REAR AXLE

CONTENTS

E27AA--

SPECIFICATIONS

GENERAL SPECIFICATIONS

E27CA--

<Vehicles built up to October, 1993>

Items	2400	3000	2500D	
			Vehicles without wide fender	Vehicles with wide fender
Axle housing type	Banjo type	Banjo type	Banjo type	Banjo type
Axle shaft Supporting type	Semi-floating type	Semi-floating type	Semi-floating type	Semi-floating type
Differential Differential size 2-door models	No. 6*1 or No. 7*2	No. 7	No. 6*1 or No. 7*2	No. 6*1 or No. 7*2
4-door models	No. 7	No. 7	A/T: No. 6*1 or No. 7*2 M/T: No. 7	No. 7
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio 2-door models	4,875	4,875	4,625	4,875
4-door models	4,875	4,875	4,875	5,285
Pinion gear type	2 pinion or 4 pinion *3	2 pinion or 4 pinion*3	2 pinion or 4 pinion*3	2 pinion or 4 pinion*3

NOTE
*1: Vehicles without rear differential lock
*2: Vehicles with rear differential lock
*3: Vehicles with limited slip differential or rear differential lock

<Vehicles built from November, 1993>

Items	2400	3000 – 12VALVE	3500
Axle housing type	Banjo type	Banjo type	Banjo type
Axle shaft Supporting type	Semi-floating type	Semi-floating type	Semi-floating type
Differential Differential size	No. 6*1 or No. 7*2	No. 7	No. 7.5
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	4,875	4,875	4,636
Pinion gear type	2 pinion or 4 pinion*3	2 pinion or 4 pinion*3	2 pinion*4 or 4 pinion

Items	2500D	2800D	3000 – 24VALVE
Axle housing type	Banjo type	Banjo type	Banjo type
Axle shaft Supporting type	Semi-floating type	Semi-floating type	Semi-floating type
Differential Differential size Reduction gear type Reduction ratio 2–door models 4–door models Pinion gear type	 No. 6*1 or No. 7*2 Hypoid gear 4.625 or 4.875*5 4.875 or 5.285*5 2 pinion or 4 pinion*3	 No. 7.5 Hypoid gear 4.636 4.900 2 pinion*4 or 4 pinion	 No. 7 Hypoid gear 4.636 or 4.875*5 4.636 or 4.875*5 2 pinion or 4 pinion*3

NOTE
*1: Vehicles without rear differential lock
*2: Vehicles with rear differential lock
*3: Vehicles with limited slip differential or rear differential lock
*4: Vehicles with automatic transmission
*5: Vehicles with wide fender

SERVICE SPECIFICATIONS

Items	Vehicles with a conventional differential or rear differential lock	Vehicles with a limited slip differential
Standard value		
Axle shaft axial play mm (in.)	0.25 (0.0098)	0.25 (0.0098)
Limited slip differential preload		
Using special tool Nm (kgm, ft.lbs.)	–	12.5 (1.25, 9) or more
Without using special tool Nm (kgm, ft.lbs.)	–	25 (2.5, 18) or more
Protruding length of stabilizer bar mounting bolt mm (in.)	15–17 (0.59–0.67)	15–17 (0.59–0.67)
Press-fitting force of retainer Nm (kgm, ft.lbs.)		
Initial press-fitting force	50,000 (5,000, 11,023)	50,000 (5,000, 11,023)
Final press-fitting force	100,000–110,000 (10,000–11,000, 22,046–24,251)	100,000–110,000 (10,000–11,000, 22,046–24,251)
Clearance of snap ring and retainer mm (in.)	0–0.166 (0–0.0065)	0–0.166 (0–0.0065)
Rear differential lock air pump pressure kPa (kg/cm^2, psi)	25–40 (0.25–0.40, 4–6)	–
Final drive gear backlash mm (in.)		
No. 6 differential	0.11–0.16 (0.0043–0.0063)	0.11–0.16 (0.0043–0.0063)
No. 7 differential	0.13–0.18 (0.0051–0.0071)	0.13–0.18 (0.0051–0.0071)
No. 7.5 differential	0.13–0.18 (0.0051–0.0071) 0.12–0.18 (0.0047–0.0071)*1	0.13–0.18 (0.0051–0.0071)
Differential gear backlash mm (in.)		
No. 6 differential	0.010–0.076 (0.0004–0.0030)	–
No. 7 differential	0–0.076 (0–0.0030)	–
No. 7.5 differential	0.10–0.25 (0.004–0.01) 0.15–0.20 (0.005–0.008)*1	–
Drive pinion turning torque		
Without oil seal Nm (kgcm, in.lbs.)		
With anti-rust agent (new)	0.6–0.9 (6.0–9.0, 5.2–7.8)	0.6–0.9 (6.0–9.0, 5.2–7.8)
With gear oil applied (new or used)	0.4–0.5 (4.0–5.0, 3.5–4.3)	0.4–0.5 (4.0–5.0, 3.5–4.3)
With oil seal Nm (kgcm, in.lbs.)		
With anti-rust agent (new)	0.85–1.15 (8.5–11.5, 7.4–10.0)	0.85–1.15 (8.5–11.5, 7.4–10.0)
With gear oil applied (new or used)	0.65–0.75 (6.5–7.5, 5.6–6.5)	0.65–0.75 (6.5–7.5, 5.6–6.5)

Items	Vehicles with a conventional differential or rear differential lock	Vehicles with a limited slip differential
Difference in total thickness between the left and right clutch plates mm (in.)		0–0.05 (0–0.020)
Clearance between spring plate and differential case mm (in.)	–	0.06–0.20 (0.0024–0.0079)
Clearance between friction disc and differential case mm (in.)	0.05–0.20 (0.0020–0.0079)*2	–
Difference between left and right dimensions from back thrust face of pressure ring to end of thrust washer mm (in.)	–	0–0.05 (0–0.020)
Clearance between thrust washer and differential case mm (in.)	–	0.05–0.20 (0.0020–0.0079)
Clutch plate preload		
When equipped with new clutch plates Nm (kgm, ft.lbs.)	–	40–75 (4.0–7.5, 29–54)
When equipped with old clutch plates Nm (kgm, ft.lbs.)	–	25–75 (2.5–7.5, 18–54)
Limit		
Rear axle total backlash mm (in.)	5 (0.20)	5 (0.20)
Drive gear runout mm (in.)	0.05 (0.0019)	0.05 (0.0019)
Differential gear backlash mm (in.)	0.2 (0.0079)	–
Friction plate and friction disc warping (flatness) mm (in.)	0.08 (0.0031)*2	0.08 (0.0031)
Friction plate and friction disc wear (difference in the thickness of the friction surfaces and the projections) mm (in.)	0.1 (0.0039)*2	0.1 (0.0039)

NOTE
*1: Vehicles with rear differential lock
*2: Vehicles with rear differential lock <3000>

LUBRICANTS

E27CD--

<Vehicles built up to October, 1993>

Items	Specified lubricant	Quantity dm^3 (U.S. qts., Imp. qts.)			
		Standard wheelbase		Long wheelbase	
		2400 2500D	3000	2500D*1	2400 3000 2500D*2
Rear axle gear oil					
Convetional differential	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	1.8 (1.90, 1.58)	2.6 (2.75, 2.29)	1.8 (1.90, 1.58)	2.6 (2.75, 2.29)
Limited slip differential	Hypoid gear oil MITSUBISHI Genuine Gear Oil Part No. 8149630EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W-90) or equivalent	1.8 (1.90, 1.58)	2.6 (2.75, 2.29)	1.8 (1.90, 1.58)	2.6 (2.75, 2.29)
Rear differential lock	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	2.6 (2.75, 2.29)	2.6 (2.75, 2.29)	2.6 (2.75, 2.29)	2.6 (2.75, 2.29)

NOTE
*1: Vehicles without wide fender–A/T.
*2: Vehicles with wide fender and vehicles without wide fender–M/T.

<Vehicles built from November, 1993>

Items	Specified lubricant	Quantity dm^3 (U.S. qts., Imp. qts.)		
		2400 2500D	3000	3500 2800D
Rear axle gear oil				
Convetional differential	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	1.8 (1.90, 1.58)	2.6 (2.75, 2.29)	3.2 (3.38, 2.82)
Limited slip differential	Hypoid gear oil MITSUBISHI Genuine Gear Oil Part No. 8149630EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W-90) or equivalent	1.8 (1.90, 1.58)	2.6 (2.75, 2.29)	3.2 (3.38, 2.82)
Rear differential lock	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	2.6 (2.75, 2.29)	2.6 (2.75, 2.29)	3.2 (3.38, 2.82)

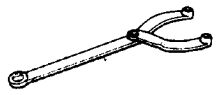
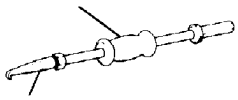
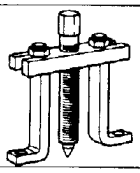
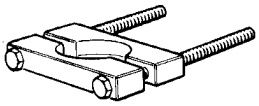
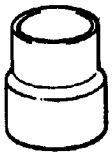
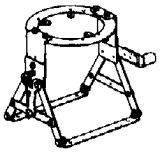
SEALANT AND ADHESIVES

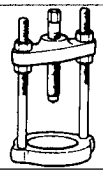
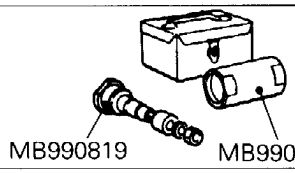
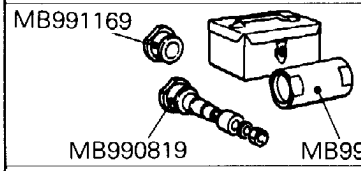
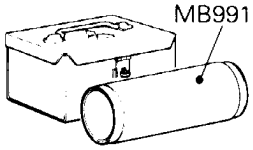
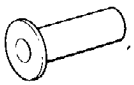
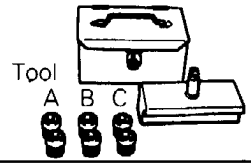
E27CE--

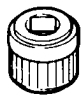
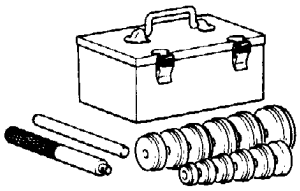
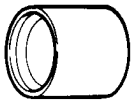
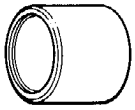
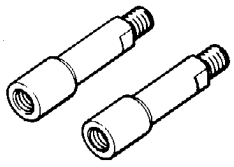
Items	Specified sealants and adhesives	Remarks
Bearing case Differential carrier mounting surface of axle housing	3M ATD Part No. 8661, 8663 or equivalent	Semi-drying sealant
Drive gear threaded hole	3M Stud Locking 4170 or equivalent	Anaerobic sealant

SPECIAL TOOLS

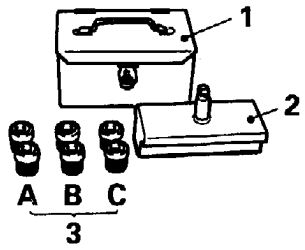
E27DA--

Tool	Number	Name	Use
	MB990767	End yoke holder	Measurement of the limited slip differential preload
MB990211  MB990212	MB990590	Sliding hammer	Removal of axle shaft (Use together with MB990241) Removal of axle housing oil seal
	MB990241	Rear axle shaft puller	Removal of axle shaft (Use together with MB990590)
	MB991552	Axle shaft bearing and case remover	Removal of the axle shaft bearing and bearing case
	MB990560	Bearing remover	Removal of bearing inner race
	MB990799	Bearing inner race installer	Press-fitting of the axle shaft bearing inner race Press-fitting of the axle shaft retainer
	MB990909	Working base	Supporting of the differential carrier
	MB990201	Side bearing adjusting special spanner	Removal and adjustment of the side bearing nut
	MB990810	Side bearing puller	Removal of the side bearing inner race
	MB990811	Side bearing cup	
	MB990850	End yoke holder	Removal of the companion flange

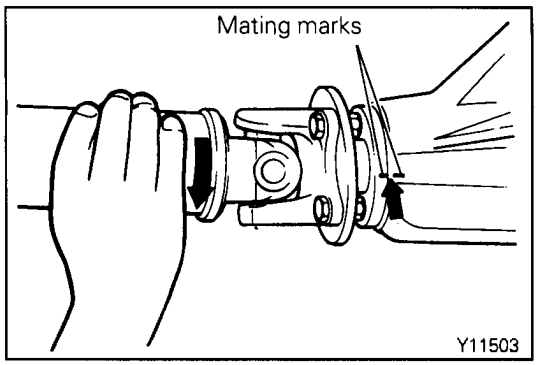
Tool	Number	Name	Use
	MB990339	Bearing puller	Removal of the drive pinion rear bearing inner race
	MB990648	Bearing remover	
	MB990818	Pinion height gauge set	Measurement of the pinion height <No. 6 differential>
	MB991171	Pinion height gauge set	Measurement of the pinion height <No. 7 differential>
	MB991542	Cylinder gauge set	Measurement of the pinion height <No. 7.5 differential> (Use together with MB990819 and MB991169)
	MB9901151 or MB990685	Torque wrench	Measurement of the starting torque of drive pinion
	MB990326	Preload socket	
	MB991168	Drive pinion oil seal installer	Press-fitting of the drive pinion oil seal
	MB990813	Tap	Removal of sealant
	MB990802	Bearing installer	Press-fitting of the drive pinion rear bearing inner race Press-fitting of the side bearing inner race
	MB990988	Side gear holding tool set	Measurement of the clutch plate preload <No. 6 differential and No. 7 differential>

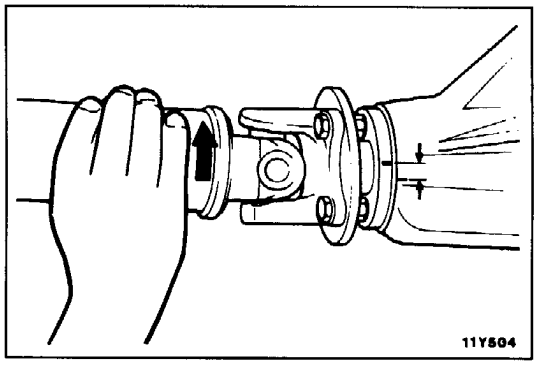
Tool	Number	Name	Use
	MB991535	Side gear holding tool	Measurement of the clutch plate preload <No. 7.5 differential> (Use together with MB990989)
	MB990925	Bearing and oil seal installer set	Press-fitting of the axle housing oil seal MB990938, MB990932 Press-fitting of the axle shaft oil seal MB990938, MB990936 Driving-out of the drive pinion bearing outer race MB990939 Press-fitting of the drive pinion rear bearing outer race No. 6 differential: MB990938, MB990936 No. 7 differential: MB990938, MB990937 Press-fitting of the drive pinion front bearing outer race MB990938, MB990934 (Refer to GROUP 26)
	MB991388	Bushing remover base	Installation of rotor assembly <Vehicles with ABS>
	MB990890 or MB990891	Rear suspension bushing base	Installation of bearing outer race
	MB991601	Extension bar	Removal of the axle shaft bearing and bearing case (Use together with MB991552)

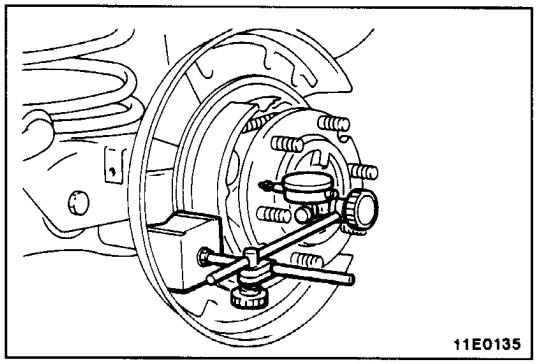
MB990988

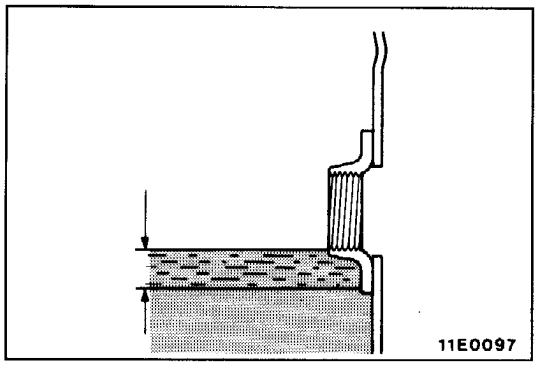


Tool number		Name	O.D. mm (in.)
1	MB990551	Box	–
2	MB990989	Base	–
3	(MB990990)	Tool A	25 (0.98)
	(MB990991)	Tool B	28 (1.10)
	(MB990992)	Tool C	31 (1.22)









SERVICE ADJUSTMENT PROCEDURES

REAR AXLE TOTAL BACKLASH CHECK E27FCAF

If the vehicle vibrates and produces a booming sound due to the unbalance of the driving system, measure the rear axle total backlash by the following procedures to see if the differential carrier assembly requires removal.

(1) Park the vehicles on a flat, level surface.
(2) Place the transmission control lever to the neutral position, and place the transfer control lever to the neutral position. Then pull the parking brake lever and raise the vehicle on a jack.
(3) Turn the companion flange clockwise as far as it will go. Make the mating mark on the dust cover of the companion flange and on the differential carrier.
(4) Turn the companion flange anti-clockwise as far as it will go, and measure the amount of distance through which the mating marks moved. If the backlash exceeds the limit, remove the differential carrier assembly and adjust the backlash.

Limit: 5 mm (0.20 in.)

AXLE SHAFT AXIAL PLAY CHECK E27FEAA

Measure the axle shaft axial play by using a dial indicator.

Standard value: 0.25 mm (0.0098 in.)

If the axle shaft axial play exceeds the standard value, replace the bearing with new one.

GEAR OIL LEVEL CHECK E27FGAA

Remove the filler plug, and check the oil level.
Check that gear oil level is not 8 mm (0.3 in.) below the bottom of filler plug hole.

Specified gear oil: dm^3 (U.S. qts, Imp.qts.)

Conventional differential

Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W

<Vehicles built up to October, 1993>

Standard wheelbase	
2400, 2500D	**1.8 (1.90, 1.58)**
3000	**2.6 (2.75, 2.29)**
Long wheelbase	
2500D*[1]	**1.8 (1.90, 1.58)**
2400, 3000, 2500D*[2]	**2.6 (2.75, 2.29)**

<Vehicles built from November, 1993>

2400, 2500D	**1.8 (1.90, 1.58)**
3000	**2.6 (2.75, 2.29)**
3500, 2800D	**3.2 (3.38, 2.82)**

Limited slip differential
Hypoid gear oil MITSUBISHI Genuine Gear Oil Part No. 8149630 EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W-90) or equivalent

<Vehicles built up to October, 1993>

Standard wheelbase	
2400, 2500D	**1.8 (1.90, 1.58)**
3000	**2.6 (2.75, 2.29)**
Long wheelbase	
2500D*1	**1.8 (1.90, 1.58)**
2400, 3000, 2500D*2	**2.6 (2.75, 2.29)**

<Vehicles built from November, 1993>

2400, 2500D	**1.8 (1.90, 1.58)**
3000	**2.6 (2.75, 2.29)**
3500, 2800D	**3.2 (3.38, 2.82)**

Rear differential lock
Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W

<Vehicles built up to October, 1993>

2400, 3000, 2500D	**2.6 (2.75, 2.29)**

<Vehicles built from November, 1993>

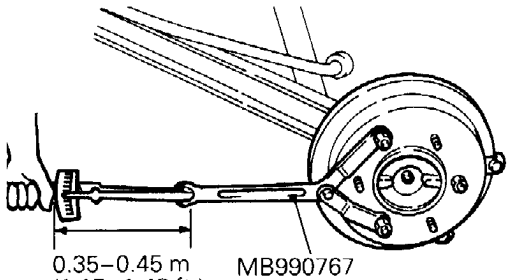
2400, 3000, 2500D	**2.6 (2.75, 2.29)**
3500, 2800D	**3.2 (3.38, 2.82)**

NOTE
*1: Vehicles without wide fender–A/T.
*2: Vehicles with wide fender and vehicles without wide fender–M/T.

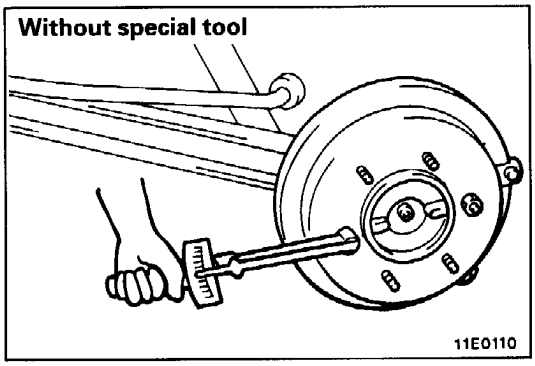
LIMITED SLIP DIFFERENTIAL PRELOAD MEASUREMENT E27FIAA

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 in the raised position by using the following procedures.

Using the special tool



Without special tool



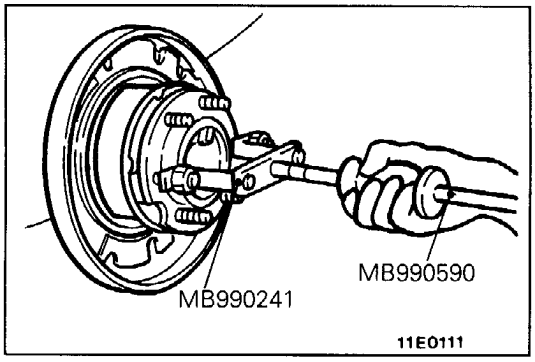
(1) Remove the wheel.
(2) Mount the special tool to the hub bolts by using the hub nuts.
(3) Find the limited slip differential preload by measuring the axle shaft starting torque in the forward direction with a torque wrench.

Standard value: Using the special tool
12.5 Nm (1.25 kgm, 9 ft.lbs.) or more
Without using the special tool
25 Nm (2.5 kgm, 18 ft. lbs.) or more

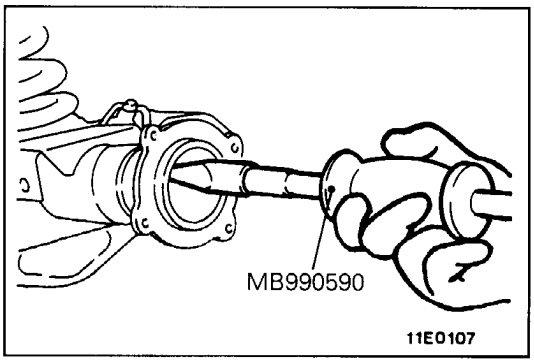
(4) If the torque is less than the standard value, remove the limited slip differential from the vehicle and disassemble it.

AXLE HOUSING OIL SEAL REPLACEMENT E27FKAD

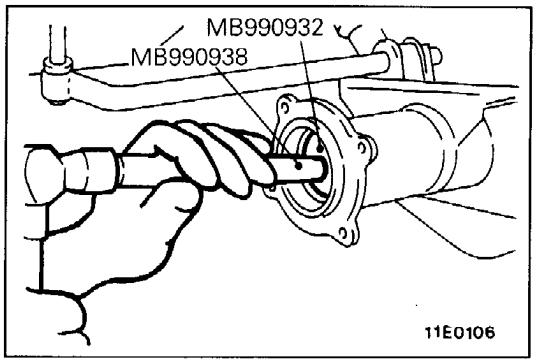
1. Release coupling between parking brake cable and backing plate.
2. Before disconnecting the brake pipe, drain the brake fluid from the bleeder screw.
3. Remove the nuts securing the backing plate to the axle housing.



4. Pull the rear axle shaft from axle housing. If the rear axle shaft is hard to remove, use the special tools.

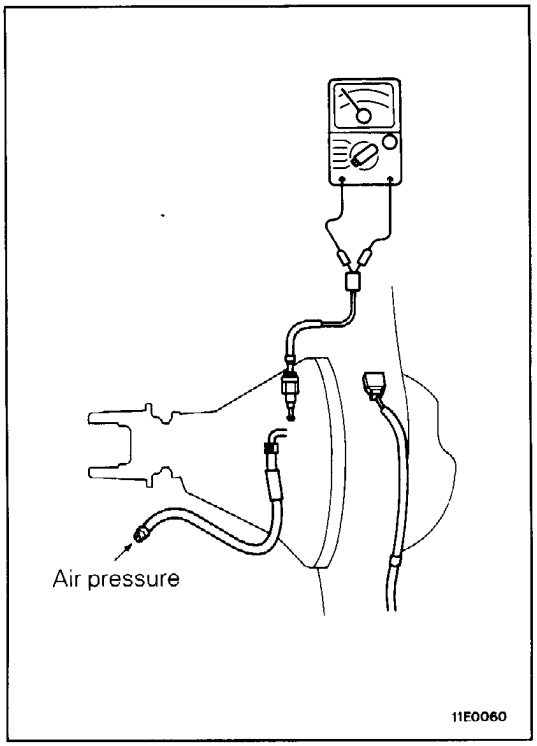


5. Use special tools with hook attached to remove the oil seal.
6. Apply multipurpose grease to the oil seal fitting area of the rear axle housing.



7. Drive the new oil seal into the rear axle housing end by using the special tool.
8. Apply multipurpose grease to the oil seal lip.

9. Install the rear axle shaft.
10. Install the brake tube and perform air bleeding of the brake system from the air bleeder. (Refer to GROUP 35 – Service Adjustment Procedures.)
11. Install the parking brake cable and adjust the parking brake lever stroke. (Refer to GROUP 36 – Service Adjustment Procedures.)



REAR DIFFERENTIAL LOCK DETECTION SWITCH CHECK

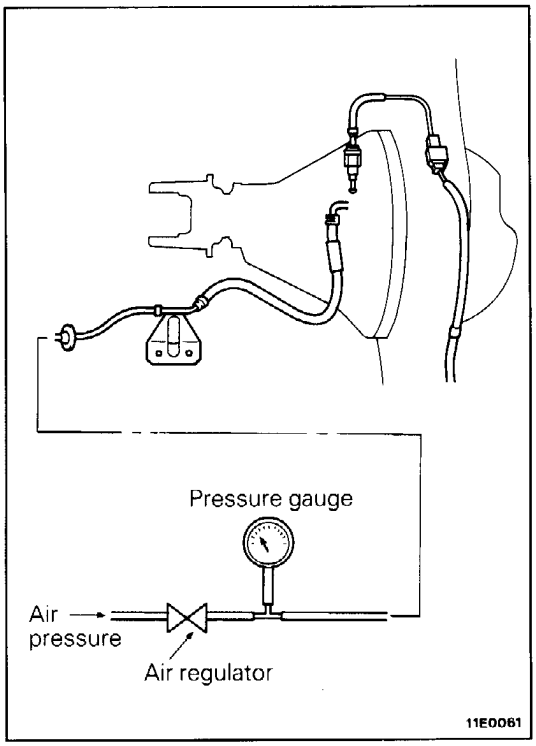
E27F0AA

1. Jack up the vehicle.
2. Remove the air pipe and air hose connections.
3. Connect a pressure gauge and air regulator, for adjusting the outside air pressure, to the air hose.
4. Adjust the outside air pressure with the air regulator until the pressure gauge shows a pressure of approx. 25 kPa (0.25 kg/cm^2, 4 psi.).

   Caution
   Do not apply a higher pressure.
5. Lock the wheel on one side of the vehicle, and slowly turn the wheel on the other side.
6. Check for continuity in the rear differential lock detection switch.

When air is supplied	Continuity
When air is released	No continuity

7. If the detection switch is defective, it cannot be removed by itself, first remove the differential carrier to remove the detection switch.



REAR DIFFERENTIAL LOCK SYSTEM AIR LEAKAGE CHECK

E27F0AA

1. Remove the rear differential lock air pump and remove the air hose from the air pump. (Refer to P.27-26.)
2. Connect a pressure gauge and air regulator, for adjusting the outside air pressure to the air hose.
3. Adjust the outside air pressure with the air regulator until the pressure gauge shows a pressure of approx. 35 kPa (0.35 kg/cm^2, 5 psi.).

   Caution
   Do not apply a higher pressure.
4. If after approximately 10 minutes have passed, the pressure has dropped not more than approximately 10 kPa (0.1 kg/cm^2, 1 psi.), it can be concluded that there is no leaking of air from the air hose, etc.

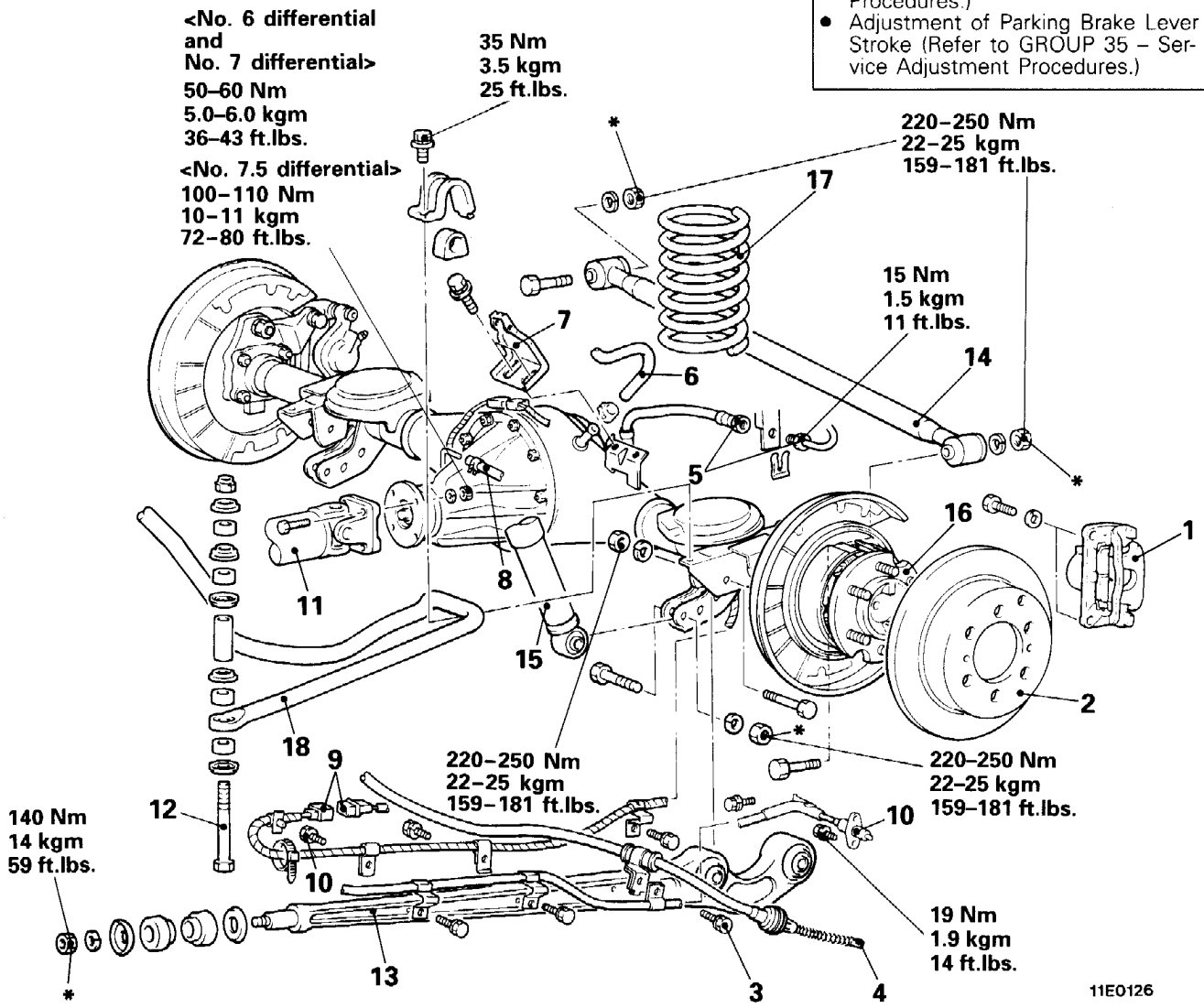
AXLE ASSEMBLY

REMOVAL AND INSTALLATION

E27JA--

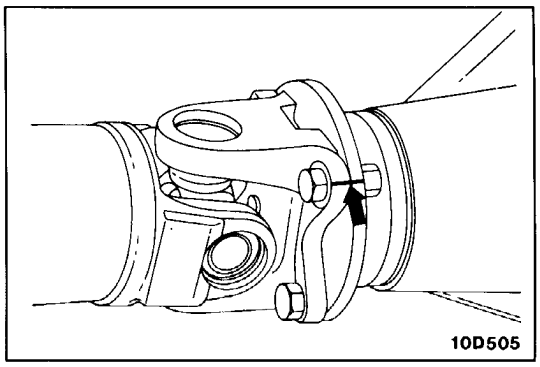
Caution
***: Indicates part which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.**

Post-installation Operation
- Air Bleeding from Brake Lines (Refer to GROUP 35 – Service Adjustment Procedures.)
- Checking and Adjustment of Load Sensing Spring Length (Refer to GROUP 35 – Service Adjustment Procedures.)
- Adjustment of Parking Brake Lever Stroke (Refer to GROUP 35 – Service Adjustment Procedures.)



Removal steps

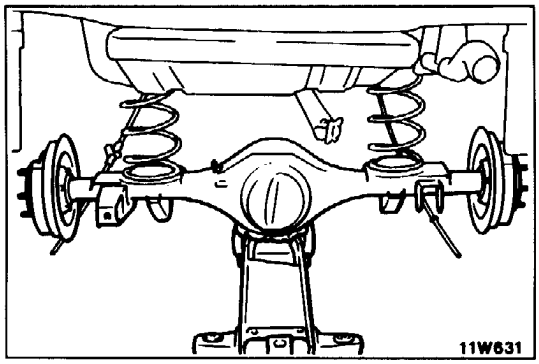
1. Rear brake assembly
2. Brake disc
3. Parking brake cable or speed sensor attaching bolt
4. Connection for parking brake cable end
5. Brake hose connection
6. Breather hose connection
7. Spring support for load sensing proportioning valve
8. Hose connection <Vehicles with rear differential lock>
9. Rear differential lock position harness connector <Vehicles with rear differential lock>
10. Speed sensor <Vehicles with ABS> (Refer to GROUP 35 – Wheel Speed Sensor)
11. Rear propeller shaft
12. Stabilizer bar installation bolt
13. Lower arm
14. Lateral rod
15. Shock absorber connection (lower part only)
16. Axle assembly
17. Coil spring
18. Stabilizer bar



SERVICE POINTS OF REMOVAL E27JBAE

11. REMOVAL OF REAR PROPELLER SHAFT

Make the mating marks on the flange yoke of the rear propeller shaft and the companion flange of the differential case.



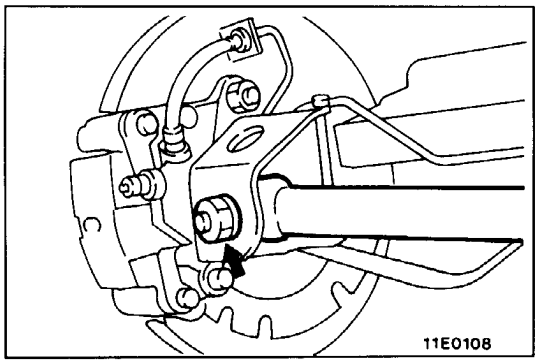
13. REMOVAL OF LOWER ARM

After supporting the axle assembly by floor jacks, remove the lower arm.

16. REMOVAL OF AXLE ASSEMBLY

Draw out the axle assembly toward the rear of the vehicle.

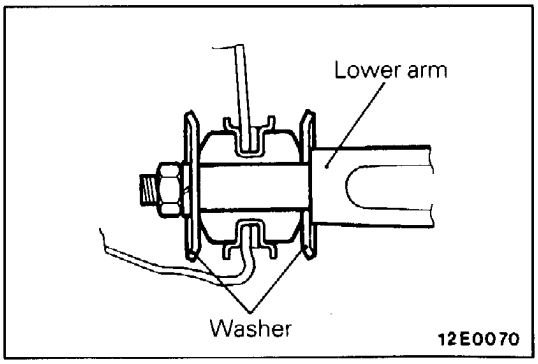
Caution
The axle assembly is unsuitable on the jack; be careful not to allow it to fall.



SERVICE POINTS OF INSTALLATION E27JDBB

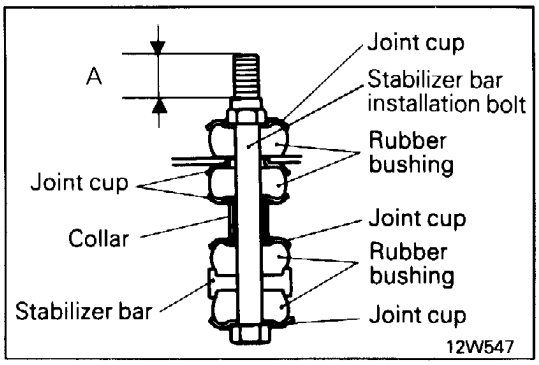
14. INSTALLATION OF LATERAL ROD

Install the lateral rod from the axle housing side.



13. INSTALLATION OF LOWER ARM

Install the washers (facing as shown in the figure) to the lower arm.



12. INSTALLATION OF STABILIZER BAR INSTALLATION BOLT

When installing the stabilizer bar to the stabilizer bar bracket, check that the amount of projection of the stabilizer bar installation bolt is within the standard value range.

Standard value (A): 15–17 mm (0.59–0.67 in.)

11. INSTALLATION OF REAR PROPELLER SHAFT

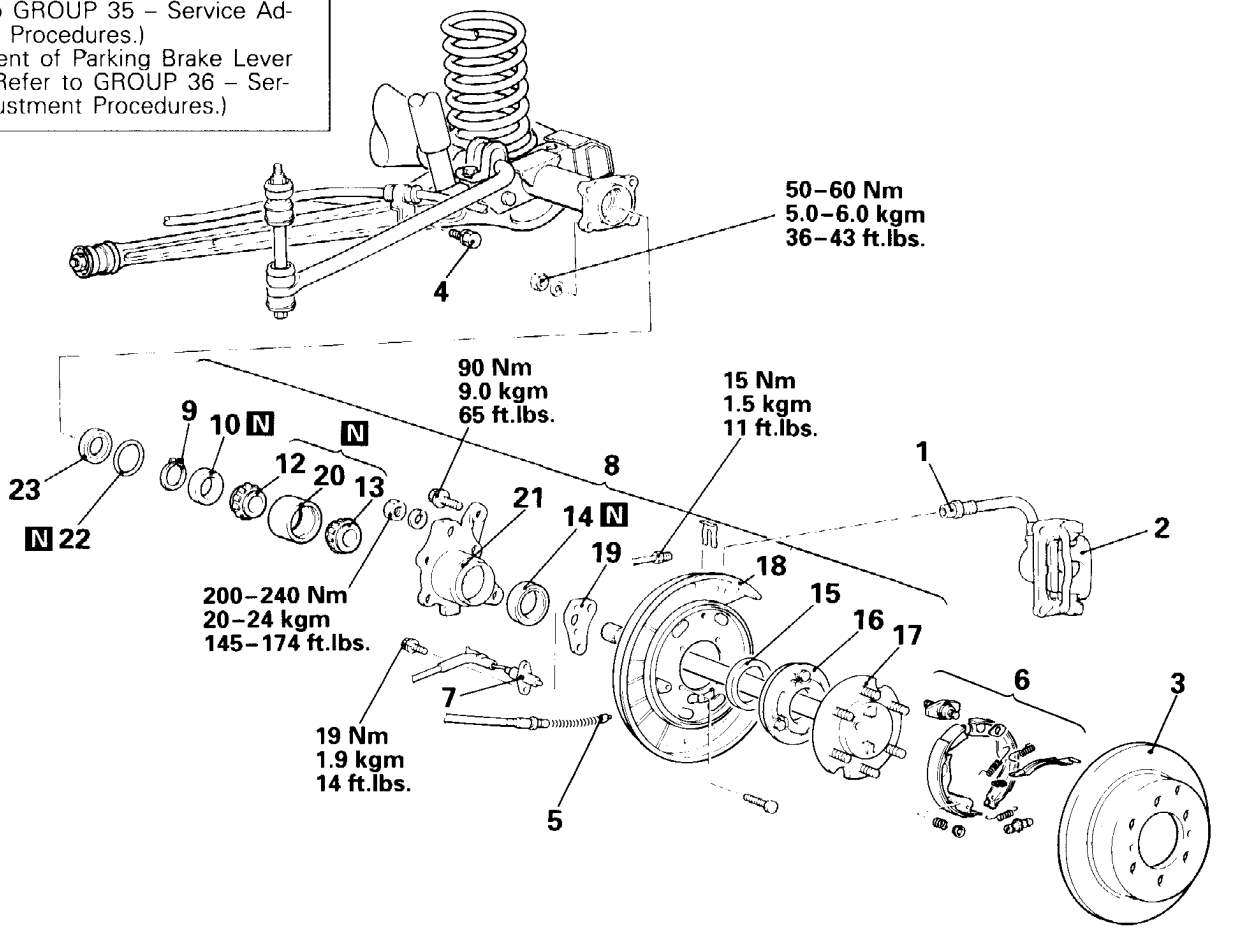
Align the mating marks on the flange yoke and the companion flange to install the rear propeller shaft.

AXLE SHAFT

REMOVAL AND INSTALLATION

E27HA--

Post-installation Operation
- Air Bleeding from Brake Lines (Refer to GROUP 35 – Service Adjustment Procedures.)
- Adjustment of Parking Brake Lever Stroke (Refer to GROUP 36 – Service Adjustment Procedures.)



11E0180

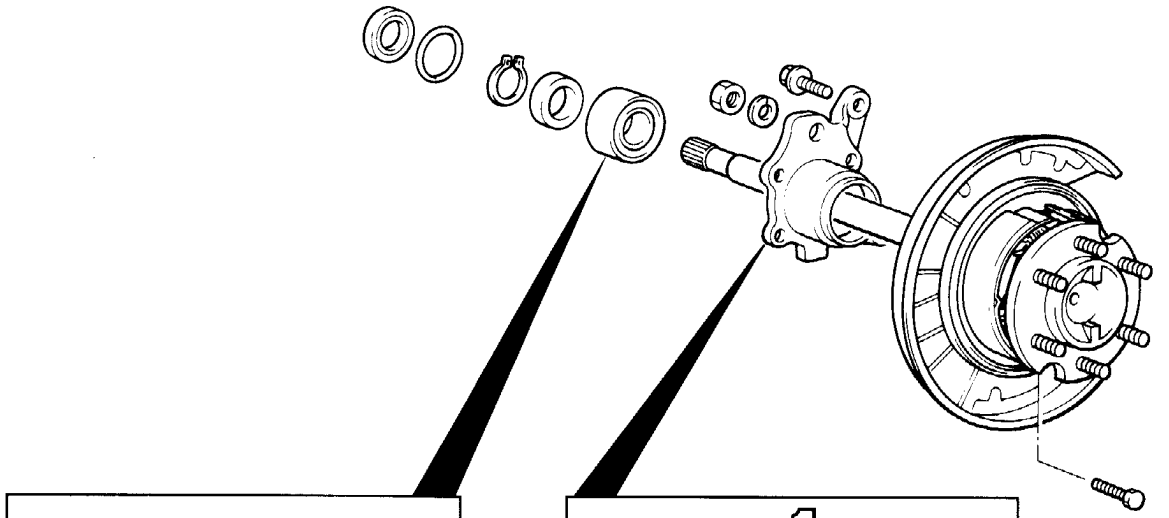
Removal steps

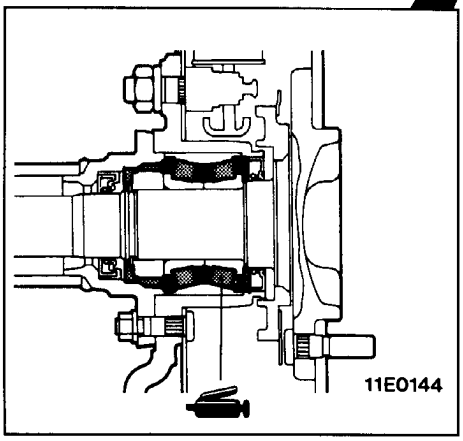
1. Connection for brake pipe
2. Rear brake assembly
3. Brake disc
4. Parking brake cable attaching bolt
5. Parking cable end
6. Parking brake assembly
7. Speed sensor <Vehicles with ABS>
8. ◆◆ Axle shaft assembly
9. ◆◆ Snap ring
10. ◆◆ Retainer
11. ◆◆ Axle shaft sub assembly (Parts from step 13 to step 17)
12. Bearing inner race (inner)
13. ◆◆ Bearing inner race (outer)
14. Oil seal
15. Dust cover <Vehicles without ABS>
16. ◆◆ Rotor assembly <Vehicles with ABS>
17. Axle shaft
18. Backing plate
19. Speed sensor bracket <Vehicles with ABS>
20. ◆◆ Bearing outer race
21. Bearing case
22. O-ring
23. ◆◆ Oil seal

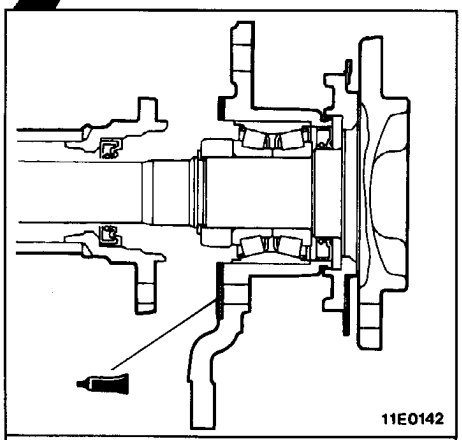
Installation steps

23. ◆◆ Oil seal
22. O-ring
21. Bearing case
20. ◆◆ Bearing outer race
19. Speed sensor bracket <Vehicles with ABS>
18. Backing plate
17. Axle shaft
16. ◆◆ Rotor assembly <Vehicles with ABS>
15. Dust cover <Vehicles without ABS>
13. Bearing inner race (outer)
14. ◆◆ Oil seal
12. ◆◆ Bearing inner race (inner)
10. ◆◆ Retainer
9. ◆◆ Snap ring
8. Axle shaft assembly
7. Speed sensor <Vehicles with ABS> (Refer to GROUP 35 – Wheel Speed Sensor.)
6. Parking brake assembly (Refer to GROUP 36 – Parking Brake Drum.)
5. Parking cable end
4. Parking brake cable attaching bolt
3. Brake disc
2. Rear brake assembly
1. Connection for brake pipe

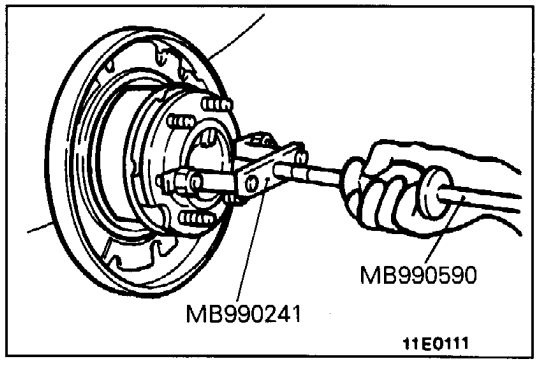
LUBRICATION AND SEALING POINTS







Sealant:
3M ATD Part. No.8661, 8663 or equivalent

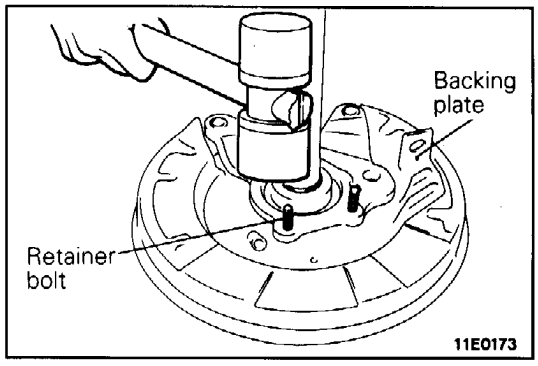


SERVICE POINTS OF REMOVAL E27HBAH

8. REMOVAL OF AXLE SHAFT ASSEMBLY

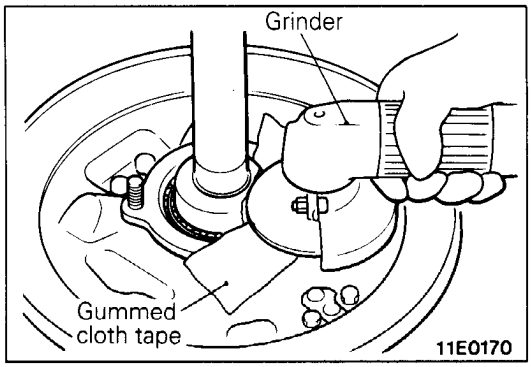
Pull the rear axle shaft. If the rear axle shaft is difficult to remove, use the special tools.

NOTE
Do not damage the oil seal during its removal.



10. REMOVAL OF RETAINER

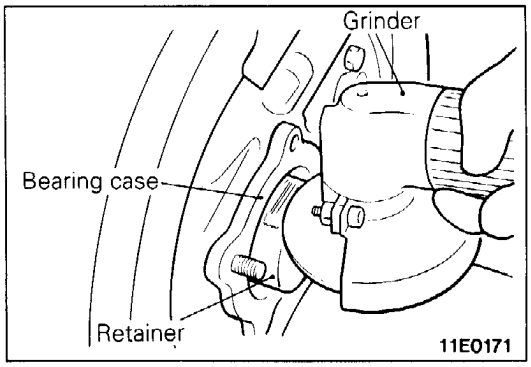
(1) Remove one retainer bolt from the backing plate.



(2) Apply gummed cloth tape around the edge of the bearing case for protection.

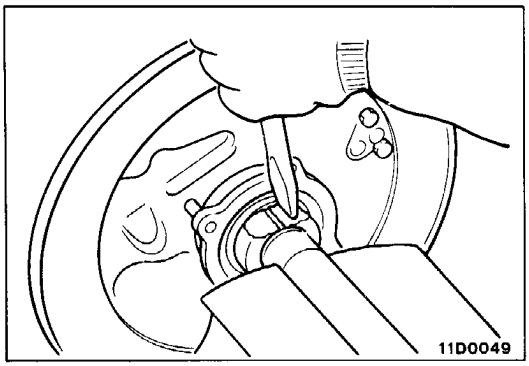
(3) As shown in the figure, fix the axle shaft and shave off with grinder a point of its circumference locally until the wall thickness on the side of axle shaft of retainer and the side of bearing become approximately 1.0–2.0 mm (0.04–0.06 in.) and 2.0 mm (0.08 in.) respectively.

Caution
Be careful not to damage the bearing case and the axle shaft.



(4) Fix the axle shaft and shave off the remaining 2.0 mm (0.08 in.) on the side of the bearing of the retainer.

Caution
Be careful not to damage the bearing case and the axle shaft.



(5) Cut in with a chisel the place where the retainer ring has been shaven and remove the retainer ring.

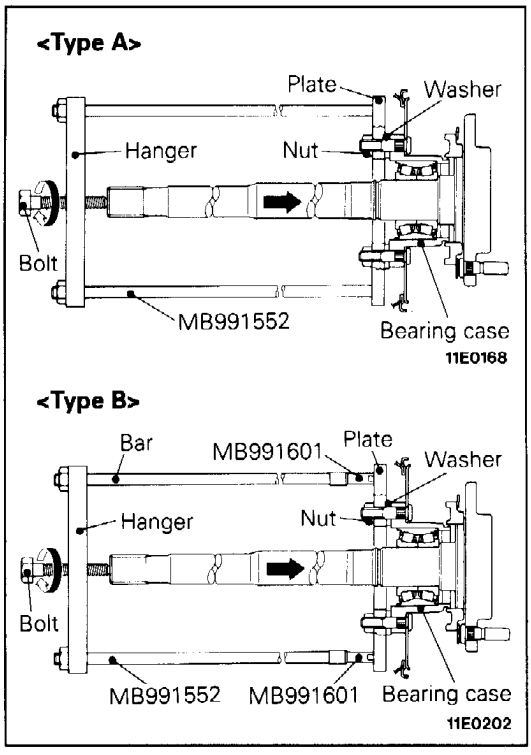
Caution
Be careful not to damage the axle shaft.

11. REMOVAL OF AXLE SHAFT SUB ASSEMBLY

(1) Adjust the height of the hanger and secure the washers, plate and nuts in that order.

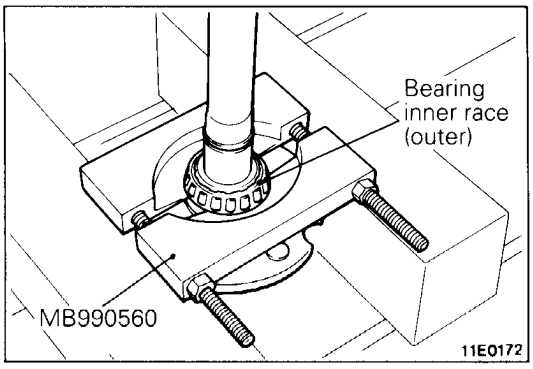
NOTE
1. If the axle shaft is type B, install the extension bar (MB991601) to the special tool bar (MB991552).
2. The washers are used to eliminate the difference in height of the bearing case so that the plate and the bearing case are parallel.

Type A	Other than the below
Type B	Right side axle shaft of: • Vehicles with rear differential lock • Vehicles with 6G74 • Vehicles with 4M40



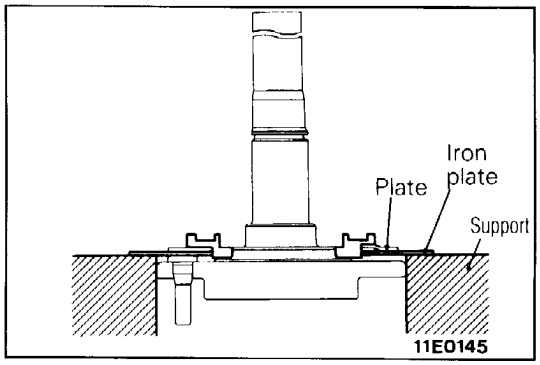
(2) Place the end of the bolt against the centre of the axle shaft, and then tighten the nuts to remove the axle shaft from the bearing case assembly.

Caution
The hanger and plate must be placed so that they are parallel.



13. REMOVAL OF BEARING INNER RACE (OUTER)

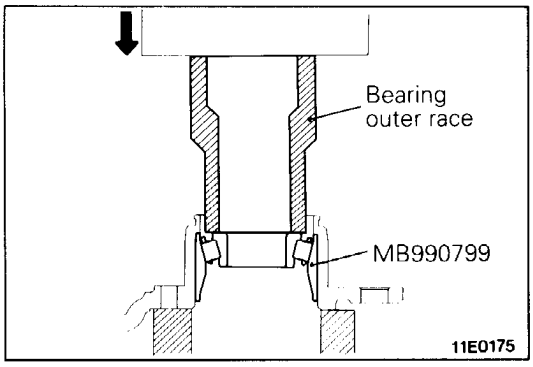
Install the special tool as shown in the illustration, and then use a press to remove the bearing inner race (outer) from the axle shaft.



16. REMOVAL OF ROTOR ASSEMBLY

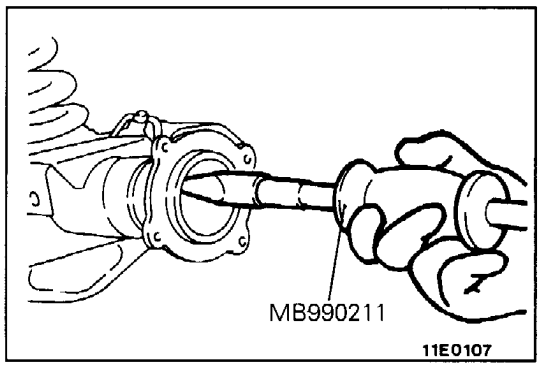
Insert an iron plate of approximately 1 mm (0.04 in.) width between the rotor assembly and the axle shaft, and use a press to remove the rotor assembly.

Caution
In order not to bend the rotor assembly plate, place the support in contact with the axle shaft when using the press.



20. REMOVAL OF BEARING OUTER RACE

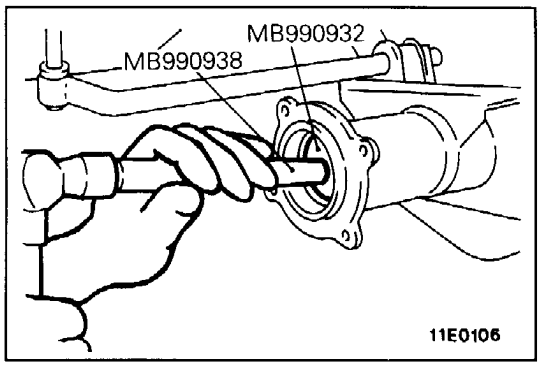
Reinstall the bearing inner race that was removed previously, and then use the special tool and a press to remove the bearing outer race.



23. REMOVAL OF OIL SEAL E27HCAA

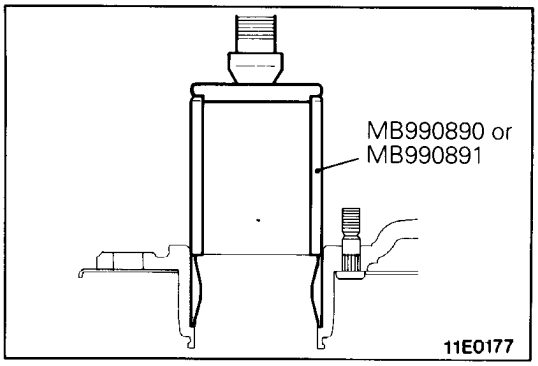
INSPECTION

- Check the dust cover for deformation and damage.
- Check the oil seal for damage.
- Check the inner and outer bearings for seizure, discoloration and rough raceway surface.
- Check the axle shaft for cracks, wear and damage.

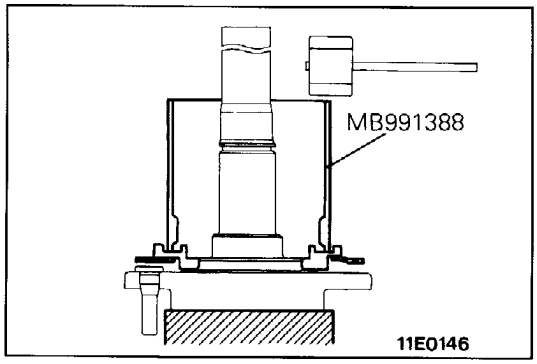


SERVICE POINTS OF INSTALLATION E27HDAJ

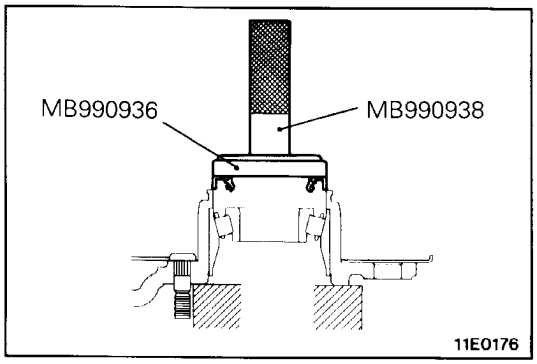
23. INSTALLATION OF OIL SEAL



20. INSTALLATION OF BEARING OUTER RACE

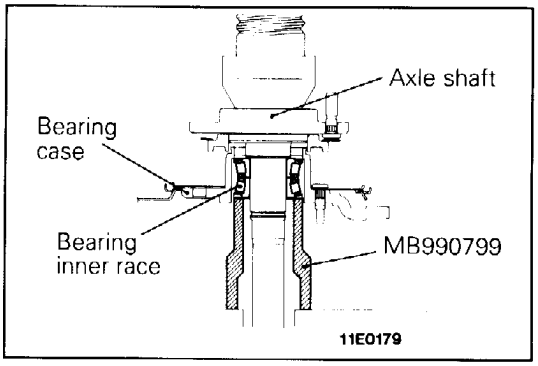


16. INSTALLATION OF ROTOR ASSEMBLY



14. INSTALLATION OF OIL SEAL

(1) Apply multi-purpose grease to the outside of the oil seal.
(2) Use the special tools to press-fit the oil seal until it is flush with the end of the bearing case.
(3) Apply multi-purpose grease to the lip of the oil seal.

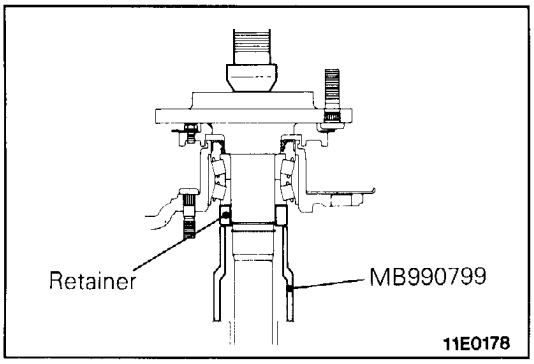


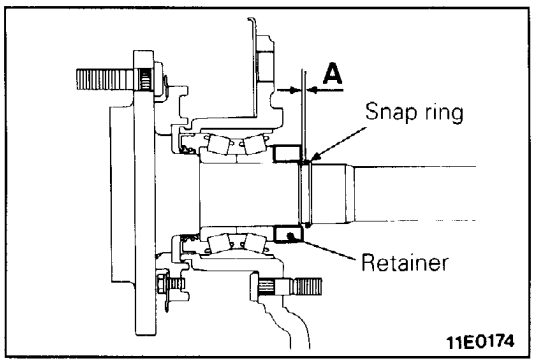
12. INSTALLATION OF BEARING INNER RACE (INNER)

(1) Pass the axle shaft through the bearing case and bearing inner race (inner).
(2) Use the special tool to press-fit the bearing inner race to the axle shaft.

Caution

1. **Both bearing inner race sets should be press-fitted together.**
2. **The left and right lengths of the axle shaft are different [approx. 7 mm (0.28 in.)] in vehicles with rear differential lock. The right side is longer, so be careful when installing.**





10. PRESS-FITTING OF RETAINER

Use the special tool to press-fit the retainer to the axle shaft, while checking that the press-fitting force is at the standard value.
If the initial press-fitting force is less that the standard value, replace the axle shaft.

Standard value:
Initial press-fitting force
50,000 N (5,000 kg, 11,023 lbs.) or more
Final press-fitting force
100,000–110,000 N (10,000–11,000 kg, 22,046–24,251 lbs.)

9. INSTALLATION OF SNAP RING

(1) After installing the snap ring, measure the clearance (A) between the snap ring and the retainer with a thickness gauge, and check that it is within the standard values.

Standard value (A): 0–0.166 mm (0–0.0065 in.)

(2) If the clearance exceeds the standard value, change the snap ring so that the clearance is at the standard value.

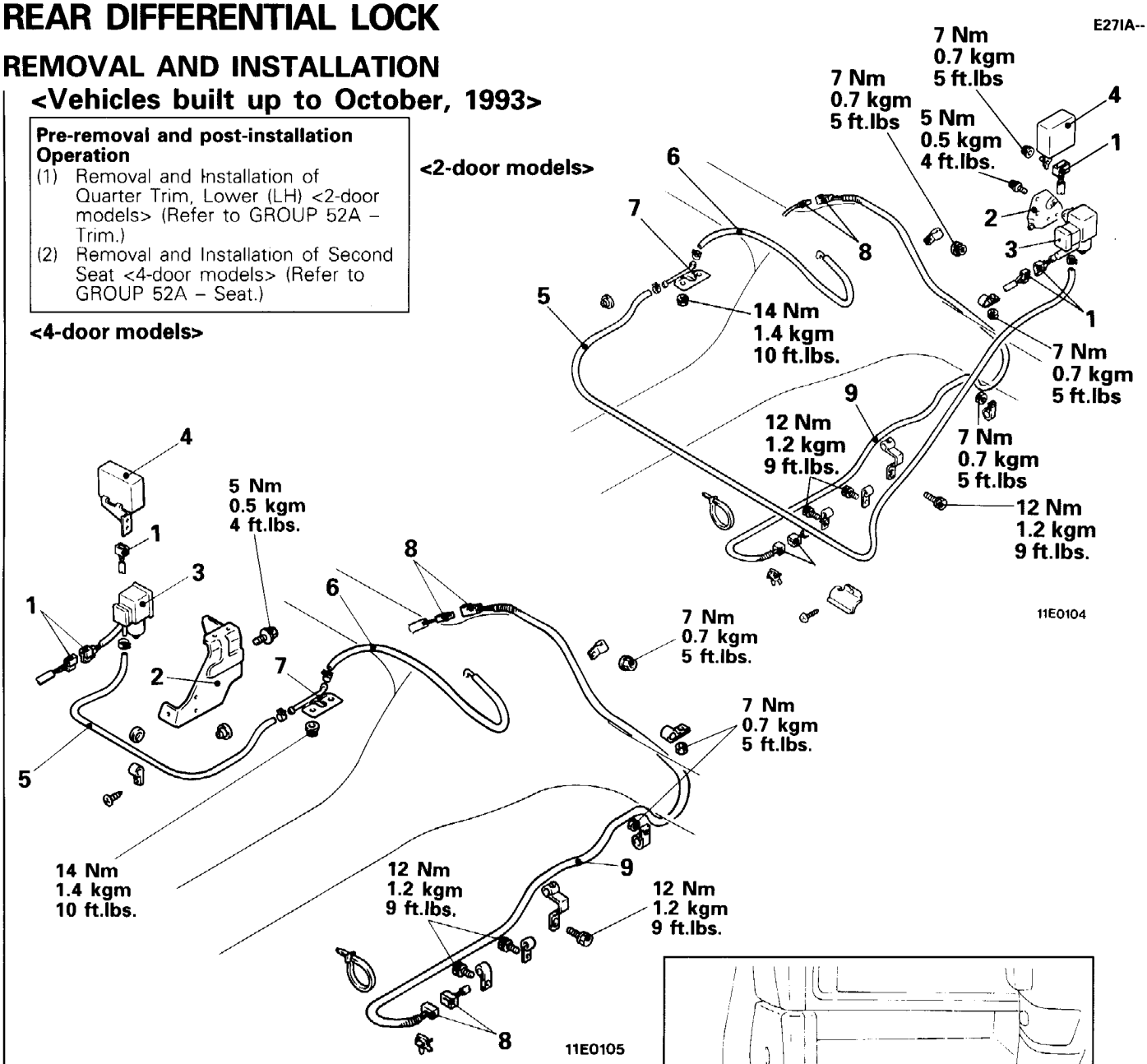
Thickness of snap ring mm (in.)	Identification colour
2.17 (0.0854)	–
2.01 (0.0791)	Yellow
1.85 (0.0728)	Blue
1.69 (0.0665)	Purple
1.53 (0.0602)	Red

REAR DIFFERENTIAL LOCK

REMOVAL AND INSTALLATION

<Vehicles built up to October, 1993>

Pre-removal and post-installation Operation
(1) Removal and Installation of Quarter Trim, Lower (LH) <2-door models> (Refer to GROUP 52A – Trim.)
(2) Removal and Installation of Second Seat <4-door models> (Refer to GROUP 52A – Seat.)



Removal steps of rear differential lock air pump and control unit

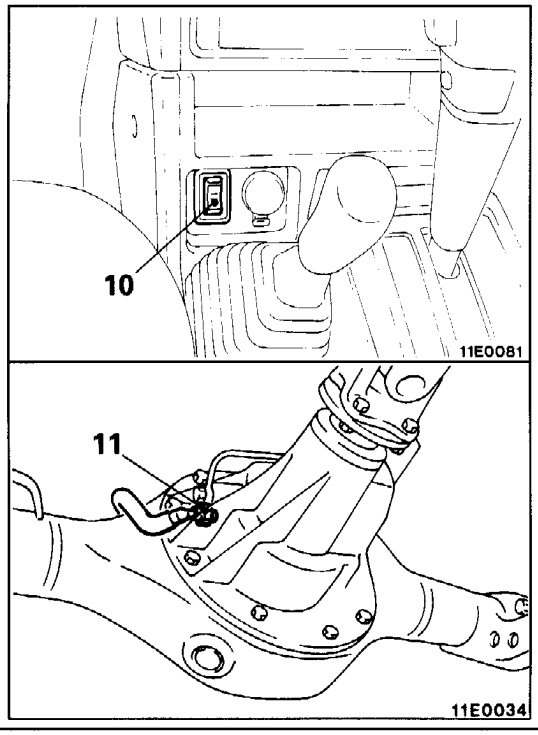
1. Harness connector
2. Bracket
3. Rear differential lock air pump
4. Rear differential lock control unit
5. Air hose
6. Air hose
7. Hose bracket
8. Harness connector
9. Position harness

Removal steps of rear differential lock switch

10. Rear differential lock switch

Removal steps of rear differential lock detection switch

11. Rear differential lock detection switch (Refer to P.27-26.)

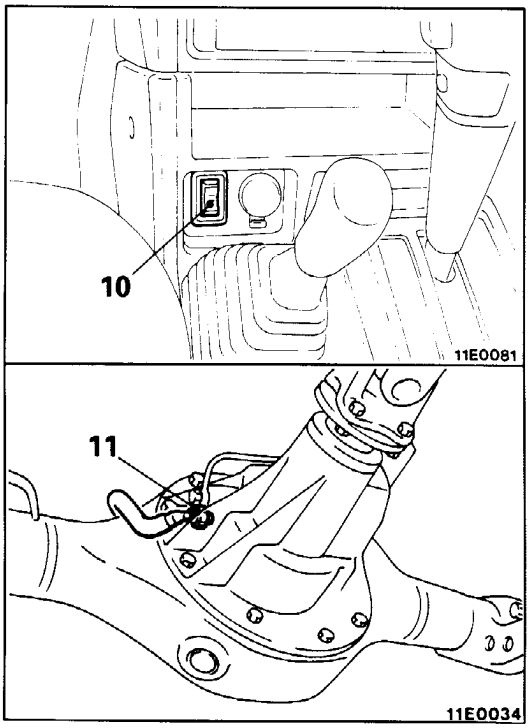


<Vehicles built from November, 1993>

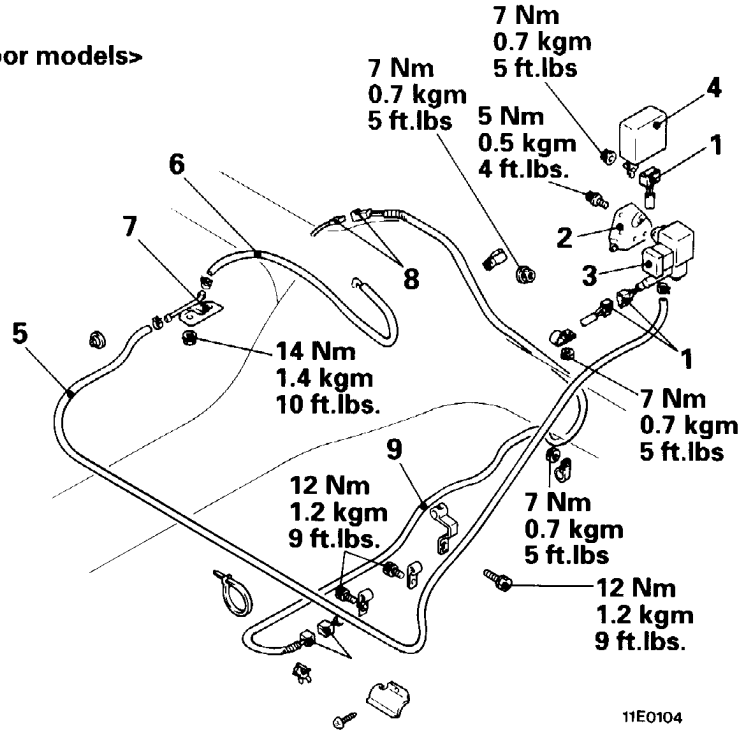
Pre-removal and post-installation Operation

(1) Removal and Installation of Quarter Trim, Lower (LH) (Refer to GROUP 52A – Trim.)

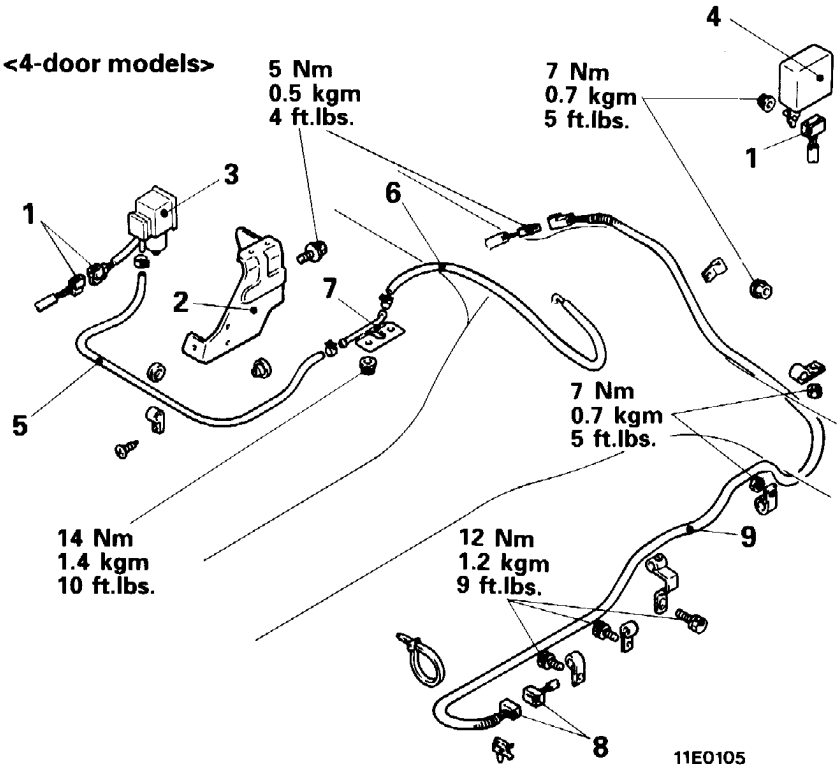
(2) Removal and Installation of Second Seat <4-door models> (Refer to GROUP 52A – Seat.)



<2-door models>



<4-door models>



Removal steps of rear differential lock air pump and control unit

1. Harness connector
2. Bracket
3. Rear differential lock air pump
4. Rear differential lock control unit
5. Air hose
6. Air hose
7. Hose bracket
8. Harness connector
9. Position harness

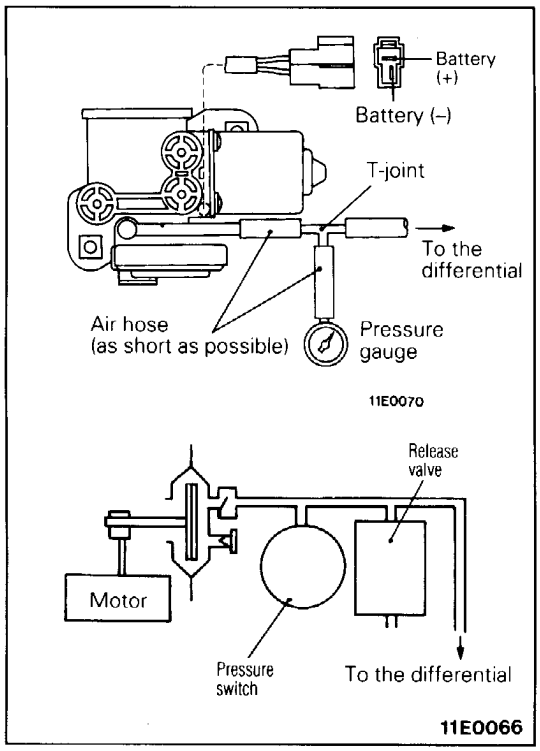
Removal of rear differential lock switch

10. Rear differential lock switch

Removal of rear differential lock detection switch

11. Rear differential lock detection switch (Refer to P.27-26.)

NOTES



INSPECTION

E27ICAA

REAR DIFFERENTIAL LOCK AIR PUMP

1. Install air hose to the differential.
2. Connect the pressure gauge to the air pump discharge outlet nozzle, via the air hose and T-joint.
3. Apply battery voltage to the air pump connector.
4. Measure the time between when the pump starts and stops operating, and if it stops within 5 seconds, the pressure switch inside the pump is normal.
5. Measure the pressure 10–20 seconds after the pump has stopped.

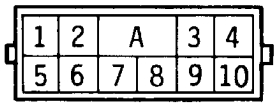
   Standard value: 25–40 kPa (0.25–0.40 kg/cm², 4–6 psi.)

   If the pressure is within the standard value, the release valve inside the pump is normal.
6. Check that the pump does not begin operating for 5 minutes after it has stopped.
7. If the inspection for 4–6 is normal, then the pump is fully operational.

REAR DIFFERENTIAL LOCK CONTROL UNIT

TYPE A (10 terminals connector)

1. Measure the terminal voltages under each condition.
2. With the control unit connected to the harness and the probe inserted into the rear of the harness connector, carry out the voltage measurements between terminal ⑥ (earth terminal) and each other terminal.

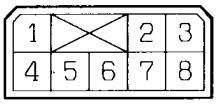


11E0068

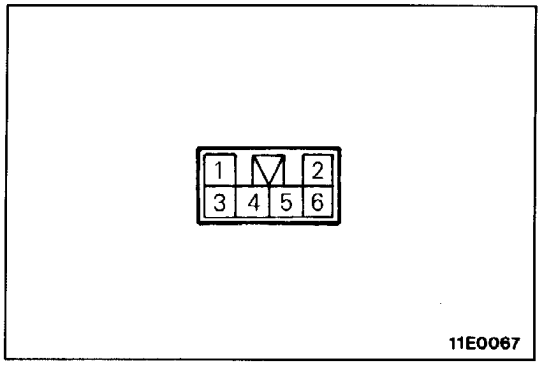
Terminal No.	Inspection Item		Condition		Terminal Voltage
3	Ignition switch (IG1)		Ignition switch (IG1)	OFF	0 V
				ON	System voltage
9	Rear differential lock switch	ON side	Ignition switch: ON	ON side or OFF side	0 V
1		OFF side		When in neutral	System voltage
10	Rear differential lock indicator lamp		Ignition switch: ON	Rear differential is locked	0 V
				Rear differential is free	System voltage
2	Vehicle speed reed switch		Select "D" or "1" (1st gear) and drive forward slowly.		5 V
8	Rear differential lock detection switch		Ignition switch: ON	Rear differential is locked	0 V
				Rear differential is free	System voltage
4	Rear differential lock air pump		Ignition switch: ON	When filling or holding	System voltage
				When releasing	0 V
5	Centre differential lock switch		Ignition switch: ON	Centre differential is free	System voltage
				Centre differential is locked	0 V

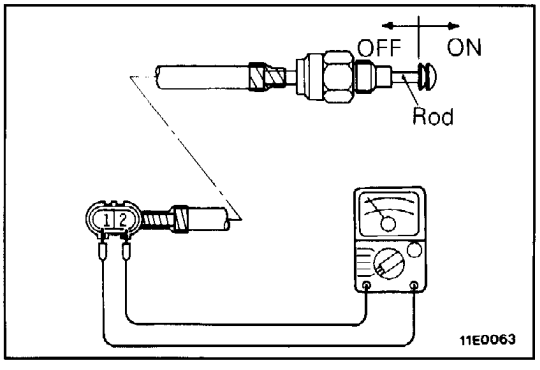
TYPE B (8 terminals connector)

1. Measure the terminal voltages under each condition.
2. With the control unit connected to the harness and the probe inserted into the rear of the harness connector, carry out the voltage measurements between terminal ④ (earth terminal) and each other terminal.



Terminal No.	Inspection Item	Condition		Terminal Voltage
2	Ignition switch (IG1)	Ignition switch (IG1)	OFF	0 V
			ON	System voltage
7	Rear differential lock switch	Ignition switch: ON	ON	0 V
			OFF	System voltage
8	Rear differential lock indicator lamp	Ignition switch: ON	Rear differential is locked	0 V
			Rear differential is free	System voltage
1	Vehicle speed reed switch	Select "D" or "1" (1st gear) and drive forward slowly.		5 V
6	Rear differential lock detection switch	Ignition switch: ON	Rear differential is locked	0 V
			Rear differential is free	System voltage
3	Rear differential lock air pump	Ignition switch: ON	When filling or holding	System voltage
			When releasing	0 V





REAR DIFFERENTIAL LOCK SWITCH CONTINUITY

TYPE A (Without indicator lamp)

Switch position \ Terminal	5	3	2	6	1
ON	○	—	○	○—(ILL)—○	
OFF		○	○		

TYPE B (With indicator lamp)

Switch position \ Terminal	6	2	5	1	3
ON	○	○	(IND) ○	○—(ILL)—○	
OFF					

NOTE
• ○—○ indicates that there is continuity between the terminals.

REAR DIFFERENTIAL LOCK DETECTION SWITCH

1. Connect an ohmmeter to the detection switch connector.
2. The rear differential lock detection switch is in good condition when the rod of the detection switch is pulled, there should be continuity, and when it is returned to its normal position, no continuity.

NOTE
Remove the differential carrier in order to replace the rear differential lock detection switch (Refer to P.27-26).

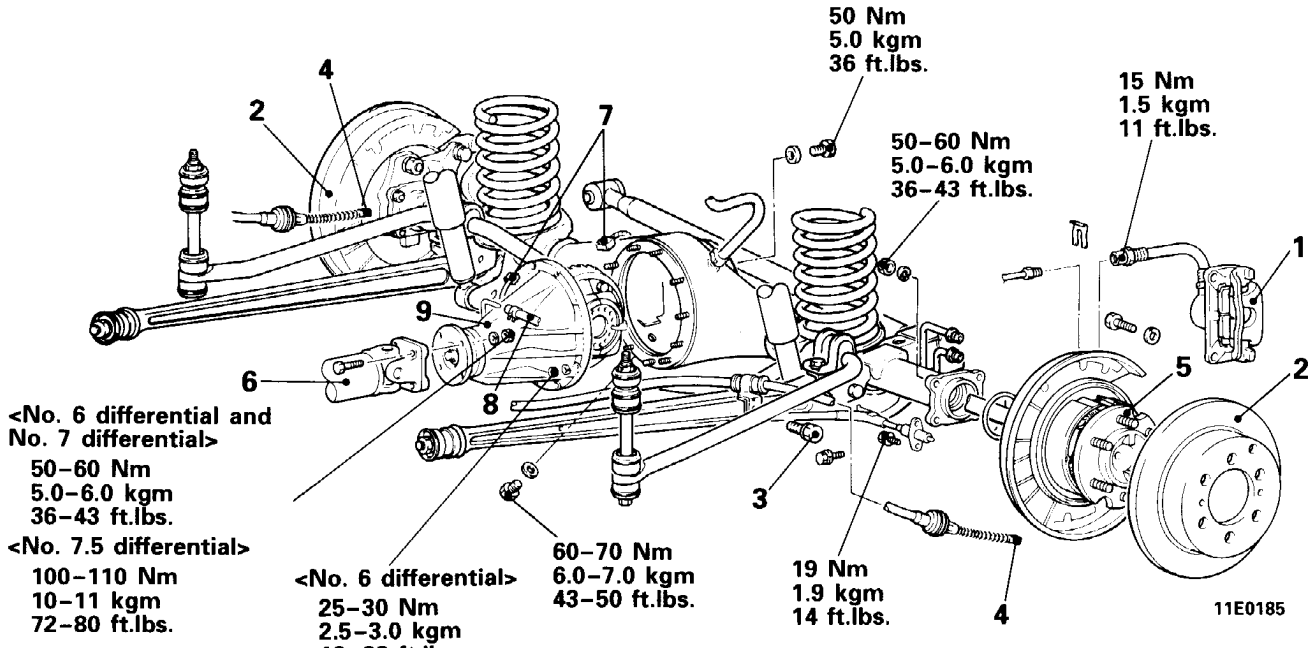
DIFFERENTIAL CARRIER

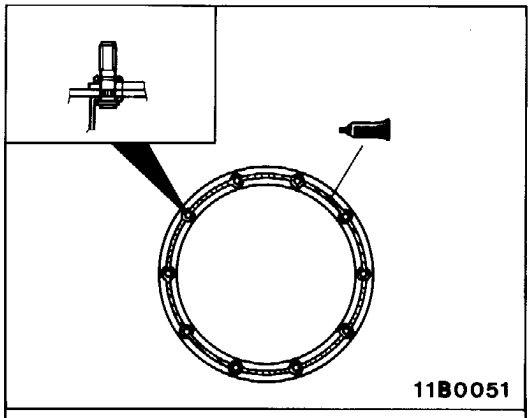
REMOVAL AND INSTALLATION

E27QA--

Pre-removal Operation
- Draining of Differential Gear Oil

Post-installation Operation
- Air Bleeding from Brake Lines (Refer to GROUP 35 – Service Adjustment Procedures.)
- Adjustment of Parking Brake Lever Stroke (Refer to GROUP 36 – Service Adjustment Procedures.)
- Filling of Differential Gear Oil (Refer to P.27-8.)



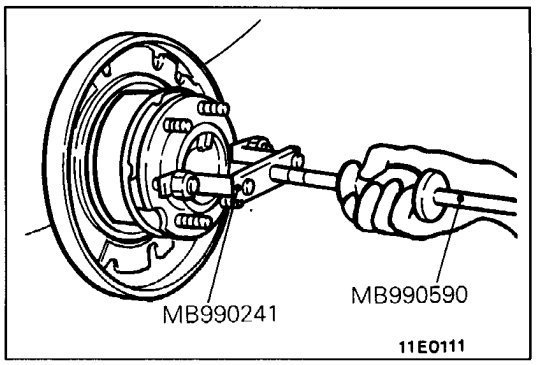


Sealant:
3M ATD Part No. 8661, 8663 or equivalent

NOTE
Apply the specified sealant to the differential carrier mounting surface of the axle housing as shown in the illustration.

Removal steps

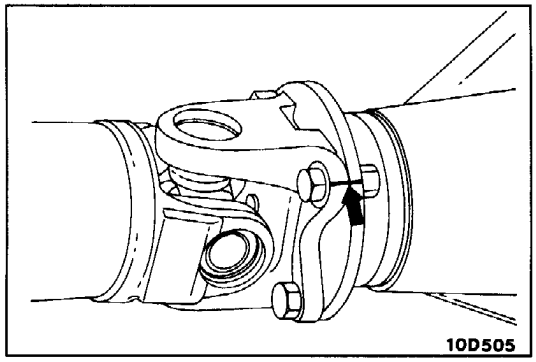
1. Rear brake assembly
2. Brake disc
3. Parking brake cable attaching nut
4. Parking brake cable end
5. Rear axle shaft assembly
6. Rear propeller shaft
7. Rear differential lock position harness connector
8. Hose connection <Vehicles with rear differential lock>
9. Differential carrier



SERVICE POINTS OF REMOVAL E27QBAI

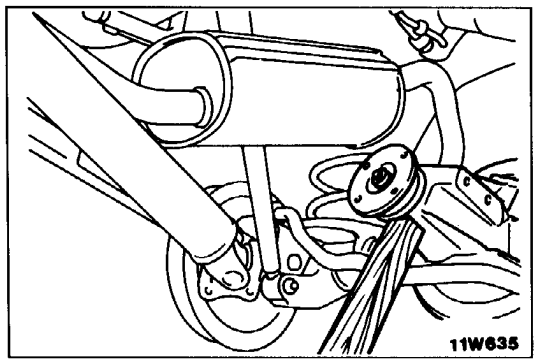
5. REMOVAL OF REAR AXLE SHAFT ASSEMBLY

Pull out the right and left axle shafts by about 70 mm (3 in.). If it is difficult to pull out, use the special tools.



6. REMOVAL OF REAR PROPELLER SHAFT

Make the mating marks on the flange yoke of the rear propeller shaft and the companion flange of the differential case.



9. REMOVAL OF DIFFERENTIAL CARRIER

Remove the attaching nuts and strike the lower part of differential carrier assembly with a piece of timber several times to loosen, then remove the assembly.

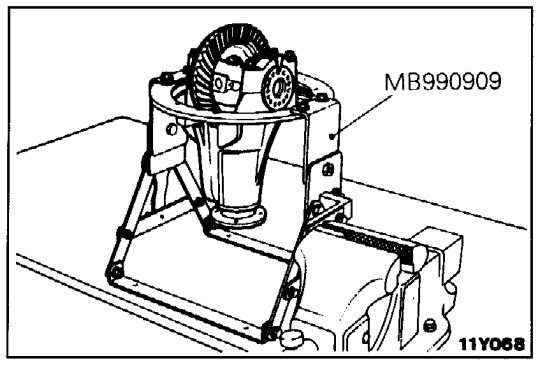
Caution

1. **Do not remove the uppermost nut but keep it loosened all the way to the stud bolt end.**
2. **Use care not to strike the companion flange.**

SERVICE POINTS OF INSTALLATION E27QBAK

6. INSTALLATION OF REAR PROPELLER SHAFT

Align the mating marks on the flange yoke and the companion flange to install the rear propeller shaft.



INSPECTION BEFORE DISASSEMBLY E27QDAA

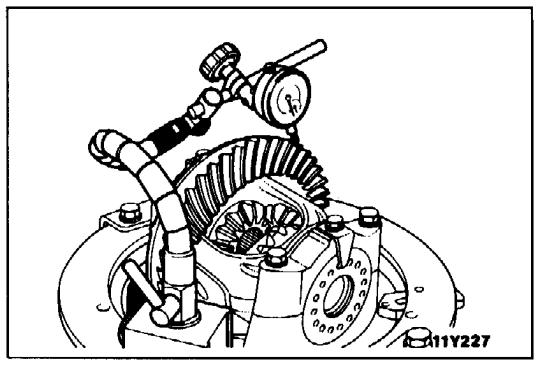
Hold the special tool in a vice, and install the differential carrier to the special tool.

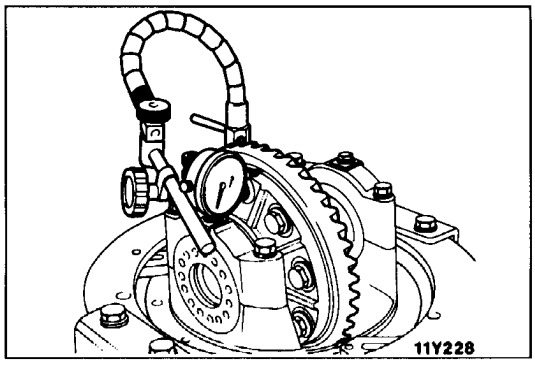
FINAL DRIVE GEAR BACKLASH

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

NOTE
Measure at four points or more on the circumference of the drive gear.

Standard value: **<No. 6 differential>**
0.11–0.16 mm (0.0043–0.0063 in.)
<No. 7 differential and No. 7.5 differential (except rear differential lock)>
0.13–0.18 mm (0.0051–0.0071 in.)
<No. 7.5 differential (rear differential lock)>
0.12–0.18 mm (0.0047–0.0071 in.)

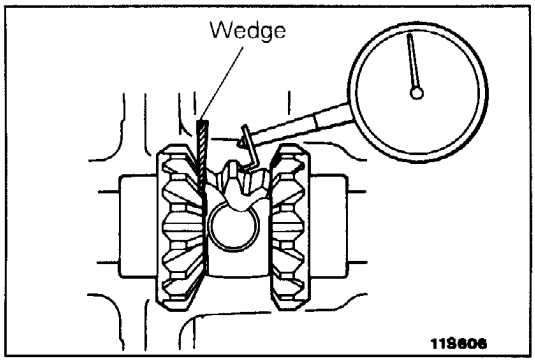




DRIVE GEAR RUNOUT

Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

Limit: 0.05 mm (0.0019 in.)



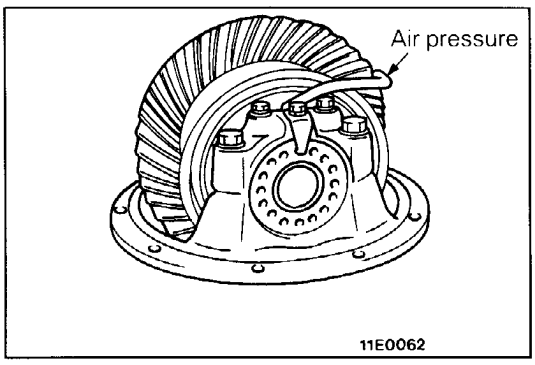
DIFFERENTIAL GEAR BACKLASH (No. 6 conventional differential and No. 7 conventional differential)

While locking the side gear with the wedge, measure the differential gear backlash with a indicator on the pinion gear.

Standard value: <No. 6 differential>
0.010–0.076 mm (0.0004–0.0030 in.)
<No. 7 differential>
0–0.076 mm (0–0.0030 in.)
Limit: 0.2 mm (0.0079 in.)

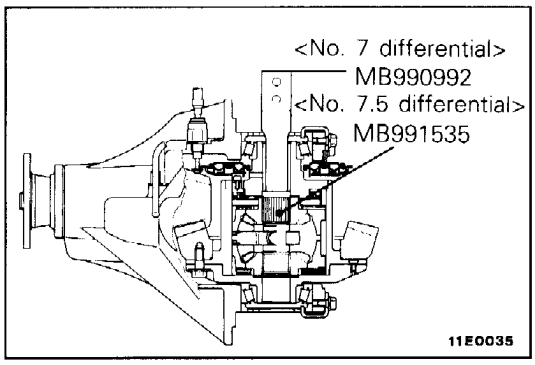
FINAL DRIVE GEAR TOOTH CONTACT

Refer to GROUP 26 – Differential Carrier.



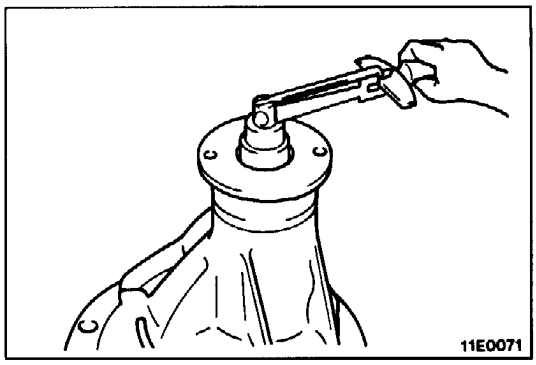
REAR DIFFERENTIAL LOCK

1. Connect an air hose, pressure gauge and air regulator, for adjusting the outside air pressure, to the actuator pipe.
2. Adjust the outside air pressure with the air regulator until the pressure gauge shows a pressure of approx. 25 kPa (0.25 kg/cm^2, 4 psi.).



3. Use the special tool to gently turn only the side gear of one side of the axle 1/4–1/2 turns.

   NOTE
   1. The lock will not operate straight away, even when air pressure is supplied, so the side gear on one side of the axle is turned so that the clutch will mesh (lock).
   2. To unlock, stop the supply of air pressure, and gently turn the side gear on one side of the axle 1/4–1/2 turns.



4. Measure the rotation torque of the companion flange, and check the lock condition and free condition of the rear differential.

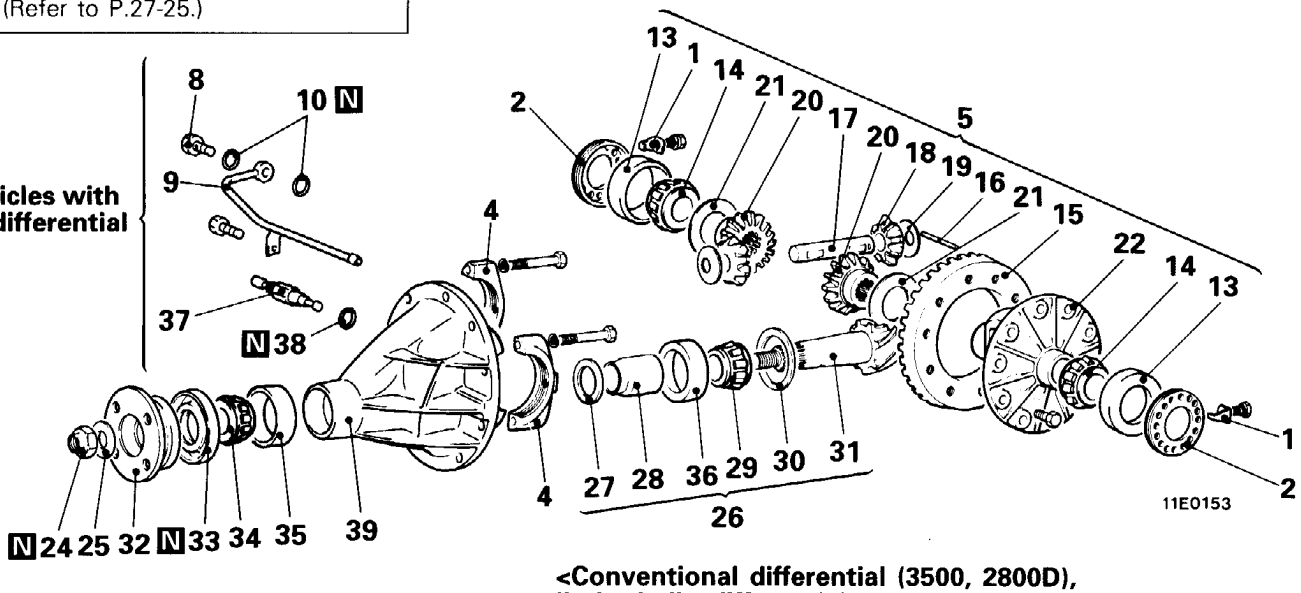
Rear differential operation	Companion flange Nm (kgm, ft.lbs.) [N (kg, lbs)]
Locked	Doesn't turn at 50 (5, 36) [1,111 (111, 248)]
Free	Turns at less than 50 (5, 36) [1,111 (111, 248)]

DISASSEMBLY

E27QI--

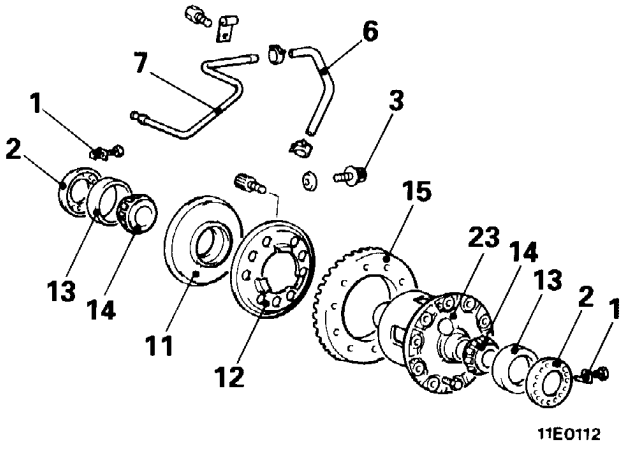
Inspection Before Disassembly
(1) Inspection of Final Drive Gear Inspection
(Refer to P.27-24.)
(2) Inspection of Drive Gear Run-out
(Refer to P.27-25.)
(3) Inspection of Differential Gear Backlash (Refer to P.27-25.)
(4) Inspection of Final Drive Gear Tooth Contact
(Refer to P.27-25.)

<Conventional differential (2400, 3000, 2500D)>



<Vehicles with rear differential lock>

<Conventional differential (3500, 2800D), limited slip differential and rear differential lock>



Disassembly steps

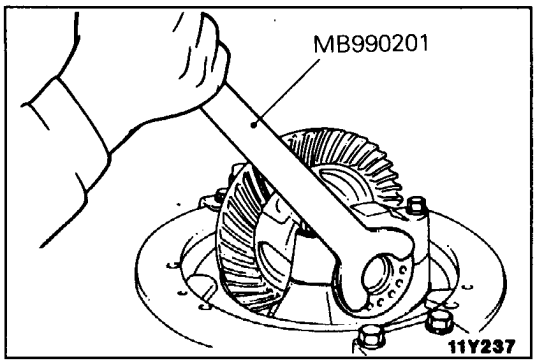
- 1. Lock plate
- ◆◆ 2. Side bearing nut
- 3. Bolt
- 4. Bearing cap
- ◆◆ 5. Differential case assembly
- 6. Hose
- 7. Air pipe assembly (A)
- 8. Eye bolt
- 9. Air pipe assembly (B)
- 10. Gasket
- 11. Actuator assembly
- 12. Pressure plate

} <Vehicles with rear differential lock>

- 13. Side bearing outer race
- ◆◆ 14. Side bearing inner race
- ◆◆ 15. Drive gear
- ◆◆ 16. Lock pin
- 17. Pinion shaft
- 18. Pinion gear
- 19. Pinion washer
- 20. Side gear
- 21. Side gear spacer
- 22. Differential case
- 23. Differential case (Refer to P. 27-37)
- ◆◆ 24. Self-locking nut
- 25. Washer
- ◆◆ 26. Drive pinion assembly
- 27. Drive pinion front shim (For adjusting preload of drive pinion)
- 28. Drive pinion spacer
- ◆◆ 29. Drive pinion rear bearing inner race
- 30. Drive pinion rear shim
(For adjusting drive pinion height)
- 31. Drive pinion
- 32. Companion flange
- ◆◆ 33. Oil seal
- ◆◆ 34. Drive pinion front bearing inner race
- ◆◆ 35. Drive pinion front bearing outer race
- ◆◆ 36. Drive pinion rear bearing outer race
- 37. Rear differential lock detection switch
- 38. Gasket

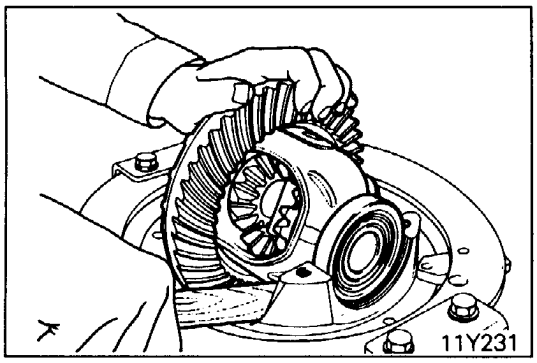
} <Vehicles with rear differential lock>

- 39. Differential carrier



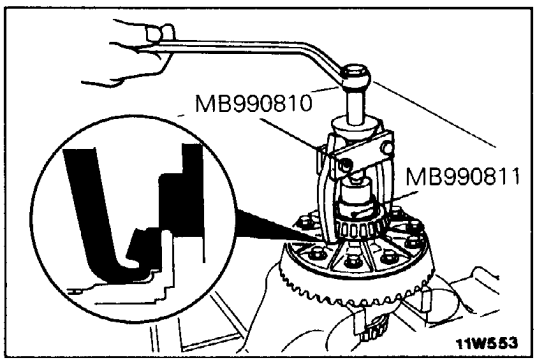
SERVICE POINTS OF DISASSEMBLY E27QFAE

2. REMOVAL OF SIDE BEARING NUT



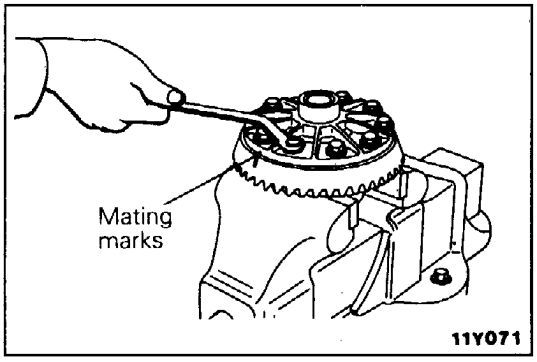
5. REMOVAL OF DIFFERENTIAL CASE ASSEMBLY

NOTE
Keep the right and left side bearings and side bearing nuts separate, so that they do not become mixed at the time of reassembly.



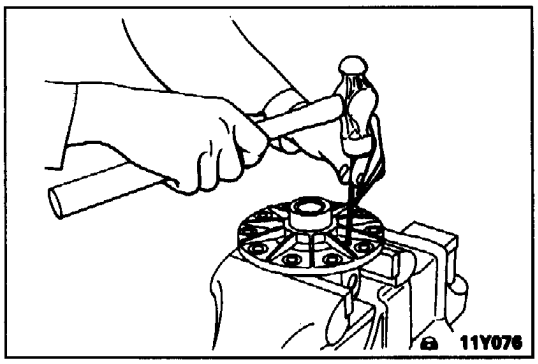
14. REMOVAL OF SIDE BEARING INNER RACE

NOTE
Attach the prongs of the special tool to the inner race of the side bearing through the openings in the differential case.

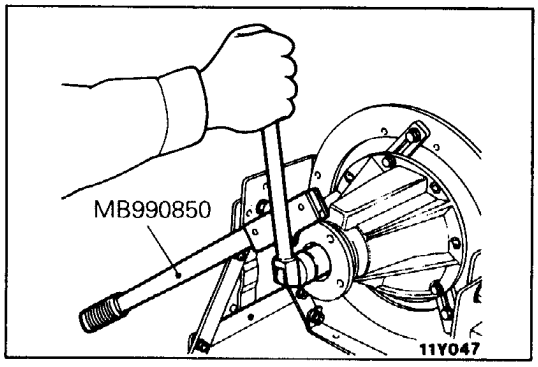


15. REMOVAL OF DRIVE GEAR

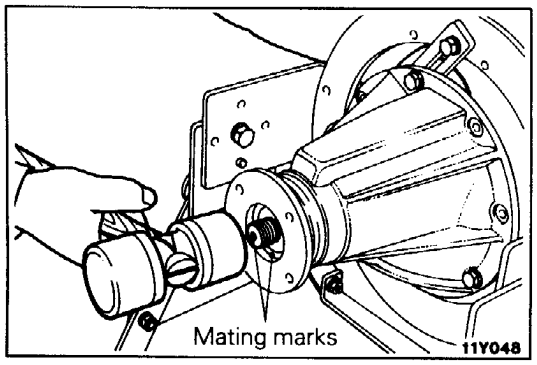
(1) Make the mating marks to the differential case and the drive gear.
(2) Loosen the drive gear attaching bolts in diagonal sequence to remove the drive gear.



16. REMOVAL OF LOCK PIN



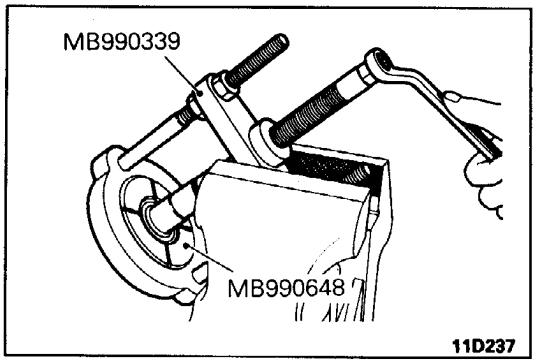
24. REMOVAL OF SELF-LOCKING NUT



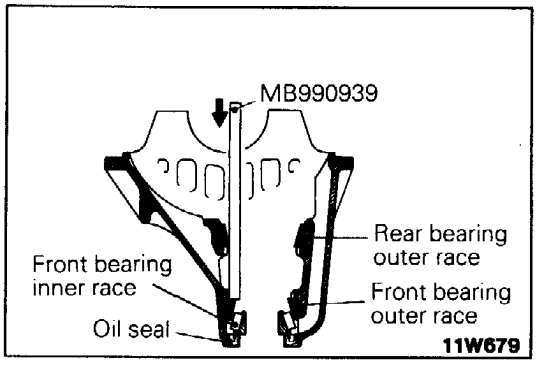
26. REMOVAL OF DRIVE PINION ASSEMBLY

(1) Make the mating marks to the drive pinion and companion flange.
(2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.

Caution
Do not make mating marks on the contact surfaces of the companion flange and propeller shaft.



29. REMOVAL OF DRIVE PINION REAR BEARING INNER RACE



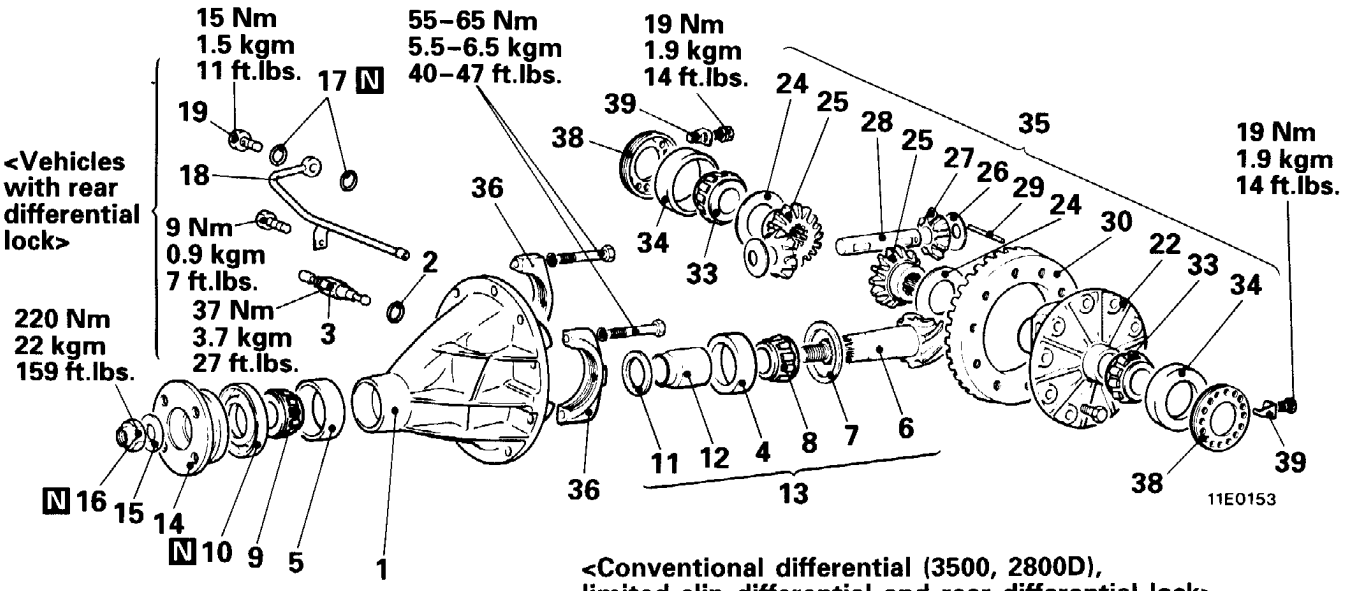
33. REMOVAL OF OIL SEAL/34. DRIVE PINION FRONT BEARING INNER RACE/35. DRIVE PINION FRONT BEARING OUTER RACE/36. DRIVE PINION REAR BEARING OUTER RACE

(1) Using the special tool, drive out the drive pinion front bearing outer race with drive pinion front bearing inner race and oil seal from the gear carrier.
(2) Drive out the drive pinion rear bearing outer race in the same manner.

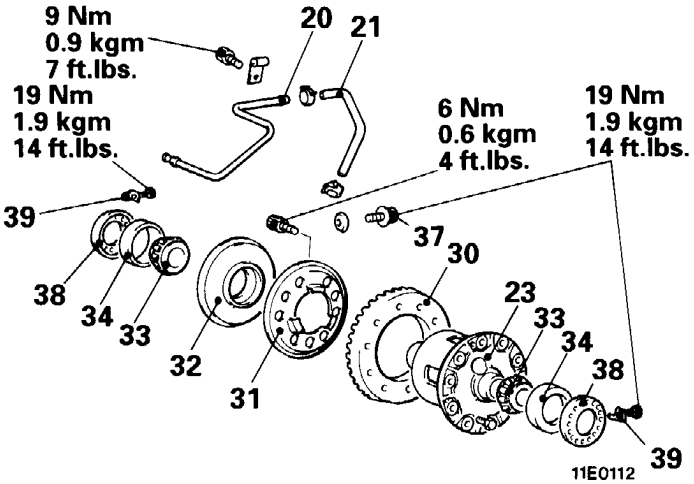
REASSEMBLY

E27QJ--

<Conventional differential (2400, 3000, 2500D)>

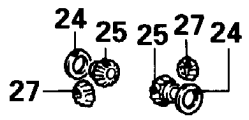
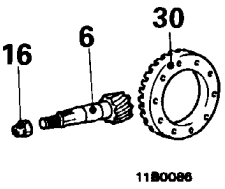


<Conventional differential (3500, 2800D), limited slip differential and rear differential lock>

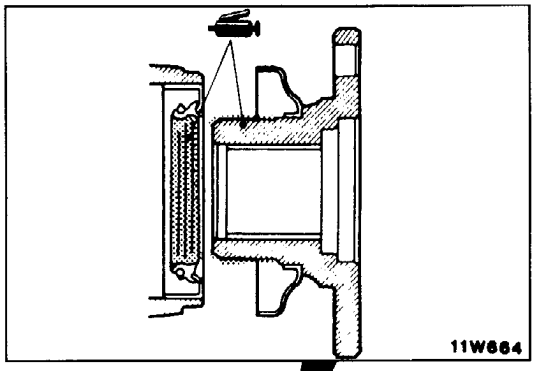


Reassembly steps

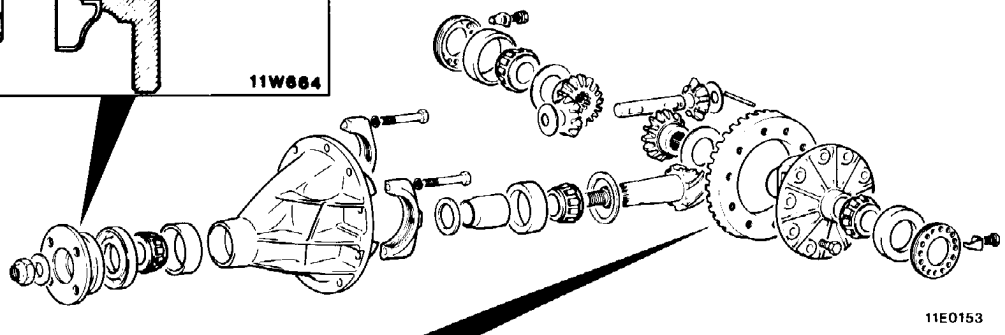
1. Differential carrier
2. Gasket
3. Rear differential lock detection switch
4. ◆◆ Drive pinion rear bearing outer race
5. ◆◆ Drive pinion front bearing outer race
6. ◆◆ • Adjustment of drive pinion height
7. Drive pinion
8. Drive pinion rear shim (For adjusting drive pinion height)
9. Drive pinion rear bearing inner race
10. Drive pinion front bearing inner race
11. Oil seal
12. Drive pinion front shim (For adjusting drive pinion preload)
13. Drive pinion spacer
14. ◆◆ • Adjustment of drive pinion preload
15. Drive pinion assembly
16. Companion flange
17. Washer
18. Self-locking nut
19. Gasket
20. Air pipe assembly (B)
21. Eye bolt
22. Air pipe assembly (A) | <Vehicles with rear
23. Hose | differential lock>
24. Differential case
25. Differential case (Refer to P.27-37)
26. Side gear spacer
27. Side gear
28. Pinion washer
29. Pinion gear
30. ◆◆ • Adjustment of differential gear backlash
31. Pinion shaft
32. ◆◆ Lock pin
33. ◆◆ Drive gear
34. Pressure plate | <Vehicles with rear
35. Actuator assembly | differential lock>
36. ◆◆ Side bearing inner race
37. Side bearing outer race
38. Differential case assembly
39. ◆◆ Bearing cap
40. ◆◆ • Adjustment of final drive gear backlash
41. Bolt
42. Side bearing nut
43. Lock plate

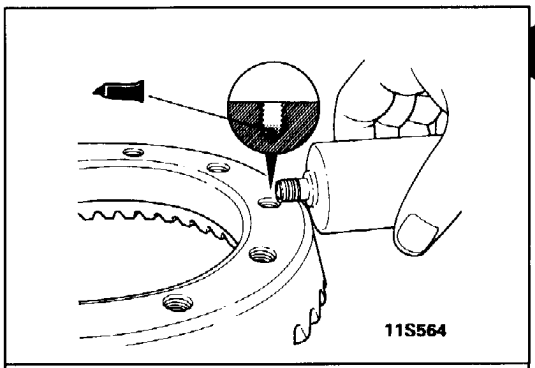
<Conventional differential (2400, 3000, 2500D)>	
	
Differential gear set	Final drive gear set

LUBRICATION AND ADHESIVE POINTS



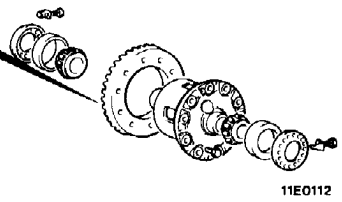
<Conventional differential (2400, 3000, 2500D)>

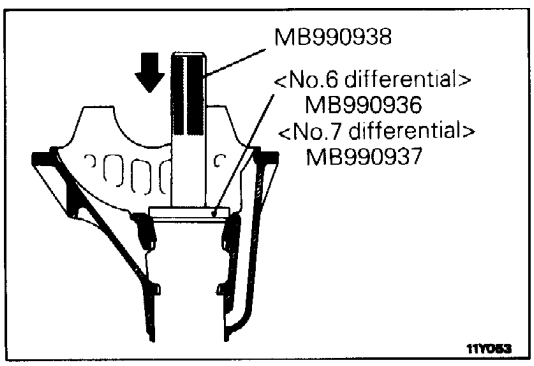




Adhesive:
3M Stud Locking 4170 or equivalent

<Conventional differential (3500, 2800D), limited slip differential and rear differential lock>

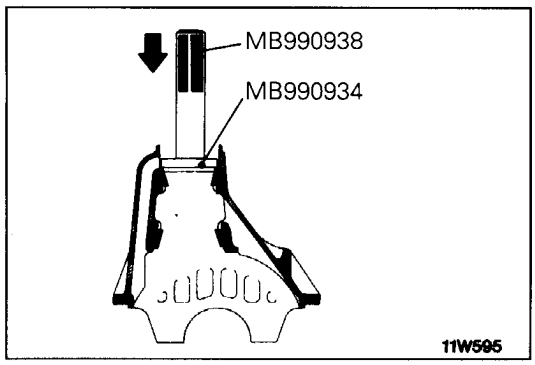




SERVICE POINTS OF REASSEMBLY E27QHAH

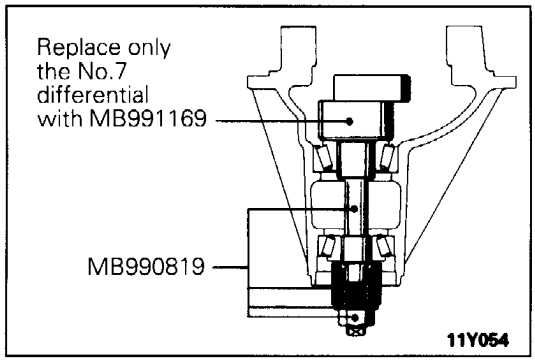
4. PRESS-FITTING OF DRIVE PINION REAR BEARING OUTER RACE

Caution
Bearing outer race must be fitted by a press to avoid tilt and distortion.



5. INSTALLATION OF DRIVE PINION FRONT BEARING OUTER RACE

Caution
Bearing outer race must be fitted by a press to avoid tilt and distortion

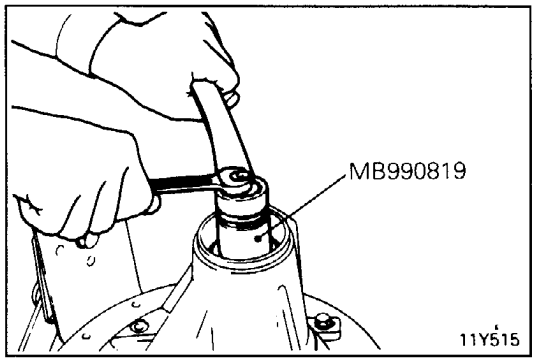


- **ADJUSTMENT OF DRIVE PINION HEIGHT**

Adjust the drive pinion height by the following procedures:

(1) Install special tools and drive pinion front and rear bearing inner races to the gear carrier in the sequence shown in the illustration.

NOTE
For the No. 7 differential, the MB990819 head part should be replaced by the MB991169 (attachment).

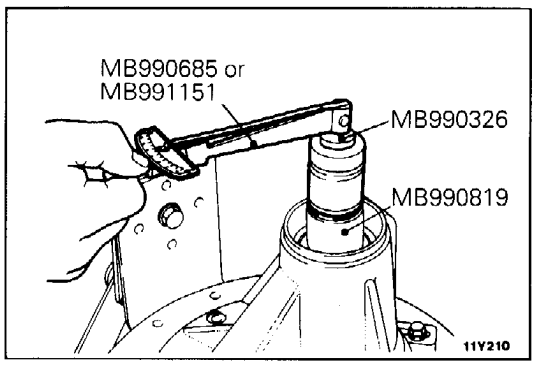


(2) Tighten the nut on the special tool until standard value of drive pinion turning torque is obtained.

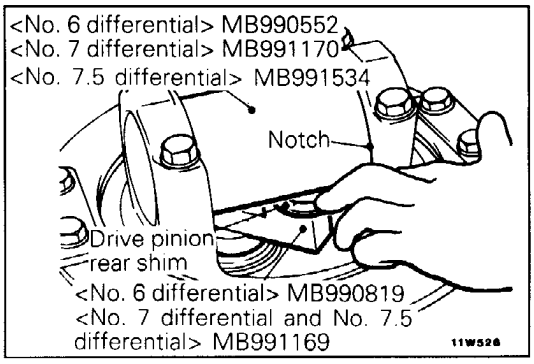
(3) Measure the drive pinion turning torque (without the oil seal).

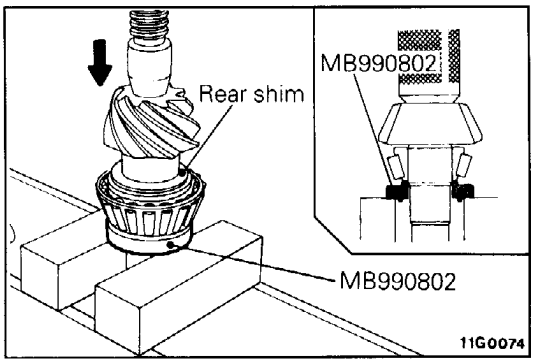
Standard value:

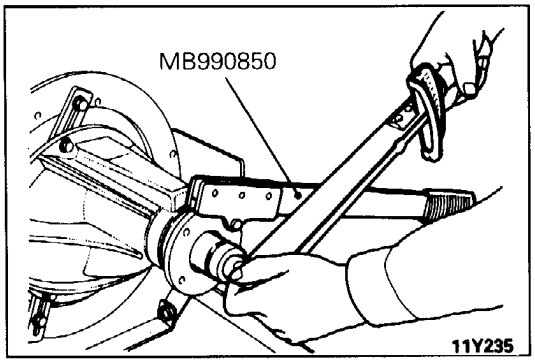
Bearing division	Bearing lubrication	Rotation torque
New	None (With anti-rust agent)	0.6–0.9 Nm 6.0–9.0 kgcm 5.2–7.8 in.lbs.
New/reusing	Gear oil applied	0.4–0.5 Nm 4.0–5.0 kgcm 3.5–4.3 in.lbs.

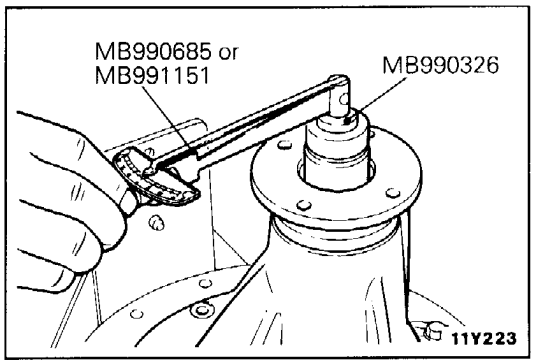


NOTE
1. Gradually tighten the nut of the special tool while checking the drive pinion turning torque.
2. With small type differentials, one complete rotation cannot be given to the special tool. Rotate tool several times within the possible range to run in the bearing, and then measure the torque.









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

NOTE
Thoroughly clean the side bearing seat.
When positioning the special tool, be sure that the cutout sections of the special tool are in the position shown in the illustration, and 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.

(5) Fit the selected drive pinion rear shim(s) to the drive pinion, and press-fit the drive pinion rear bearing inner race by using the special tool.

• ADJUSTMENT OF DRIVE PINION PRELOAD

Adjust the drive pinion turning torque by using the following procedure:

Without oil seal

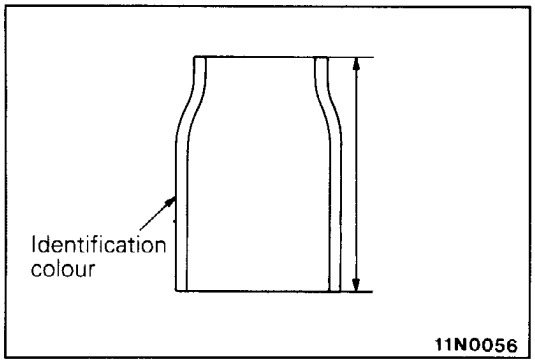
(1) Fit the drive pinion front shim(s) between the drive pinion spacer and the drive pinion front bearing inner race.
(2) Tighten the companion flange to the specified torque by using the special tools.

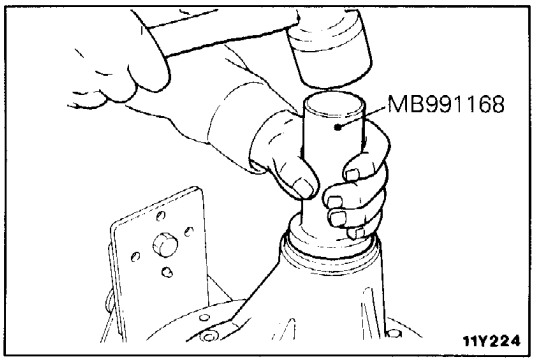
NOTE
Do not install the oil seal.

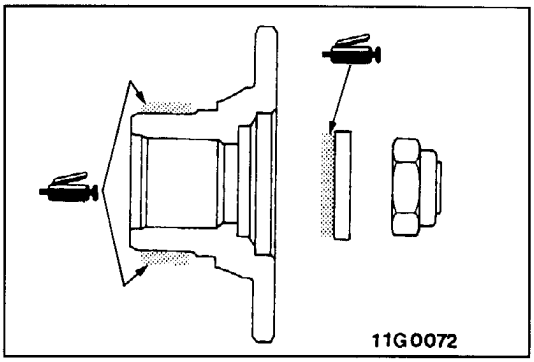
(3) Measure the drive pinion turning torque. (without the oil seal)

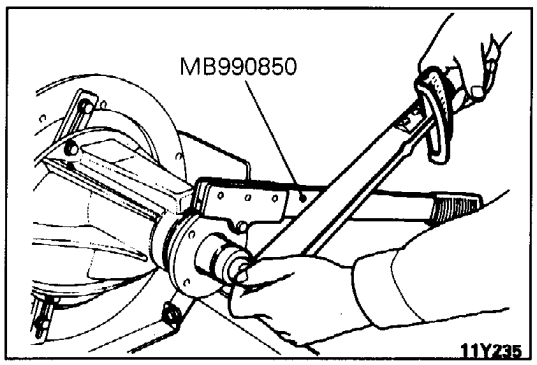
Standard value:

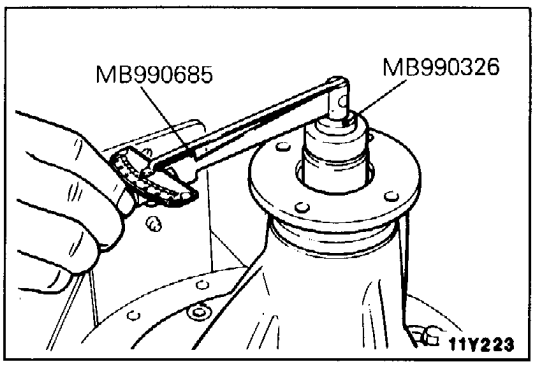
Bearing division	Bearing lubrication	Rotation torque
New	None (With anti-rust agent)	0.6–0.9 Nm 6.0–9.0 kgcm 5.2–7.8 in.lbs.
New/reusing	Gear oil applied	0.4–0.5 Nm 4.0–5.0 kgcm 3.5–4.3 in.lbs.











(4) If the drive pinion turning torque is not within the range of the standard value, adjust the turning torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

NOTE
When selecting the drive pinion front shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers.
Also, select the drive pinion spacer from the following two types.

	Height of drive pinion spacer mm (in.)	Identification colour
2400, 3000 2500D	56.67 (2.231)	—
	57.01 (2.244)	White
3500, 2800D	52.50 (2.067)	Yellow
	52.84 (2.080)	Red

(5) Remove the companion flange and drive pinion once again.

With oil seal

(1) After setting the drive pinion front bearing inner race, drive the oil seal into the gear carrier front lip by using the special tool.

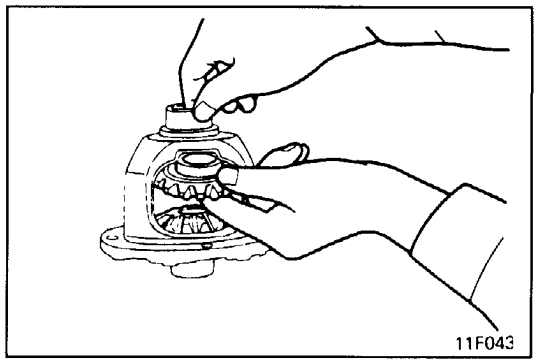
(2) Apply a thin coat of multipurpose grease to the companion flange contacting surface of the washer and oil seal contacting surface before installing drive pinion assembly.

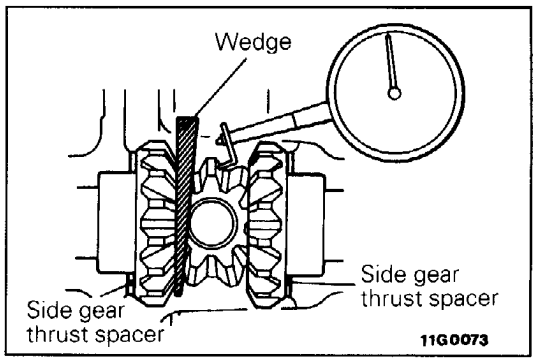
(3) Install the drive pinion assembly and companion flange with mating marks properly aligned, and tighten the companion flange self-locking nut to the specified torque by using the special tools.

(4) Measure the drive pinion turning torque (with oil seal) to verify that the drive pinion turning torque complies with the standard value.

Standard value:

Bearing division	Bearing lubrication	Rotation torque
New	None (With anti-rust agent)	0.85–1.15 Nm 8.5–11.5 kgcm 7.4–10.0 in.lbs.
New/reusing	Gear oil applied	0.65–0.75 Nm 6.5–7.5 kgcm 5.6–6.5 in.lbs.





- **ADJUSTMENT OF DIFFERENTIAL GEAR BACKLASH <Conventional differential (2400, 3000, 2500D)>**

Adjust the differential gear backlash by the following procedure.

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

(2) Temporarily install the pinion shaft.

NOTE
Do not assemble the thrust block and lock pin yet.

(3) Insert a wedge between the side gear and the pinion shaft to lock the side gear.

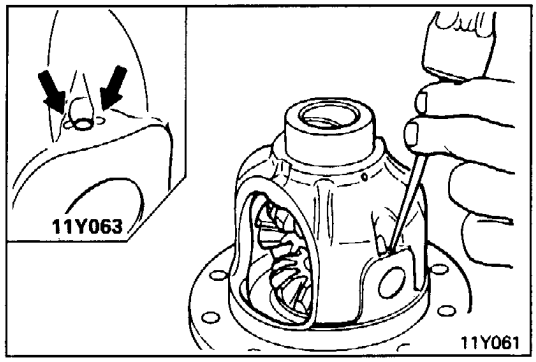
(4) While locking the side gear with the wedge, measure the differential gear backlash with a dial indicator on the pinion gear.

Standard value:
<No.6 differential>
0.010–0.076 mm (0.0004–0.0030 in.)
<No. 7 differential>
0–0.076 mm (0–0.0030 in.)
Limit: 0.2 mm (0.0079 in.)

NOTE
Measure both pinion gears.

(5) If the differential gear backlash exceeds the limit, adjust the backlash by installing thicker side gear thrust spacers.

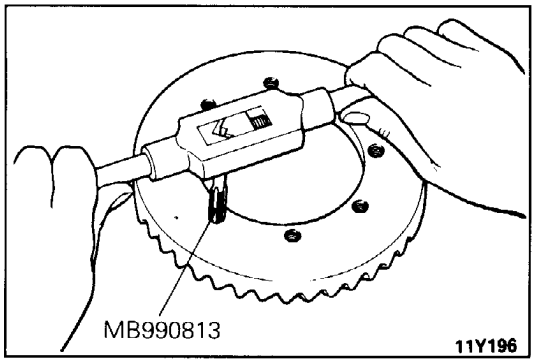
(6) Measure the differential gear backlash once again, and confirm that it is within the limit.
If adjustment is not possible, replace the side gears and pinion gears as a set.



29. INSTALLATION OF LOCK PIN

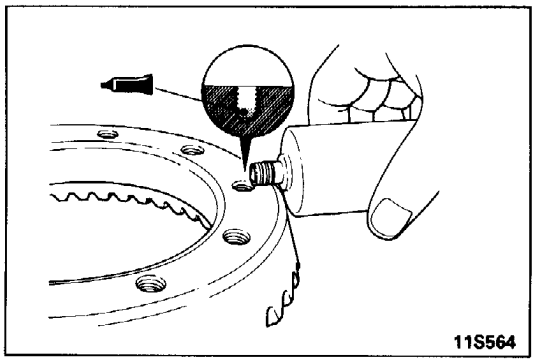
(1) Align the pinion shaft lock pin hole with the differential case lock pin hole, and drive in the lock pin.

(2) Stake the lock pin with a punch at two points.



30. INSTALLATION OF DRIVE GEAR

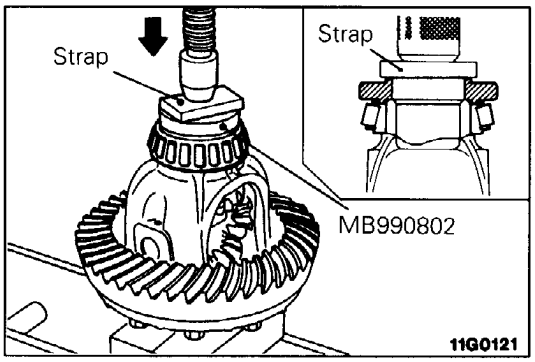
(1) Clean the drive gear attaching bolts.
(2) Remove the adhesive adhered to the threaded holes of the drive gear by turning the special tool (tap M10 × 1.25), and then clean the threaded holes by applying compressed air.



(3) Apply the specified adhesive to the threaded holes of the drive gear

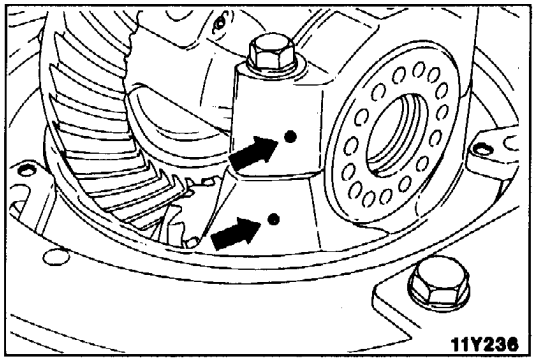
Specified adhesive: 3M Stud Locking 4170 or equivalent

(4) Install the drive gear onto the differential case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.



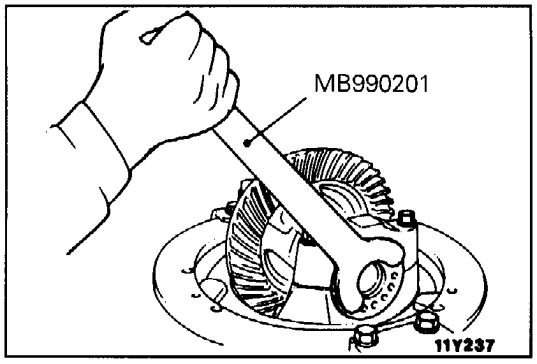
33. PRESS-FIT OF SIDE BEARING INNER RACE

Caution
When only one side bearing inner race is installed, only place load on the differential case.



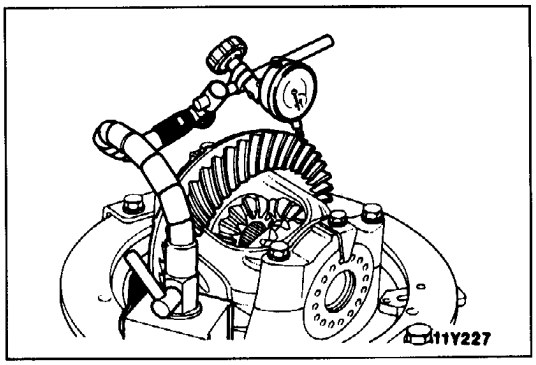
36. INSTALLATION OF BEARING CAP

Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap.



• ADJUSTMENT OF FINAL DRIVE GEAR BACKLASH

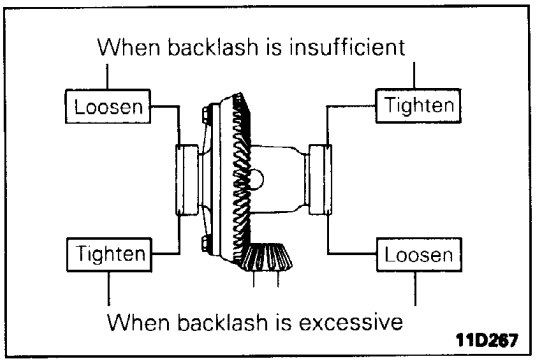
Adjust final drive gear backlash as follows:
(1) Using the special tool, temporarily tighten the side bearing nut until it is in the state just before preloading of the side bearing.



(2) Measure the final drive gear backlash.

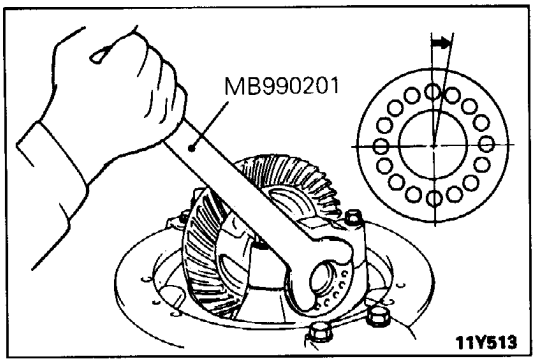
Standard value: <No. 6 differential>
0.11–0.16 mm (0.0043–0.0063 in.)
<No. 7 differential and No. 7.5 differential (except rear differential lock)>
0.13–0.18 mm (0.0051–0.0071 in.)
<No. 7.5 differential (rear differential lock)>
0.12–0.18 mm (0.0047–0.0071 in.)

NOTE
Measure at least 4 points on the drive gear periphery.

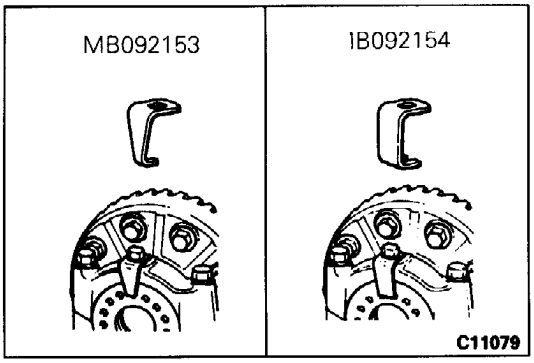


(3) Using the special tool (MB990201), adjust the backlash to standard value by moving the side bearing nut as shown.

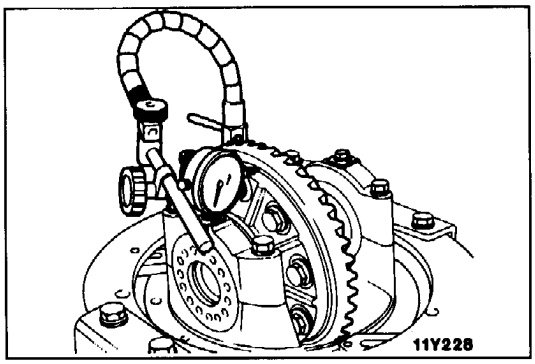
NOTE
First turn the side bearing nut for loosening, and then turn (by the same amount) the side bearing nut for tightening.



(4) Using the special tool, to apply the preload, turn down both right and left side bearing nuts on half the distance between centres of two neighbouring holes.



(5) Choose and install the lock plate (two kinds).
(6) Check the final drive gear tooth contact. If poor contact is evident, make adjustment. (Refer to GROUP 26-Differential Carrier.)



(7) Measure the drive gear runout.

Limit: 0.05 mm (0.0020 in.)

(8) When drive gear runout exceeds the limit, remove the differential case and then the drive gears, moving them to different positions and reinstall them.

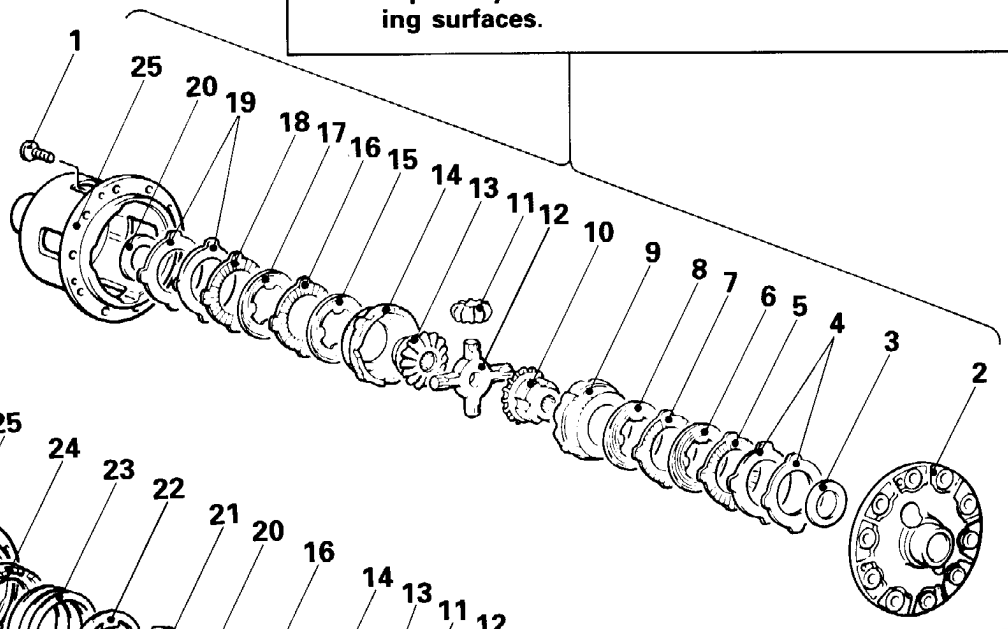
E27TI--

DIFFERENTIAL CASE DISASSEMBLY AND REASSEMBLY <Limited slip differential (All models) and Rear differential lock (2400, 3000, 2500D)>

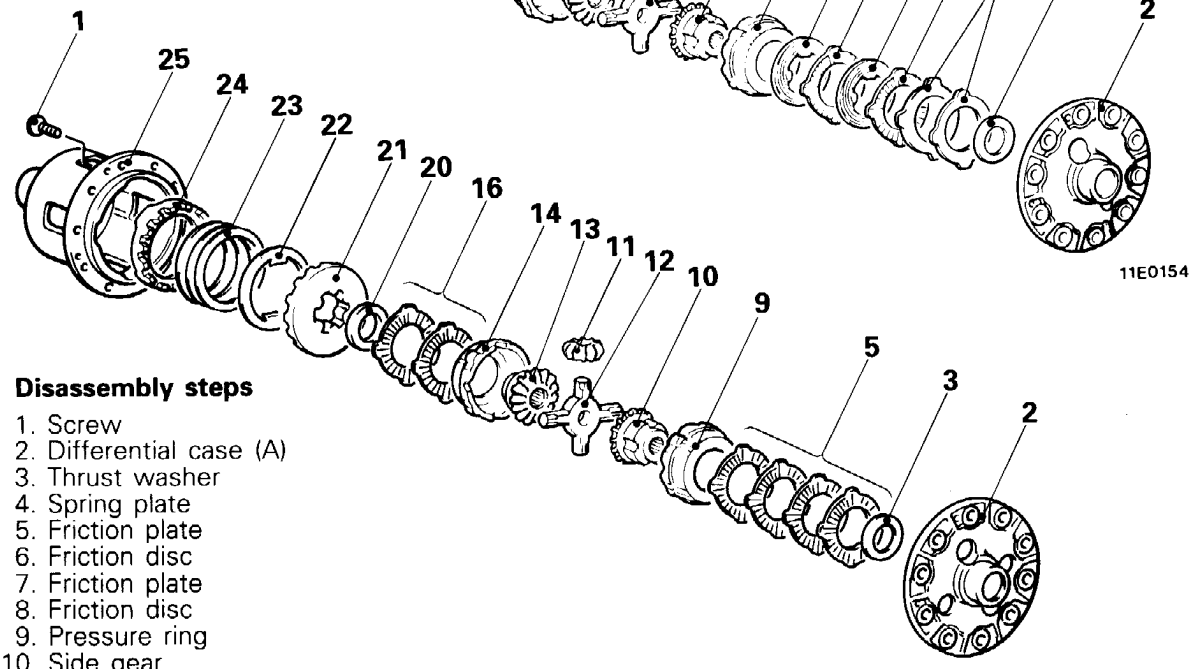
Gear oil:
MITSUBISHI Genuine Gear Oil Part No. 8149630EX, CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD (GL-5, SAE 80W-90) or equivalent

Caution
Apply the specified gear oil to each component especially careful to coat contact surfaces and sliding surfaces.

<Vehicles with limited slip differential>



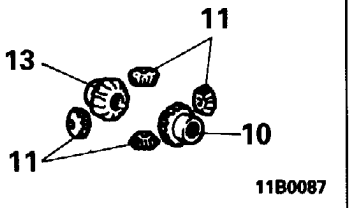
<Vehicles with rear differential lock>



11E0154

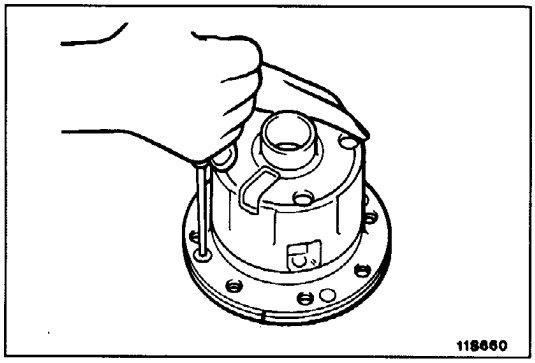
Disassembly steps

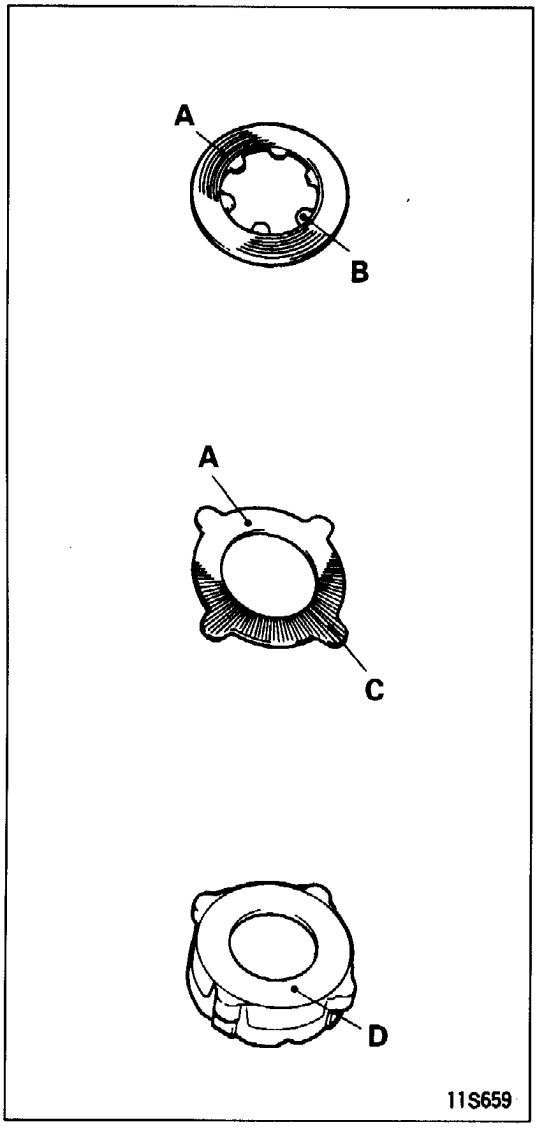
◆◆ ◆◆ 1. Screw
2. Differential case (A)
3. Thrust washer
4. Spring plate
5. Friction plate
6. Friction disc
7. Friction plate
8. Friction disc
9. Pressure ring
10. Side gear
11. Differential pinion gear
12. Differential pinion shaft
13. Side gear
14. Pressure ring
15. Friction disc
16. Friction plate
17. Friction disc
18. Friction plate
19. Spring plate
20. Thrust washer
21. Driven cam
22. Spring washer
23. Spring
24. Drive cam
◆◆ ◆◆ Adjustment of clutch plate friction force
25. Differential case (B)



11B0087

Differential gear set





SERVICE POINTS OF DISASSEMBLY E27TJAD

1. REMOVAL OF SCREW

(1) Loosen screws of the differential cases (A) and (B) uniformly a little at a time.
(2) Separate differential case (A) from differential case (B).
(3) 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.

INSPECTION E27TKAE

CONTACT AND SLIDING SURFACES OF PARTS

(1) Inspect the friction plate, friction disc, spring plate and pressure ring.

A. The friction surfaces of the friction plate, friction disc, spring plate.
If there are any signs of seizure, severe friction, or colour change from the heat, it will adversely affect the locking performance; replace the part with a new one.

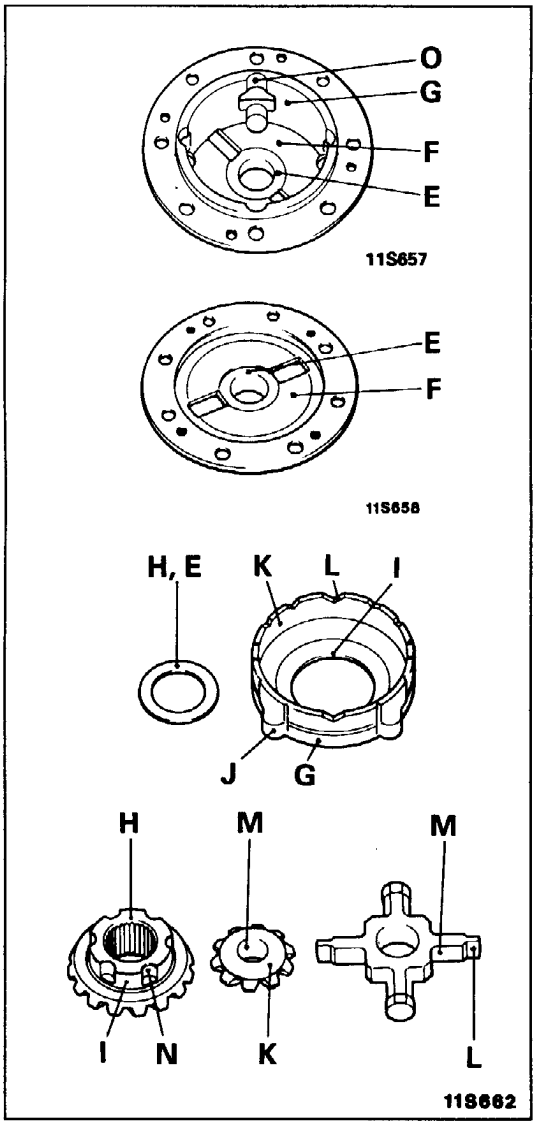
NOTE
The strong contact on the inner circumference of the friction surfaces is because of the spring plate; this wear is not abnormal.

B. The six projections on the inner circumference of the friction disc.
If there are nicks and dents, it will cause abnormalities in the clutch pressure.
Repair the parts by using an oil stone; if the parts cannot be repaired, replace them.

C. The four projections on the outer circumference of the friction disc.
If there are nicks and dents, it will cause abnormalities in the clutch pressure.
Repair the parts by using an oil stone; if the parts cannot be repaired, replace them.

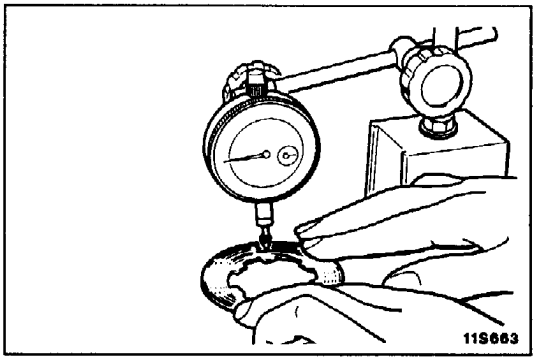
D. The friction surface of the friction disc of the pressure ring. If there are nicks or scratches, repair the part by first grinding with an oil stone and then polishing with rubbing compound on a surface plate.

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



(2) Inspect the contact and sliding surfaces listed below, and repair any nicks and burrs by using an oil stone.

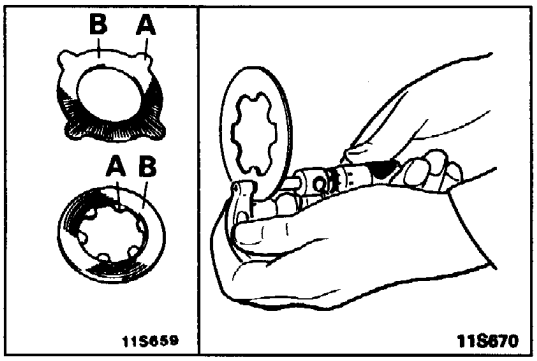
E. The sliding surfaces of the thrust washer and the case.
F. The spring contacting surface of the differential case.
G. The contact surfaces of the outer circumference of the pressure ring and the inner circumference of the differential case.
H. The sliding surface of the side gear and thrust washer.
I. The sliding surfaces of the hole in the pressure ring and the outer circumference of the side gear.
J. The projection on the outer circumference of the pressure ring.
K. The spherical surface of the differential pinion gear and the inner diameter of the pressure ring.
L. The V-shaped groove in the pressure ring, and the V-shaped part in the pinion shaft.
M. The outer diameter of the pinion shaft and the hole of the differential pinion gear.
N. The outer circumference groove of the side gear.
O. The inner circumference groove of the differential case.



WARPING OF THE FRICTION PLATE AND FRICTION DISC

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

Limit: 0.08 mm (0.0031 in.)



WEAR OF THE FRICTION PLATE AND FRICTION DISC

(1) In order to measure the wear, measure the thickness of the friction surfaces and projections of the friction disc and plate, and then find the difference.

Limit: 0.1 mm (0.0039 in.)

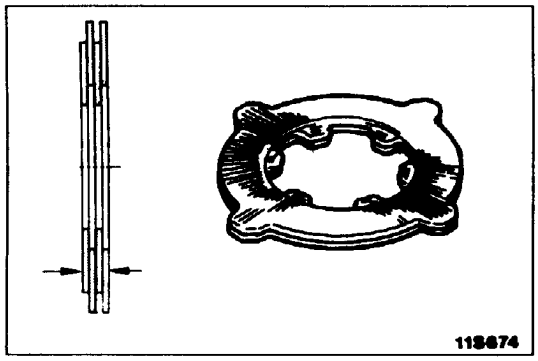
NOTE
Make the measurement at several different points.

(2) If the parts are worn beyond the allowable limit, replace them with new parts.

SERVICE POINTS OF REASSEMBLY E27TLAE

• ADJUSTMENT OF CLUTCH PLATE FRICTION FORCE

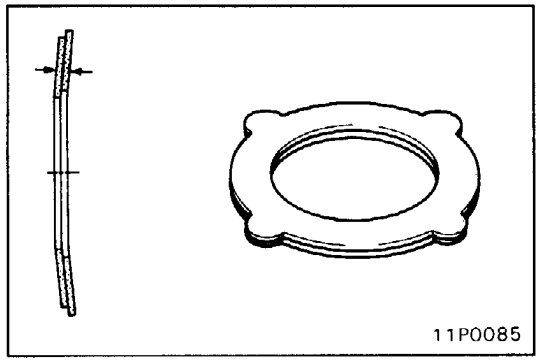
Before assembly, use the following method to adjust the clearance between the spring plates and differential cases (for adjustment of the clutch plate friction force), and to adjust the end play of the side gear when installing the internal components into the differential case.



(1) Arrange the two (each) friction discs and friction plates for each side, one on top of another, as shown in the figure, combining them so that the difference in thickness between the left and the right is the standard value.

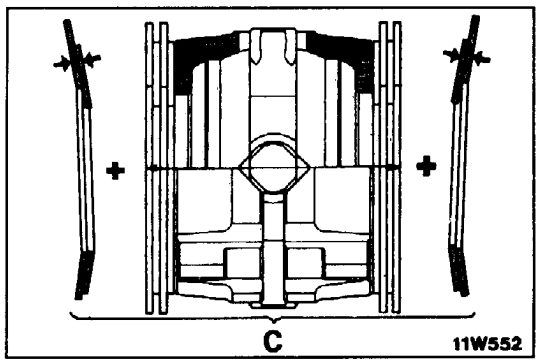
Standard value: 0–0.05 mm (0–0.0020 in.)

NOTE
For new ones, there is one type of friction plate: 1.75 mm (0.0689 in.); there are two types of friction disc: 1.75 mm (0.0689 in.) and 1.85 mm (0.0728 in.).

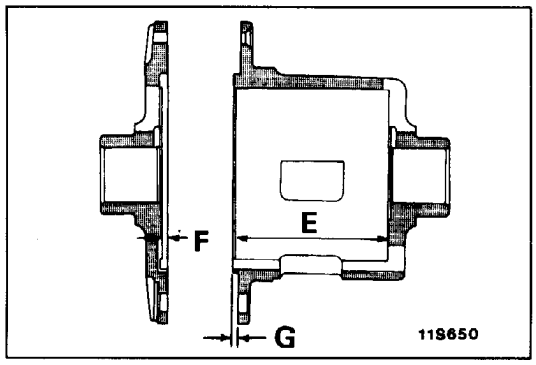


(2) Arrange the two spring plates for each side one on top of the other, as shown in the illustration, so that the difference between the left and the right thickness is minimized.

NOTE
For new ones, there is one type of spring disc and spring plate: 1.75 mm (0.0689 in.).

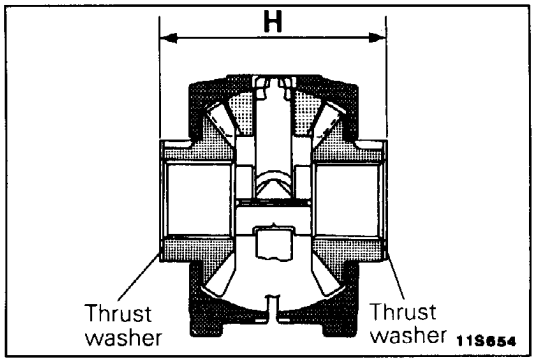


(3) Assemble the pressure ring's internal components (differential pinion shaft and pressure ring) and the friction discs and friction plates, and then as shown in the figure, measure the overall width.
(4) Calculate the total value (C) of the thickness of the 2 sets of spring plate plus the value measured in (3) above.

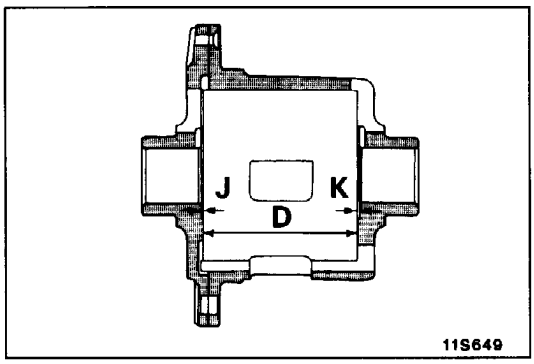


(5) Obtain the dimension (D) between the spring plate contact surfaces when differential cases (A) and (B) are combined.
(D = E + F – G)
(6) Change the thickness of the friction disc so that the clearance (D – C) between the differential case and the spring plate (vehicles with limited slip differential) or friction disc (vehicles with rear differential lock) becomes the standard value.

Standard value:
<Vehicles with limited slip differential>
0.06–0.20 mm (0.0024–0.0079 in.)
<Vehicles with rear differential lock>
0.05–0.20 mm (0.0020–0.0079 in.)



(7) Remove the spring plates, spring discs, friction plates and friction disc.
(8) Measure the dimension (H) from the thrust washer end surface to end surface.



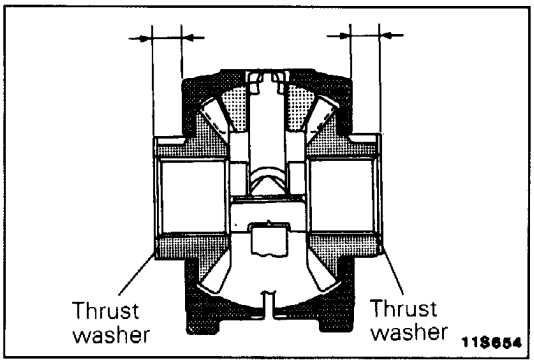
(9) Obtain the dimension (I) between the thrust washer contact surfaces when differential cases (A) and (B) are combined.
(I = D + J + K)

NOTE
Dimension (D) is the distance between the spring plate contact surfaces when differential cases (A) and (B) are combined. (Refer to P.27-40.)

(10)Change the thickness of the thrust washer so that the clearance (I – H) between the thrust washer and the differential case is the standard value.

Standard value: 0.05–0.20 mm (0.0020–0.0079 in.)

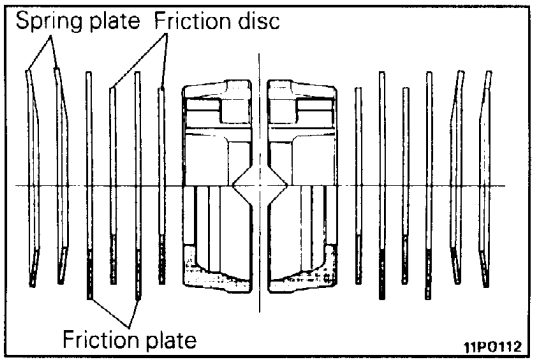
NOTE
There are three sizes of new thrust washers: 1.50 mm (0.0591 in.), 1.60 mm (0.0630 in.), and 1.70 mm (0.0670 in.).



(11)Install the thrust washer as shown in the figure, and then select a thrust washer so that the difference between the left and right dimensions from the pressure ring rear face to the thrust washer end face is the standard value.

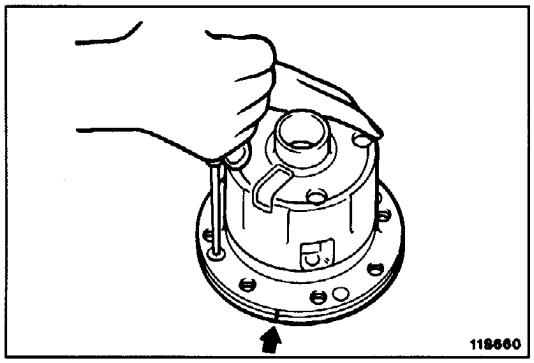
Standard value: 0–0.05 mm (0–0.0020 in.)

NOTE
Measure the distance while squeezing the V-shaped groove manually.



(12)Place the each part in the differential case (B) as directions shown in the figure.

NOTE
Be careful not to insert the friction plates and friction discs in the incorrect order and to install the spring plates in incorrect direction.

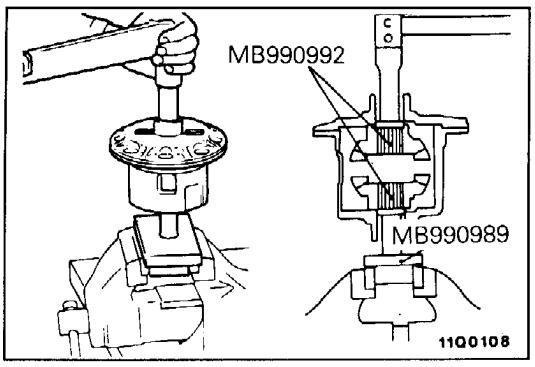


1. INSTALLATION OF SCREW

(1) Align the mating marks (the same numeral on each case) of differential case (A) and differential case (B).

(2) Turning the screwdriver slowly several times, tighten the screw so that the cases are in close contact.

NOTE
If, even though the screw is tightened, the end surfaces of case (A) and case (B) do not come into close contact, probably the thrust washer and spring plate are not fit correctly into the groove, so make the assembly again.



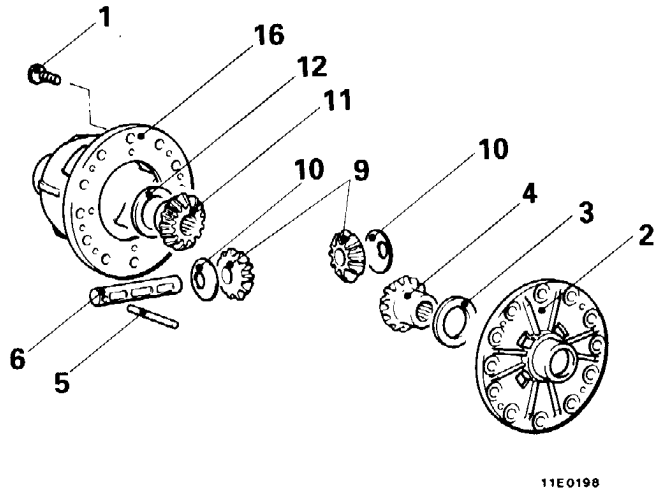
(3) After assembly, in order to check the frictional force of the clutch plate, use the special tools to measure the starting torque.

Standard value:
When a new clutch plate is used
40–75 Nm (4.0–7.5 kgm, 29–54 ft.lbs.)
When an old clutch plate is used
25–75 Nm (2.5–7.5 kgm, 18–54 ft.lbs.)

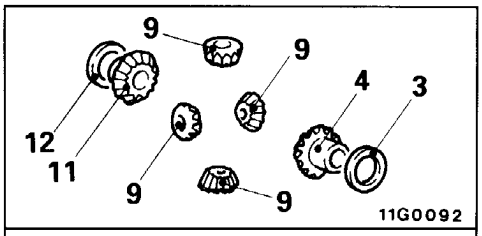
NOTE
Measure the starting torque after rotating slightly. When measuring the torque, do so at the beginning of movement.

DISASSEMBLY AND REASSEMBLY
<Conventional differential (3500, 2800D) and Rear differential lock (3500, 2800D)>

<Vehicles with conventional differential – A/T>

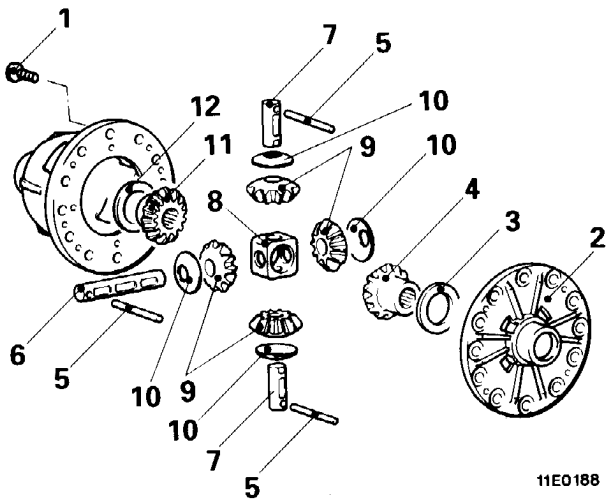


11E0198



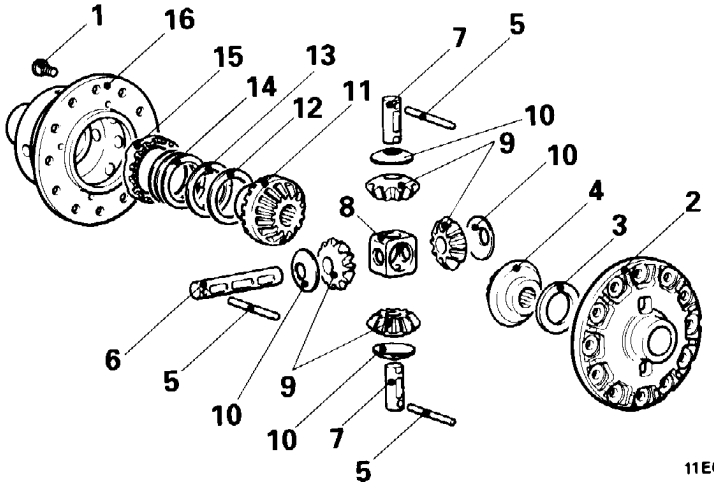
Differential gear set

<Vehicles with conventional differential – M/T>



11E0188

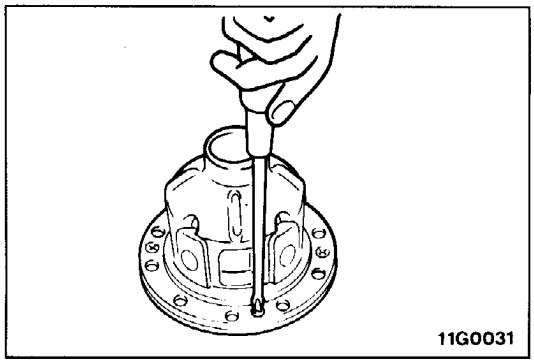
<Vehicles with rear differential lock>

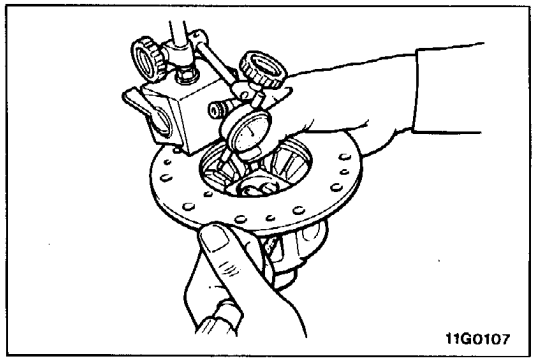


11E0189

Disassembly steps

- 1. Screw
- 2. Case A
- 3. Side gear spacer (RH)
- 4. Side gear (RH)
- • Backlash adjustment on differential gear case A side
- • Differential gear backlash check
- 5. Lock pin
- 6. Pinion shaft-A
- 7. Pinion shaft-B
- 8. Pinion shaft holder
- 9. Pinion gear
- 10. Washer
- 11. Side gear (LH)
- 12. Side gear spacer (LH)
- 13. Spring washer
- 14. Spring
- 15. Drive cam
- • Backlash adjustment on differential gear case B side
- 16. Case B





SERVICE POINTS OF DISASSEMBLY E26WLAB

1. REMOVAL OF SCREW

(1) Evenly loosen 4 screws on case A and B to remove.
(2) Set case B downward and remove case A, side gear spacer (RH) and side gear (RH).

NOTE
Check differential gear backlash to determine necessity of disassembling side gear (RH) and onward.

• DIFFERENTIAL GEAR BACKLASH CHECK

Check differential gear backlash as follows.
(1) Insert cloth wrapped screwdriver through side of case B and lock side gear (LH) and pinion gear. (one piece)
(2) Contact dial gauge on pinion gear facing the locked pinion gear and measure backlash within the standard value.

NOTE
Measure 2 pinion gears.

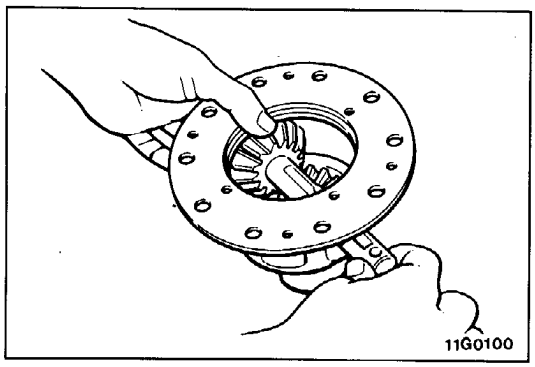
Standard value:
Conventional differential
0.10–0.25 mm (0.004–0.01 in.)
Vehicles with rear differential lock
0.15–0.20 mm (0.005–0.008 in.)

(3) When backlash exceeds the standard value, adjust side gear spacer (LH).

NOTE
If backlash is within the standard value, assure appropriate gear spacer (RH) thickness and assemble differential case assembly.

INSPECTION M27IHAC

Wash the disassembled parts in cleaning solvent, dry them using compressed air, and then check the following areas:
- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.



SERVICE POINTS OF REASSEMBLY E26WNAB

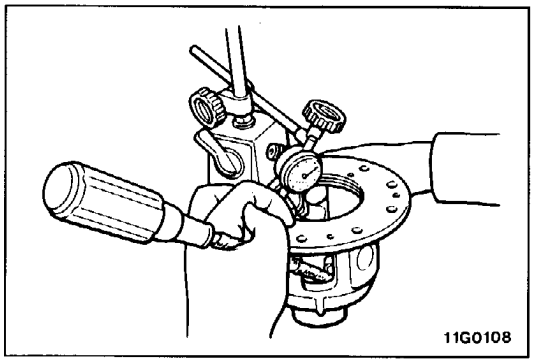
- **BACKLASH ADJUSTMENT ON DIFFERENTIAL GEAR CASE B SIDE**

Adjust backlash on differential gear case B side as follows.

(1) Temporarily install side gear spacer (LH), side gear (LH), washers, 2 pinion gears and pinion shaft A on case B.

NOTE
Do not assemble pinion shaft holder, pinion shaft-B or the remaining pinion gears (2).

(2) Insert wrapped screwdriver through side of case B to lock one side of pinion gear and side gear (LH).



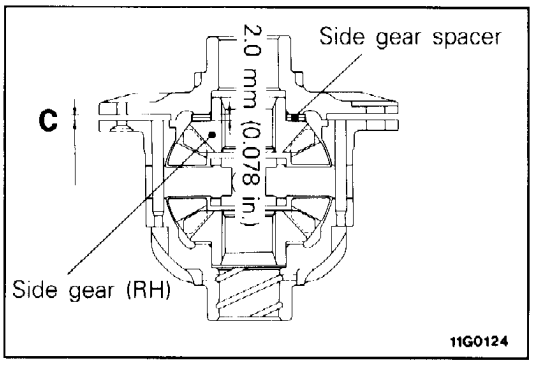
(3) Place dial gauge on unlocked pinion gear and measure differential gear backlash within the standard value.

NOTE
Measure 2 pinion gears.

Standard value:
Conventional differential
0.10–0.25 mm (0.004–0.01 in.)
Vehicles with rear differential lock
0.15–0.20 mm (0.005–0.008 in.)

(4) When backlash exceeds the standard value, adjust with selected side gear spacer (LH).

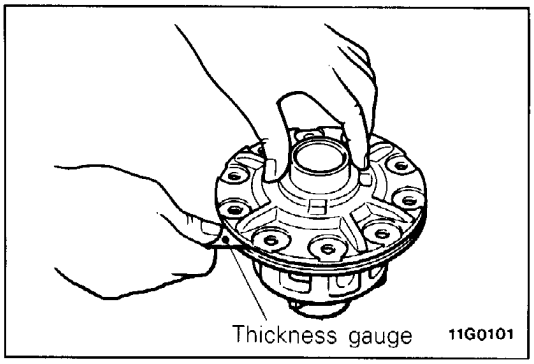
(5) Install washers, pinion gears, pinion shaft holder and pinion shaft-A and B. Lock with lock pin through case B.



- **BACKLASH ADJUSTMENT ON DIFFERENTIAL GEAR CASE A SIDE**

Adjust backlash as follows.

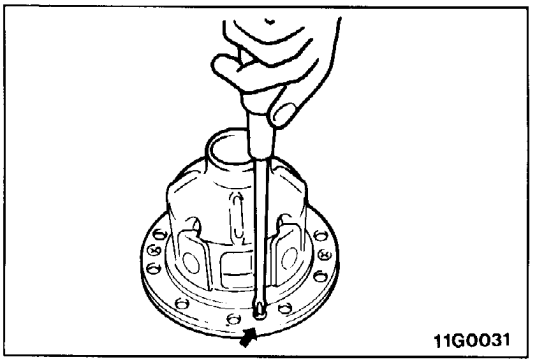
(1) Install side gear (RH) and 2 side gear spacers [1.0 mm (0.039 in.) thick]. Press differential case A to differential case B.



(2) Measure flange space (C) between differential case A and B with thickness gauge.
(3) Calculate side gear spacer (RH) thickness (D) as follows:

D=2.0 mm (0.078 in.)–[C+0.2 mm (0.008 in.)]

(4) Choose spacer with a thickness nearest D in (3) and adjust differential gear backlash on the right side.



(5) Match the match marks and assemble cases A and B.
(6) Assure smooth rotation of inner shaft.