

GROUP 33

FRONT SUSPENSION

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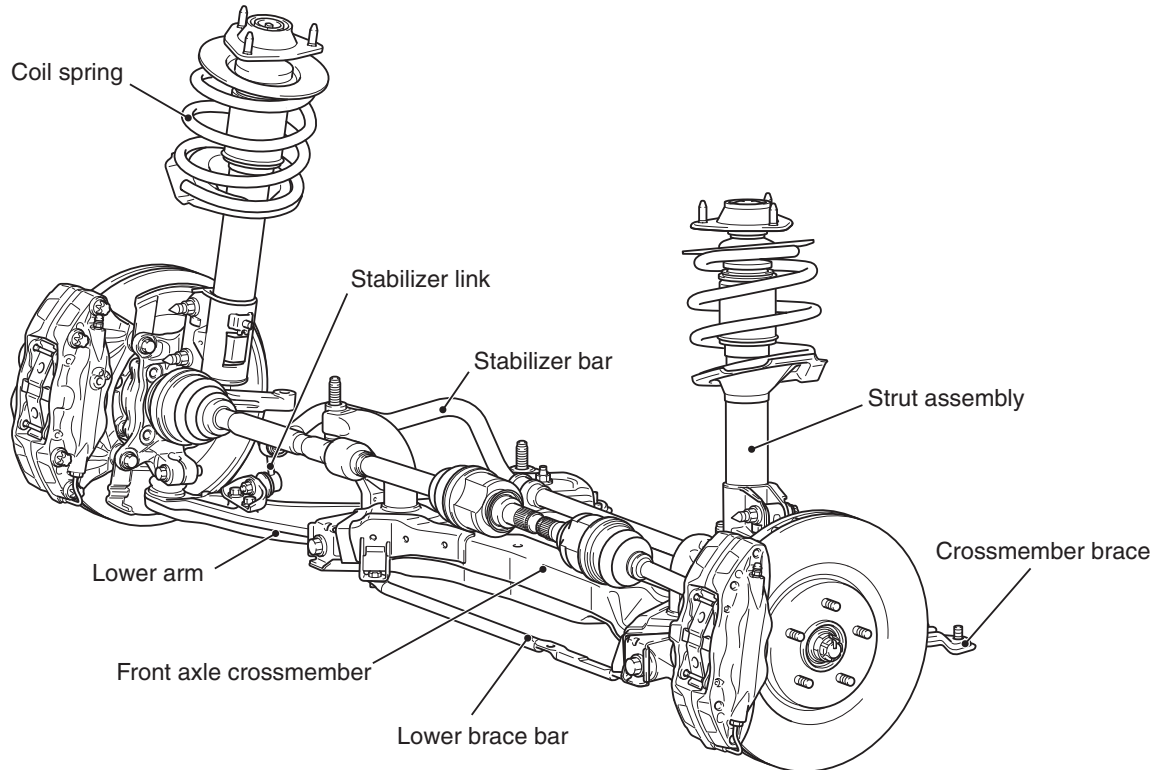
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GENERAL INFORMATION

M1332000101198

The MacPherson strut type suspension is adopted.

CONSTRUCTION DIAGRAM



AC703648 AC

FASTENER TIGHTENING SPECIFICATIONS

M1332008500391

Item	Specification
Lower arm assembly	
Lower arm to crossmember connection bolt (Front)	110 ± 11 N· m (81 ± 8 ft-lb)
Lower arm to crossmember connection nut (Rear)	110 ± 11 N· m (81 ± 8 ft-lb)
Lower arm to knuckle connection nut	71 ± 10 N· m (52 ± 7 ft-lb)
Lower arm to stabilizer link bracket connection bolt	39 ± 5 N· m (29 ± 4 ft-lb)
Stabilizer bar	
Stabilizer fixture bolt	31 ± 4 N· m (23 ± 3 ft-lb)
Stabilizer bracket and Lower arm assembly connection bolt	39 ± 5 N· m (29 ± 4 ft-lb)
Stabilizer bar to stabilizer link connection nut	39 ± 6 N· m (29 ± 4 ft-lb)
Stabilizer bracket to stabilizer link connection nut	39 ± 6 N· m (29 ± 4 ft-lb)

Item	Specification
Strut assembly	
Strut nut (jam nut)	61 ± 9 N· m (45 ± 6 ft-lb)
Strut mounting nut	45 ± 7 N· m (33 ± 5 ft-lb)
Knuckle and strut connection nut	110 ± 11 N· m (81 ± 8 ft-lb)
Break hose bracket and strut assembly connection nut	13 ± 2 N· m (115 ± 17 in-lb)

GENERAL SPECIFICATIONS

M1332000200460

COIL SPRING

Item	GSR		MR
	M/T	TC-SST	
Wire diameter mm (in)	14 (0.55), 15 (0.59)*	14 (0.55), 15 (0.59)*	15
Mean diameter of coil mm (in)	121 -159 (4.8 -6.3), 120 -160 (4.7 -6.3)*	121 -159 (4.8 -6.3), 120 -160 (4.7 -6.3)*	120 -160 (4.7 -6.3)
Free length mm (in)	286 (11.3), 287 (11.3)*	291 (11.5), 292 (11.5)*	292 (11.5)

NOTE: *: Optional

SERVICE SPECIFICATIONS

M1332000301578

Item	Specification	
Toe-in mm (in)	0 ± 2 (0 ± 0.08)	
Camber	-1° 00' ± 0° 30' (Left/right deviation within 0° 30')	
Caster	4° 25' ± 0° 30' (Left/right deviation within 0° 30')	
Kingpin inclination	13° 50' ± 1° 30'	
Lower arm ball joint rotation starting torque N· m (in-lb)	1.5 -3.4 (13 -29)	
Stabilizer link ball joint rotation torque N· m (in-lb)	Within 10 to 30° C (50 to 86° F)	0.2 -2.0 (1.8 -18)
	Not within 10 to 30° C (50 to 86° F)	{0.2 -5.0 (1.8 -44)

LUBRICANTS

M1333000400047

Item	Specified lubricant	Quantity
Lower arm ball joint	Lip portion of dust cover	As required
	Inside of dust cover	9.0 ± 1.0g (0.32 ± 0.04oz)
Strut upper insulator	Shell Retinax Grease CL0 or equivalent	As required

FRONT SUSPENSION DIAGNOSIS

INTRODUCTION TO FRONT SUSPENSION DIAGNOSIS

M1332009000281

If the front suspension is faulty, the vehicle will not run straightforward or noise will occur. Incorrect wheel alignment, malfunction of strut assembly, stabilizer bar, coil spring, or worn or out-of-balance tires can cause these problems.

FRONT SUSPENSION DIAGNOSIS TROUBLESHOOTING STRATEGY

M1332009100277

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a front suspension fault.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.
3. Find and repair the malfunction by following the Symptom Chart and Symptom Procedures.
4. Verify malfunction is eliminated.

SYMPTOM CHART

M1332009400319

Symptom	Inspection procedure	Reference page
Steering wheel is heavy, vibrates or pulls to one side	1	P.33-4
Excessive body rolling	2	P.33-5
Poor ride	3	P.33-5
Unequal ride height	4	P.33-5
Noise	5	P.33-6

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Steering Wheel Is Heavy, Vibrates or Pulls to One Side

DIAGNOSIS

STEP 1. Check the tires.

Refer to GROUP 31, Diagnosis P.31-3.

Q: Are the tires in normal condition?

YES : Replace the tires as necessary, then go to Step 2.

NO : If out of balance, balance the tires as necessary. If excessively worn, replace the tires as necessary and go to Step 5.

STEP 2. Check the wheel alignment.

Refer to P.33-8.

Q: Is the wheel alignment correct?

YES : Go to Step 3.

NO : Adjust it (Refer to P.33-8), then go to Step 5.

STEP 3. Check the lower arm ball joint.

Q: Is the ball joint in good condition?

YES : Go to Step 4.

NO : Replace the lower arm assembly (Refer to P.33-15), then go to Step 5 .

STEP 4. Check the coil spring.

Q: Is the coil spring in good condition?

YES : Go to Step 5.

NO : Replace it (Refer to P.33-11), then go to Step 5.

STEP 5. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 2: Excessive Body Rolling

DIAGNOSIS

STEP 1. Check for broken or deteriorated stabilizer bar.

Q: Is the stabilizer bar in good condition?

YES : Go to Step 2.

NO : Replace it (Refer to [P.33-17](#)), then go to Step 3.

STEP 2. Check the strut assembly for damage.

Q: Is the strut assembly in good condition?

YES : Go to Step 3.

NO : Replace it (Refer to [P.33-10](#)), then go to Step 3.

STEP 3. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 3: Poor Ride

DIAGNOSIS

STEP 1. Check for improper tire inflation pressure.

Refer to GROUP 31, On-vehicle Service –Tire Inflation Pressure Check [P.31-7](#).

Q: Is the tire inflation correct?

YES : Go to Step 2.

NO : Adjust it, then go to Step 4.

STEP 3. Check for strut assembly damage.

Q: Is the strut assembly damaged?

YES : Replace it (Refer to [P.33-10](#)), then go to Step 4.

NO : Go to Step 4.

STEP 4. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete.

NO : Return to Step 1.

STEP 2. Check for broken or deteriorated coil spring(s).

Q: Are the coil spring(s) broken or deteriorated?

YES : Replace the coil spring(s) (Refer to [P.33-11](#)), then go to Step 4.

NO : Go to Step 3.

INSPECTION PROCEDURE 4: Unequal Ride Height

DIAGNOSIS

STEP 1. Check for broken or deteriorated coil spring(s).

Q: Is the coil spring(s) broken or deteriorated?

YES : Replace it (Refer to [P.33-11](#)), then go to Step 2.

NO : Go to Step 2.

STEP 2. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 5: Noise

DIAGNOSIS

STEP 1. Check for lack of lubrication.**Q: Is lubrication inadequate?****YES :** Lubricate it, then go to Step 5.**NO :** Go to Step 2.

STEP 2. Check the tightened parts for looseness as well as the bushings for wear.**Q: Are the tightened parts and bushings in good condition?****YES :** Go to Step 3.**NO :** Replace it (Refer to [P.33-9](#)), then go to Step 5.


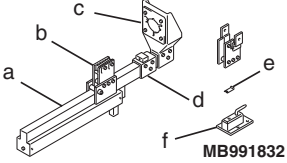
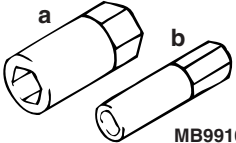
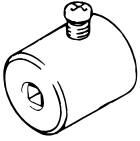

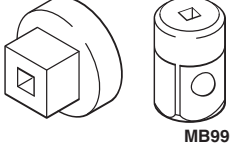
STEP 3. Check for broken coil spring.**Q: Is the coil spring broken?****YES :** Replace it (Refer to [P.33-11](#)), then go to Step 5 .**NO :** Go to Step 4.

STEP 4. Check for strut assembly damage.**Q: Is the strut assembly damaged?****YES :** Replace it (Refer to [P.33-10](#)), then go to Step 5 .**NO :** Go to Step 5.

STEP 5. Retest the system.**Q: Is the malfunction eliminated?****YES :** The procedure is complete.**NO :** Return to Step 1.

SPECIAL TOOLS

M1332000601041

Tool	Tool number and name	Supersession	Application
 <p>MB991004</p>	<p>MB991004 Wheel alignment gauge attachment</p>	<p>MB991004-01 or General service tool</p>	<p>Wheel alignment measurement</p>
 <p>MB991832</p>	<p>MB991832 a. MB991793 b. MB991795 c. MB991794 d. MB991829 e. MB991831 f. MB991830 Spring compressor set a. Spring compressor b. Attachment A c. Upper plate d. Arm bracket e. Spacer f. Fixture</p>	<p>General service tool</p>	<p>Front coil spring compression <i>NOTE: The coil spring can not be compressed by following conventional special tools.</i></p> <ul style="list-style-type: none"> • MB991237 Spring compressor body • MB991238 Arm set
 <p>MB991680</p>	<p>MB991680 a. MB991681 b. MB991682 Wrench set a. Wrench b. Socket</p>	<p>–</p>	<p>Strut assembly disassembly and reassembly</p>
 <p>MB991006</p>	<p>MB991006 Preload socket</p>	<p>MB990228-01</p>	<p>Lower arm ball joint breakaway torque check</p>
 <p>MB990800</p>	<p>MB990800 Ball joint dust cover installer</p>	<p>MB990800-01 or General service tool</p>	<p>Lower arm ball joint dust cover installation</p>
 <p>MB990326</p>	<p>MB990326 Preload socket</p>	<p>General service tool</p>	<p>Ball joint turning torque check</p>

ON-VEHICLE SERVICE

FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT

M1332012400397

⚠ CAUTION

After performing the front wheel alignment, perform a calibration for the ASC-ECU to learn the steering wheel sensor neutral point. (Refer to GROUP 35C –On-vehicle Service – Steering Wheel Sensor Calibration P.35C-289.)

1. Before the wheel alignment measurement, maintain the front suspension, the steering system, the wheel and tires in good condition.
2. Park the vehicle on a level surface, and position the front wheel in the straight-ahead position to measure the wheel alignment.

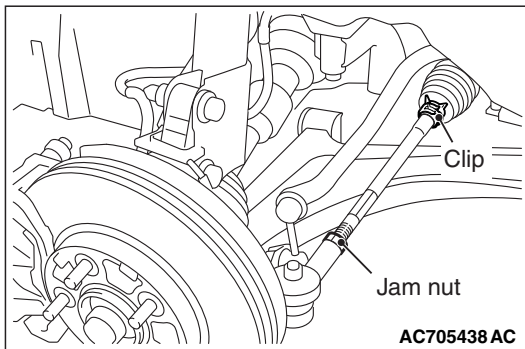
TOE-IN

Standard value: 0 ± 2 mm (0 ± 0.08 inch)

1. Loosen the jam nut with the tie-rod clip removed, and then perform the adjustment by turning the tie-rod left/right at the same degree in the opposite direction.

NOTE: The toe moves to the outside by turning the tie-rod left to the forward direction, and right to the reverse direction.

2. After adjustment, check that the steering angle is within the standard range using the turning radius gauge. (Refer to GROUP 37 –On-vehicle Service P.37-16.)



CAMBER, CASTER AND KINGPIN INCLINATION

CAMBER

Standard value:

$-1^{\circ} 00' \pm 0^{\circ} 30'$ (Left/right deviation within $0^{\circ} 30'$)

CASTER

Standard value:

$4^{\circ} 25' \pm 0^{\circ} 30'$ (Left/right deviation within $0^{\circ} 30'$)

Kingpin inclination $13^{\circ} 50' \pm 1^{\circ} 30'$

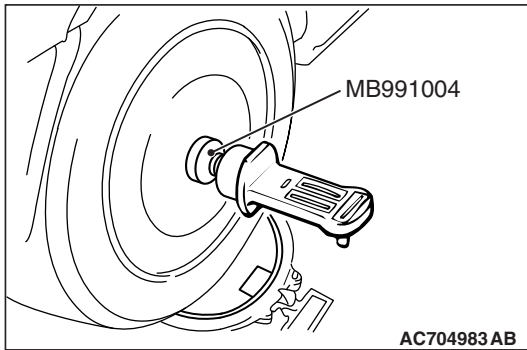
NOTE: Camber and caster are preset at the factory and cannot be adjusted.

⚠ CAUTION

Do not apply the vehicle weight to the wheel bearing with the driveshaft nut loosened.

NOTE: Tighten the wheel alignment gauge attachment (special tool: MB991004) to the specified torque, then perform measurement.

Tightening torque: 144 –176 N· m (106 –130 ft-lb)

**LOWER ARM BALL JOINT END PLAY CHECK**

M1332015000376

1. Raise the vehicle.
2. Remove the stabilizer link from the lower arm (Refer to [P.33-15](#)).
3. Move the lower arm assembly up and down with your hands to check for an excessive play in the axial direction of the ball joint. If there is an excessive play, replace the lower arm assembly (Refer to [P.33-15](#)).

BALL JOINT DUST COVER CHECK

M1332008601012

LOWER ARM BALL JOINT DUST COVER CHECK

1. Using your fingers, press the dust cover to check for a crack or damage.
2. If there is a crack or damage on the dust cover, replace the lower arm assembly. (Refer to [P.33-15](#).)

NOTE: The crack or damage on the dust cover may damage the ball joint.

If the dust cover is damaged during maintenance, replace the dust cover. (Refer to [P.33-16](#).)

STABILIZER LINK BALL JOINT DUST COVER CHECK

1. Using your fingers, press the dust cover to check for a crack or damage.
2. If there is a crack or damage on the dust cover, replace the stabilizer link. (Refer to [P.33-17](#).)

NOTE: The crack or damage on the dust cover may damage the ball joint.

If the dust cover is damaged during maintenance, replace the stabilizer link. (Refer to [P.33-17](#).)

STRUT ASSEMBLY**REMOVAL AND INSTALLATION**

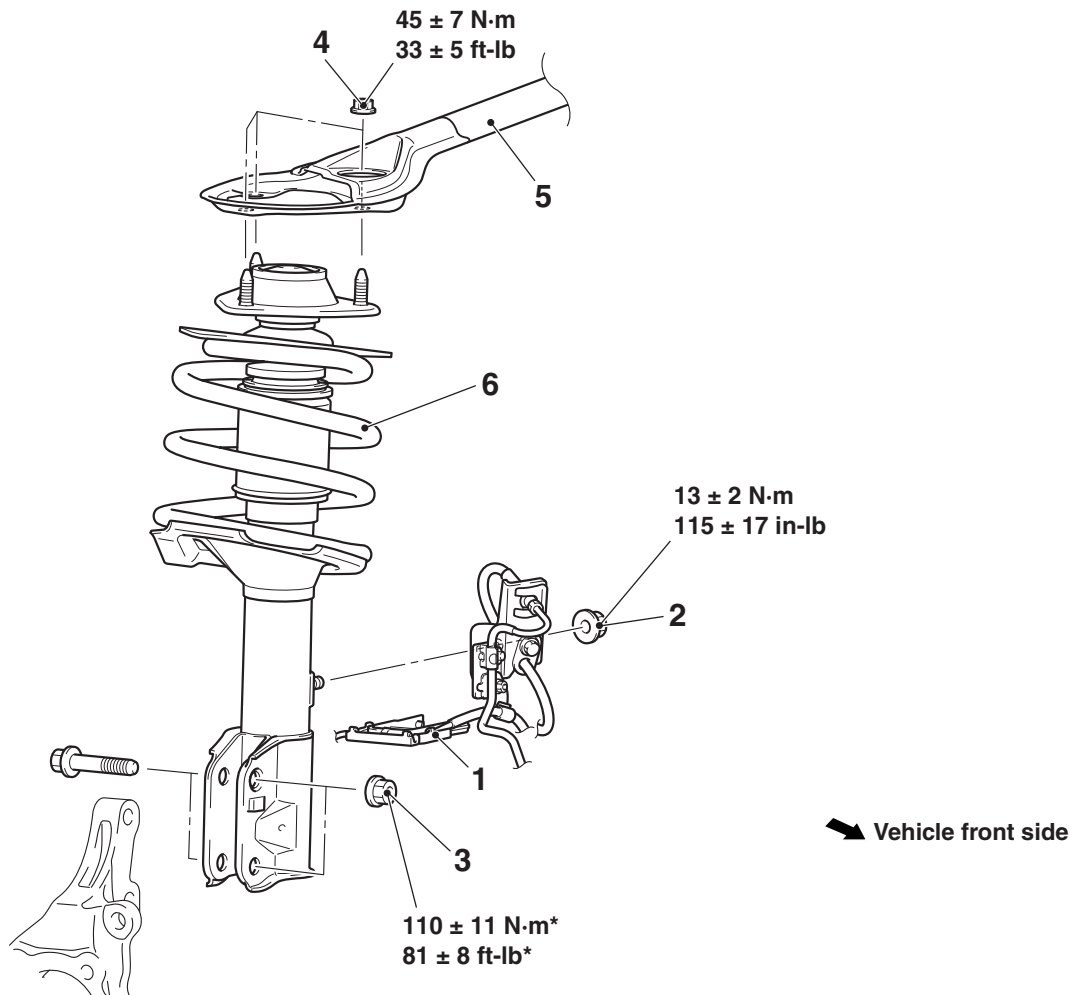
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CAUTION

The part indicated by * is the bolt/nut with friction coefficient stabilizer. During removal, ensure there is no damage, clean dust and soiling from the bearing and thread surfaces, and tighten it to the specified torque.

Post-installation Operation

Front Wheel Alignment Check and Adjustment (Refer to P.33-8).



AC704992AE

Removal steps

1. Harness clip and strut assembly connection
2. Brake hose bracket and strut assembly connection

>>A<<

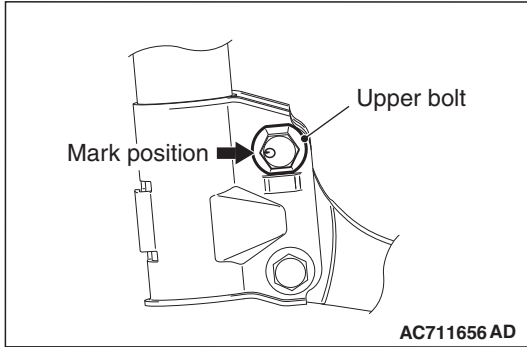
Removal steps (Continued)

3. Knuckle and strut connection nut
4. Strut mounting nut
5. Strut tower bar
6. Strut assembly

INSTALLATION SERVICE POINT

>>A<< KNUCKLE AND STRUT CONNECTION NUT INSTALLATION

Locate the knuckle and strut connection upper bolt's mark position as shown in the figure and tighten it.



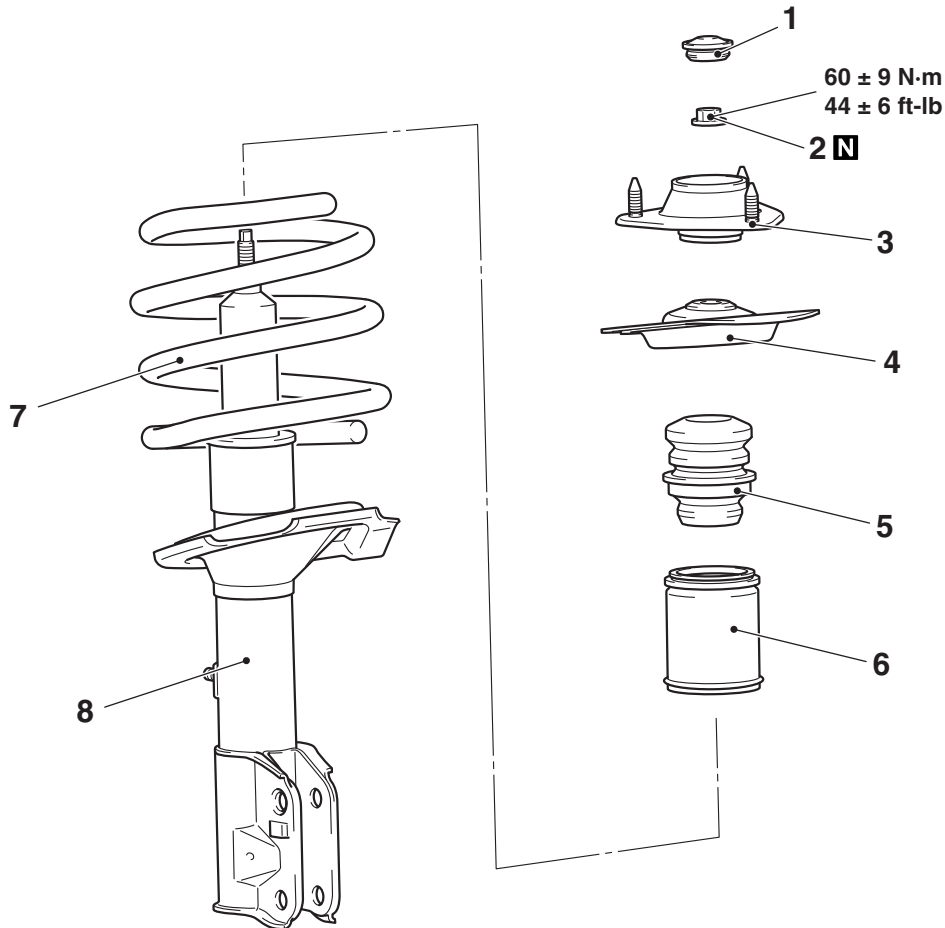
INSPECTION

M1332001200430

- Check for oil leaks from the strut assembly.
- Check the strut assembly for damage or deformation.

DISASSEMBLY AND ASSEMBLY

M1332001301054



AC707644 AC

Disassembly steps

1. Cap
2. Strut nut (Jam nut)

Disassembly steps

3. Strut insulator assembly
4. Upper spring seat

<<A>>

>>C<<

>>B<<

Disassembly steps

5. Bump rubber
6. Dust cover
7. Coil spring
8. Strut

>>A<<

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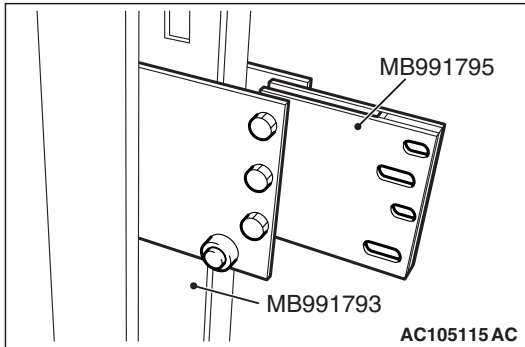
Required Special Tools:

- MB991681: Wrench

- MB991682: Socket
- MB991793: Spring compressor
- MB991794: Upper plate
- MB991795: Attachment A
- MB991796: Attachment B
- MB991830: Fixture

DISASSEMBLY SERVICE POINTS**<<A>> STRUT NUT (JAM NUT) REMOVAL**

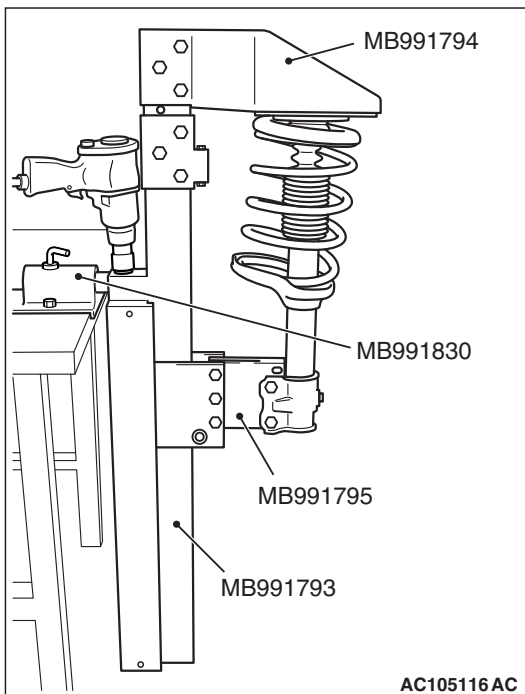
1. Install special tool MB991795 to the special tool MB991793 as shown in the figure.



2. Set the strut assembly to special tools: MB991793, MB991795, MB991794 and MB991830.

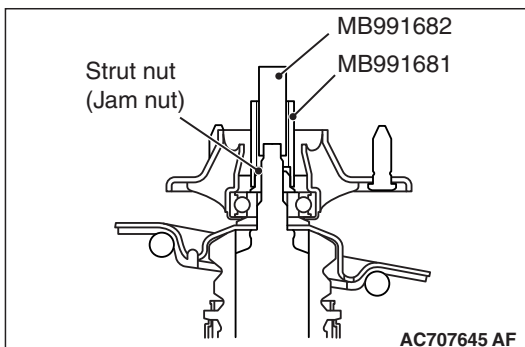
NOTE: Use the bolts and nuts removed from the vehicle to secure the strut assembly and tighten them lightly by hand.

3. After setting the strut assembly, operate the spring compressor and compress the coil spring by approximately 5 mm (0.20 in).

**⚠ CAUTION**

The lock nut for the piston rod inside the strut may be loose. Do not use the impact wrench to loosen the strut nut.

4. Use special tools MB991681, MB991682 to loosen the strut nut (jam nut):

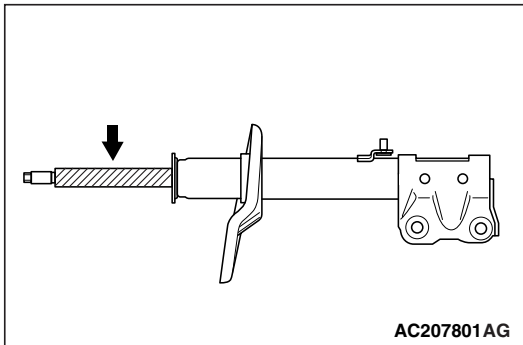


<> STRUT DISPOSAL

⚠ CAUTION

Wear the protective glasses. Although the gas is harmless, drilling chips may be blown out by the gas.

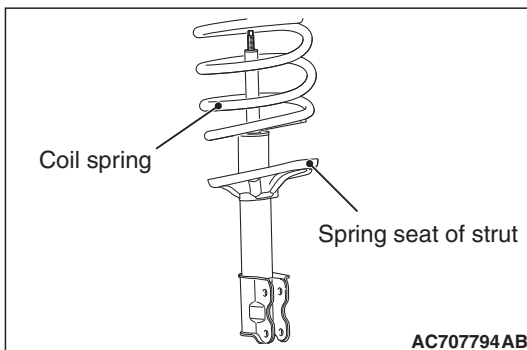
Before disposal of the strut, place the strut on the level surface with the piston rod extended, and make a hole of approximately 3 mm in diameter at the point shown in the figure to discharge the gas.



ASSEMBLY SERVICE POINTS

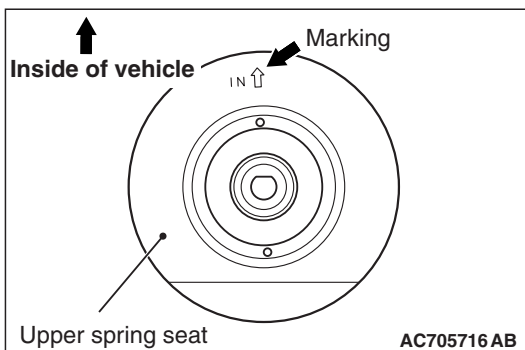
>>A<< COIL SPRING INSTALLATION

Install the coil spring to align the bottom with the shape of the strut spring seat.



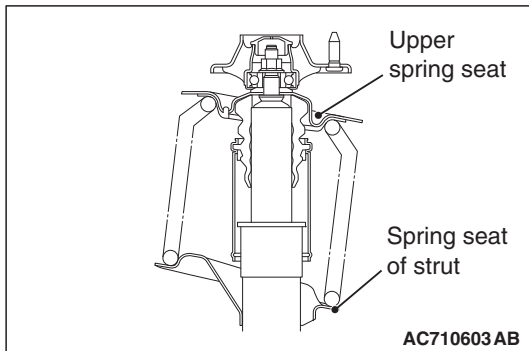
>>B<< UPPER SPRING SEAT INSTALLATION

Align the D-shaped hole with the D (cut-off) of the strut, and install the marked part shown in the figure facing the inside of the vehicle.



>>C<< STRUT NUT (JAM NUT) INSTALLATION

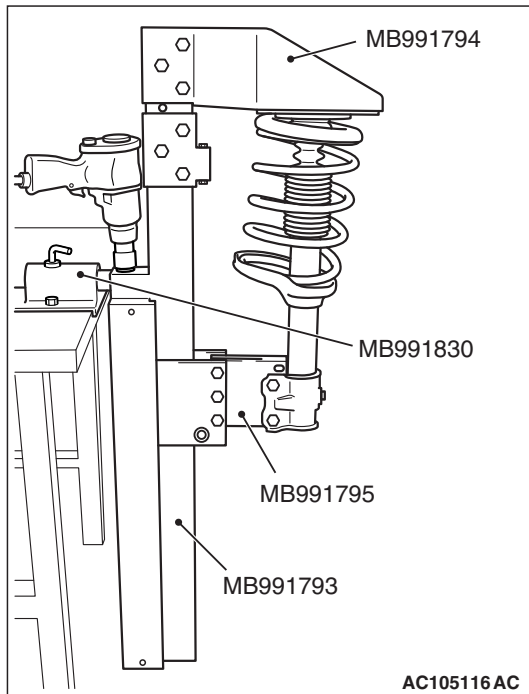
1. Check that both of the coil spring ends align with the spring seat groove correctly.



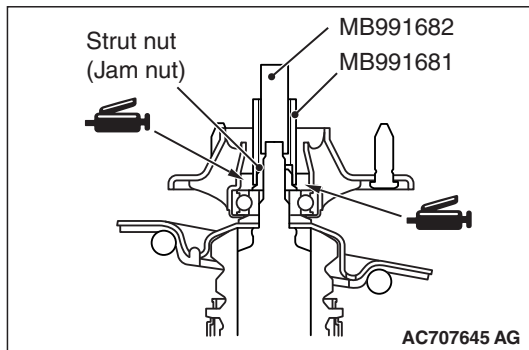
- Align the strut spring seat hole with the upper spring seat hole.

CAUTION

Be careful that the hand is not pinched by the coil spring when aligning the piston rod with the hole of upper insulator while compressing the coil spring.



- While passing the strut piston rod through the hole of upper insulator by hand slowly compress the coil spring by special tool: MB991793, MB991795, MB991794 and MB991830.



CAUTION

The lock nut for the piston rod inside the strut may be loose. Do not use the impact wrench to tighten the strut nut (jam nut).

- Use special tools MB991681 and MB991682 to tighten the strut nut (jam nut) to the specified torque:

GREASE: Shell Retinax Grease CL0

Tightening torque : 61 ± 9 N·m (45 ± 6 ft-lb)

INSPECTION

M1332001400315

- Check the bearing for wear or rust.
- Check the rubber parts for damage or deterioration.
- Check the spring for deformation, deterioration or damage.
- Check the shock absorber for deformation.

LOWER ARM

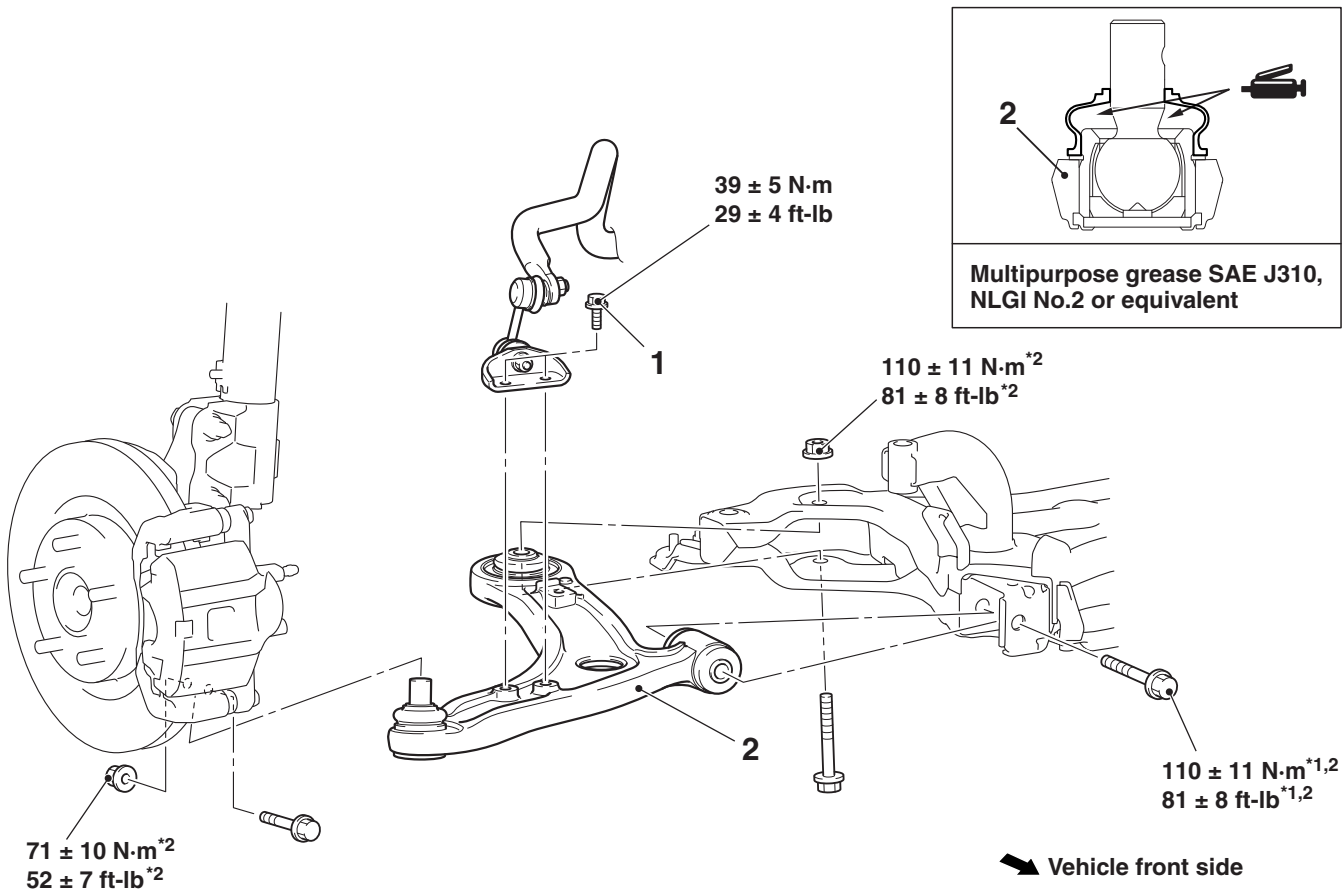
REMOVAL AND INSTALLATION

M1332001601516

CAUTION

- *1: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle standing on the ground and the curb weight condition.
- *2: Indicates the bolts and nuts with friction coefficient stabilizer. In removal, ensure there is no damage, clean dust and soiling from bearing and thread surfaces, and tighten them to the specified torque.
- Do not damage the lower arm ball joint dust cover during maintenance. If it is damaged, replace the lower arm ball joint dust cover.(Refer to P.33-16.)

<p>Post-installation Operation</p> <ul style="list-style-type: none"> • Engine Room Under Cover (A, B, Center) and Engine Room Side Cover Removal (Refer to GROUP 51 –Under Cover P.51-15.) 	<p>Post-installation Operation</p> <ul style="list-style-type: none"> • Engine Room Under Cover (A, B, Center) and Engine Room Side Cover Installation (Refer to GROUP 51 – Under Cover P.51-15.) • Using your Fingers, Press the Lower Arm Ball Joint Dust Cover to Check for a Crack or Damage. • Wheel Alignment Check and Adjustment (Refer to P.33-8.)
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AC708307AE

Removal steps

1. Stabilizer link bracket and lower arm connection
2. Lower arm assembly

INSPECTION

M1332001701018

- Check the bushing for wear and deterioration.
- Check the lower arm for bend or breakage.
- Check all bolts for condition and straightness.

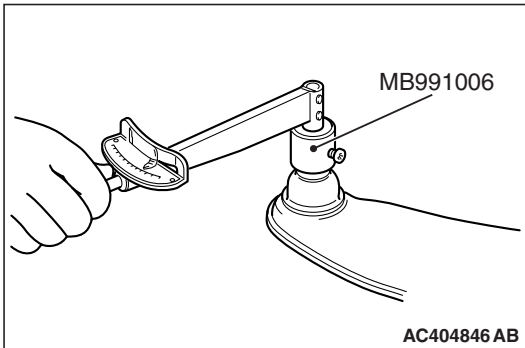
LOWER ARM BALL JOINT ROTATIONAL
STARTING TORQUE

Required Special Tool:

- MB991006: Preload socket
1. Move the lower arm ball joint stud back and forth for several times, and measure the lower arm ball joint rotation starting torque using special tool MB991006.

Standard value: 1.5 –3.4 N· m (13 –29 in-lb)

2. If the measured value exceeds the standard value, replace the lower arm assembly. (Refer to P.33-15.)
3. If the measured value is within the standard value, check that the lower arm ball joint has no looseness or gritty feeling. If there is looseness or gritty feeling, replace the lower arm assembly. (Refer to P.33-15.)



LOWER ARM BALL JOINT DUST COVER CHECK

Refer to P.33-9.

LOWER ARM BALL JOINT DUST COVER
REPLACEMENT

M1332020000338

Only when the dust cover is damaged accidentally during maintenance, replace the dust cover as follows.

1. Remove the lower arm ball joint dust cover.
2. Fill and apply the specified grease into the inside and lip of the lower arm ball joint dust cover.

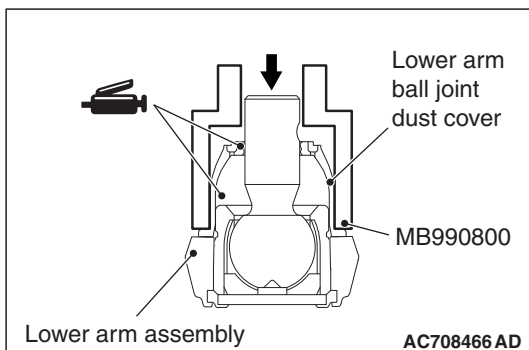
Specified grease:

Multipurpose grease SAE J310, NLGI No. 2 or equivalent

Application amount:

Inside the dust cover: 9.0 ± 1.0 g (0.32 ± 0.04 oz), Lip: As required

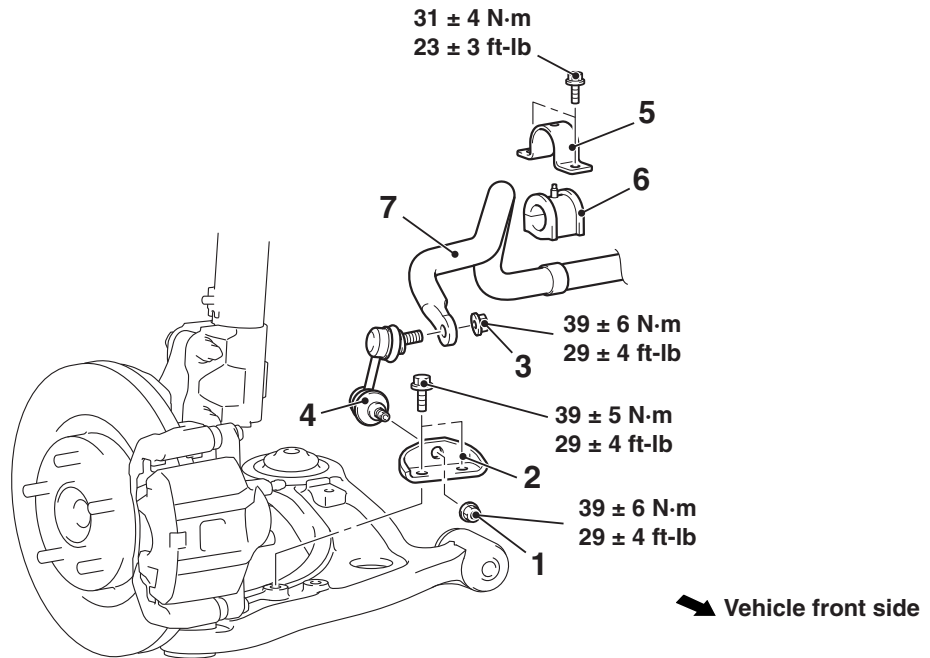
3. Use the ball joint remover and installer (special tool: MB990800) to drive in the dust cover to the point where it contacts the lower arm assembly.
4. Using your fingers, press the lower arm ball joint dust cover to check for a crack or damage.



STABILIZER BAR

REMOVAL AND INSTALLATION

M1332001900804



AC704986 AB

Removal steps

1. Stabilizer nut
2. Stabilizer bracket
3. Stabilizer nut
4. Stabilizer link

Removal steps (Continued)

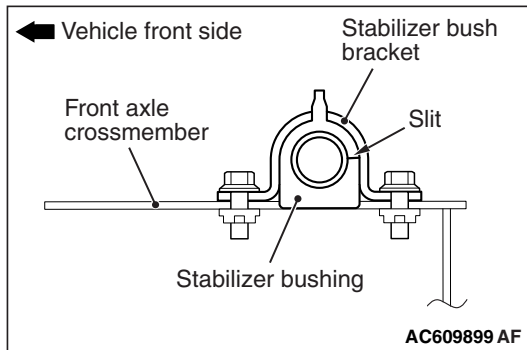
- Front axle crossmember (Refer to GROUP 32 –Rear roll stopper and crossmember [P.32-10](#)).
- 5. Stabilizer bar bracket
- 6. Stabilizer bushing
- 7. Stabilizer bar

>>A<<

INSTALLATION SERVICE POINT

>>A<< STABILIZER BUSHING INSTALLATION

Install the stabilizer bushing as shown in the figure.



INSPECTION

M1332013100087

- Check the bushings for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check all bolts for condition and straightness.

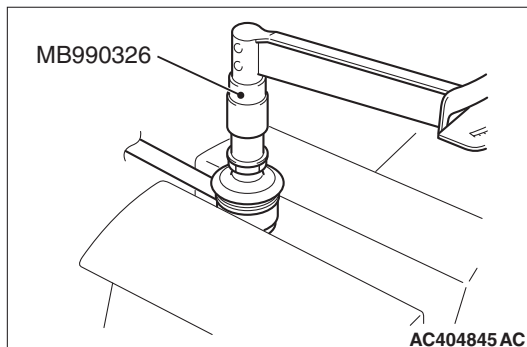
STABILIZER LINK BALL JOINT ROTATION
STARTING TORQUE CHECK

Required Special Tool:

- MB990326: Preload socket
1. Move the stabilizer link ball joint stud back and forth for several times, install the stud with nut, and measure the stabilizer link ball joint rotation torque using the preload socket special tool MB990326.

Standard value:

Within 10 to 30° C (50 to 86° F)	0.2 to 2.0 N· m (1.8 to 18 in-lb)
Not within 10 to 30° C (50 to 86° F)	0.2 to 5.0 N· m (1.8 to 44 in-lb)



2. If the measured value exceeds the standard value, replace the stabilizer link. (Refer to P.33-17.)
3. When the measured value stays within the standard range, if the stabilizer link ball joint has looseness or gritty feeling, it is judged as unusable. Then, replace the stabilizer link. (Refer to P.33-17.)

STABILIZER LINK BALL JOINT DUST COVER
CHECK

Refer to P.33-9.