

# REAR AXLE

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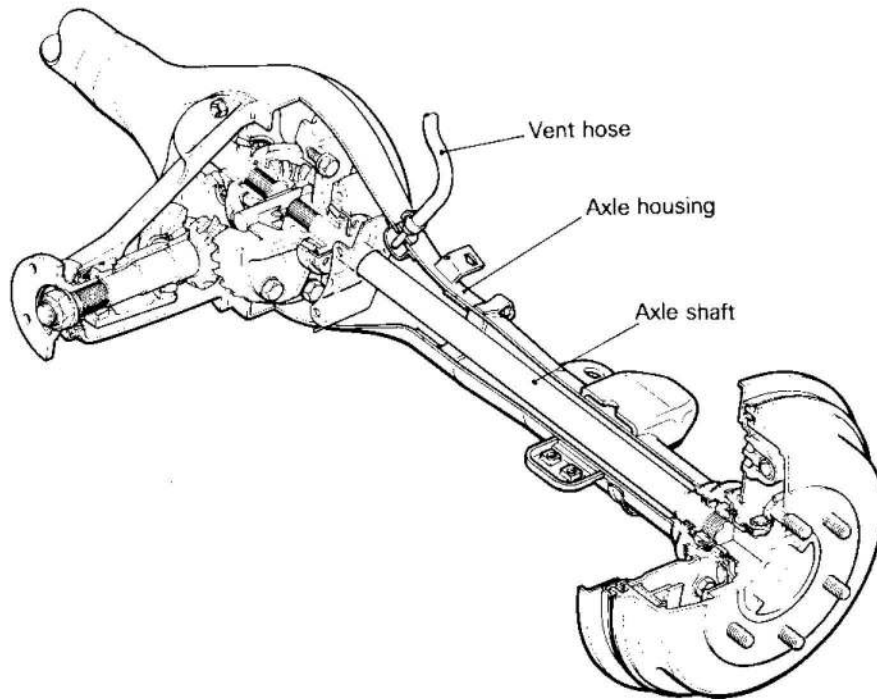
E27AA--

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**GENERAL INFORMATION**

E27BAAC

The banjo-type, semi-floating type of rear axle has been adopted. In order to improve the river-crossing ability of this model, a vent hose has been installed from the axle housing, and a differential breather (air bleeder) has been used within the frame crossmember. (4WD) There are two types of differential; conventional differential and limited slip differential. The limited slip differential is of great help when driving on muddy and other slippery ground.



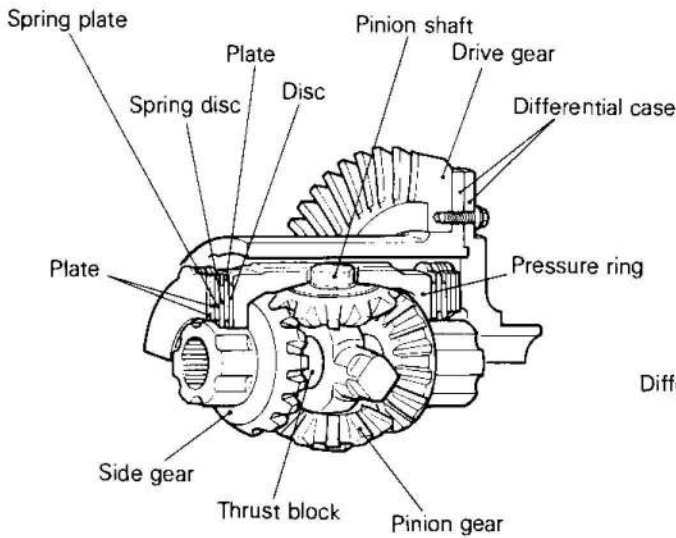
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**LIMITED SLIP DIFFERENTIAL**

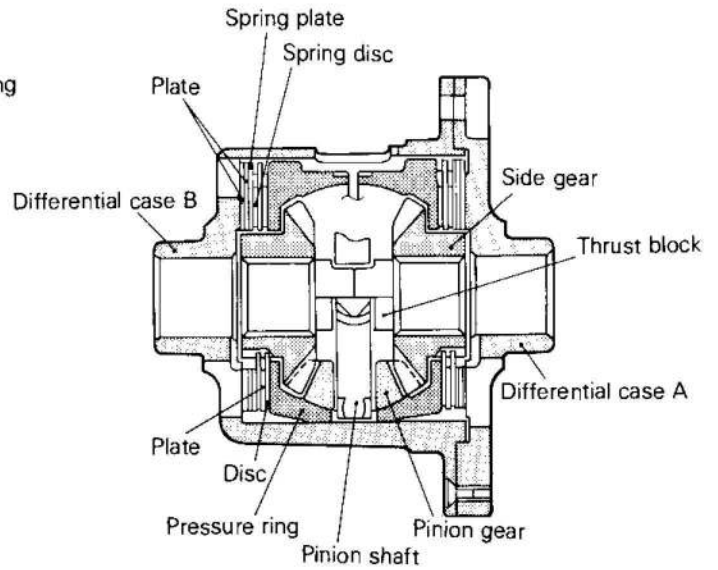
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The limited slip differential device is a kind of anti-slipping device which functions as a differential during cornering to turn the outer wheel at a faster revolution speed than the inner wheel, and, in the event that one wheel begins spinning (driving on slippery road surfaces, one wheel leaves the road surface, etc.), it automatically functions to prevent such spinning. In addition, it serves the second function of doubling the driving force by transmitting the larger part of the driving torque to the wheel which has the better traction conditions.

**LIMITED SLIP DIFFERENTIAL (SMALL TYPE)**

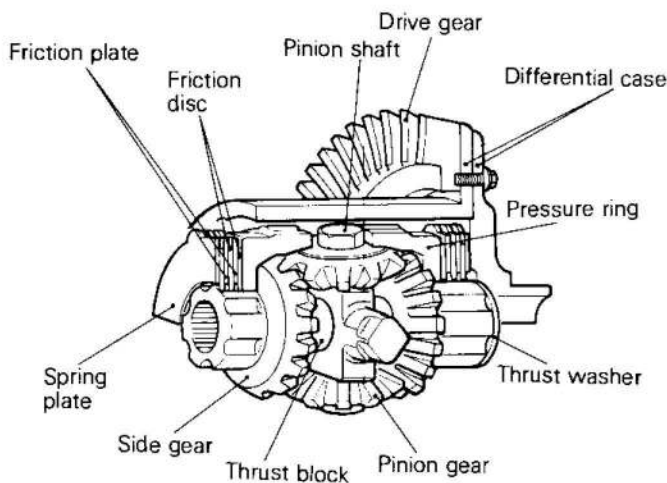


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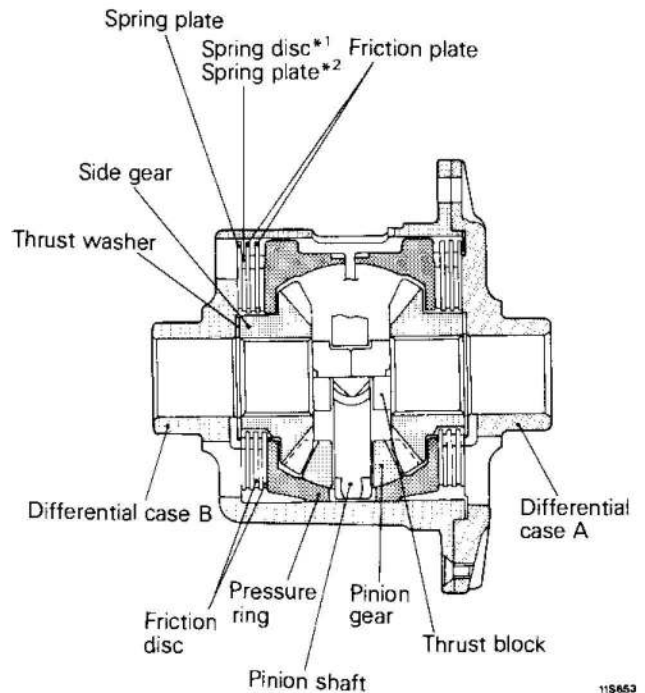


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**LIMITED SLIP DIFFERENTIAL (LARGE TYPE)**



11G0015



11S453

**NOTE**

- \*1: Vehicles built up to July 1989.
- \*2: Vehicles built from August 1989.

## SPECIFICATIONS

GENERAL SPECIFICATIONS <Vehicles built up to May 1994>  
(2WD)

E27CA--

## VEHICLES FOR EUROPE

Items	P02V, P03V, P03W	P05V, P15V, P05W	P04W	P12V	P13V
Axle housing type	Banjo type		Banjo type		
Axle shaft	Semi-floating type		Semi-floating type		
Supporting type	Semi-floating type		Semi-floating type		
Shaft dimension					
Bearing portion dia. mm (in.)	38.1 (1.50)		38.1 (1.50)		
Center portion dia. mm (in.)	28.5 (1.12)		31.5 (1.24)		
Overall length mm (in.)	716.2 (28.20)		714.5 (28.13)		
Bearing					
O.D. x I.D. x width mm (in.)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)			80.0 x 40.0 x 19.75 (3.15 x 1.57 x 0.78)	
Differential					
Differential size	Small type	Small type	Large type	Large type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	4.625	4.222	4.222	4.875	4.625
Differential gear type and quantity					
Side gear	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2
Pinion gear	Straight bevel gear x 2	Straight bevel gear x 2 or *4	Straight bevel gear x 2 or *4	Straight bevel gear x 2 or *4	Straight bevel gear x 2 or *4
Number of teeth					
Drive gear	37	38	38	39	37
Drive pinion	8	9	9	8	8
Side gear	14 or *16	14 or *16	14 or *16	14 or *16	14 or *16
Pinion gear	10	10	10	10	10

## NOTE

\* indicates a limited slip differential.

## VEHICLES FOR GENERAL EXPORT

Items	P01V, P01W	P12V, P12W	P03W	P05V, P05W, P15V, P15W
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
Shaft dimension				
Bearing portion dia. mm (in.)	38.1 (1.50)	38.1 (1.50)	38.1 (1.50)	38.1 (1.50)
Center portion dia. mm (in.)	28.5 (1.12)	31.5 (1.24)	31.5 (1.24)	31.5 (1.24)
Overall length mm (in.)	716.2 (28.20)	714.5 (28.13)	714.5 (28.13)	714.5 (28.13)
Bearing				
O.D. x I.D. x width mm (in.)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)



Items	P01V, P01W	P12V, P12W	P03W	P05V, P05W, P15V, P15W
Differential				
Differential size	Small type	Large type	Large type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	4.625	4.875	4.625	4.222
Differential gear type and quantity				
Side gear	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2
Pinion gear	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2
Number of teeth				
Drive gear	37	39	37	38
Drive pinion	8	8	8	9
Side gear	14	14	14	14
Pinion gear	10	10	10	10

VEHICLES FOR GENERAL EXPORT (GULF COUNTRIES)

Items	P02V, P02W	P12V, P12W
Axle housing type	Banjo type	Banjo type
Axle shaft		
Supporting type	Semi-floating type	Semi-floating type
Shaft dimension		
Bearing portion dia. mm (in.)	38.1 (1.50)	38.1 (1.50)
Center portion dia. mm (in.)	28.5 (1.12)	31.5 (1.24)
Overall length mm (in.)	716.2 (28.20)	714.5 (28.13)
Bearing		
O.D.×I.D.×width mm (in.)	65.0×38.1×18.03 (2.56×1.50×0.71)	80.0×40.0×19.75 (3.15×1.57×0.78)
Differential		
Differential size	Small type	Large type
Reduction gear type	Hypoid gear	Hypoid gear
Reduction ratio	4.625	4.875
Differential gear type and quantity		
Side gear	Straight bevel gear × 2	Straight bevel gear × 2
Pinion gear	Straight bevel gear × 2	Straight bevel gear × 2
Number of teeth		
Drive gear	37	39
Drive pinion	8	8
Side gear	14	14
Pinion gear	10	10

## VEHICLES FOR AUSTRALIA

Items	P03V, P03W, P13V (A/T)	P13V (M/T)	P04W	P05V	P15V
Axle housing type	Banjo type				
Axle shaft	Semi-floating type		Semi-floating type		Semi-floating type
Supporting type					
Shaft dimension mm (in.)					
Bearing portion dia.	38.1 (1.50)		38.1 (1.50)		38.1 (1.50)
Center portion dia.	28.5 (1.12)		31.5 (1.24)		31.5 (1.24)
Overall length	716.2 (28.20)		714.5 (28.13)		714.5 (28.13)
Bearing					
O.D.xI.D.xwidth mm (in.)	65.0×38.1×18.03 (2.56×1.50×0.71)		80.0×40.0×19.75 (3.15×1.57×0.78)		65.0×38.1×18.03 (2.56×1.50×0.71)
Differential					
Differential size	Small type	Large type	Large type	Large type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	4.625	4.625	4.222	4.625	4.222
Differential gear type and quantity					
Side gear	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2
Pinion gear	Straight bevel gear×2 or 4*	Straight bevel gear×2 or 4*	Straight bevel gear×2 or 4*	Straight bevel gear×2 or 4*	Straight bevel gear×2 or 4*
Number of teeth					
Drive gear	37	37	38	37	38
Drive pinion	8	8	9	8	9
Side gear	14 or 16*	14 or 16*	14 or 16*	14 or 16*	14 or 16*
Pinion gear	10	10	10	10	10

## (4WD)

Items	P23V, P23W	P24V, P24W	P25V, P45V, P25W
Axle housing type	Banjo type		
Axle shaft	Semi-floating type		
Supporting type			
Shaft dimension mm (in.)			
Bearing portion dia.		40.0 (1.57)	
Center portion dia.		34.5 (1.36)	
Overall length		723.5 (28.5)	
Bearing			
O.D.xI.D.xwidth mm (in.)		80.0×40.0×19.75 (3.15×1.57×0.78)	
Differential			
Differential size	Large type	Large type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	5.285	4.625	4.875
Differential gear type and quantity			
Side gear	Straight bevel gear×2	Straight bevel gear×2	Straight bevel gear×2
Pinion gear	Straight bevel gear×2 or 4*	Straight bevel gear×2 or 4*	Straight bevel gear×2 or 4*

## NOTE

\* indicates a limited slip differential.

## REAR AXLE – Specifications

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Items	P23V, P23W	P24V, P24W	P25V, P45V, P25W
Number of teeth			
Drive gear	37	37	39
Drive pinion	7	8	8
Side gear	14 or 16*	14 or 16*	14 or 16*
Pinion gear	10	10	10

### GENERAL SPECIFICATIONS <Vehicles built from June 1994> (2WD)

#### VEHICLES FOR EUROPE

Items	P03V	P05V, P15V	P13V
Axle housing type	Banjo type		Banjo type
Axle shaft	Semi-floating type		
Supporting type	Semi-floating type		
Shaft dimension			
Bearing portion dia. mm (in.)	38.1 (1.50)		38.1 (1.50)
Center portion dia. mm (in.)	28.5 (1.12)		31.5 (1.24)
Overall length mm (in.)	716.2 (28.20)		714.5 (28.13)
Bearing			
O.D. x I.D. x width mm (in.)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)		80.0 x 40.0 x 19.75 (3.15 x 1.57 x 0.78)
Differential			
Differential size	Small type	Small type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	4.875	4.222	4.875
Differential gear type and quantity			
Side gear	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2
Pinion gear	Straight bevel gear x 2 or 4*	Straight bevel gear x 2 or 4*	Straight bevel gear x 2 or 4*
Number of teeth			
Drive gear	39	38	39
Drive pinion	8	9	8
Side gear	14 or 16*	14 or 16*	14 or 16*
Pinion gear	10	10	10

#### VEHICLES FOR GENERAL EXPORT

Items	P06V	P16V	P03V, P13V P13W	P15V, P15W
Axle housing type	Banjo type	Banjo type		
Axle shaft	Semi-floating type			
Supporting type	Semi-floating type	Semi-floating type		

**NOTE**

\* indicates a limited slip differential.

Items	P06V	P16V	P03V, P13V P13W	P15V, P15W
Shaft dimension				
Bearing portion dia. mm (in.)	38.1 (1.50)		38.1 (1.50)	
Center portion dia. mm (in.)	28.5 (1.12)		31.5 (1.24)	
Overall length mm (in.)	716.2 (28.20)		714.5 (28.13)	
Bearing				
O.D. x I.D. x width mm (in.)	65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)		65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)	
Differential				
Differential size	Small type	Large type	Large type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	5.285	5.285	4.875	4.222
Differential gear type and quantity				
Side gear	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2
Pinion gear	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2 or 4*	Straight bevel gear x 2
Number of teeth				
Drive gear	37	37	39	38
Drive pinion	7	7	8	9
Side gear	14	14	14 or 16*	14
Pinion gear	10	10	10	10

## VEHICLES FOR AUSTRALIA

Items	P03V	P05V (A/T), P15V (A/T)	P14V	P15V (M/T), P15V (M/T)
Axle housing type		Banjo type		Banjo type
Axle shaft		Semi-floating type		Semi-floating type
Supporting type				
Shaft dimension mm (in.)		38.1 (1.50)		38.1 (1.50)
Bearing portion dia.		28.5 (1.12)		31.5 (1.24)
Center portion dia.		716.2 (28.20)		714.2 (28.13)
Overall length				
Bearing				
O.D. x I.D. x width mm (in.)		65.0 x 38.1 x 18.03 (2.56 x 1.50 x 0.71)		80.0 x 40.0 x 19.75 (3.15 x 1.57 x 0.78)
Differential				
Differential size	Small type	Small type	Large type	Large type
Reduction gear type	Hypoid gear	Hypoid gear	Hypoid gear	Hypoid gear
Reduction ratio	4.875	4.222	4.222	4.625
Differential gear type and quantity				
Side gear	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2	Straight bevel gear x 2
Pinion gear	Straight bevel gear x 2 or 4*	Straight bevel gear x 2 or 4*	Straight bevel gear x 2 or 4*	Straight bevel gear x 2 or 4*
Number of teeth				
Drive gear	39	38	38	37
Drive pinion	8	9	9	8
Side gear	14 or 16*	14 or 16*	14 or 16*	14 or 16*
Pinion gear	10	10	10	10

## NOTE

\*indicates a limited slip differential.

(4WD)

Items	P24V, P25V, P45V	
Axle housing type	Banjo type	
Axle shaft	Semi-floating type	
Supporting type		
Shaft dimension	mm (in.)	
Bearing portion dia.		40.0 (1.57)
Center portion dia.		34.5 (1.36)
Overall length		723.5 (28.5)
Bearing		
O.D. x I.D. x width	mm (in.)	80.0 x 40.0 x 19.75 (3.15 x 1.57 x 0.78)
Differential		
Differential size	Large type	
Reduction gear type	Hypoid gear	
Reduction ratio	4.875	
Differential gear type and quantity		
Side gear	Straight bevel gear x 2	
Pinion gear	Straight bevel gear x 2 or 4*	
Number of teeth		
Drive gear	39	
Drive pinion	8	
Side gear	14 or 16*	
Pinion gear	10	

NOTE

\* indicates a limited-slip differential.

## SERVICE SPECIFICATIONS

Items	Vehicles with a conventional differential	Vehicles with a limited slip differential
Standard Value		
Axle shaft end play mm (in.)	0.05-0.02 (0.0020-0.0079)	0.05-0.02 (0.0020-0.0079)
Limited slip differential preload		
Using special tool Nm (kgm, ft.lbs.)		
Small type	-	17.5 (1.75, 13) or more
Large type		
Vehicles built up to July 1989	-	17.5 (1.75, 13) or more
Vehicles built from August 1989	-	12.5 (1.25, 9) or more
Without using special tool Nm (kgm, ft.lbs.)		
Small type	-	35 (3.5, 25) or more
Large type		
Vehicles built up to July 1989	-	35 (3.5, 25) or more
Vehicles built from August 1989	-	25 (2.5, 18) or more
Shock absorber attaching dimension <4WD> mm (in.)	7-8 (0.28-0.31)	7-8 (0.28-0.31)
Load sensing spring length mm (in.)		
Standard body vehicles	176-179 (6.93-7.05)	176-179 (6.93-7.05)
Long body vehicles	176.5-179.5 (6.95-7.07)	176.5-179.5 (6.95-7.07)
Parking brake lever stroke		
2WD	4-6 notches	4-6 notches
4WD	5-7 notched	5-7 notches
Pressure inputs of retainer ring N (kg, lbs.)		
Middle pressure input of retainer ring <2WD>	40,000 (4,000, 8,818) or more	40,000 (4,000, 8,818) or more
- <4WD>	50,000 (5,000, 11,023) or more	50,000 (5,000, 11,023) or more
Final pressure input of retainer ring <2WD>	60,000 (6,000, 13,228) or more	60,000 (6,000, 13,228) or more
- <4WD>	80,000 (8,000, 17,637) or more	80,000 (8,000, 17,637) or more
Final drive gear backlash mm (in.)	0.11-0.16 (0.0043-0.0063)	0.11-0.16 (0.0043-0.0063)
Differential gear backlash mm (in.)	0.01-0.076 (0.0004-0.0030)	-
Drive pinion turning torque		
Small type differential		
Without oil seal Nm (kgcm, in.lbs)	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)	0.6-0.7 (6.0-7.0, 5.2-6.1)	0.6-0.7 (6.0-7.0, 5.2-6.1)
Large type differential		
Without oil seal Nm (kgcm, in.lbs)	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)	0.65-0.75 (6.5-7.05, 5.6-6.5)	0.65-0.75 (6.5-7.5, 5.6-6.5)
Difference in total thickness between the left and right clutch plates mm (in.)	-	0-0.05 (0-0.0020)
Clearance between spring plate and differential case mm (in.)		
Small type differential	-	0.05-0.20 (0.0020-0.0079)
Large type differential	-	0.06-0.20 (0.0024-0.0079)

Items	Vehicles with a conventional differential	Vehicles with a limited slip differential
Clearance between thrust washer and differential case (Large type differential) mm (in.)	–	0.05 – 0.20 (0.0020 – 0.0079)
Difference between left and right dimensions from back thrust face of pressure ring to end of thrust washer (Large type differential) mm(in.)	–	0 – 0.05 (0 – 0.0020)
Clutch plate preload		
Small type differential		
When equipped with new clutch plates Nm (kgm, ft.lbs.)	–	50 – 80 (5.0 – 8.0, 36 – 58)
When equipped with old clutch plates Nm (kgm, ft.lbs.)	–	35 – 80 (3.5 – 8.0, 25 – 58)
Large type differential		
When equipped with new clutch plates Nm (kgm, ft.lbs.)		
Vehicles built up to July 1989	–	65 – 100 (6.5 – 10.0, 47 – 72)
Vehicles built from August 1989	–	40 – 75 (4.0 – 7.5, 29 – 54)
When equipped with old clutch plates Nm (kgm, ft.lbs.)		
Vehicles built up to July 1989	–	35 – 100 (3.5 – 10.0, 25 – 72)
Vehicles built from August 1989	–	25 – 75 (2.5 – 7.5, 18 – 54)
Limit		
Rear axle total backlash mm (in.)	5 (0.2)	5 (0.2)
Drive gear run-out mm (in.)	0.05 (0.0020)	0.05 (0.0020)
Differential gear backlash mm (in.)	0.2 (0.0079)	–
Friction plate and friction disc warpping (flatness) mm (in.)	–	0.08 (0.0031)
Friction plate and disc wear (difference in the thickness of the friction surfaces and the projections) mm (in.)	–	0.1 (0.0039)

TORQUE SPECIFICATIONS

E27CC --

Items	Nm	kgm	ft.lbs.
Shackle assembly attaching nut (2WD)	30 – 45	3.0 – 4.5	22 – 33
Shock absorber attaching nut (4WD)	20 – 30	2.0 – 3.0	14 – 22
U – bolt attaching nut	85 – 110	8.5 – 11.0	61 – 80
Brake tube flare nut	13 – 17	1.3 – 1.7	9 – 12
Propeller shaft attaching nut	50 – 60	5.0 – 6.0	36 – 43
Bearing case to rear axle housing	50 – 60	5.0 – 6.0	36 – 43
Rear axle bearing lock nut	180 – 220	18 – 22	130 – 159
Filler plug	40 – 60	4.0 – 6.0	29 – 43
Drain plug	50 – 70	5.0 – 7.0	36 – 51
Differential carrier to rear axle housing	25 – 30	2.5 – 3.0	18 – 22
Companion flange	190 – 250	19 – 25	137 – 181
Differential case to drive gear	80 – 90	8.0 – 9.0	58 – 65
Bearing cap	55 – 65	5.5 – 6.5	40 – 47
Lock plate	15 – 22	1.5 – 2.2	11 – 16



## LUBRICANTS

E27CD--

Items	Specified lubricant	Quantity
Rear axle gear oil		
Conventional differential	Hypoid gear oil API classification GL-5 or higher SAE viscosity No. 90, 80W	2WD Small type differential 1.20 liter (1.27 U.S.qts., 1.06 Imp.qts.) Large type differential 1.50 liter (1.59 U.S.qts., 1.32 Imp.qts.)
Limited slip differential	Hypoid gear oil MITSUBISHI Genuine Gear Oil Part No. 8149630EX, CASTROL HYPOYLS (GL-5, SAE90), SHELL-LSD (GL-5, SAE80W-90) or equivalent	4WD 1.80 liter (1.90 U.S.qts., 1.58 Imp.qts.) 1.80 liter (1.90 U.S.qts., 1.58 Imp.qts.)
Axle shaft bearing	Multipurpose grease SAE J310, NLGI No. 2	As required
Axle shaft oil seal lip	Multipurpose grease SAE J310, NLGI No. 2	As required
Differential case washer	Multipurpose grease SAE J310, NLGI No. 2	As required
Differential case oil seal lip	Multipurpose grease SAE J310, NLGI No. 2	As required

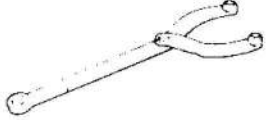

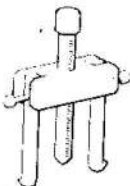
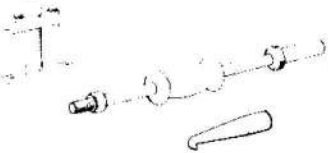
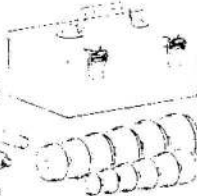


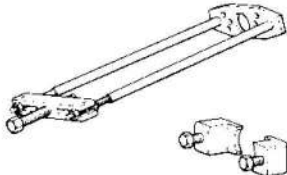


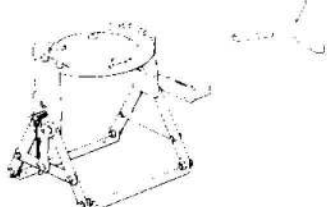

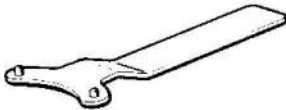
## SEALANTS AND ADHESIVES





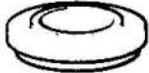


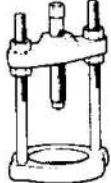

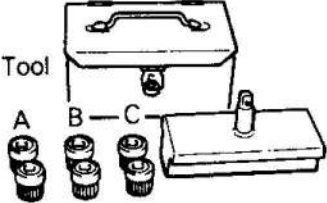
E27CE--

Items	Specified sealants and adhesives	Remarks
Bearing case end face Differential carrier gasket	3M ATD Part No. 8663, 8661 or equivalent	Semi-drying sealant
Drive gear threaded hole	3M Stud Locking Part No. 4170 or equivalent	Anaerobic adhesive

NOTES

**SPECIAL TOOLS**

Tool (Number and name)	Use	Tool (Number and name)	Use
MB990767 End yolk holder 	Measurement of the limited slip differential preload	MB990786 Rear axle bearing outer race bridge   MB990801 Rear axle bearing outer race remover 	Removal of the side bearing Removal of the axle shaft bearing outer race
MB990241 Rear axle shaft puller MB990590 Sliding hammer 	Removal of axle shaft Removal of oil seal	MB990925 Bearing and oil seal installer set   MB990939   MB990938 	Press-fitting of the axle shaft bearing outer race Removal and press-fitting of the drive pinion bearing outer race Press-fitting of the oil seal
MB990860 Axle shaft bearing case remover 	Removal of the axle shaft bearing case (2WD)	MB990799 Bearing inner race installer 	Press-fitting of the axle shaft bearing inner race
MB990787 Axle shaft bearing case remover 	Removal of the axle shaft bearing case (4WD)	MB990909 Working base MB991116 Adapter 	Supporting of the differential carrier
MB990785 Lock nut special spanner 	Removal and installation of the lock nut	MB990722 (Small type differential) MB990201 (T100ST14) (Large type differential) Side bearing adjustment special spanner 	Removal and adjustment of the side bearing nut

Tool (Number and name)	Use	Tool (Number and name)	Use
Pinion height gauge set MB990856 (Small type differential) MB990818 (Large type differential) Pinion gauge MB90858 (Small type differential) MB990819 (Large type differential) Cylinder gauge MB990720 (Small type differential) MB990552 (Large type differential)	Measurement of the pinion height	MB990810 Bearing puller MB990811 Bearing puller cup  MB990685 or MB991151 Torque wrench  MB990326 Preload socket 	Removal of the side bearing  Measurement of the starting torque of drive pinion
MB990850 End yoke holder 	Removal and installation of companion flange	MB990728 MB990802 (Large type differential) Bearing installer 	Press-fitting of the drive pinion rear bearing inner race Press-fitting of the side bearing inner race
MB990031 (Small type differential) Drive pinion shaft oil seal installer MB991168 (Large type differential) Differential oil seal installer 	Press-fitting of the drive pinion oil seal.	MB990813 Tap 	Removal of sealant
MB990339 (WT-00104) Bearing puller  MB990648 Bearing remover 	Removal of the drive pinion rear bearing inner race	MB990988 Side gear holding tool set 	Measurement of the clutch plate preload

## TROUBLESHOOTING

E27EAAE

Symptom	Probable cause	Remedy	Reference page
AXLE SHAFT, AXLE HOUSING Noise while wheels are rotating	Brake drag Bent axle shaft Worn or scarred axle shaft bearing	Replace	27-20, 22, 30, 32
Grease leakage	Worn or damaged oil seal Malfunction of bearing seal	Replace	27-16, 20, 30
DIFFERENTIAL (CONVENTIONAL DIFFERENTIAL) Constant noise	Improper final drive gear tooth contact adjustment Loose, worn or damaged side bearing Loose, worn or damaged drive pinion bearing	Correct or replace	27-38, 40, 43
	Worn drive gear, drive pinion Worn side gear thrust washer or pinion shaft Deformed drive gear or differential case Damaged gear	Replace	27-40, 43
	Foreign material	Eliminate the foreign material and check; replace the parts if necessary	27-40, 43
	No oil	Fill or change	27-15
Gear noise while driving	Poor gear engagement Improper gear adjustment Improper drive pinion preload adjustment	Correct or replace	27-38, 45
	Damaged gear	Replace	27-40, 43
	Foreign material	Eliminate the foreign material and check; replace the parts if necessary	27-40, 43
	Insufficient oil	Replenish	27-15
Gear noise while coasting	Improper drive pinion preload adjustment	Correct or replace	27-45
	Damaged gear	Replace	27-40, 43
Bearing noise while driving or coasting	Cracked or damaged drive pinion rear bearing	Replace	27-40, 43
Noise while turning	Loose side bearing Damaged side gear, pinion gear or pinion shaft	Replace	27-40, 43
Heat	Improper gear backlash Excessive preload	Adjust	27-46, 48
	Insufficient oil	Replenish	27-15
Oil leakage	Clogged vent hose	Clean or replace	27-28
	Differential carrier not tightened Seal malfunction	Retighten, apply sealant, or replace the gasket	27-25, 35
	Worn or damaged oil seal	Replace	27-16, 20, 30
	Excessive oil	Adjust the oil level	27-15

Symptom	Probable cause	Remedy	Reference page
DIFFERENTIAL (LIMITED SLIP DIFFERENTIAL) Abnormal noise during driving or gear changing	Excessive final drive gear backlash Insufficient drive pinion preload	Adjust	27-37, 55
	Excessive differential gear backlash	Adjust or replace	27-59, 64
	Worn spline of a side gear	Replace	27-59, 64
	Loose companion flange self-locking nut	Retighten or replace	27-50, 53

**NOTE**

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

Abnormal noise when cornering	Damaged differential gears Damaged pinion shaft Nicked and/or abnormal wear of inner and outer clutch plates Poor gear oil Abnormally worn or damaged thrust washer	Relace	27-15, 50, 53, 59, 64
	Improper gear oil quantity	Refill or replace	27-15
Gear noise	Improper final drive gear tooth contact adjustment	Adjust or replace	27-38
	Incorrect final drive gear backlash Improper drive pinion preload adjustment	Adjust	27-37, 55
	Damaged, broken, and/or seized tooth surfaces of the drive gear and drive pinion Damaged, broken, and/or seized drive pinion bearings Damaged, broken, and/or seized side bearings Damaged differential case Poor gear oil	Replace	27-50, 53
	Insufficient gear oil quantity	Refill or replace	27-15

**NOTE**

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

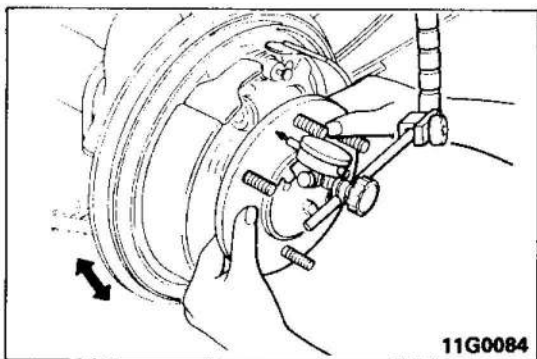
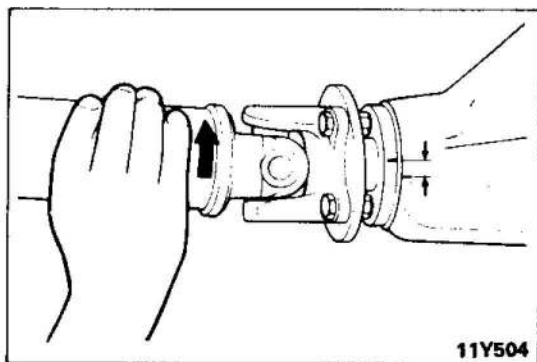
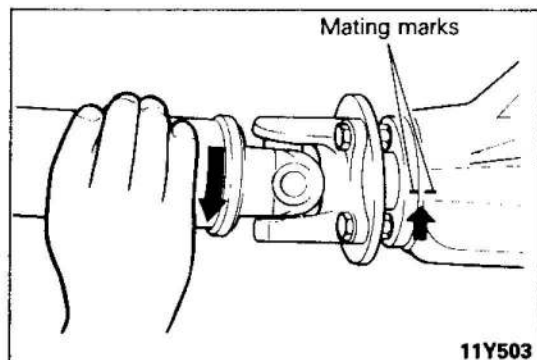
Test methods to confirm the source of the abnormal noise include: coasting, acceleration, constant speed driving, raising the rear wheels on a jack, etc. Use the method most appropriate to the circumstances.

Gear oil leakage	Worn or damaged front oil seal, or an improperly installed oil seal	Replace	27-50, 53
	Loose companion flange self-locking nut	Retighten or replace	27-50, 53
	Loose filler or drain plug	Retighten or apply adhesive	27-25, 35
	Clogged or damaged vent hose	Clean or replace	27-28
Seizure	Improper final drive gear backlash Excessive drive pinion preload Excessive side bearing preload Improper differential gear backlash Excessive clutch plate preload	Adjust	27-37, 55, 57, 62, 67
	Improper gear oil	Replace	27-15
	Improper gear oil quantity	Refill or replace	27-15

**NOTE**

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

Symptom	Probable cause	Remedy	Reference page
Breakdown	Incorrect final drive gear backlash Incorrect drive pinion preload Incorrect side bearing preload Excessive differential gear backlash Insufficient clutch plate preload	Adjust	27-37, 55, 57, 62, 67
	Loose drive gear clamping bolts	Retighten	27-50, 53
	Operational malfunction due to overloaded clutch	Avoid excessively rough operation	27-59, 64
<p><b>NOTE</b> In addition to disassembling and replacing the failed parts, be sure to check all components for irregularities and repair or replace as necessary.</p>			
The limited slip differential does not function (on snow, mud, ice, etc.)	The limited slip device is damaged	Disassemble, check the functioning, and replace the damaged parts	27-15, 59, 64



## SERVICE ADJUSTMENT PROCEDURES

E27FCAA

### CHECKING OF THE REAR AXLE TOTAL BACKLASH

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) 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.
- (2) Turn the companion flange fully clockwise. Make the mating mark on the dust cover of the companion flange and on the differential carrier.
- (3) Turn the companion flange fully counter clockwise, 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.

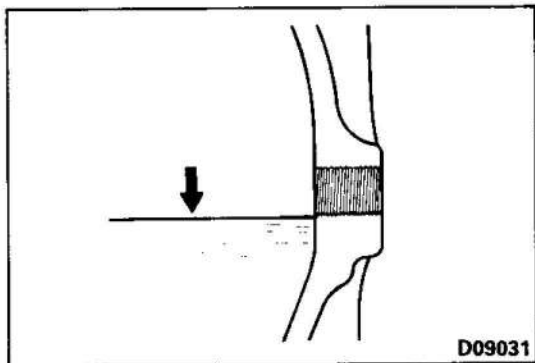
**Limit: 5 mm (0.20 in.)**

### CHECKING OF THE AXLE SHAFT FOR AXIAL PLAY

E27FFAA

1. Measure the axle shaft for axial play by using a dial indicator.  
**Standard value: 0.05-0.20 mm (0.0020-0.0079 in.)**
2. If the axle shaft end play exceeds the standard value, withdraw the axle shaft, and then adjust to the standard value by changing the shim thickness. (Refer to P.27-17)





**CHECKING OF THE GEAR OIL LEVEL**

E27FGAD

1. Remove the filler plug, and check the oil level.
2. The oil level is sufficient if it reaches the filler plug hole.

**Specified gear oil:**

**Conventional differential**

API classification GL-5 or higher

SAE viscosity No. 90, 80W

2WD

**Small type differential**

[1.20 lit. (1.27 U.S.qts., 1.06 Imp.qts.)]

**Large type differential**

[1.50 lit. (1.59 U.S.qts., 1.32 Imp.qts.)]

4WD

[1.80 lit. (1.90 U.S.qts., 1.58 Imp.qts.)]

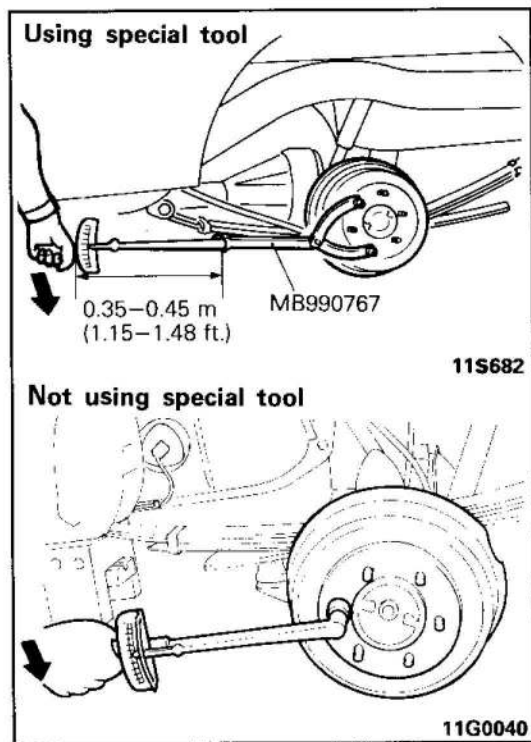
**Limited slip differential**

MITSUBISHI Genuine Gear Oil Part No. 8149630EX,

CASTROL HYPOY LS (GL-5, SAE 90), SHELL-LSD

(GL-5, SAE 80W-90) or equivalent

[1.80 lit. (1.90 U.S.qts., 1.58 Imp.qts.)]



**LIMITED SLIP DIFFERENTIAL PRELOAD MEASUREMENT**

E27FIAC

1. 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.
2. Measure the starting torque at the side on which the wheel is in the raised position by using the following procedures.

- (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 special tool**

**Small type** 17.5 Nm (1.75 kgm, 13 ft.lbs.) or more

**Large type**

**Vehicles built up to July 1989**

17.5 Nm (1.75 kgm, 13 ft.lbs.) or more

**Vehicles built from August 1989**

12.5 Nm (1.25 kgm, 9 ft.lbs.) or more

**Without using special tool**

**Small type** 35 Nm (3.5 kgm, 25 ft.lbs.) or more

**Large type**

**Vehicles built up July 1989**

35 Nm (3.5 kgm, 25 ft.lbs.) or more

**Vehicles built from August 1989**

25 Nm (2.5 kgm, 18 ft.lbs.) or more

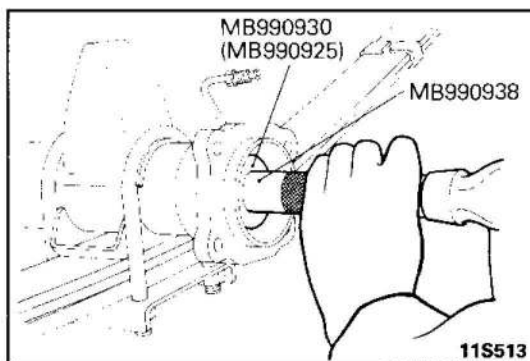
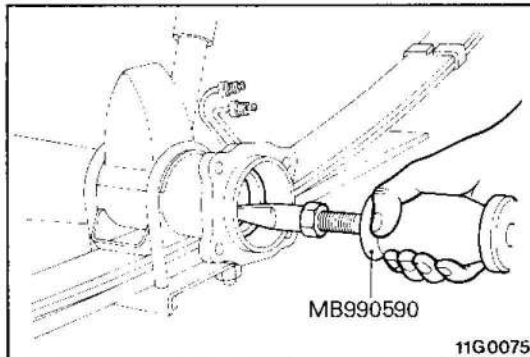
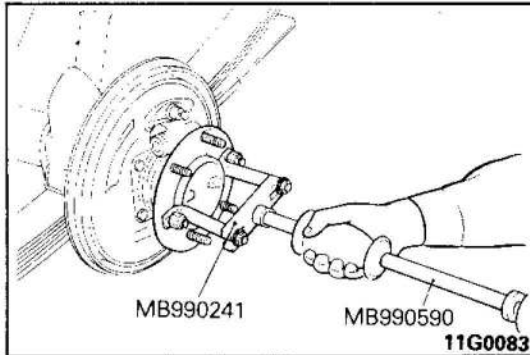
**NOTE**

To measure starting torque, first rotate hub to run-in and measure torque with hub rotating.

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

### REPLACEMENT OF OIL SEAL FOR AXLE HOUSING <sup>E27FKAB</sup>

1. Release coupling between parking brake cable and backing plate. (Refer to GROUP 36 PARKING BRAKES-Parking Brake Cable.)
2. Before disconnecting the brake tube, drain the brake fluid from the bleeder screw at the right side of the rear brake.
3. Remove the nuts securing the backing plate to the axle housing.
4. Pull the rear axle shaft with rear brake assembly attached. 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 the specified grease to the oil seal fitting area of the rear axle housing.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

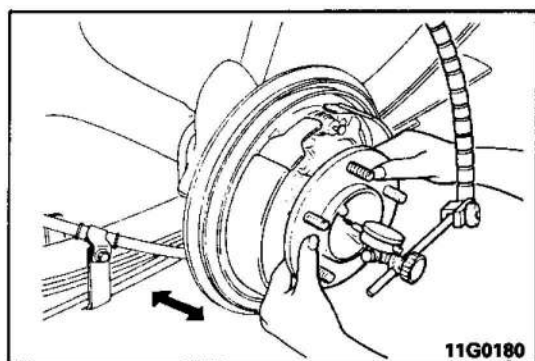
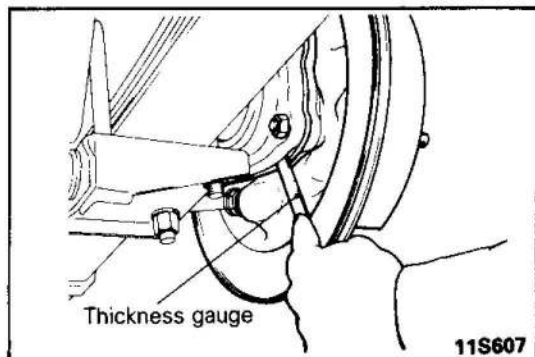
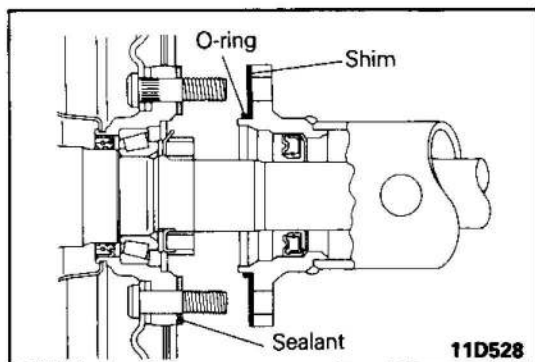
7. Drive the new oil seal into the rear axle housing end by using the special tool.
8. Apply the specified grease to the oil seal lip.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

9. Adjust the clearance between the bearing case and rear axle housing end. (Refer to P.27-17)

10. Install the rear axle shaft.
11. Install the brake tube and perform air bleeding of the brake system from the air bleeder at the left side of the rear brake.
12. Install the parking brake cable and adjust the parking brake lever stroke. (Refer to GROUP 36 PARKING BRAKES—Service Adjustment Procedures.)

**Standard value:** 2WD 4-6 notches  
4WD 5-7 notches



**ADJUSTMENT OF REAR AXLE SHAFT AXIAL PLAY**  
E27FLAB

1. Insert a 1 mm (0.04 in.) thick shim and O-ring into the left side rear axle housing.
2. Apply the specified sealant to the mating surface of the bearing case, install the left axle shaft into rear axle housing and tighten the nuts [50–60 Nm (5.0–6.0 kgm, 36–43 ft.lbs.)].

**Specified sealant: 3M ATD Part No. 8663, 8661 or equivalent**

**NOTE**

Tighten the nuts in diagonal sequence.

3. Install the right axle shaft without a shim(s) and O-ring and temporarily tighten to about 6 Nm (0.6 kgm, 4.3 ft.lbs.).

**NOTE**

Tighten the nuts in diagonal sequence in two stages.

4. Measure the clearance between the bearing case and rear axle housing end with a thickness gauge.

**NOTE**

Confirm that the measurement values no differ in the horizontal and vertical positions.

5. Select shims of the thickness which is equal to the sum of the measured clearance and 0.06–0.20 mm (0.0023–0.0079 in.)
6. Remove the right axle shaft, and install shim(s) and O-ring on the right side rear axle housing end.
7. Apply the specified sealant to the mating surface of bearing case, install the right axle shaft into rear axle housing and tighten the nut [50–60 Nm (5.0–6.0 kgm, 36–43 ft.lbs.)].

**Specified sealant: 3M ATD Part No. 8663, 8661 or equivalent**

**NOTE**

Tighten the nuts in diagonal sequence.

8. Check to assure that the axle shaft axial play is within the standard value.

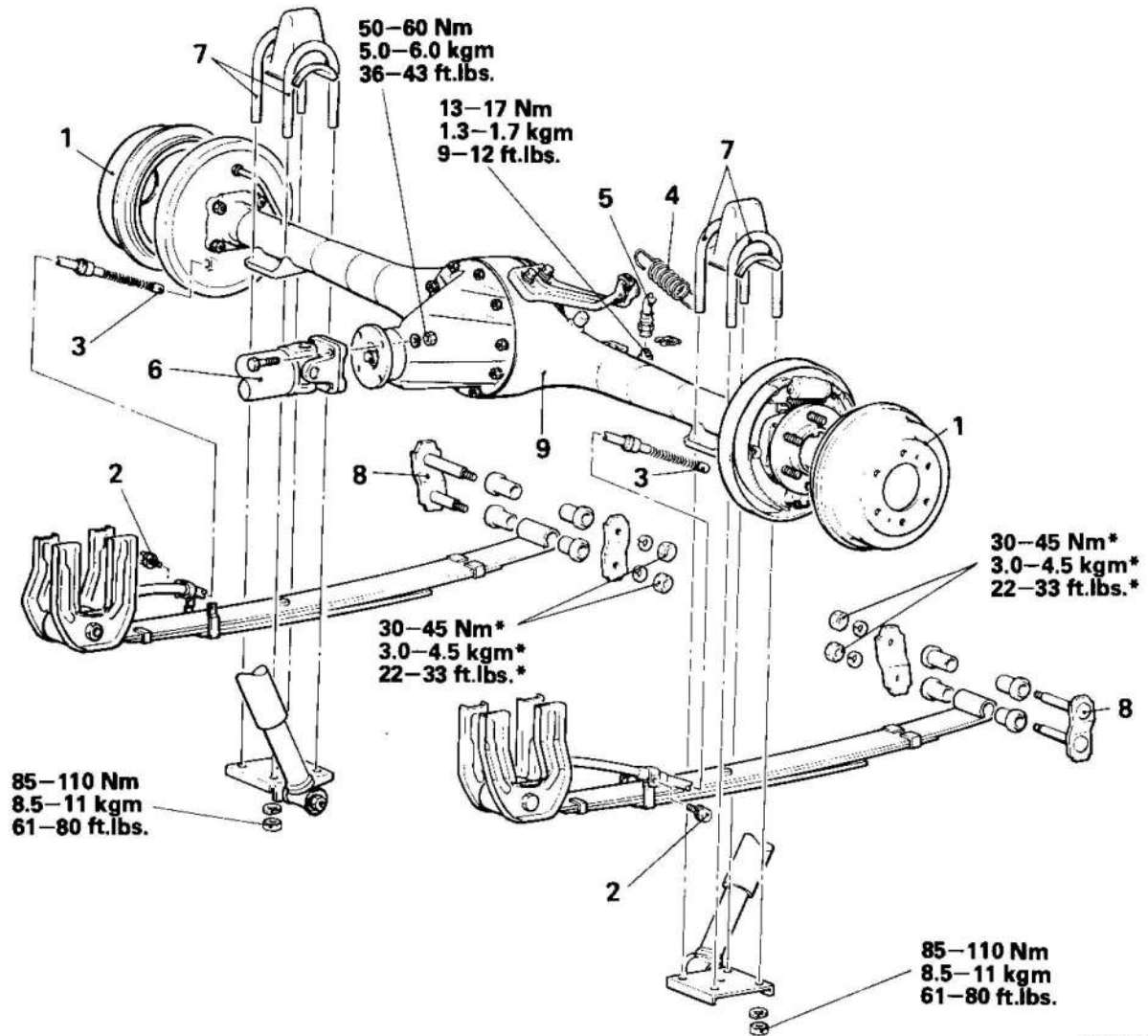
**Standard value: 0.05–0.20 mm (0.0020–0.0079 in.)**

## AXLE ASSEMBLY (2WD)

### REMOVAL AND INSTALLATION

#### Post-installation Operation

- Air bleeding of brake line (Refer to GROUP 35—Service Adjustment Procedures.)
- Adjustment of parking brake pull rod (Refer to GROUP 36—Service Adjustment Procedures.)



11G0146

#### Removal steps

- ◆◆ Adjustment of load sensing spring length (vehicles for Europe and Australia)
  1. Brake drums
  2. Bolts
- ◆◆◆◆ 3. Parking brake cable connection
- ◆◆◆◆ 4. Spring (vehicles for Europe and Australia)
- ◆◆◆◆ 5. Brake hose connection
- ◆◆◆◆ 6. Propeller shaft
- ◆◆◆◆ 7. U-bolts
- ◆◆◆◆ 8. Shackle assembly
- ◆◆◆◆ 9. Axle assembly

#### NOTE

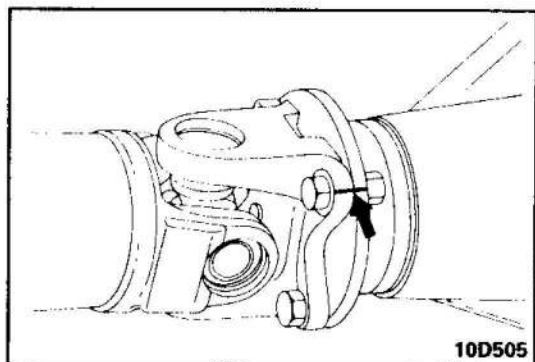
- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆◆ : Refer to "Service Points of Removal".
- (3) ◆◆◆◆ : Refer to "Service Points of Installation".
- (4) The part with \* must be tightened with the vehicles lowered to the ground.

**SERVICE POINTS OF REMOVAL**

E27JBABa

**3. DISCONNECTION OF PARKING BRAKE CABLE**

Refer to GROUP 36—Parking Brakes (2WD).

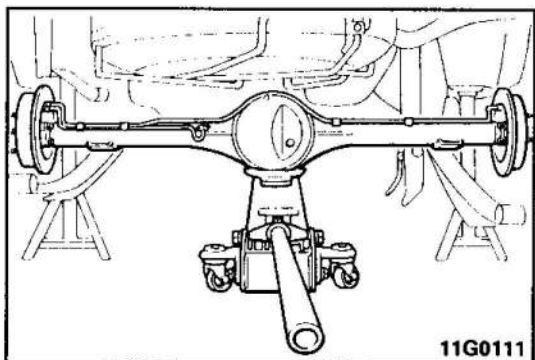


**5. REMOVAL OF BRAKE HOSE CONNECTION**

Before disconnecting the brake hose, drain the brake fluid from the bleeder screw at the right side of the rear brake.

**6. REMOVAL OF PROPELLER SHAFT**

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



**7. REMOVAL OF U-BOLT**

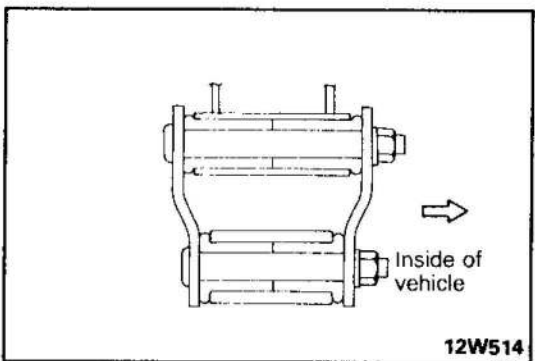
Before removing the U-bolt and the bump stopper, place the jack underneath the center of the axle assembly to hold it slightly upward.

**9. REMOVAL OF AXLE ASSEMBLY**

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

**Caution**

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



**SERVICE POINTS OF INSTALLATION**

E27JDACa

**8. INSTALLATION OF SHACKLE ASSEMBLY**

Install the shackle assembly from the outside toward the inside of vehicle.

**6. INSTALLATION OF PROPELLER SHAFT**

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

**3. CONNECTION OF PARKING BRAKE CABLE**

Refer to GROUP 36—Parking Brakes (2WD).

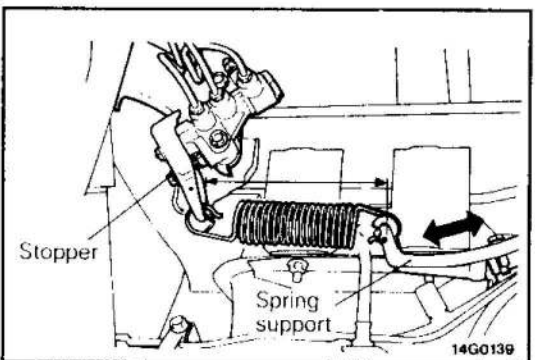
**• ADJUSTMENT OF LOAD SENSING SPRING LENGTH**

Install the spring support so that the distance between the lever of the load sensing proportioning valve and the spring support is standard value. (Refer to GROUP 35—Service Adjustment Procedures)

**Standard value:**

**Standard body vehicles** 176–179 mm (6.39–7.05 in.)

**Long body vehicles** 176.5–179.5 mm (6.95–7.07 in.)



**NOTE**

Adjust the dimensions in the drawing with the vehicle on the ground and without load.

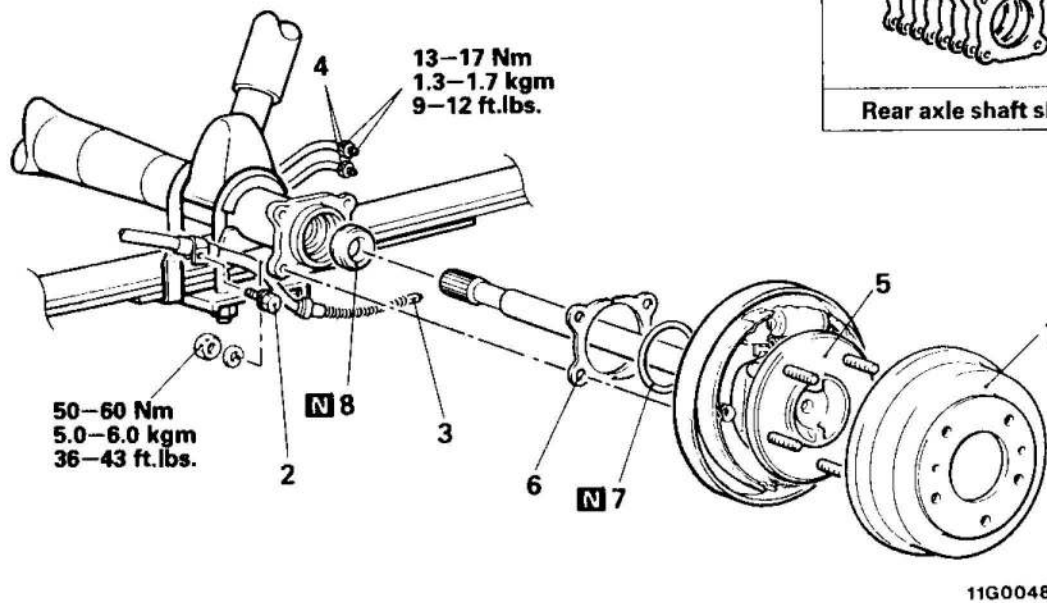
## AXLE SHAFT (2WD)

## REMOVAL AND INSTALLATION

E27HA--

**Post-installation Operation**

- Air bleeding of brake line (Refer to GROUP 35—Service Adjustment Procedures.)
- Adjustment of parking brake pull rod (Refer to GROUP 36—Service Adjustment Procedures.)

**Removal steps**

1. Brake drum
2. Bolt
- ◆◆◆◆ 3. Parking brake cable connection
- ◆◆ 4. Brake tubes connections
- ◆◆ 5. Axle shaft assembly
6. Shim
7. O-ring
- ◆◆ Adjustment of axle shaft axial play
- ◆◆◆ 8. Oil seal

**NOTE**

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".
- (4) [N]: Non-reusable parts

**SERVICE POINTS OF REMOVAL**

E27HBABa

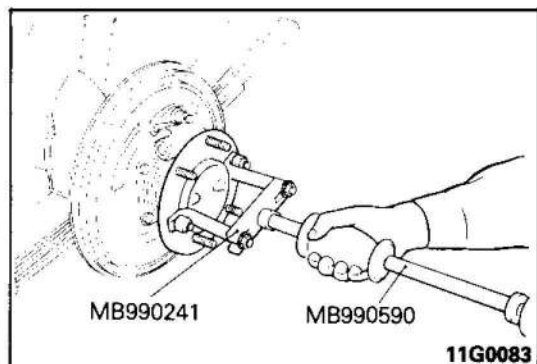
**3. DISCONNECTION OF PARKING BRAKE CABLE**

Refer to GROUP 36—Parking Brakes (2WD).

**4. DISCONNECTION OF BRAKE TUBES**

Before disconnecting the brake tube, drain the brake fluid from the bleeder screw at the right side of the rear brake.





**5. REMOVAL OF AXLE SHAFT ASSEMBLY**

- (1) Remove the nuts coupling the backing plate to the axle housing.
- (2) Pull axle shaft from axle housing. If difficult to pull, use special tools.

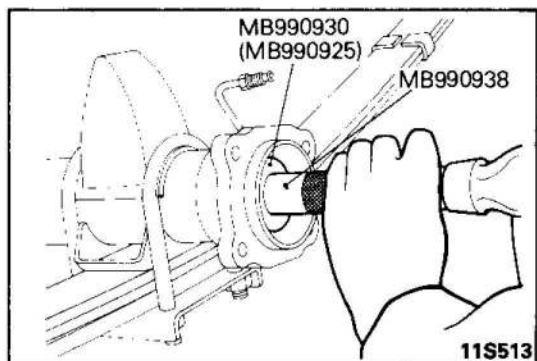
**Caution**

**Be careful not to damage the oil seal when pulling axle shaft.**

**INSPECTION**

E27HCAC

- Check the backing plate for deformation and damage.
- Check the wheel bearing for seizure and discoloration.
- Check the axle shaft for cracks, wear and damage.
- Check the oil seal of axle housing for damage.



**SERVICE POINTS OF INSTALLATION**

E27HDAC

**8. INSTALLATION OF OIL SEAL**

- (1) Apply specified grease on the contact surface between the axle housing and oil seal.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

- (2) Press the oil seal in with the special tool until correctly snugged into the axle housing.
- (3) Apply specified grease to the oil seal lip.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

**3. CONNECTION OF PARKING BRAKE CABLE**

Refer to GROUP 36—Parking Brakes (2WD).

**• ADJUSTMENT OF AXLE SHAFT AXIAL PLAY**

Backlash adjustment is performed when the axle shaft or wheel bearing is replaced.

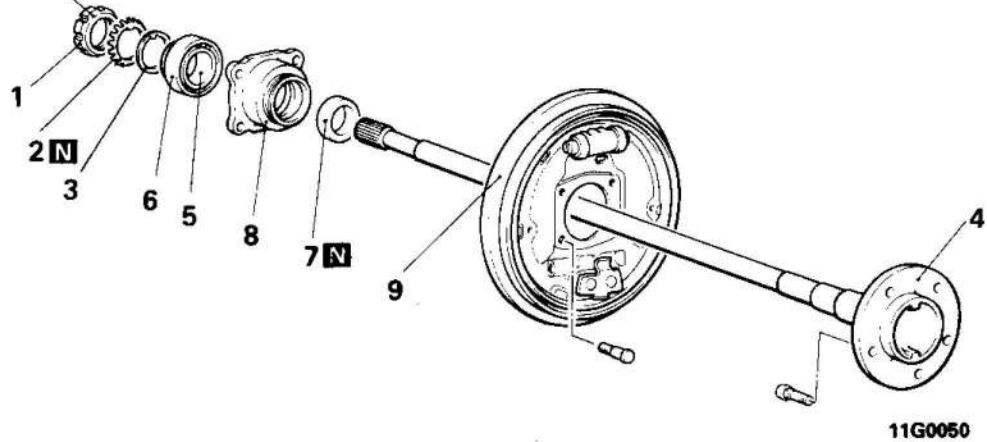
When only removing and installing the axle shaft, use the same number and thickness of shims as previously used. (Refer to P.27—17.)



DISASSEMBLY AND REASSEMBLY (LOCK NUT TYPE)

E27HE-A1

180–220 Nm  
18–22 kgm  
130–159 ft.lbs.



Disassembly steps

- ◆◆◆◆ 1. Lock nut
- ◆◆◆ 2. Lock washer
- ◆◆ 3. Washer
- ◆◆ 4. Axle shaft
- ◆◆◆◆ 5. Bearing inner race
- ◆◆◆◆ 6. Bearing outer race
- ◆◆◆ 7. Oil seal
- ◆◆◆ 8. Bearing case
- ◆◆◆ 9. Backing plate

NOTE

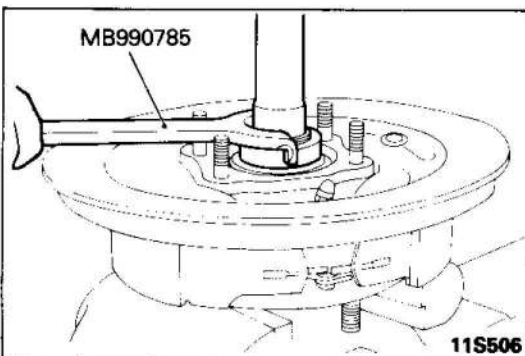
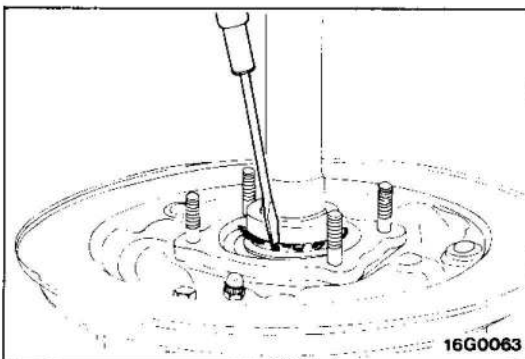
- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆◆ : Refer to "Service Points of Disassembly".
- (3) ◆◆◆ : Refer to "Service Points of Reassembly".
- (4) **N** : Non-reusable parts

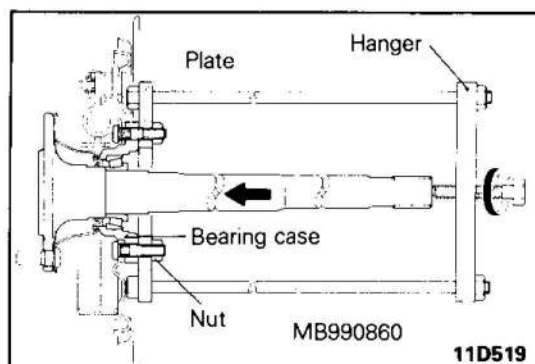
SERVICE POINTS OF DISASSEMBLY

E27HFAB

1. REMOVAL OF LOCK NUT

- (1) Straighten the bent tab of the lock washer with the screwdriver.
- (2) To remove the wheel bearing, first remove the lock washer then remove the lock nut, using special tool.
- (3) Remove lock washer and washer.





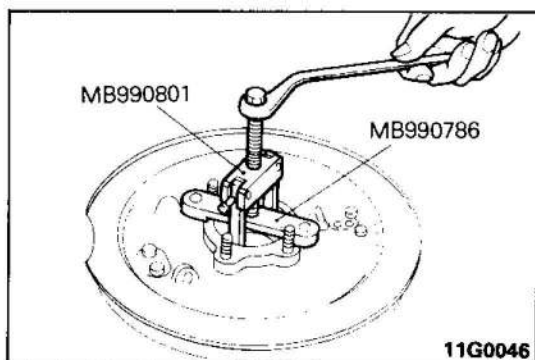
**4. REMOVAL OF AXLE SHAFT**

Remove bearing case assembly from the axle shaft with the special tool and follow these procedures:

- (1) Set the special tool by fixing its plate to the bearing case as shown in the figure.
- (2) Place the special tool bolt tip to the center of the shaft. Screw in the bolt and pull the axle shaft from the bearing case assembly.

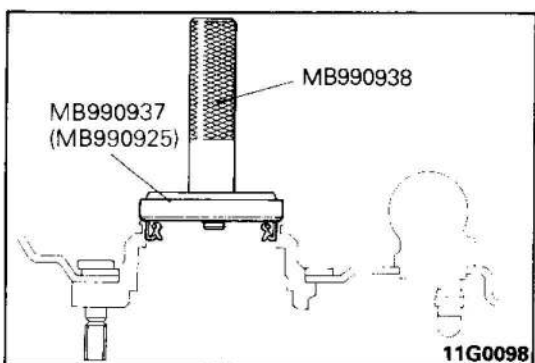
**Caution**

**Set the hanger parallel with the plate.**



**6. REMOVAL OF BEARING OUTER RACE**

- (1) Remove the oil seal from the bearing case.
- (2) Use the special tool to draw the bearing outer race from the bearing case.

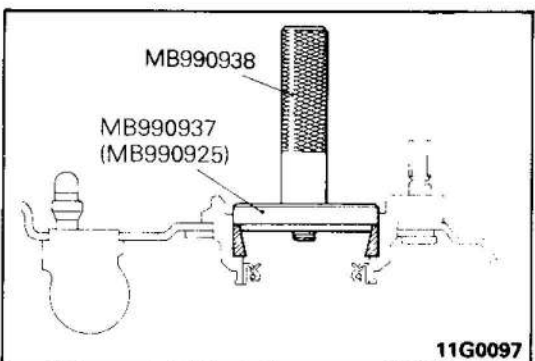


**SERVICE POINTS OF REASSEMBLY**

E27HHAB

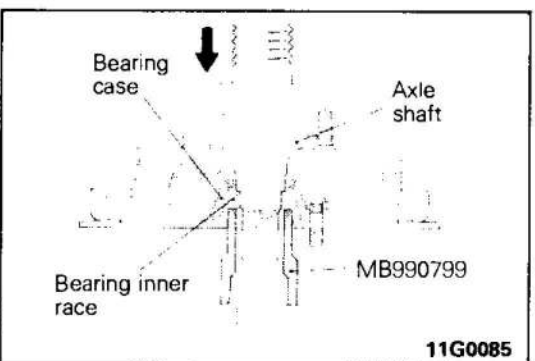
**7. PRESS-FITTING OF OIL SEAL**

- (1) Apply the multipurpose grease to the external periphery of the oil seal.
- (2) Press-fit the oil seal into the bearing case until it is flush with the face of the bearing case by using the special tools.
- (3) Apply the multipurpose grease to the lips of the oil seal.



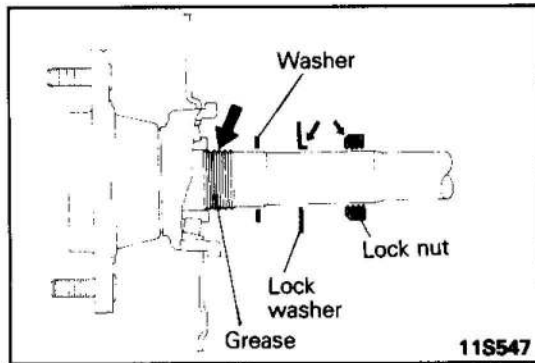
**6. PRESS-FITTING OF BEARING OUTER RACE**

- (1) Apply the multipurpose grease to the external periphery of the bearing outer race.
- (2) Press-fit the bearing outer race into the bearing case by using the special tools.



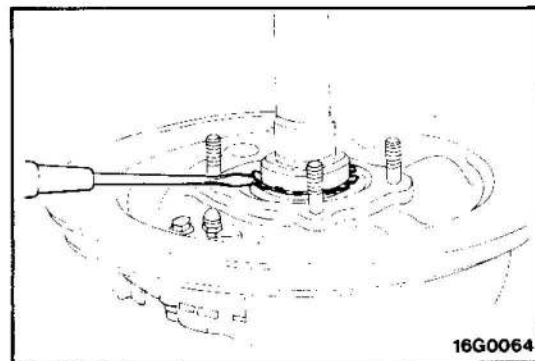
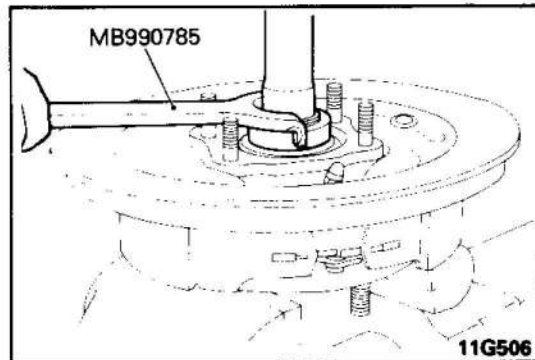
**5. INSTALLATION OF BEARING INNER RACE**

- (1) Apply the multipurpose grease to the roller surfaces of the bearing inner race.
- (2) Install the rear brake assembly attached with bearing case and the bearing inner race in that order to the axle shaft.
- (3) Press-fit the bearing inner race into the axle shaft by using the special tools.
- (4) Pack the bearing case with the multipurpose grease.



### 3 .INSTALLATION OF WASHER/2. LOCK WASHER/1. LOCK NUT

- (1) Apply the multipurpose grease to the thread portion of the axle shaft, to which locking nut is installed.
- (2) Align the washer tab with the slot of the axle shaft to install the washer.
- (3) Align the lock washer tab with the slot of the axle shaft to install the lock washer as figure.
- (4) Install the lock nut with its chamfering in the directions shown in the illustration.
- (5) Tighten the lock nut to the specified torque by using the special tool.



- (6) Bend the tab of the lock washer into the slot of the lock nut.

#### NOTE

If the slot in the nut and the tab of the lock washer are out of alignment, turn the lock nut in until they are in alignment.

DISASSEMBLY AND REASSEMBLY (RETAINER RING TYPE)

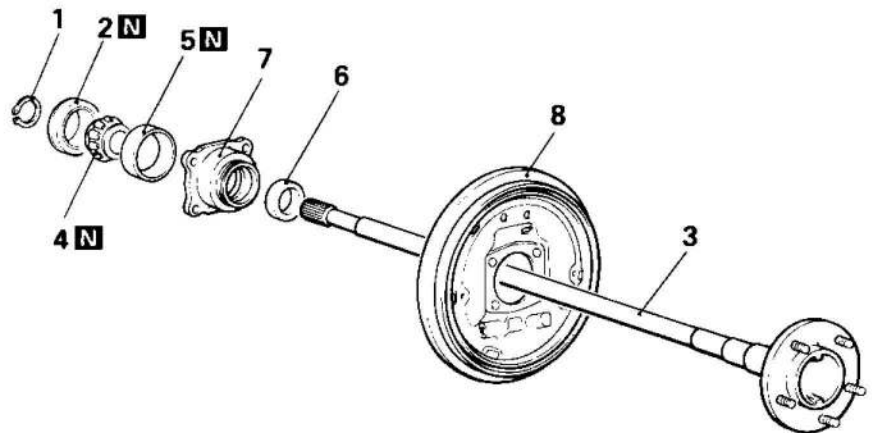
E27HE-B1

**Pre-disassembly and Post-reassembly Operation**

- Remove and install shoes from backing plate (Refer to GROUP 35—Rear Drum Brake Shoe).

**Disassembly steps**

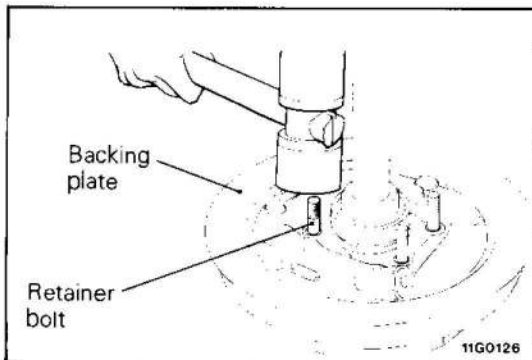
- ◆◆ 1. Snap ring
- ◆◆◆◆ 2. Retainer ring
- ◆◆◆◆ 3. Axle shaft
- ◆◆◆◆ 4. Bearing inner race
- ◆◆◆◆ 5. Bearing outer race
- ◆◆ 6. Oil seal
- ◆◆ 7. Bearing case
- ◆◆ 8. Backing plate



11G0195

**NOTE**

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆: Refer to "Service Points of Disassembly".
- (3) ◆◆◆: Refer to "Service Points of Reassembly".
- (4) **N**: Non-reusable parts



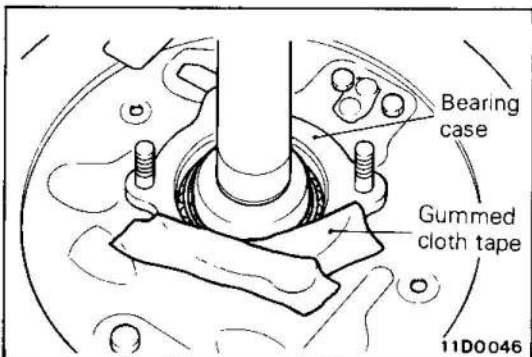
11G0126

**SERVICE POINTS OF DISASSEMBLY**

E27HAE1

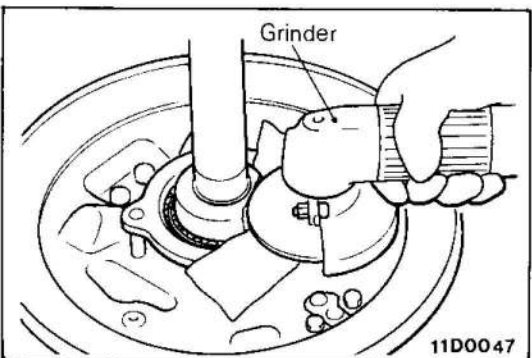
**2. REMOVAL OF RETAINER RING**

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



11D0046

- (2) Push down the bearing case all the way to the cover side.
- (3) Apply gummed cloth tape around the edge of the bearing case for protection.

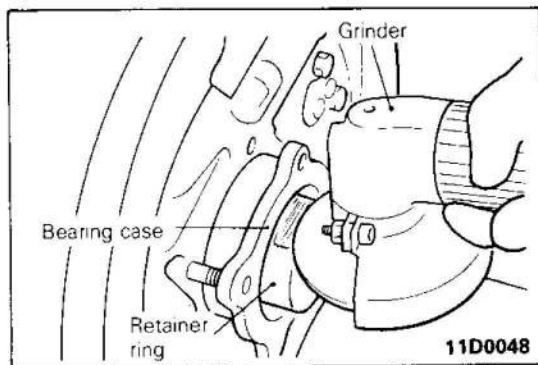


11D0047

- (4) 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 ring and the side of bearing become approximately 1.0–1.5 mm (0.039–0.059 in.) and 2.0 mm (0.079 in.) respectively.

**Caution**

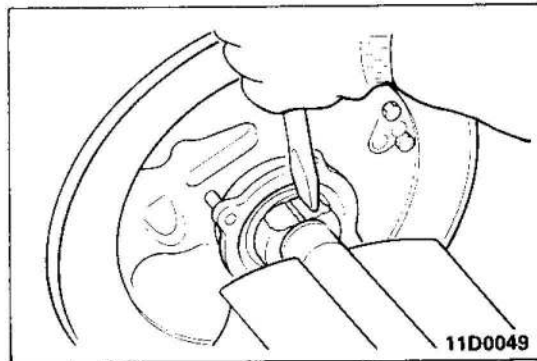
**Be careful not to damage the bearing case and the axle shaft.**



- (5) Fix the axle shaft and shave off the remaining 2.0 mm (0.078 in.) on the side of the bearing of the retainer ring.

**Caution**

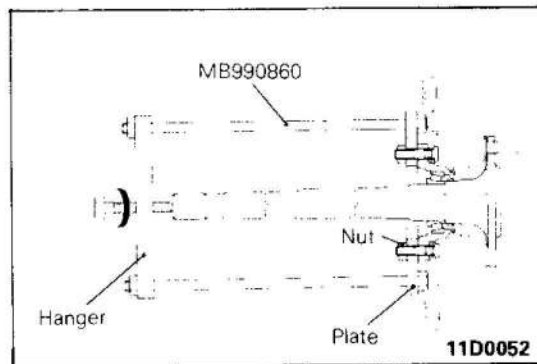
**Be careful not to damage the bearing case and the axle shaft.**



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

**Caution**

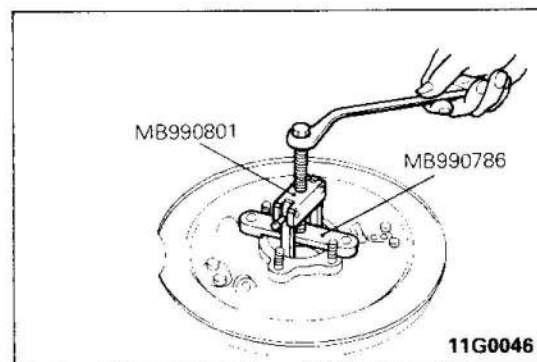
**Be careful not to damage the axle shaft.**

**3. REMOVAL OF AXLE SHAFT**

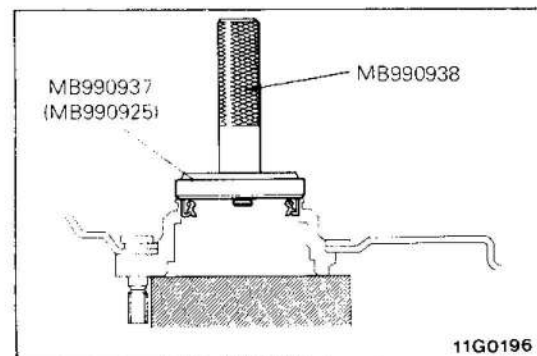
- (1) Set the special tool by fixing its plate to the bearing case as shown in the figure.
- (2) Place the special tool bolt tip to the centre of shaft. Screw in the bolt and pull the axle shaft from the bearing case assembly.

**Caution**

**Set the hanger parallel with the plate.**

**5. REMOVAL OF BEARING OUTER RACE**

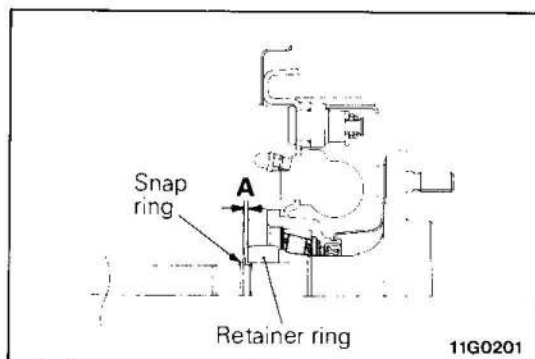
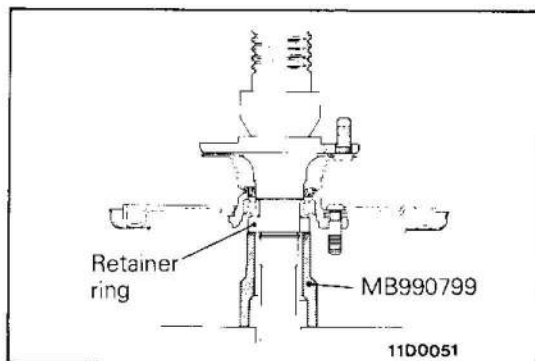
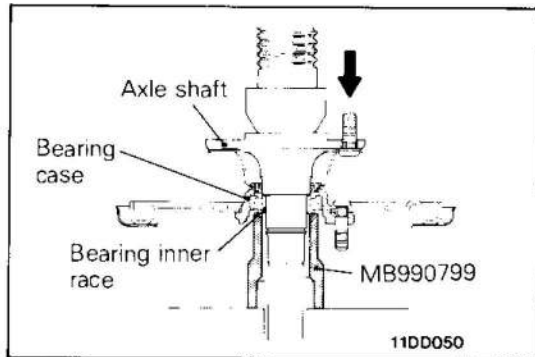
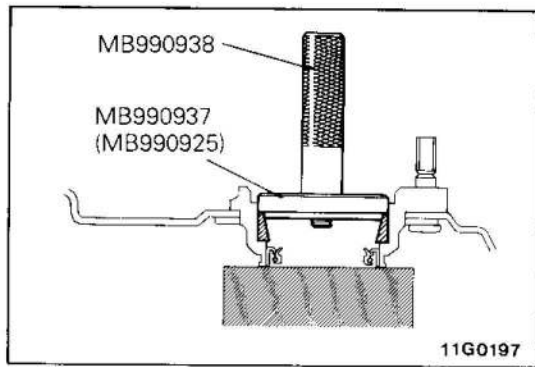
- (1) Remove the oil seal from the bearing case.
- (2) Use the special tool to draw the bearing outer race from the bearing case.

**SERVICE POINTS OF REASSEMBLY**

E27HHAG

**6. PRESS-FITTING OF OIL SEAL**

- (1) Apply the multipurpose grease to the external periphery of the oil seal.
- (2) Press-fit the oil seal into the bearing case until it is flush with the face of the bearing case by using the special tools.
- (3) Apply the multipurpose grease to the lips of the oil seal.



Thickness of snap ring mm (in.)	Identification colour of periphery
2.17 (0.0854)	—
2.01 (0.0791)	Yellow
1.85 (0.0728)	Blue
1.69 (0.0665)	Purple

## 5 . PRESS-FITTING OF BEARING OUTER RACE

- (1) Apply the multipurpose grease to the external periphery of the bearing outer race.
- (2) Press-fit the bearing outer race into the bearing case by using the special tools.

## 4 . INSTALLATION OF BEARING INNER RACE/ 3 . AXLE SHAFT

- (1) Apply the multipurpose grease to the roller surfaces of the bearing inner race.
- (2) Install the bearing case and the bearing inner race in that order to the axle shaft.
- (3) Press-fit the bearing inner race into the axle shaft by using the special tool.
- (4) Pack the bearing case with the multipurpose grease.

## 2 . PRESS-FITTING OF RETAINER RING

Use a special tool, and pressing in the retainer to the axle shaft, confirm whether or not the pressure input is in the standard value.

In case the initial pressure input is less than the standard value, replace the axle shaft.

### Standard value:

**Middle pressure input 40,000 N (4,000 kg, 8,818 lbs) or more**

**Final pressure input 60,000 N (6,000 kg, 13,228 lbs) or more**

### NOTE

The retainer ring is to be cold press-fitting, and in case the middle pressure input is less than the standard value, replace the axle shaft.

## 1 . INSTALLATION OF SNAP RING

- (1) After press-fitting the retainer ring, fix the snap ring to the bezel of the axle shaft, measure the clearance (the measure shown on fig. A) between the retainer ring and the snap ring with a thickness gauge and confirm whether or not the pressure input is in the standard value.

**Standard value (A): 0.166 mm (0.0065 in.) or less**

- (2) In case the clearance (A) between the snap ring and the retainer ring is more than the standard value, select a snap ring by referring to the list as shown on the left side and make an adjustment so that the clearance (A) comes into the standard value.

27-24-4

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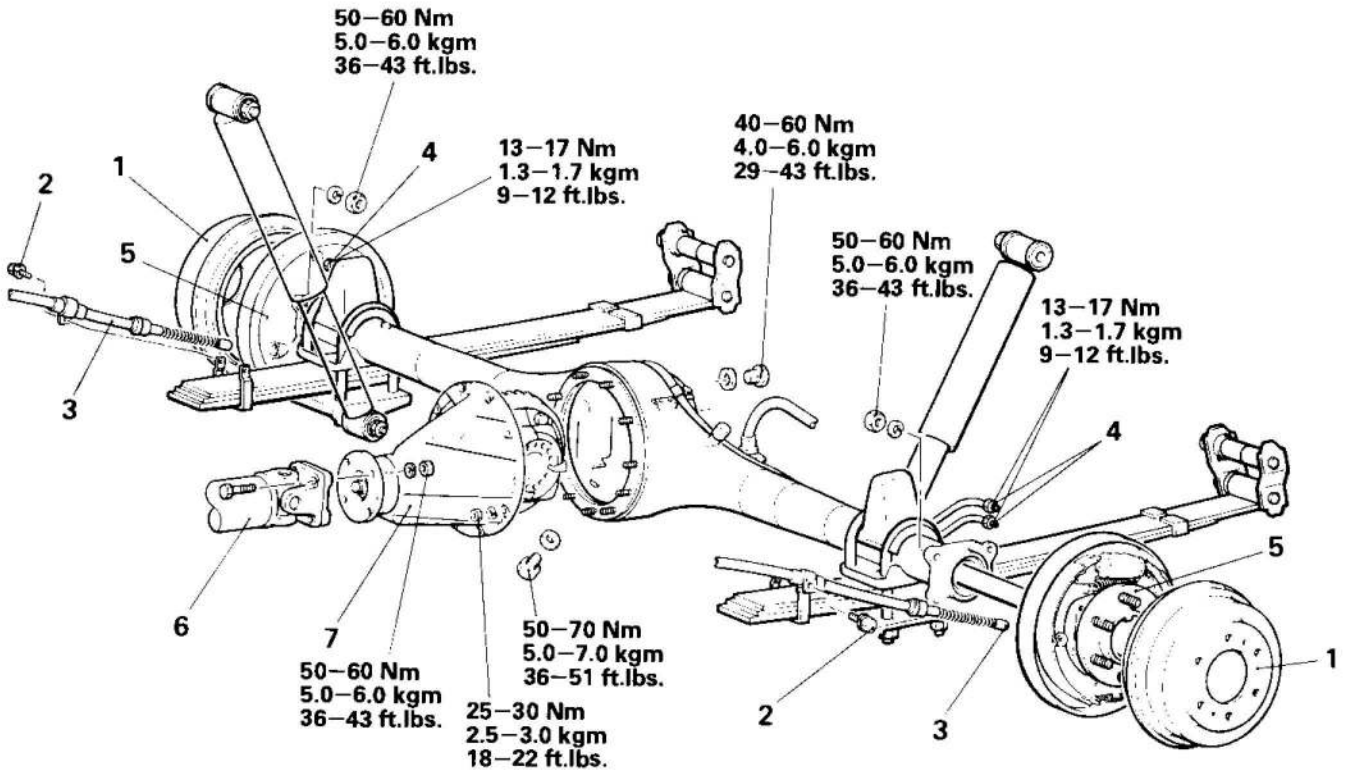
NOTES



**DIFFERENTIAL CARRIER ASSEMBLY (2WD)**

E27QA---

**REMOVAL AND INSTALLATION**



11G0179

**Removal steps**

1. Brake drums
2. Bolts
- ◆◆◆◆ 3. Parking brake cable connection
- ◆◆ 4. Brake tubes and backing plate connection
- ◆◆◆◆ 5. Axle shaft assembly
- ◆◆◆◆ 6. Propeller shaft
- ◆◆◆◆ 7. Differential carrier assembly

**Pre-removal Operation**

- Drainage of differential gear oil

**Post-installation Operation**

- Air bleeding of brake line (Refer to GROUP 35—Service Adjustment Procedures.)
- Adjustment of parking brake pull rod (Refer to GROUP 36—Service Adjustment Procedures.)
- Filling differential gear oil (Refer to P.27-15.)

**NOTE**

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆: Refer to "Service Points of Removal".
- (3) ◆◆◆: Refer to "Service Points of Installation".

**SERVICE POINTS OF REMOVAL**

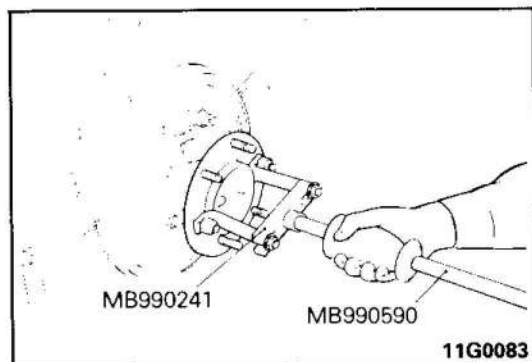
E27QBADa

**3. DISCONNECTION OF PARKING BRAKE CABLE**

Refer to GROUP 36—Parking Brakes (2WD).

#### 4. DISCONNECTION OF BRAKE TUBES AND BACKING PLATE

Before disconnecting the brake tube, drain the brake fluid from the bleeder screw at the right side of the rear brake.

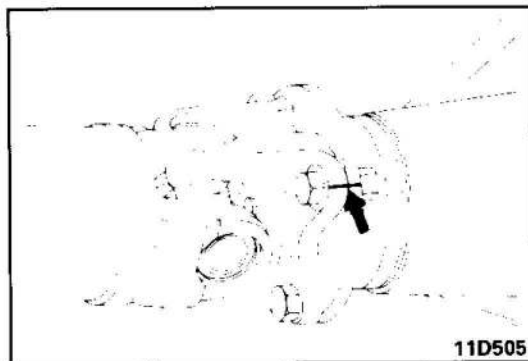


#### 5. REMOVAL OF AXLE SHAFT ASSEMBLY

- (1) Remove the nuts coupling the backing plate to the axle housing.
- (2) Pull axle shaft from axle housing. If difficult to pull, use special tools.

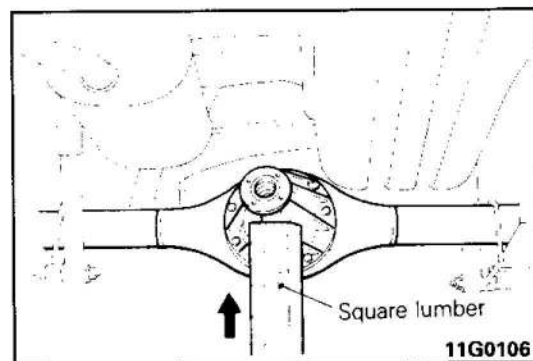
##### Caution

Be careful not to damage the oil seal when pulling axle shaft.



#### 6. REMOVAL OF PROPELLER SHAFT

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



#### 7. REMOVAL OF DIFFERENTIAL CARRIER ASSEMBLY

Loosen the coupling nuts. Gently tap the differential carrier assembly free from the axle housing with a block of wood.

##### NOTE

Loosen coupling nuts to the end of the stud bolts, but do not completely remove.

##### Caution

Do not tap the companion flange when freeing differential carrier.

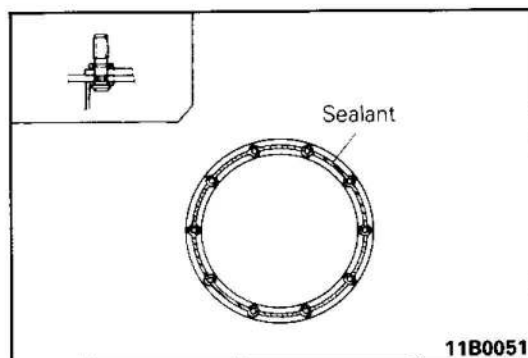
#### SERVICE POINTS OF INSTALLATION

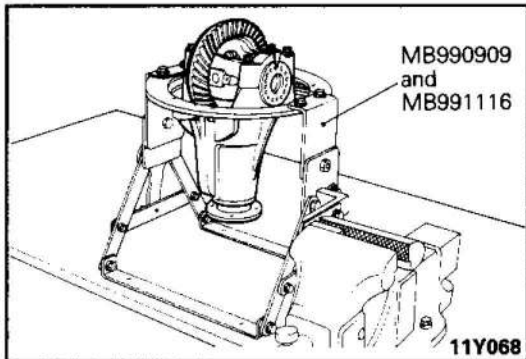
E27QCAFa

#### 7. APPLICATION OF SEALANT TO DIFFERENTIAL CARRIER ASSEMBLY

Apply specified sealing agent on axle housing flange surface as shown in the drawing, and install differential carrier assembly.

**Specified sealant: 3M ATD Part No. 8663, 8661 or equivalent**





**6. INSTALLATION OF PROPELLER SHAFT**

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

**5. INSTALLATION OF AXLE SHAFT ASSEMBLY**

(1) Apply sealing agent on axle housing and bearing case faces.

**Specified sealant: 3M ATD Part No.8663, 8661 or equivalent**

(2) Install new O-ring, and install axle shaft assembly.

**3. CONNECTION OF PARKING BRAKE CALBE**

Refer to GROUP 36—Parking Brakes (2WD).

**INSPECTION BEFORE DISASSEMBLY**

E27QDAF

Fix the special tool to a vice and install the differential gear assembly. Carry out the following inspections.

**1. FINAL DRIVE GEAR BACKLASH**

Refer to P.27—37.

**2. DRIVE GEAR RUNOUT**

Refer to P.27—37.

**3. DIFFERENTIAL GEAR BACKLASH (EXCEPT LIMITED SLIP DIFFERENTIAL)**

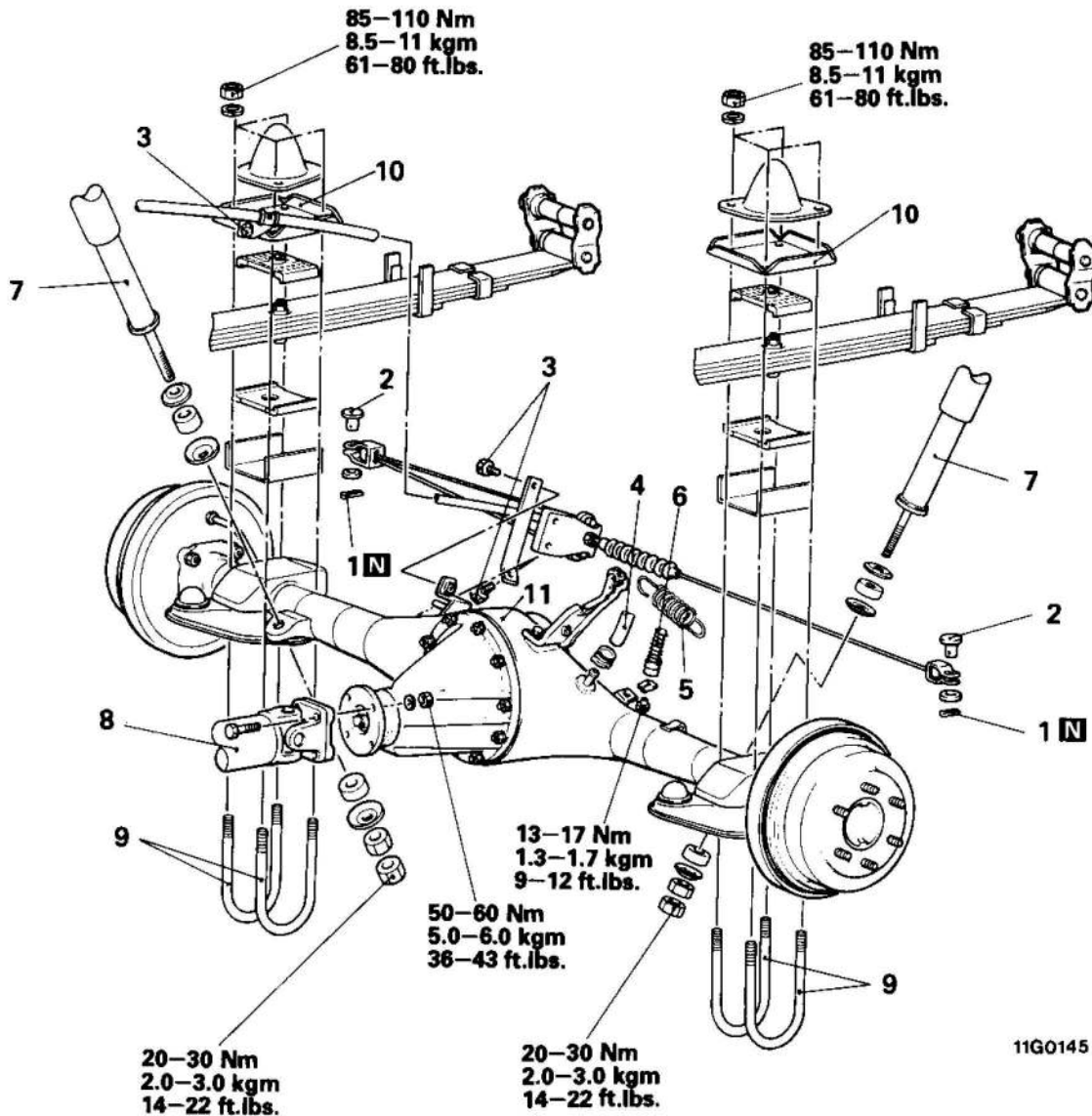
Refer to P.27—38.

**4. FINAL DRIVE GEAR TOOTH CONTACT**

Refer to P.27—38.

## AXLE ASSEMBLY (4WD)

## REMOVAL AND INSTALLATION



## Removal steps

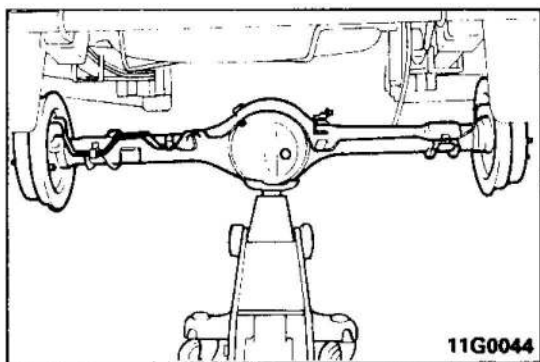
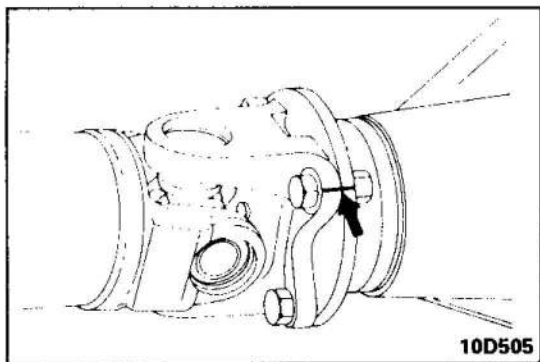
1. Split pins
2. Pins
3. Bolts
4. Vent hose connection
- ◆◆ Adjustment of load sensing spring length (vehicles for Europe and Australia)
5. Spring (vehicles for Europe and Australia)
- ◆◆ 6. Brake hose connection
- ◆◆ 7. Shock absorber connection
- ◆◆◆ 8. Rear propeller shaft
- ◆◆ 9. U-bolt
- ◆◆ 10. U-bolt seat
- ◆◆ 11. Axle assembly

## Post-installation Operation

- Bleeding of brake line (Refer to GROUP 35 SERVICE BRAKES—Service Adjustment Procedures.)
- Adjustment of parking brake lever stroke (Refer to GROUP 36 PARKING BRAKES—Service Adjustment Procedures.)

## NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆ : Refer to "Service Points of Removal".
- (3) ◆◆◆ : Refer to "Service Points of Installation".
- (4) N : Non-reusable parts



**SERVICE POINTS OF REMOVAL**

E27JBAC

**6. DISCONNECTION OF BRAKE HOSE**

Before disconnecting the brake hose drain the brake fluid from the bleeder screw at the right side of the rear brake.

**8. 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 U-BOLT**

Before removing the U-bolt and the bump stopper, place the jack underneath the center of the axle assembly to hold it slightly upward.

**11. REMOVAL OF AXLE ASSEMBLY**

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

**Caution**

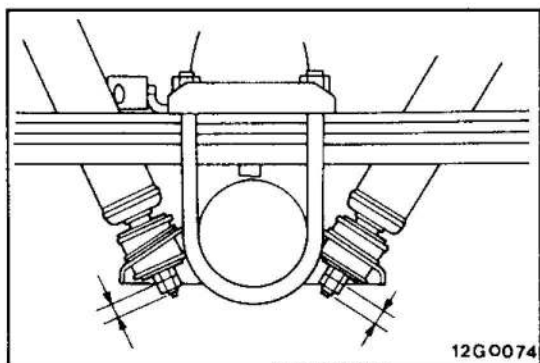
The axle assembly is unstable on the jack; be careful not to allow it to fall.

**SERVICE POINTS OF INSTALLATION**

E27JDAD

**8. INSTALLATION OF REAR PROPELLER SHAFT**

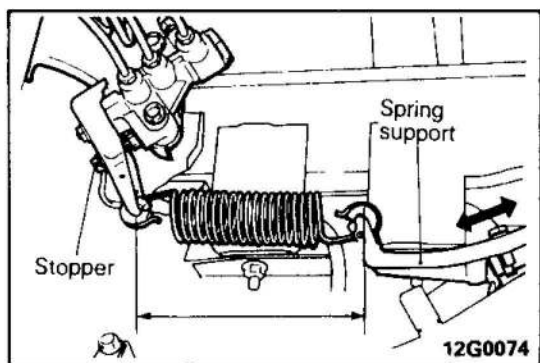
Align the mating marks on the flange yoke and the companion flange to install the rear propeller shaft.



**7. INSTALLATION OF SHOCK ABSORBER**

Tighten shock absorber mounting nuts to the standard dimensions shown in the drawing.

**Standard value: 7–8 mm (0.28–0.31 in.)**



**ADJUSTMENT OF LOAD SENSING SPRING LENGTH**

Install the spring support so that the distance between the lever of the load sensing proportioning valve and the spring support is standard value. (Refer to GROUP 35 SERVICE BRAKES—Service Adjustment Procedures)

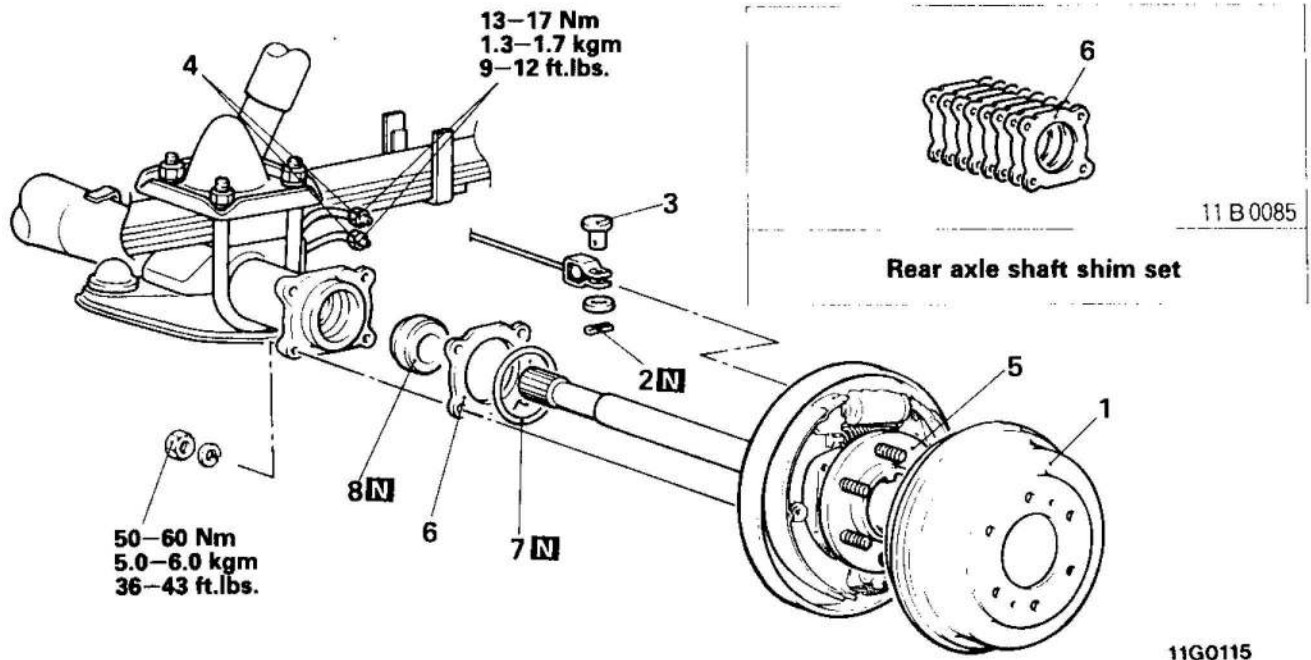
**Standard value: 176–179 mm (6.93–7.05 in.)**

**NOTE**

Adjust the dimensions in the drawing with the vehicle on the ground and without load.

## AXLE SHAFT (4WD)

### REMOVAL AND INSTALLATION



#### Post-installation Operation

- Bleeding of brake line (Refer to GROUP 35 SERVICE BRAKES—Service Adjustment Procedures.)
- Adjustment of parking brake lever stroke (Refer to GROUP 36 PARKING BRAKES—Service Adjustment Procedures.)

#### Removal steps

1. Brake drum
2. Split pin
3. Pin
- ◆◆ 4. Brake tubes connections
- ◆◆ 5. Axle shaft assembly
6. Shim
- ◆◆ 7. O-ring
- ◆◆ 8. Adjustment of axle shaft axial play
- ◆◆ 8. Oil seal

#### NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆ : Refer to "Service Points of Removal".
- (3) ◆◆ : Refer to "Service Points of Installation".
- (4) [N] : Non-reusable parts

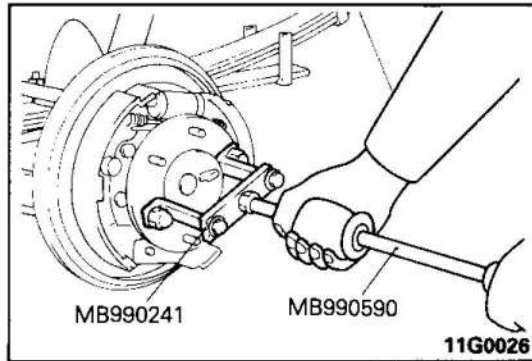
## SERVICE POINTS OF REMOVAL

E27HBAC

### 4. DISCONNECTION OF BRAKE TUBES

Before disconnecting the brake tube, drain the brake fluid from the bleeder screw at the right side of the rear brake.





**5. REMOVAL OF AXLE SHAFT ASSEMBLY**

- (1) Remove the nuts coupling the backing plate to the axle housing.
- (2) Pull axle shaft from axle housing. If difficult to pull, use special tools.

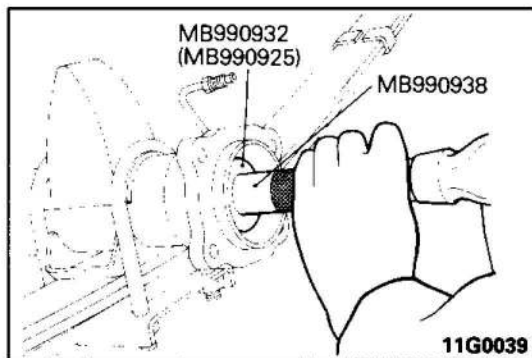
**Caution**

**Be careful not to damage the oil seal when pulling axle shaft.**

**INSPECTION**

E27HCAC

- Check the backing plate for deformation and damage.
- Check the wheel bearing for seizure and discoloration.
- Check the axle shaft for cracks, wear and damage.
- Check the oil seal of axle housing for damage.



**SERVICE POINTS OF INSTALLATION**

E27HDAD

**8. INSTALLATION OF OIL SEAL**

- (1) Apply specified grease on the contact surface between the axle housing and oil seal.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

- (2) Press the oil seal in with the special tool until correctly snugged into the axle housing.
- (3) Apply specified grease to the oil seal lip.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

• **ADJUSTMENT OF AXLE SHAFT AXIAL PLAY**

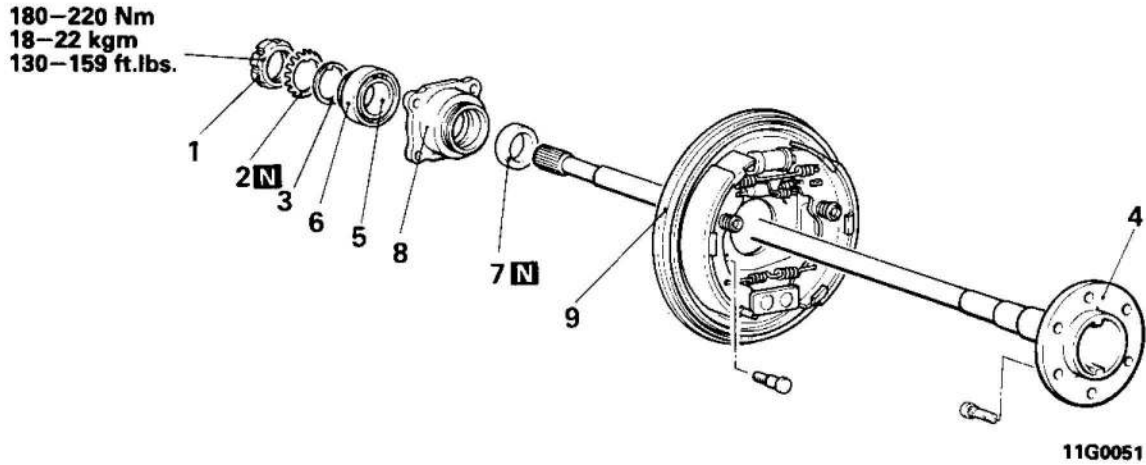
Backlash adjustment is performed when the axle shaft or wheel bearing is replaced.

When only removing and installing the axle shaft, use the same number and thickness of shims as previously used. (Refer to P.27-17.)



DISASSEMBLY AND REASSEMBLY <LOCK NUT TYPE>

E27HE-A 2

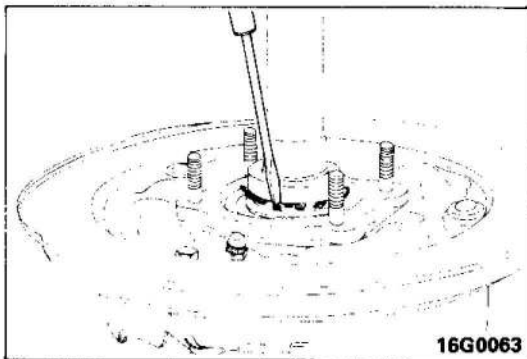


**Disassembly steps**

- ◆◆◆◆ 1. Lock nut
- ◆◆◆ 2. Lock washer
- ◆◆ 3. Washer
- ◆◆ 4. Axle shaft
- ◆◆ 5. Bearing inner race
- ◆◆◆◆ 6. Bearing outer race
- ◆◆◆ 7. Oil seal
- ◆◆◆ 8. Bearing case
- ◆◆◆ 9. Brake assembly

**NOTE**

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆◆ : Refer to "Service Points of Disassembly".
- (3) ◆◆◆ : Refer to "Service Points of Reassembly".
- (4) **N** : Non-reusable parts

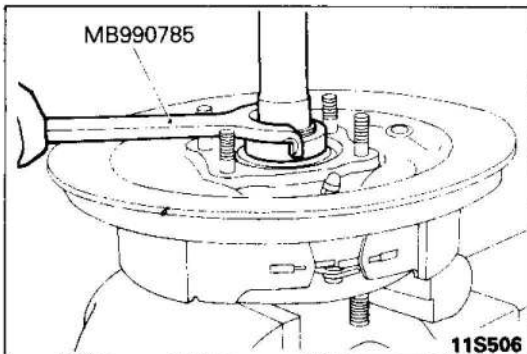


**SERVICE POINTS OF DISASSEMBLY**

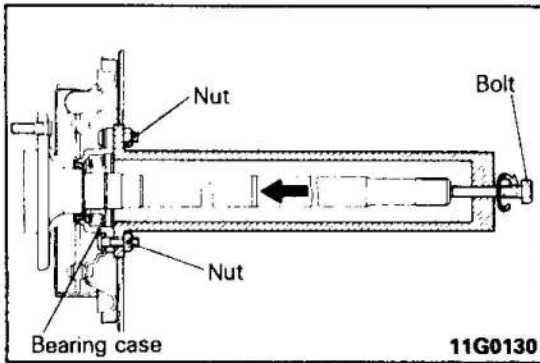
E27HFAC

**1. REMOVAL OF LOCK NUT**

- (1) Straighten the bent tab of the lock washer with the screwdriver.



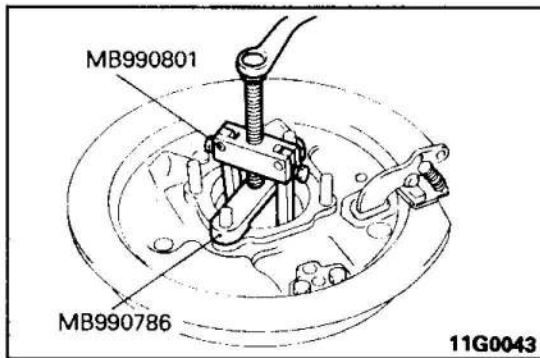
- (2) To remove the wheel bearing, first remove the lock washer then remove the lock nut, using special tool.
- (3) Remove lock washer and washer.



**4. REMOVAL OF AXLE SHAFT**

Remove bearing case assembly from the axle shaft with the special tool and follow these procedures.

- (1) Install MB990787 flange to the bearing case with nuts.
- (2) Place the special tool bolt tip to the axle shaft. Screw in the bolt and draw the axle shaft from bearing case assembly.



**6. REMOVAL OF BEARING OUTER RACE**

Use the special tool to draw the bearing outer race from the bearing case.

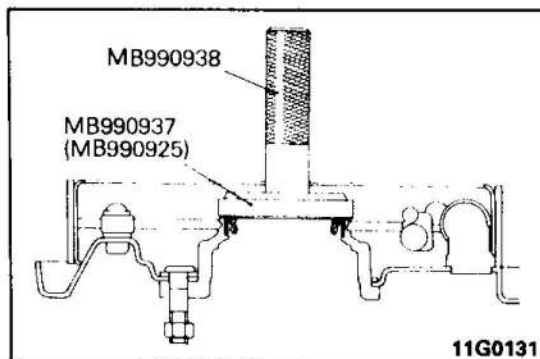
**SERVICE POINTS OF REASSEMBLY**

E27HAC

**7. INSTALLATION OF OIL SEAL**

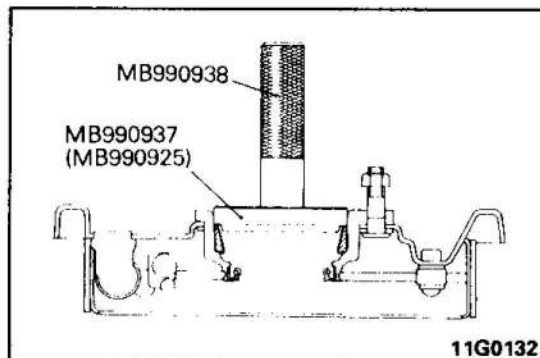
- (1) Apply the specified grease to the external surface of the new oil seal.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**



- (2) Using the special tools, press-fit the new oil seal into the bearing case until it is flush with the face of the bearing case.
- (3) Apply the specified grease to lips of the oil seal.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

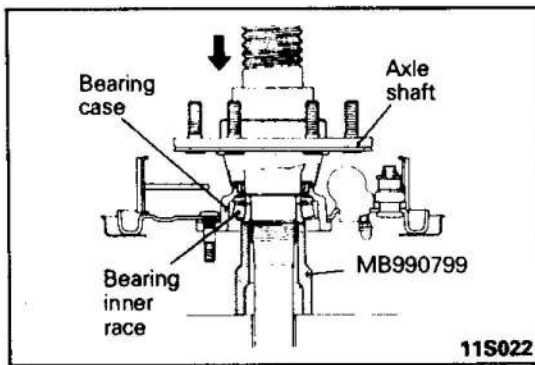


**6. INSTALLATION OF BEARING OUTER RACE**

- (1) Apply the specified grease to the external surface of the bearing outer race.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

- (2) Press-fit the bearing outer race into the bearing case.



### 5. INSTALLATION OF BEARING INNER RACE

- (1) Apply the specified grease to the roller surfaces of the bearing inner race.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

- (2) Install the rear brake assembly attached with bearing case and the bearing inner race in that order to the axle shaft.
- (3) Press-fit the bearing inner race into the axle shaft by using the special tool.
- (4) Pack the bearing case with the specified grease.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

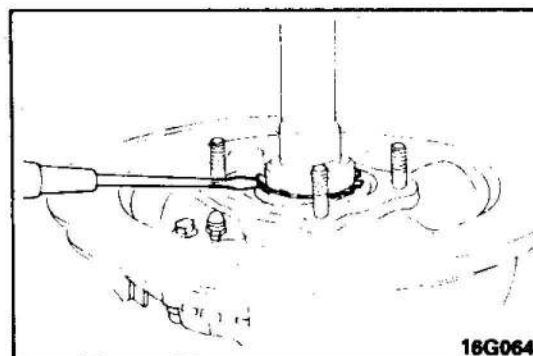
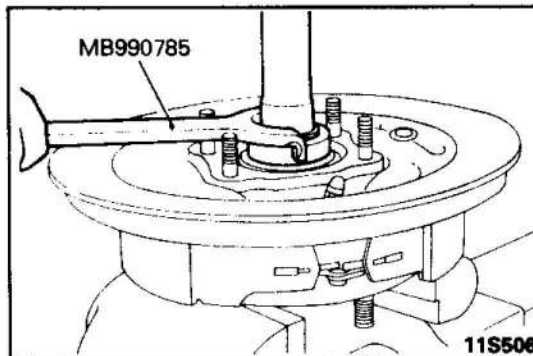
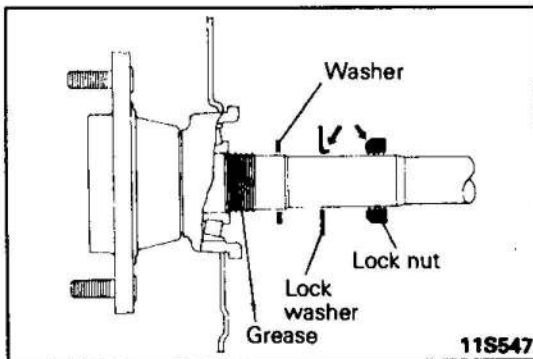
### 3. INSTALLATION OF WASHER/2. LOCK WASHER/1. LOCK NUT

Install these parts with care as described below.

- (1) Apply the specified grease to the thread portion of the axle shaft to which the locking nut is installed.

**Specified grease: Multipurpose grease SAE J310, NLGI No. 2**

- (2) Align the washer tab with the slot of the axle shaft to install the washer.
- (3) Align the lock washer tab with the slot of the axle shaft to install the lock washer as figure.
- (4) Install the lock nut with its chamfering in the directions shown in the illustration.



- (5) Tighten the lock nut to the specified torque by using the special tool.

- (6) Bend the tab of the lock washer into the slot of the lock nut.

#### NOTE

If the slot in the nut and the tab of the lock washer are out of alignment, turn the lock nut in until they are in alignment.

DISASSEMBLY AND REASSEMBLY (RETAINER RING TYPE)

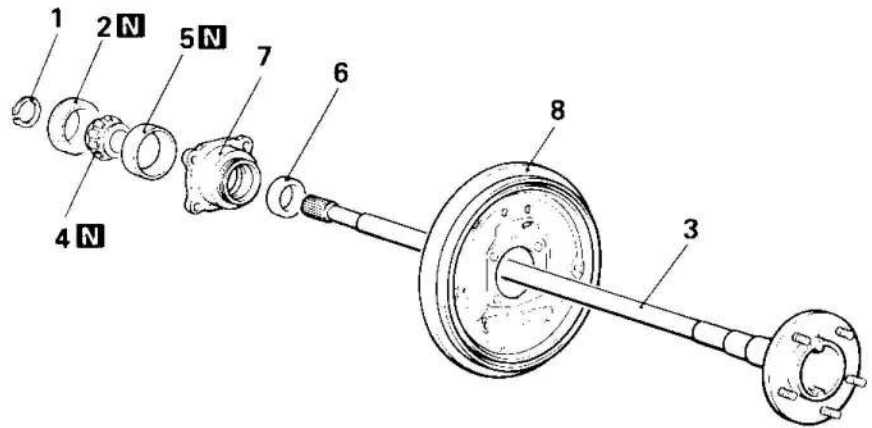
E27HE-B2

**Pre-disassembly and Post-reassembly Operation**

- Remove and install shoes from backing plate (Refer to GROUP 35—Rear Drum Brake Shoe).

**Disassembly steps**

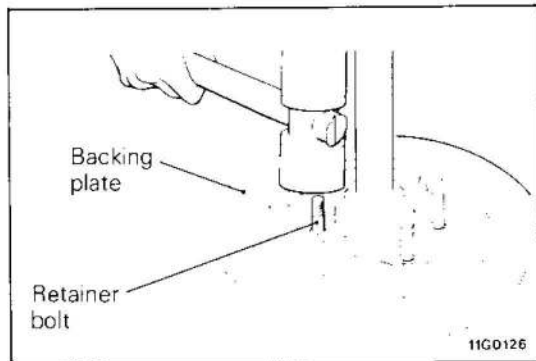
- ◆◆◆ 1. Snap ring
- ◆◆◆◆ 2. Retainer ring
- ◆◆◆◆◆ 3. Axle shaft
- ◆◆◆◆◆ 4. Bearing inner race
- ◆◆◆◆◆ 5. Bearing outer race
- ◆◆◆ 6. Oil seal
- ◆◆◆◆ 7. Bearing case
- ◆◆◆◆◆ 8. Backing plate



11G0195

**NOTE**

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆◆: Refer to "Service Points of Disassembly".
- (3) ◆◆◆◆: Refer to "Service Points of Reassembly".
- (4) [N]: Non-reusable parts



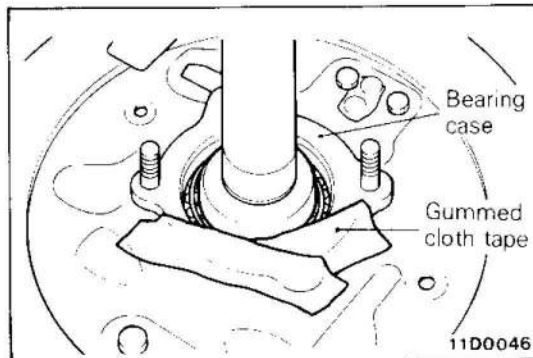
11G0126

**SERVICE POINTS OF DISASSEMBLY**

E27HFAE2

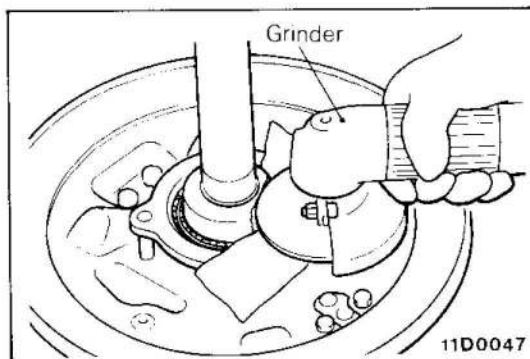
**2. REMOVAL OF RETAINER RING**

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



11D0046

- (2) Push down the bearing case all the way to the cover side.
- (3) Apply gummed cloth tape around the edge of the bearing case for protection.

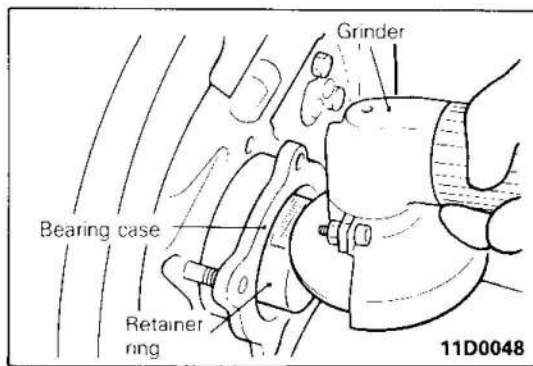


11D0047

- (4) 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 ring and the side of bearing become approximately 1.0–1.5 mm (0.039–0.059 in.) and 2.0 mm (0.079 in.) respectively.

**Caution**

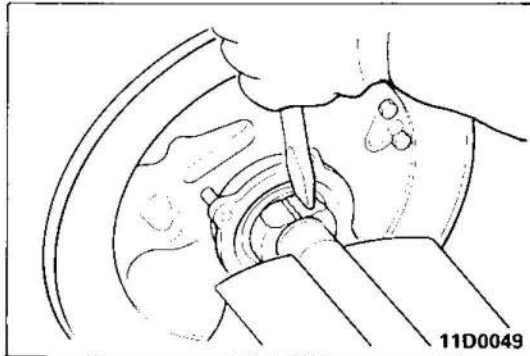
**Be careful not to damage the bearing case and the axle shaft.**



- (5) Fix the axle shaft and shave off the remaining 2.0 mm (0.078 in.) on the side of the bearing of the retainer ring.

**Caution**

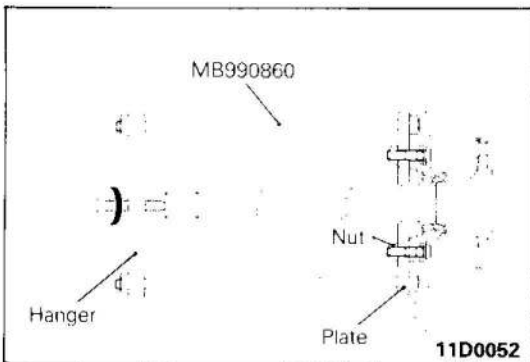
**Be careful not to damage the bearing case and the axle shaft.**



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

**Caution**

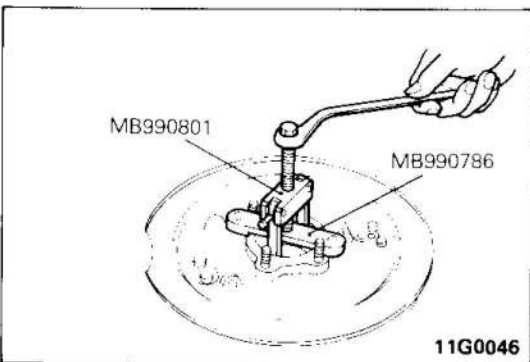
**Be careful not to damage the axle shaft.**

**3. REMOVAL OF AXLE SHAFT**

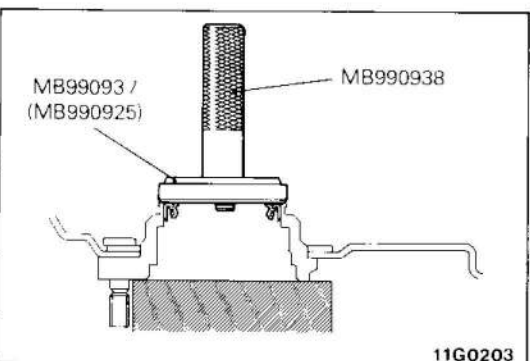
- (1) Set the special tool by fixing its plate to the bearing case as shown in the figure.
- (2) Place the special tool bolt tip to the centre of shaft. Screw in the bolt and pull the axle shaft from the bearing case assembly.

**Caution**

**Set the hanger parallel with the plate.**

**5. REMOVAL OF BEARING OUTER RACE**

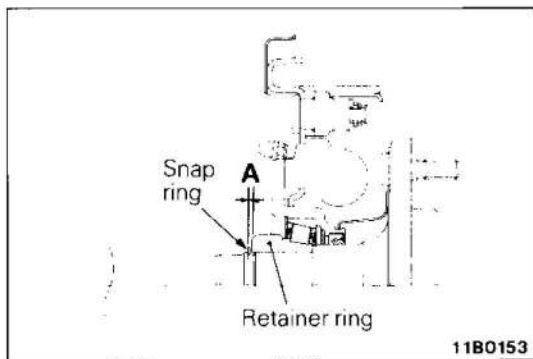
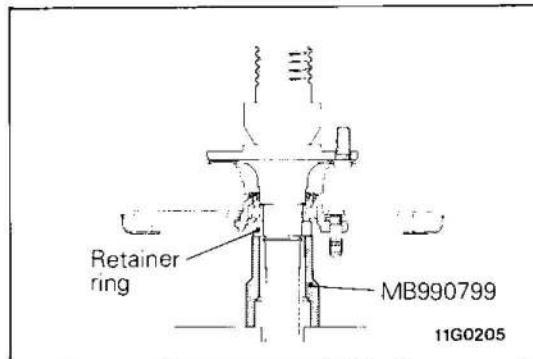
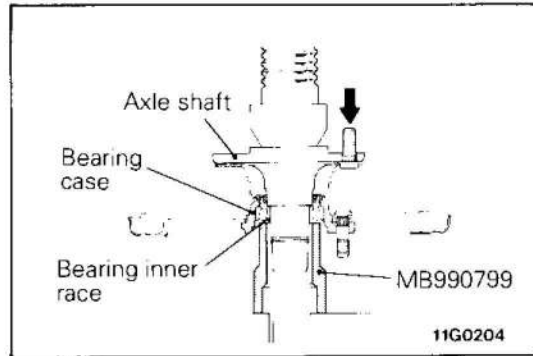
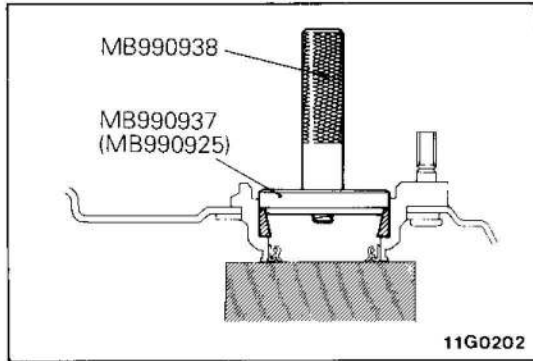
- (1) Remove the oil seal from the bearing case.
- (2) Use the special tool to draw the bearing outer race from the bearing case.

**SERVICE POINTS OF REASSEMBLY**

E27HHAH

**6. PRESS-FITTING OF OIL SEAL**

- (1) Apply the multipurpose grease to the external periphery of the oil seal.
- (2) Press-fit the oil seal into the bearing case until it is flush with the face of the bearing case by using the special tools.
- (3) Apply the multipurpose grease to the lips of the oil seal.



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

**5 . PRESS-FITTING OF BEARING OUTER RACE**

- (1) Apply the multipurpose grease to the external periphery of the bearing outer race.
- (2) Press-fit the bearing outer race into the bearing case by using the special tools.

**4 . INSTALLATION OF BEARING INNER RACE/ 3 . AXLE SHAFT**

- (1) Apply the multipurpose grease to the roller surfaces of the bearing inner race.
- (2) Install the bearing case and the bearing inner race in that order to the axle shaft.
- (3) Press-fit the bearing inner race into the axle shaft by using the special tool.
- (4) Pack the bearing case with the multipurpose grease.

**2 . PRESS-FITTING OF RETAINER RING**

Use a special tool, and pressing in the retainer to the axle shaft, confirm whether or not the pressure input is in the standard value.  
 In case the initial pressure input is less than the standard value, replace the axle shaft.

**Standard value:**  
**Middle pressure input 50,000 N (5,000 kg, 11,023 lbs) or more**  
**Final pressure input 80,000 N (8,000 kg, 17,637 lbs) or more**

**NOTE**  
 The retainer ring is to be cold press-fitting, and in case the middle pressure input is less than the standard value, replace the axle shaft.

**1 . INSTALLATION OF SNAP RING**

- (1) After press-fitting the retainer ring, fix the snap ring to the bezel of the axle shaft, measure the clearance (the measure shown on fig. A) between the retainer ring and the snap ring with a thickness gauge and confirm whether or not the pressure input is in the standard value.

**Standard value (A): 0.166 mm (0.0065 in.) or less**

- (2) In case the clearance (A) between the snap ring and the retainer ring is more than the standard value, select a snap ring by referring to the list as shown on the left side and make an adjustment so that the clearance (A) comes into the standard value.

27-34-4

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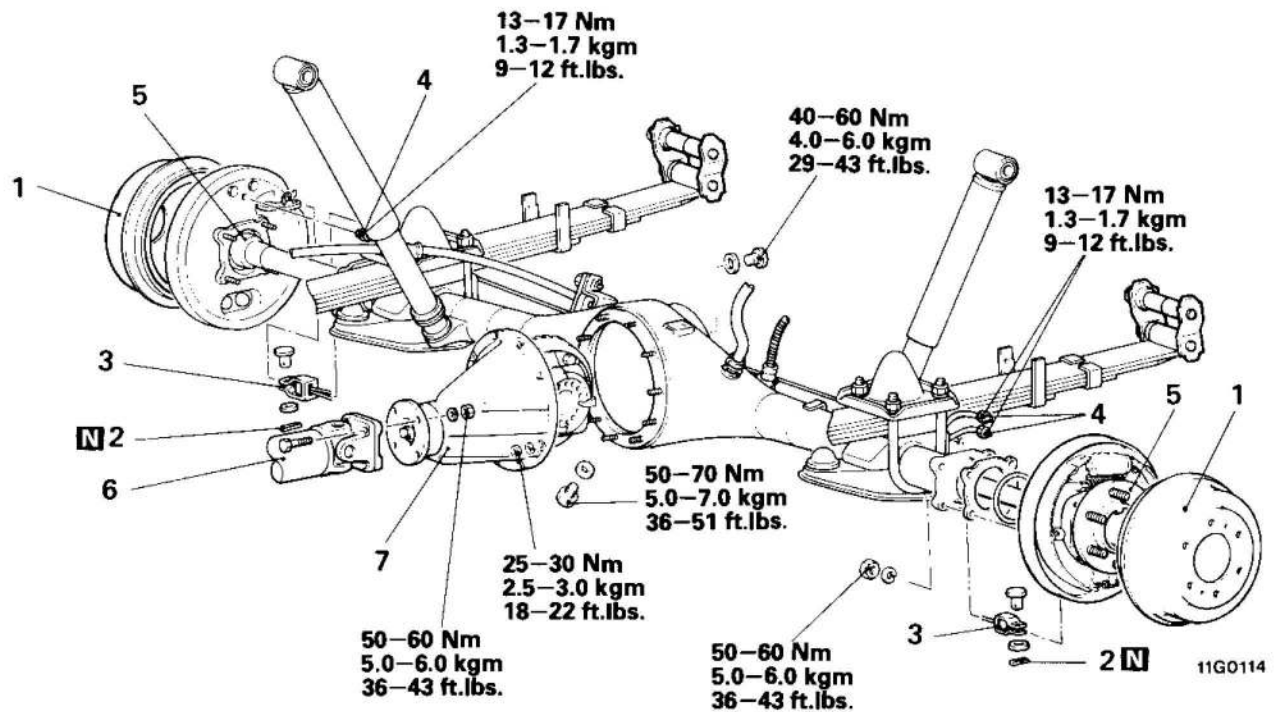
NOTES



**DIFFERENTIAL CARRIER ASSEMBLY (4WD)**

E270A--

**REMOVAL AND INSTALLATION**



**Removal steps**

1. Brake drums
2. Split pin
3. Parking brake cable and backing plate connection
- ◆◆ 4. Brake tubes and backing plate connection
- ◆◆◆◆ 5. Axle shaft assembly
- ◆◆◆◆ 6. Propeller shaft
- ◆◆◆◆ 7. Differential carrier assembly

**Pre-removal Operation**

- Drainage of differential gear oil

**Post-installation Operation**

- Air bleeding of brake line (Refer to GROUP 35 SERVICE BRAKES—Service Adjustment Procedures.)
- Adjustment of parking brake pull rod (Refer to GROUP 36 PARKING BRAKES—Service Adjustment Procedures.)
- Filling differential gear oil (Refer to P. 27-15)

**NOTE**

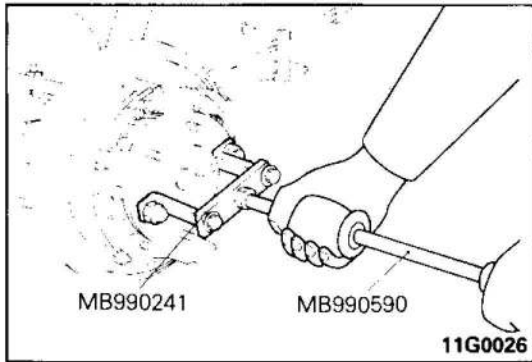
- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆ : Refer to "Service Points of Removal".
- (3) ◆◆◆ : Refer to "Service Points of Installation".
- (4) [N] : Non-reusable parts

**SERVICE POINTS OF REMOVAL**

E270BAE

**4. DISCONNECTION OF BRAKE TUBES AND BACKING PLATE**

Before disconnecting the brake tube, drain the brake fluid from the bleeder screw at the right side of the rear brake.

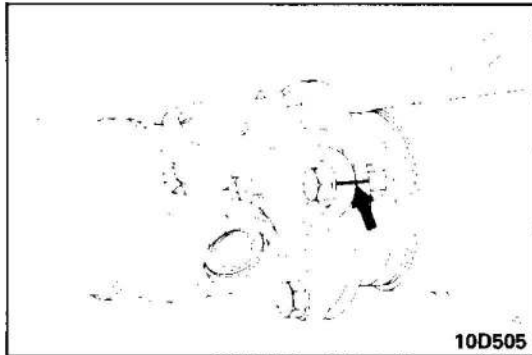


### 5. REMOVAL OF AXLE SHAFT ASSEMBLY

- (1) Remove the nuts coupling the backing plate to the axle housing.
- (2) Pull axle shaft from axle housing. If difficult to pull, use special tools.

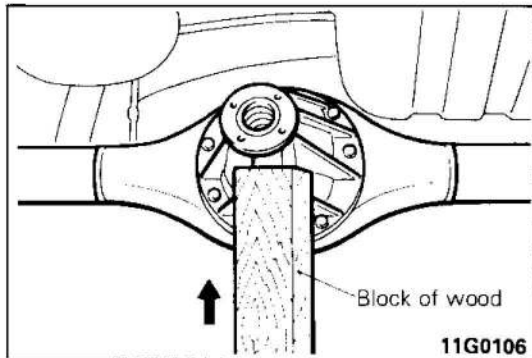
#### Caution

**Be careful not to damage the oil seal when pulling axle shaft.**



### 6. REMOVAL OF PROPELLER SHAFT

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



### 7. REMOVAL OF DIFFERENTIAL CARRIER ASSEMBLY

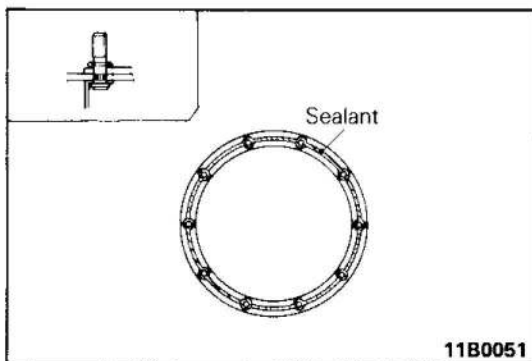
- (1) Loosen the coupling nuts. Gently tap the differential carrier assembly free from the axle housing with a block of wood.

#### NOTE

Loosen coupling nuts to the end of the stud bolts, but do not completely remove.

#### Caution

**Do not tap the companion flange when freeing differential carrier.**



### SERVICE POINTS OF INSTALLATION

E27QCAG

### 7. APPLICATION OF SEALANT TO DIFFERENTIAL CARRIER ASSEMBLY

Apply specified sealing agent on axle housing flange surface as shown in the drawing, and install differential carrier assembly.

**Specified sealant: 3M ATD Part No. 8663, 8661 or equivalent**

### 6. INSTALLATION OF PROPELLER SHAFT

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

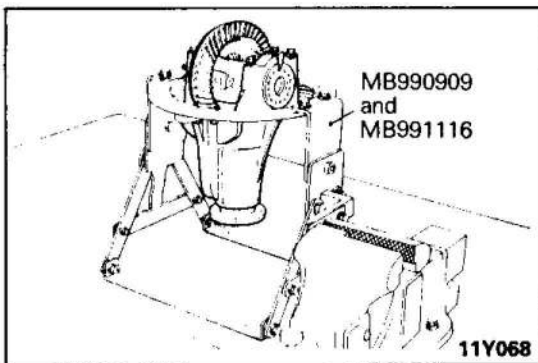
**Specified sealant: 3M ATD Part No. 8663, 8661 or equivalent**

### 5. INSTALLATION OF AXLE SHAFT ASSEMBLY

- (1) Apply sealing agent on axle housing and bearing case faces.

**Specified sealant: 3M ATD Part No. 8663, 8661 or equivalent**

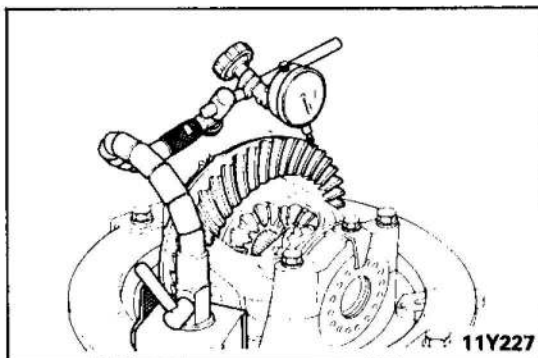
- (2) Install new O-ring, and install axle shaft assembly.



**INSPECTION BEFORE DISASSEMBLY**

E270DAG

Fix the special tool into a vice and install differential gear assembly, and carry out the following inspections.



**1. FINAL DRIVE GEAR BACKLASH**

Check the final drive gear backlash by the following procedure.

- (1) Place dial gauge on the drive gear tooth face.  
Fix the drive pinion and move the drive gear to check backlash is within the standard range.

**NOTE**

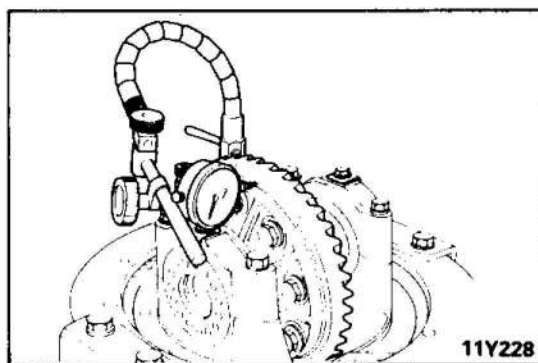
Measure at 4 points on the gear periphery.

**Standard value: 0.11–0.16 mm (0.0043–0.0063 in.)**

- (2) Adjust with the side bearing nuts if backlash values are not within standard range.

**NOTE**

After adjusting, check the state of the final drive gear's tooth contact.



**2. DRIVE GEAR RUNOUT**

Check displacement of the gear back face as follows:

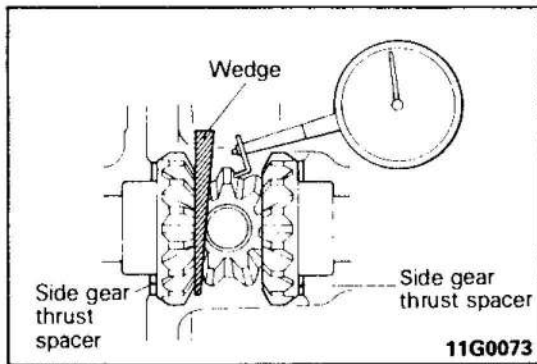
- (1) Place dial gauge on the back face of the drive gear and rotate the drive gear to check displacement is within allowable limits.

**Limit: 0.05 mm (0.0020 in.)**

- (2) If displacement exceeds allowable limit, check for foreign object between the gear back face and differential case, or for loose drive gear fixing bolts.
- (3) If nothing is wrong in check (2), change the matching position of the drive gear to the differential case, and remeasure.

**NOTE**

If these adjustments are unsuccessful, replace the case or install new drive gear/drive pinion set



### 3. DIFFERENTIAL GEAR BACKLASH (EXCEPT LIMITED SLIP DIFFERENTIAL)

Check differential gear backlash as follows:

- (1) Insert a wedge between the side gear and pinion shaft or thrust block to lock the side gears.  
Apply dial gauge on the pinion gear (by extending the measurement rod) and check backlash is within the standard range.

**NOTE**

Measure both pinion gears.

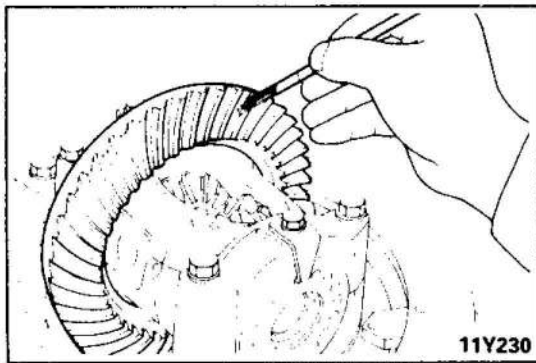
**Standard value: 0.01–0.076 mm (0.0004–0.0030 in.)**

**Limit: 0.2 mm (0.0079 in.)**

- (2) If the backlash values exceed the allowable limit, adjust with the side gear thrust spacer.

**NOTE**

If adjustment is impossible, replace side gear and pinion gears as a set.



### 4. FINAL DRIVE GEAR TOOTH CONTACT

Check the final drive gear tooth contact by following the steps below.

- (1) Apply a thin, uniform coat of machine blue to both surfaces of the drive gear teeth.
- (2) Insert a brass rod between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear, so that the revolution torque [approximately 250–300 Ncm (25–30 kgcm, 28–33 in.lbs.)] is applied to the drive pinion.

**Caution**

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

- (3) Check the tooth-contact condition of the drive gear and drive pinion.

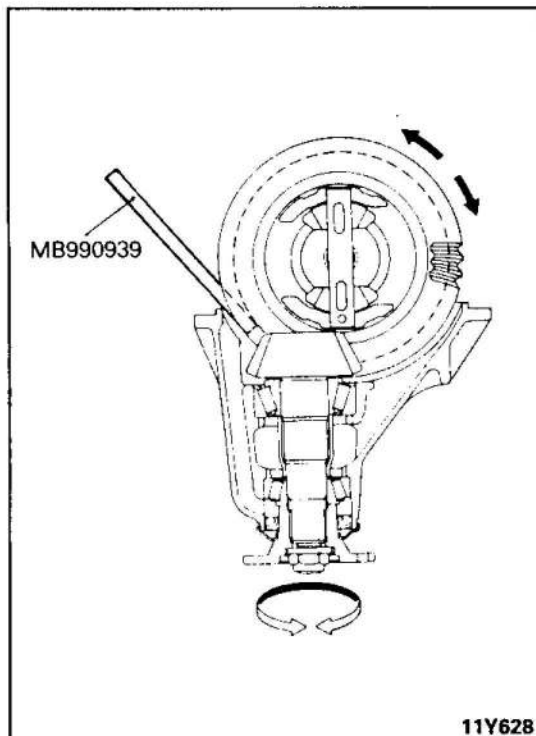
**NOTE**

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

If, after adjustments have been made, the correct tooth contact pattern cannot be obtained, it means that the drive gear and the drive pinion have become worn beyond the allowable limit. Replace the gear set.

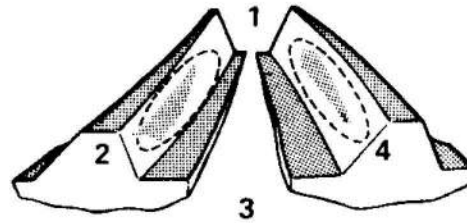
**Caution**

**If either the drive gear or the drive pinion is to be replaced, be sure to replace both gears as a set.**



**Standard tooth contact pattern**

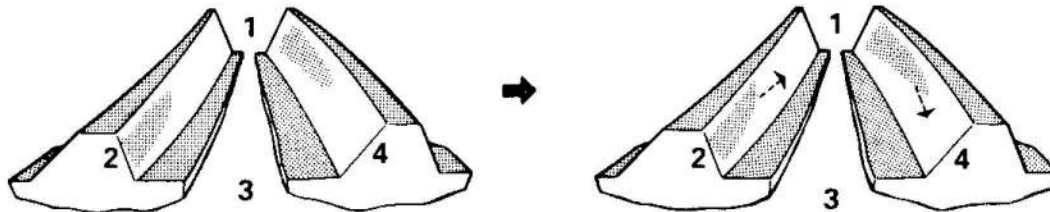
- 1 Toe
- 2 Drive-side
- 3 Heel
- 4 Coast-side



Problem

Solution

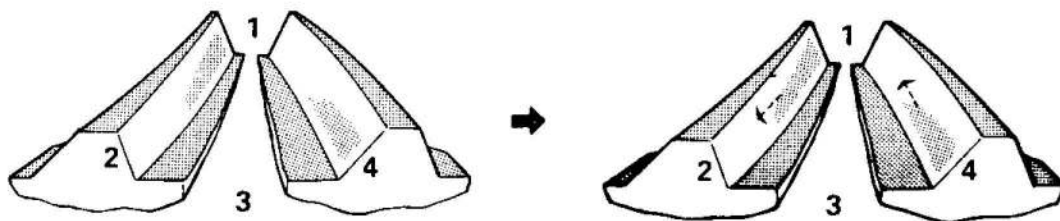
**Tooth contact pattern resulting from excessive pinion height**



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

Increase the thickness of the pinion height adjusting shim, and position the drive pinion closer to the center of the drive gear. Also, for backlash adjustment, position the drive gear farther from the drive pinion.

**Tooth contact pattern resulting from insufficient pinion height**



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

Decrease the thickness of the pinion height adjusting shim, and position the drive pinion farther from the center of the drive gear. Also, for backlash adjustment, position the drive gear closer to the drive pinion.

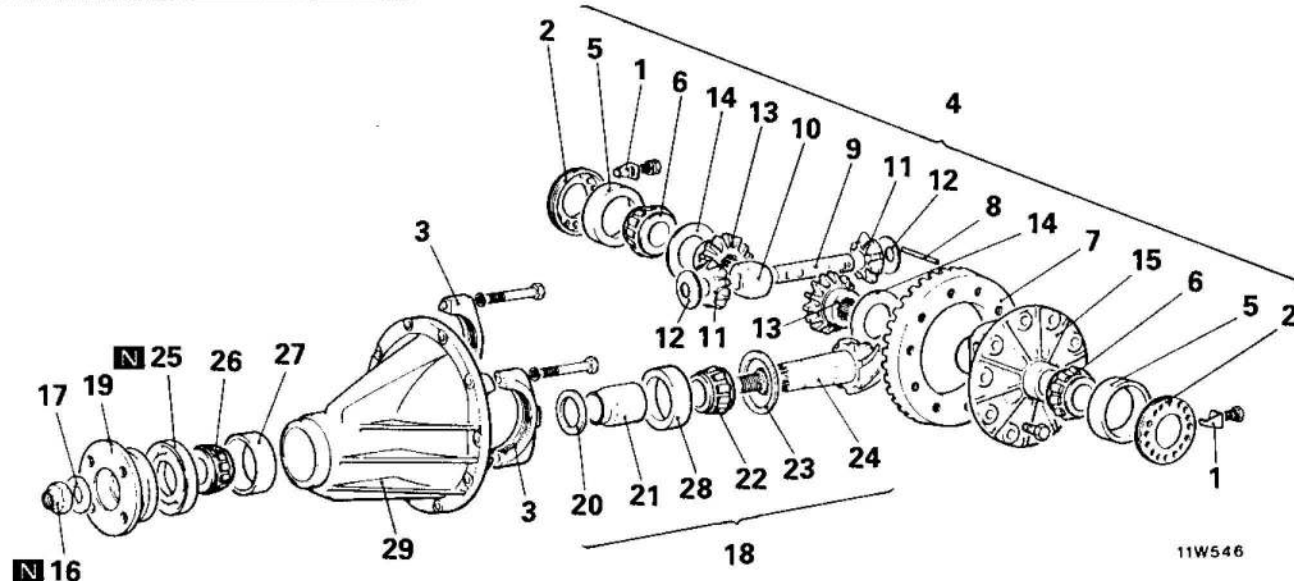
## DIFFERENTIAL CARRIER (CONVENTIONAL TYPE)

## DISASSEMBLY

E270E--

**Inspection Before Disassembly**

- Final drive gear backlash (Refer to P.27-37)
- Drive gear runout (Refer to P.27-37)
- Differential gear backlash (Refer to P.27-38)
- Final drive gear tooth contact (Refer to P.27-38)



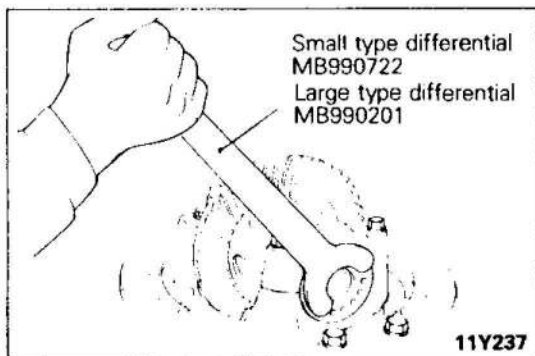
11W546

**Disassembly steps**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Lock plate</li> <li>◆◆ 2. Side bearing nut</li> <li>3. Bearing cap</li> <li>◆◆ 4. Differential case assembly</li> <li>5. Side bearing outer race</li> <li>◆◆ 6. Side bearing inner race</li> <li>◆◆ 7. Drive gear</li> <li>◆◆ 8. Lock pin</li> <li>9. Pinion shaft</li> <li>10. Thrust block (except P01V)</li> <li>11. Pinion gear</li> <li>12. Pinion washer</li> <li>13. Side gear</li> <li>14. Side gear thrust spacer</li> <li>15. Differential case</li> <li>◆◆ 16. Self-locking nut</li> <li>17. Washer</li> </ul> | <ul style="list-style-type: none"> <li>◆◆ 18. Drive pinion assembly</li> <li>19. Companion flange</li> <li>20. Drive pinion front shim (for preload adjustment)</li> <li>21. Drive pinion spacer</li> <li>◆◆ 22. Drive pinion rear bearing inner race</li> <li>◆◆ 23. Drive pinion rear shim (for pinion height adjustment shim)</li> <li>24. Drive pinion</li> <li>25. Oil seal</li> <li>◆◆ 26. Drive pinion front bearing inner race</li> <li>◆◆ 27. Drive pinion front bearing outer race</li> <li>◆◆ 28. Drive pinion rear bearing outer race</li> <li>29. Gear carrier</li> </ul> |
|---|--|

**NOTE**

- (1) ◆◆ : Refer to "Service Points of Disassembly".  
 (2) N : Non-reusable parts



11Y237

**SERVICE POINTS OF DISASSEMBLY**

E270FAC

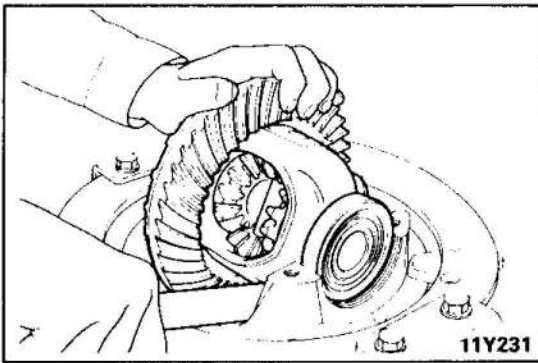
**2. REMOVAL OF SIDE BEARING NUT**

Using the special tool, remove the side bearing nut.

**NOTE**

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



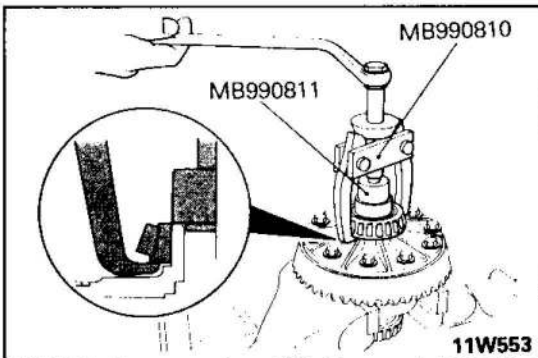


**4. REMOVAL OF DIFFERENTIAL CASE ASSEMBLY**

Take out the differential case assembly with hammer handles.

**NOTE**

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

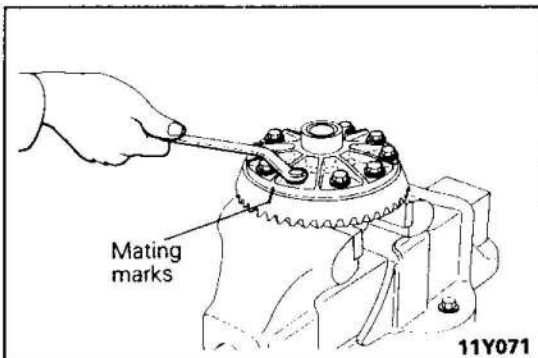


**6. REMOVAL OF SIDE BEARING INNER RACE**

Using the special tools, pull off the side bearing inner races.

**NOTE**

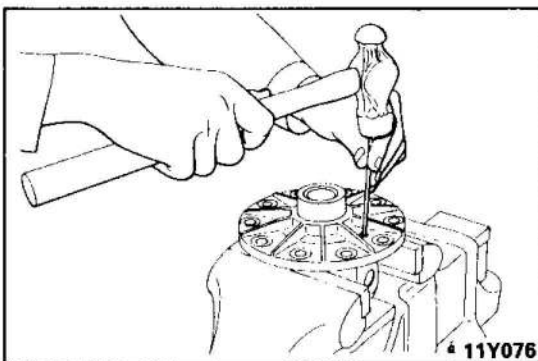
Hook the special tool claw to the side bearing inner race, using the 2 notches on the differential case side.



**7. 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.

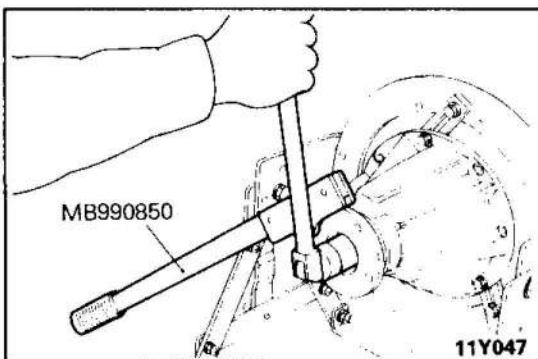


**8. REMOVAL OF LOCK PIN**

Drive out the lock pin with a punch.

**NOTE**

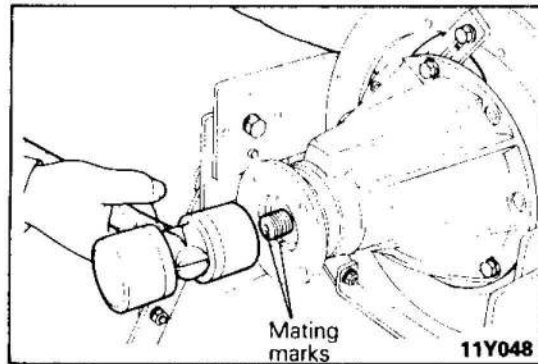
The removed side gears and side gear thrust spacers, left and right, should be retained for reassembly.



**16. REMOVAL OF SELF-LOCKING NUT**

Use the special tools to hold the companion flange and remove the companion flange self-locking nut.



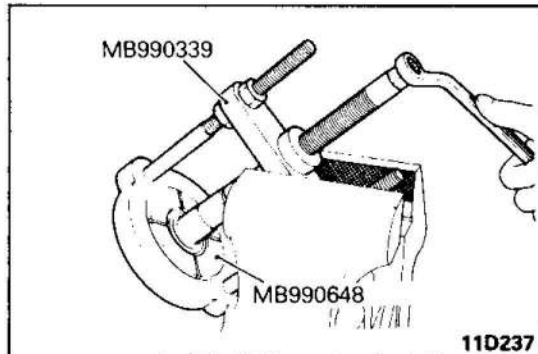
**18. REMOVAL OF DRIVE PINION ASSEMBLY**

- (1) Make the mating marks to the drive pinion and companion flange.

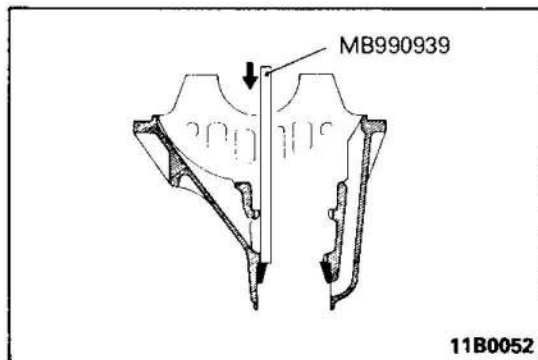
**Caution**

The mating mark made on the companion flange must not be on the coupling surface of the flange yoke and the propeller shaft.

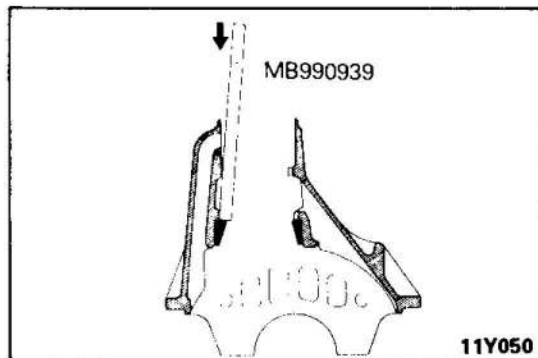
- (2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.

**22. REMOVAL OF DRIVE PINION REAR BEARING INNER RACE**

Pull out the drive pinion rear bearing inner race by using the special tools.

**27. REMOVAL OF DRIVE PINION FRONT BEARING OUTER RACE**

Drive out the drive pinion front bearing outer race from the gear carrier.

**28. REMOVAL OF DRIVE PINION REAR BEARING OUTER RACE**

Drive out the drive pinion rear bearing outer race from the gear carrier.

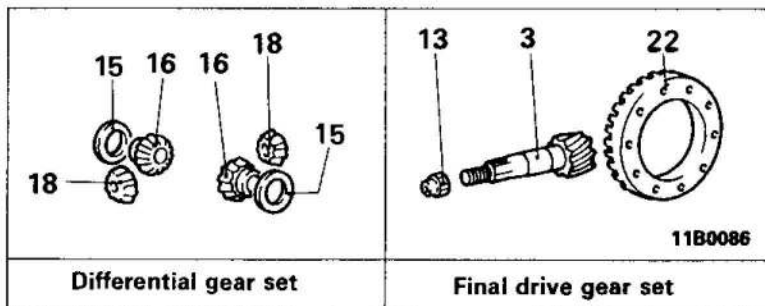
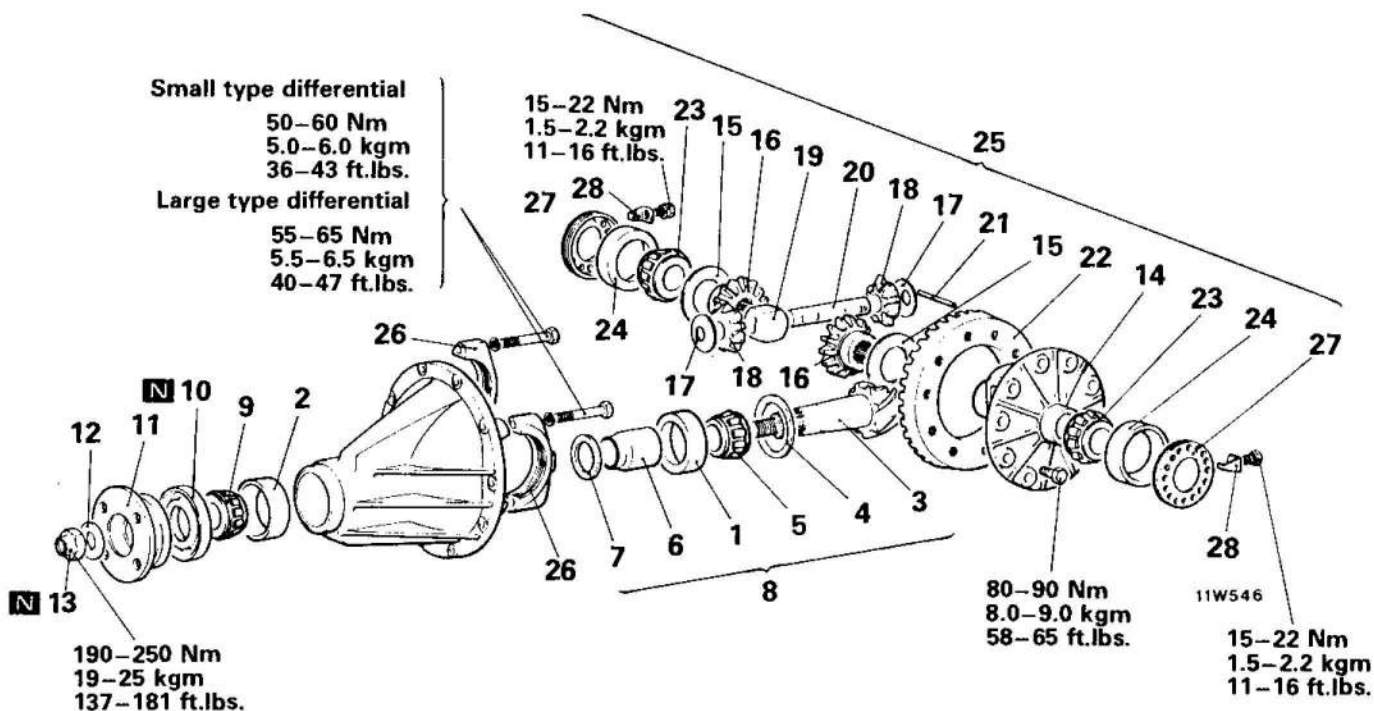
**INSPECTION**

E270GAD

- Check the companion flange for wear or damage.
- Check the bearings for wear or discoloration.
- Check the gear carrier for cracks.
- Check the drive pinion and drive gear for wear or cracks.
- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.

REASSEMBLY

E270E--



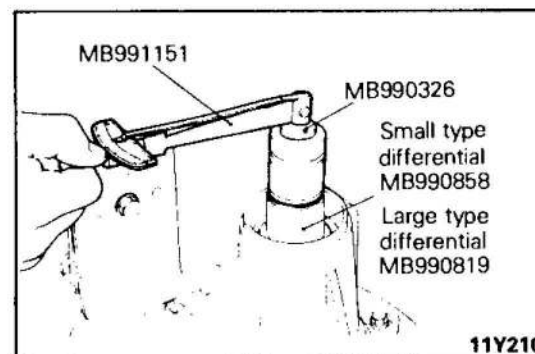
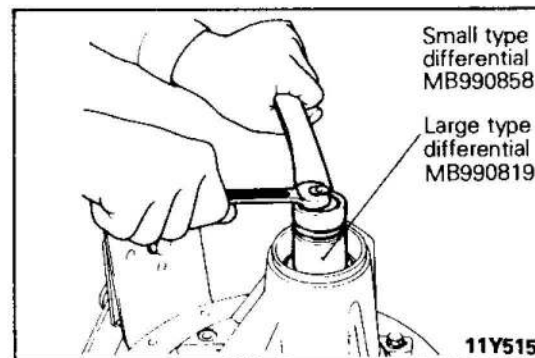
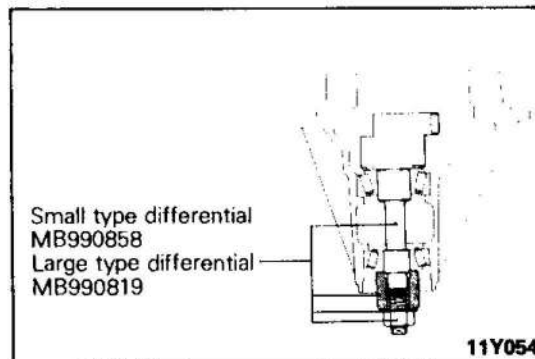
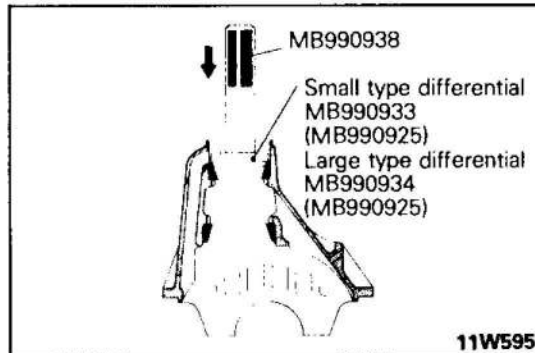
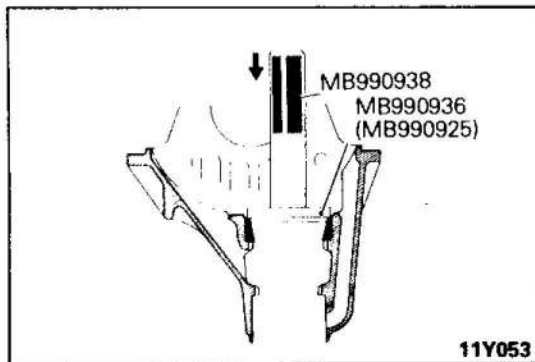
Reassembly steps

- ◆◆ 1. Drive pinion rear bearing outer race
- ◆◆ 2. Drive pinion front bearing outer race
- ◆◆ Adjustment of pinion height
- 3. Drive pinion
- 4. Drive pinion rear shim (for pinion height adjustment shim)
- 5. Drive pinion rear bearing inner race
- 6. Drive pinion spacer
- ◆◆ Adjustment of drive pinion preload
- 7. Drive pinion front shim (for preload adjustment)
- 8. Drive pinion assembly
- 9. Drive pinion front bearing inner race
- 10. Oil seal
- 11. Companion flange
- 12. Washer
- 13. Self-locking nut
- 14. Differential case

- ◆◆ Adjustment of differential gear backlash
- 15. Side gear thrust spacer
- 16. Side gear
- 17. Pinion washer
- 18. Pinion gear
- 19. Thrust block (except P01V)
- 20. Pinion shaft
- ◆◆ 21. Lock pin
- ◆◆ 22. Drive gear
- ◆◆ 23. Side bearing inner race
- 24. Side bearing outer race
- 25. Differential case assembly
- ◆◆ 26. Bearing cap
- ◆◆ Adjustment of final drive gear backlash
- 27. Side bearing nut
- 28. Lock plate

NOTE

- (1) ◆◆ : Refer to "Service Points of Reassembly".
- (2) N : Non-reusable parts



## SERVICE POINTS OF REASSEMBLY

E27QHAD

## 1. INSTALLATION OF DRIVE PINION REAR BEARING OUTER RACE

Press-fit the drive pinion rear bearing outer race into the gear carrier.

**Caution**

**Perform press-fitting carefully so as not to tilt the outer race.**

## 2. INSTALLATION OF DRIVE PINION FRONT BEARING OUTER RACE

Press-fit the drive pinion front bearing outer race into gear carrier.

**Caution**

**Perform press-fitting carefully so as not to tilt the outer race.**

## • ADJUSTMENT OF 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.

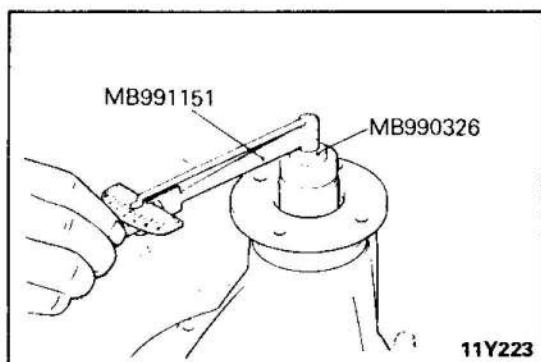
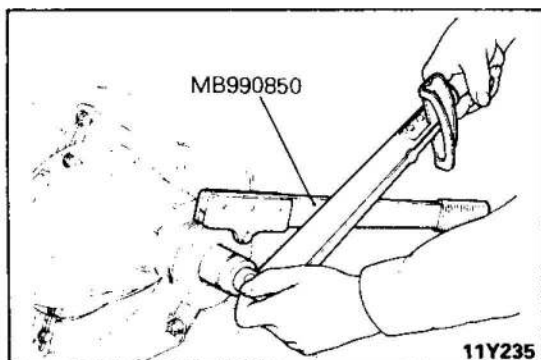
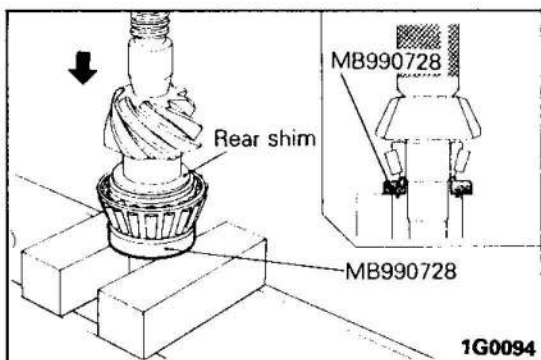
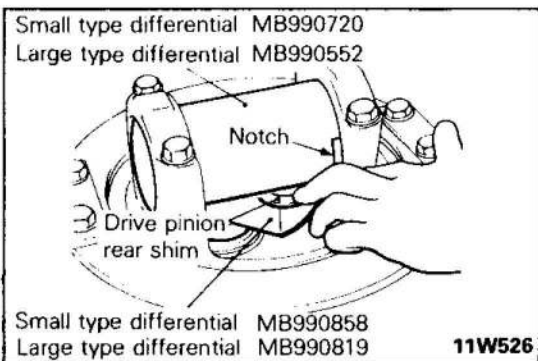
- (2) Tighten the nut of the special tool until standard value of drive pinion turning torque is obtained.

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

**Standard value: 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**

Be sure to clean the side bearing seat thoroughly. When positioning the special tool, be sure that the cut-out sections of the special tool are in the 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)

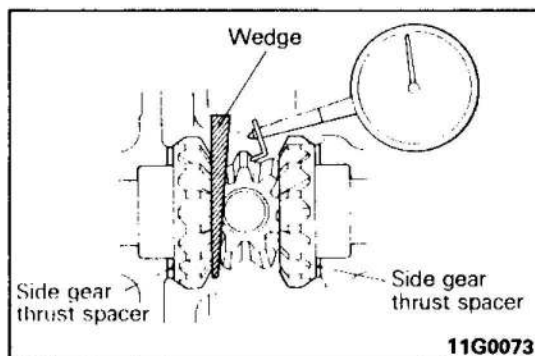
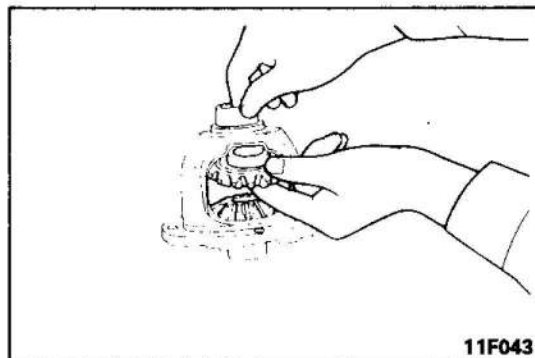
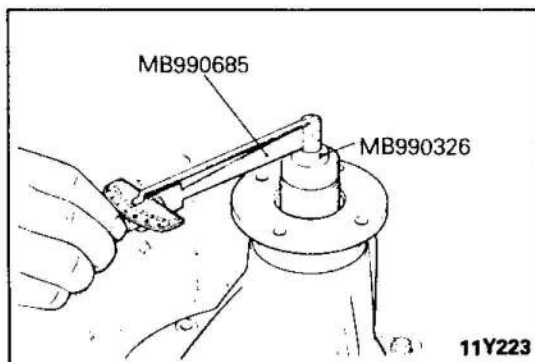
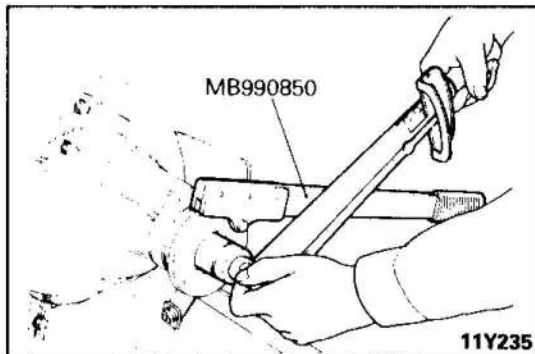
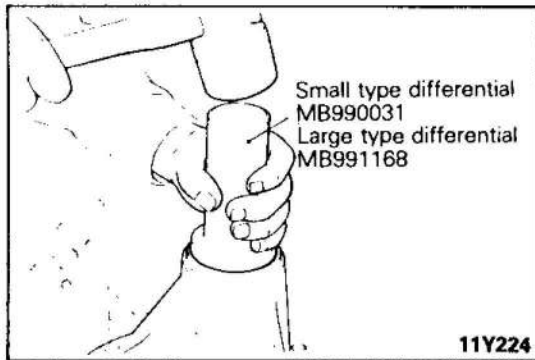
**Standard value: 0.4–0.5 Nm  
(4.0–5.0 kgcm, 3.5–4.3 In.lbs.)**

- (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.

- (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 specified grease to the oil seal lip.

**Specified grease: Multipurpose grease SAE J310,  
NLGI No.2**

- (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:****Small type differential:**

0.6–0.7 Nm (6.0–7.0 kgcm, 5.2–6.1 in.lbs.)

**Large type differential:**

0.65–0.75 Nm (6.5–7.5 kgcm, 5.6–6.5 in.lbs.)

- **ADJUSTMENT OF DIFFERENTIAL GEAR BACKLASH**

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: 0.01–0.076 mm (0.0004–0.0030 in.)**

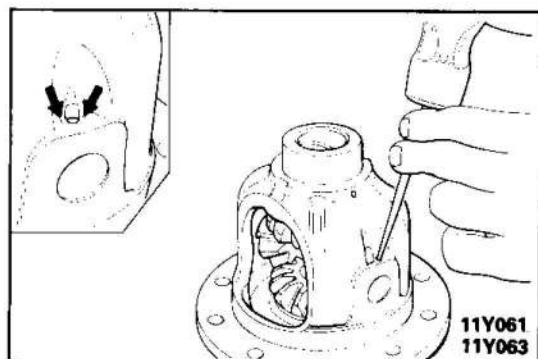
**Limit: 0.2 mm (0.0079 in.)**

**NOTE**

Measure both pinion gears.

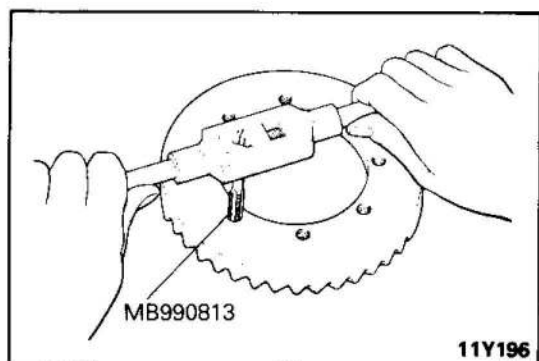


- (5) If the differential gear backlash exceeds the limit, adjust the backlash by installing thicker side gear thrust spacers.
- (6) Measure the differential gear backlash once again, and confirm that it is within the limit.  
If adjustment is not possible, replace the side gears and pinion gears as a set.



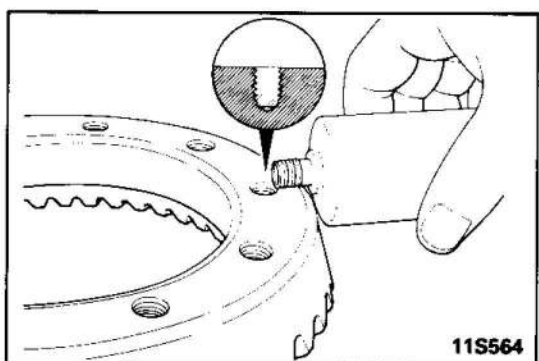
**21. INSTALLATION OF LOCK PIN**

- (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.



**22. INSTALLATION OF DRIVE GEAR**

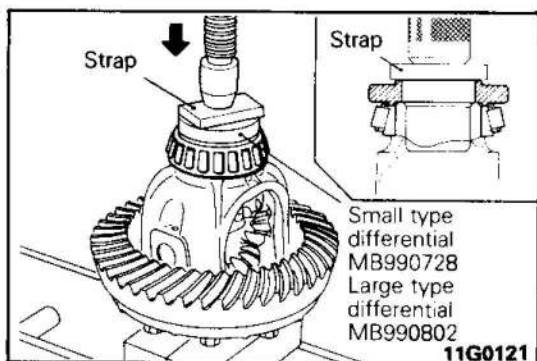
- (1) Clean the drive gear attaching bolts.
- (2) Remove the adhesive adhered to the threaded holes of the drive gear by turning the special tool (tap M10×1.25), and then clean the threaded holes by applying compressed air.



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

**Specified adhesive: 3M Stud Locking Part No. 4170 or equivalent**

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

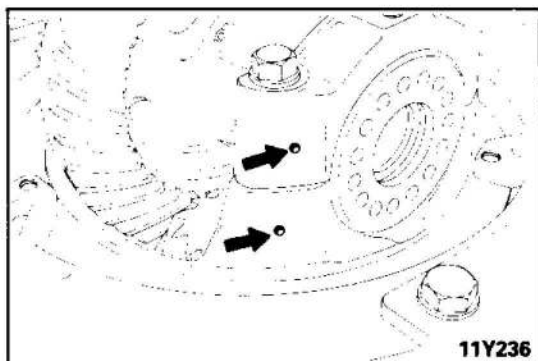


**23. PRESS-FIT OF SIDE BEARING INNER RACE**

Press-fit the side bearing inner races to the differential case by using the special tool.

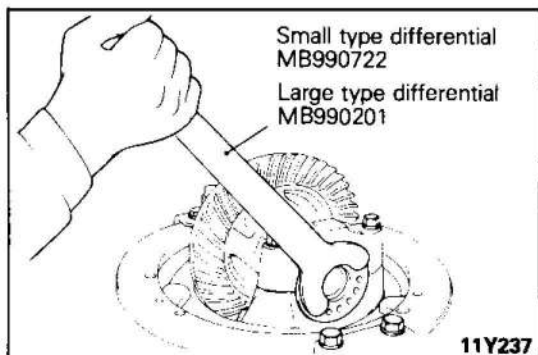
**Caution**

**When only one side bearing inner race is installed, be sure to only place load on the differential case.**



## 26. INSTALLATION OF BEARING CAP

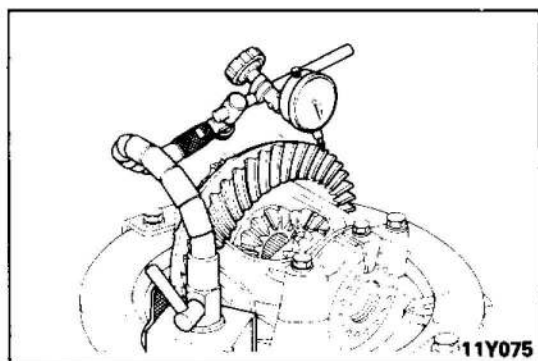
Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap.



## • 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.

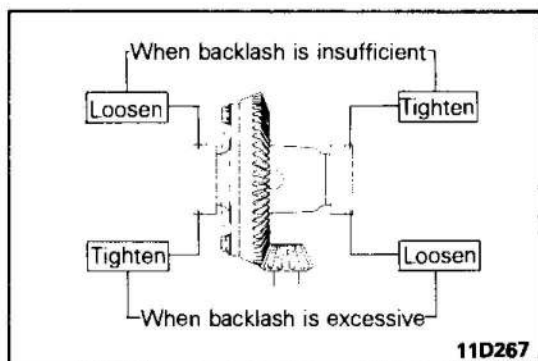


- (2) Measure the final drive gear backlash.

**Standard value: 0.11–0.16 mm (0.0043–0.0063 in.)**

### NOTE

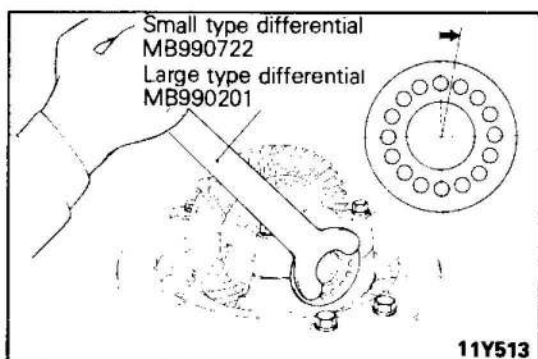
Measure at least 4 points on the drive gear periphery.



- (3) Using the special tool (MB990722 or MB990201), adjust the backlash to standard value by moving the side bearing nut as shown.

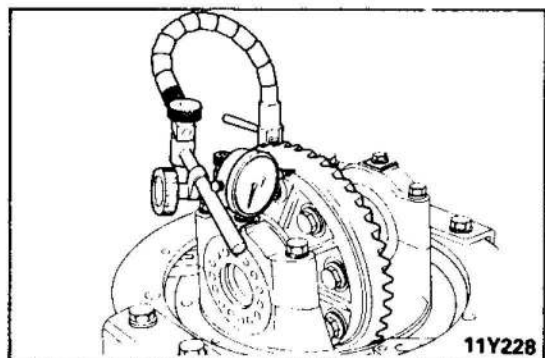
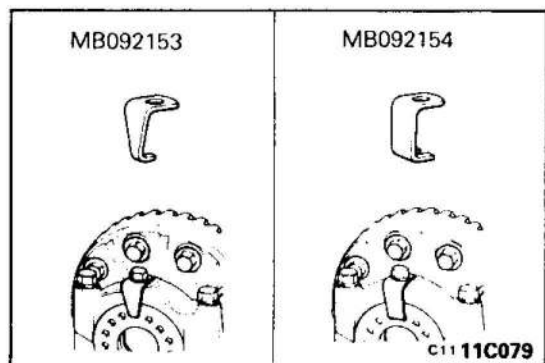
### NOTE

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 centers of two neighboring holes.





- (5) Choose and install the lock plates (two kinds).
- (6) Check the final drive gear tooth contact. If poor contact is evident, make adjustment. (Refer to P. 27-38).

- (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 reinstalling them.

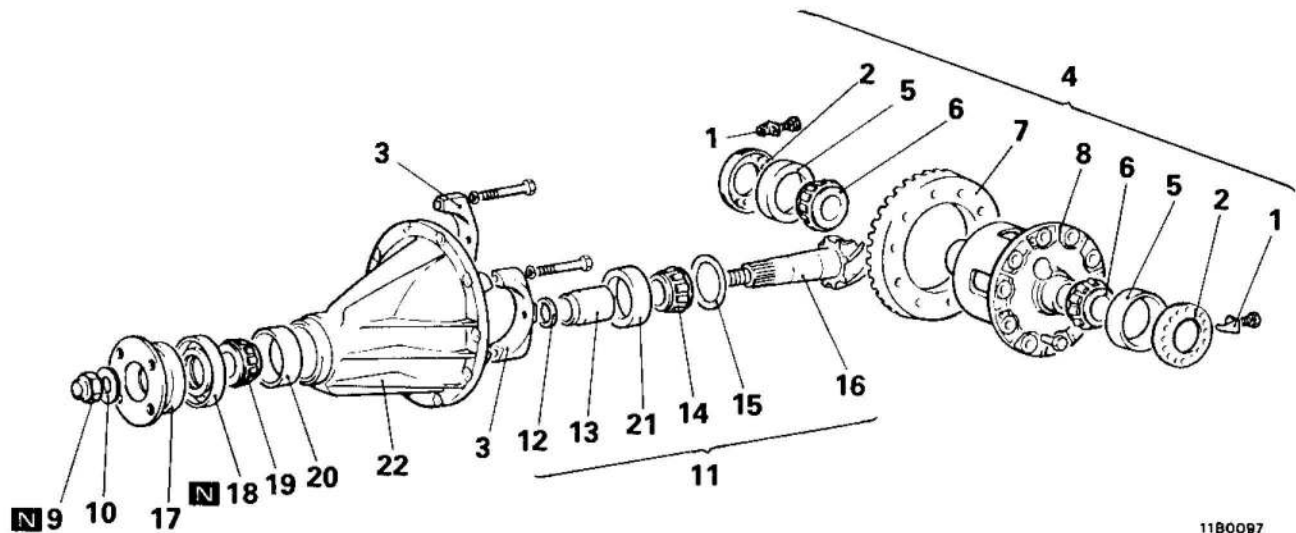
## DIFFERENTIAL CARRIER (LIMITED SLIP TYPE)

## DISASSEMBLY

E27TE--

**Inspection Before Disassembly**

- Final drive gear backlash (Refer to P.27-37)
- Drive gear runout (Refer to P.27-37)
- Final drive gear tooth contact (Refer to P.27-38)



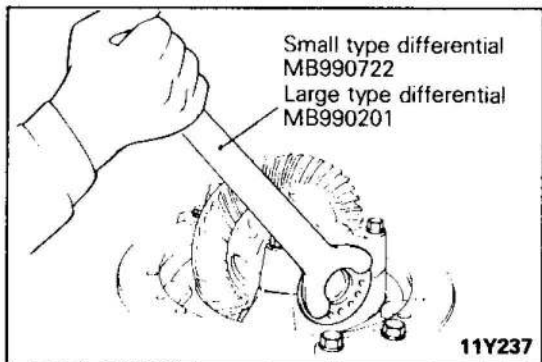
11B0097

**Disassembly steps**

1. Lock plate
- ◆◆ 2. Side bearing nut
- ◆◆ 3. Bearing cap
- ◆◆ 4. Differential case assembly
- ◆◆ 5. Side bearing outer race
- ◆◆ 6. Side bearing inner race
- ◆◆ 7. Drive gear
- ◆◆ 8. Limited slip differential case assembly
- ◆◆ 9. Self-locking nut
- ◆◆ 10. Washer
- ◆◆ 11. Drive pinion assembly
- ◆◆ 12. Drive pinion front shim (for preload adjustment)
- ◆◆ 13. Drive pinion spacer
- ◆◆ 14. Drive pinion rear bearing inner race
- ◆◆ 15. Drive pinion rear shim (for pinion height adjustment)
- ◆◆ 16. Drive pinion
- ◆◆ 17. Companion flange
- ◆◆ 18. Oil seal
- ◆◆ 19. Drive pinion front bearing inner race
- ◆◆ 20. Drive pinion front bearing outer race
- ◆◆ 21. Drive pinion rear bearing outer race
- ◆◆ 22. Gear carrier

**NOTE**

- (1) ◆◆ : Refer to "Service Points of Disassembly".  
 (2) N : Non-reusable parts



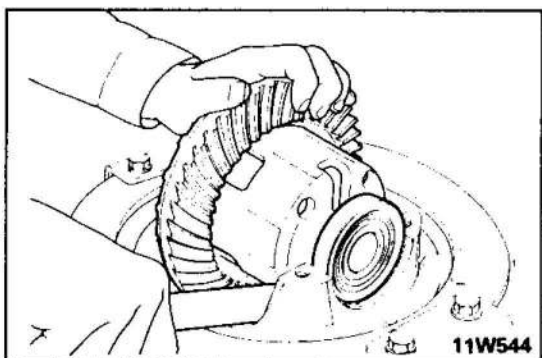
**SERVICE POINTS OF DISASSEMBLY**

**2. REMOVAL OF SIDE BEARING NUT**

Using the special tool, remove the side bearing.

**NOTE**

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

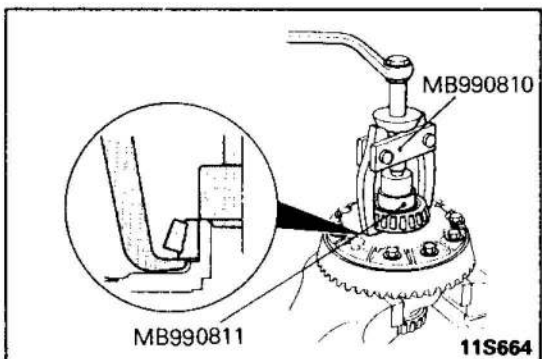


**4. REMOVAL OF DIFFERENTIAL CASE ASSEMBLY**

Take out the differential case assembly with hammer handles.

**NOTE**

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

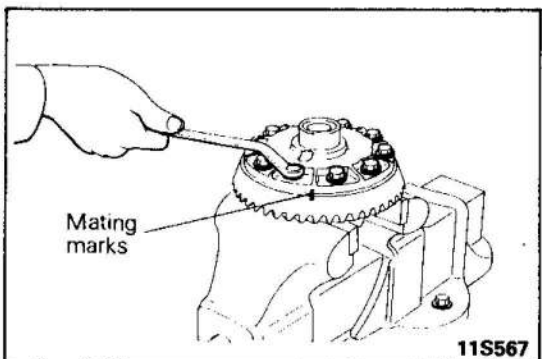


**6. REMOVAL OF SIDE BEARING INNER RACE**

Using the special tools, pull off the side bearing inner races.

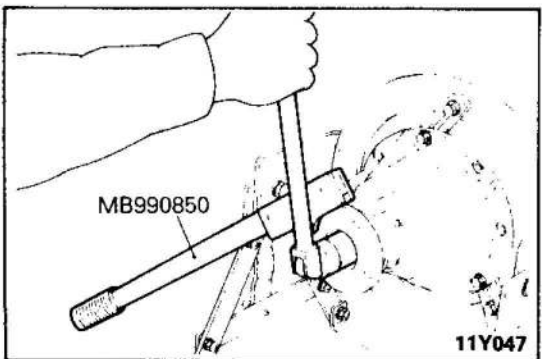
**NOTE**

Hook the special tool claw to the side bearing inner race, using the 2 notches on the differential case side.



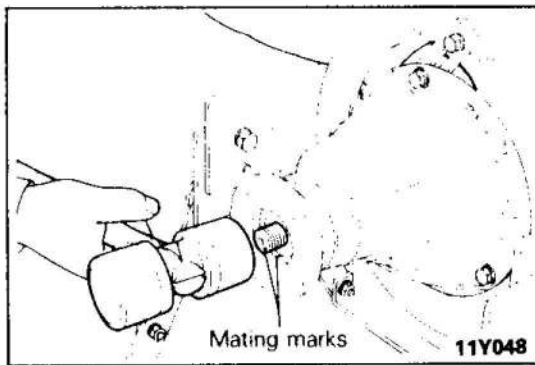
**7. REMOVAL OF DRIVE GEAR**

- (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.



**9. REMOVAL OF SELF-LOCKING NUT**

Use the special tools to hold the companion flange and remove the companion flange self-locking nut.

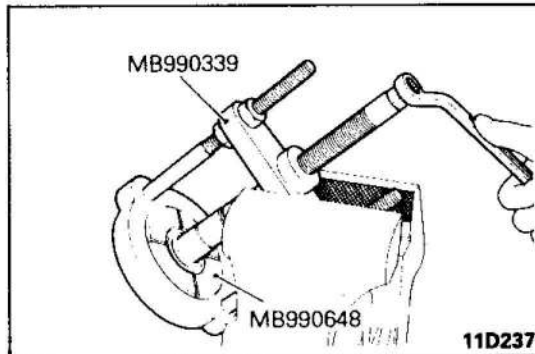
**11. REMOVAL OF DRIVE PINION ASSEMBLY**

- (1) Make the mating marks to the drive pinion and companion flange.

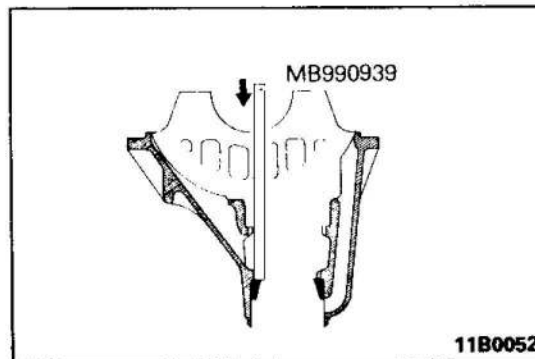
**Caution**

The mating mark made on the companion flange must not be on the coupling surface of the flange yoke and the propeller shaft.

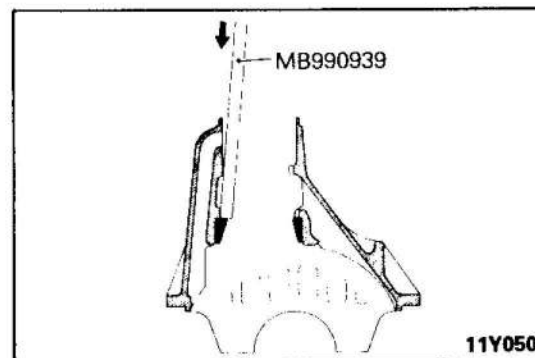
- (2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.

**14. REMOVAL OF DRIVE PINION REAR BEARING INNER RACE**

Pull out the drive pinion rear bearing inner race by using the special tools.

**20. REMOVAL OF DRIVE PINION FRONT BEARING OUTER RACE**

Drive out the drive pinion front bearing outer race from the gear carrier.

**21. REMOVAL OF DRIVE PINION REAR BEARING OUTER RACE**

Drive out the drive pinion rear bearing outer race from the gear carrier.

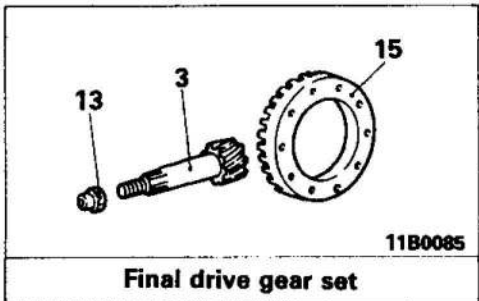
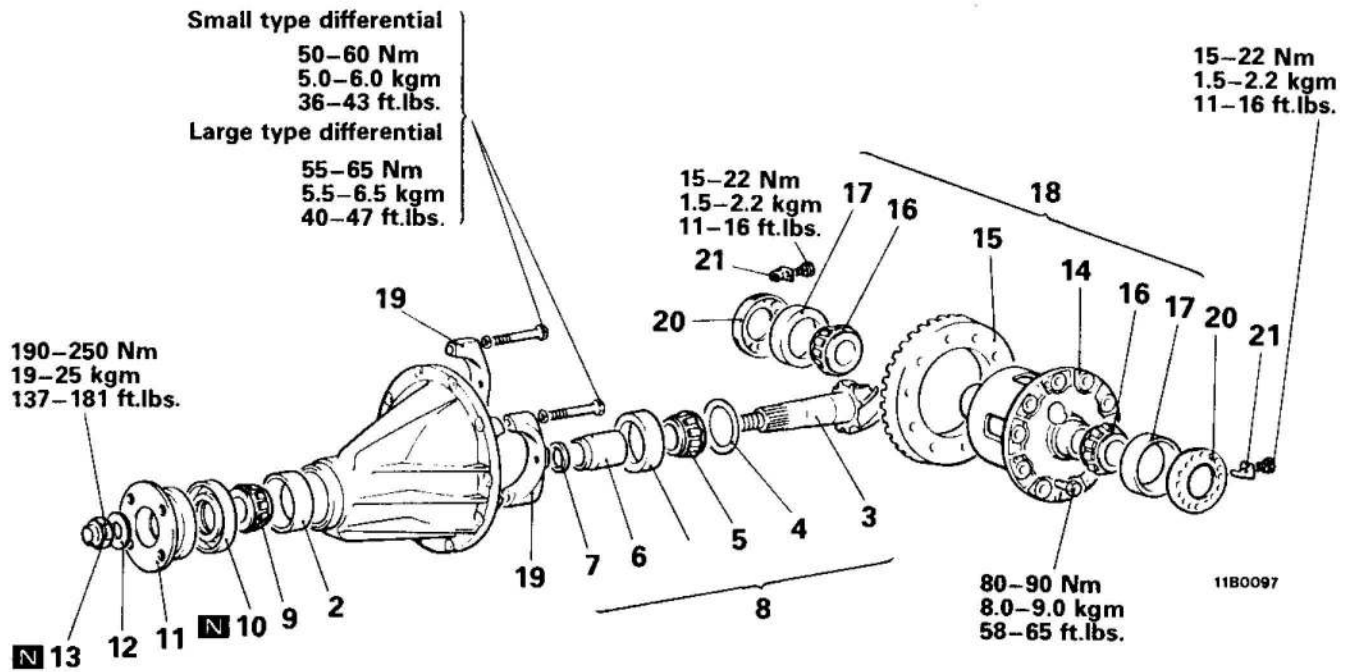
**INSPECTION**

E27TGAE

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

- Check the companion flange for wear or damage.
- Check the bearings for wear or discoloration.
- Check the gear carrier for cracks.
- Check the drive pinion and drive gear for wear or cracks.

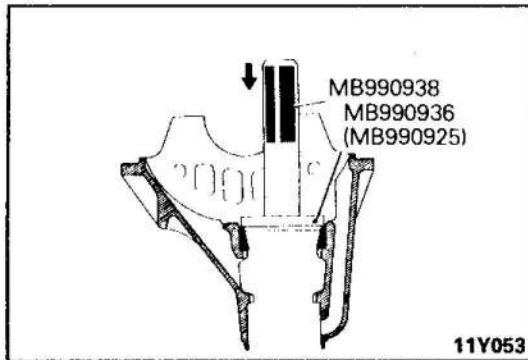
REASSEMBLY



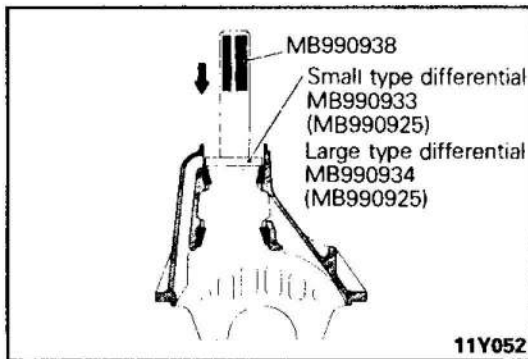
Reassembly steps

- ◆◆ 1. Drive pinion rear bearing outer race
- ◆◆ 2. Drive pinion front bearing outer race
- ◆◆ Adjustment of pinion height
- 3. Drive pinion
- 4. Drive pinion rear shim (for pinion height adjustment)
- 5. Drive pinion rear bearing inner race
- 6. Drive pinion spacer
- ◆◆ Adjustment of drive pinion preload
- 7. Drive pinion front shim (for preload adjustment)
- 8. Drive pinion assembly
- 9. Drive pinion front bearing inner race
- 10. Oil seal
- 11. Companion flange
- 12. Washer
- 13. Self-locking nut
- 14. Limited slip differential case assembly
- ◆◆ 15. Drive gear
- ◆◆ 16. Side bearing inner race
- ◆◆ 17. Side bearing outer race
- 18. Differential case assembly
- ◆◆ 19. Bearing cap
- ◆◆ Adjustment of final drive gear backlash
- 20. Side bearing nut
- 21. Lock plate

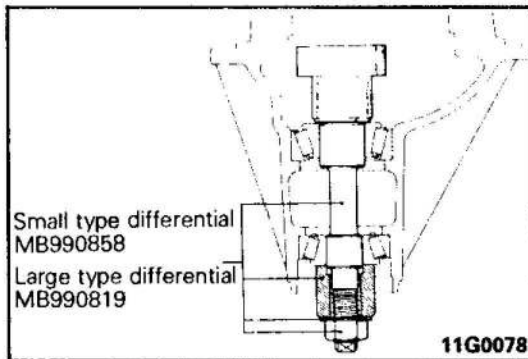
NOTE  
 (1) ◆◆ : Refer to "Service Points of Reassembly".  
 (2) N : Non-reusable parts



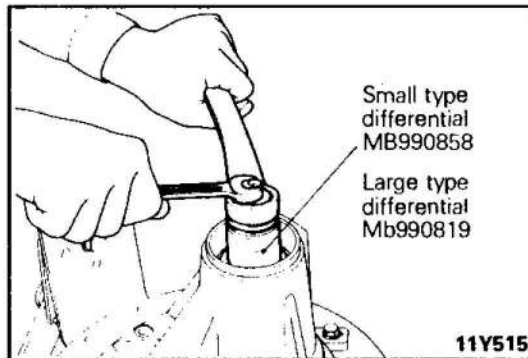
11Y053



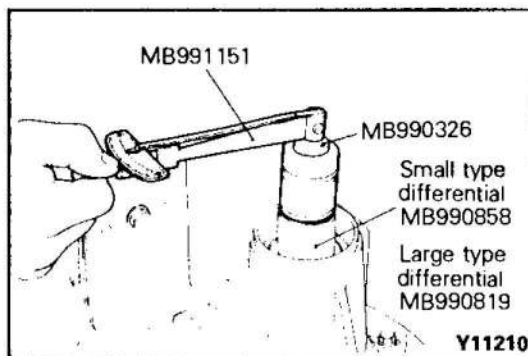
11Y052



11G0078



11Y515



Y11210

## SERVICE POINTS OF REASSEMBLY

E27THAC

## 1. INSTALLATION OF DRIVE PINION REAR BEARING OUTER RACE

Press-fit the drive pinion rear bearing outer race into the gear carrier.

**Caution**

Perform press-fitting carefully so as not to tilt the outer race.

## 2. INSTALLATION OF DRIVE PINION FRONT BEARING OUTER RACE

Press-fit the drive pinion front bearing outer race into the gear carrier.

**Caution**

Perform press-fitting carefully so as not to tilt the outer race.

## • ADJUSTMENT OF PINION HEIGHT

Adjust the drive pinion height by the following procedures:

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

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

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

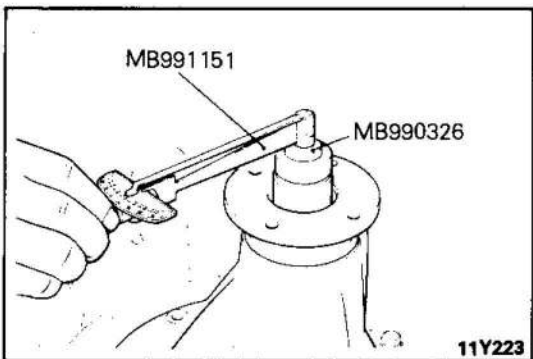
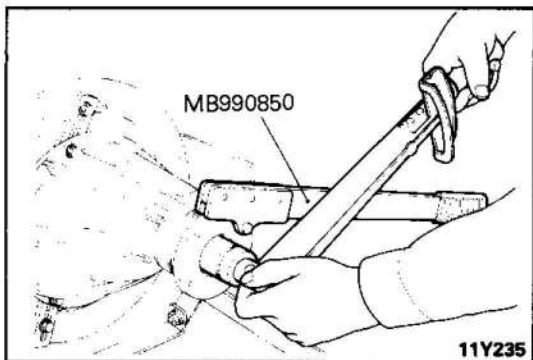
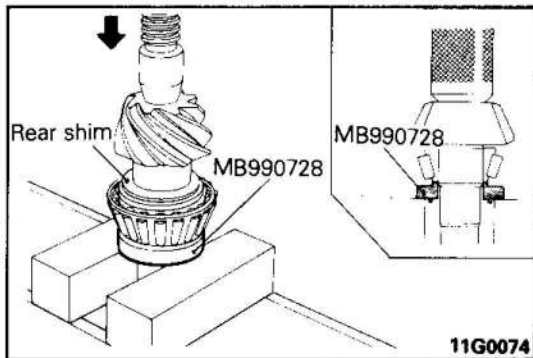
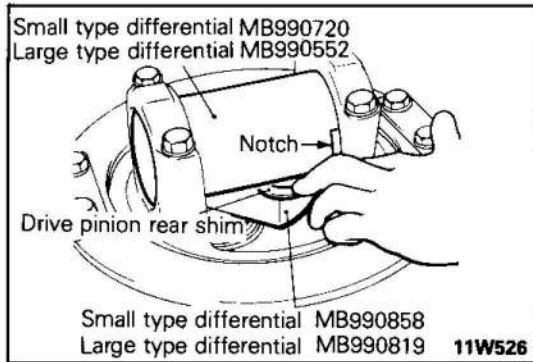
**Standard value: 0.4–0.5 Nm**

**(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 differential, 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, and then select a drive pinion rear shim of a thickness which corresponds to the gap between the special tools.

**NOTE**

Be sure to clean the side bearing seat thoroughly. When positioning the special tool, be sure that the cut-out sections of the special tool are in the 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).

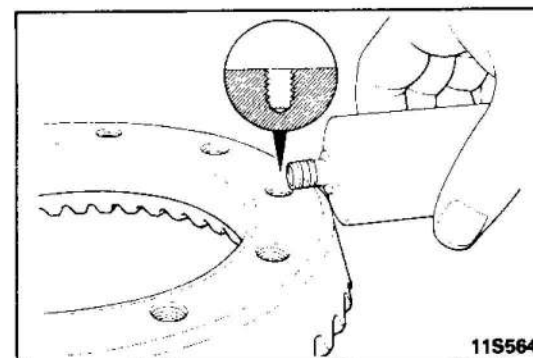
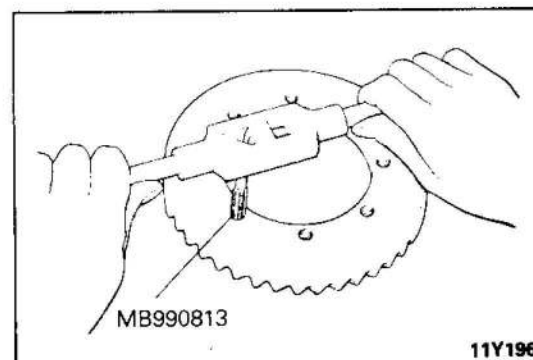
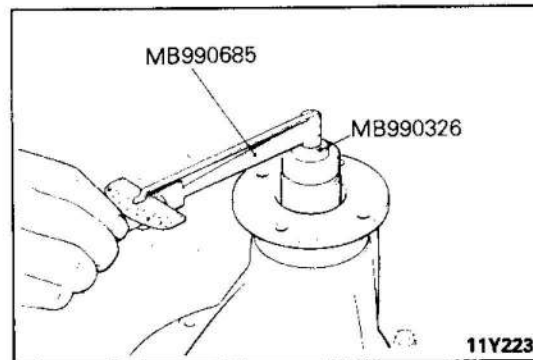
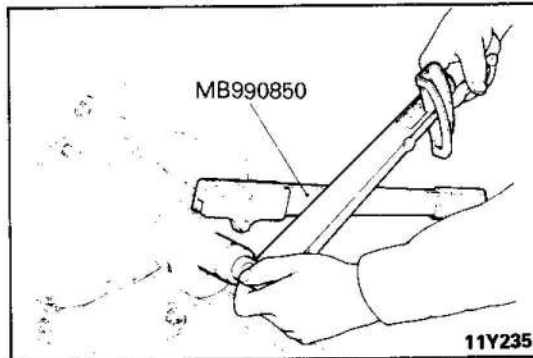
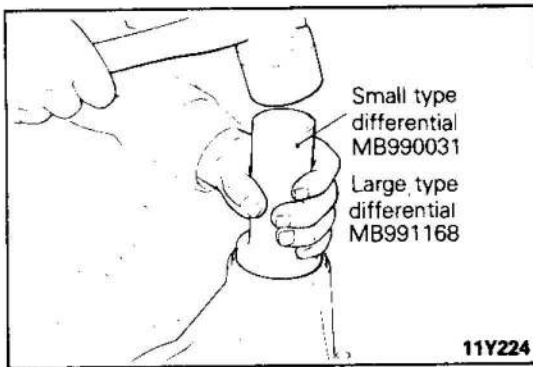
**Standard value: 0.4–0.5 Nm  
(4.0–5.0 kgcm, 3.5–4.3 In.lbs.)**

- (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.

- (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 multipurpose grease to the oil seal lip.

- (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:****Small type differential:**

0.6–0.7 Nm (6.0–7.0 kgcm, 5.2–6.1 in.lbs.)

**Large type differential:**

0.65–0.75 Nm (6.5–7.5 kgcm, 5.6–6.5 in.lbs.)

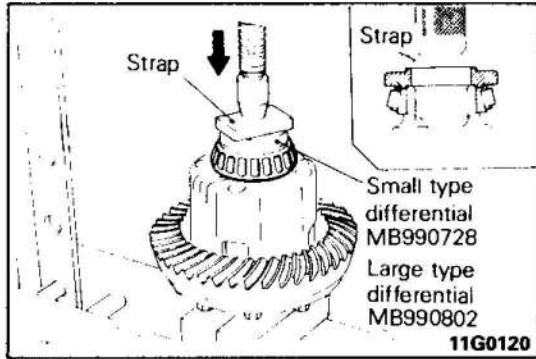
**15. INSTALLATION OF DRIVE GEAR**

- (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 Part No. 4170 or equivalent**

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

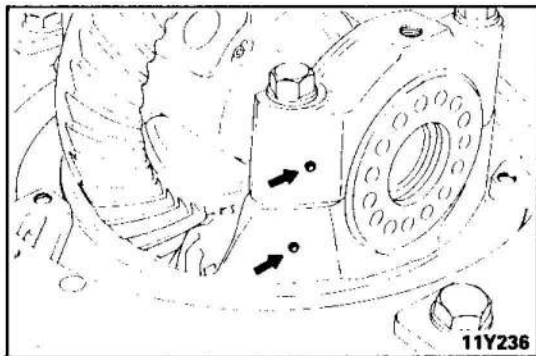


**16. PRESS-FIT OF SIDE BEARING INNER RACE**

Press-fit the side bearing inner races to the differential case by using the special tool.

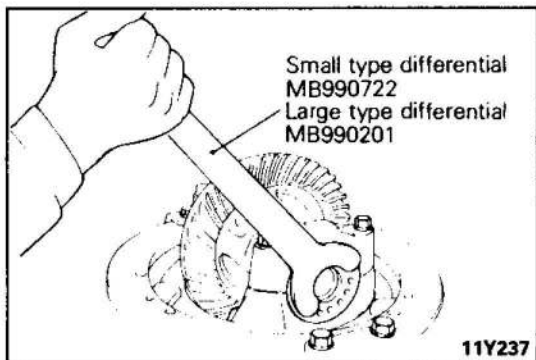
**Caution**

**When only one side bearing inner race is installed, be sure to only place load on the differential case.**



**19. INSTALLATION OF BEARING CAP**

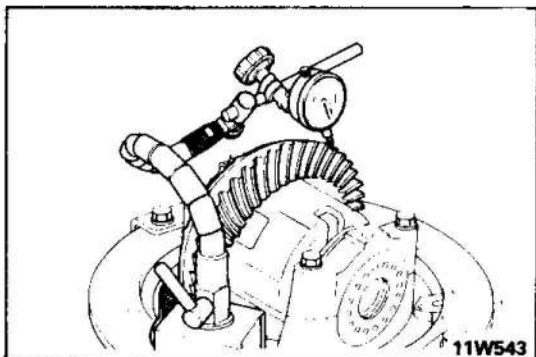
Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap.



**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.

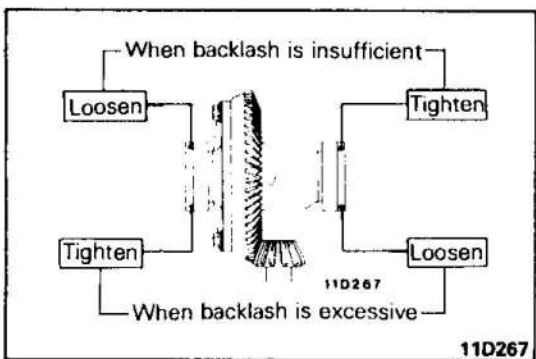


(2) Measure the final drive gear backlash.

**Standard value: 0.11–0.16 mm (0.0043–0.0063 in.)**

**NOTE**

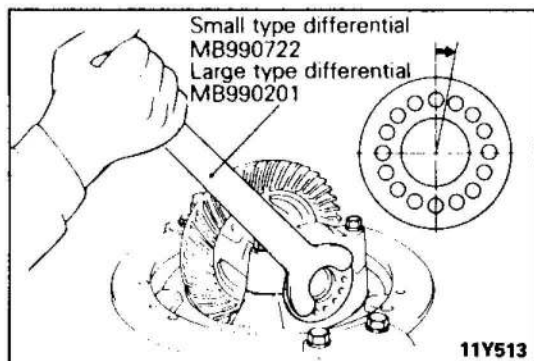
Measure at least 4 points on the drive gear periphery.



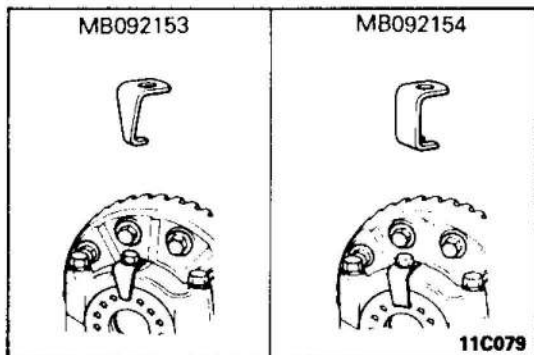
(3) Using the special tool (MB990722 or MB990201), adjust the backlash to standard value by moving the side bearing nut as shown.

**NOTE**

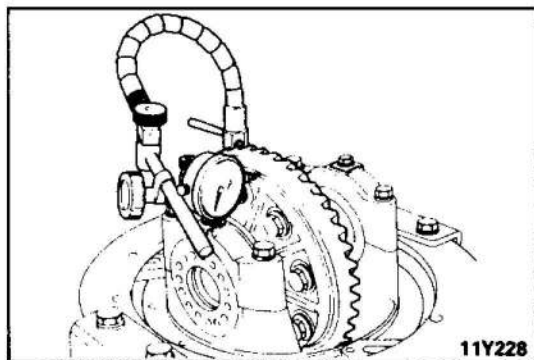
First turn the side bearing nut for loosening, and then turn (by the same amount) the side bearing nut for tightening.



- (4) Using the special tool, to apply the preload, turn down both right and left side bearing nuts one half the distance between centers of two neighboring holes.

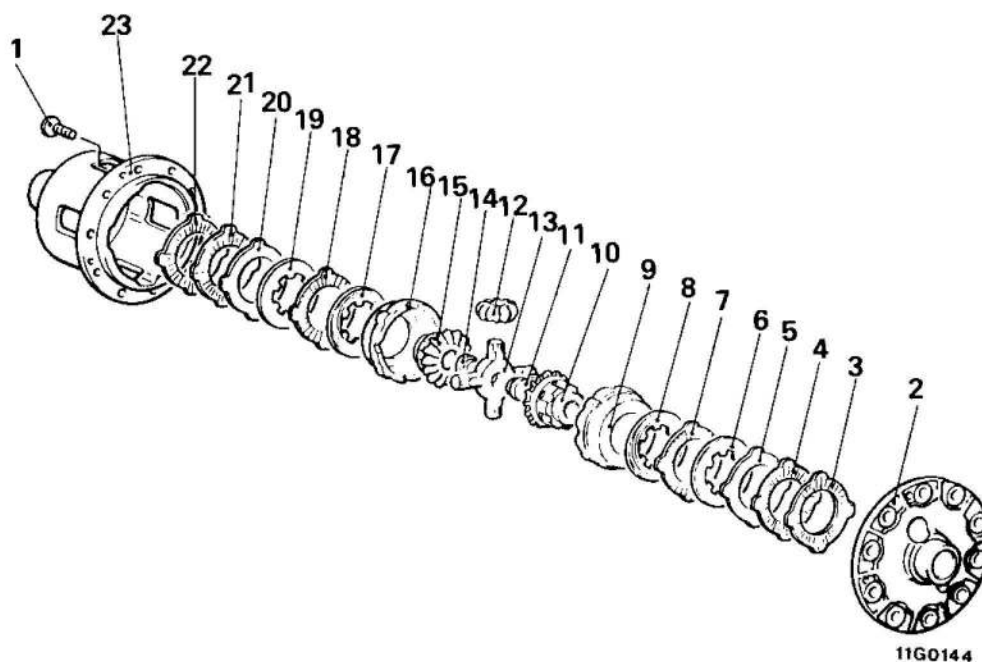


- (5) Choose and install the lock plates (two kinds).  
(6) Check the final drive gear tooth contact. If poor contact is evident, make adjustment. (Refer to P. 27-38.)



- (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 reinstalling them.

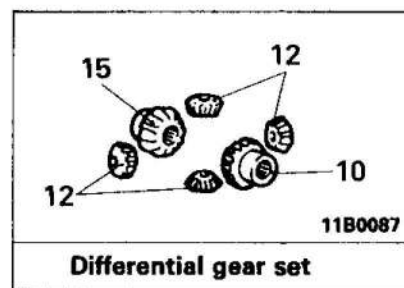
**OVERHAUL (LIMITED SLIP TYPE)**  
**LIMITED SLIP DIFFERENTIAL CASE ASSEMBLY**  
**(SMALL TYPE)**



11G0144

**Disassembly steps**

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

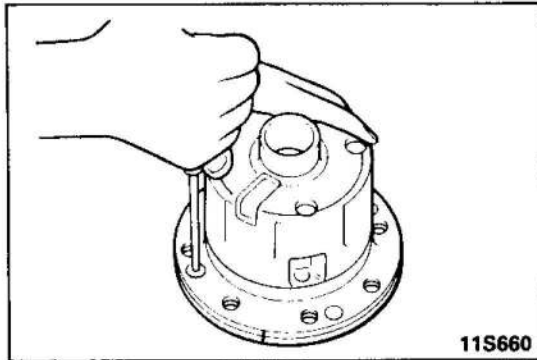


11B0087

**Differential gear set**

**NOTE**

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆◆ : Refer to "Service Points of Disassembly".
- (3) ◆◆◆ : Refer to "Service Points of Reassembly".



## SERVICE POINTS OF DISASSEMBLY

E27TJAA

### 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).

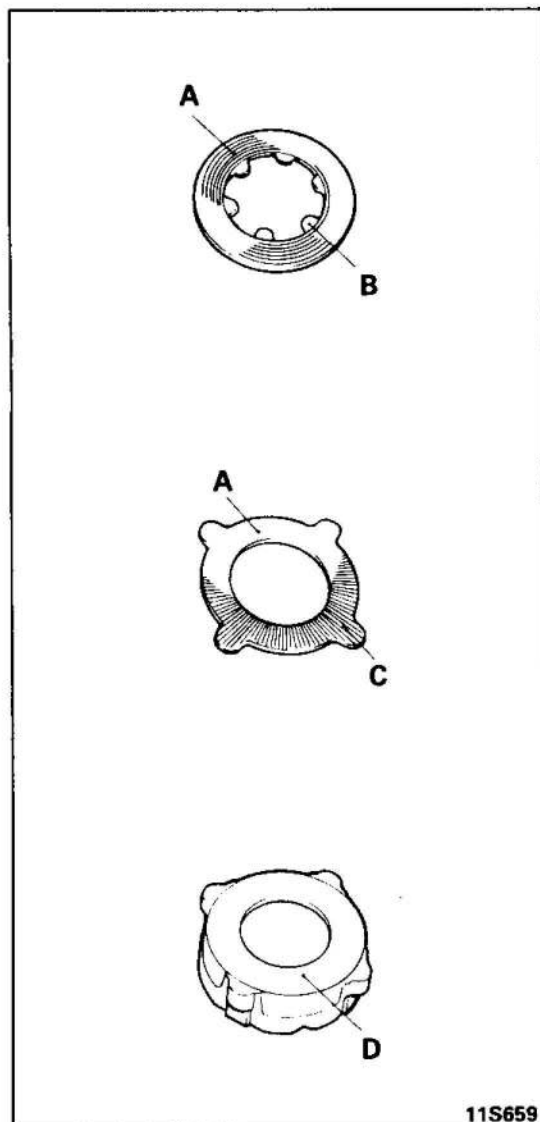
#### NOTE

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

## INSPECTION

E27TKAA

- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.



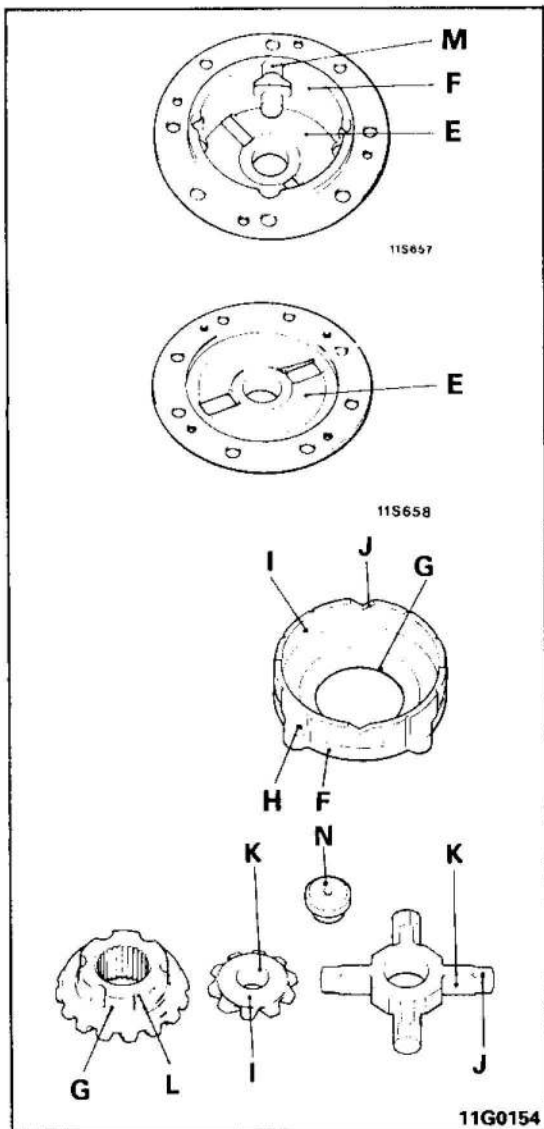
## INSPECTION OF THE CONTACT AND SLIDING SURFACES OF PARTS

- (1) Inspect the plate, disc, spring plate, spring disc and pressure ring.
  - A. The friction surfaces of the plate, disc, spring plate, and spring disc.  
If there are any signs of seizure, severe friction, or color 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 and the spring disc; this wear is not abnormal.
  - B. The six projections on the inner circumference of the 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 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 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.

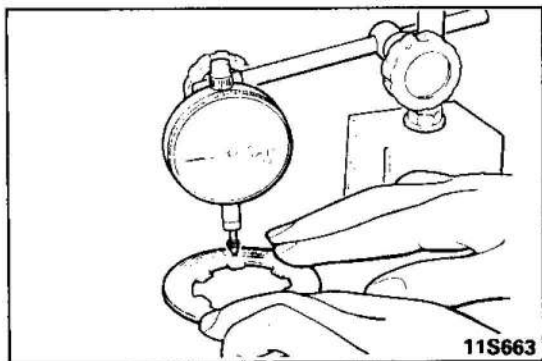
#### NOTE

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





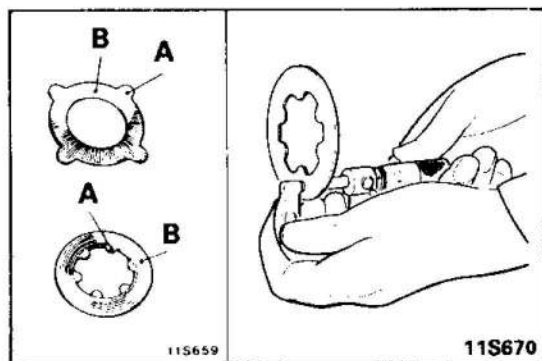
- (2) Inspect the contact and sliding surfaces listed below, and repair any nicks and burrs by using an oil stone.
- E. The spring contacting surface of the differential case.
  - F. The contact surfaces of the outer circumference of the pressure ring and the inner circumference of the differential case.
  - G. The sliding surfaces of the hole in the pressure ring and the outer circumference of the side gear.
  - H. The projection on the outer circumference of the pressure ring.
  - I. The spherical surface of the differential pinion gear and the inner diameter of the pressure ring.
  - J. The V-shaped groove in the pressure ring, and the V-shaped part in the pinion shaft.
  - K. The outer diameter of the pinion shaft and the hole of the differential pinion gear.
  - L. The outer circumference groove of the side gear.
  - M. The inner circumference groove of the differential case.
  - N. The sliding surface of the thrust block.



**INSPECTION FOR WARPING OF THE PLATE AND DISC**

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

**Limit: 0.08 mm (0.0031 in.)**



**INSPECTION FOR WEAR OF THE PLATE AND DISC**

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

**Limit: 0.1 mm (0.0039 in.)**

**NOTE**

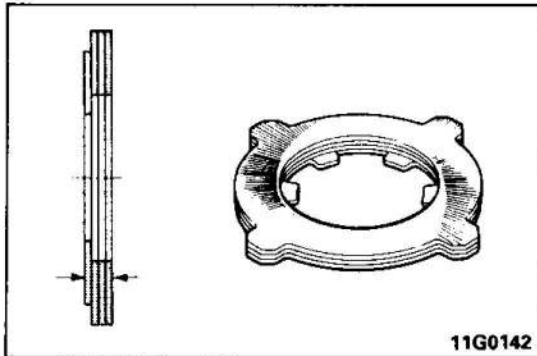
Make the measurement at several different points.

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

## SERVICE POINTS OF REASSEMBLY

## • ADJUSTMENT OF CLUTCH PLATE FRICTION FORCE

Before assembly, use the following method to adjust the clearance between the plates and differential cases (for adjustment of the clutch plate friction force).



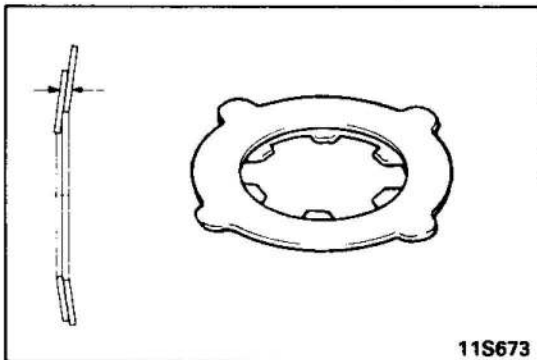
11G0142

- (1) Arrange the three plates and disc 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 plate and disc: 1.70 mm (0.0669 in.).

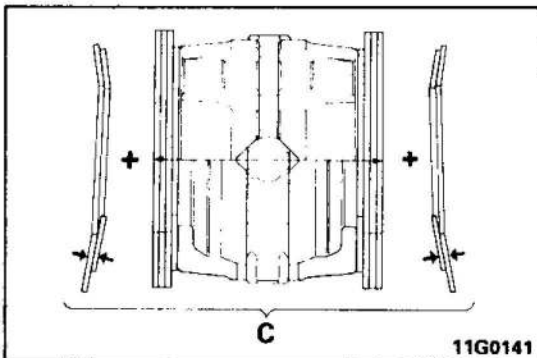


11S673

- (2) Arrange one spring disc and one spring plate for each side, one on top of the other, so that the difference between the left and the right thickness is minimized.

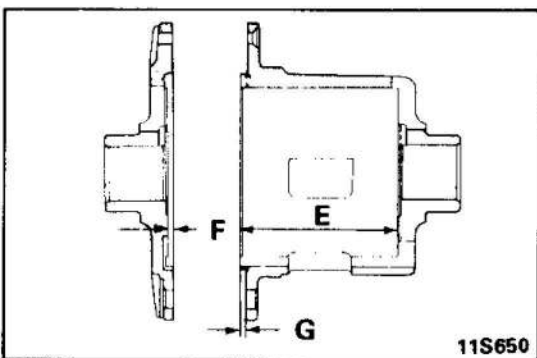
## NOTE

For new ones, there is one type of spring disc and spring plate: 1.70 mm (0.0669 in.).



11G0141

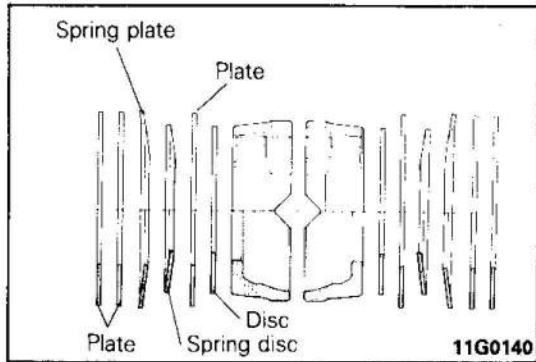
- (3) Assemble the pressure ring's internal components (differential pinion shaft and pressure ring) and the discs and plates, and then as shown in the figure, measure the overall width.
- (4) Calculate the total value (C) of the thickness of the spring discs and spring plates plus the value measured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



11S650

- (5) Obtain the dimension (D) between the plate contact surfaces when differential cases (A) and (B) are combined.  
( $D = E + F - G$ )
- (6) Change the clutch plates so that the clearance (D–C) between the differential case and the plate becomes the standard value.

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



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

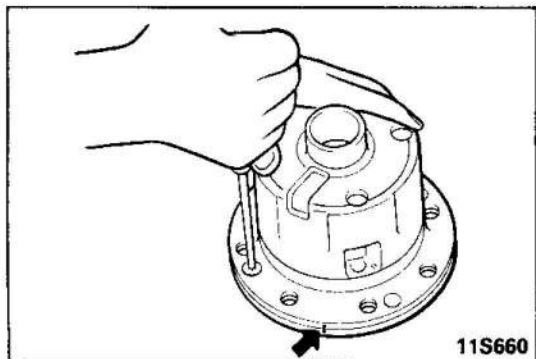
NOTE

1. Before assembly, apply the specified gear oil to each component especially careful to coat contact surfaces and sliding surfaces.

**Specified 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**

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

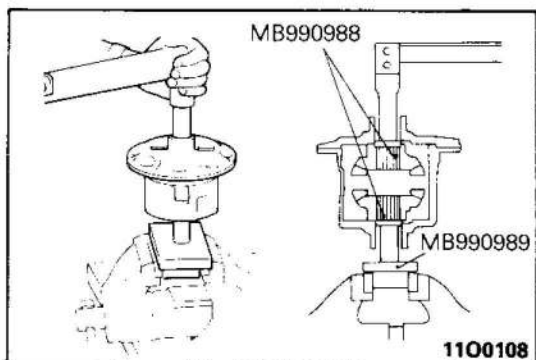


**1. INSTALLATION OF SCREW**

- (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:**

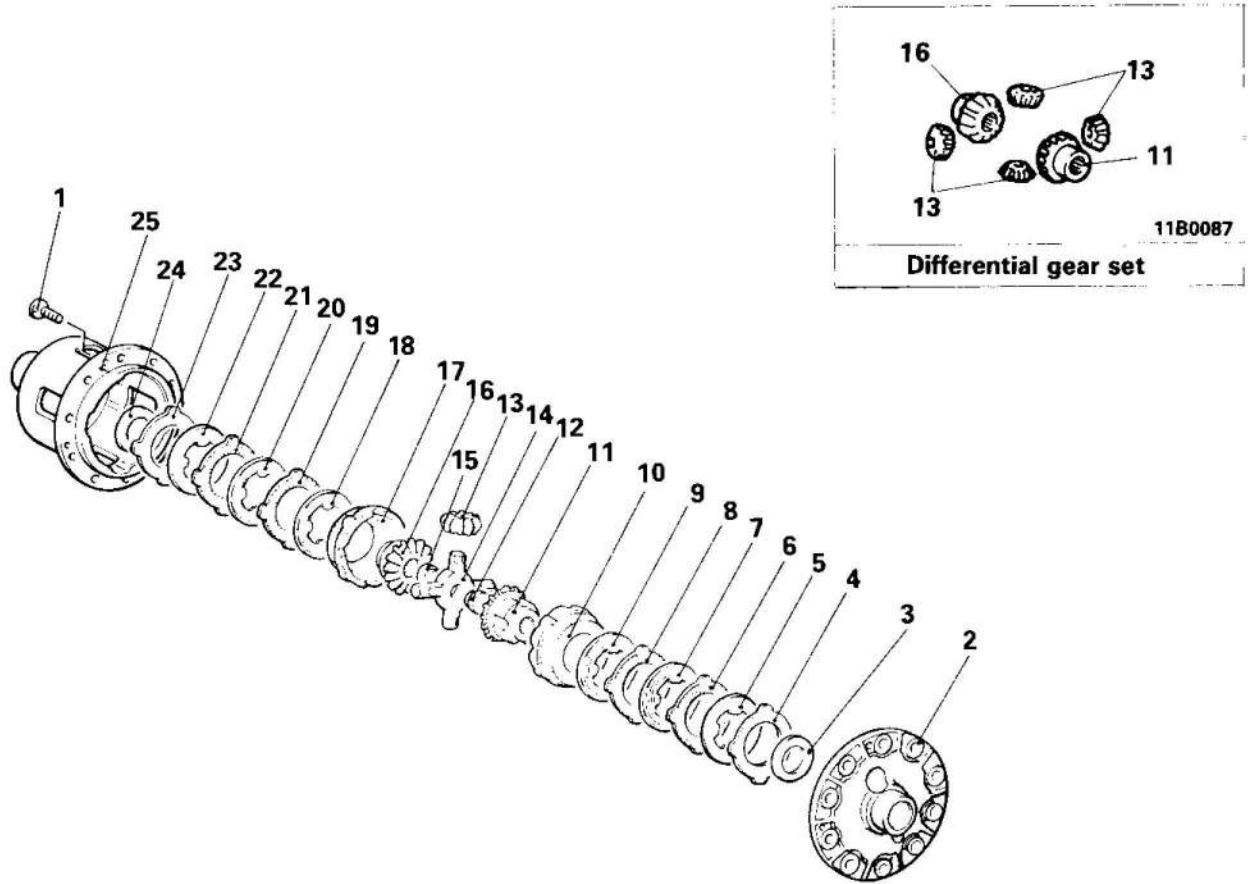
**When a new clutch plate is used**  
 50–80 Nm (5.0–8.0 kgm, 36–58 ft.lbs.)  
**When an old clutch plate is used**  
 35–80 Nm (3.5–8.0 kgm, 25–58 ft.lbs.)

NOTE

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

LIMITED SLIP DIFFERENTIAL CASE ASSEMBLY (LARGE TYPE)

E27T1--



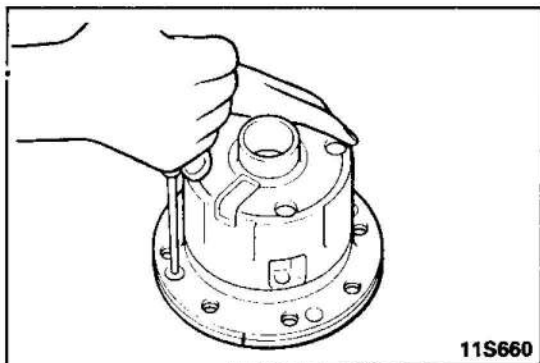
11B0098

**Disassembly steps**

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

**NOTE**

- (1) Reverse the disassembly procedures to reassemble.
- (2) ◆◆ : Refer to "Service Points of Disassembly".
- (3) ◆◆ : Refer to "Service Points of Reassembly".
- (4) \*<sup>1</sup> : Vehicles built up to July 1989.
- (5) \*<sup>2</sup> : Vehicles built from August 1989.



**SERVICE POINTS OF DISASSEMBLY**

E27TJAB

**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).

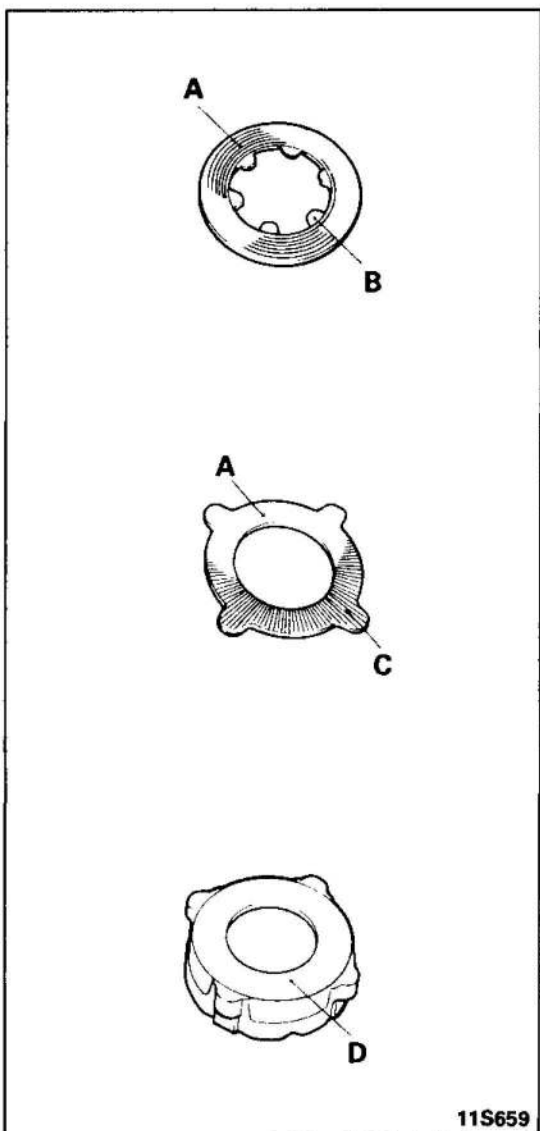
**NOTE**

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**

E27TKAB

- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.



**INSPECTION OF THE CONTACT AND SLIDING SURFACES OF PARTS**

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

- A. The friction surfaces of the friction plate, friction disc, spring plate, and spring disc.

If there are any signs of seizure, severe friction, or color 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 and the spring disc; 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.

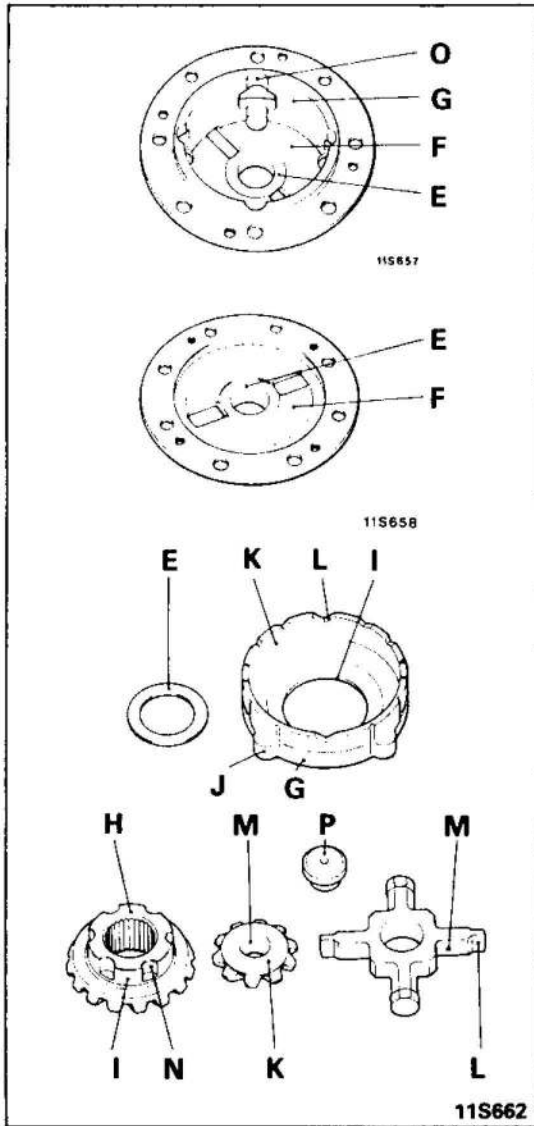
Repair the parts by using an oil stone; if the parts cannot be repaired, replace them.

- D. The friction surface of the friction disc of the pressure ring.

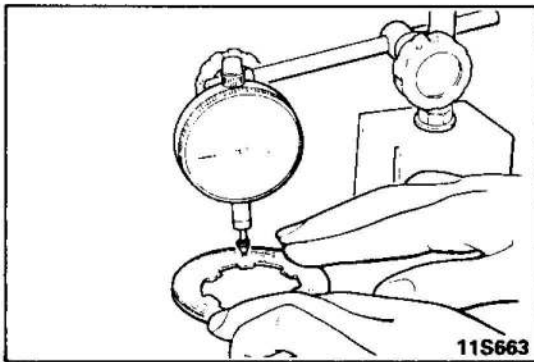
If there are nicks or scratches, repair the part by first grinding with an oil stone and then polishing with rubbing compound on a surface plate.

**NOTE**

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



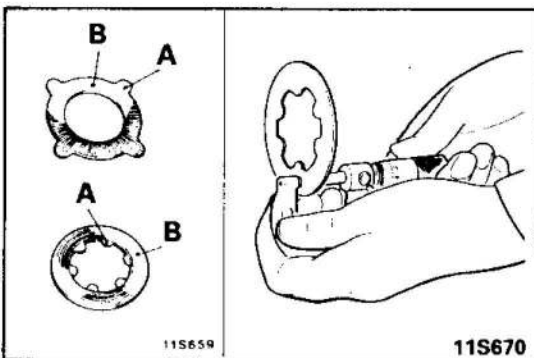
- (2) Inspect the contact and sliding surfaces listed below, and repair any nicks and burrs by using an oil stone.
- E. The sliding surfaces of the thrust washer and the case.
  - F. The spring contacting surface of the differential case.
  - G. The contact surfaces of the outer circumference of the pressure ring and the inner circumference of the differential case.
  - H. The sliding surface of the 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.
  - P. The sliding surface of the thrust block.



**INSPECTION FOR 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.)**



**INSPECTION FOR 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.

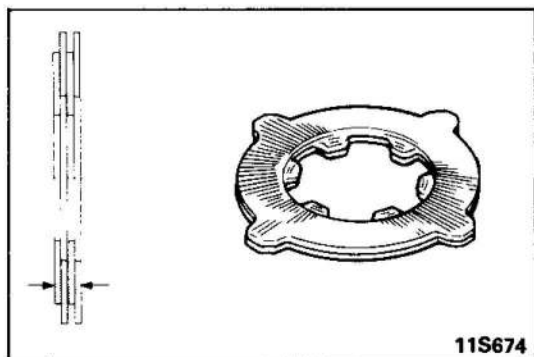


SERVICE POINTS OF REASSEMBLY

E27TLAB

• 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.



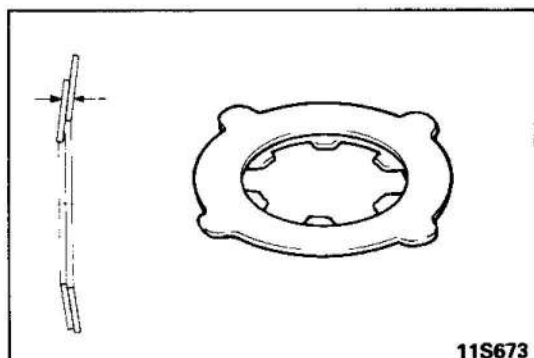
11S674

- (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.).

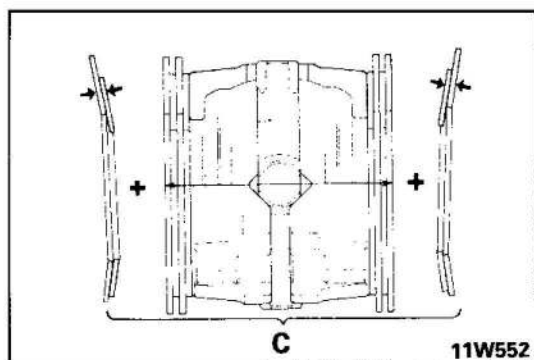


11S673

- (2) Arrange one spring disc and one spring plate for each side, one on top of the other, so that the difference between the left and the right thickness is minimized.

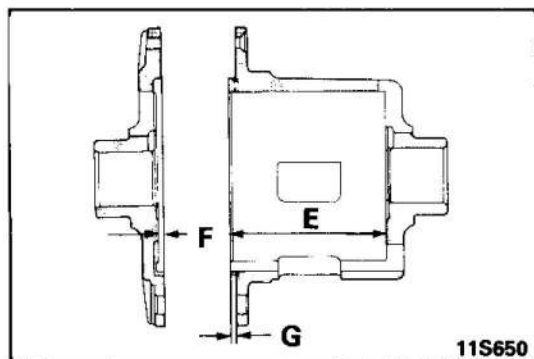
NOTE

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



11W552

- (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 spring discs and spring plates plus the value measured in (3) above.



11S650

- (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 becomes the standard value.

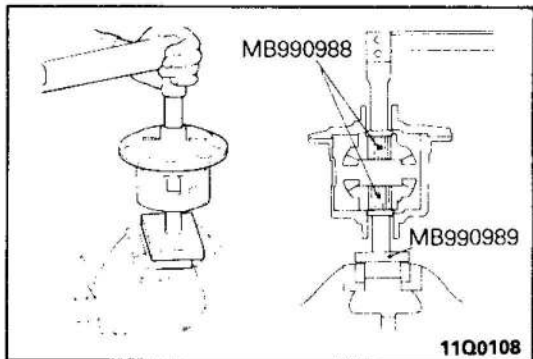
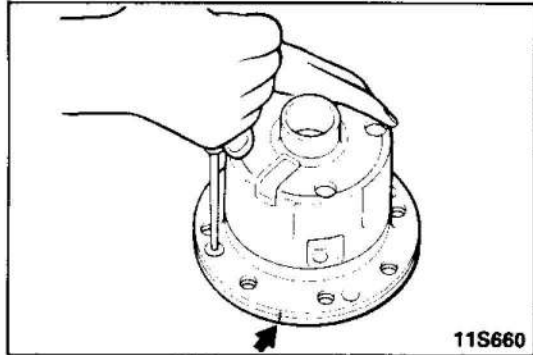
**Standard value: 0.06–0.20 mm (0.0024–0.0079 in.)**



**Specified 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**

2. Be careful not to insert the friction plates and friction discs in the incorrect order and to install the spring plates and spring disc 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**

**Vehicles built up to July 1989**

**65 – 100 Nm (6.5 – 10.0 kgm, 47 – 72 ft.lbs.)**

**Vehicles built from August 1989**

**40 – 75 Nm (4.0 – 7.5 kgm, 29 – 54 ft.lbs.)**

**When an old clutch plate is used**

**Vehicles built up to July 1989**

**35 – 100 Nm (3.5 – 10.0 kgm, 25 – 72 ft.lbs.)**

**Vehicles built from August 1989**

**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.

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NOTES