

## GENERAL INFORMATION

A coil spring-type double wishbone independent-type suspension has been adopted as the front suspension. This type of suspension is rigid,

has very little variation in roll centre height and provides excellent riding comfort, making it ideal for cross-country vehicles.

### COIL SPRING

#### <GENERAL EXPORT (EXCEPT BRAZIL, TAIWAN, HONG KONG, SOUTH AFRICA, AND CHINA) AND GCC>

Item	3000, long wheelbase-3500 (GL)	Short wheelbase-2800, 3500, long wheelbase-2800 (GL), 3500 (GLS)	Long wheelbase-2800 (GLX, GLS)
Wire diameter × average diameter × free length mm	16 × 109 × 318	16 × 109 × 322	16 × 109 × 327

#### <BRAZIL, TAIWAN>

Item	3000	3500	2800
Wire diameter × average diameter × free length mm	16 × 109 × 318	16 × 109 × 322	16 × 109 × 327

#### <HONG KONG, AUSTRALIA>

Item	Short wheelbase	Long wheelbase
Wire diameter × average diameter × free length mm	16 × 109 × 322	16 × 109 × 327

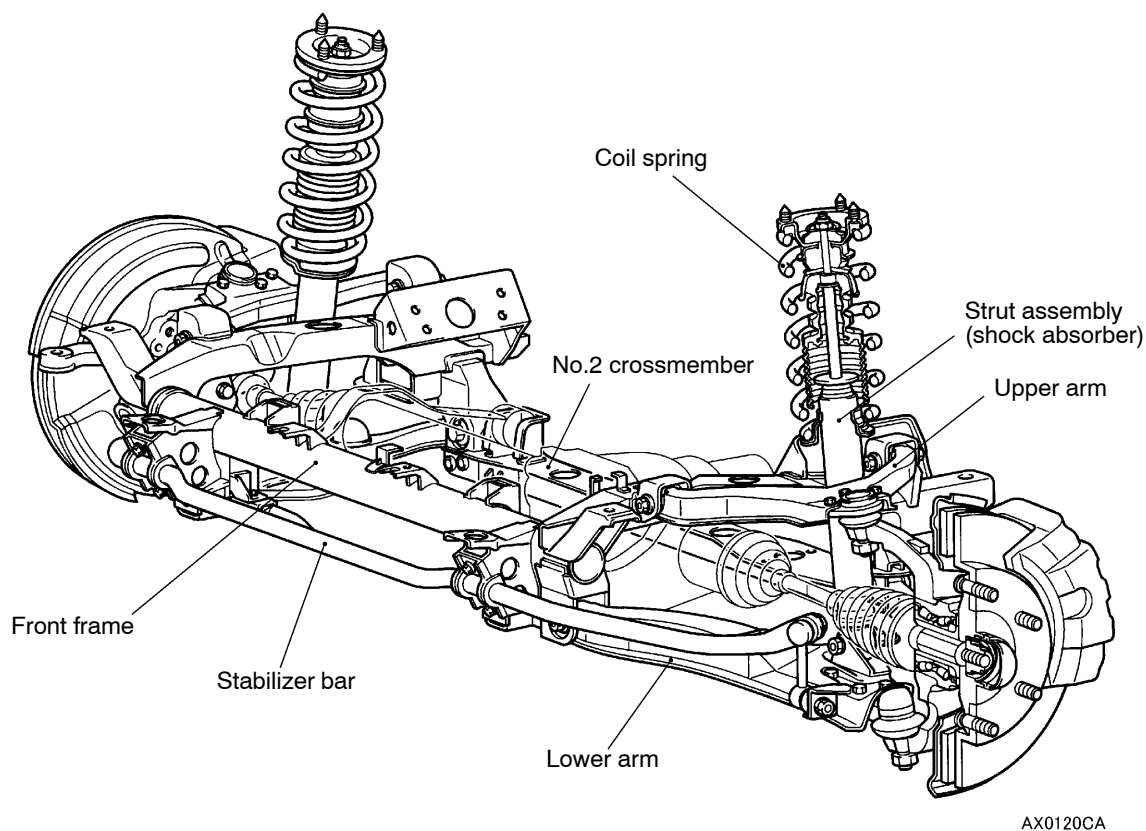
#### <SOUTH AFRICA>

Item	Short wheelbase-3000, 3500 (M/T)	Short wheelbase-3500 (A/T), long wheelbase-3500	3200
Wire diameter × average diameter × free length mm	16 × 109 × 318	16 × 109 × 322	16 × 109 × 327

#### <CHINA>

Item	Specifications
Wire diameter × average diameter × free length mm	16 × 109 × 313

## CONSTRUCTION DIAGRAM



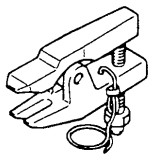
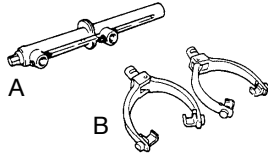
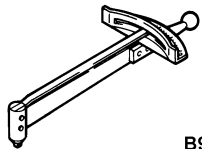
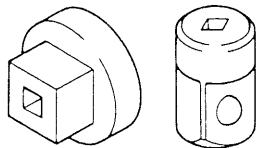
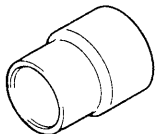
## SERVICE SPECIFICATIONS

Items		Standard value
Toe-in	At the centre of tyre tread mm	$2.5 \pm 2.5$
	Toe-angle (per wheel)	$0^{\circ} 05' \pm 05'$
Toe-out angle on turns (inner wheel when outer wheel at $20^{\circ}$ )		$21^{\circ} 48'$
Camber		$0^{\circ} 30' \pm 30'^*$
Caster		$3^{\circ} 50' \pm 1'^*$
Side slip mm (per 1 m)		$0 \pm 3$
Kingpin inclination		$11^{\circ} 30'$
Upper arm ball joint rotation torque N·m		0.4 – 2.5
Lower arm ball joint rotation torque N·m		0.3 – 4.5
Stabilizer link ball joint turning torque N·m		0.5 – 2.0

## NOTE

\*: difference between right and left wheels: less than  $30'$

## SPECIAL TOOLS

Tools	Number	Name	Use
 B991113	MB990635, MB991113 or MB991406	Steering linkage puller	Ball joint and knuckle disconnection
 A B 00003796	A: MB991237  B: MB991238	A: Spring com- pressor body  B: Arm set	Coil spring compression
 B990968	MB990968	Torque wrench	Upper arm ball joint, lower arm ball joint and stabilizer link ball joint rotation starting torque measurement
 B990326	MB990326	Preload socket	
 B990799	MB990799	Ball joint remover & installer	Lower arm ball joint dust cover press-in

## ON-VEHICLE SERVICE

WHEEL ALIGNMENT CHECK AND  
ADJUSTMENT

Measure the wheel alignment with the vehicle parked on a level surface.

The front suspension, steering system, and wheels should be serviced to normal condition prior to measurement of wheel alignment.

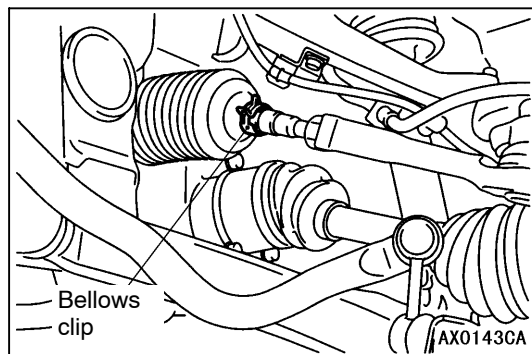
## TOE-IN

## Standard value:

At the centre of tyre tread  $2.5 \pm 2.5$  mm

Toe angle (per wheel)  $0^{\circ}05' \pm 05'$

1. Adjust the toe-in by undoing the clip and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).



**NOTE**

The toe will move out as the left turnbuckle is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.

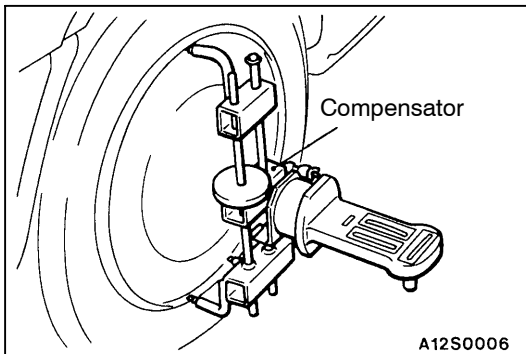
2. Use a turning radius gauge to check that the steering angle is at the standard value.  
(Refer to GROUP 37A – On-vehicle Service.)

**TOE-OUT ANGLE ON TURNS**

To check the steering linkage, especially after the vehicle has been involved in an accident or if an accident is presumed, it is advisable to check the toe-out angle on turns in addition to the wheel alignment.

Conduct this test on the left turn as well as on the right turn.

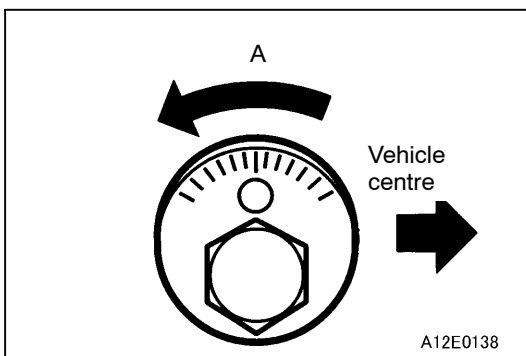
**Standard value (inner wheel when outer wheel at 20°): 21°48'**

**CAMBER, CASTER AND KINGPIN INCLINATION**

**Standard value:**

**Camber  $0^{\circ}30' \pm 30'$  (difference between right and left wheel: less than 30')**

**Caster  $3^{\circ}50' \pm 1^{\circ}$  (difference between right and left wheel: less than 30')**



If camber or caster are not within the standard value, adjust by following procedures.

1. Adjust the camber and caster by turning the camber adjusting bolt of the lower arm. For the standard value, refer to the camber and caster adjusting table (P.33A-6).
2. After adjusting the camber, the toe should be adjusted.

## Camber And Caster Adjusting Table

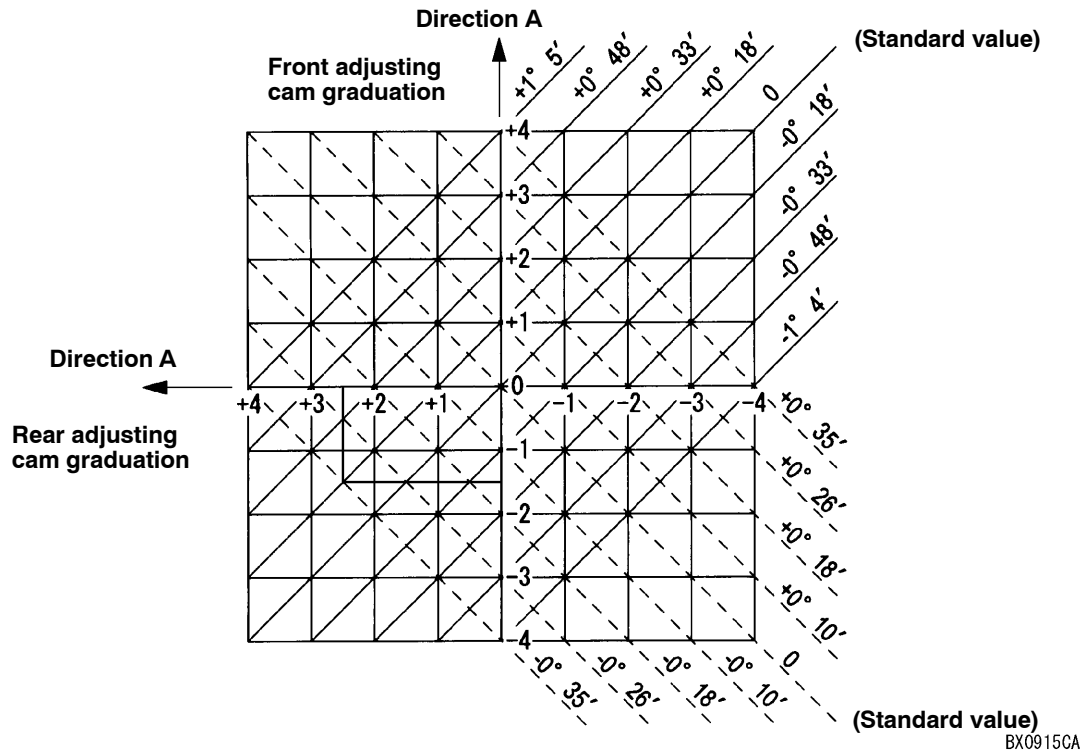
### HOW TO READ

#### (EXAMPLE)

Compare the measurement value with the standard value. When the camber is  $-0^{\circ}35'$  and caster is  $0^{\circ}18'$ , turn the front adjusting cam by 1.5 graduations to the direction opposite to "A" and the rear adjusting cam by 2.5 graduations to the "A" direction.

#### NOTE

Solid lines show caster, broken lines shows camber.



### SIDE SLIP

Measure the side slip with a side slip tester.

**Standard value:  $0 \pm 3$  mm**

### BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the lower arm assembly or stabilizer link.

#### NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

# UPPER ARM ASSEMBLY

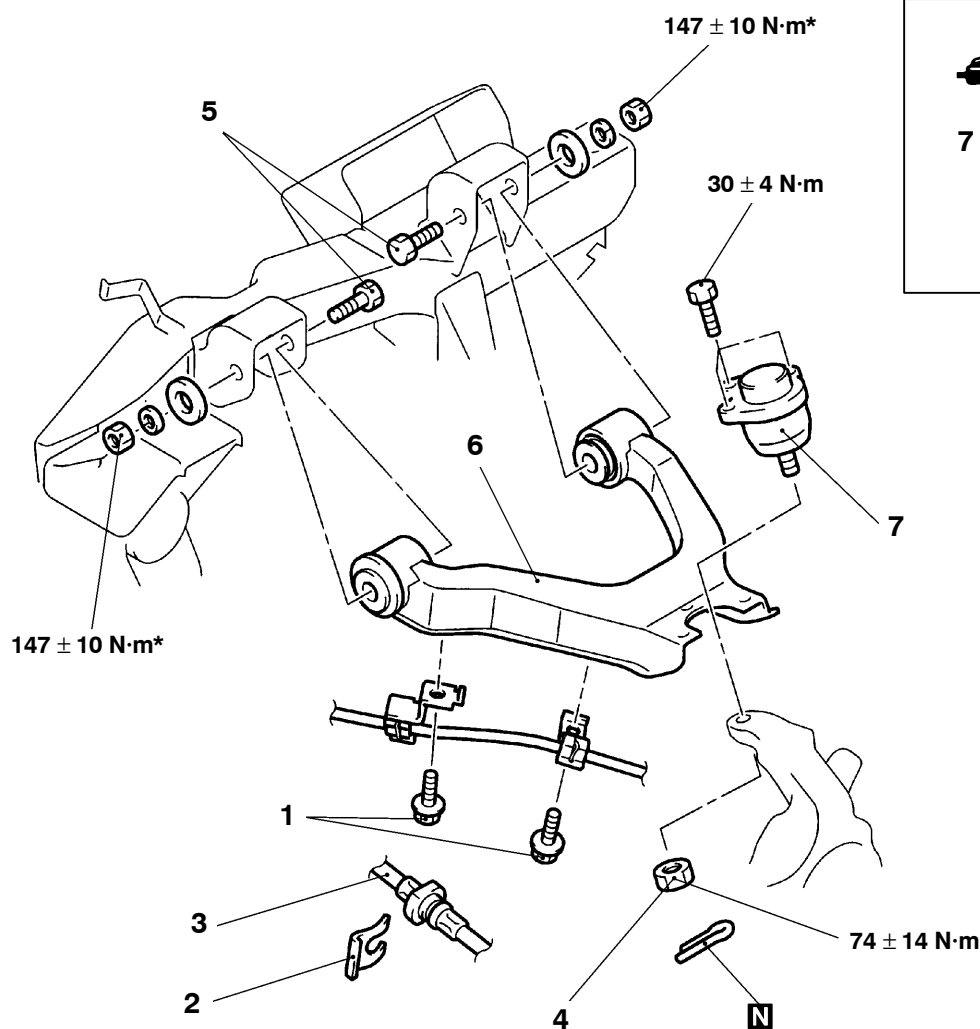
## REMOVAL AND INSTALLATION

### Caution

\*: To prevent bushings from breakage, the parts indicated by \* should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

#### Post-installation Operation

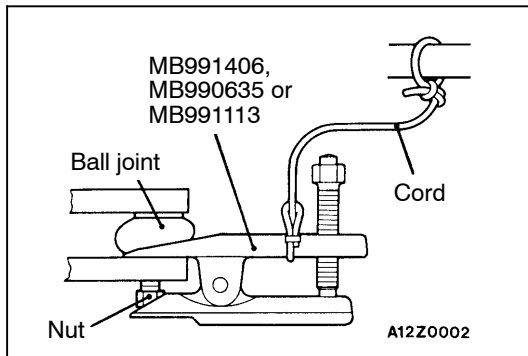
- Check the dust cover for cracks or damage by pushing it with finger.
- Wheel alignment check and adjustment (Refer to P.33A-4.)



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### Removal steps

1. Front wheel speed sensor bracket mounting bolt <Vehicles with ABS>
2. Clip
3. Brake hose
4. Upper arm assembly and knuckle connection
5. Upper arm assembly and front frame connection
6. Upper arm assembly
7. Upper arm ball joint assembly



## REMOVAL SERVICE POINT

### ◀A▶ UPPER ARM BALL JOINT AND KNUCKLE DISCONNECTION

#### Caution

1. To prevent the ball joint thread from damage, only loosen but do not remove the nut securing the upper arm to the knuckle from the ball joint and use the special tool.
2. Support the special tool with a cord to prevent it from coming off.

## INSPECTION

### UPPER ARM BALL JOINT ROTATION TORQUE CHECK

1. After shaking the upper arm ball joint stud several times, use the special tool to measure the rotation torque of the upper arm ball joint.

**Standard value: 0.4 – 2.5 N·m**

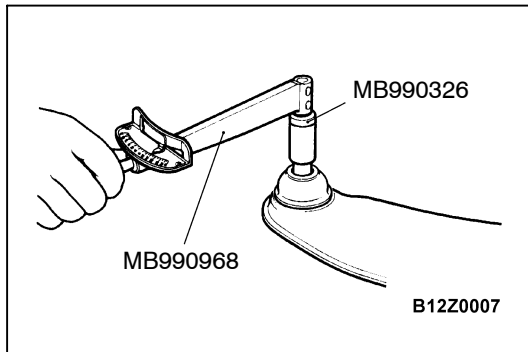
2. When the measured value exceeds the standard value, replace the upper arm ball joint assembly.
3. When the measured value is lower than the standard value, check that the upper arm ball joint turns smoothly without excessive play. If there is no excessive play, the ball joint can be reused.

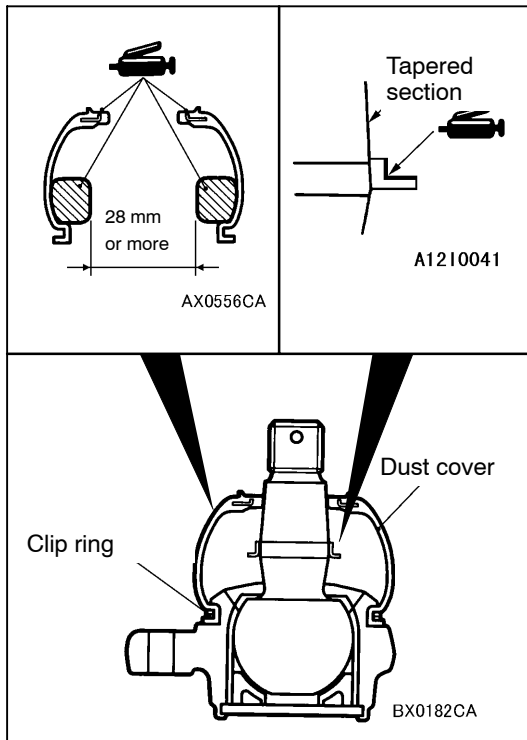
### UPPER ARM BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the upper arm assembly.

#### NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.





## UPPER ARM BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the clip ring, and then remove the dust cover.
2. Fill the inside of the dust cover with the specified grease as shown in the illustration.
3. Apply the specified grease to the dust cover and ball joint stud as shown in the illustration.
4. Wrap plastic tape around the upper arm ball joint stud, and then install the dust cover to the upper arm ball joint.

### Caution

**Do not apply grease to the place (tapered section) where the threaded section of the ball joint connects with the knuckle. Wipe the grease off if it is applied.**

5. Secure the dust cover in place with the clip ring.

### Caution

**To prevent the grease to be applied on the ball joint connection (taper) with knuckle, do not compress the dust cover before installation.**

6. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.



## SHOCK ABSORBER ASSEMBLY

### REMOVAL AND INSTALLATION

#### Caution

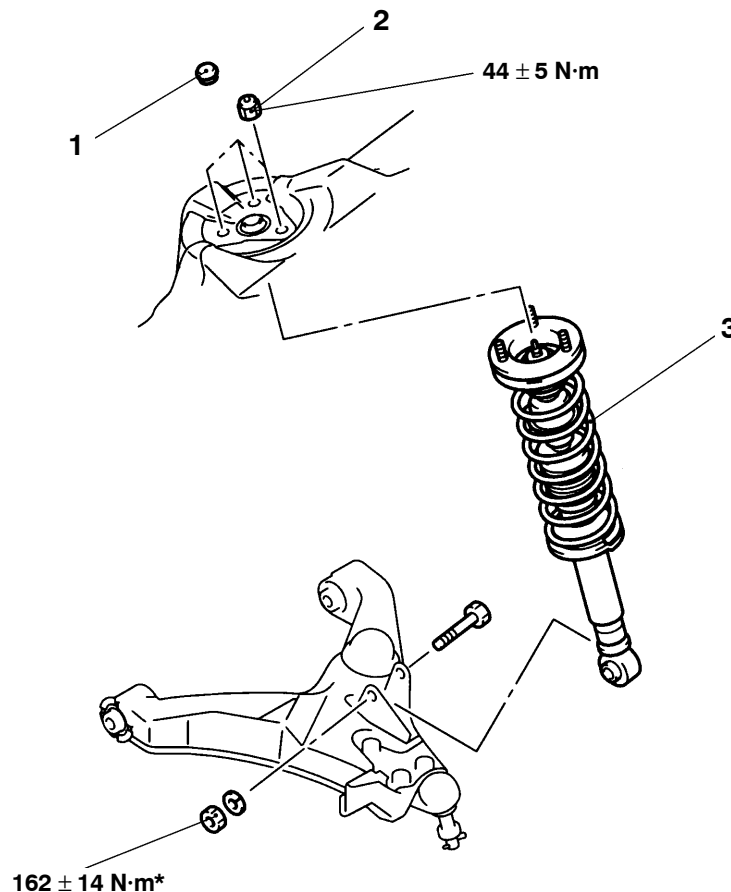
\*: To prevent bushings from breakage, the parts indicated by \* should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

#### Pre-removal Operation

- Upper Arm Assembly Removal (Refer to P.33A-7.)
- Battery and Battery Tray (LH) Removal
- Condense Tank (LH) Removal (Refer to GROUP 14 – Radiator.)
- Air Cleaner (RH) Removal (Refer to GROUP 15 – Air Cleaner.)

#### Post-installation Operation

- Air Cleaner Assembly (RH) (Refer to GROUP 15 – Air Cleaner.)
- Condense Tank (LH) Installation (Refer to GROUP 14 – Radiator.)
- Battery and Battery Tray (LH) Removal
- Upper Arm Assembly Installation (Refer to P.33A-7.)
- Wheel Alignment Check and Adjustment (Refer to P.33A-4.)

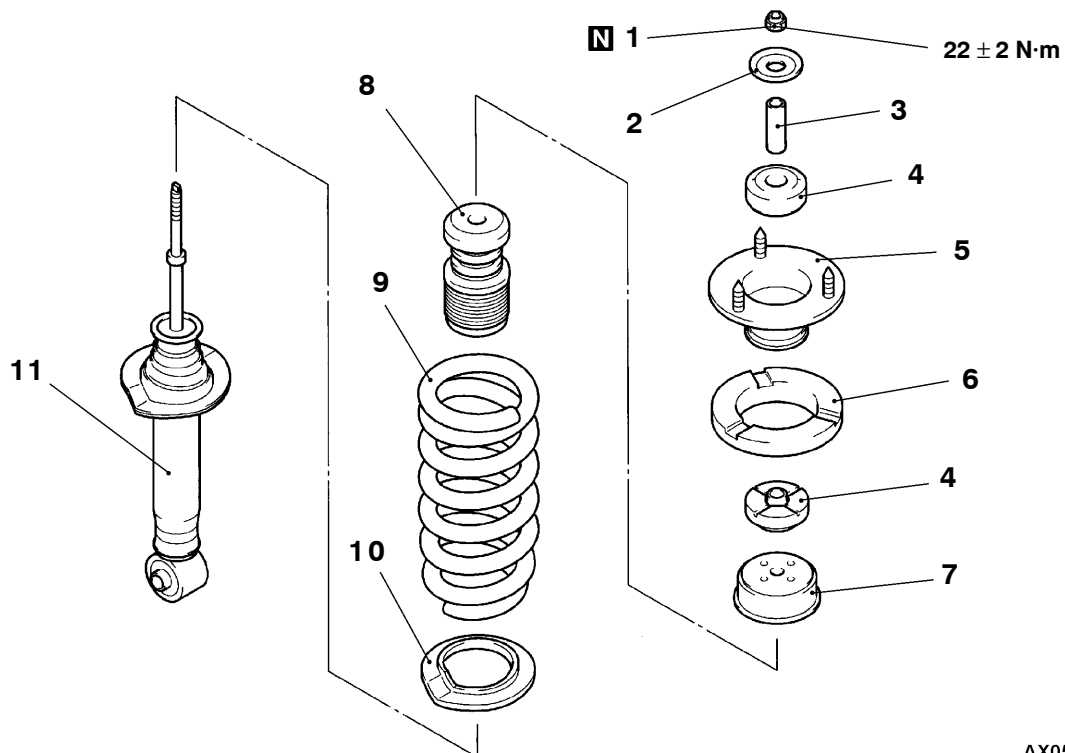


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#### Removal steps

1. Cap
2. Shock absorber mounting nut
3. Shock absorber assembly

# DISASSEMBLY AND REASSEMBLY

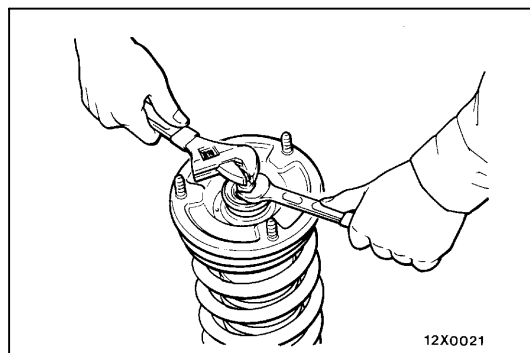
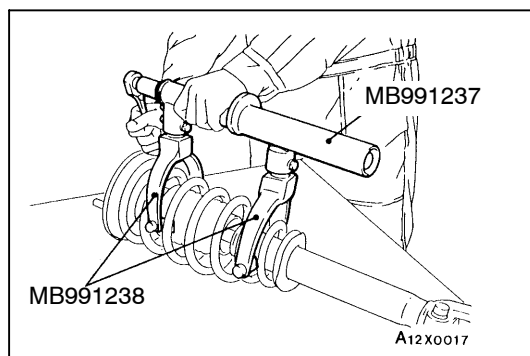


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## Disassembly steps

- ◀A▶ ▶C▶ 1. Self-locking nut  
2. Seat  
3. Collar  
▶B▶ 4. Upper bush  
5. Spring bracket assembly  
6. Spring upper pad

7. Cup assembly  
8. Helper rubber  
▶A▶ ▶A▶ 9. Coil spring  
10. Spring lower pad  
11. Shock absorber assembly



## DISASSEMBLY SERVICE POINT

### ◀A▶ SELF-LOCKING NUT REMOVAL

1. Use the special tools to compress the coil spring.

#### Caution

- (1) Do not tighten the special tool bolt too tight. The special tool will be broken if the allowable tightening torque of 74 N·m is exceed.
  - (2) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
  - (3) Do not use an impact wrench as it will cause the bolt of the special tool to be seized.
2. To prevent the piston rod from turning and unscrew the self-locking nut.

#### Caution

To prevent the piston rod lock nut inside the strut from loosening, do not use an impact wrench when the locking nuts are loosened.

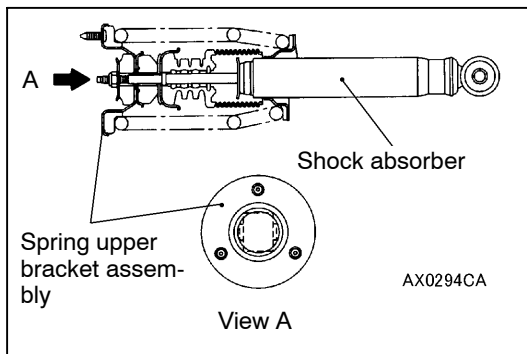
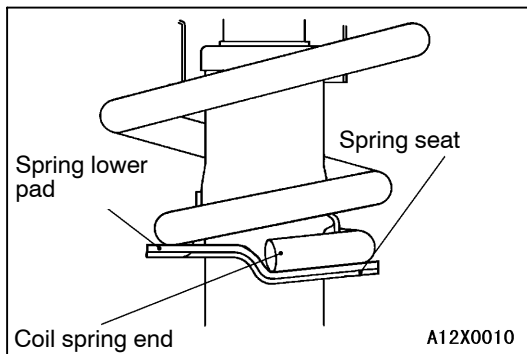
**REASSEMBLY SERVICE POINTS****►A◄ SELF-LOCKING NUT INSTALLATION**

1. Install the special tool same as its removal and compress the coil spring to install to the shock absorber.

**Caution**

- (1) **Do not tighten the special tool bolt too tight.**  
The special tool will be broken if the allowable tightening torque of 74 N·m is exceed.
- (2) **Install the special tools evenly, and so that the maximum length will be attained within the installation range.**
- (3) **Do not use an impact wrench as it will cause the bolt of the special tool to be seized.**

2. Align the coil spring lower end and the stepped spring lower pad with the shock absorber spring seat stepped part.

**►B◄ SPRING BRACKET ASSEMBLY INSTALLATION**

Install the spring bracket assembly so that it faces as shown in respect to the shock absorber.

**►C◄ SELF-LOCKING NUT INSTALLATION**

1. Tighten the self-locking nut loosely.
2. Remove the special tools (MB991237, MB991238) and then tighten the self-locking nut to the specified torque.

**Caution**

**Do not use an impact wrench as it will cause the bolt of the special tool to be seized.**

## LOWER ARM ASSEMBLY

### REMOVAL AND INSTALLATION

#### Caution

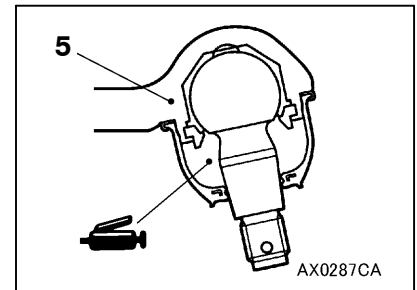
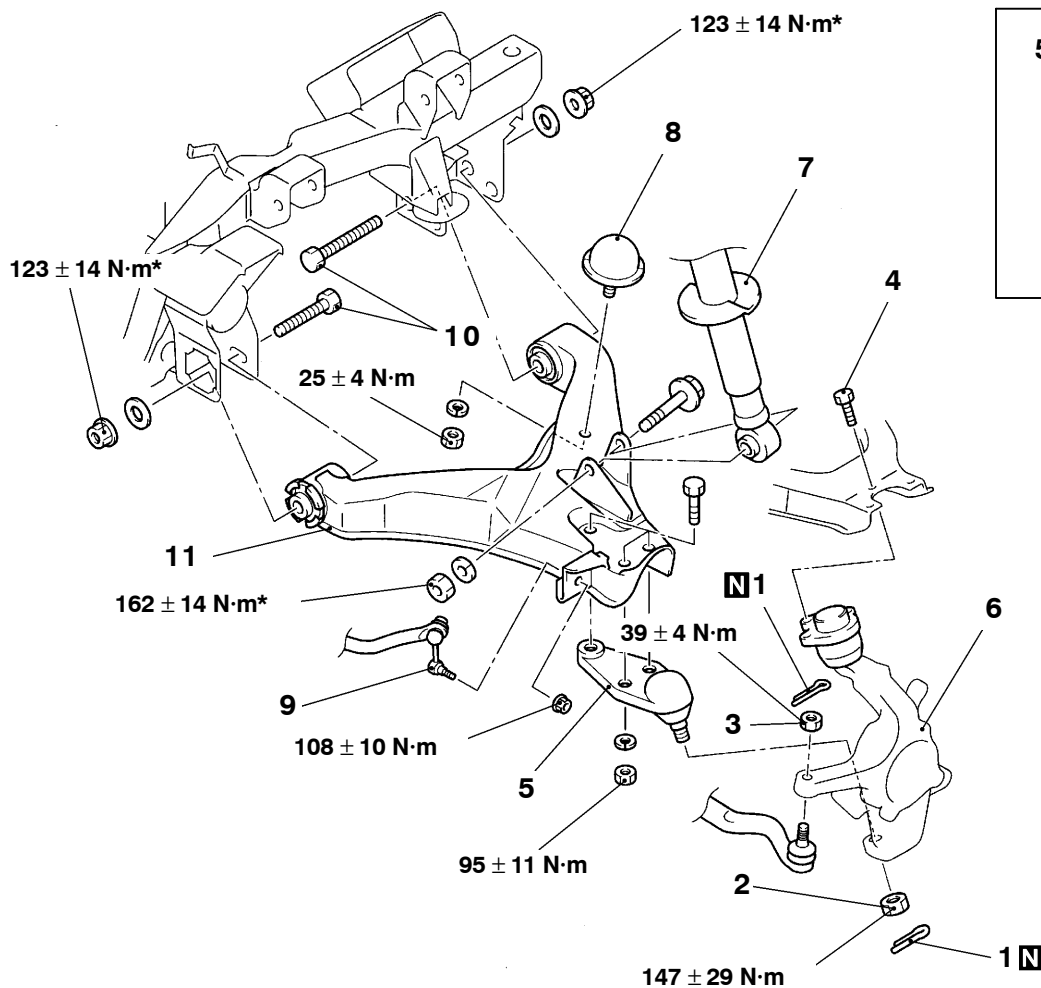
\*: To prevent bushings from breakage, the parts indicated by \* should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

#### Pre-removal Operation

Drive Shaft Removal (Refer to GROUP 26 – Drive Shaft.)

#### Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Drive Shaft Installation (Refer to GROUP 26 – Drive Shaft.)
- Wheel alignment check and adjustment (Refer to P.33A-4.)



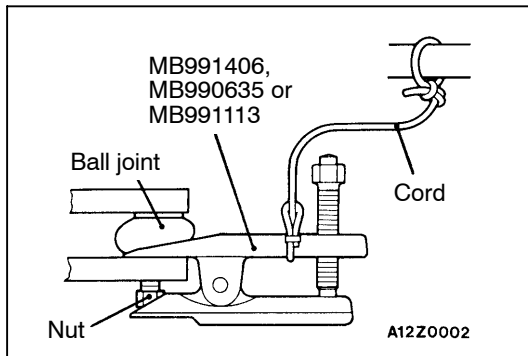
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#### Removal steps

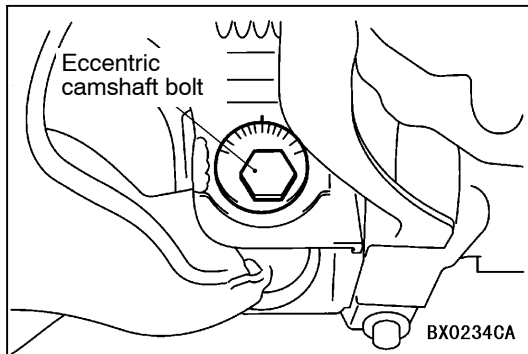
1. Split pin
2. Lower arm ball joint and knuckle assembly connection
3. Tie rod end and knuckle connection
4. Upper arm and upper arm ball joint connection
5. Lower arm ball joint
6. Hub and knuckle assembly

7. Shock absorber and lower arm assembly connection
8. Bump stopper
9. Lower arm assembly and stabilizer link connection
10. Lower arm mounting bolt
11. Lower arm assembly

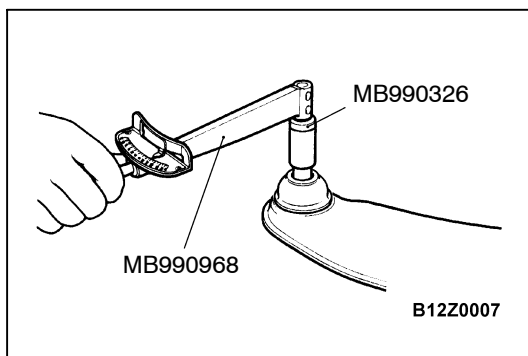


**REMOVAL SERVICE POINTS****◀A▶ TIE ROD END AND KNUCKLE SEPARATION/LOWER ARM BALL JOINT REMOVAL****Caution**

1. To prevent the ball joint thread from damage, only loosen but do not remove the nut securing the lower arm and tie rod end to the knuckle from the ball joint and use the special tool.
2. Support the special tool with a cord to prevent it from coming off.

**◀B▶ LOWER ARM MOUNTING BOLT REMOVAL**

After making the alignment mark on the bracket and eccentric cam bolt and remove them.

**INSPECTION****LOWER ARM BALL JOINT ROTATION STARTING TORQUE CHECK**

1. After shaking the ball joint stud several times, use the special tools to measure the rotation starting torque of the lower ball joint.

**Standard value: 0.3 – 4.5 N·m**

2. When the measured value exceeds the standard value, replace the lower arm ball joint assembly.
3. When the measured value is lower than the standard value, check that the lower arm ball joint turns smoothly without excessive play. If there is no excessive play, the ball joint can be reused.

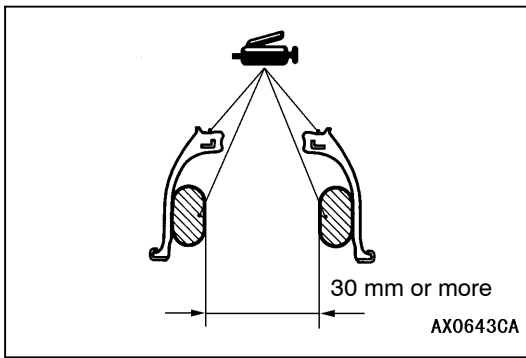
**LOWER ARM BALL JOINT DUST COVER CHECK**

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the lower arm ball joint assembly.

**NOTE**

If the dust cover is cracked or damaged, it is possible that there may also be damage to the ball joint.

When it is damaged during service work, replace the dust cover.

**LOWER ARM BALL JOINT DUST COVER REPLACEMENT**

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the dust cover.
2. Fill the inside of the dust cover with the specified grease as shown in the illustration.
3. Apply the specified grease to the dust cover and ball joint stud as shown in the illustration.
4. Wrap plastic tape around the lower arm ball joint stud, and then install the dust cover to the lower arm ball joint.

**Caution**

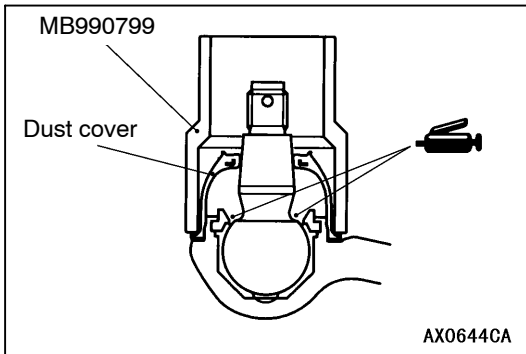
**Do not apply grease to the place (tapered section) where the threaded section of the ball joint connects with the knuckle. Wipe the grease off if it is applied.**

5. Using the special tool, drive the dust cover into the position shown in the illustration.

**Caution**

**To prevent the grease to be applied on the ball joint connection (taper) with knuckle, do not compress the dust cover before installation.**

6. Press the dust cover with your finger to check that there are no cracks or damage in the dust cover.



## STABILIZER BAR

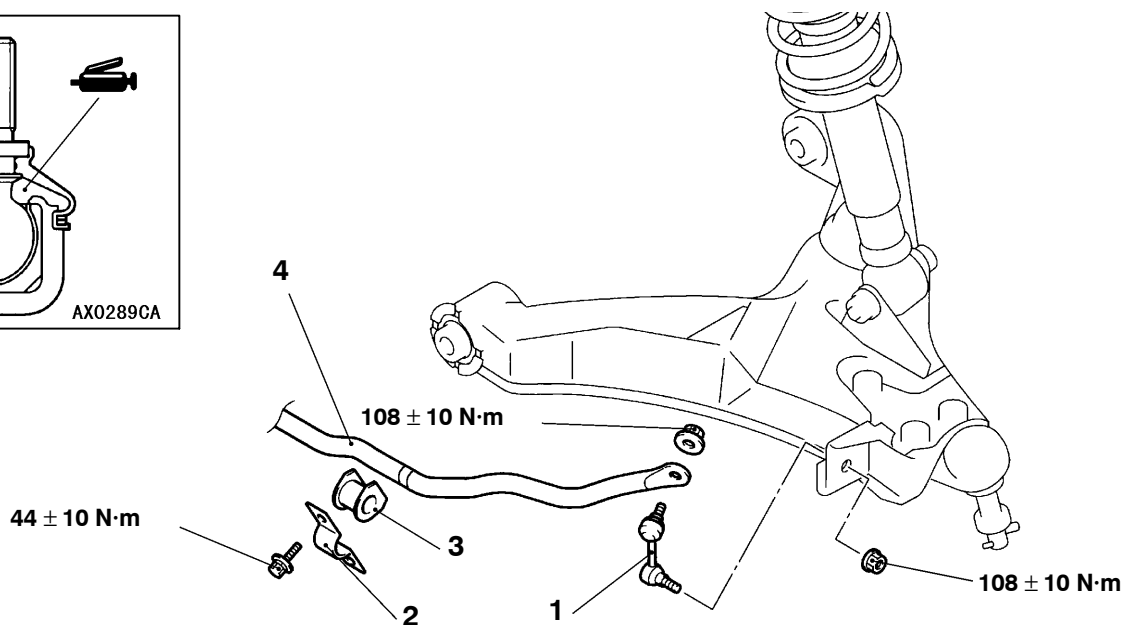
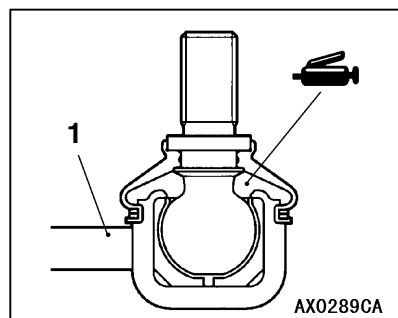
### REMOVAL AND INSTALLATION

#### Pre-removal Operation

Under Cover Removal

#### Post-installation Operation

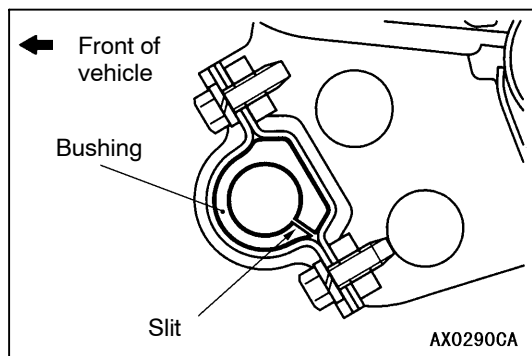
- Check the Dust Cover for Cracks or Damage by Pushing it with Finger.
- Under Cover Installation



#### Removal steps

- B◄
1. Stabilizer link
  2. Stabilizer clamp

- A◄
3. Stabilizer bush
  4. Stabilizer bar



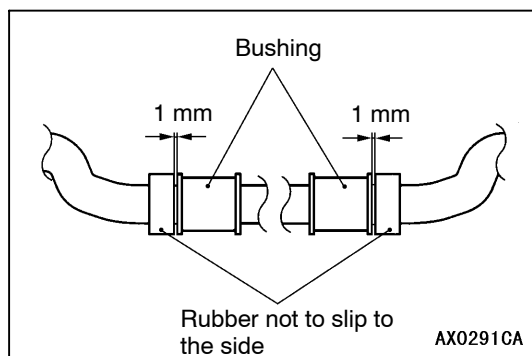
#### INSTALLATION SERVICE POINTS

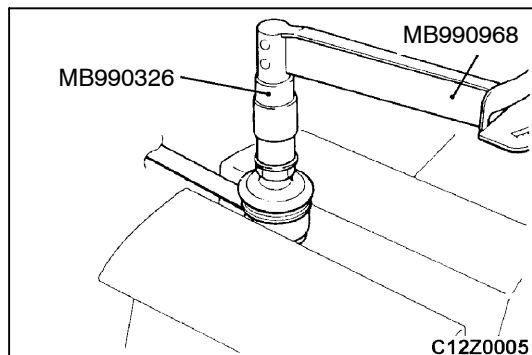
##### ►A◄ STABILIZER BUSHING INSTALLATION

Install the bush slit as shown in the illustration.

##### ►B◄ STABILIZER CLAMP INSTALLATION

Position the stabilizer clamp as shown in the illustration and then tighten the stabilizer clamp mounting bolt.





## INSPECTION

### STABILIZER LINK BALL JOINT TURNING TORQUE CHECK

1. After shaking the ball joint stud several times, install the nut to the stud and use the special tools to measure the turning torque of the ball joint.

**Standard value: 0.5 – 2.0 N·m**

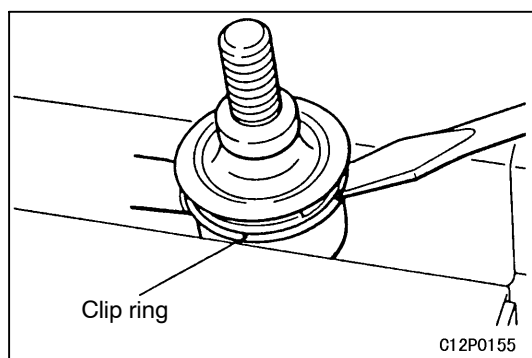
2. When the measured value exceeds the standard value, replace the stabilizer link.
3. When the measured value is lower than the standard value, check that the ball joint turns smoothly without excessive play. If so, it is possible to reuse that ball joint.

### STABILIZER LINK BALL JOINT DUST COVER CHECK

1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the stabilizer link.

#### NOTE

Cracks or damage of the dust cover may cause damage of the ball joint. When it is damaged during service work, replace the dust cover.



### STABILIZER LINK BALL JOINT DUST COVER REPLACEMENT

Only when the dust cover is damaged accidentally during service work, replace the dust cover as follows:

1. Remove the clip ring and the dust cover.
2. Apply multipurpose grease to the inside of the dust cover.
3. Wrap plastic tape around the stabilizer link stud, and then install the dust cover to the stabilizer link.
4. Secure the dust cover by the clip ring.
5. Check the dust cover for cracks or damage by pushing it with finger.