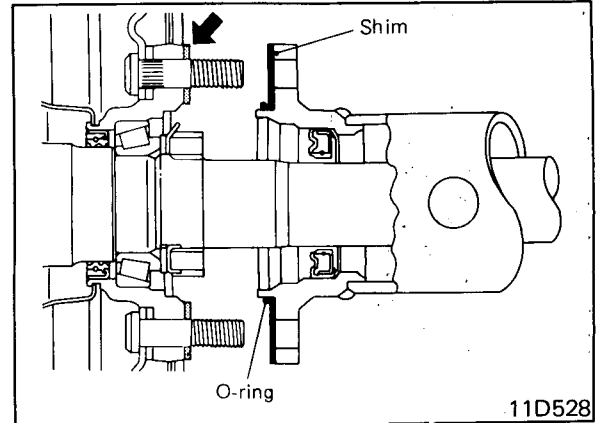
- (3) Install the right axle shaft without shim(s) and O-ring, and temporarily tighten to about 6 Nm (4.3 ft.lbs.).
- (4) Measure the clearance between the bearing case and rear axle housing with a feeler gauge. (11S607)
- (5) Select shim(s) of the thickness which is equal to the sum of the measured clearance plus 0.05-0.20 mm (.002-.008 in.).
- (6) Remove the right axle shaft and install shim(s) and O-ring on the right rear axle housing.
- (7) Apply semi-drying sealant to the mating surface of bearing case, install the right axle shaft into the rear axle housing and tighten the retainer bolts to the specified torque.

Bearing case to rear axle housing torque . . . . .  
50-60 Nm (36-43 ft.lbs.)

## NOTE

Tighten the nuts diagonally.

5. Check to be sure that the axle shaft end play is within the service limit. (Refer to p. 3-10.)

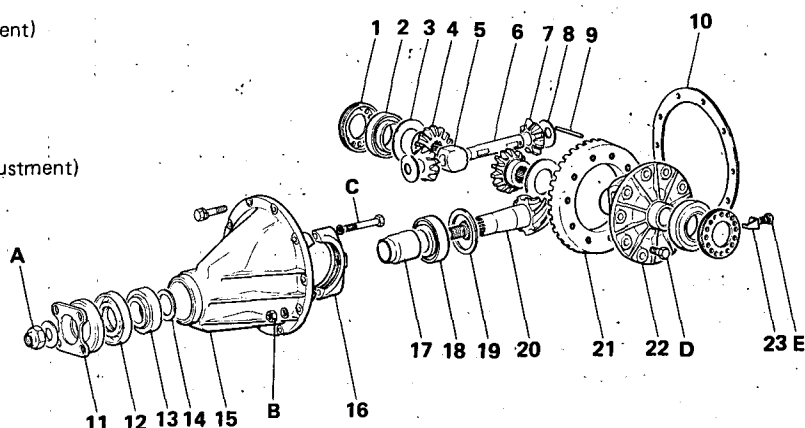




## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

### COMPONENTS

1. Side bearing nut
2. Side bearing
3. Side gear thrust spacer
4. Side gear
5. Thrust block
6. Pinion shaft
7. Pinion gear
8. Pinion washer
9. Lock pin
10. Gasket
11. Companion flange
12. Oil seal
13. Drive pinion front bearing
14. Drive pinion front shim (for preload adjustment)
15. Gear carrier
16. Bearing cap
17. Drive pinion spacer
18. Drive pinion rear bearing
19. Drive pinion rear shim (for pinion height adjustment)
20. Drive pinion
21. Ring gear
22. Differential case
23. Lock plate

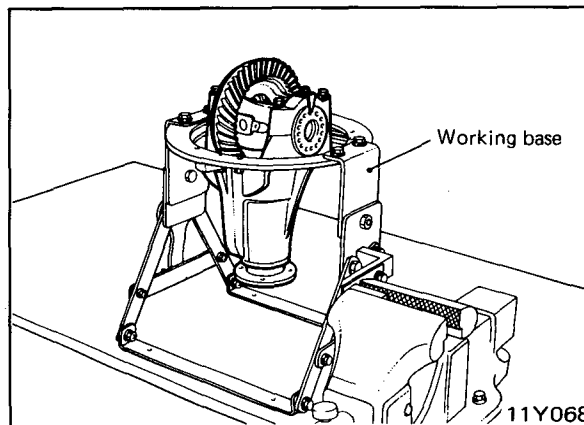


	Nm	ft.lbs.
A	190-250	137-181
B	25-30	18-22
C	55-65	40-47
D	80-90	58-65
E	15-22	11-16

11S079

### REMOVAL

1. Remove the drain plug and drain the differential gear oil.
2. Detach the propeller shaft from the differential carrier. (Refer to GROUP 16.)
3. Pull the right and left axle shafts out about 70 mm (3 in.). (Refer to p. 3-13.)
4. Remove the differential carrier from the rear axle housing. (Refer to p. 3-12.)
5. Secure the working base in a vice, and mount the differential carrier to the working base. (11Y068)





## INSPECTION BEFORE DISASSEMBLY

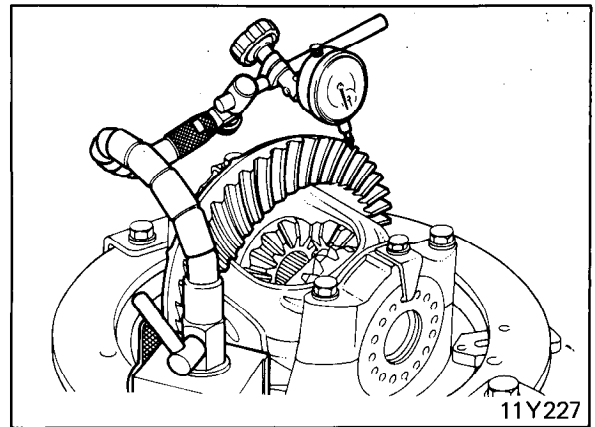
### Final Ring Gear Backlash

With the drive pinion locked in place, measure the final ring gear backlash with a dial indicator.

Final ring gear backlash .....  
0.13-0.18 mm (.005-.007 in.)

### NOTE

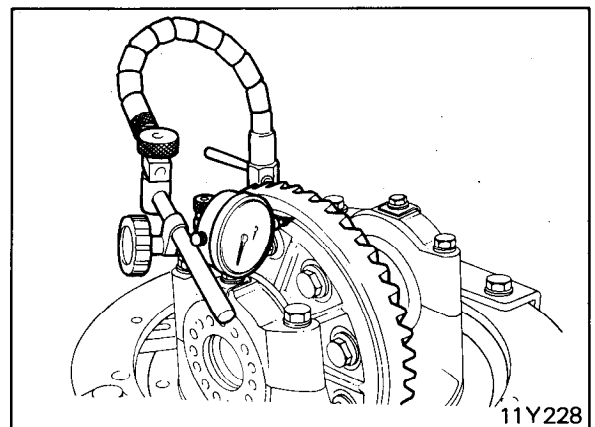
Measure at four different points on the circumference of the ring gear.



### Ring Gear Runout

Measure the ring gear runout at the shoulder on the back of the gear teeth.

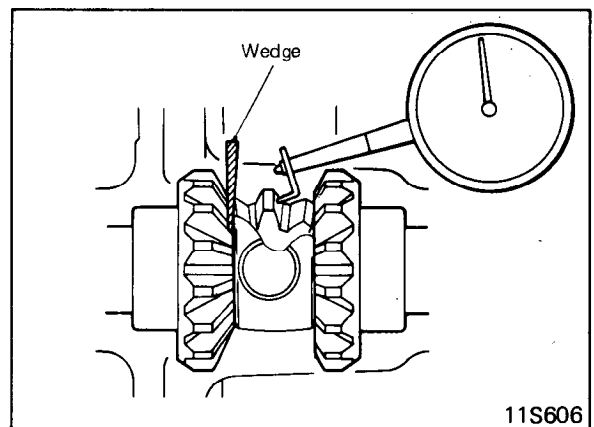
Ring gear runout [Repair limit] .....  
0.05 mm (.002 in.)



### Differential Gear Backlash

Lock the side gear with a wedge and measure the differential gear backlash with a dial indicator positioned on the pinion gear.

Differential gear backlash .....  
0.05-0.13 mm (.002-.005 in.)

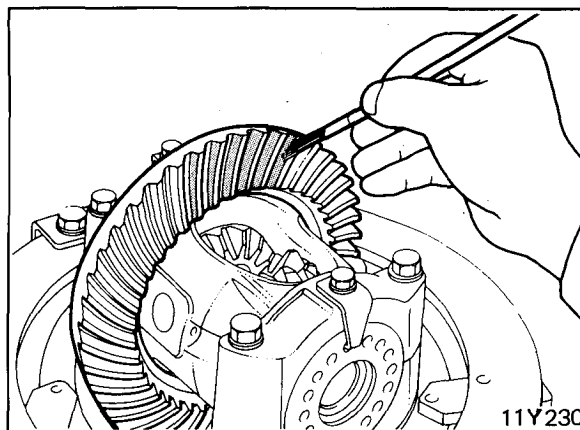




## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

### Final Ring Gear Tooth Contact

1. Apply a thin, uniform coat of marking compound to both sides of the ring gear teeth.



2. Insert a brass rod between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the ring gear [approximately 2.5 to 3.0 Nm (1.8 to 2.2 ft.lbs.) through the drive pinion]. (11Y628)

#### Caution

If the ring gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.

3. Inspect the tooth contact pattern of the ring gear and drive pinion.

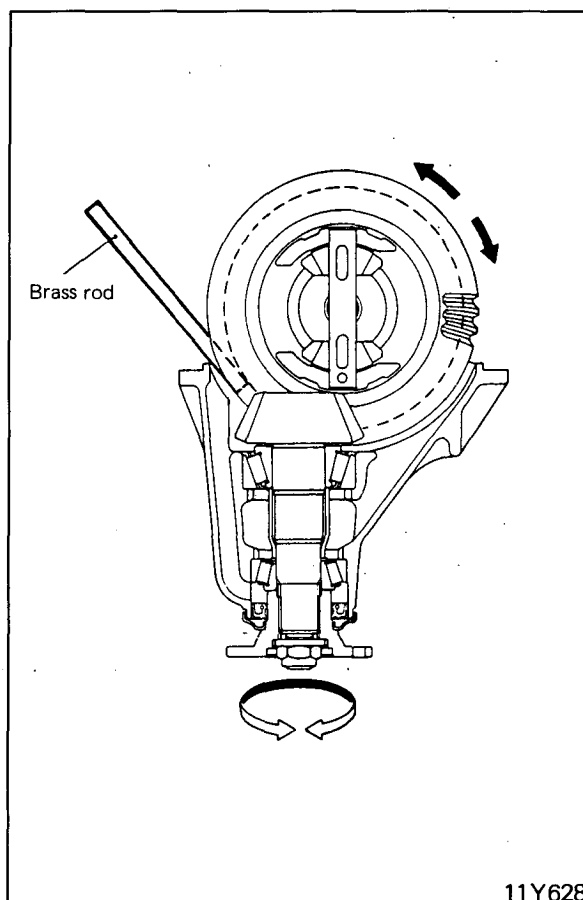
#### NOTE

Checking the tooth contact pattern is the way to confirm that the adjustments of the pinion height and backlash have been done properly. Continue to adjust the pinion height and backlash until the tooth contact pattern resembles the standard pattern.

4. If the correct tooth contact pattern cannot be obtained even after adjustments have been made, replace the ring gear and pinion.

#### Caution

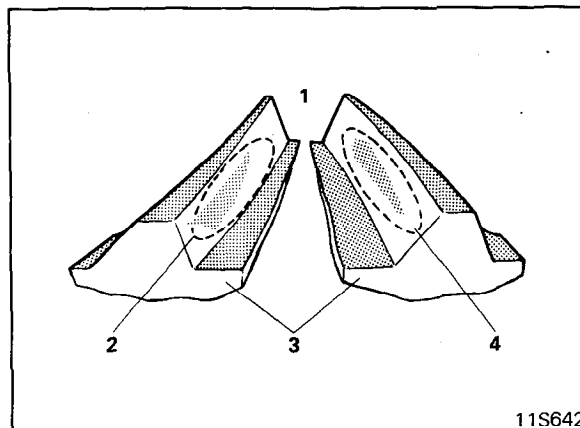
If either the ring gear or the drive pinion is to be replaced, be sure to replace them as a set.





## Standard tooth contact pattern

1. Toe
2. Drive-side
3. Heel
4. Coast-side



11S642

## Tooth contact pattern resulting from excessive pinion height

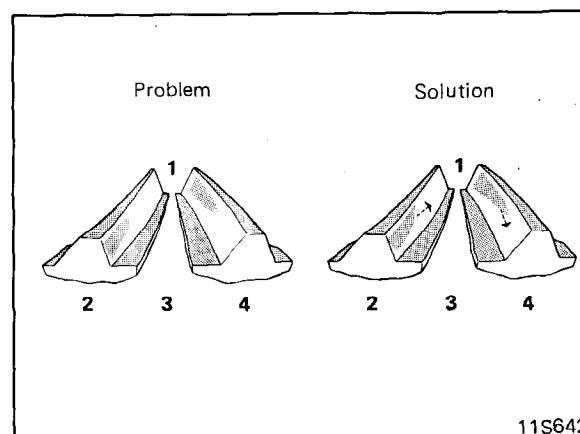
### Problem

The drive pinion is positioned too far from the center of the ring gear.

### Solution

Increase the thickness of the pinion height adjusting shim, and position the drive pinion closer to the center of the ring gear.

For backlash adjustment, position the ring gear farther from the drive pinion.



11S642

## Tooth contact pattern resulting from insufficient pinion height

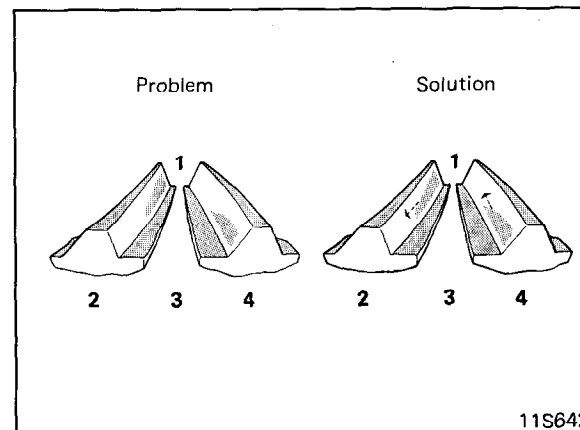
### Problem

The drive pinion is positioned too close to the center of the ring gear.

### Solution

Decrease the thickness of the pinion height adjusting shim, and position the drive pinion farther from the center of the ring gear.

For backlash adjustment, position the ring gear closer to the drive pinion.



11S642

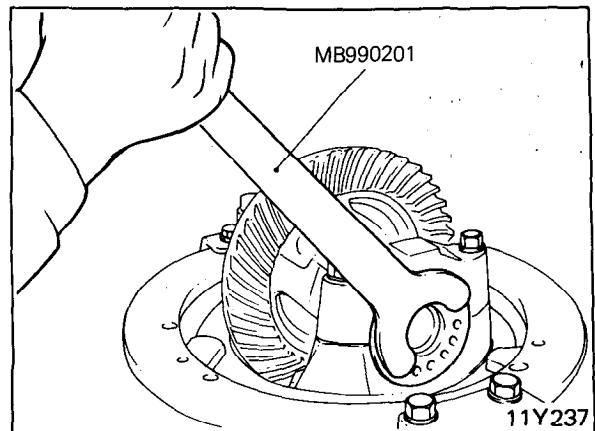


## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

### DISASSEMBLY

#### Differential Case Assembly

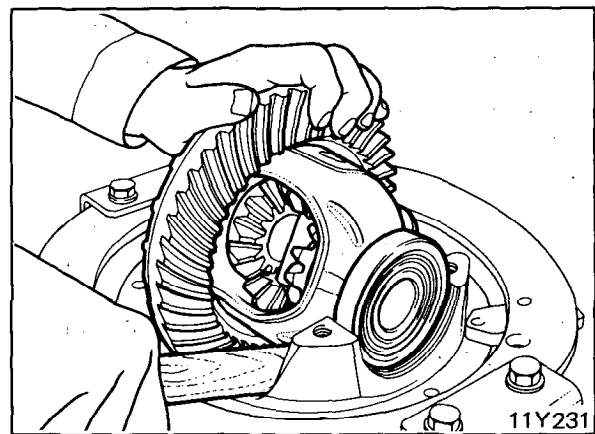
1. Remove the lock plates and then remove the side bearing nuts with the special tool. (11Y237)
2. Remove the bearing caps.



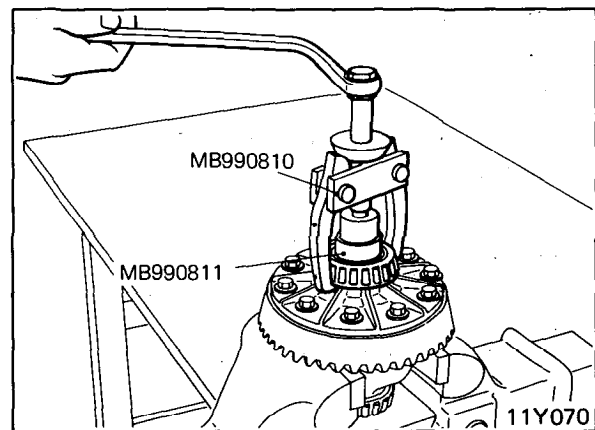
3. Remove the differential case assembly with hammer handles.

#### NOTE

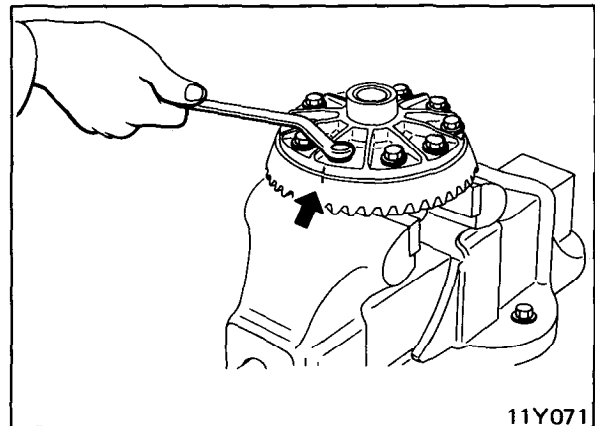
Keep the right and left side bearings, bearing caps and side bearing adjusting spacers separate so that they do not become mixed up at the time of reassembly.



4. Remove the side bearing inner races with the special tools shown in the illustration.

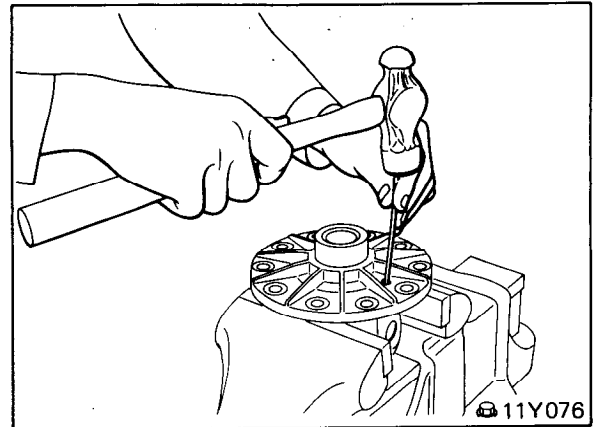


5. Make mating marks on the differential case and ring gear. (11Y071)
6. Loosen the ring gear bolts diagonally and remove the ring gear.



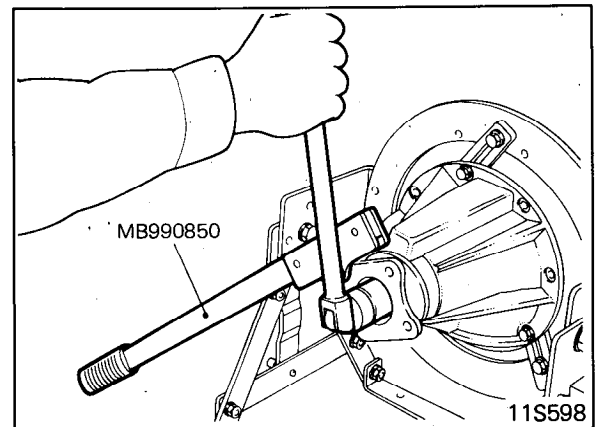


7. Remove the lock pin with a punch, and then remove the pinion shaft, pinion gears, pinion washers, side gears and side gear thrust spacers.

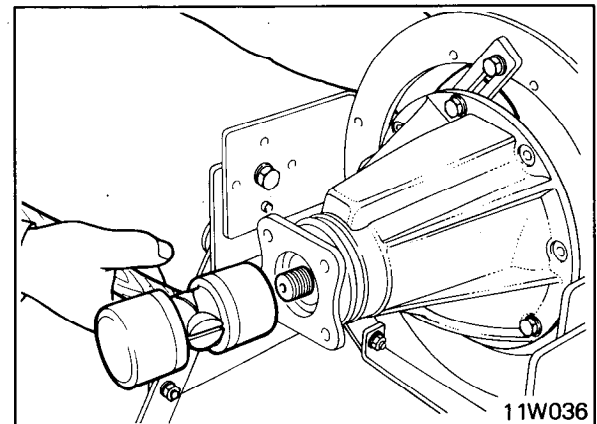


## Drive Pinion

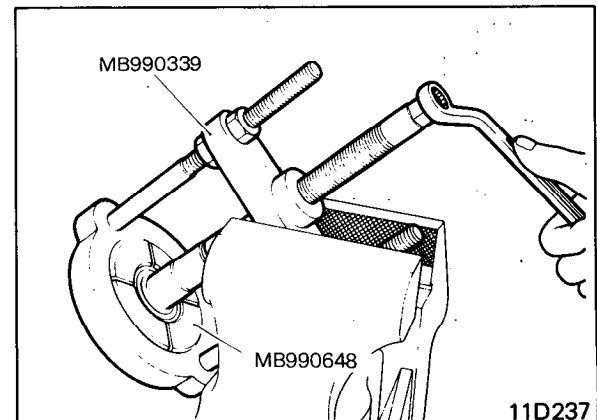
1. Use a special tool shown in the illustration to hold the companion flange and then remove the companion flange self-locking nut.



2. Make mating marks on the drive pinion and companion flange.
3. Remove the drive pinion together with the drive pinion spacer and drive pinion front shims. (11W036)



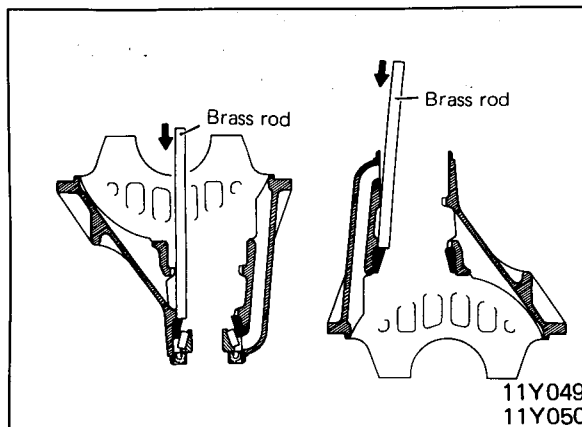
4. Remove the drive pinion rear bearing inner race with the special tools shown in the illustration.





## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

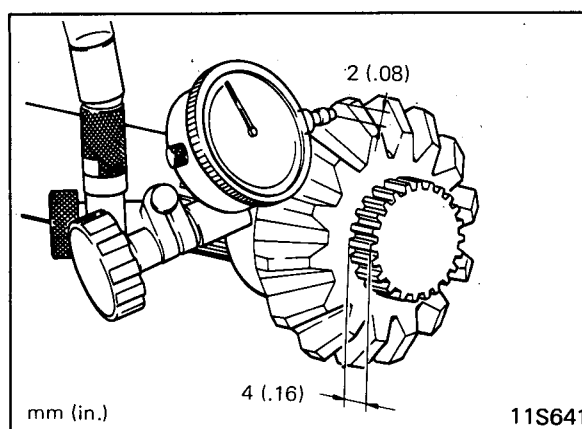
- Remove the front drive pinion and rear bearing outer races with a brass rod.



### INSPECTION

- Check companion flange for wear or damage.
- Check oil seal for wear or deterioration.
- Check bearings for wear or discoloration.
- Check gear carrier for cracks.
- Check drive pinion and ring gear for wear or cracks.
- Check side gears, pinion gears and pinion shaft for wear or damage.
- Check axle shaft spline for looseness. With the axle shaft secured in a vice, measure the free play with a dial indicator. (11S641)

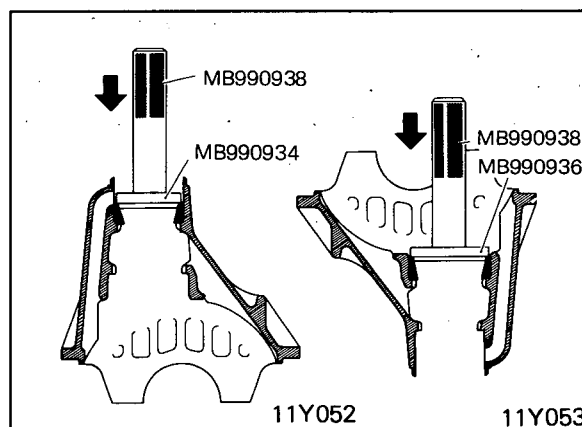
Axle shaft spline play  
 [Service limit] ..... 0.6 mm (.024 in.)



### REASSEMBLY

#### Drive Pinion

- Press the drive pinion front and rear bearing outer races into the gear carrier with the special tools shown in the illustration.

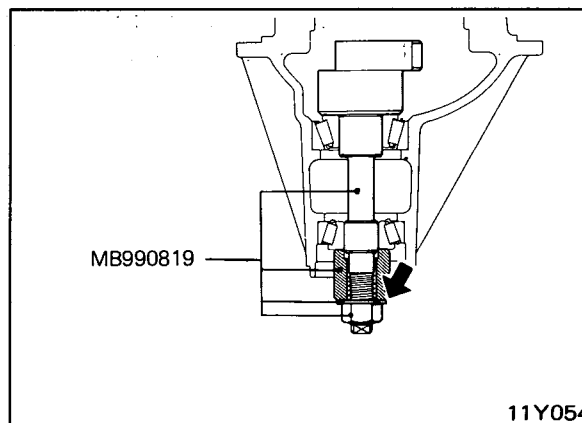


- Adjust the drive pinion height.  
 (1) Mount the special tools and front and rear drive pinion bearings onto the gear carrier.

#### NOTE

Apply a thin coat of the specified multipurpose grease to the mating surfaces of the washer of the special tool.

Recommended multipurpose grease .....  
 SAE J310a, NLGI grade #2EP







- (2) Tighten the nut and measure the drive pinion turning torque (without the oil seal). (Y11515, Y11210)

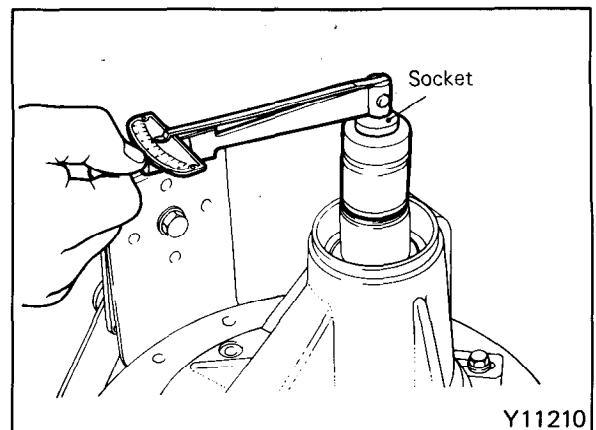
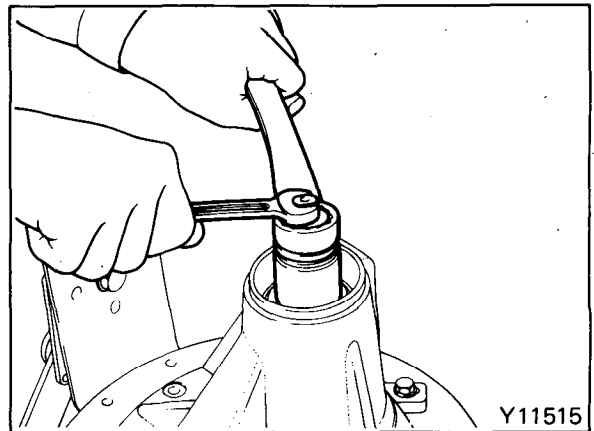
## NOTE

Loosen or tighten the nut as necessary to obtain the specified drive pinion turning torque.

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Drive pinion turning torque [without oil seal] . . . .  
70-100 Ncm (6.1-8.7 in.lbs.)

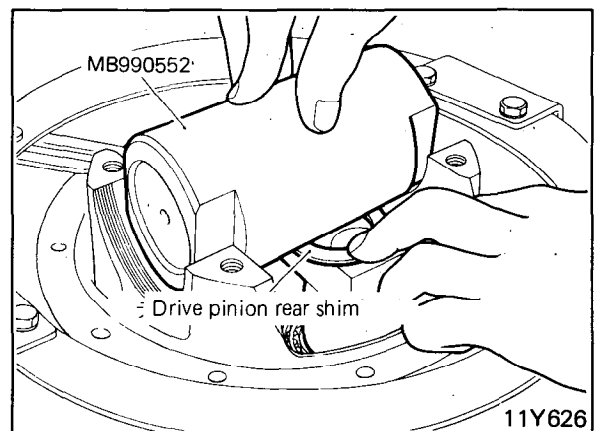
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- (3) Position the drum of the special tools in the side bearing seat of the gear carrier, and then select a drive pinion rear shim(s) of a thickness which corresponds to the gap between the special tools.

## NOTE

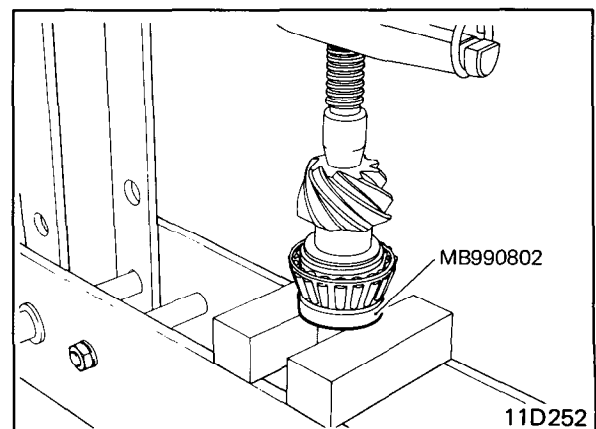
Be sure to clean the side bearing seat thoroughly. When positioning the special tool, be sure that the cut-out sections of the special tool are in the positions shown in the illustration. Also confirm that the special tool is in close contact with the side bearing seat. When selecting the drive pinion rear shims, keep the number of shims to a minimum.



- (4) Install the selected drive pinion rear shim(s) onto the drive pinion, and press the drive pinion rear bearing onto the pinion with a special tool. (11D252)
3. Adjust the drive pinion preload.
    - (1) Fit the drive pinion front shim(s) between the drive pinion spacer and the drive pinion front bearing inner race.
    - (2) Tighten the companion flange to the specified torque with the special tool (MB990850). (Refer to p. 3-23.)

## NOTE

Do not install the oil seal at this time.





## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

- (3) Measure the drive pinion preload (without the oil seal). (Refer to p. 3-25.)
- (4) If the drive pinion preload is not within the range of the standard value, adjust the preload by replacing either the drive pinion front shim(s) or the drive pinion spacer.

### NOTE

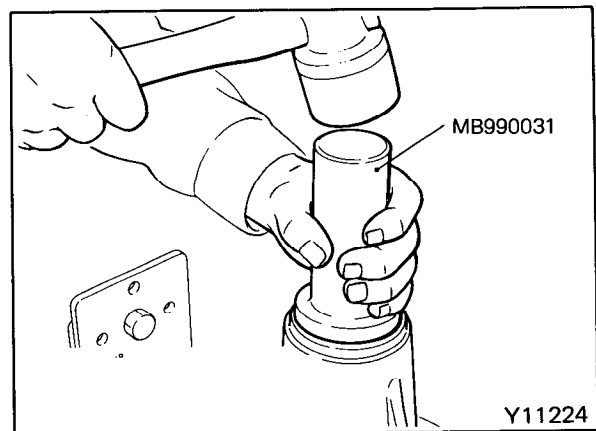
Select a thicker drive pinion spacer if necessary to avoid using a large number of shims.

4. Remove the companion flange and drive pinion and drive the pinion seal into place with the special tool. (Y11224)
5. Apply the specified multipurpose grease to the oil seal lip.

---

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

---



6. Install the drive pinion assembly and companion flange with the mating marks properly aligned, and tighten the companion flange self-locking nut to the specified torque with the special tool (MB990850). (Refer to p. 3-23.)

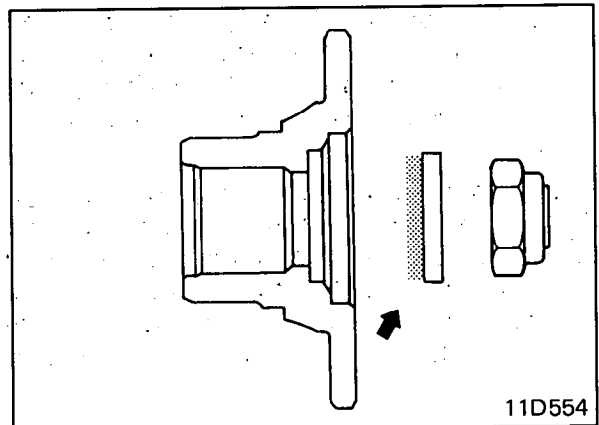
### NOTE

Apply a thin coat of specified multipurpose grease to the surface of the washer that contacts the companion flange before installing the drive pinion assembly.

---

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

---



7. Measure the drive pinion preload (with the oil seal) to verify that the drive pinion preload complies with the standard value. (Refer to p. 3-25.)



## Differential Case Assembly

1. Assemble the side gears, side gear thrust spacers, pinion gears, and pinion washers into the differential case.

### NOTE

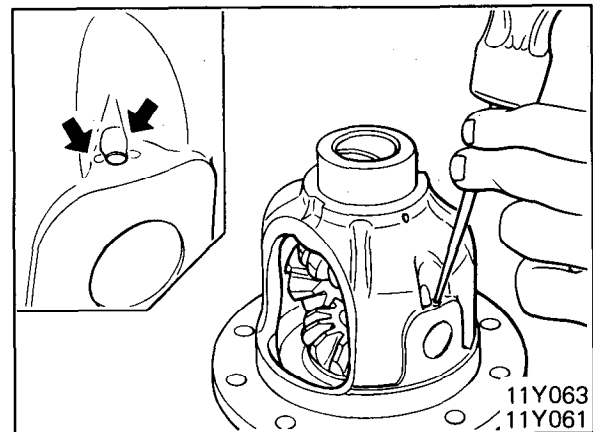
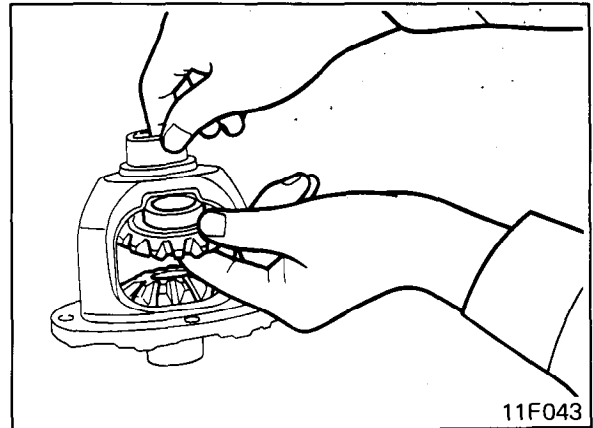
Install the side gear thrust spacers with the oil grooves facing the side gears.

2. Install the pinion shaft and thrust block.

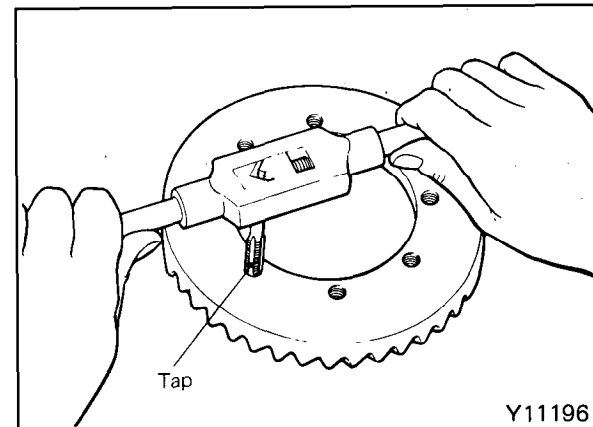
### NOTE

Do not drive in the lock pin at this time.

3. Adjust the differential gear backlash.
  - (1) Insert a wedge between the side gear and the pinion shaft to lock the side gear.
  - (2) Measure the differential gear backlash with a dial indicator. (Refer to p. 3-19.)
  - (3) If the differential gear backlash exceeds the repair limit, adjust the backlash by installing thicker side gear thrust spacers.
  - (4) Measure the differential gear backlash once again, and confirm that it meets specifications.
4. Align the pinion shaft lock pin hole with the differential case lock pin hole and then drive in the lock pin. (11Y063)
5. Stake the lock pin at two points with a punch. (11Y061)

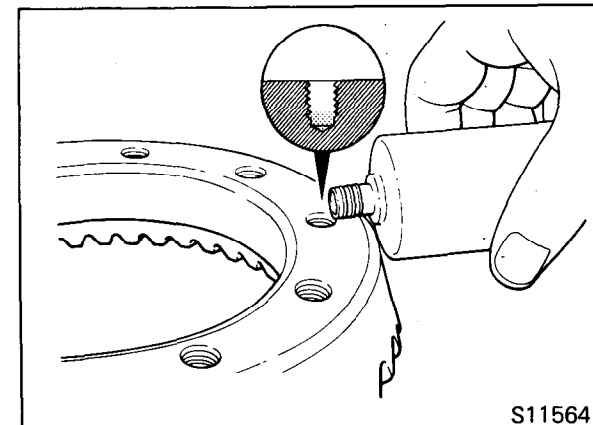


6. Clean the ring gear attaching bolts and remove the adhesive from the threaded holes of the ring gear with a M10 x 1.25 tap. Clean the threaded holes with compressed air.



7. Apply LOCTITE 270 or 271 to the threaded holes of the ring gear. (S11564)
8. Install the ring gear into the differential case with the mating marks properly aligned. Be sure to tighten the bolts diagonally to the specified torque.

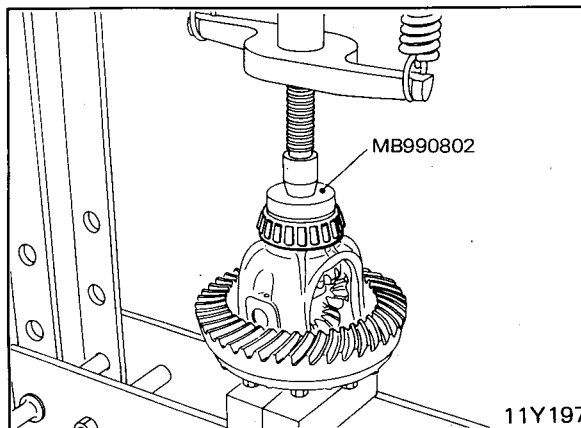
Ring gear bolt tightening torque .....  
80-90 Nm (58-65 ft.lbs.)



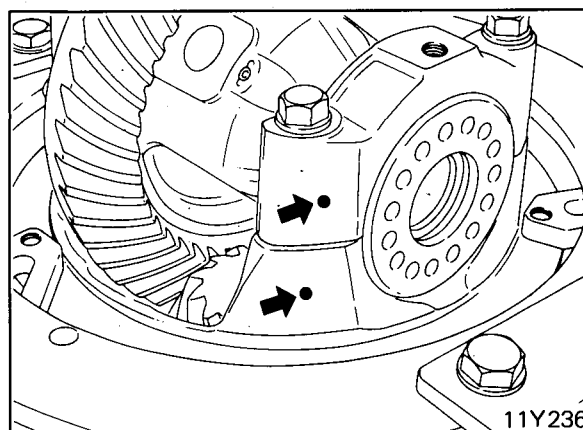


## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

9. Press the side bearings onto the differential case using the special tool. (11Y197)
10. Adjust the final ring gear backlash.
  - (1) Mount the differential case assembly into the gear carrier.



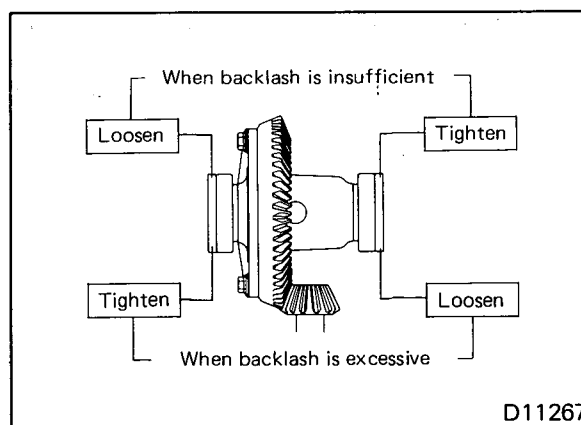
- (2) Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap. (11Y236)
- (3) Using the special tool (MB990201), temporarily tighten the side bearing nut until it is in the position just preloading of the side bearing. (Refer to p. 3-22.)
- (4) Measure the final ring gear backlash. (Refer to p. 3-19.)



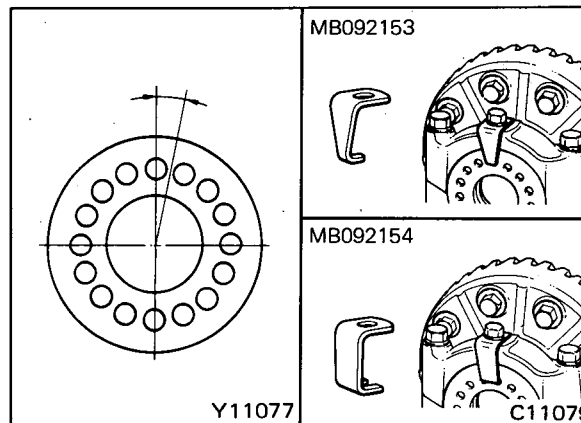
- (5) Using the special tool (MB990201), adjust the backlash to meet specifications by moving the side bearing nut as shown.

### NOTE

First loosen the side bearing nut, and then tighten it by the same amount.



- (6) Using the special tool (MB990201), tighten both right and left side bearing nuts half the distance between centers of two neighboring holes. (Y11077)
- (7) Select and install the necessary lock plates (two kinds). (C11079)
- (8) Check tooth contact of the ring gear and drive pinion. If the contact is not good, adjust (Refer to p. 3-20.), and then remeasure the backlash to verify that it agrees with the standard value.





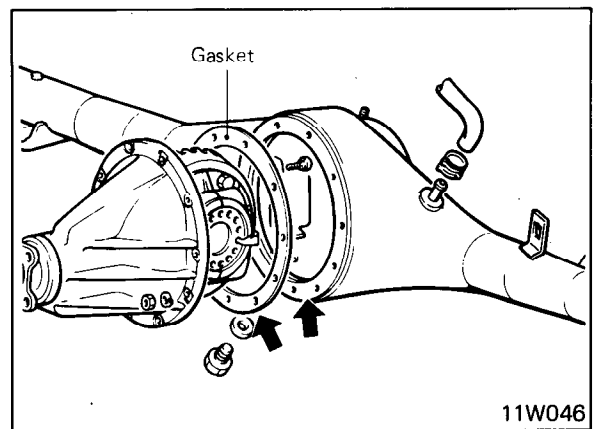
## NOTE

There is a correlation between the backlash and tooth contact of the ring gear. Coordinate their adjustment while checking both until both are within specifications. If correct adjustment cannot be made by moving the ring gear, adjustment of the drive pinion height is required.

11. Measure the ring gear runout. (Refer to p. 3-19.) If the ring gear runout exceeds the repair limit, reinstall the ring gear by changing the phase of the ring gear and differential case, and then remeasure the runout.
12. Torque all parts to specifications during assembly.

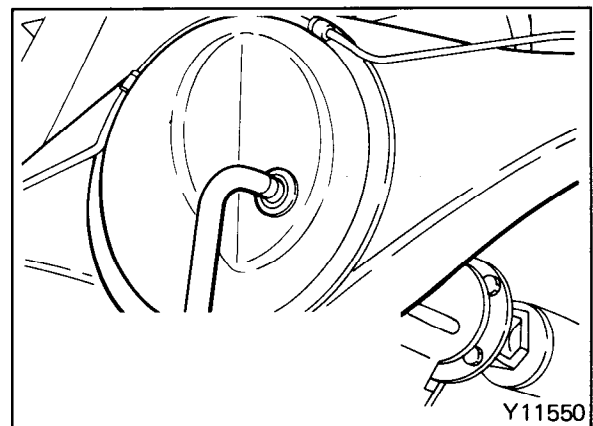
## INSTALLATION

1. Before installing the differential carrier assembly, apply semi-drying sealant to both sides of the gasket and threaded portions of bolts. (11W046)
2. Torque all parts to specifications during assembly.



3. Supply the specified quantity of the specified gear oil.

Rear axle gear oil .....  
Hypoid gear oil API classification GL-4 or GL-5 SAE  
viscosity No. 90, 1.80 liter (1.90 U.S.qt., 1.58 Imp.qt.)

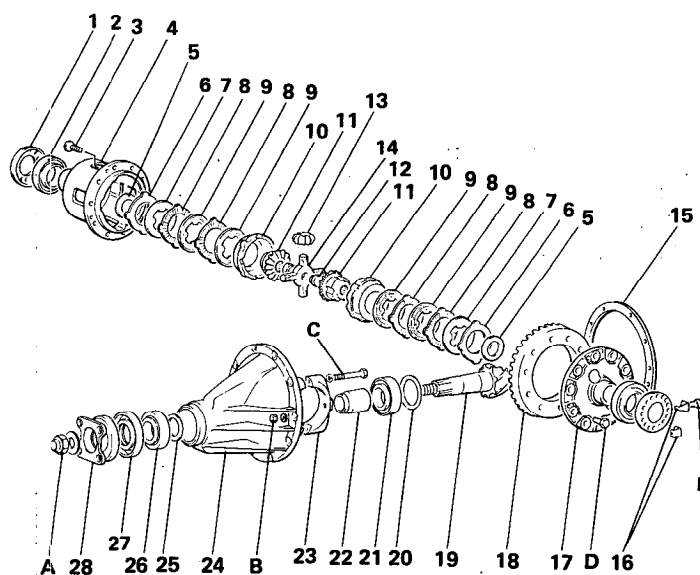




## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

### COMPONENTS

1. Side bearing nut
2. Side bearing
3. Screw
4. Differential case B
5. Thrust washer
6. Spring plate
7. Spring disc
8. Friction plate
9. Friction disc
10. Pressure ring
11. Side gear
12. Thrust block
13. Differential pinion gear
14. Differential pinion shaft
15. Gasket
16. Lock plate
17. Differential case A
18. Ring gear
19. Drive pinion
20. Drive pinion rear shim  
(for pinion height adjustment)
21. Drive pinion rear bearing
22. Drive pinion spacer
23. Bearing cap
24. Gear carrier
25. Drive pinion front shim  
(for preload adjustment)
26. Drive pinion front bearing
27. Oil seal
28. Companion flange



	Nm	ft.lbs.
A	190-250	137-181
B	25-30	18-22
C	55-65	40-47
D	80-90	58-65
E	15-22	11-16

11S661

**OUTLINE**

A limited slip differential is an anti-slipping device which functions as a differential during cornering to allow the outer wheel to turn at a faster speed than the inner wheel. In the event that one wheel begins spinning (driving on slippery road surfaces, one wheel leaves the road surface, etc.), it automatically functions to prevent such spinning.

The only component of the limited slip differential that differs from a conventional differential is the differential case assembly. Therefore, the basic operation procedures for the following points are the same as those for a conventional differential. Refer to the following items.

**INSTALLATION and REMOVAL of DIFFERENTIAL CARRIER ASSEMBLY** (Refer to pp. 3-18 and 3-29.)

**NOTE**

Use the special oil in the limited slip differential.

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MITSUBISHI genuine gear oil Part No. 8149630EX,  
or Mopar Hypoid Gear Lubricant Part No. 3744994  
or 3744995 Plus Mopar Hypoid Gear Oil Additive/  
Friction Modifier Part No. 4057100, or equivalent.

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**INSPECTION and ADJUSTMENT of Final Ring Gear Tooth Contact** (Refer to p. 3-20.)

**INSPECTION and ADJUSTMENT of Final Ring Gear Backlash** (Refer to p. 3-19.)

**INSPECTION and ADJUSTMENT of Drive Pinion Height** (Refer to p. 3-24.)

**INSPECTION and ADJUSTMENT of Drive Pinion Preload** (Refer to p. 3-25.)

**INSPECTION and ADJUSTMENT of Ring Gear Runout** (Refer to p. 3-19.)

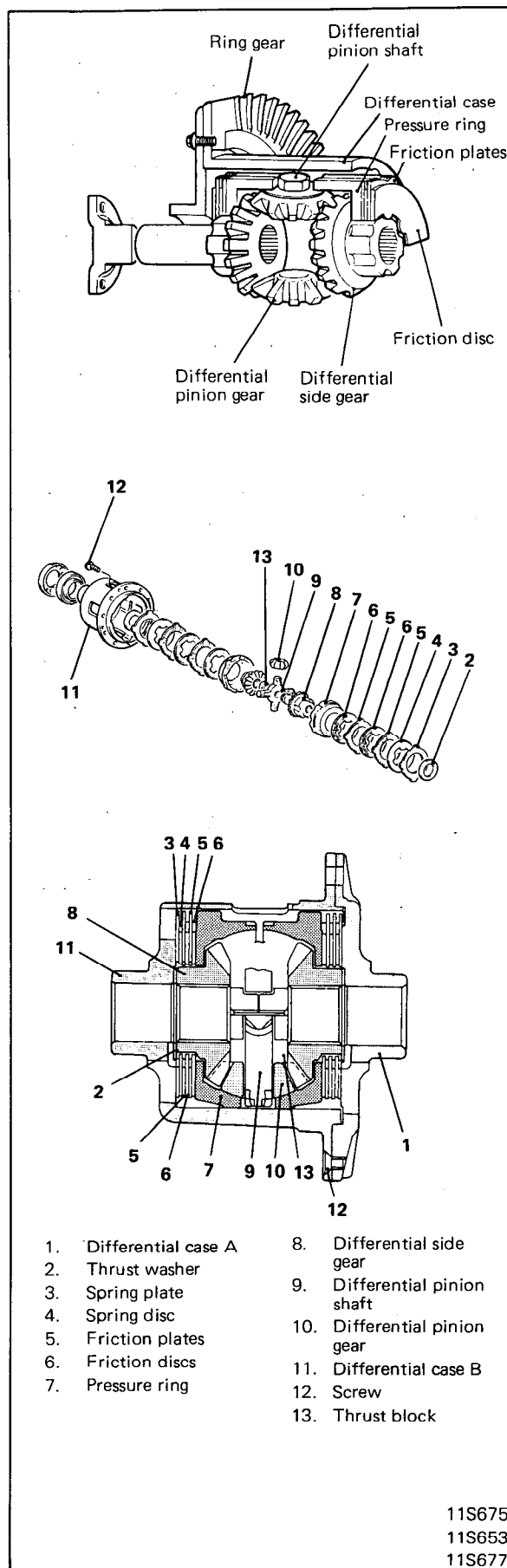
**DISASSEMBLY, INSPECTION and REASSEMBLY of Drive Pinion** (Refer to pp. 3-22 and 3-29.)



## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

### CONSTRUCTION AND FUNCTION

With a conventional differential, in the event that one wheel of the vehicle is on ice, mud, or some other slippery surface, the wheel will spin and the drive force of the vehicle will be greatly reduced. If this happens, the speeds of the differential case and of the side gear (axle shaft) are different because of differential operation. The limited slip function acts to limit this differential operation. The construction is shown in the illustration. The multi-plate clutches engage with the differential case and with each of the differential side gears. If spinning causes a difference in component speeds, the frictional force between the clutch plates will cause the speed of the differential side gear to become closer to that of the differential case, and thus the limited slip function will control the spinning. In addition, the purpose of the pressure rings inside the differential case is to transmit the driving force to the pinion gear, and the reason for the separation is to provide an increase in the clutch plate pressing force through the leverage of the pinion shaft.



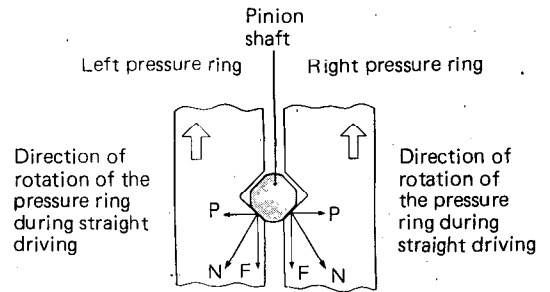
11S675  
11S653  
11S677





## OPERATION (TORQUE TRANSMISSION) DURING STRAIGHT DRIVING

When the differential case is turned the drive pinion via the ring gear, the pressure rings which are interlocked with the differential case will also turn at the same speed. (The projections located on the outside of the pressure rings engage (with some play) the grooves located on the inside of the differential case.) When the pressure rings move in the direction of rotation, they contact the tapered portion of the differential pinion shaft, and thereby receive reaction force in both the lateral direction and the direction of rotation. The reaction force in the lateral direction presses the clutch plates together, and maintains straight driving. During such driving, because the road surface gives equal resistance to both the left and right wheels, equal resistance is applied to the left and right differential side gears. Therefore, the differential pinion gear does not revolve, and the ring gear, the differential case, the differential pinion shaft, the differential pinion gear, and the left and right differential side gears all turn as one unit.



Reaction force symbol code

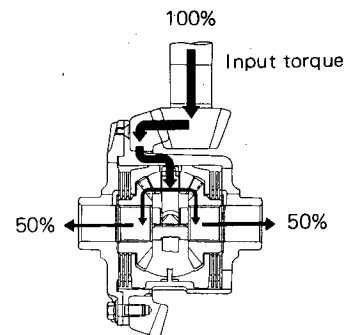
P = Force of the pressure rings on the clutch plates

F = Force of the pressure rings on the pinion shaft

N = Resultant force of P + F

Distribution of the reaction force of the pressure rings

.11F108



Transmission of torque (during straight driving)

11S652

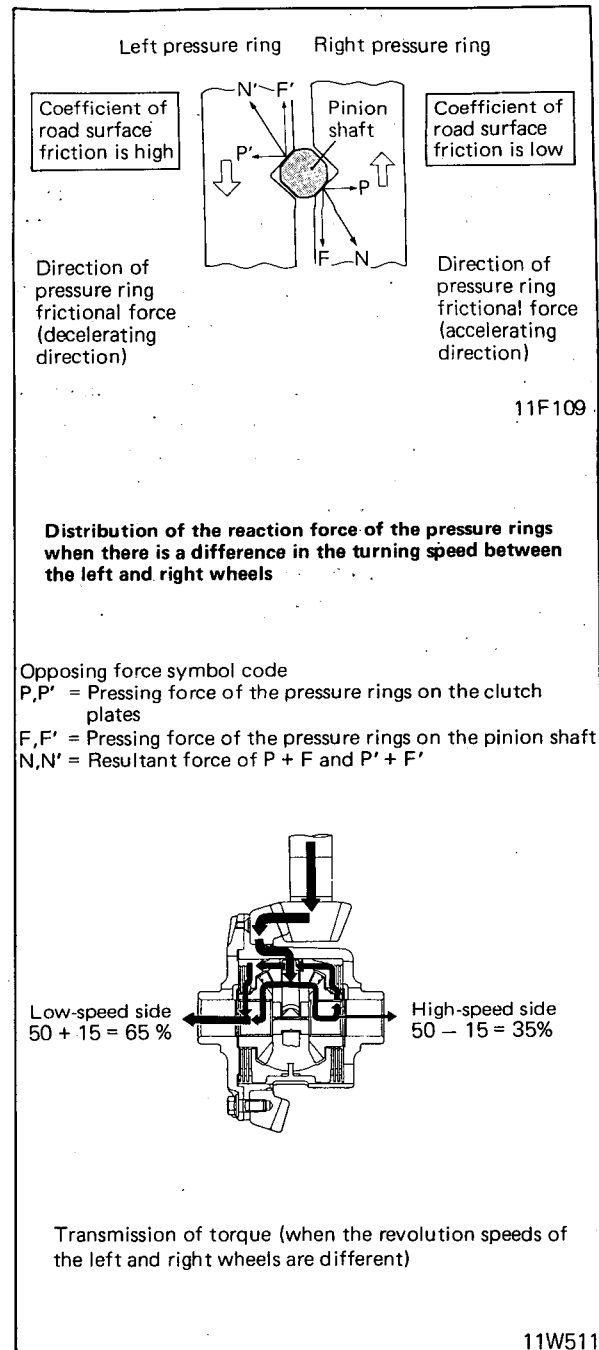


## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

### OPERATION (TORQUE TRANSMISSION) WHEN THE SPEEDS OF THE LEFT AND RIGHT WHEELS ARE DIFFERENT

When one wheel is in contact with a concrete road surface (which has high coefficient of friction) and the other wheel is in contact with a muddy or other slippery road surface (which has low coefficient of friction), the differential operation will cause the speed of the wheel in contact with the slippery surface to be faster than the speed of the ring gear, lowering the maximum drive force. If this occurs, the limited slip function will control the differential operation and increase the driving force. The transmission of torque through the limited slip device in this event is as follows:

When the differential case is turned by the ring gear and the drive pinion, the pressure rings which are interlocked with the differential case will turn at the same speed. Also, the difference in the road surface resistances will cause differential operation and the left and right side gears will revolve at speeds different from that of the differential case. Because of the friction produced between the clutch plates in mesh with both the differential side gear and differential case, one of the pressure rings increases its rotating speed, whereas the other reduces its rotating speed. The pressure rings press the tapered portion of the differential pinion shaft with which they are in contact, and thereby receive reaction force in both the lateral direction and the direction of rotation. The reaction force in the lateral direction causes the clutch plates to mesh, increasing the frictional and the drive force.





## FEATURES OF THE LIMITED SLIP DIFFERENTIAL

When one wheel of the vehicle is in contact with a road surface which has poor traction, the limited slip differential, in comparison to a conventional differential, supplies additional torque to the wheel which has the better traction conditions by utilizing clutch plates, thus improving the traction capacity. Moreover, the effect of the limited slip differential is to prevent the vehicle from becoming stuck, even if the traction of one of the wheels becomes radically reduced.

When one wheel moves from a road surface which has poor traction onto one which has good traction, or when the wheels are constantly leaving the road surface while driving on a rough, bumpy road, the clutch plates of the limited slip differential allow the torque to absorb the differences between the revolution speeds of the right and left wheels. In addition, the sudden changes (jolting) in the drive force are also absorbed, thus preventing skidding.

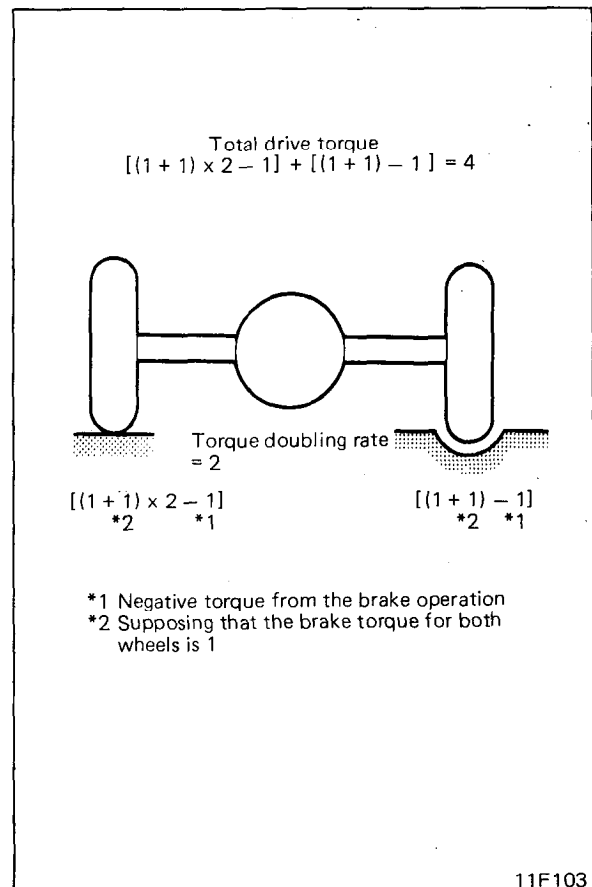
Because in the limited slip differential, the differential operation is slightly restricted during normal cornering, the understeer tendency (the tendency for the cornering of the vehicle to exceed the turning of the steering wheel) becomes greater; however, this does not have any detrimental effect on the driving of the vehicle. Moreover, in the event that the inside wheel lifts up (the tire leaves the road surface) during high-speed cornering, the clutch plates function to limit differential operation which would simultaneously decrease the drive force of the outside wheel; therefore, the limited slip differential moderates sudden speed reductions during vehicle cornering, and thereby provides greater cornering capability than a conventional differential.

## MAKING EFFECTIVE USE OF A LIMITED SLIP DIFFERENTIAL

### Effective Use in Combination with the Brakes

If a wheel is in contact with a slippery road surface and has begun to spin, using the brakes in combination with the limited slip differential will provide even greater traction capability. The resistance caused by the brakes will further increase the drive torque of the engine, and this increased torque will increase the clutch plate pressing force of the pressure ring, thus increasing the traction. Also, the drive force transmitted to the brakes will not function as real drive force. This is shown in the illustration at right.

In the illustration at the right, the application rate is  $R_t = 2$ , and, supposing the torque from the brake operation is 1, a drive torque of  $1 + 1 = 2$  will be applied to the spinning wheel (the right wheel), and a drive torque of twice that which is applied to the spinning wheel, or  $(1 + 1) \times 2 = 4$ , will be applied to the wheel which is not spinning (the left wheel). However, because the brake force of 1 is a negative value with regard to the propulsion torque of each wheel, the propulsion torque actually obtained by the right wheel is  $(1 + 1) - 1 = 1$ , and that obtained by the left wheel is  $[(1 + 1) \times 2 - 1] = 3$ .





## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

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Therefore, the total drive torque is  $1 + 3 = 4$ . In the same circumstances, the total drive torque of a conventional differential is  $1 + 1 = 2$ , and that of a limited slip differential when the brakes are not used in combination is  $1 + 2 = 3$ . This represents an increase in the traction by a factor of 2 over that of a conventional differential, and by a factor of 1.3 over that of a limited slip differential when the brakes are not used.

### NOTES REGARDING SERVICE PROCEDURES FOR THE LIMITED SLIP DIFFERENTIAL

The engine must never be operated while only a single wheel is jacked up. Doing so is extremely dangerous; if the differential functions while the engine is operated at high speed, the oil film between the clutch plates will decrease, thus causing the friction coefficient to increase, the prescribed torque ratio will be exceeded, an excessive amount of torque will be applied to the stationary wheel, and the vehicle will move forward. Also, resistance must never be applied to the spinning wheel.

In the event that one of the wheels comes in contact with a slippery road surface and begins to spin, if the engine continues to be operated at high speed for too long, the clutch plates might become abnormally worn; such action must be avoided.

Use only Mitsubishi genuine gear oil, part No. 8149630. This oil has been developed exclusively for use in the limited slip differential and it differs from ordinary gear oil. When changing the oil, the oil which is removed will appear considerably blacker than ordinary oil. This, however, is not a change in color due to the deterioration of the oil, but rather the oil has become mixed with worn particles of the special treatment on the clutch plates.

### REMOVAL/INSPECTION BEFORE DISASSEMBLY

For information concerning REMOVAL/INSPECTION BEFORE DISASSEMBLY (except for differential gear backlash), refer to p. 3-18 and p. 3-19.



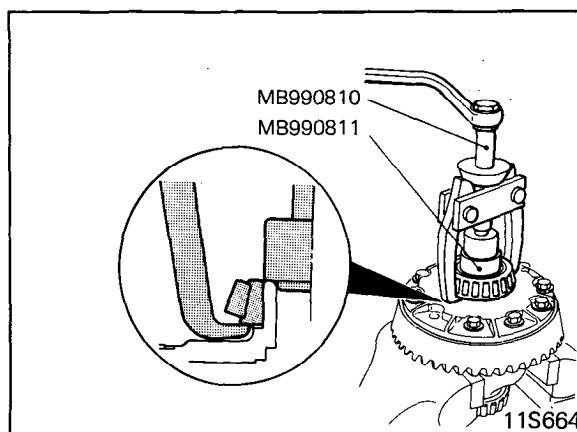
## DISASSEMBLY

### Differential Case Assembly

1. Remove the differential case assembly from the gear carrier. (Refer to p. 3-22.)
2. Remove the side bearings with the special tools. (11S664)  
Attach the prongs of the special tool to the inner race of the side bearing through the openings in the differential case.

#### NOTE

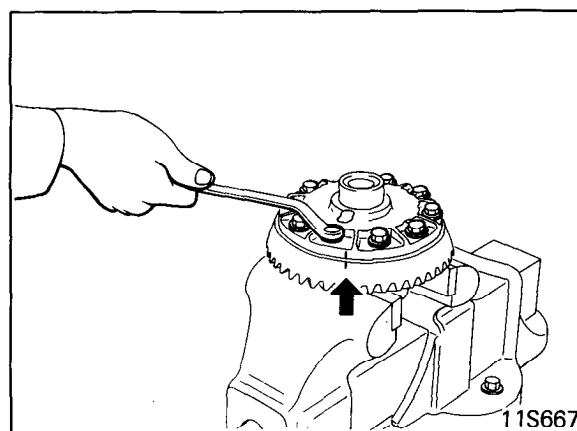
Keep the right and left wheel bearings separate in order to be able to distinguish them for reassembly.



3. Make mating marks on the case and ring gear and remove the ring gear bolts diagonally. (11S667)
4. Remove the ring gear.

#### NOTE

An anti-looseness agent has been used on the bolts. If they cannot be loosened, heat the area to approximately 150°C (302°F) with a propane torch, and then loosen them.



5. Loosen the screws of differential cases A and B evenly, a little at a time. (11S660)
6. Separate differential case A from differential case B.

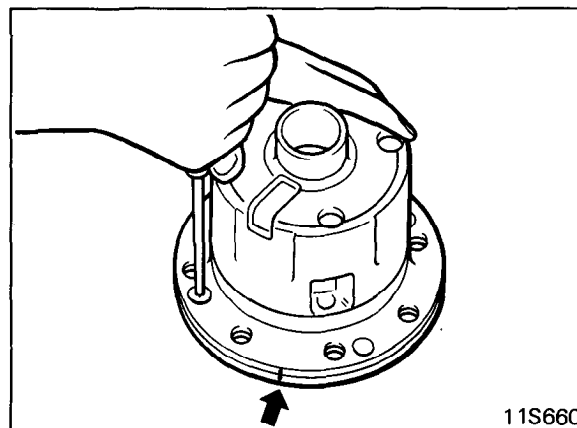
#### NOTE

Before disassembling the differential cases, confirm that the mating marks (numbers) on case A and case B are the same.

7. Remove the components from differential case B.

#### NOTE

Keep the right and left thrust washers, spring plates, spring discs, friction plates, and friction discs separate in order to be able to distinguish them for reassembly.



### Drive Pinion

Refer to p. 3-23 for information concerning drive pinion DISASSEMBLY.



## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

### INSPECTION AND REPAIR

Wash the disassembled parts in cleaning solvent and dry them with compressed air, then check the following areas.

#### NOTE

For inspection information other than that given below, refer to p. 3-24.

#### Inspection of Friction Plates and Discs for Wear

- (1) In order to check the wear, measure the thicknesses of the friction surfaces and projections of the friction discs and plates, and then find the difference.  
(The same procedure is used for the spring discs and the spring plates.) (11S670)

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Clutch plate thickness [Service limit] .....  
0.1 mm (.004 in.) or less

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#### NOTE

Make the measurement at several different points.

- (2) If the parts are worn beyond the allowable limit, replace them with new parts.  
Refer to the section regarding adjustments for information concerning selection of thickness.

#### Inspection of Thrust Washer for Wear

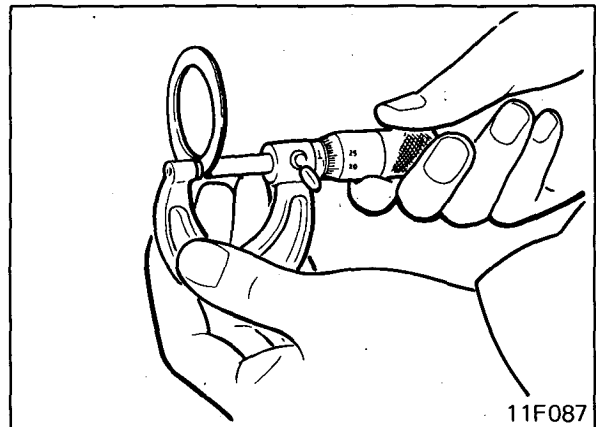
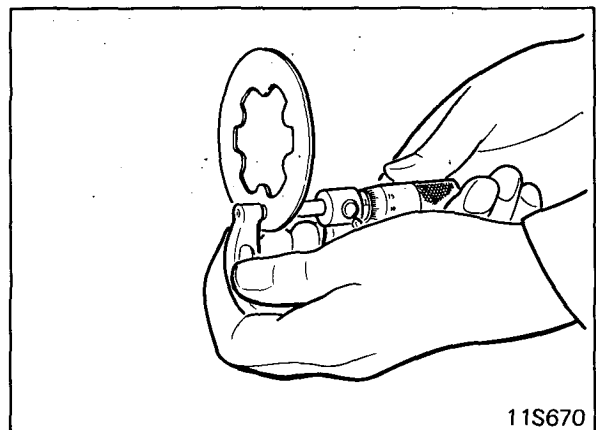
- (1) Measure the thickness of the thrust washer. (11F087)

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Thrust washer thickness [Service limit] .....  
1.4 mm (.55 in.) or more

---

- (2) If the thrust washer is worn beyond the limit, replace it with a new one. Refer to the section regarding adjustments for information concerning selection of thickness.





## Inspection of Contact and Sliding Surfaces of Parts

### 1. Inspect the clutch plates and pressure rings.

- (1) The friction surfaces of the friction plates, friction discs, spring plates, and spring discs.

If there are any signs of seizure, severe friction, or color change from heat, the locking performance will be adversely affected. Replace the part with a new one.

### NOTE

The strong contact on the inner circumference of the friction surfaces is because of the spring plate and the spring disc; this wear is not abnormal.

- (2) The six projections on the inner circumference of the friction disc.

Nicks or dents will cause abnormalities in the clutch pressure; if present, repair with an oil stone, or replace the parts if necessary.

- (3) The four projections on the outer circumference of the friction disc.

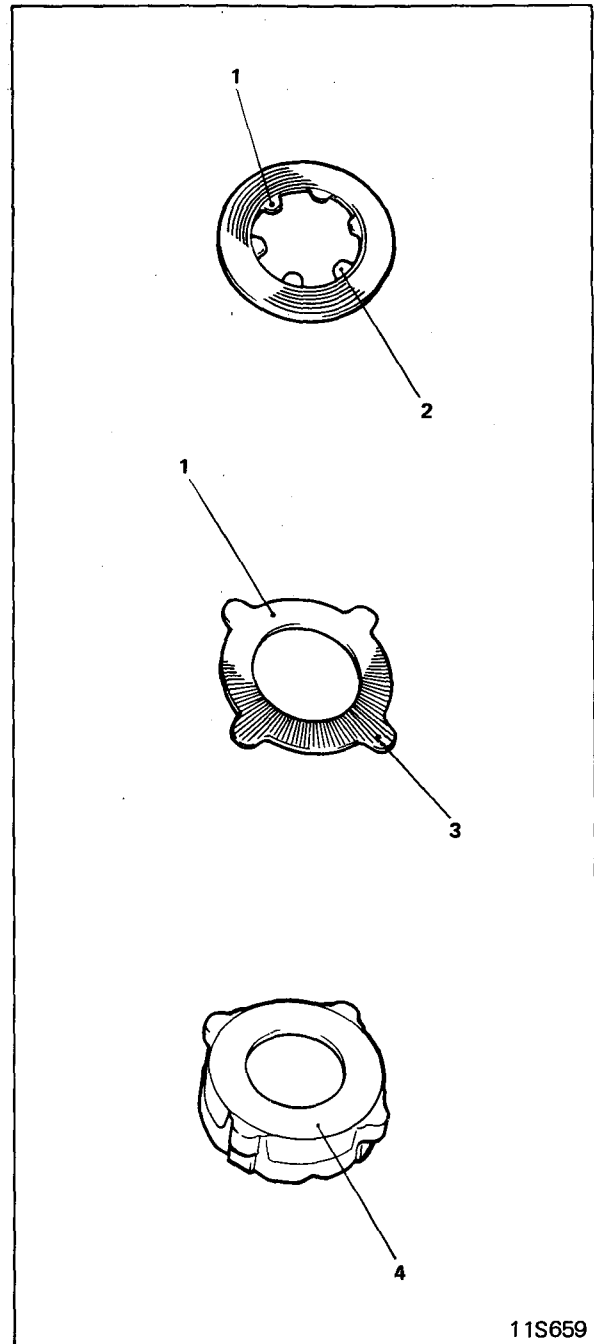
Nicks and dents will cause abnormalities in the clutch pressure; if present, repair with an oil stone, or replace the parts if necessary.

- (4) The friction surface of the friction disc of the pressure ring.

If there are nicks or scratches, repair by first grinding with an oil stone and then polishing with rubbing compound on a surface plate.

### NOTE

The strong contact on the inner circumference of the friction surface is because of the spring plate and the spring disc; this wear is not abnormal.

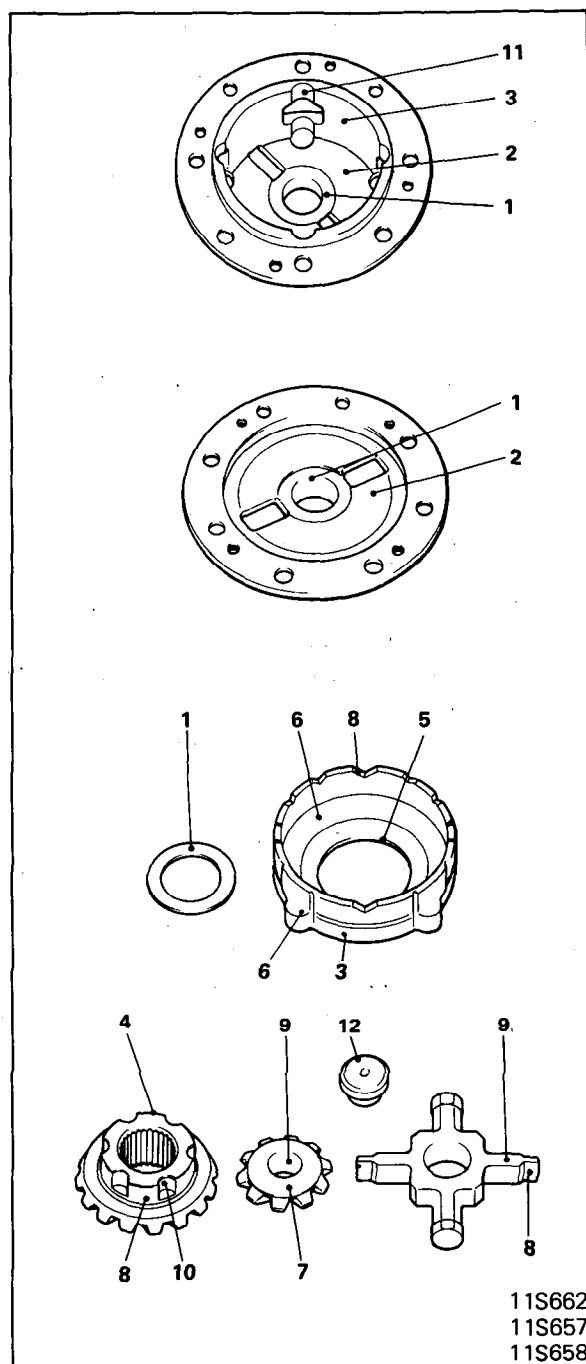


11S659



## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

2. Inspect the contact and sliding surfaces listed below, and repair any nicks and burrs with an oil stone.
  - (1) The sliding surfaces of the thrust washers and the case.
  - (2) The spring contacting surface of the differential case.
  - (3) The contact surfaces of the outer circumference of the pressure rings and the inner circumference of the differential case.
  - (4) The sliding surface of the thrust washers.
  - (5) The sliding surfaces of the hole in the pressure rings and the outer circumference of the side gears.
  - (6) The projections on the outer circumference of the pressure rings.
  - (7) The spherical surface of the differential pinion gears and the inner diameter of the pressure rings.
  - (8) The V-shaped groove in the pressure rings, and the V-shaped part in the pinion shaft.
  - (9) The outer diameter of the pinion shaft and the hole in the differential pinion gears.
  - (10) The outer circumference groove of the side gears.
  - (11) The inner circumference groove of the differential case.
  - (12) The sliding surface of the thrust blocks.

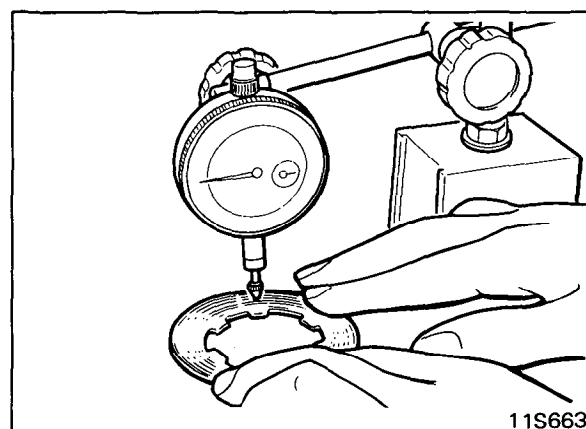


### Inspection of Friction Plates and Discs for Warping

Using a dial indicator, measure the amount of warping (the flatness) of the friction plate and friction disc on a surface plate.

Friction plate and disc warping

[Service limit] ..... 0.08 mm (.03 in) or less







## REASSEMBLY

### Drive Pinion

For information concerning drive pinion reassembly, refer to p. 3-24.

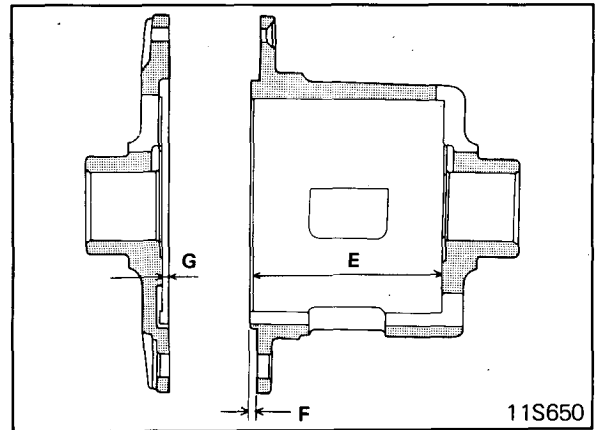
### Differential Case Assembly

1. Before assembly, use the following method to adjust the dimensional differences of the clearance between the clutch plates and differential case when installing the internal components into the differential case.

(1) Measurement of differential case depth

Depth of the differential case: A

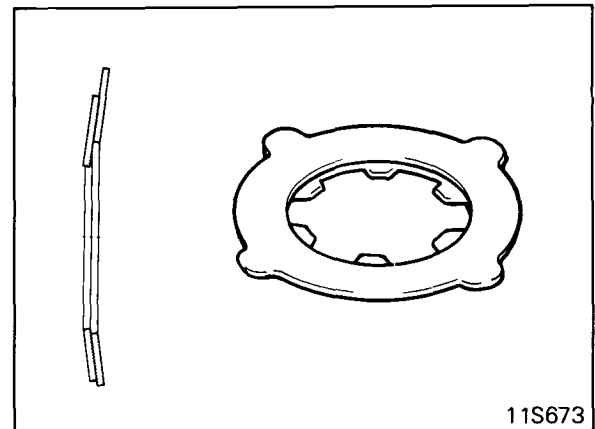
$$A = E - F + G$$



- (2) Measurement of spring disc and spring plate thickness  
Measure the thickness using a micrometer, with the spring disc and spring plate both extended in the same direction and one placed over the other. Arrange them so that the difference between right and left is minimized.

Right side: Lr

Left side: Ll

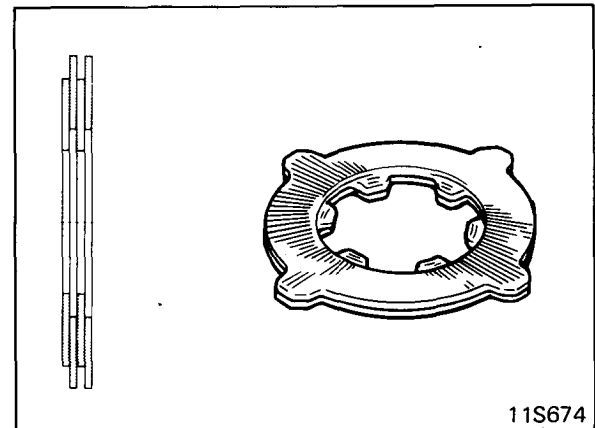


- (3) Measurement of friction disc and friction plate thickness

In the same way as described the above, combine the two friction discs and the two friction plates, as shown in the illustration, so that the difference in thickness is minimized.

Right side: Kr

Left side: Kl



### NOTE

The difference between (Lr + Kr) and (Ll + Kl) must be 0.05 mm (.002 in.) or less.



## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

- (4) Assemble the right and left friction plates, friction discs, differential pinion shafts, and pressure rings, and then measure the total width, as shown in the illustration. Consider this to be "B". (11S665)

### NOTE

Manually hold the V-shaped groove, squeeze the groove together, and measure.

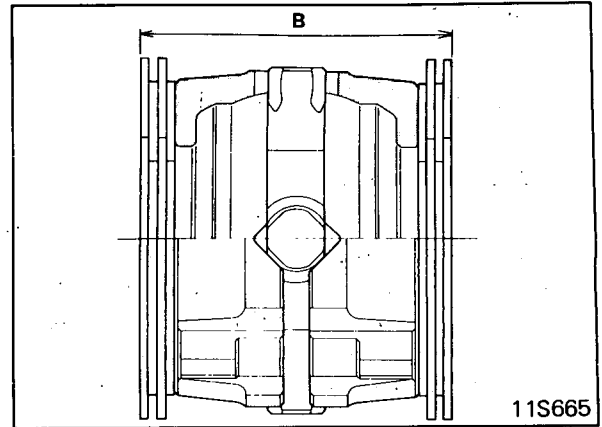
All parts should be dry.

- (5) If the difference "S" between the depth "A" of the differential case and the overall width "B" obtained previously plus the spring thickness is not within the range of the standard value, replace the friction discs to adjust.

$$S = A - (B + L_l + L_r)$$

### NOTE

Be careful not to mix the types of clutch plates selected for the right and left sides.



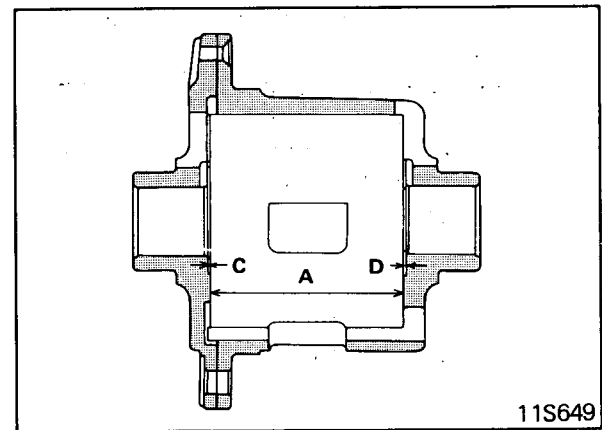
11S665

2. Make the adjustment as follows so that the dimensional difference of the shaft direction of the differential side gear while it is assembled into the differential case agrees with the standard value.

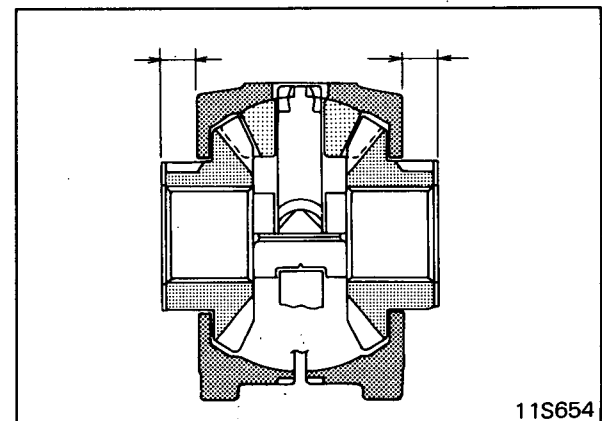
- (1) Measure depth of contact surfaces of differential case. Measure the depths of the thrust washer contact surfaces of differential case A and B with calipers. Assume these to be "C" and "D".
- (2) Assemble the pressure rings, the differential pinion gears, the differential side gears, the differential pinion shafts, and the thrust washers, and then measure the distances from the backs of the pressure rings to the ends of the thrust washers. Select thrust washers so that the difference between the right and left measured values is less than 0.05 mm (.002 in.).

### NOTE

Measure with calipers while squeezing the V-shaped groove manually.



11S649



11S654



## (3) Overall width measurement

In the same condition as described above, measure the overall width as shown in the illustration.

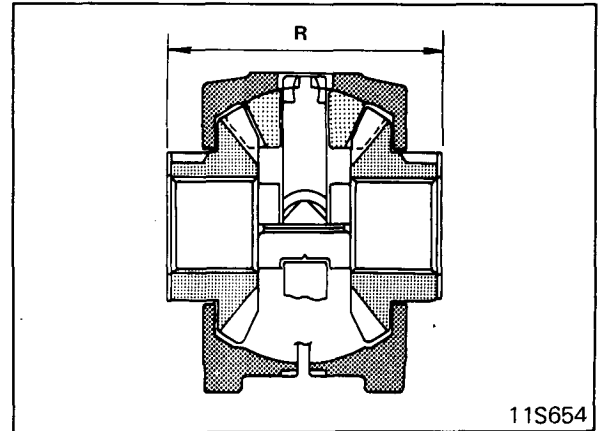
Consider this to be "R". (11S654)

## (4) Clearance adjustment

Using the width of the assembled differential unit and the depth of the differential case, check whether the clearance "V" is within the standard value or not. If it is not within the standard value, replace the thrust washers to adjust.

$$V = A + C + D - R$$

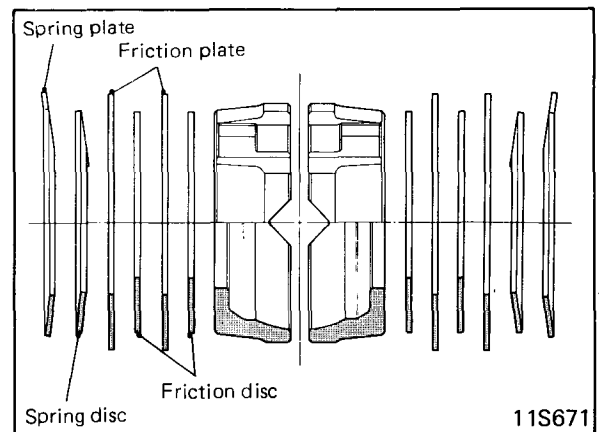
3. Before assembly, apply the specified gear oil to each component.
4. Be especially careful to coat all contact surfaces and sliding surfaces.  
The order of assembly is the reverse of that for disassembly.



5. The directions for assembly is as shown in the illustration. (11S671)
6. Be careful not to insert the clutch plates in the incorrect order or to install the springs in the wrong direction.

## NOTE

Be sure that mating marks on the differential cases are matched.



7. After assembly, in order to check the frictional force of the clutch plates, use the special tools to measure the starting torque. (11S684)

## NOTE

Rotate the unit slightly before measuring the starting torque. When measuring the torque, do so at the beginning of movement.

8. For reassembly of the unit, beginning with the adjustment of ring gear runout, refer to p. 3-27.
9. Torque parts to specifications during assembly.

