GROUP 27B

REAR AXLE <4WD>

CONTENTS

SERVICE SPECIFICATIONS

M1271000301419

Item		Standard value	Limit
Rear axle total backlash mm		–	5
Wheel bearing axial looseness mm		–	0.05
Hub rotation starting torque N·m		–	1.4
Electronic control coupling stud bolt length mm		21.6 – 24.4	–
Final drive gear backlash mm		0.08 – 0.15	–
Drive gear runout on backside mm		–	0.05
Differential gear backlash mm		0 – 0.076	0.2
Drive pinion rotation torque N·m	When replaced with new one (coated with rust inhibitor oil)	0.7 – 1.2	–
ETJ boot assembly dimension mm		75 ± 3	–

LUBRICANTS

M1271000401212

Item	Specified lubricant	Quantity
Gear oil	Hypoid gear oil API classification GL-5, SAE 80	Approx. 0.4 L
ETJ joint	Repair kit grease	75 ± 10 g

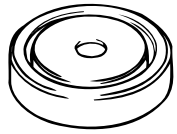
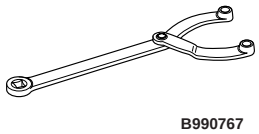
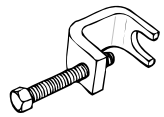
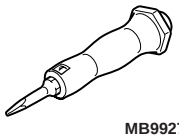
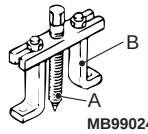
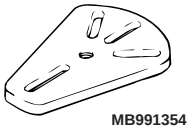
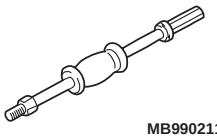
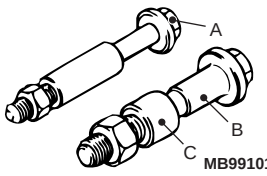
SEALANT AND ADHESIVE

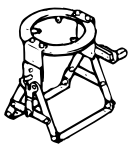
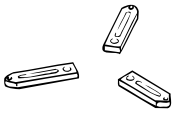
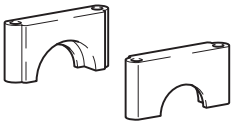
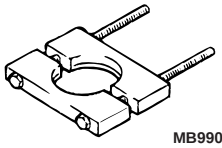
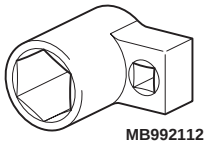
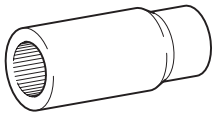
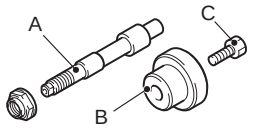
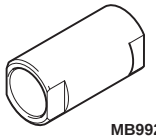
M1271000500711

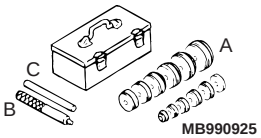
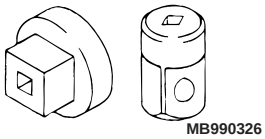
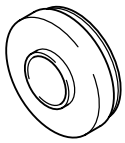
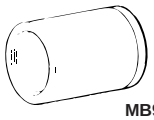
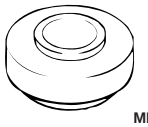
Item	Specified sealant and adhesive	Remark
Differential cover assembly	ThreeBond 1217	Semi-drying sealant
Vent plug	ThreeBond 1215, 1216, 1217 or equivalent	
Joint between differential carrier and electronic control coupling		
Tightening area between drive gear and differential case	LOCTITE No.271	Anaerobic adhesive

SPECIAL TOOLS

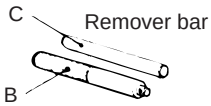
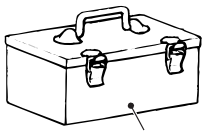
M1271000601443

Tool	Number	Name	Use
	MB991115	Oil seal installer	Oil seal press-fitting (used in combination with MB990938)
 B990767	MB990767	Front hub and flange yoke holder	Hub fixing
 MB991618	MB991618	Hub bolt remover	Removal of hub bolt
 MB992700	MB992700	Lock nut chisel	Raising up the swaged part driveshaft nut
 MB990241AD	MB990241 A:MB990242 B:MB990244	Rear axle shaft puller A: Puller shaft B: Puller bar	• Driveshaft removal • Rear wheel hub assembly removal
 MB991354	MB991354	Puller body	
 MB990211	MB990211	Slide hammer	Rear wheel hub assembly removal
 MB991017	A:MB991017 B:MB990998 C:MB991000	A, B: Front hub remover and installer C: Spacer	• Wheel bearing temporarily fixing • Hub rotation starting torque measurement • Wheel bearing axial looseness measurement Use MB991000 (a part of MB990998) for spacer

Tool	Number	Name	Use
 MB990909	MB990909	Working base	Differential carrier assembly disassembly/assembly
	MB991116	Working base adapter	
 MB992111	MB992111	Side bearing holder	Differential carrier fixing
 MB990810	MB990810	Side bearing puller	Differential side bearing inner race removal
 MB990560	MB990560	Rear axle shaft bearing remover	Drive pinion rear bearing inner race removal
 MB992112	MB992112	Locking nut wrench	Differential nut removal
 MB992113	MB992113	Drive pinion holder	• Rear axle backlash inspection • Drive pinion fixing
 MB992114AB	MB992114 A: MB992115 B: MB992116 C: MB992128	Dummy pinion gauge assembly A: Dummy pinion gauge body B: Dummy pinion gauge head C: Hex socket head bolt	Drive pinion height adjustment
 MB992117	MB992117	Cylinder gauge	

Tool	Number	Name	Use
 MB990925	MB990925 A: MB990926 to MB990937 B:MB990938 C:MB990939	Bearing and oil seal installer set A: Installer adapter B: Installer bar C: Remover bar	• Differential carrier oil seal driving in • Final drive gear teeth contact inspection • Drive pinion bearing removal/press-fitting
 MB990326	MB990326	Preload socket	Hub rotation torque measurement
	MB990685	Torque wrench	
	MD998816	Bearing installer	Drive pinion rear bearing inner race press-fitting
 MB991180	MB991180	Bushing remover and installer base	Drive pinion oil seal press-fitting
 MB990829	MB990829	Pinion and side bearing installer	Side bearing inner race press-fitting

MB990925 Bearing and oil seal installer set

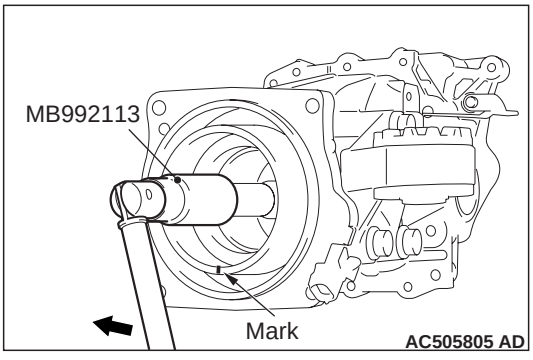
Tool	Type	Number	Outer diameter mm
MB990925  A Installer adapter  C Remover bar B Installer bar (Snap-in type)  Toolbox ACX02372AE	A	MB990926	39
		MB990927	45
		MB990928	49.5
		MB990929	51
		MB990930	54
		MB990931	57
		MB990932	61
		MB990933	63.5
		MB990934	67.5
		MB990935	71.5
		MB990936	75.5
		MB990937	79
	B	MB990938	–
	C	MB990939	–

ON-VEHICLE SERVICE

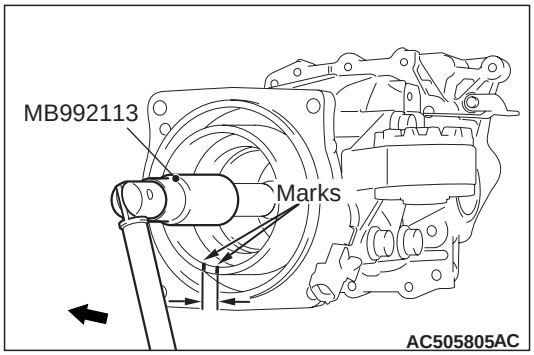
REAR AXLE TOTAL BACKLASH CHECK

M1271001200650

1. Place the gearshift lever or selector lever in the Neutral position, pull the parking brake lever, and then raise the vehicle using a jack.
2. Remove the propeller shaft (Refer to GROUP 25 – Propeller Shaft).
3. Remove the electronic control coupling (Refer to).



4. Install special tool drive pinion holder (MB992113) to the drive pinion. Lightly push the special tool to the left to eliminate free play between the drive pinion serration and the special tool and then put a mark on the flange.



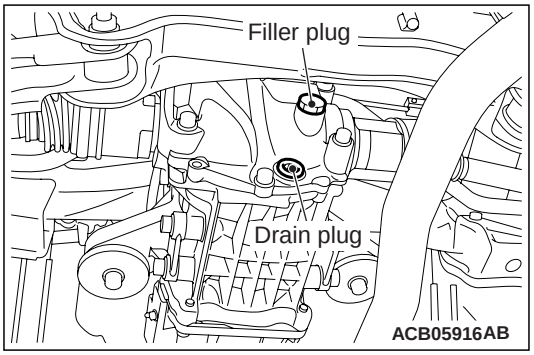
5. Rotate the special tool clockwise until it stops, and then put a mark on the flange. Measure the distance between the marks.

   Limit: 5 mm

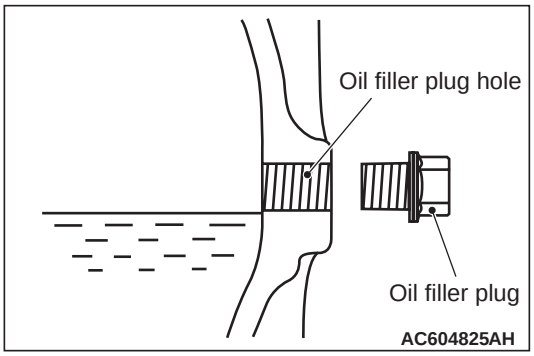
6. If the backlash exceeds the limit, remove the differential carrier assembly and check the following.
   - Drive gear backlash (Refer to P.27B-23)
   - Differential gear backlash (Refer to P.27B-23)

GEAR OIL LEVEL CHECK

M1271004900410



1. Remove the filler plug.

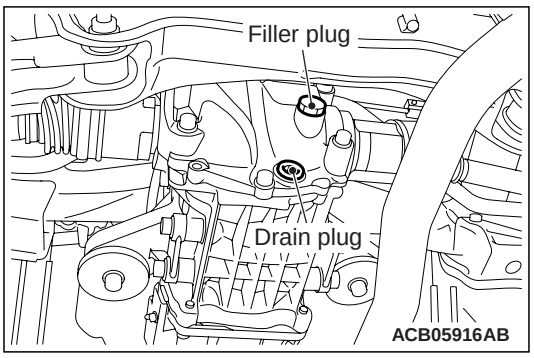


2. Check that the oil level is up to the lower edge of the oil filler plug hole.
3. Check that the oil is not noticeably dirty.
4. Tighten the filler plug to the specified torque.

Tightening torque: 32 ± 2 N·m

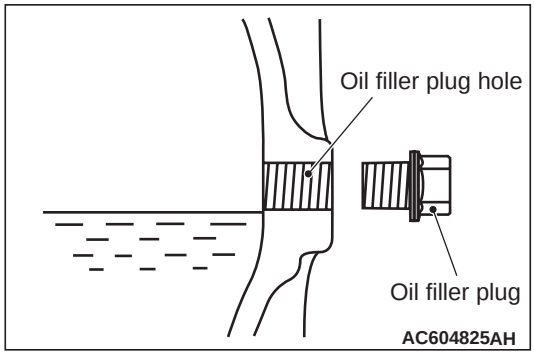
GEAR OIL REPLACEMENT

M1272004600917



1. Remove the filler plug.
2. Remove the drain plug and drain oil.
3. Tighten the drain plug to the specified torque.

Tightening torque: 32 ± 2 N·m



4. Fill the oil until the level comes to the lower portion of the filler plug hole.

Specified gear oil: Hypoid gear oil API classification GL-5, SAE 80
Amount to use: approx. 0.4 L

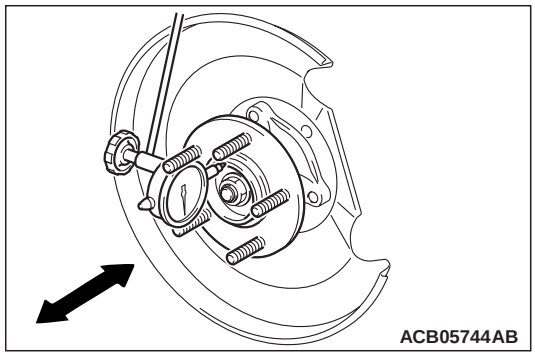
5. Tighten the filler plug to the specified torque.

Tightening torque: 32 ± 2 N·m

WHEEL BEARING AXIAL PLAY CHECK

M1271000901392

1. Remove the caliper assembly and the brake disc. Retain the caliper assembly with a wire and the like to prevent from falling.



2. Set a dial gauge as shown in the figure. Move the hub in the axial direction and measure the looseness.

Limit: 0.05 mm

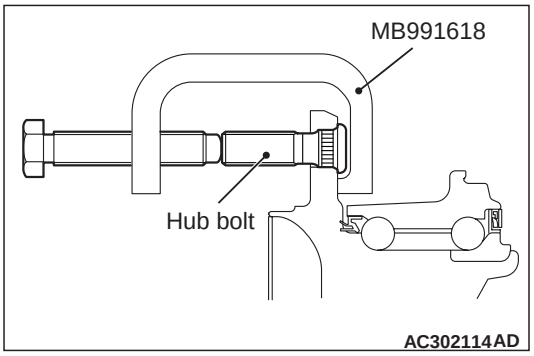
3. When the looseness exceeds the limit, replace the rear wheel hub assembly.
4. After checking, install the brake disc and the caliper assembly, and tighten the caliper mounting bolt to the specified torque.

Tightening torque: 58 ± 7 N·m

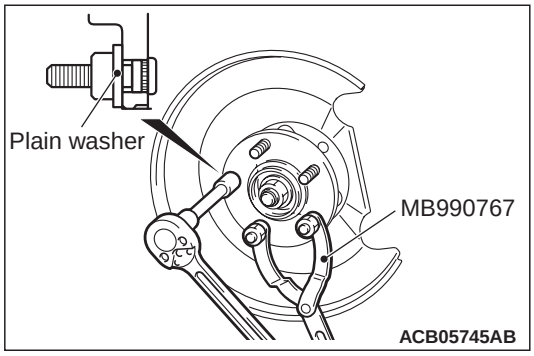
HUB BOLT REPLACEMENT

M1271001001046

1. Remove the caliper assembly and the brake disc. Retain the caliper assembly with a wire and the like to prevent from falling.



2. Use special tool hub bolt remover (MB991618) to remove the hub bolt.



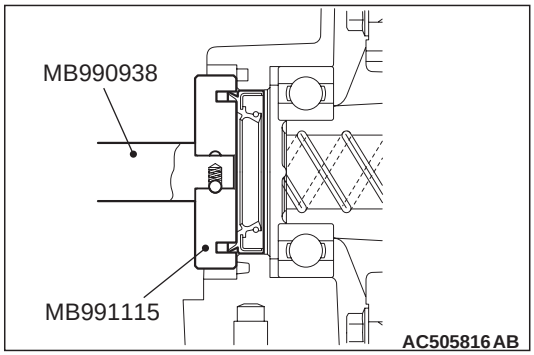
3. After fixing the hub using special tool front hub and flange yoke holder (MB990767), install the plain washer to the new hub bolt, and tighten the bolt with a nut.
4. Install the brake disc, caliper assembly and tighten the caliper assembly mounting bolts to the specified torque.

   Tightening torque: 58 ± 7 N·m

DIFFERENTIAL CARRIER OIL SEAL REPLACEMENT

M1271005100127

1. Remove the driveshaft (Refer to P.27B-14).
2. Remove the differential carrier oil seal.



3. Use the following special tools to drive in the oil seal:
   - Installer bar (MB990938)
   - Oil seal installer (MB991115)
4. Coat the oil seal lip and the oil seal contact surface on the driveshaft with the multi-purpose grease.
5. Replace the driveshaft circlip with a new one, and install the driveshaft (Refer to P.27B-14).

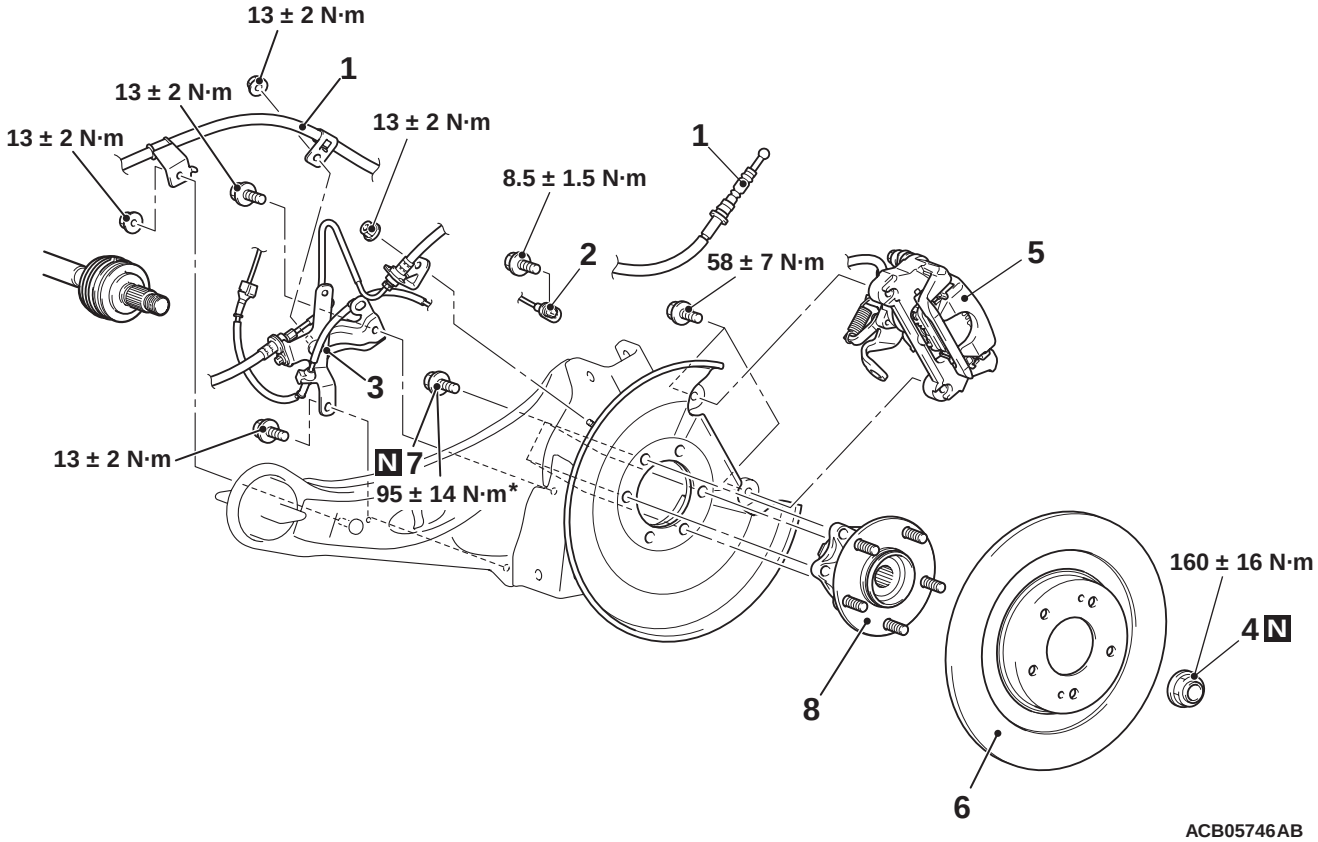
REAR AXLE HUB ASSEMBLY

REMOVAL AND INSTALLATION

M1271002001652

⚠ CAUTION

- **Do not disassemble the rear wheel hub assembly.**
- **The wheel speed detection magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it.**
- **When the rear wheel hub assembly is removed/installed, make sure that the wheel speed detection magnetic encoder (integrated with inner oil seal) does not contact with surrounding parts to avoid damage.**
- **When removing and installing the rear wheel speed sensor, make sure that its pole piece at the end does not contact with surrounding parts to avoid damage.**
- **The part indicated with * is the bolt with friction coefficient stabilizer. In removal, replace it with a new one.**



Removal steps

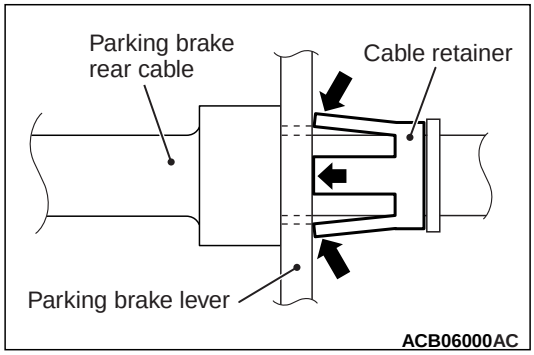
<<A>> >>B<< 1. Parking brake rear cable connection <Rear brake caliper assembly side>
2. Rear wheel speed sensor connection
3. Brake hose bracket with brake hose and rear wheel speed sensor wiring harness connection

Removal steps (Continued)

<<B>> >>A<< 4. Rear driveshaft nut
<<C>> 5. Rear caliper assembly
6. Rear brake disc
7. Rear wheel hub assembly mounting bolt
<<D>> 8. Rear wheel hub assembly

REMOVAL SERVICE POINTS

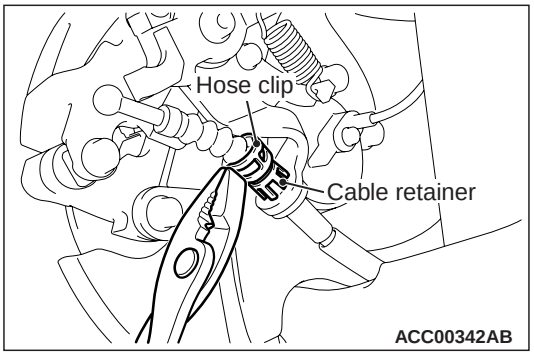
<<A>> PARKING BRAKE REAR CABLE CONNECTION <REAR BRAKE CALIPER ASSEMBLY SIDE>



Compress the tabs on the cable retainer to pull out the parking rear cable through the parking lever hole of the rear brake caliper assembly.

NOTE:

- *When pulling out the parking rear cable, be careful not to damage the tab on the cable retainer.*

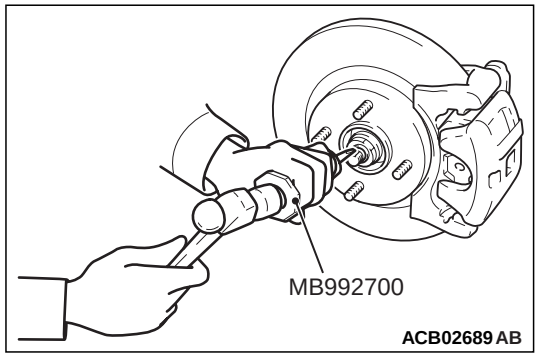


Example: Insert the 12.8-mm hose clip (MB248923) into the parking rear cable. Then push the clip over the cable retainer to protect the tabs.

<<B>> DRIVESHAFT NUT REMOVAL

⚠ CAUTION

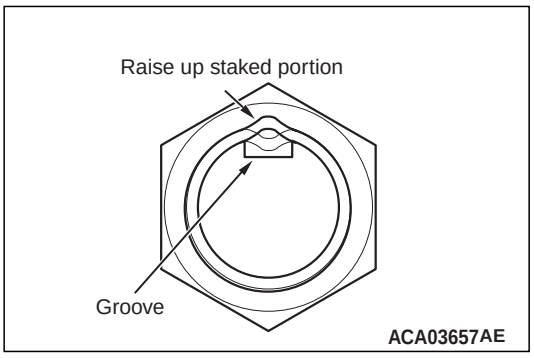
- **Make sure that the lock nut chisel is set in the correct direction. Otherwise, the groove or thread in the driveshaft may be broken, or the tip of the chisel may be chipped.**
- **Never use a chisel which tip is damaged.**
- **For how to use the lock nut chisel, refer to the manufacturer's operating instructions.**



1. Set the special tool lock nut chisel (MB992700) in the groove of the driveshaft with its "UPPER" mark facing upwards. Then strike the staked portion of the driveshaft nut with the chisel and a hammer to raise up.

⚠ CAUTION

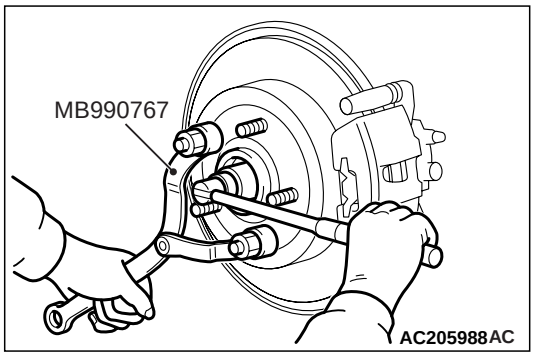
Be careful not to damage the thread of the driveshaft.



2. Raise up the staked portion of the driveshaft nut until it does not interfere with the shaft thread.

⚠ CAUTION

- **Never use a impact wrench to loosen the driveshaft nut.**
- **Do not apply the vehicle weight on the wheel bearing with the driveshaft nut loosened. Otherwise, the wheel bearing may be broken.**

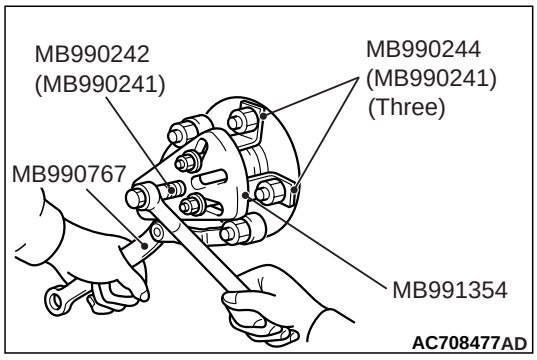


3. Use special tool front hub and flange yoke holder (MB990767) to counter the hub, and remove the driveshaft nut.

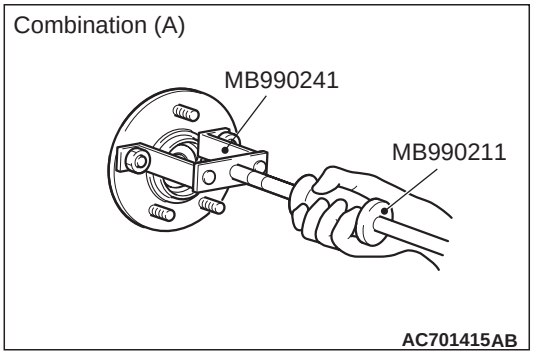
<<C>> CALIPER ASSEMBLY REMOVAL

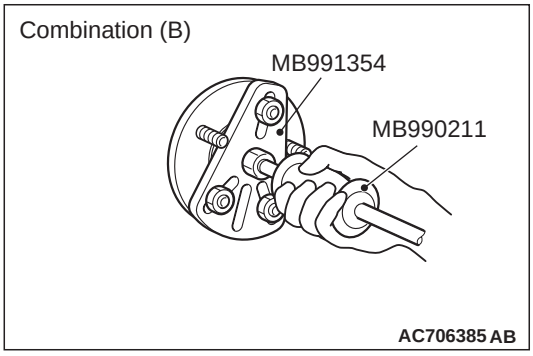
1. Remove the caliper assembly with brake hose.
2. Secure the removed caliper assembly with a wire or other similar material at a position where it will not interfere with the removal and installation of the rear wheel hub assembly.

<<D>> REAR WHEEL HUB ASSEMBLY REMOVAL



1. If the rear wheel hub assembly is seized with the rear driveshaft assembly, use the following special tools to push the rear driveshaft assembly out from the hub and then remove the rear wheel hub assembly.
   - Puller shaft (MB990242)
   - Puller bar (MB990244)
   - Puller body (MB991354)
   - Front hub and flange yoke holder (MB990767)





2. If the rear wheel hub assembly is seized with the knuckle, use the following special tools to remove the rear wheel hub assembly.

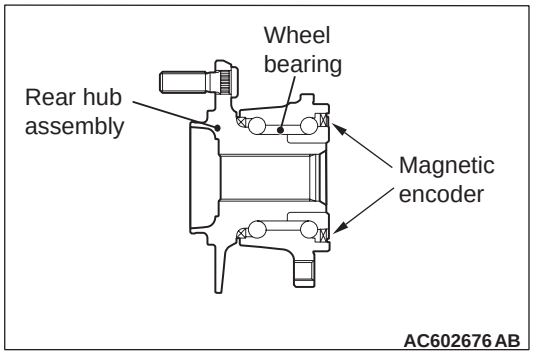
   Combination (A)
   - Slide hammer (MB990211)
   - Rear axle shaft puller (MB990241)

   Combination (B)
   - Slide hammer (MB990211)
   - Puller body (MB991354)

INSTALLATION SERVICE POINT

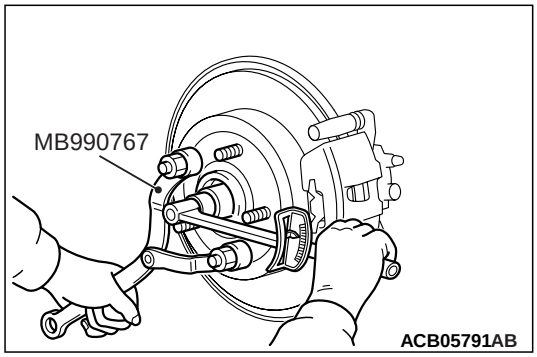
>>A<< DRIVESHAFT NUT INSTALLATION

⚠ CAUTION



- **The wheel speed detection magnetic encoder collects metallic particles easily, because it is magnetized. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it.**
- **When installing the drive shaft, make sure that it does not contact with the wheel speed detection magnetic encoder (integrated with the inner oil seal) to avoid damage.**
- **Do not apply the vehicle weight on the rear wheel hub assembly before fully tightening the driveshaft nuts. Otherwise, the wheel bearing will be broken.**

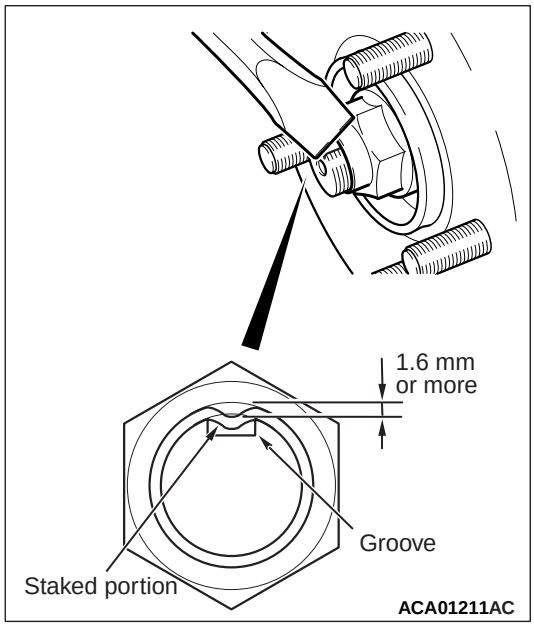
1. Check the hub seated surface for damage or corrosion. Whenever solvent is used for removing the corrosion, the surface should be degreased.
2. Check that the new driveshaft nut can be turned smoothly by hand. Then tighten it until it is seated.



3. Using special tool front hub and flange yoke holder (MB990767), tighten the driveshaft nut.

   Tightening torque: 160 ± 16 N·m

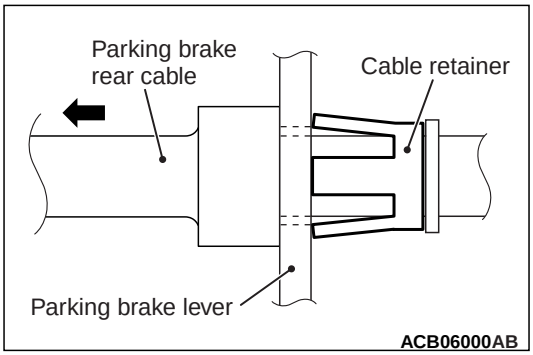
4. After tightening to the specified torque, check that the nut is seated securely.



5. Use the chisel and a hammer to stake the nut until the centre in the staked portion reaches the shown dimension.
6. Finally, check that the nut is not cracked at its staked portion.

>>B<< PARKING BRAKE REAR CABLE CONNECTION (REAR BRAKE CALIPER ASSEMBLY SIDE) INSTALLATION

1. Guide the parking brake rear cable through the parking lever hole of the rear brake caliper assembly to the cable retainer.

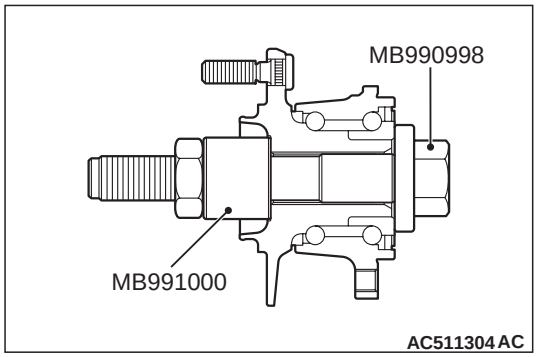


2. Pull back the parking brake rear cable to assure it is tightly fastened to the cable retainer.

INSPECTION

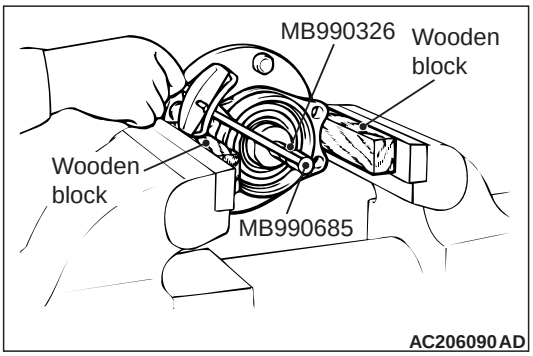
M1271002100548

INSPECTION OF HUB ROTATION STARTING TORQUE AND WHEEL BEARING LOOSENESS



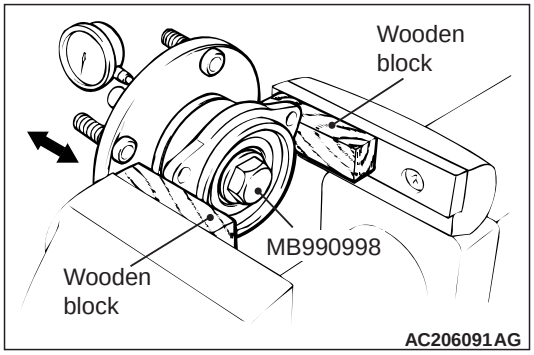
1. Install the following special tools to the hub and tighten to the specified torque.
   - Front hub remover and installer (MB990998)
   - Spacer (MB991000)

   Tightening torque: 160 ± 16 N·m
2. Fix the hub in a vice using a piece of wood or the like.
3. Rotate the hub to make the bearing well-greased.



4. Use the following special tools to measure the hub rotation starting torque.
   - Preload socket (MB990326)
   - Torque wrench (MB990685)

   Limit: 1.4 N·m
5. If the hub rotation starting torque at the specified tightening torque (270 ± 27 N·m) exceeds the limit, replace the hub. If there are rough or gritty feelings in rotation, replace the hub.



6. Set a dial gauge, and move the hub in the axial direction to measure the looseness in the wheel bearing.

   Limit: 0.05 mm
7. If the wheel bearing looseness at the specified tightening torque (270 ± 27 N·m) exceeds the limit, replace the hub.

DRIVESHAFT ASSEMBLY

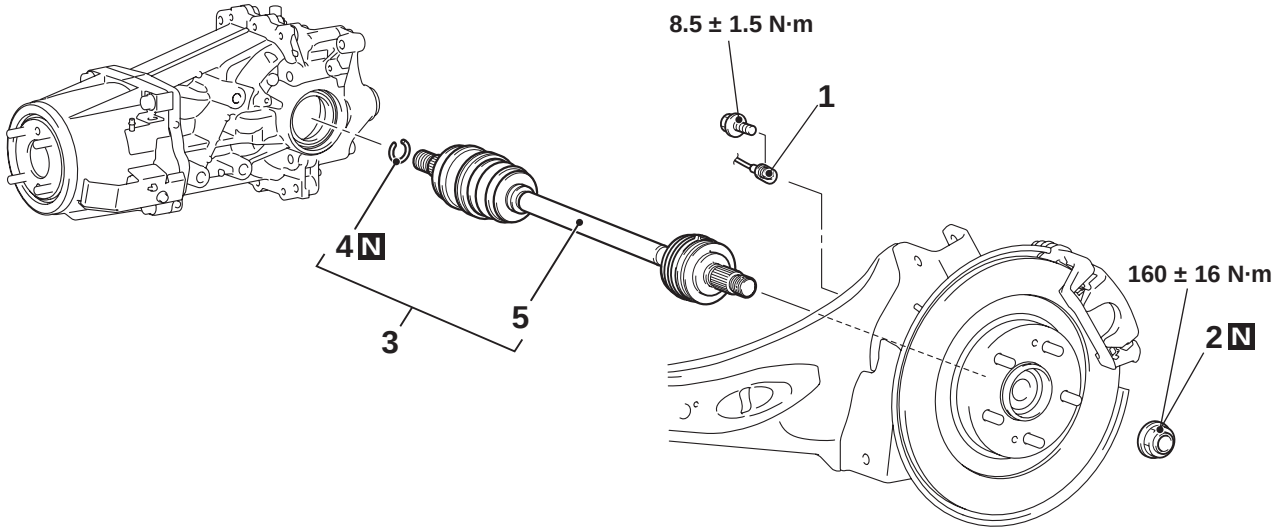
REMOVAL AND INSTALLATION

M1271003300813

⚠ CAUTION

When removing and installing the rear wheel speed sensor, make sure that its pole piece at the end does not contact with surrounding parts to avoid damage.

Pre-removal operation	Post-installation operation
• Parking brake rear cable connection (Rear brake caliper side) Removal and Installation (Refer to GROUP 36 -Parking Brakes). • Drain differential gear oil. • Rear height sensor and control link disconnection (Refer to GROUP34 – Control Link, Upper Arm and Lower Arm). • Disconnect joints between the lower arm, trailing arm, shock absorber, and stabilizer link. (Refer to GROUP 34 – Control Link, Upper Arm, Lower Arm Removal and Installation). • Disconnect joint between the upper arm and the trailing arm. (Refer to GROUP 34– Control Link, Upper Arm, Lower Arm Removal and Installation).	• Connect the upper arm and the trailing arm. (Refer to GROUP 34 – Control Link, Upper Arm, Lower Arm Removal and Installation). • Connect the lower arm, trailing arm, shock absorber, and stabilizer link. (Refer to GROUP 34 – Control Link, Upper Arm, Lower Arm Removal and Installation). • Fill the differential gear oil. • Rear height sensor and control link connection (Refer to GROUP34 – Control Link, Upper Arm and Lower Arm). • Wheel alignment check and adjustment (Refer to GROUP 34 – On-vehicle Service – Rear Wheel Alignment Check and Adjustment). • Check the beam direction of the headlamp (Low beam) (Refer to GROUP 54A – Headlamp Aiming). • Parking brake rear cable connection (Rear brake caliper side) Removal and Installation (Refer to GROUP 36 -Parking Brakes).



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Removal steps

<<**A**>> >>**B**<< 1. Driveshaft nut
2. Rear wheel speed sensor
<<**B**>> >>**A**<< 3. Driveshaft assembly

Removal steps (Continued)

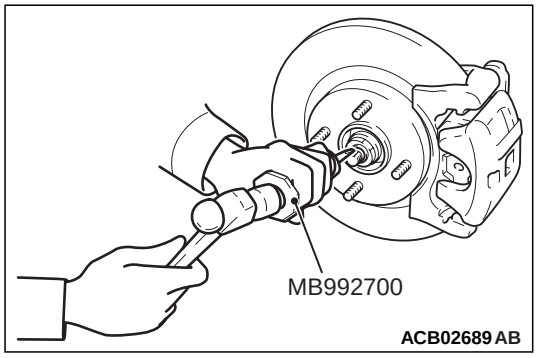
4. Driveshaft
5. Circlip

REMOVAL SERVICE POINTS

<<A>> DRIVESHAFT NUT REMOVAL

⚠ CAUTION

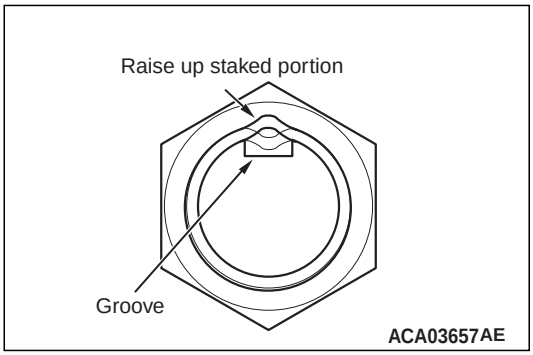
- **Make sure that the lock nut chisel is set in the correct direction. Otherwise, the groove or thread in the driveshaft may be broken, or the tip of the chisel may be chipped.**
- **Never use a chisel which tip is damaged.**
- **For how to use the lock nut chisel, refer to the manufacturer's operating instructions.**



1. Set the special tool lock nut chisel (MB992700) in the groove of the driveshaft with its "UPPER" mark facing upwards. Then strike the staked portion of the driveshaft nut with the chisel and a hammer to raise up.

⚠ CAUTION

Be careful not to damage the thread of the driveshaft.



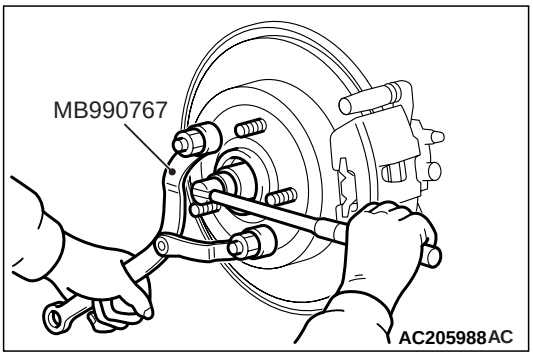
2. Raise up the staked portion of the driveshaft nut until it does not interfere with the shaft thread.

⚠ CAUTION

- **Do not pull out the driveshaft from the EUJ assembly side. Otherwise, the ETJ assembly will be damaged. Be sure to remove the driveshaft from the ETJ assembly side, by using a lever.**
- **Care must be taken to ensure that the oil seal of the differential carrier is not damaged by the spline part of the driveshaft.**

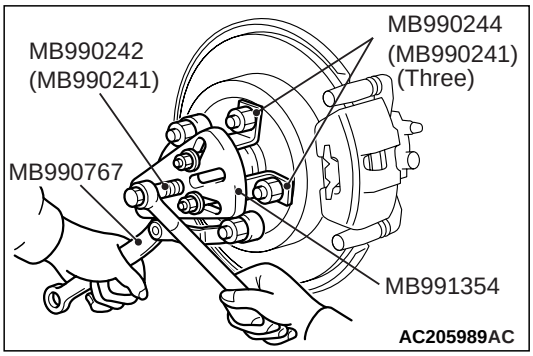
⚠ CAUTION

- **Never use a impact wrench to loosen the driveshaft nut.**
- **Do not apply the vehicle weight on the wheel bearing with the driveshaft nut loosened. Otherwise, the wheel bearing may be broken.**

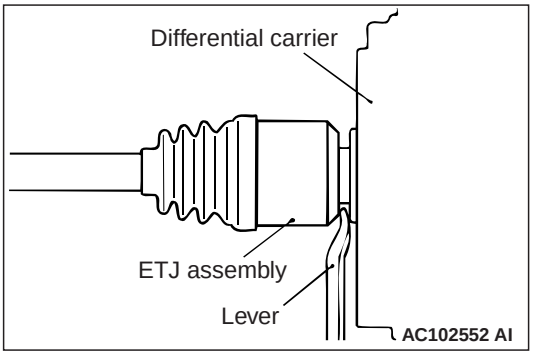


3. Use special tool front hub and flange yoke holder (MB990767) to counter the hub, and remove the driveshaft nut.

<<B>> DRIVESHAFT ASSEMBLY REMOVAL

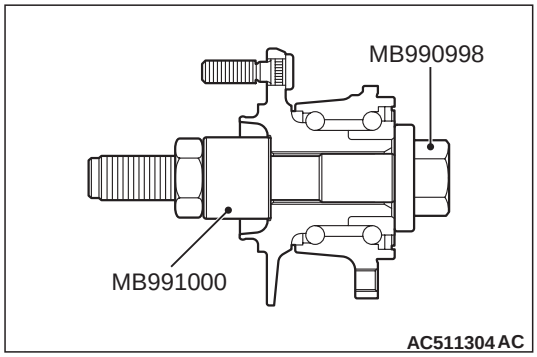


1. If the driveshaft is seized, use the following special tools to push the driveshaft out from the hub:
   - Puller shaft (MB990242)
   - Puller bar (MB990244)
   - Puller body (MB991354)
   - Front hub and flange yoke holder (MB990767)



2. Use a lever to remove the driveshaft (ETJ assembly side) from the differential carrier.

⚠ CAUTION



Do not apply the vehicle weight to the wheel bearing with the driveshaft removed. If, however, the vehicle weight shall be applied to the bearing (in order to move the vehicle), use the following special tools for tightening to the specified torque (160 ± 16 N·m):

- **Front hub remover and installer (MB990998)**
- **Spacer (MB991000)**

INSTALLATION SERVICE POINTS

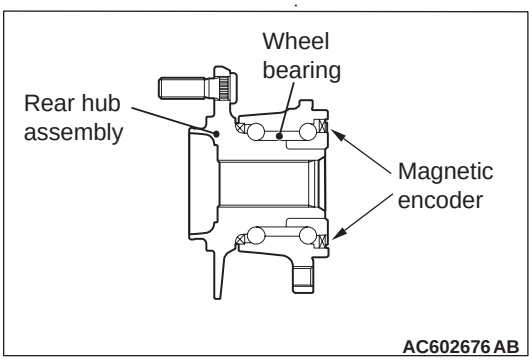
>>A<< DRIVESHAFT ASSEMBLY INSTALLATION

⚠ CAUTION

Care must be taken to ensure that the oil seal of the differential carrier is not damaged by the spline part of the driveshaft.

>>B<< DRIVESHAFT NUT INSTALLATION

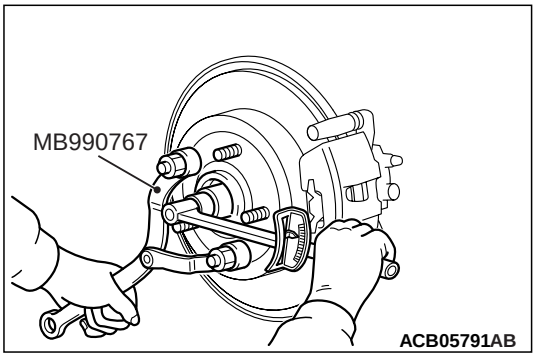
⚠ CAUTION



The wheel speed detection magnetic encoder collects metallic particles easily, because it is magnetised. Make sure that the magnetic encoder should not collect metallic particles. Check that there is not any trouble prior to reassembling it.

- **When installing the drive shaft, make sure that it does not contact with the wheel speed detection magnetic encoder (integrated with the inner oil seal) to avoid damage.**
- **Do not apply the vehicle weight on the rear wheel hub assembly before fully tightening the driveshaft nuts. Otherwise, the wheel bearing will be broken.**

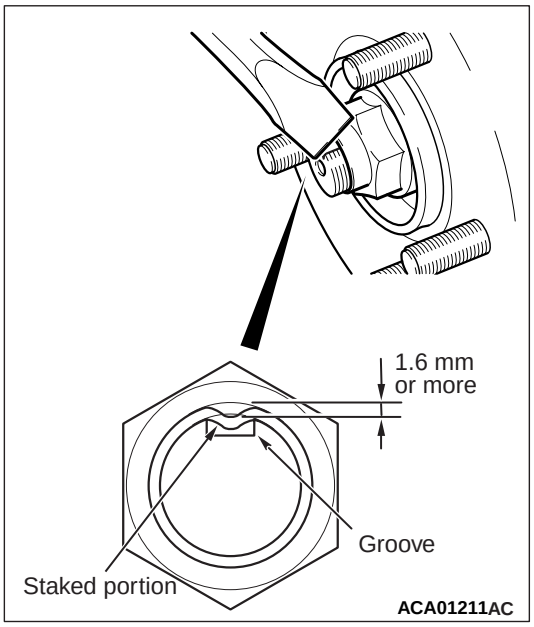
1. Check the hub seated surface for damage or corrosion. Whenever solvent is used for removing the corrosion, the surface should be degreased.
2. Check that the new driveshaft nut can be turned smoothly by hand. Then tighten it until it is seated.



3. Using special tool front hub and flange yoke holder (MB990767), tighten the driveshaft nut.

   Tightening torque: 160 ± 16 N·m

4. After tightening to the specified torque, check that the nut is seated securely.



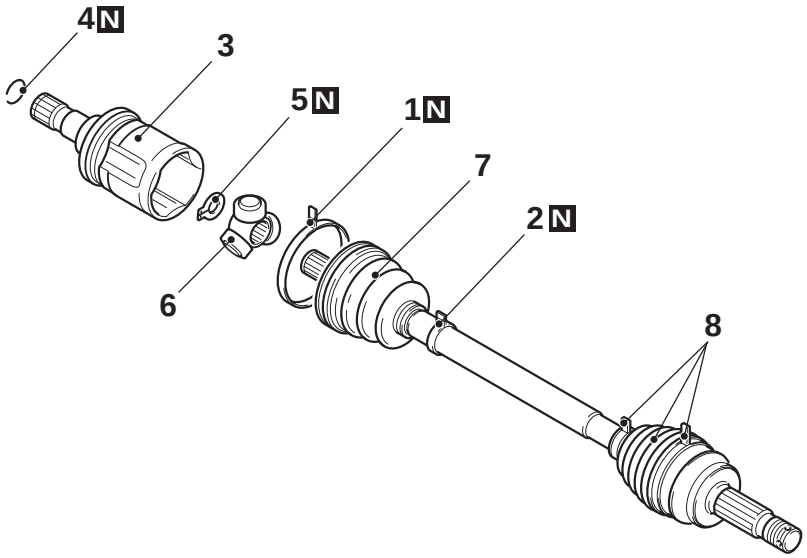
5. Use the chisel and a hammer to stake the nut until the centre in the staked portion reaches the shown dimension.
6. Finally, check that the nut is not cracked at its staked portion.

DISASSEMBLY AND REASSEMBLY

M1271003500431

⚠ CAUTION

EUJ assembly cannot be disassembled.



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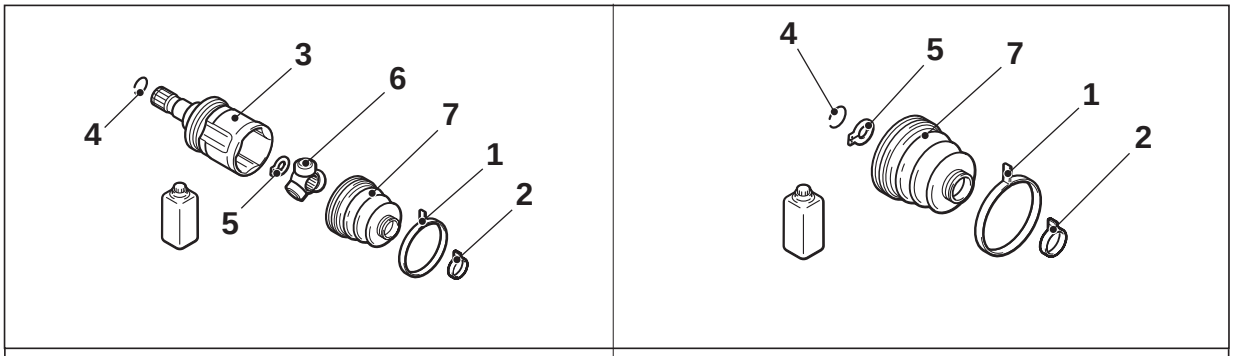


ETJ repair kit	ETJ boot repair kit

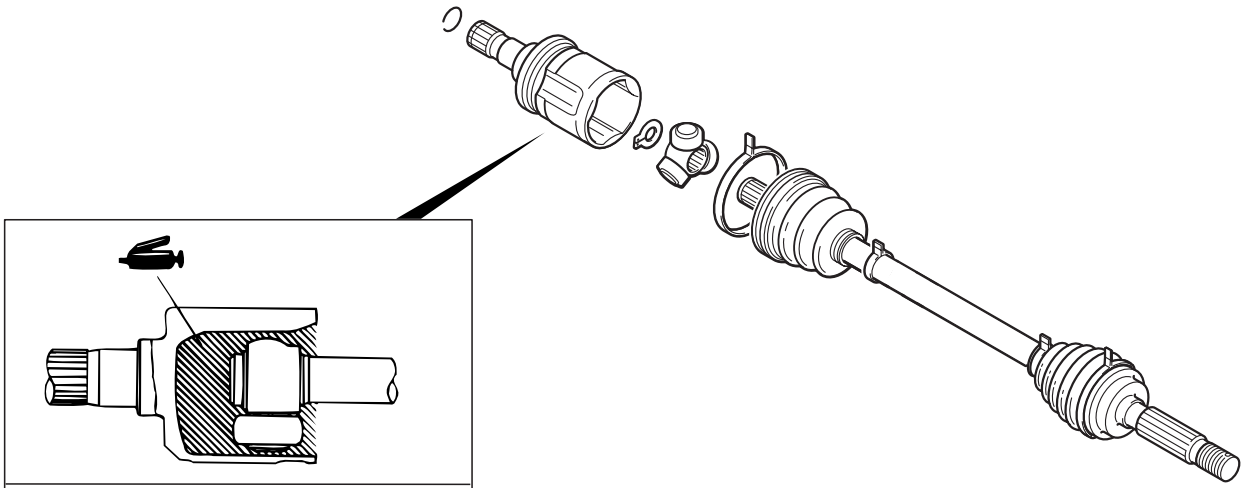
Disassembly steps

	>>**B**<<	1.	ETJ boot band (large)
	>>**B**<<	2.	ETJ boot band (small)
<<**A**>>	>>**A**<<	3.	ETJ case
		4.	Circlip
		5.	Snap ring

Disassembly steps (Continued)

<<**A**>>	>>**A**<<	6.	Spider assembly
<<**B**>>		7.	ETJ boot
		8.	EUJ assembly

LUBRICATION POINT



Grease: repair kit grease
Amount used: 75 ± 10 g

⚠ CAUTION
The drive shaft joint uses special grease. Do not mix old and new or different types of grease.

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DISASSEMBLY SERVICE POINTS

<<A>> ETJ CASE/SPIDER ASSEMBLY REMOVAL

⚠ CAUTION
Do not disassemble the spider assembly.

1. Wipe off the grease inside the ETJ case and on the spider assembly.
2. If the grease is contaminated with the foreign material (water, dust, etc.), be sure to wash the spider assembly.

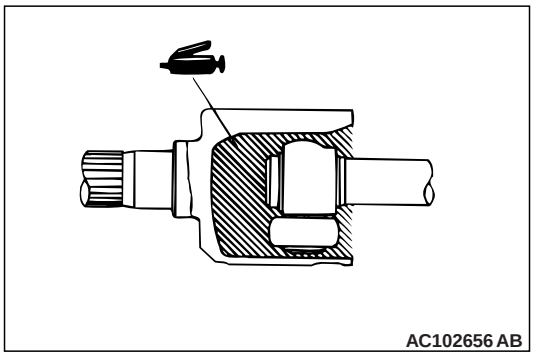
<<B>> ETJ BOOT REMOVAL

1. Wipe off the grease on the shaft spline.
2. If the ETJ boot is reused, protect the shaft spline area with taping from the damage in removal of the boot.

REASSEMBLY SERVICE POINTS

>>A<< SPIDER ASSEMBLY/ETJ CASE INSTALLATION

⚠ CAUTION
Special grease is used for the joint. Do not mix the new and previous types of grease or different types of grease.



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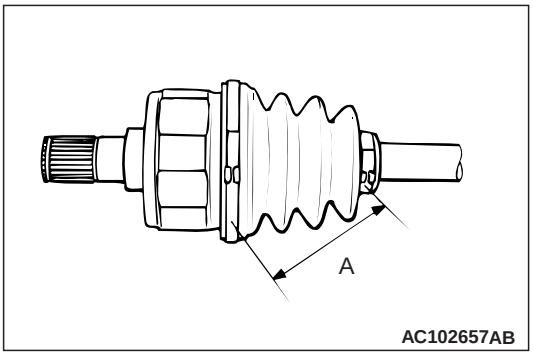
Fill the ETJ case with the specified grease, insert the drive shaft, and then fill the specified grease again.

Specified grease: Repair kit grease
Application amount: 75 ± 10 g

NOTE: When using the repair kit grease, fill the half of the grease into the joint and the other half into the boot as a guideline, and consume the grease completely.

>>B<< ETJ BOOT BAND (SMALL)/ETJ BOOT BAND (LARGE) TIGHTENING



Adjust the distance between the boot bands to the standard value to adjust the air volume inside the ETJ boot to the specified value, then be sure to tighten the ETJ boot band (large) and ETJ boot band (small).

Standard value (A): 75 ± 3 mm

DIFFERENTIAL CARRIER ASSEMBLY

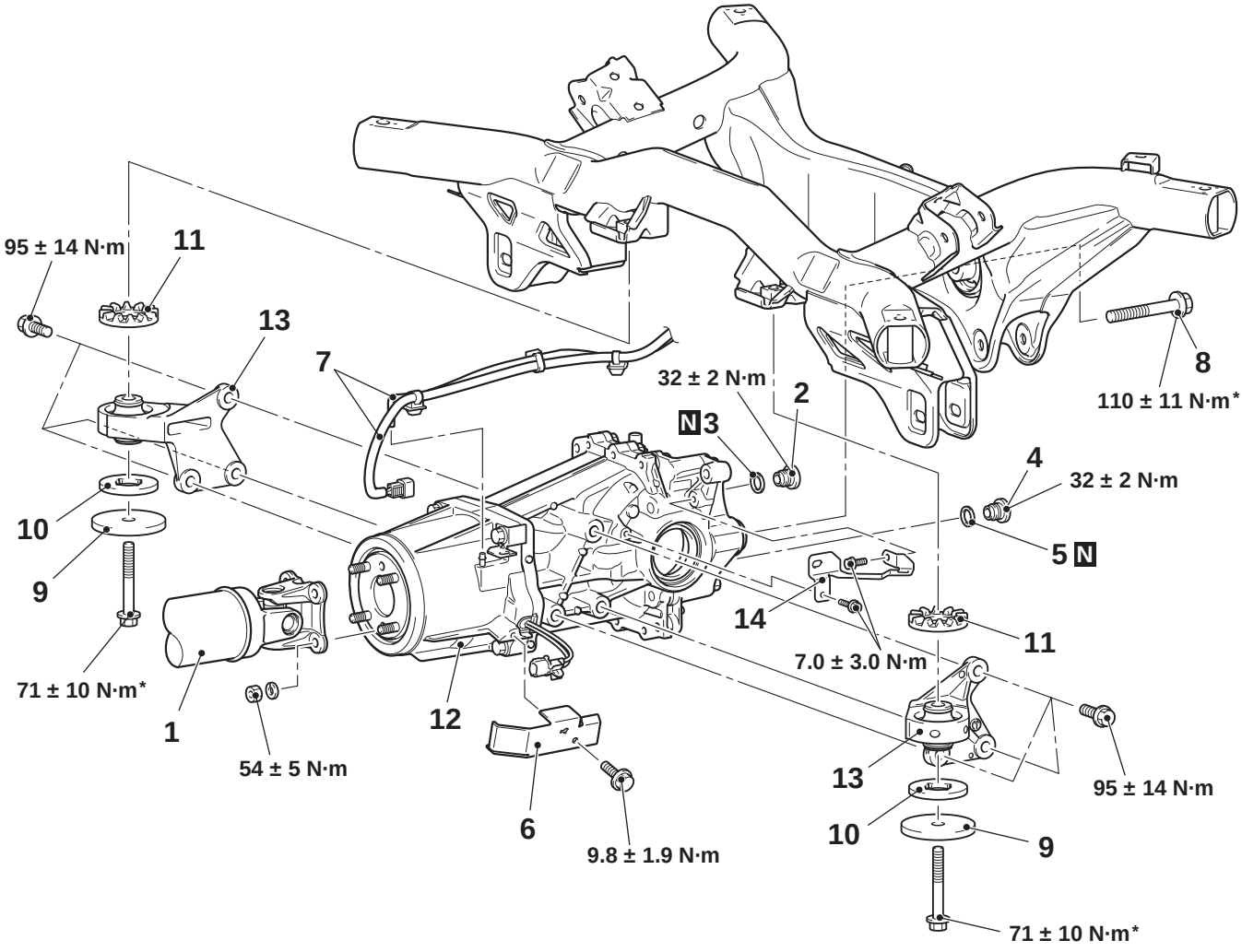
REMOVAL AND INSTALLATION

M1271005300392

⚠ CAUTION

- **The parts indicated by * are the bolts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten them to the specified torque.**

Pre-removal operation	Post-installation operation
• Spare tyre and spare tyre carrier removal (Refer to GROUP 31, Spare Tyre Carrier). • Centre exhaust pipe and main muffler removal (Refer to GROUP 15, Exhaust Pipe and Muffler). • Drain differential gear oil. • Drive shaft removal (Refer to P.27B-14).	• Drive shaft installation (Refer to P.27B-14). • Fill the differential gear oil. • Centre exhaust pipe and main muffler installation (Refer to GROUP 15, Exhaust Pipe and Muffler). • Spare tyre and spare tyre carrier installation (Refer to GROUP 31, Spare Tyre Carrier).



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<<A>>

Removal steps

1. Propeller shaft connection
2. Filler plug
3. Gasket
4. Drain plug
5. Gasket

Removal steps (Continued)

6. Cover
7. Electronic control coupling harness connection, breather hose connection

Removal steps (Continued)

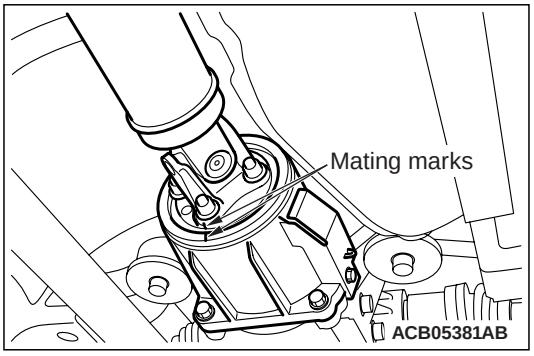
8. Differential to rear suspension crossmember connecting bolt
9. Weight
10. Lower stopper
11. Upper stopper

>>**A**<< 12. Differential carrier assembly

13. Differential mount bracket (LH/RH)
14. Differential bracket

REMOVAL SERVICE POINT

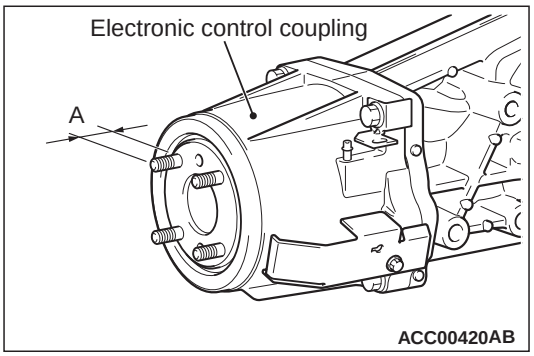
<<A>> PROPELLER SHAFT DISCONNECTION



1. Put mating marks on the flange yoke and the electronic control coupling.
2. Hold the disconnected propeller shaft with a wire so that it will not be bent sharply.

INSTALLATION SERVICE POINT

>>A<< DIFFERENTIAL CARRIER ASSEMBLY INSTALLATION



1. Check that the length of the electronic control coupling stud bolt (A) is within the standard value range.

   Standard value: 21.6 – 24.4 mm

2. If the length exceeds the standard value, replace the stud bolt.

   Tightening torque: 15 ± 3 N·m

   NOTE: When replacing the stud bolts, always clean the stud bolt threaded holes.

DISASSEMBLY

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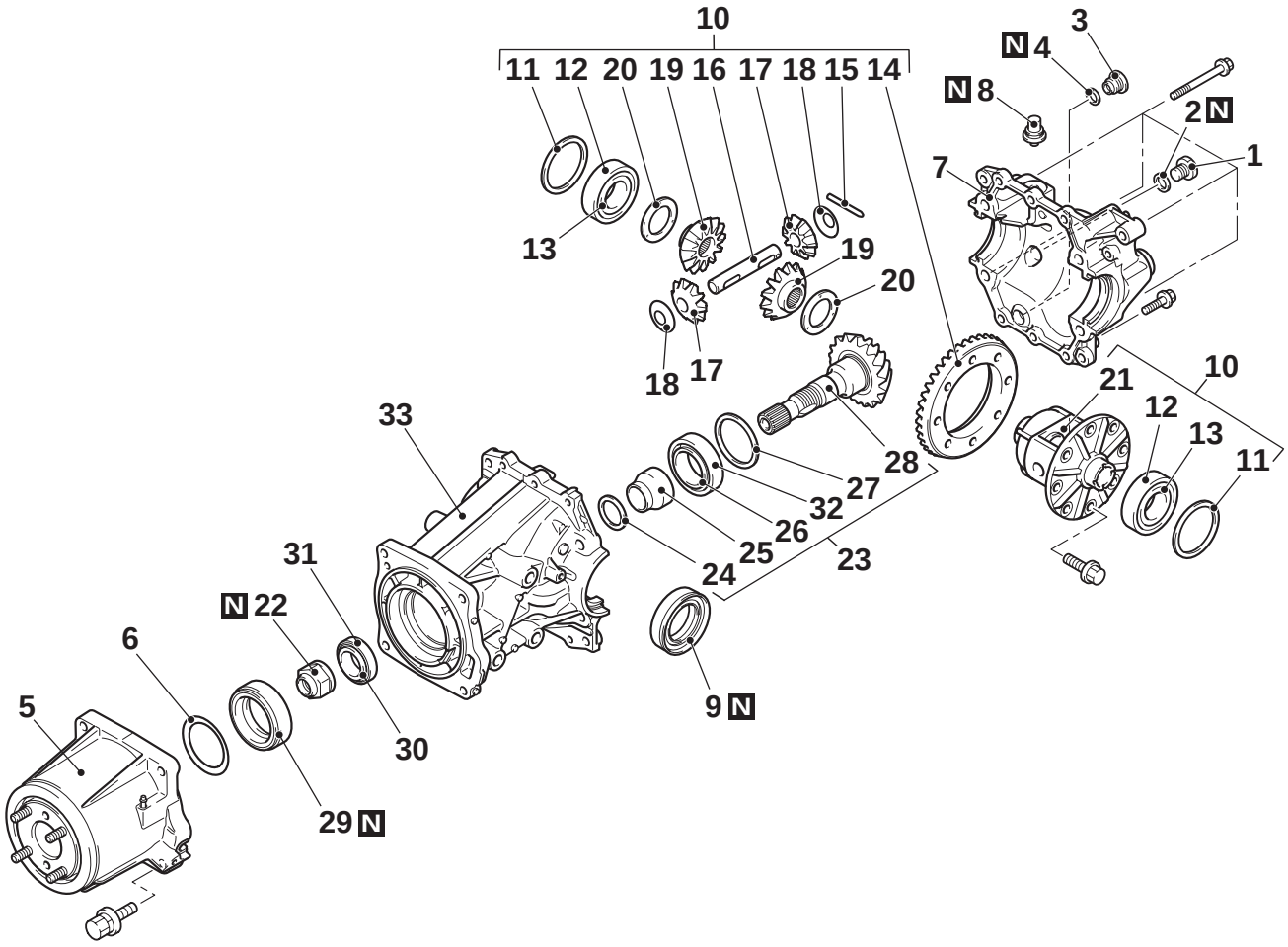

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Disassembly steps

1. Filler plug
2. Gasket
3. Drain plug
4. Gasket
5. Electronic control coupling
6. Wave washer
7. Differential cover assembly
8. Vent plug
9. Oil seal

<<A>> • Pre-disassembly check

10. Differential case assembly

<<B>> 11. Differential side bearing spacer

<<B>> 12. Differential side bearing outer race

<<B>> 13. Differential side bearing inner race

<<C>> 14. Drive gear

<<D>> 15. Lock pin

<<E>> 16. Pinion shaft

17. Pinion gear
18. Pinion washer
19. Side gear
20. Side gear spacer

Disassembly steps (Continued)

21. Differential case

<<F>> 22. Differential nut

23. Drive pinion assembly
24. Drive pinion front shim (for drive pinion rotation torque adjustment)
25. Drive pinion spacer

<<G>> 26. Drive pinion rear bearing inner race

27. Drive pinion rear shim (for drive pinion height adjustment)
28. Drive pinion
29. Oil seal
30. Drive pinion front bearing inner race

<<H>> 31. Drive pinion front bearing outer race

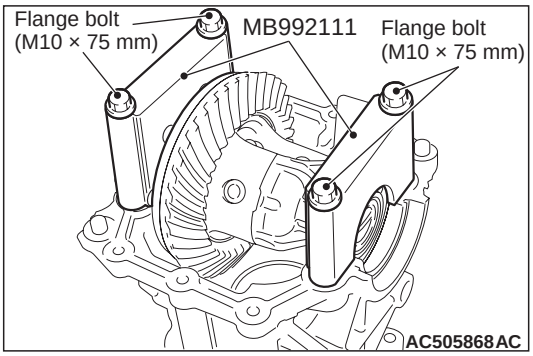
<<I>> 32. Drive pinion rear bearing outer race

33. Differential carrier

DISASSEMBLY SERVICE POINTS

<<A>> PRE-DISASSEMBLY CHECK

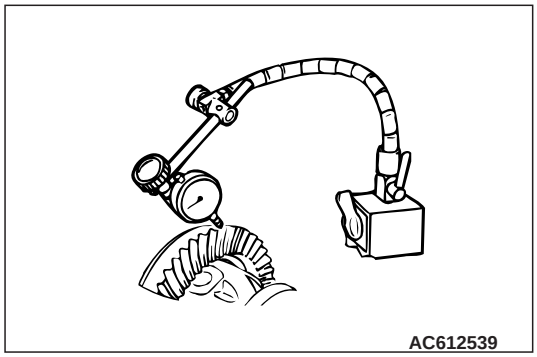
1. Remove the differential case assembly, differential side bearing spacer and differential side bearing.
2. Fix the following special tools in a vice, and install the differential carrier assembly.
   - Working base (MB990909)
   - Working base adapter (MB991116)



3. Use special tool side bearing holder (MB992111) to install the differential case assembly, differential side bearing spacer and differential side bearing to the differential carrier, then perform the following checks. Then tighten a flange bolt (M10 × 75 mm) to the specified torque.

   Tightening torque: 43 ± 7 N·m

DRIVE GEAR BACKLASH

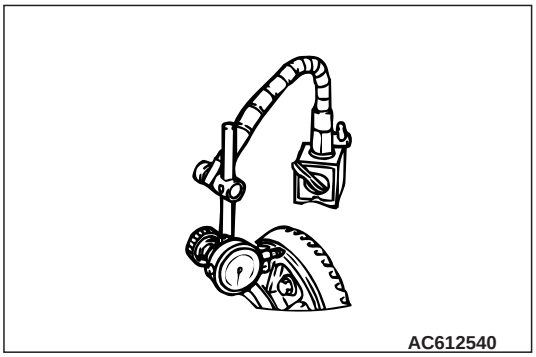


1. Set a dial gauge against the drive gear teeth edge and fix the drive pinion. Rotate the drive gear to measure the backlash at four or more points.

   Standard value: 0.08 – 0.15 mm

2. When the backlash is not within the standard value range, adjust the final drive gear backlash. (Refer to P.27B-28.)
3. After the adjustment, check the final drive gear teeth contact.

DRIVE GEAR RUNOUT ON BACKSIDE

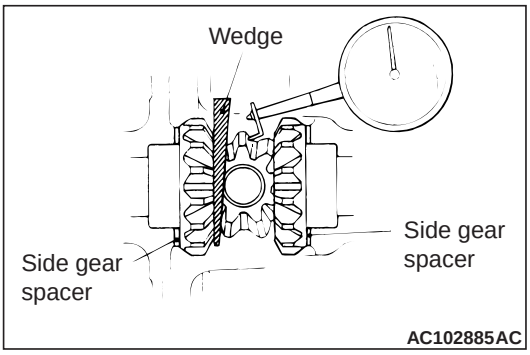


1. Set a dial gauge against the backside of the drive gear. Rotate the drive gear to measure the runout.

   Limit : 0.05 mm

2. When the runout exceeds the limit, check for the foreign material between the backside of the drive gear and the differential gear case, and looseness of the drive gear mounting bolt.
3. When the runout measured in step 2 is normal, change the position of the drive gear and differential case, and measure the runout again.
4. If the adjustment is not possible, replace the differential case or the drive gear and the drive pinion as a set.

DIFFERENTIAL GEAR BACKLASH



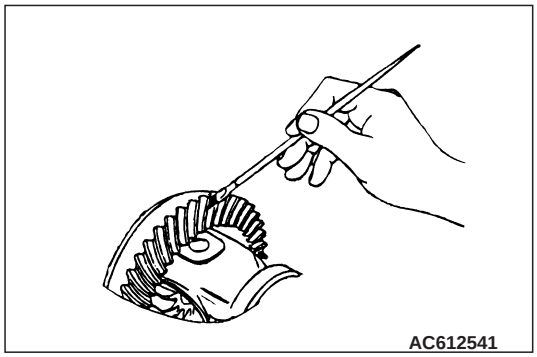
1. Drive the wooden wage between one of the side gears and the pinion shaft to fix one side of the side gear. Then, set a dial gauge (with the measuring rod extended) against the pinion gear, and measure the backlash to check that it is within the standard value. Repeat the same procedure to measure the backlash at the other pinion gear.

   Standard value: 0 – 0.076 mm
   Limit : 0.2 mm

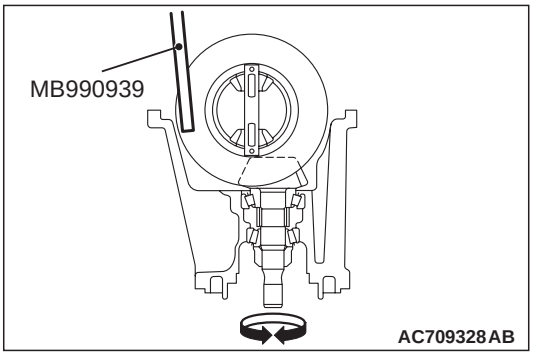
2. When the backlash exceeds the limit, adjust the backlash of the differential gear(Refer to P.27B-28).
3. When the adjustment is not possible, replace the side gear and the pinion gear as a set.

FINAL DRIVE GEAR TEETH CONTACT ADJUSTMENT

Check the final drive gear teeth contact in the following steps:


AC612541

1. Apply the bearing blue on the drive gear teeth (on both sides) thinly and evenly.



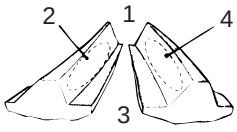
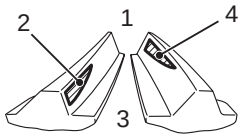
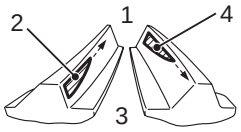
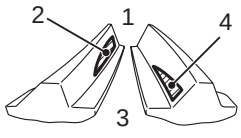
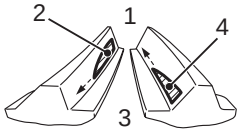
AC709328AB

2. Insert special tool remover bar (MB990939) between the gear carrier and the drive gear installation side of the differential case. While applying load to the drive gear rotation so that approx. 2.5 to 2.9 N·m rotation torque is applied to the drive pinion, rotate the drive pinion by hand (360 degrees clockwise and anti-clockwise respectively).

⚠ CAUTION

Do not let the drive gear rotated over 360 degrees. It makes the gear contact pattern unclear.

3. Check contact of the final drive gear teeth.

Normal contact pattern	Cause	Measures
1. Small-end side 2. Drive-side tooth face (the side to which the force is applied while driving forward) 3. Large-end side 4. Coast-side tooth face (the side to which the force is applied while driving backward)  ACX01039AB	Contact pattern indicating that the drive pinion height is too high  AC104880AC Drive pinion is too much away from the centre of the drive gear.	 AC104881AC Increase thickness of the drive pinion rear shim to bring the drive pinion closer to the centre of the drive gear. Then move the drive gear away from the drive pinion for the final drive gear backlash adjustment.
	Contact pattern indicating that the drive pinion height is too low  AC104882AC Drive pinion is too close to the centre of the drive gear.	 AC104883AC Reduce thickness of the drive pinion rear shim to bring the drive pinion away from the centre of the drive gear. Then move the drive gear closer to the drive pinion for the final drive gear backlash adjustment.

NOTE:

1. *Checking the contact pattern is the method to check that the drive pinion height and the final drive gear backlash are or are not adjusted properly. Repeat the adjustments of the drive pinion height and the final drive gear backlash until the contact pattern similar to the normal pattern.*
2. *If the normal contact pattern cannot be obtained even after making the adjustments, the drive gear and the drive pinion have been worn exceeding the usage limit. Replace both gears as a set.*

<<B>> DIFFERENTIAL CASE ASSEMBLY/DIFFERENTIAL SIDE BEARING SPACER/DIFFERENTIAL SIDE BEARING OUTER RACE REMOVAL

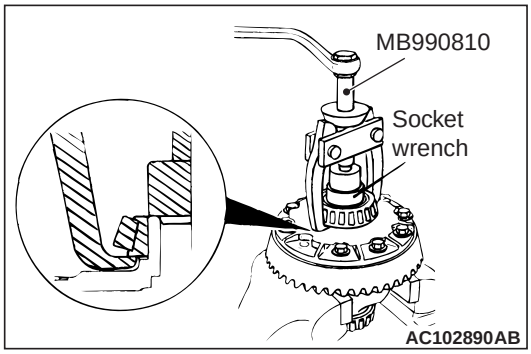
⚠ CAUTION

When removing the differential case assembly, remove it slowly with care not to drop the differential side bearing spacer and the differential side bearing outer race.

Remove the differential case assembly, differential side bearing spacer and differential side bearing outer race.

NOTE: Identify the RH and LH side bearing spacers as a reference for the reassembly operation.

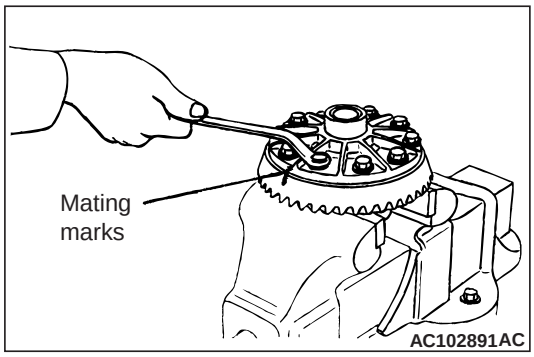
<<C>> DIFFERENTIAL SIDE BEARING INNER RACE REMOVAL



Use special side bearing puller (MB990810) to remove the differential side bearing inner race.

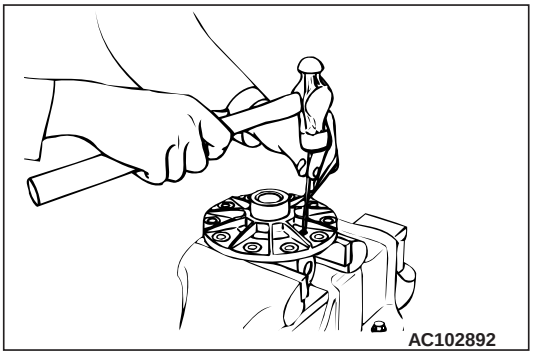
NOTE: Hook the claws of the special tool on the differential side bearing inner race through two cut-off parts on the differential case side.

<<D>> DRIVE GEAR REMOVAL

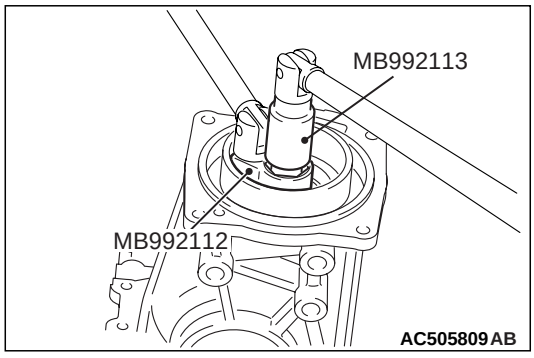


1. Put mating marks on the drive gear and differential case as a reference for the reassembly operation.
2. Loosen the drive gear tightening bolts in a diagonal order to remove the drive gear.

<<E>> LOCK PIN DRIVING OUT



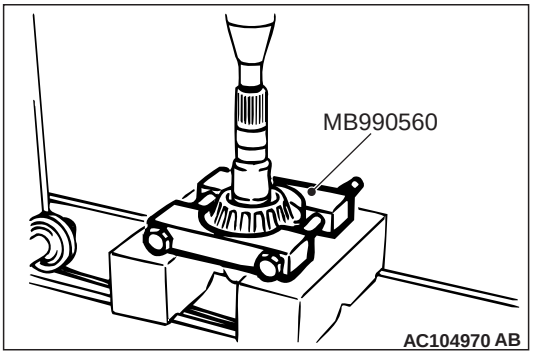
<<F>> DIFFERENTIAL NUT REMOVAL



Use the following special tools to remove the differential nut:

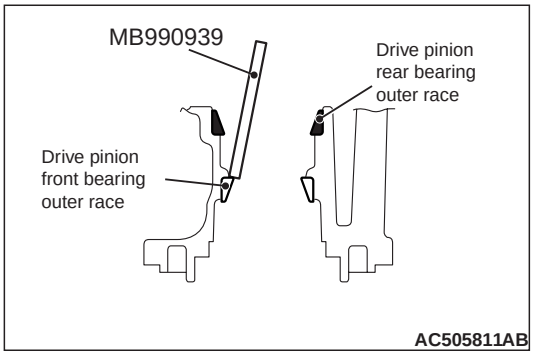
- Locking nut wrench (MB992112)
- Drive pinion holder (MB992113)

<<G>> DRIVE PINION REAR BEARING INNER RACE REMOVAL



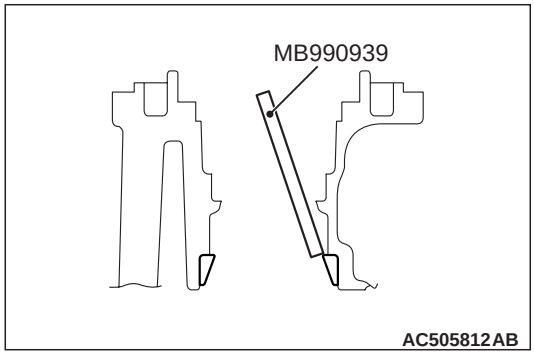
Use special rear axle shaft bearing remover (MB990560) to remove the drive pinion rear bearing inner race.

<<H>> DRIVE PINION FRONT BEARING OUTER RACE REMOVAL



Use special remover bar (MB990939) to remove the drive pinion front bearing outer race.

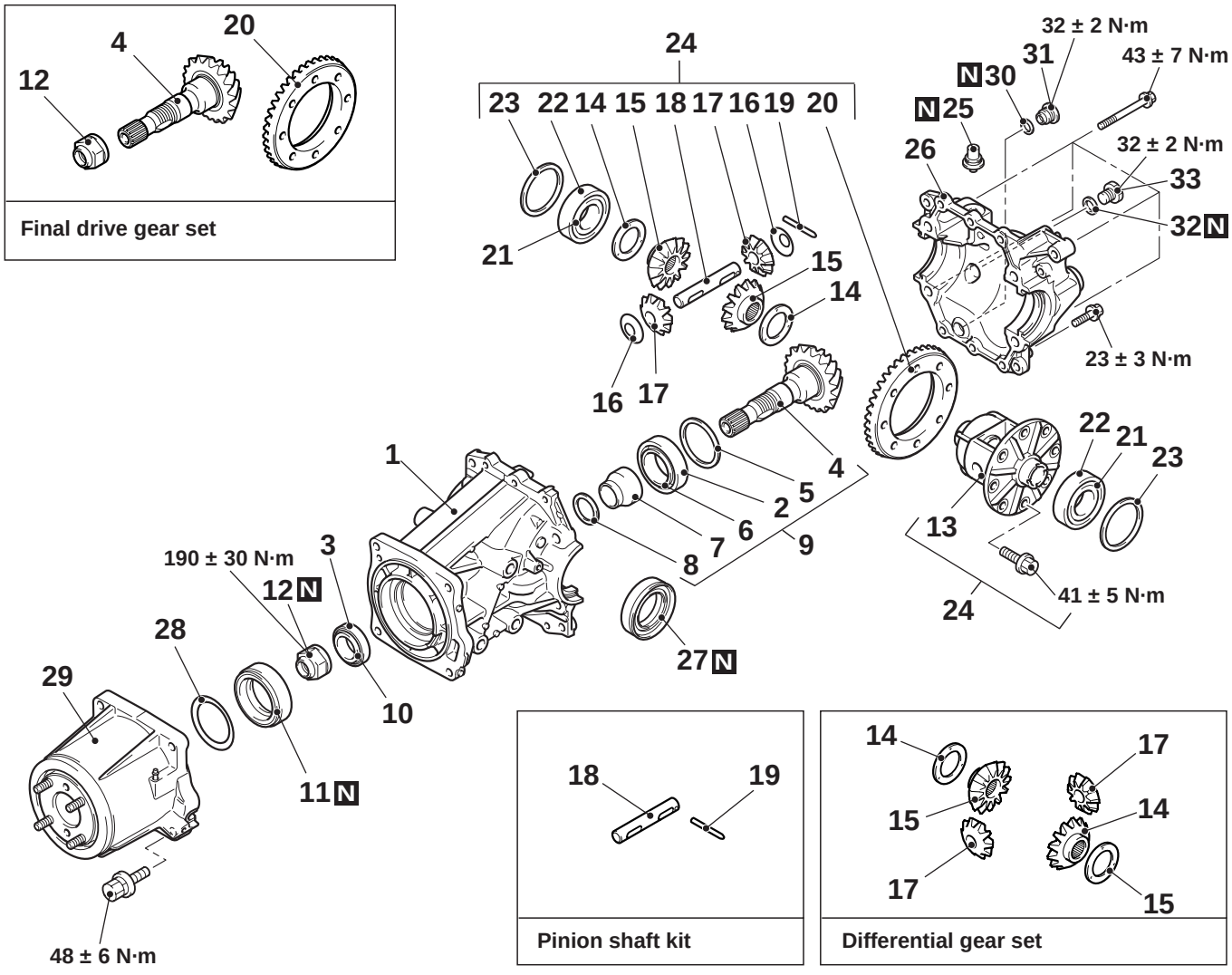
<<I>> DRIVE PINION REAR BEARING OUTER RACE REMOVAL



Use special remover bar (MB990939) to remove the drive pinion rear bearing outer race.

REASSEMBLY

M1271005500266



Reassembly steps

1. Differential carrier
- >>**A**<< 2. Drive pinion rear bearing outer race
- >>**B**<< 3. Drive pinion front bearing outer race
- >>**C**<< • Drive pinion height adjustment
4. Drive pinion
5. Drive pinion rear shim (for drive pinion height adjustment)
6. Drive pinion rear bearing inner race
7. Drive pinion spacer
- >>**D**<< • Drive pinion rotation torque adjustment
8. Drive pinion front shim (for drive pinion rotation torque adjustment)
9. Drive pinion assembly
10. Drive pinion front bearing inner race

Reassembly steps (Continued)

- >>**D**<< 11. Oil seal
12. Differential nut
13. Differential case
- >>**E**<< • Differential gear backlash adjustment
14. Side gear spacer
15. Side gear
16. Pinion washer
17. Pinion gear
18. Pinion shaft
- >>**F**<< 19. Lock pin
- >>**G**<< 20. Drive gear
- >>**H**<< 21. Differential side bearing inner race
22. Differential side bearing outer race
23. Differential side bearing spacer
24. Differential case assembly
- >>**I**<< • Final drive gear backlash adjustment
25. Vent plug
26. Differential cover assembly

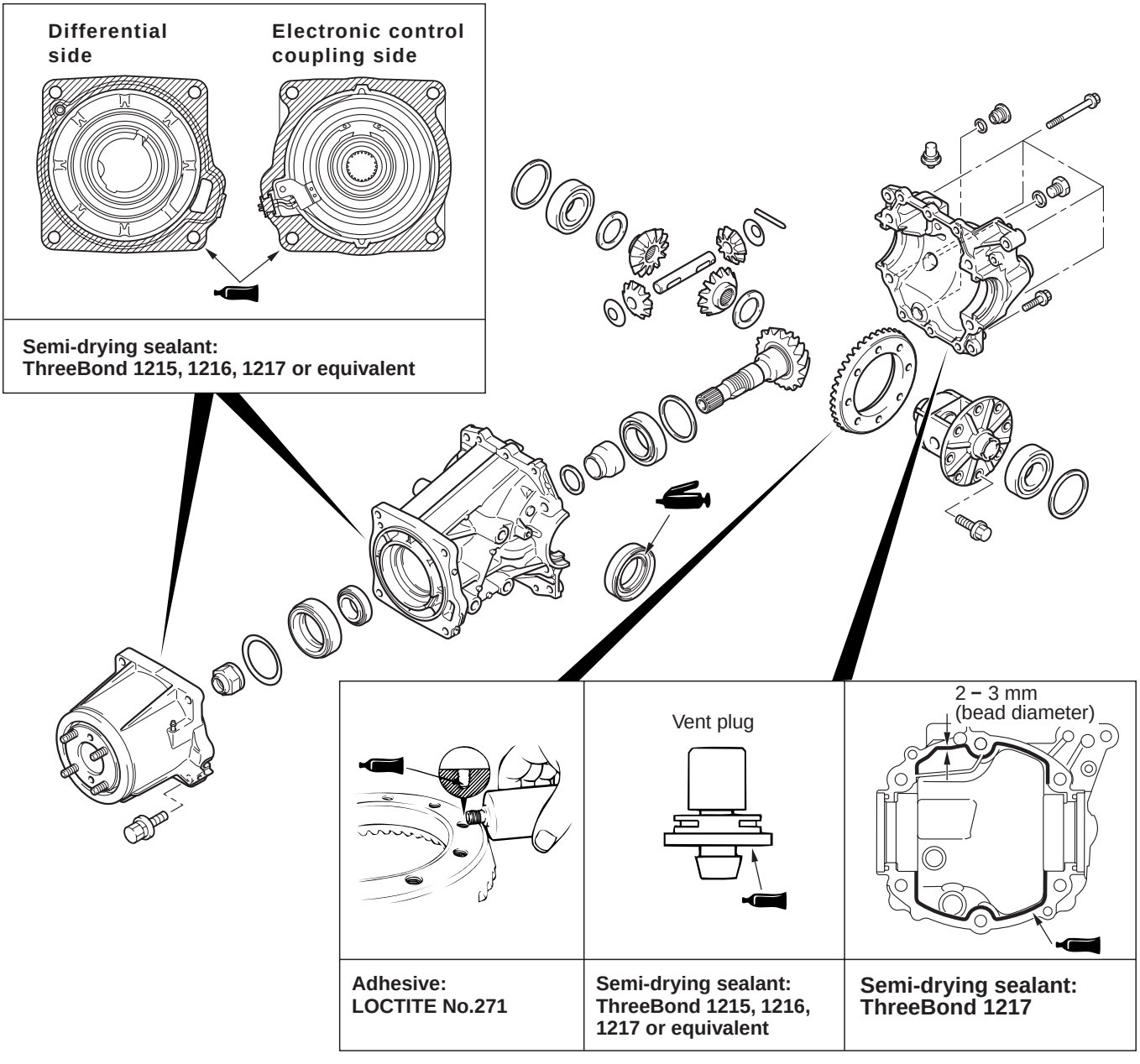
Reassembly steps (Continued)

>>**J**<< 27. Oil seal
28. Wave washer
29. Electronic control coupling
30. Gasket
31. Drain plug

Reassembly steps (Continued)

32. Gasket
33. Filler plug

LUBRICANT/SEALANT APPLICATION POINTS



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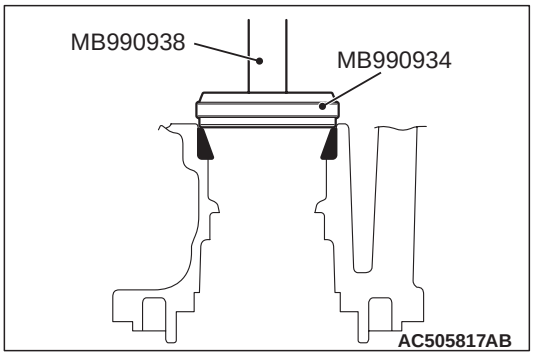
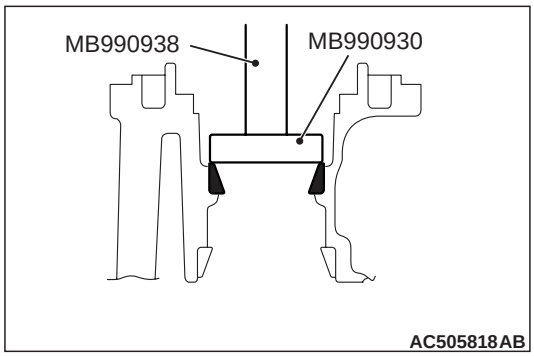
REASSEMBLY SERVICE POINTS

>>A<< DRIVE PINION REAR BEARING OUTER RACE PRESS-FITTING



Use the following special tools to press-fit the drive pinion rear bearing outer race:
- Installer adapter (MB990934)
- Installer bar (MB990938)

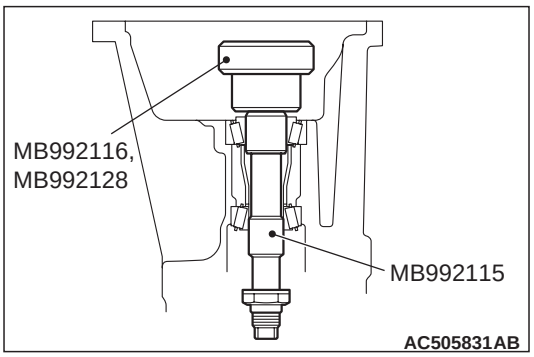
>>B<< DRIVE PINION FRONT BEARING OUTER RACE PRESS-FITTING



Use the following special tools to press-fit the drive pinion front bearing outer race:
- Installer adapter (MB990930)
- Installer bar (MB990938)

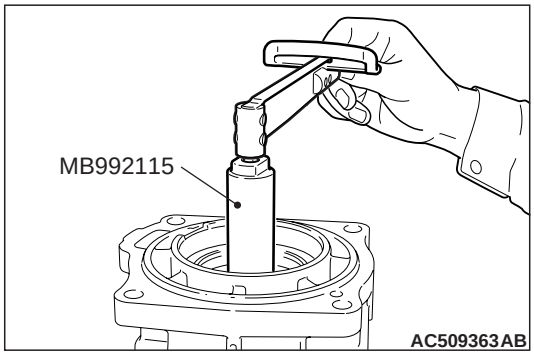
>>C<< DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height in the following steps.



1. Use the following special tools to assemble the drive pinion front and rear bearing inner laces onto the gear carrier:
   - Dummy pinion gauge body (MB992115)
   - Dummy pinion gauge head (MB992116)
   - Hex socket head bolt (MB992128)

⚠ CAUTION
The bearing must be free from gear oil.

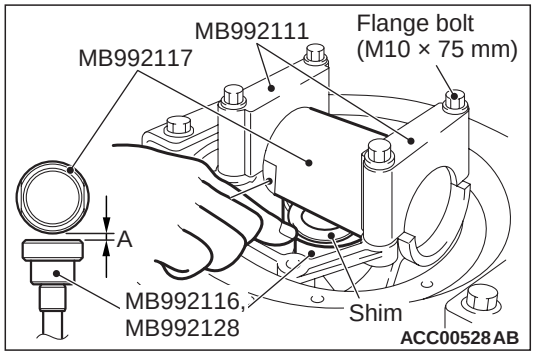


2. Measure the drive pinion rotation torque.

   Standard value:

Bearing type	Bearing lubrication	Rotation torque N·m
New	None (coated with rust inhibitor oil)	0.7 – 1.2

   NOTE: After seating the bearing, measure the rotation torque.



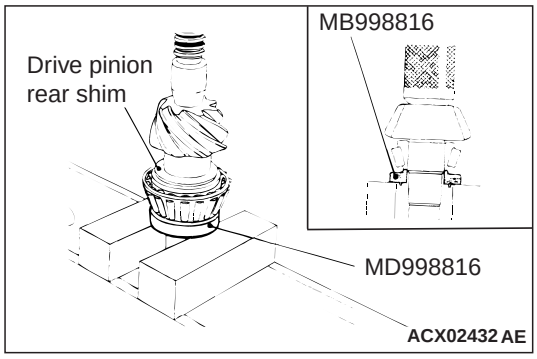
3. Set special tool cylinder gauge (MB992117) on the differential carrier side bearing, and use special tool side bearing holder (MB992111) to install it to the differential carrier.

   Make sure that the cut-off part of the cylinder gauge is positioned as shown in the figure, and the cylinder gauge is closely contacted with the side bearing. Then tighten a flange bolt (M10 × 75 mm) to the specified torque.

   Tightening torque: 43 ± 7 N·m

4. Select the drive pinion rear shim(s) that corresponds to the gap between the special tools.

NOTE:
1. Clean the side bearing.
2. When setting the special tool, make sure that its cut-off part is positioned as shown in the figure, and it is closely contacted with the side bearing.
3. Try to minimize the number of the drive pinion rear shim(s) to be used.



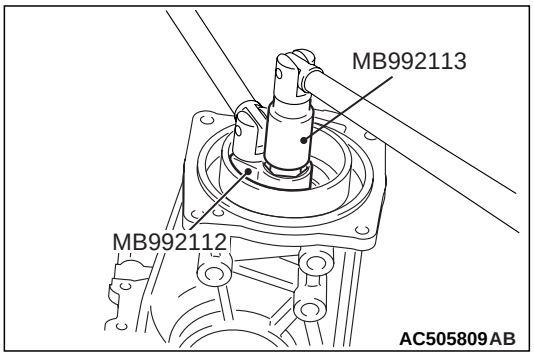
5. Fit the selected drive pinion rear shim(s) onto the drive pinion. Use special tool installer adapter (MD998816) to press-fit the drive pinion rear bearing inner race.

>>D<< DRIVE PINION ROTATION TORQUE ADJUSTMENT/OIL SEAL PRESS-FITTING

Adjust the drive pinion rotation torque in the following steps:

1. Insert the drive pinion into the gear carrier. From rear side of the carrier, assemble the drive pinion spacer, drive pinion front shim and drive pinion front bearing inner race.

   NOTE: Do not assemble the oil seal.



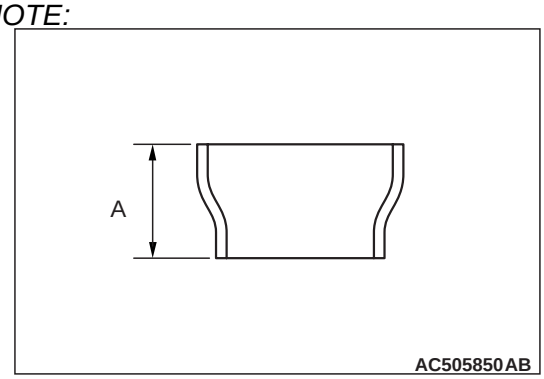
2. Use the following special tools to tighten the differential nut to the specified torque:
   - Locking nut wrench (MB992112)
   - Drive pinion holder (MB992113)
3. Rotate the drive pinion several turns, and then measure the drive pinion rotation torque.

   Standard value:

Bearing type	Bearing lubrication	Rotation torque N·m
New	None (coated with rust inhibitor oil)	0.7 – 1.2

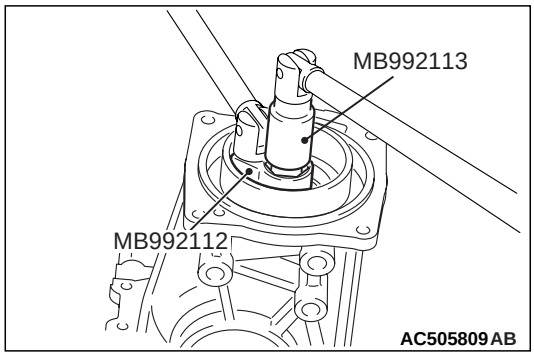
4. When the rotation torque is not within the standard value range, adjust the torque by selecting the drive pinion front shim(s).

   NOTE:



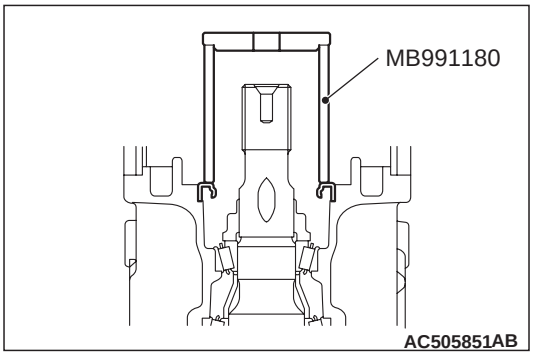
   When selecting the drive pinion front shim(s), select the drive pinion spacer to minimize the number of the shims to be used. There are two drive pinion spacers available:

Drive pinion spacer height A mm
24.3
23.6



5. Use the following special tools to tighten the differential nut to the specified torque:
   - Locking nut wrench (MB992112)
   - Drive pinion holder (MB992113)

   Tightening torque: 190 ± 30 N·m



6. Use special tool bushing remover and installer base (MB991180) to press-fit the oil seal.
7. Rotate the drive pinion several turns, and then measure the drive pinion rotation torque.

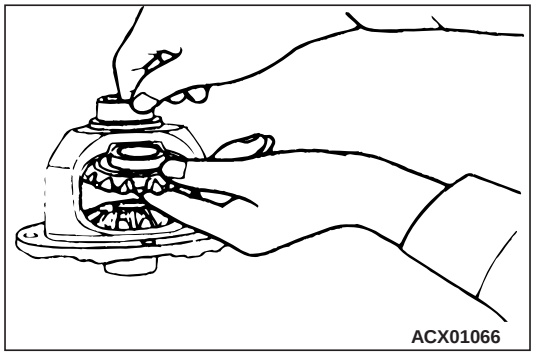
Standard value:

Bearing type	Companion flange lubrication	Rotation torque N·m
New	None (coated with rust inhibitor oil)	0.7 – 1.2

8. When the rotation torque is not within the standard value, check the differential locking nut tightening torque or the oil seal assembly condition.

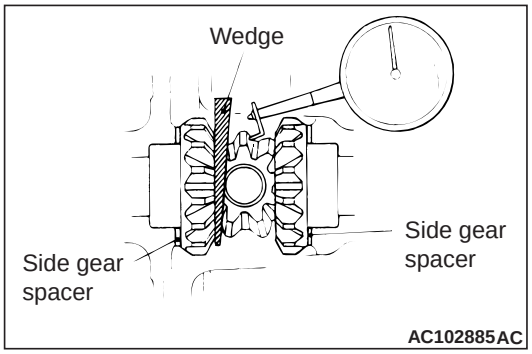
>>E<< DIFFERENTIAL GEAR BACKLASH ADJUSTMENT

Adjust the differential gear backlash in the following steps.



1. Assemble the side gear, side gear spacer, pinion gear and pinion washer into the differential case.
2. Temporarily assemble the pinion shaft.

   NOTE: Do not assemble the lock pin at this stage.

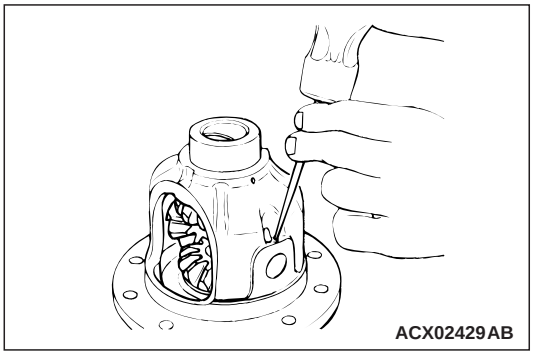


3. Drive a wooden wedge between one of the side gears and the pinion shaft to fix the side gear.
4. Set a dial gauge (with the measuring rod extended) against the pinion gear and measure the backlash. Repeat the same procedure to measure the backlash at the other pinion gear.

   Standard value: 0 – 0.076 mm
   Limit: 0.2 mm

5. When the backlash exceeds the limit, adjust it by selecting the side gear spacer.
6. When the adjustment is not possible, replace the side gear and the pinion gear as a set.
7. After the adjustments, make sure that the backlash is within the limit and the differential gear rotates smoothly.

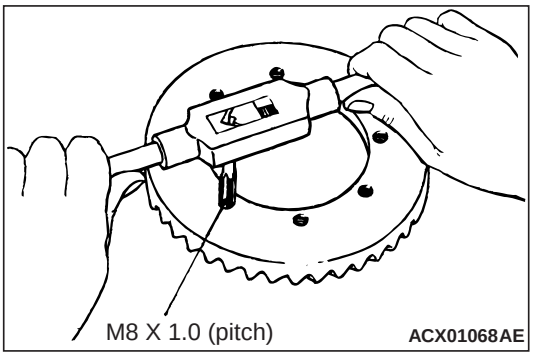
>>F<< LOCK PIN INSTALLATION



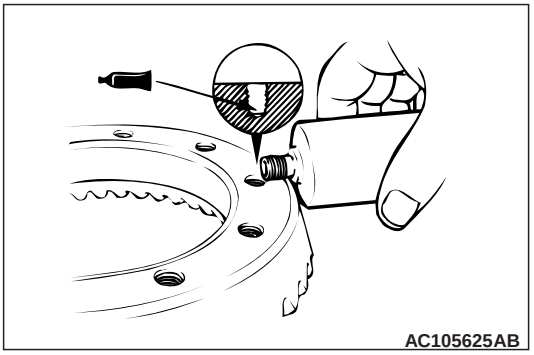
1. Align the lock pin holes in the pinion shaft and in the differential case, and drive in the lock pin.
2. Use a punch to crimp two points.

>>G<< DRIVE GEAR INSTALLATION

1. Remove adhesive on the drive gear tightening bolts.



2. Use a tap to remove adhesive in the drive gear screw holes, and clean the holes by blowing air.



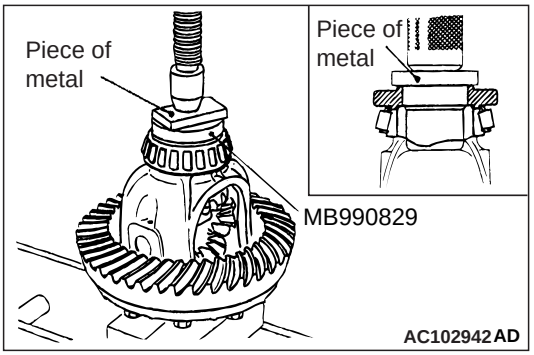
3. Apply the specified adhesive in the drive gear screw holes.

   Specified adhesive: LOCTITE No.271

4. Align the mating marks and assemble the drive gear to the differential case.

   Tightening torque: 41 ± 5 N·m

>>H<< DIFFERENTIAL SIDE BEARING INNER RACE INSTALLATION

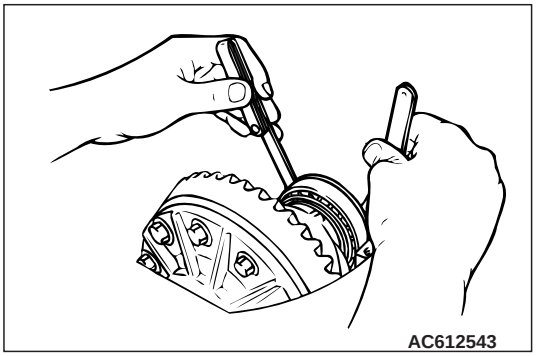


Use special tool pinion and side bearing installer (MB990829) to press-fit the differential side bearing inner race.

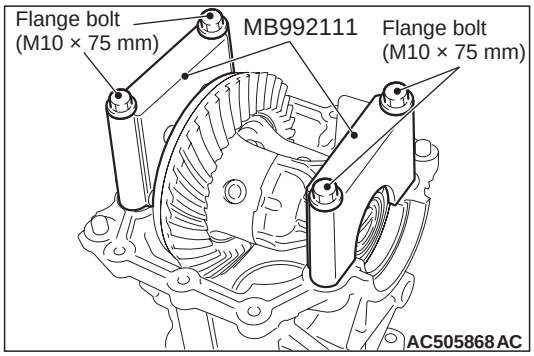
>>I<< FINAL DRIVE GEAR BACKLASH ADJUSTMENT

Adjust the final drive gear backlash in the following steps:

1. To the gear carrier, install the differential case with the side bearing outer race assembled.

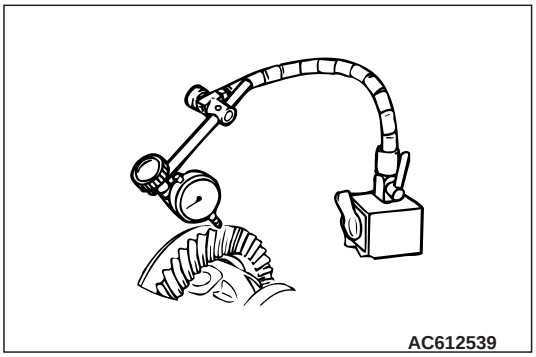


2. Press the differential case to one side, and measure clearance between the side bearing outer race and the gear carrier.
3. Select two pairs of the side bearing spacers. (Thickness: 1/2 of the measured clearance with 0.05-mm preload added)



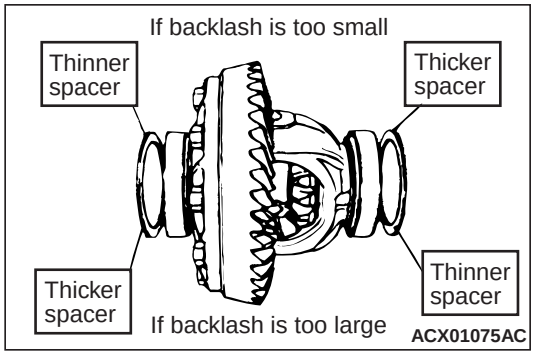
4. Use special tool side bearing holder (MB992111) to install the differential case with the selected side bearing spacers to the differential carrier. Then tighten a flange bolt (M10 × 75 mm) to the specified torque.

   Tightening torque: 43 ± 7 N·m



5. Measure the final drive gear backlash at four or more points.

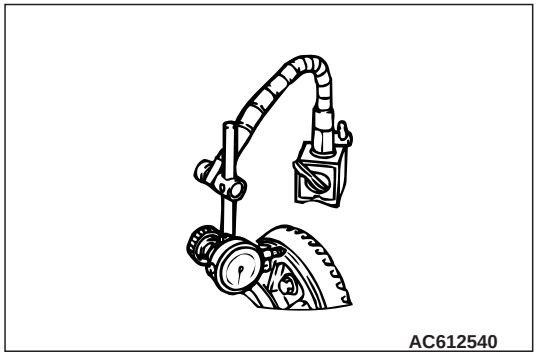
   Standard value: 0.08 – 0.15 mm



6. When the backlash is not within the standard value range, change the side bearing spacers as shown in the figure to adjust the backlash.

   NOTE: Increase the side bearing spacers by the same amount as for the decrease.

7. Check the final drive gear teeth contact, and if not proper, adjust it (Refer to P.27B-23).

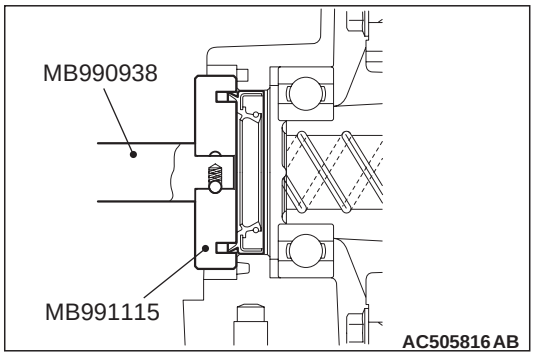


8. Measure the drive gear runout on the backside.

   Limit: 0.05 mm

9. When the runout exceeds the limit, change position of the drive gear and differential case, and measure the runout again.
10. If the adjustment is not possible, replace the differential case or the drive gear and the drive pinion as a set.

>>J<< OIL SEAL PRESS-FITTING



Use the following special tools to press-fit the oil seal:

- Installer bar (MB990938)
- Oil seal installer (MB991115)