



# SERVICE BULLETIN

AFTERSALES SERVICE OFFICE, MITSUBISHI MOTORS CORPORATION

PURPOSE : INFORMATION	ISSUE NO. : MSB-09E37-001A	DATE : 2009-08-05
SUBJECT: STEERING TIE ROD	<MODEL> <M/Y>	
GROUP : STEERING	(EUR/RUSSIA/UK(Japanese Domestic Spec.)) See following <u>2. Applicable Manuals table.</u>	

## 1. Description:

The tie rod looseness check procedure and the power steering disassembly and reassembly procedure are newly established to improve reliability. This Service Bulletin contains these new procedures.

## 2. Applicable Manuals:

See Attached sheets 1 (1/5) to 1 (5/5).

There may be some attached sheets not included in this Service Bulletin because they are not applicable to your market. Their sheet numbers are not listed in the above table.

REVISION A : ADDED 2010 LANCER / LANCER EVOLUTION / LANCER SPORTBACK /  
OUTLANDER

&lt;EUR&gt;

Manual/Model	<M/Y>	Pub. No.	Title (Info-ID)	Attached Sheet
2008 LANCER Workshop Manual (GS41)(CY0A)	08	CG1E08E2-CD (English) CG1S08E2-CD (Spanish) CG1F08E2-CD (French) CG1G08E2-CD (German)	Special Tools (M372-00-061-10800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-96600-01)	Attached sheet 12
			Special Tools (M372-00-061-03400-01)	Attached sheet 9
			To be added after Group 37B-Inspection (M372-01-101-08100-01)	Attached sheet 13
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-10600-01)	Attached sheet 18
			To be added after Group 37B-On-Vehicle Service Steering Angle Check (M372-00-110-09800-01)	
2009 LANCER Workshop Manual (GS41)(CY0A)	09	CG1E09E1-CD (English) CG1S09E1-CD (Spanish) CG1F09E1-CD (French) CG1G09E1-CD (German) CG1I09E1-CD (Italian)	Special Tools (M372-00-061-10800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-96600-01)	Attached sheet 12
			Special Tools (M372-00-061-38000-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-111-04400-01)	Attached sheet 13
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-32200-01)	Attached sheet 18
			To be added after Group 37B-On-Vehicle Service Steering Angle Check (M372-00-111-42900-01)	

Manual/Model	<M/Y>	Pub. No.	Title (Info-ID)	Attached Sheet
2010 LANCER Workshop Manual (GS41)(CY0A)	10	CG1E10E1-CD (English)	Special Tools (M372-00-061-10800-01)	Attached sheet 9
		CG1S10E1-CD (Spanish)	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-96600-01)	Attached sheet 12
		CG1F10E1-CD (French)	Special Tools (M372-00-061-36800-01)	Attached sheet 9
		CG1G10E1-CD (German)	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-111-04400-01)	Attached sheet 13
		CG1I10E1-CD (Italian)	To be added after On-Vehicle Service Steering Angle Check (M372-00-111-32200-01)	Attached sheet 18
			To be added after Group 37B-On-Vehicle Service Steering Angle Check (M372-00-111-54800-01)	
2009 LANCER EVOLUTION Workshop Manual (GS41EVO)(CZ4A)	09	CGEE09E1-CD (English)	Special Tools (M372-00-061-33500-01)	Attached sheet 9
		CGES09E1-CD (Spanish)	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-99900-01)	Attached sheet 10
		CGEF09E1-CD (French)	To be added after On-Vehicle Service Steering Angle Check (M372-00-111-29200-01)	Attached sheet 19
		CGEG09E1-CD (German)		
2010 LANCER EVOLUTION Workshop Manual (GS41EVO)(CZ4A)	10	CG1E10E1-CD (English)	Special Tools (M372-00-061-33500-01)	Attached sheet 9
		CG1S10E1-CD (Spanish)	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-99900-01)	Attached sheet 10
		CG1F10E1-CD (French)	To be added after On-Vehicle Service Steering Angle Check (M372-00-111-29200-01)	Attached sheet 19
		CG1G10E1-CD (German)		
		CG1I10E1-CD (Italian)		

Manual/Model	<M/Y>	Pub. No.	Title (Info-ID)	Attached Sheet
2009 LANCER SPORTBACK Workshop Manual (GS44S)(CX0A)	09	CG4E09E1-CD (English) CG4S09E1-CD (Spanish) CG4F09E1-CD (French) CG4G09E1-CD (German) CG4I09E1-CD (Italian)	Special Tools (M372-00-061-10800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-96600-01)	Attached sheet 12
			Special Tools (M372-00-061-36800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-111-04400-01)	Attached sheet 13
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-32200-01)	Attached sheet 18
			To be added after Group 37B-On-Vehicle Service Steering Angle Check (M372-00-111-33300-01)	
2010 LANCER SPORTBACK Workshop Manual (GS44S)(CX0A)	10	CG4E10E1-CD (English) CG4S10E1-CD (Spanish) CG4F10E1-CD (French) CG4G10E1-CD (German) CG4I10E1-CD (Italian)	Special Tools (M372-00-061-10800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-96600-01)	Attached sheet 12
			Special Tools (M372-00-061-36800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-111-04400-01)	Attached sheet 13
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-32200-01)	Attached sheet 18
			To be added after Group 37B-On-Vehicle Service Steering Angle Check (M372-00-111-54800-01)	
2007 OUTLANDER Workshop Manual (GS45X)(CW0W)	07	CGXE07E1-CD (English) CGXS07E1-CD (Spanish) CGXF07E1-CD (French) CGXG07E1-CD (German)	Special Tools (M372-00-060-91200-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-54600-01)	Attached sheet 11
			To be added after On-Vehicle Service Steering Angle Check (M372-00-110-89100-01)	Attached sheet 20
2008 OUTLANDER Workshop Manual (GS45X)(CW0W)	08	CGXE08E2-CD (English) CGXS08E2-CD (Spanish) CGXF08E2-CD (French) CGXG08E2-CD (German)	Special Tools (M372-00-061-16400-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-79500-01)	Attached sheet 11
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-21400-01)	Attached sheet 20

Manual/Model	<M/Y>	Pub. No.	Title (Info-ID)	Attached Sheet
2009 OUTLANDER Workshop Manual (GS45X)(CW0W)	09	CGXE09E1-CD (English)	Special Tools (M372-00-061-16400-01)	Attached sheet 9
		CGXS09E1-CD (Spanish)	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-111-05500-01)	Attached sheet 11
		CGXF09E1-CD (French)	To be added after On-Vehicle Service Steering Angle Check (M372-00-111-28100-01)	Attached sheet 20
		CGXG09E1-CD (German)		
2010 OUTLANDER Workshop Manual (GS45X)(CW0W)	10	CGXI09E1-CD (Italian)		
		CGXE10E1-CD (English)	Special Tools (M372-00-061-16400-01)	Attached sheet 9
		CGXS10E1-CD (Spanish)	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-111-05500-01)	Attached sheet 11
		CGXF10E1-CD (French)	To be added after On-Vehicle Service Steering Angle Check (M372-00-111-28100-01)	Attached sheet 20
		CGXG10E1-CD (German)		
		CGXI10E1-CD (Italian)		

## &lt;RUSSIA&gt;

Underneath Manual/Model	<M/Y>	Underneath Pub. No.	Title (Info-ID)	Attached Sheet
2008 LANCER Workshop Manual (GS41)(CY0A)	08	N/A	Special Tools (M372-00-061-10800-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-96600-01)	Attached sheet 12
			Special Tools (M372-00-061-03400-01)	Attached sheet 9
			To be added after Group 37B-Inspection (M372-01-101-08100-01)	Attached sheet 13
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-10600-01)	Attached sheet 18
			To be added after Group 37B-On-Vehicle Service Steering Angle Check (M372-00-110-09800-01)	

Underneath Manual/Model	<M/Y>	Underneath Pub. No.	Title (Info-ID)	Attached Sheet
2008 LANCER Workshop Manual (GS41)(CY0A)	08	N/A	Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-76200-01)	Attached sheet 12
			Special Tools (M372-00-061-12000-01)	Attached sheet 9
			To be added after Group 37B-Inspection (M372-01-100-95800-01)	Attached sheet 13
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-07600-01)	Attached sheet 18
2010 LANCER EVOLUTION Workshop Manual (GS41EVO)(CZ4A)	10	N/A	Special Tools (M372-00-061-33500-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-99900-01)	Attached sheet 10
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-29200-01)	Attached sheet 19

## &lt;UK(Japanese Domestic Specification)&gt;

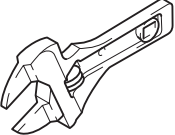
Manual/Model	<M/Y>	Pub. No.	Title (Info-ID)	Attached Sheet
2008 LANCER EVOLUTION Workshop Manual (GS41EVO)(CZ4A)	08	N/A	Special Tools (M372-00-061-17500-01)	Attached sheet 9
			Power Steering Gear Box and Linkage Disassembly and Reassembly (M372-01-110-82500-01)	Attached sheet 10
			To be added after On-Vehicle Service Steering Angle Check (M372-00-111-22500-01)	Attached sheet 19

POWER STEERING  
SPECIAL TOOL

Attached sheet 9

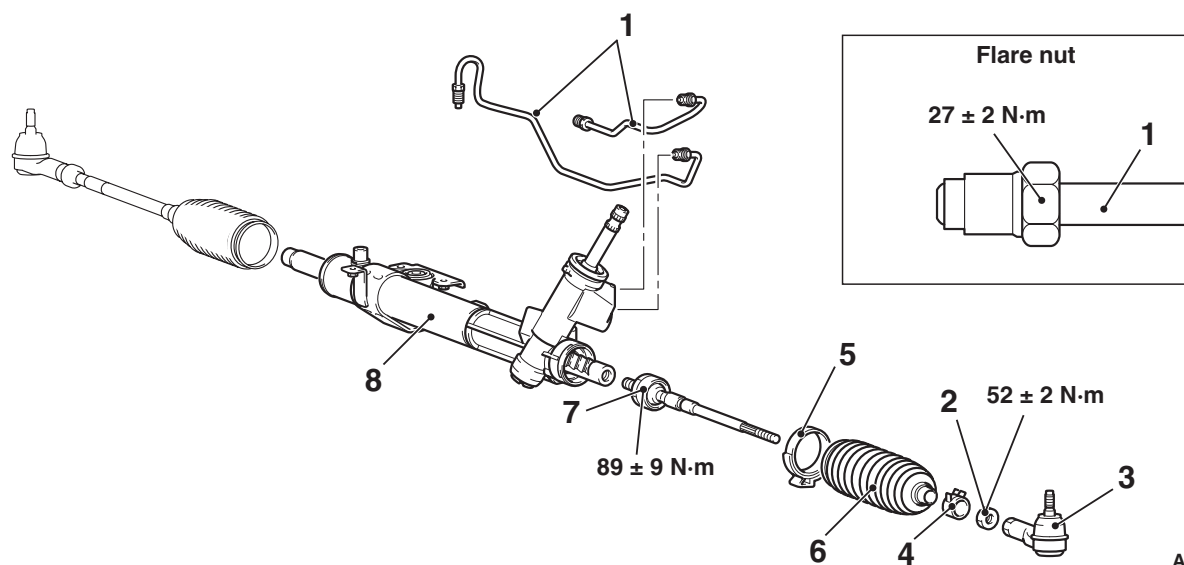
SPECIAL TOOL

M1372000601647

Tool	Number	Name	Use
 MB992249	MB992249	Variable spanner	Tie-rod removal and installation

## DISASSEMBLY AND REASSEMBLY

M1372011101323



### Disassembly steps

- >>C<< 1. Feed pipe  
>>C<< 2. Lock nut  
>>C<< 3. Tie-rod end  
4. Clip  
>>B<< 5. Band

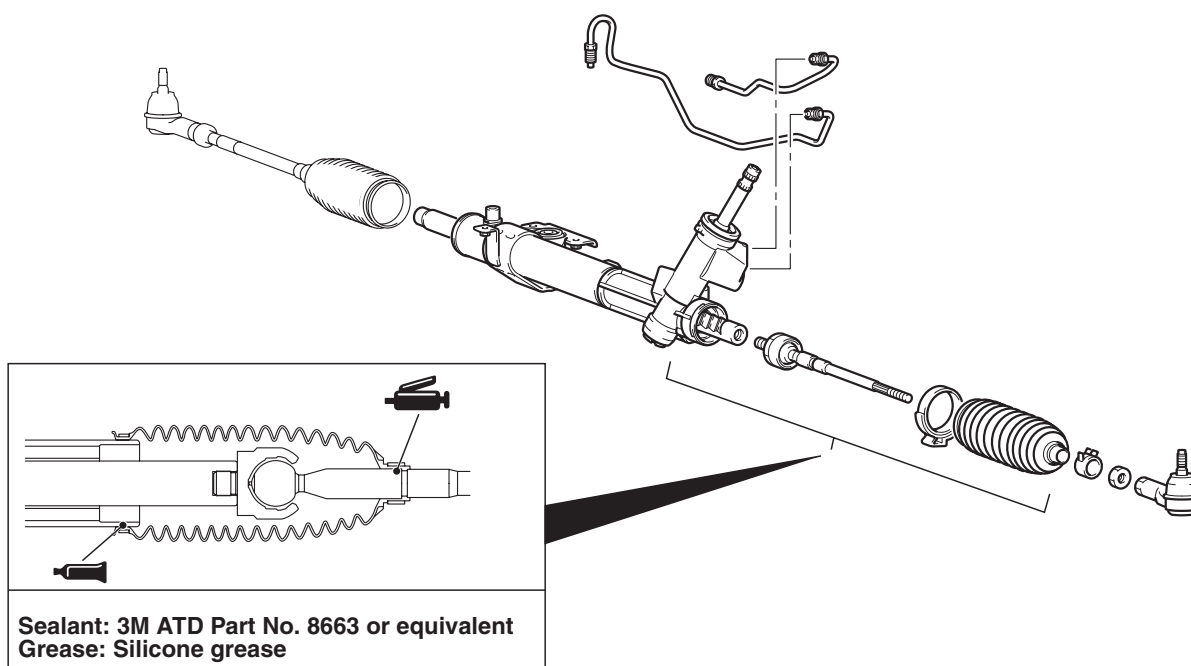
<<A>>

>>A<<

### Disassembly steps

6. Bellows  
7. Tie-rod  
8. Gear housing

## LUBRICATION AND SEALING POINTS

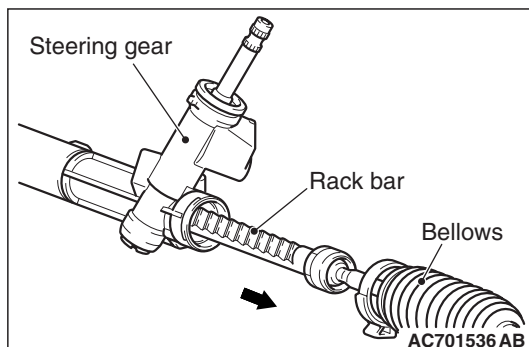


AC609895 AC



## DISASSEMBLY SERVICE POINT

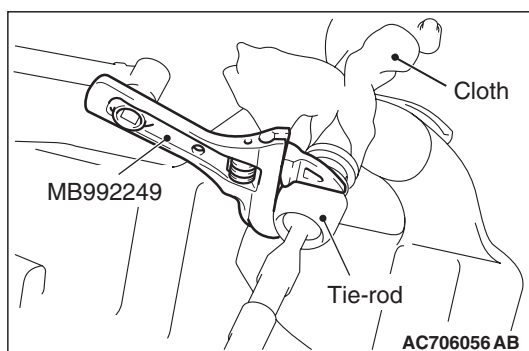
### <<A>> TIE-ROD REMOVAL



1. Move the bellows and pull the rack bar toward arrow direction.

#### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



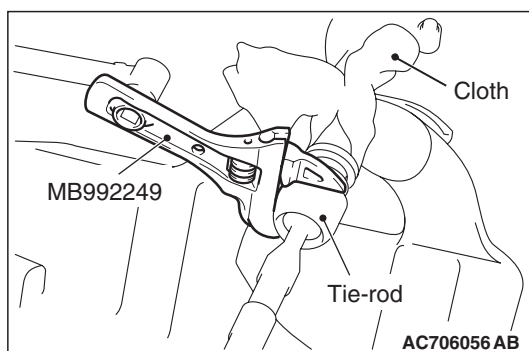
2. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
3. Use special tool variable spanner (MB992249) to remove the tie-rod.

## ASSEMBLY SERVICE POINTS

### >>A<< TIE-ROD INSTALLATION

#### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



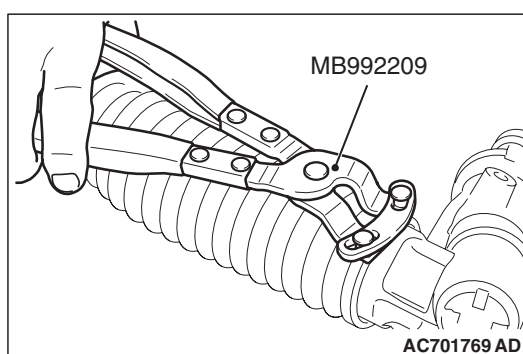
1. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
2. Use special tool variable spanner (MB992249) to tighten the tie-rod to the specified torque.

**Tightening torque:  $89 \pm 9$  N·m**

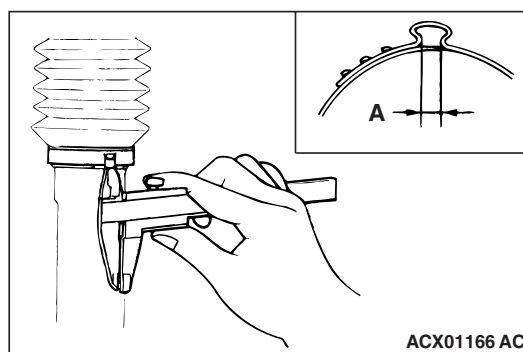
### >>B<< BAND INSTALLATION

#### ⚠ CAUTION

- Hold the rack housing, and use special tool bellows band crimping tool (MB992209) to crimp the bellows band securely.
- Crimp the bellows band until special tool (MB992209) touches the stopper.

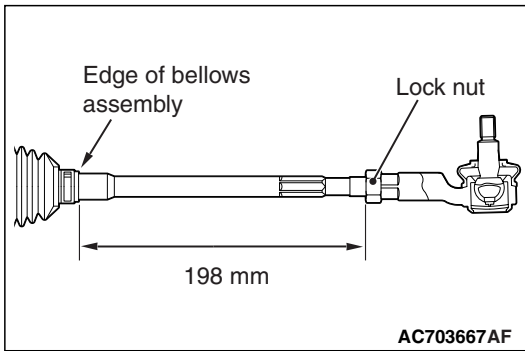


1. Use special tool boot band crimping tool (MB992209) to crimp the bellows band.



2. Check that crimped width (A) is within the standard value.

**Standard value (A): 2.4 – 2.8 mm**

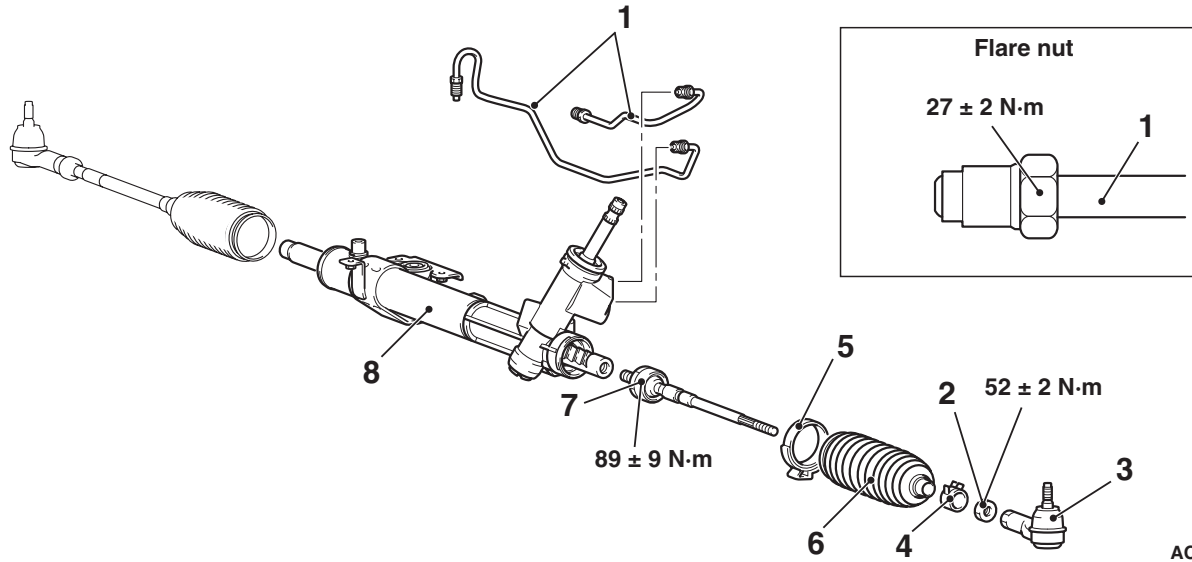
**POWER STEERING  
SPECIAL TOOL****>>C<< TIE ROD END/LOCK NUT INSTALLATION**

Screw in the tie-rod to the length shown in the figure, and hand-tighten the lock nut.

*NOTE: Install the steering gear and linkage to the body, adjust the toe-in, and then tighten the lock nut to the specified torque.*

## DISASSEMBLY AND REASSEMBLY

M1372011101334



### Disassembly steps

- >>C<< 1. Feed pipe  
>>C<< 2. Lock nut  
>>C<< 3. Tie-rod end  
4. Clip  
>>B<< 5. Band

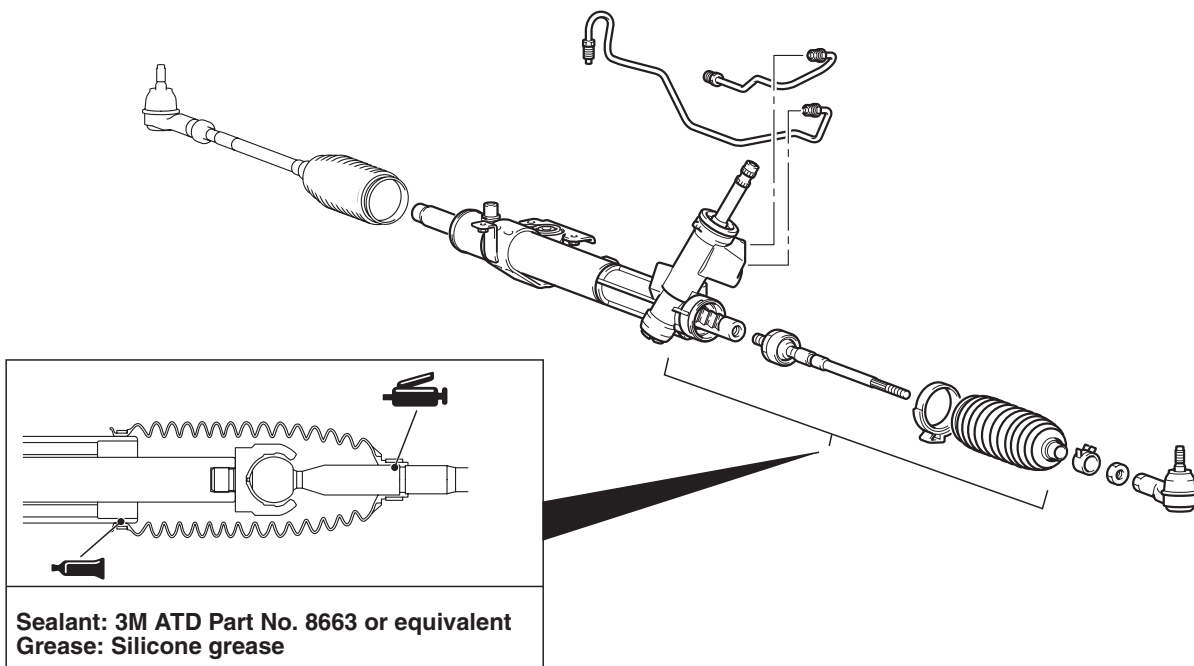
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>>A<<

### Disassembly steps

6. Bellows  
7. Tie-rod  
8. Gear housing

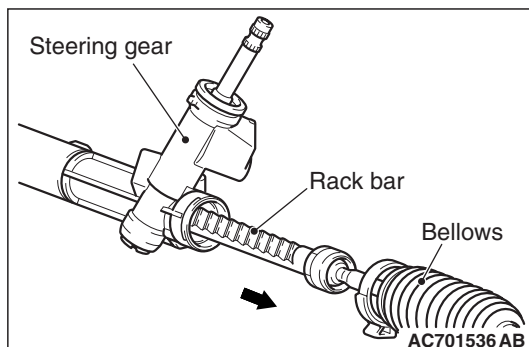
## LUBRICATION AND SEALING POINTS



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## DISASSEMBLY SERVICE POINT

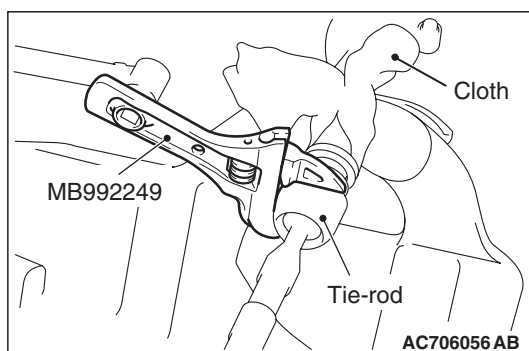
### <<A>> TIE-ROD REMOVAL



1. Move the bellows and pull the rack bar toward arrow direction.

#### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



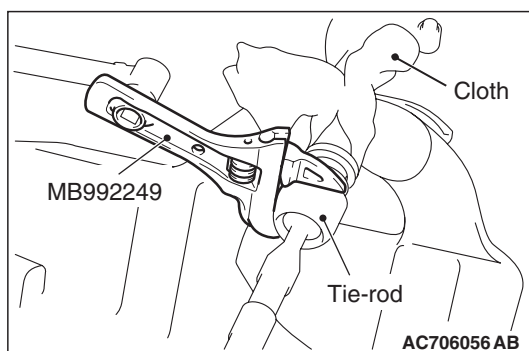
2. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
3. Use special tool variable spanner (MB992249) to remove the tie-rod.

## ASSEMBLY SERVICE POINTS

### >>A<< TIE-ROD INSTALLATION

#### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



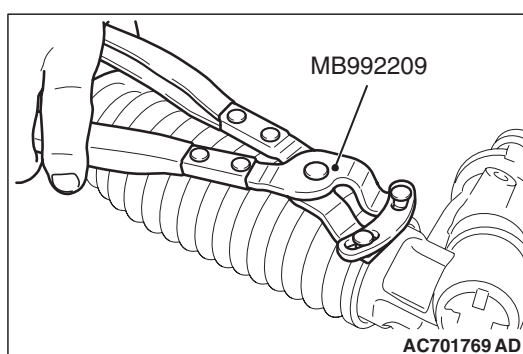
1. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
2. Use special tool variable spanner (MB992249) to tighten the tie-rod to the specified torque.

**Tightening torque:  $89 \pm 9$  N·m**

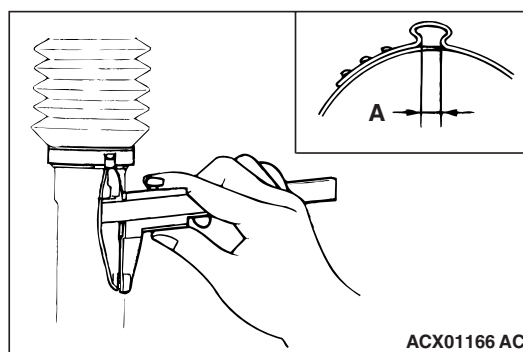
### >>B<< BAND INSTALLATION

#### ⚠ CAUTION

- Hold the rack housing, and use special tool bellows band crimping tool (MB992209) to crimp the bellows band securely.
- Crimp the bellows band until special tool (MB992209) touches the stopper.



1. Use special tool boot band crimping tool (MB992209) to crimp the bellows band.

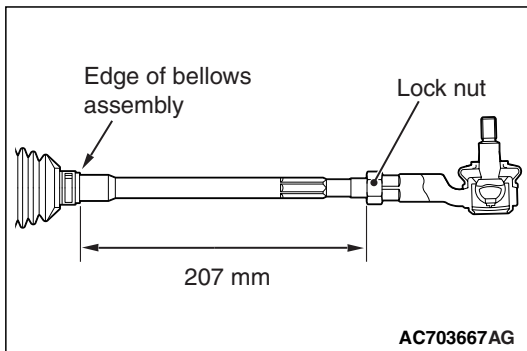


2. Check that crimped width (A) is within the standard value.

**Standard value (A): 2.4 – 2.8 mm**

### >>C<< TIE ROD END/LOCK NUT INSTALLATION

MSB-09E37-001A (09AL007A)

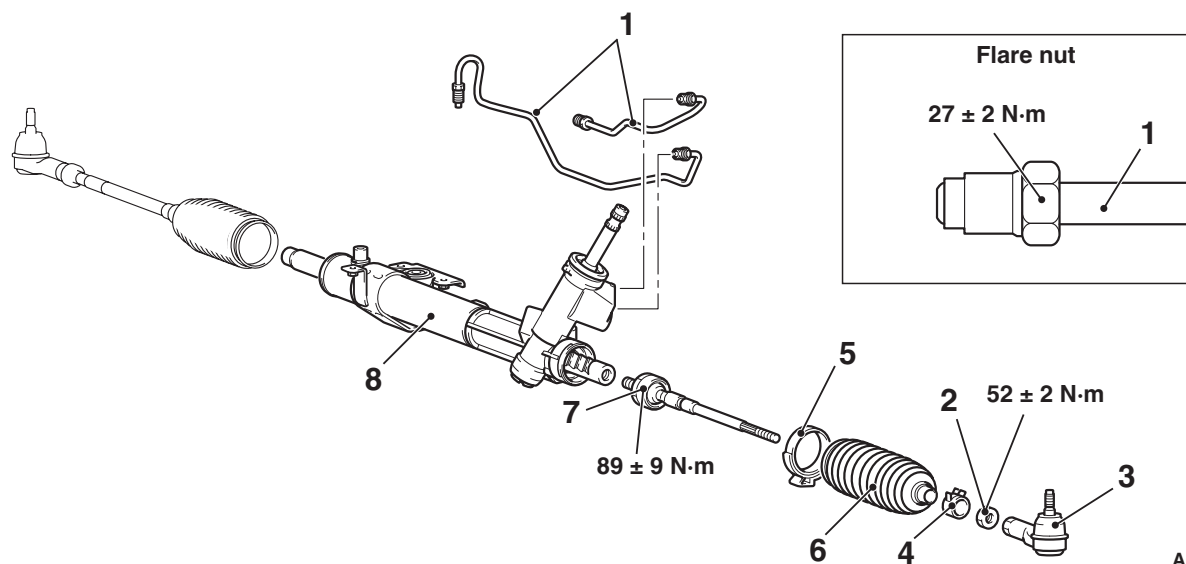
**POWER STEERING  
SPECIAL TOOL**

*NOTE: Install the steering gear and linkage to the body, adjust the toe-in, and then tighten the lock nut to the specified torque.*

Screw in the tie-rod to the length shown in the figure, and hand-tighten the lock nut.

## DISASSEMBLY AND REASSEMBLY

M1372011101345



### Disassembly steps

- >>C<< 1. Feed pipe  
>>C<< 2. Lock nut  
>>C<< 3. Tie-rod end  
4. Clip  
>>B<< 5. Band

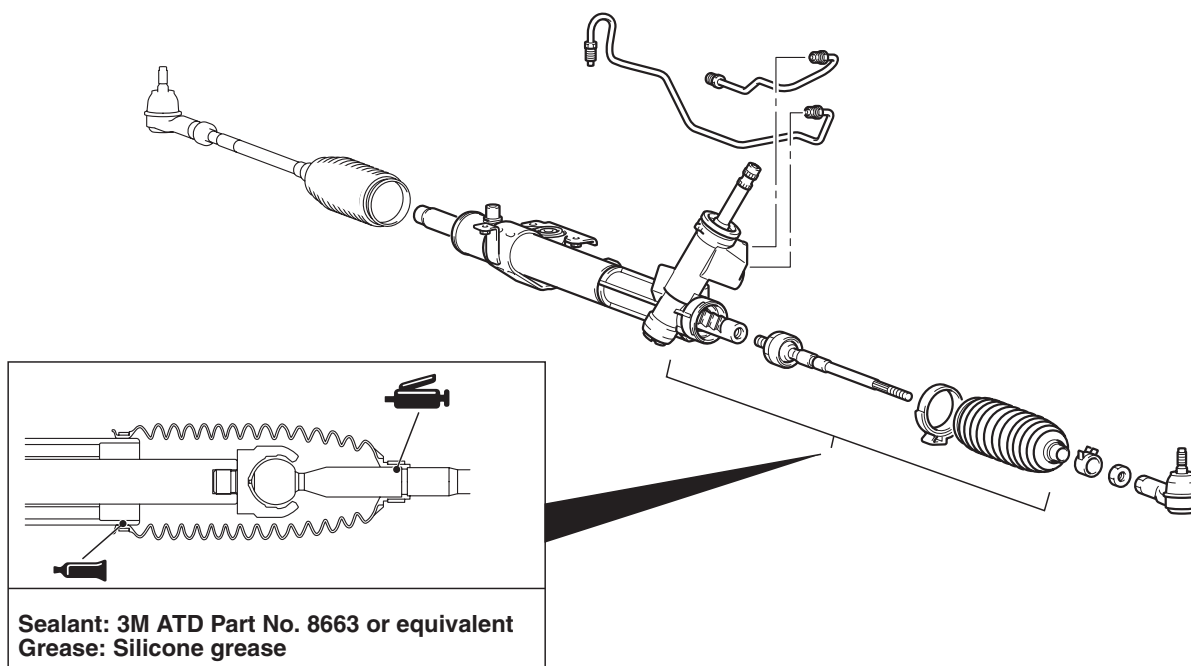
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### Disassembly steps

6. Bellows  
7. Tie-rod  
8. Gear housing

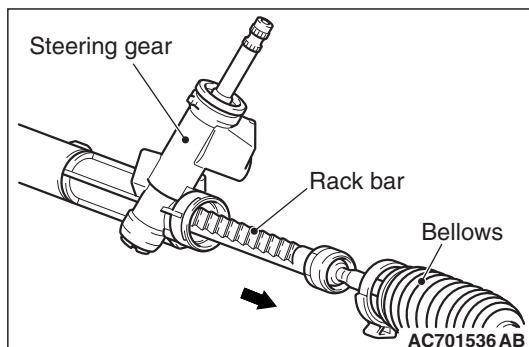
## LUBRICATION AND SEALING POINTS



AC609895 AC

## DISASSEMBLY SERVICE POINT

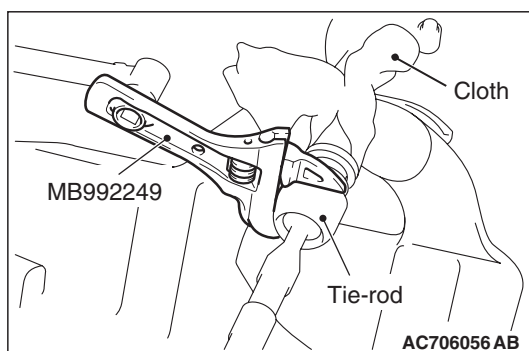
### <<A>> TIE-ROD REMOVAL



1. Move the bellows and pull the rack bar toward arrow direction.

#### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



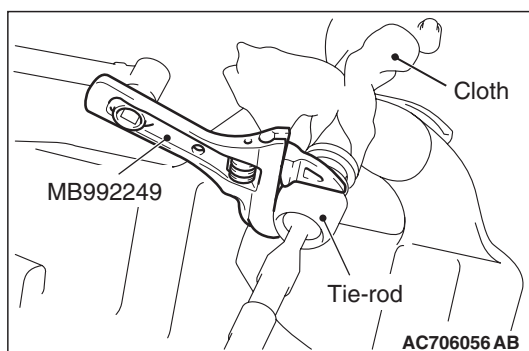
2. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
3. Use special tool variable spanner (MB992249) to remove the tie-rod.

## ASSEMBLY SERVICE POINTS

### >>A<< TIE-ROD INSTALLATION

#### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



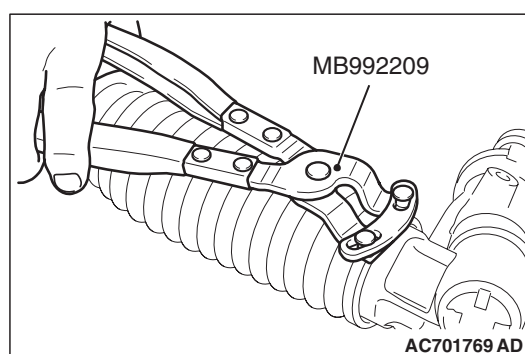
1. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
2. Use special tool variable spanner (MB992249) to tighten the tie-rod to the specified torque.

**Tightening torque:  $89 \pm 9$  N·m**

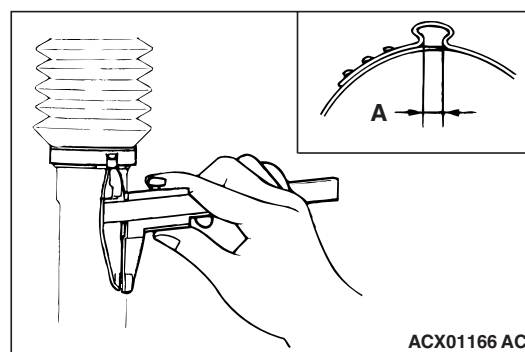
### >>B<< BAND INSTALLATION

#### ⚠ CAUTION

- Hold the rack housing, and use special tool bellows band crimping tool (MB992209) to crimp the bellows band securely.
- Crimp the bellows band until special tool (MB992209) touches the stopper.

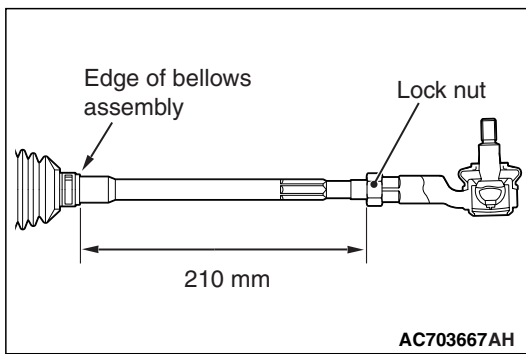


1. Use special tool boot band crimping tool (MB992209) to crimp the bellows band.



2. Check that crimped width (A) is within the standard value.

**Standard value (A): 2.4 – 2.8 mm**

**POWER STEERING  
SPECIAL TOOL****>>C<< TIE ROD END/LOCK NUT INSTALLATION**

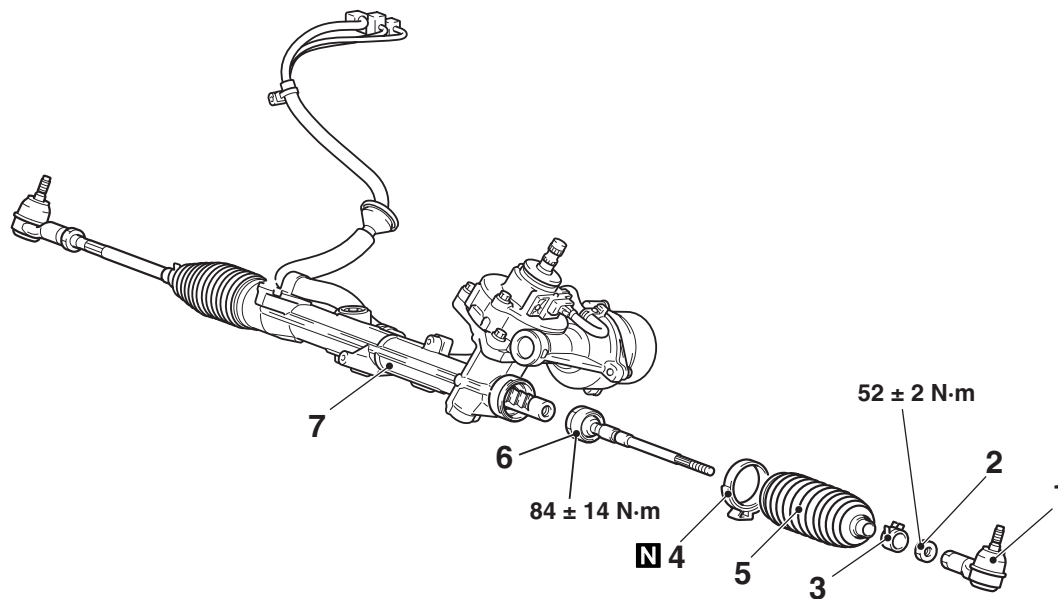
Screw in the tie-rod to the length shown in the figure, and hand-tighten the lock nut.

*NOTE: Install the steering gear and linkage to the body, adjust the toe-in, and then tighten the lock nut to the specified torque.*



## DISASSEMBLY AND REASSEMBLY

M1372011101356



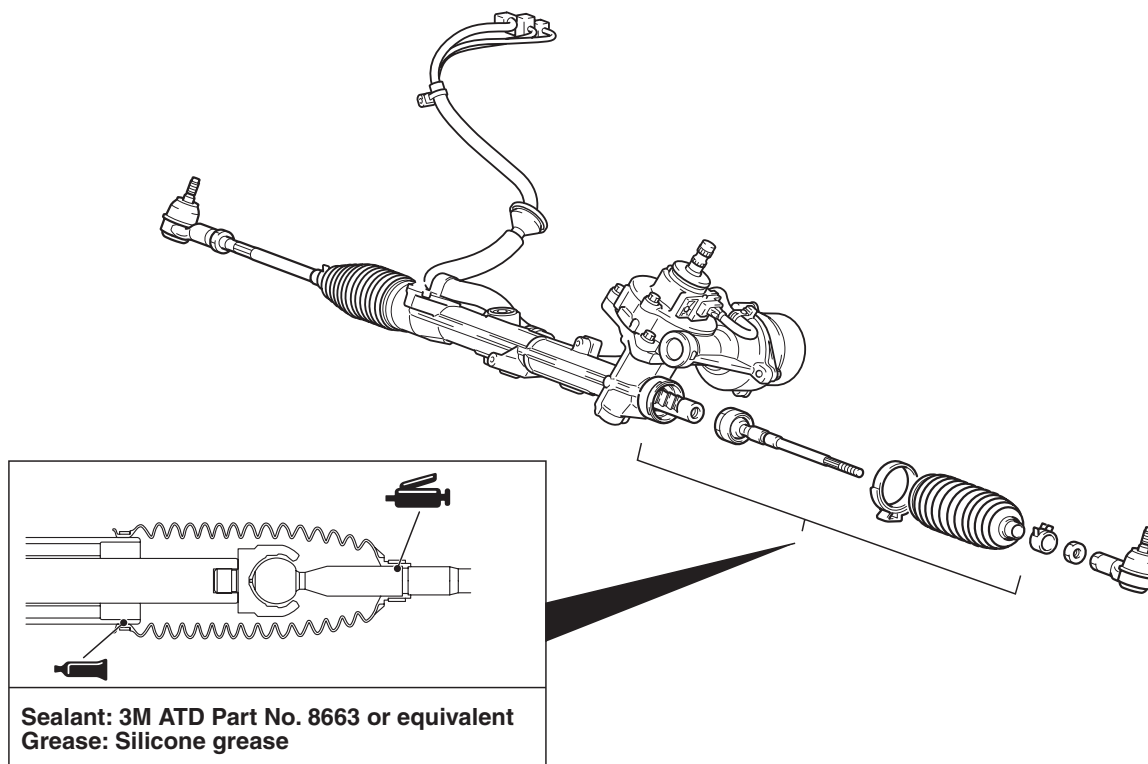
AC802304 AB

- Disassembly steps**
- >>C<< 1. Tie-rod end
  - >>C<< 2. Lock nut
  - >>B<< 3. Clip
  - >>B<< 4. Band

<<A>> >>A<<

- Disassembly steps**
- 5. Bellows
  - 6. Tie-rod
  - 7. Gear housing

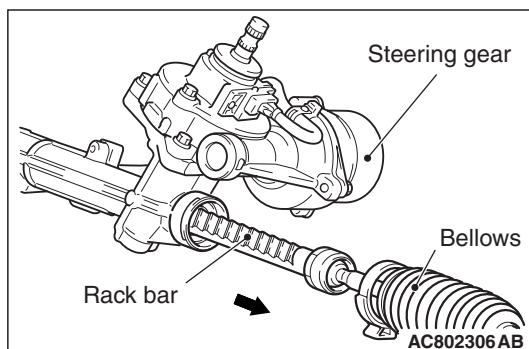
## LUBRICATION AND SEALING POINTS



AC802304 AC

## DISASSEMBLY SERVICE POINT

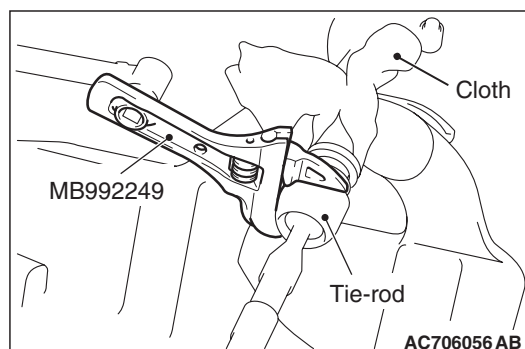
### <<A>> TIE-ROD REMOVAL



1. Move the bellows and pull the rack bar toward arrow direction.

### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



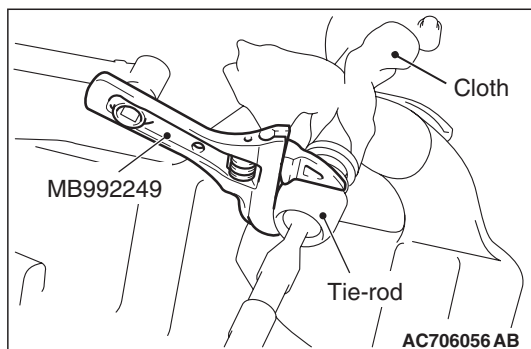
2. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
3. Use special tool variable spanner (MB992249) to remove the tie-rod.

## ASSEMBLY SERVICE POINTS

### >>A<< TIE-ROD INSTALLATION

### ⚠ CAUTION

Do not tighten the vise strongly in order not to damage the rack bar.



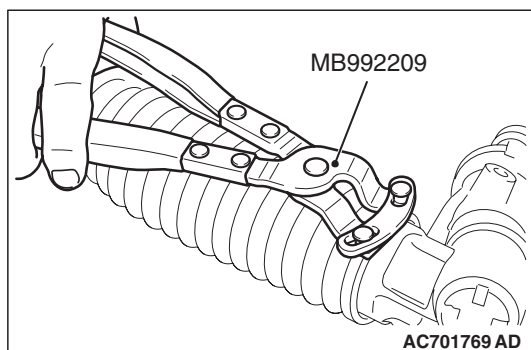
1. Wrap rack bar with cloth in order not to damage, and fix the rack bar with a vise.
2. Use special tool variable spanner (MB992249) to tighten the tie-rod to the specified torque.

**Tightening torque:  $84 \pm 14$  N·m**

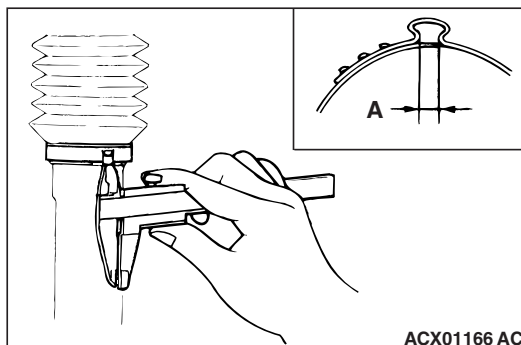
### >>B<< BAND INSTALLATION

#### ⚠ CAUTION

- Hold the rack housing, and use special tool bellows band crimping tool (MB992209) to crimp the bellows band securely.
- Crimp the bellows band until special tool (MB992209) touches the stopper.



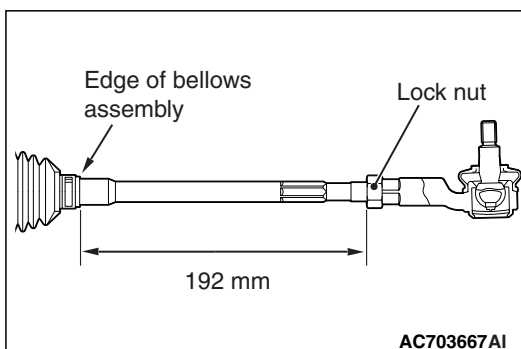
1. Use special tool boot band crimping tool (MB992209) to crimp the bellows band.



2. Check that crimped width (A) is within the standard value.

**Standard value (A): 2.4 – 2.8 mm**

### >>C<< LOCK NUT/TIE-ROD END INSTALLATION



Screw in the tie-rod to the length shown in the figure, and hand-tighten the lock nut.

**NOTE:** Install the steering gear and linkage to the body, adjust the toe-in, and then tighten the lock nut to the specified torque.

## TIE-ROD LOOSENESS CHECK

## TIE-ROD LOOSENESS CHECK

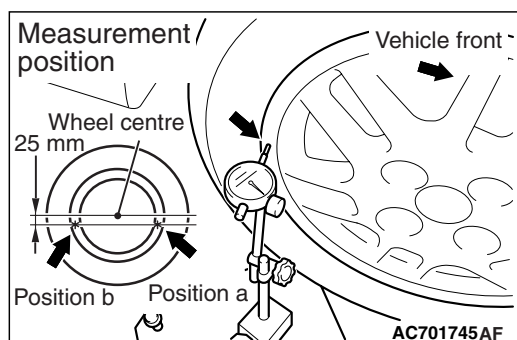
M1372018200135

When an abnormal noise is generated by the steering system, check the tie-rod for looseness. For the tie-rod looseness check, using a push-pull gauge and a spring scale, carry out the items below.

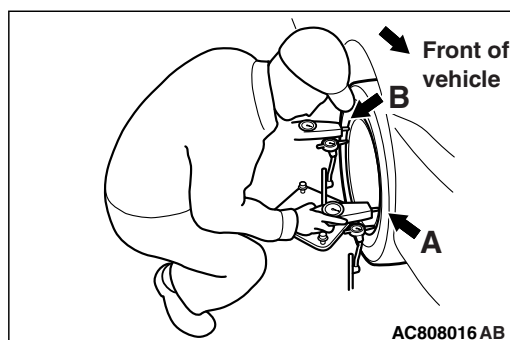
- Install a dial gauge.
- Check the points to load for a push-pull gauge and a spring scale.
- Operate to stabilize the load and fluctuation with a push-pull gauge and a spring scale.
- Carry out the dial gauge measurement and calculation with a push-pull gauge and a spring scale.

### When the push-pull gauge is used

- Before the looseness check, check the items below.
  - Check that the Mitsubishi genuine wheel with specified size is mounted. Also check that the wheel bearing is not loose. (Refer to GROUP 26 – On-vehicle Service – Wheel Bearing Check for Looseness in the Axial Direction.)
  - Raise the vehicle at the jack up point on the side sill of the inspection side, and lift the tyre for approximately 30 mm. At this time, check that the tyre of the opposite side is grounded.

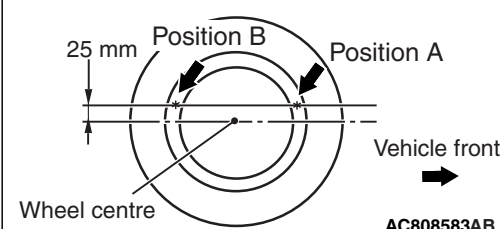


- Install a dial-gauge respectively to the "Position a (front side position)" and "Position b (rear side position)" on the wheel rim, 25 mm below from the wheel centre. (Install the dial gauges to the smooth position that is around the edge of the tyre.)

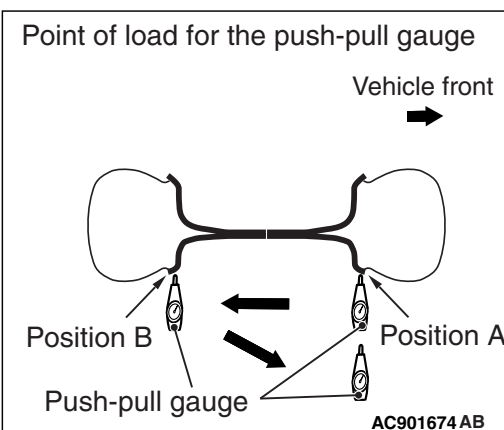


#### Point of load

- Smooth position around the edge of the tyre on the wheel rim



- The push-pull gauge shall be set to the smooth position that is 25 mm above from the wheel centre and the edge of the tyre on the wheel rim. Then the position on the vehicle front side shall be the "Position A" and the vehicle rear side shall be the "Position B".



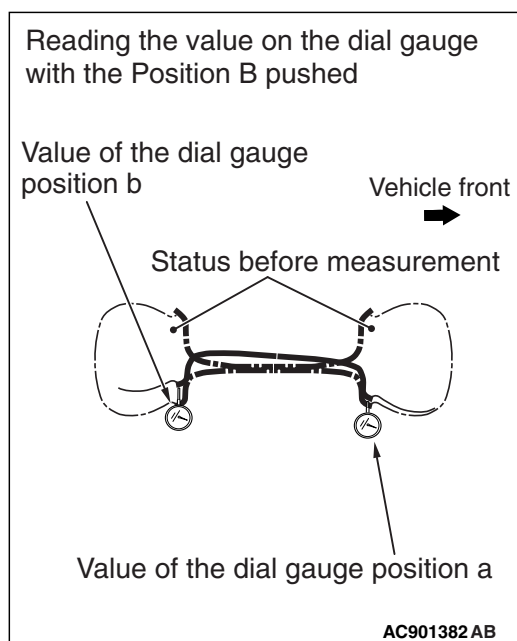
- To stabilize the relationship between the load and fluctuation, push with the specified load by wheel size in the order of "Position A", "Position B", and "Position A" using the push-pull gauge. Note that the pushed load on each position shall be extracted.

Wheel size	Specified load
16 inches	120 N
18 inches	100 N

## TIE-ROD LOOSENESS CHECK

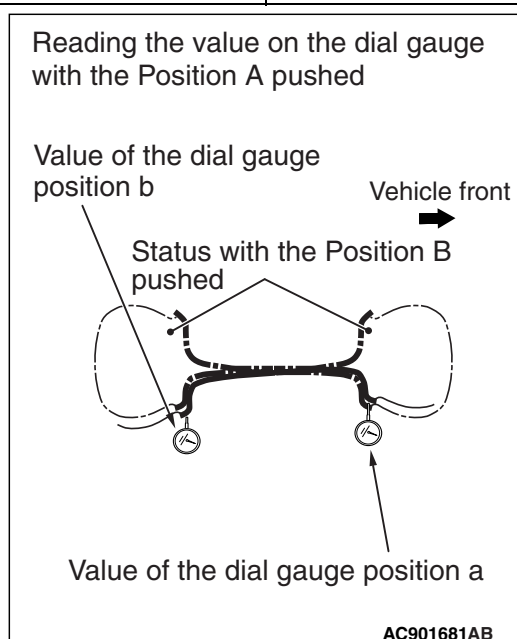
5. Using the push-pull gauge, carry out the procedure below to read the value on the dial gauge and calculate the looseness.

*NOTE: The +/- sign acquired with the calculation result shall be used as it is.*



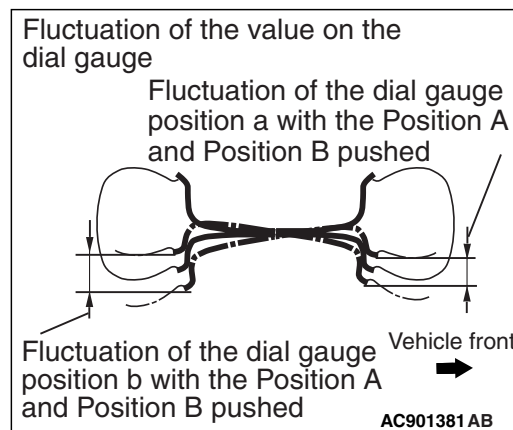
- (1) While pushing the "Position B" with the specified load by wheel size, read the values on the dial gauges at the "Position a" and "Position b". The values of the dial gauges at this time shall respectively be "aB" and "bB".

Wheel size	Specified load
16 inches	120 N
18 inches	100 N



- (2) Remove the load in the "Position B". Then while pushing the "Position A" with the specified load by wheel size, read the values on the dial gauge in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aA" and "bA".

Wheel size	Specified load
16 inches	120 N
18 inches	100 N



- (3) Make calculation taking the value differences of the dial gauge positions a and b which were read while pushing the "Position A" and "Position B" as each fluctuation.

- Fluctuation of the dial gauge position a:  $aA - aB$
- Fluctuation of the dial gauge position b:  $bA - bB$

- (4) Calculate each fluctuation difference of the dial gauge positions a and b acquired above for looseness. Perform the procedure above twice.

Fluctuation of the dial gauge position a –  
Fluctuation of the dial gauge position b

- (5) Calculate the average of the looseness calculated twice.

6. If the average exceeds the standard value, check the tie-rod oscillating torque and tie-rod end for looseness. (Refer to GROUP 37 – Power Steering Gear and Linkage Check.)

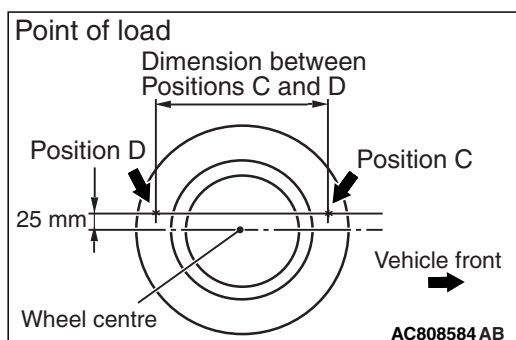
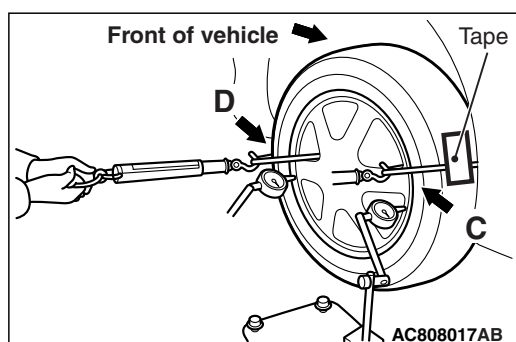
**Standard value: Within  $\pm 2.0$  mm**

*NOTE: Measure the tie-rod looseness on the right side and left side respectively.*

### When a spring scale is used

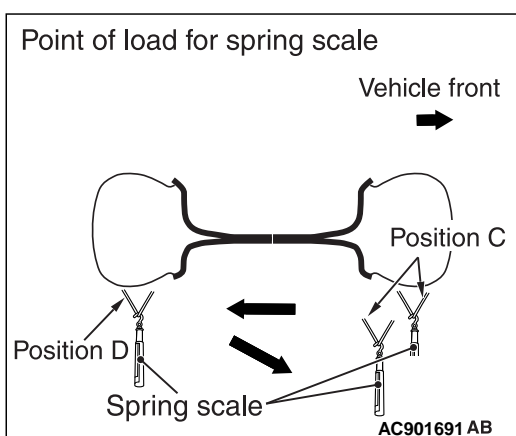
1. Carry out the confirmation before the looseness check with the same manner as the check using a push-pull gauge.

## TIE-ROD LOOSENESS CHECK



- At the position that is 25 mm above from the wheel centre, bind the tyre and the wheel rim with a cord for both the front and rear sides, and fix them with a tape not to loose vertically.
- Set the spring scale to the cord bound as above. At this time, the point to pull shall be in the dimension between the "Position C" and "Position D" by wheel size, and the position on the vehicle front side shall be the "Position C" and the vehicle rear side shall be the "Position D".

Wheel size	C – D dimension
16 inches	480 – 495 mm
18 inches	525 mm

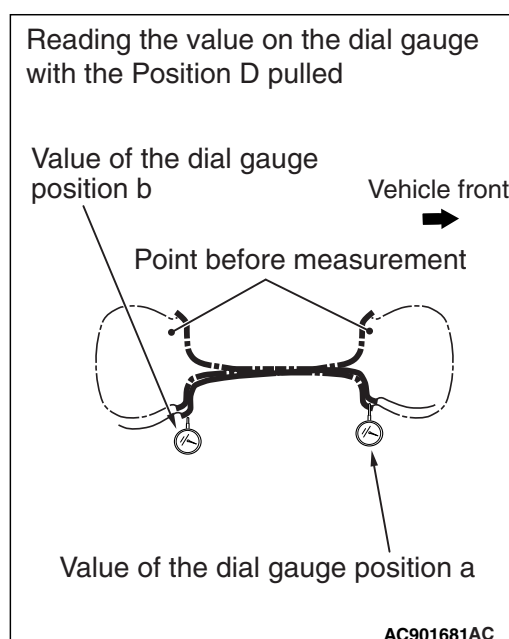


- To stabilize the relationship between the load and fluctuation, pull with the specified load by wheel size in the order of "Position C", "Position D", and "Position C" using the spring scale. Note that the pulled load on each position shall be extracted.

Wheel size	Specified load
16 inches	120 N
18 inches	80 N

- Using the spring scale, carry out the procedure below to read the value on the dial gauge and calculate the looseness.

*NOTE: The +/- sign acquired with the calculation result shall be used as it is.*

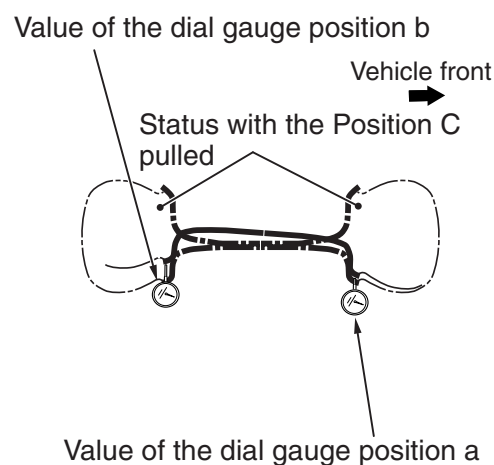


- While pulling the "Position D" with the specified load by wheel size, read the values on the dial gauges in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aD" and "bD".

Wheel size	Specified load
16 inches	120 N
18 inches	80 N

## TIE-ROD LOOSENESS CHECK

Reading the value on the dial gauge with the Position C pulled



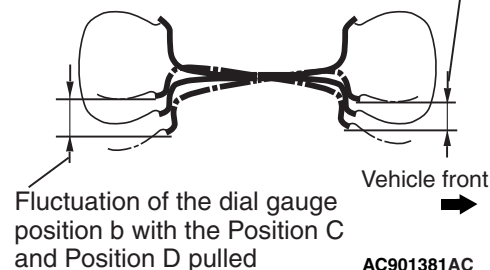
AC901382 AC

- (2) Remove the load at the "Position D". Then while pulling the "Position C" with the specified load by wheel size, read the values on the dial gauge in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aC" and "bC".

Wheel size	Specified load
16 inches	120 N
18 inches	80 N

Fluctuation of the value on the dial gauge

Fluctuation of the dial gauge position a with the Position C and Position D pulled



AC901381 AC

- (3) Make calculation taking the value differences of the dial gauge positions a and b which were read while pulling the "Position C" and "Position D" as each fluctuation.
- Fluctuation of the dial gauge position a:  $aC - aD$
  - Fluctuation of the dial gauge position b:  $bC - bD$
- (4) Calculate each fluctuation difference of the dial gauge positions a and b acquired above for looseness. Perform the procedure above twice.
- Fluctuation of the dial gauge position a –  
Fluctuation of the dial gauge position b
- (5) Calculate the average of the looseness calculated twice.
6. If the average exceeds the standard value, check the tie-rod oscillating torque and tie-rod end for looseness. (Refer to GROUP 37 – Power Steering Gear and Linkage Check.)

**Standard value: Within  $\pm 2.0$  mm**

**NOTE:** Measure the tie-rod looseness on the right side and left side respectively.



## TIE-ROD LOOSENESS CHECK

## TIE-ROD LOOSENESS CHECK

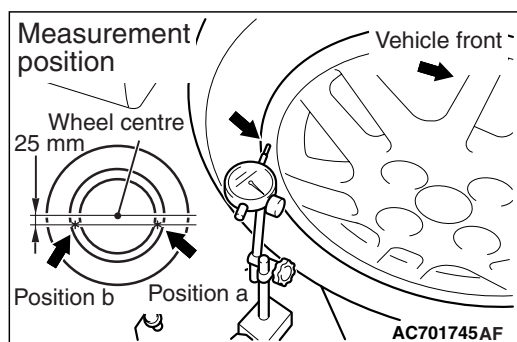
M1372018200179

When an abnormal noise is generated by the steering system, check the tie-rod for looseness. For the tie-rod looseness check, using a push-pull gauge and a spring scale, carry out the items below.

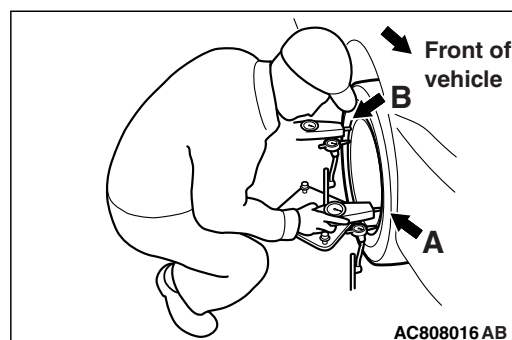
- Install a dial gauge.
- Check the points to load for a push-pull gauge and a spring scale.
- Operate to stabilize the load and fluctuation with a push-pull gauge and a spring scale.
- Carry out the dial gauge measurement and calculation with a push-pull gauge and a spring scale.

### When the push-pull gauge is used

- Before the looseness check, check the items below.
  - Check that the Mitsubishi genuine wheel with specified size is mounted. Also check that the wheel bearing is not loose. (Refer to GROUP 26 – On-vehicle Service – Wheel Bearing Check for Looseness in the Axial Direction.)
  - Raise the vehicle at the jack up point on the side sill of the inspection side, and lift the tyre for approximately 30 mm. At this time, check that the tyre of the opposite side is grounded.

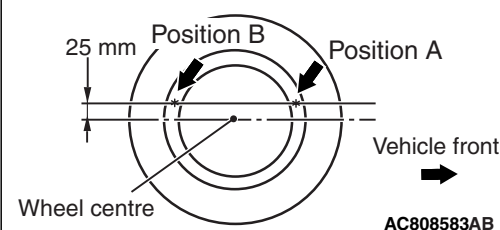


- Install a dial-gauge respectively to the "Position a (front side position)" and "Position b (rear side position)" on the wheel rim, 25 mm below from the wheel centre. (Install the dial gauges to the smooth position that is around the edge of the tyre.)

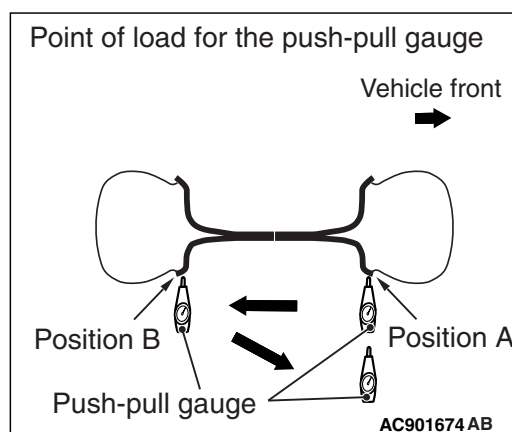


#### Point of load

- Smooth position around the edge of the tyre on the wheel rim



- The push-pull gauge shall be set to the smooth position that is 25 mm above from the wheel centre and the edge of the tyre on the wheel rim. Then the position on the vehicle front side shall be the "Position A" and the vehicle rear side shall be the "Position B".



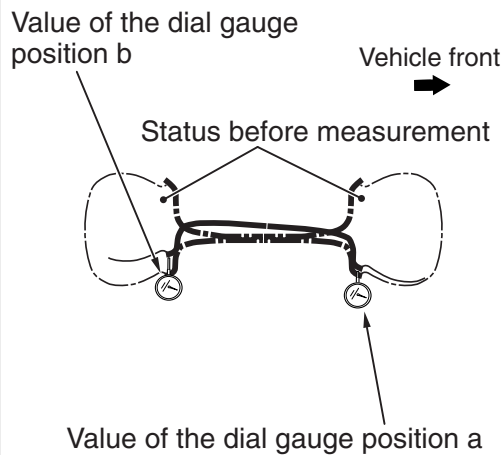
- To stabilize the relationship between the load and fluctuation, push with the specified load by 100N of "Position A", "Position B", and "Position A" using the push-pull gauge. Note that the pushed load on each position shall be extracted.
- Using the push-pull gauge, carry out the procedure below to read the value on the dial gauge and calculate the looseness.

**NOTE:** The  $\pm$  sign acquired with the calculation result shall be used as it is.



## TIE-ROD LOOSENESS CHECK

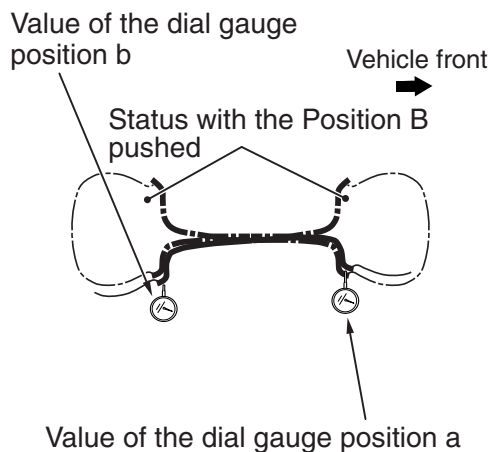
Reading the value on the dial gauge with the Position B pushed



AC901382 AB

- (1) While pushing the "Position B" with the specified load by 100N, read the values on the dial gauges at the "Position a" and "Position b". The values of the dial gauges at this time shall respectively be "aB" and "bB".

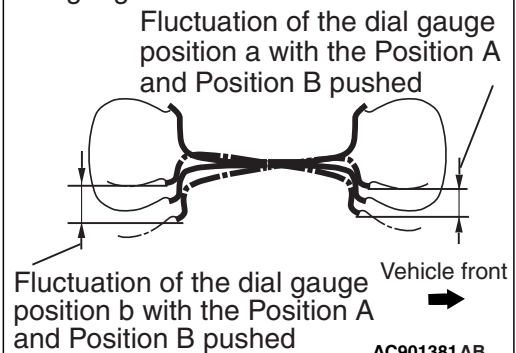
Reading the value on the dial gauge with the Position A pushed



AC901681 AB

- (2) Remove the load in the "Position B". Then while pushing the "Position A" with the specified load by 100N, read the values on the dial gauge in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aA" and "bA".

Fluctuation of the value on the dial gauge



AC901381 AB

- (3) Make calculation taking the value differences of the dial gauge positions a and b which were read while pushing the "Position A" and "Position B" as each fluctuation.
- Fluctuation of the dial gauge position a:  $aA - aB$
  - Fluctuation of the dial gauge position b:  $bA - bB$
- (4) Calculate each fluctuation difference of the dial gauge positions a and b acquired above for looseness. Perform the procedure above twice.
- Fluctuation of the dial gauge position a –  
Fluctuation of the dial gauge position b
- (5) Calculate the average of the looseness calculated twice.
6. If the average exceeds the standard value, check the tie-rod oscillating torque and tie-rod end for looseness. (Refer to GROUP 37 – Power Steering Gear and Linkage Check.)

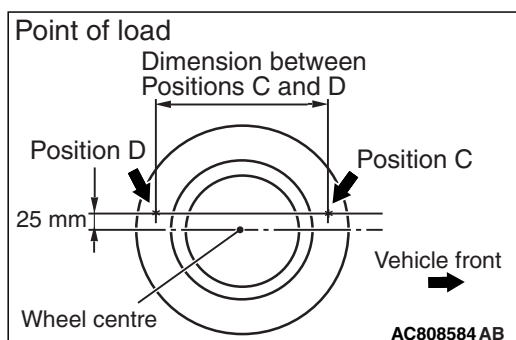
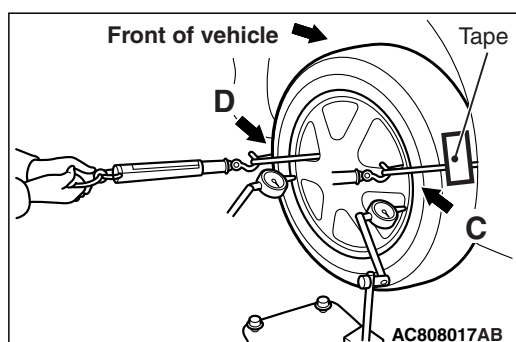
**Standard value: Within  $\pm 2.0$  mm**

*NOTE: Measure the tie-rod looseness on the right side and left side respectively.*

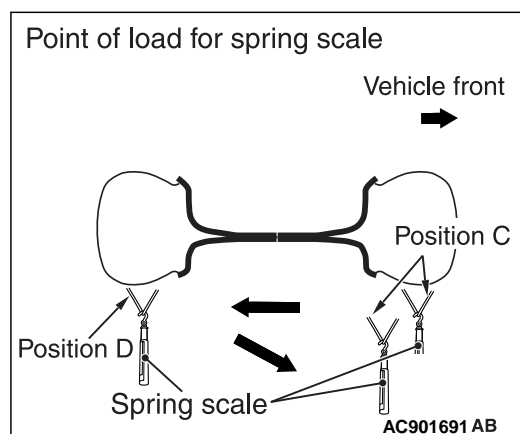
### When a spring scale is used

1. Carry out the confirmation before the looseness check with the same manner as the check using a push-pull gauge.

## TIE-ROD LOOSENESS CHECK



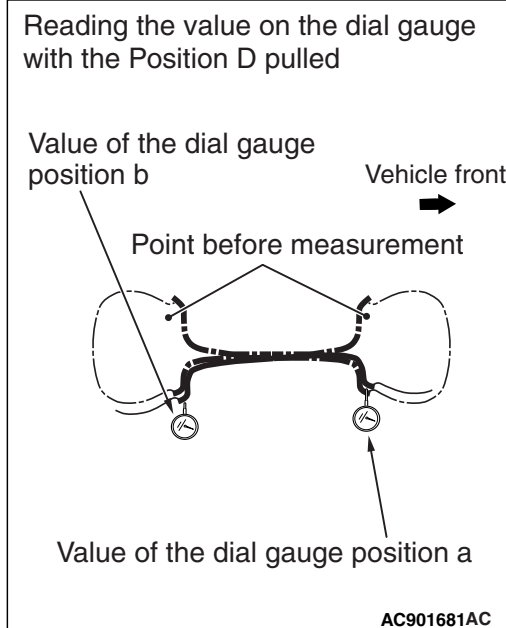
2. At the position that is 25 mm above from the wheel centre, bind the tyre and the wheel rim with a cord for both the front and rear sides, and fix them with a tape not to loose vertically.
3. Set the spring scale to the cord bound as above. At this time, the point to pull shall be in the dimension between the "Position C" and "Position D" by 515mm, and the position on the vehicle front side shall be the "Position C" and the vehicle rear side shall be the "Position D".



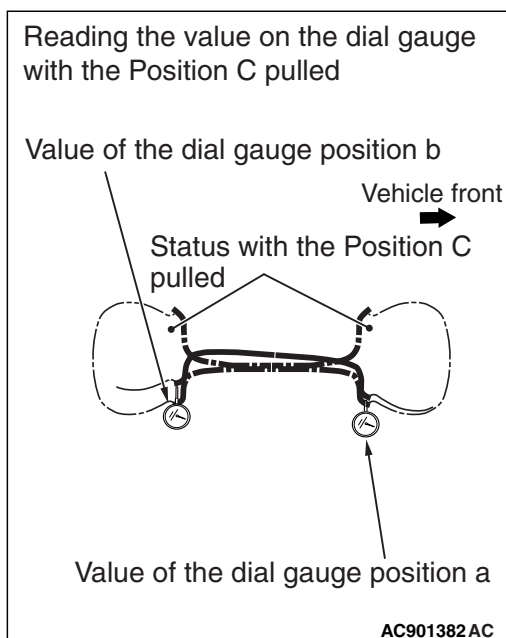
4. To stabilize the relationship between the load and fluctuation, pull with the specified load by 100N of "Position C", "Position D", and "Position C" using the spring scale. Note that the pulled load on each position shall be extracted.
5. Using the spring scale, carry out the procedure below to read the value on the dial gauge and calculate the looseness.

MSB-09E37-001A (09AL007A)

NOTE: The +/- sign acquired with the calculation result shall be used as it is.

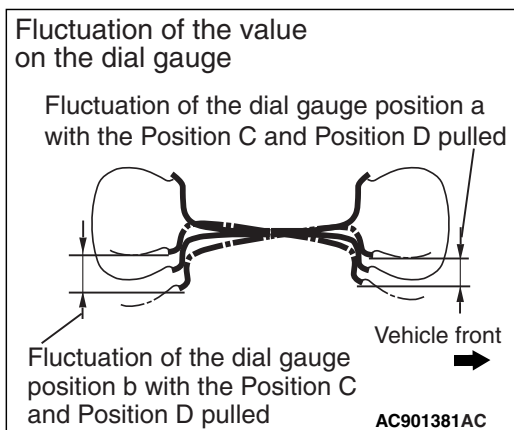


- (1) While pulling the "Position D" with the specified load by 100N, read the values on the dial gauges in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aD" and "bD".



- (2) Remove the load at the "Position D". Then while pulling the "Position C" with the specified load by 100N, read the values on the dial gauge in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aC" and "bC".

## TIE-ROD LOOSENESS CHECK



- (3) Make calculation taking the value differences of the dial gauge positions a and b which were read while pulling the "Position C" and "Position D" as each fluctuation.

- Fluctuation of the dial gauge position a:  $aC - aD$

- Fluctuation of the dial gauge position b:  $bC - bD$

- (4) Calculate each fluctuation difference of the dial gauge positions a and b acquired above for looseness. Perform the procedure above twice.

Fluctuation of the dial gauge position a –

Fluctuation of the dial gauge position b

- (5) Calculate the average of the looseness calculated twice.

6. If the average exceeds the standard value, check the tie-rod oscillating torque and tie-rod end for looseness. (Refer to GROUP 37 – Power Steering Gear and Linkage Check.)

**Standard value: Within  $\pm 2.0$  mm**

*NOTE: Measure the tie-rod looseness on the right side and left side respectively.*

## TIE-ROD LOOSENESS CHECK

## TIE-ROD LOOSENESS CHECK

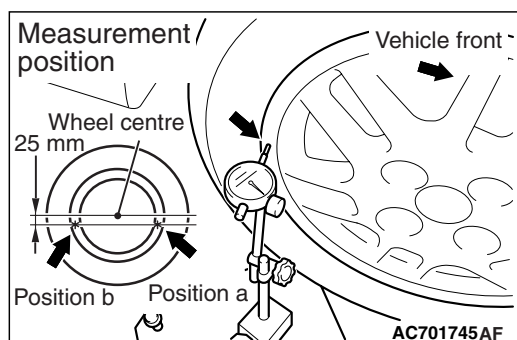
M1372018200157

When an abnormal noise is generated by the steering system, check the tie-rod for looseness. For the tie-rod looseness check, using a push-pull gauge and a spring scale, carry out the items below.

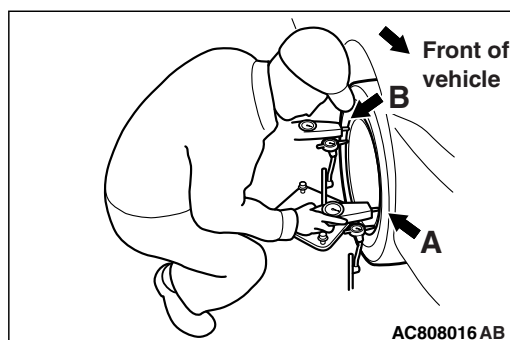
- Install a dial gauge.
- Check the points to load for a push-pull gauge and a spring scale.
- Operate to stabilize the load and fluctuation with a push-pull gauge and a spring scale.
- Carry out the dial gauge measurement and calculation with a push-pull gauge and a spring scale.

### When the push-pull gauge is used

- Before the looseness check, check the items below.
  - Check that the Mitsubishi genuine wheel with specified size is mounted. Also check that the wheel bearing is not loose. (Refer to GROUP 26 – On-vehicle Service – Wheel Bearing Check for Looseness in the Axial Direction.)
  - Raise the vehicle at the jack up point on the side sill of the inspection side, and lift the tyre for approximately 30 mm. At this time, check that the tyre of the opposite side is grounded.

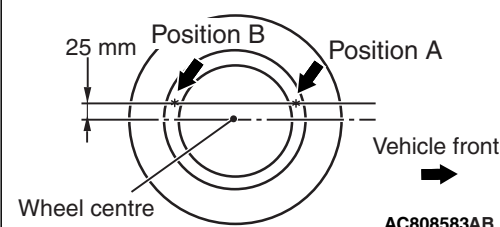


- Install a dial-gauge respectively to the "Position a (front side position)" and "Position b (rear side position)" on the wheel rim, 25 mm below from the wheel centre. (Install the dial gauges to the smooth position that is around the edge of the tyre.)



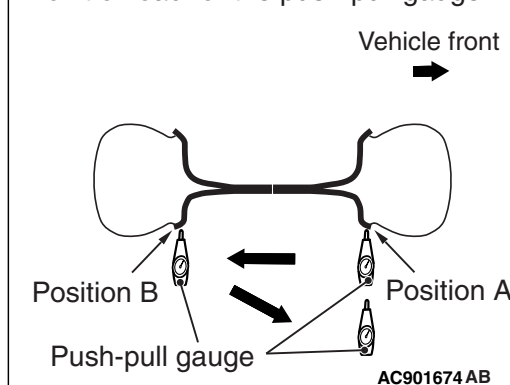
#### Point of load

- Smooth position around the edge of the tyre on the wheel rim



- The push-pull gauge shall be set to the smooth position that is 25 mm above from the wheel centre and the edge of the tyre on the wheel rim. Then the position on the vehicle front side shall be the "Position A" and the vehicle rear side shall be the "Position B".

#### Point of load for the push-pull gauge



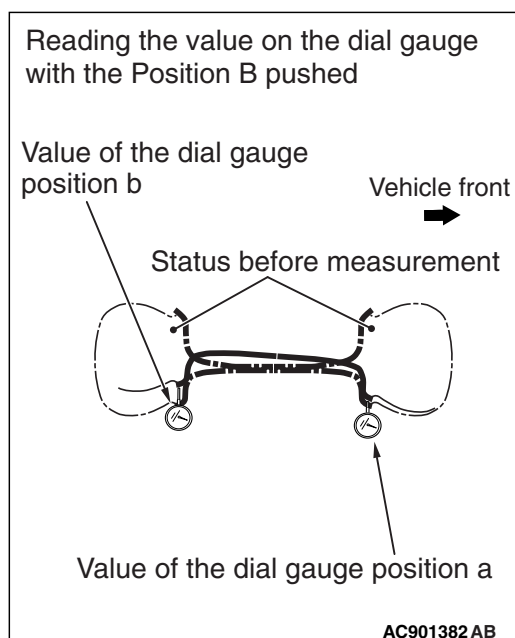
- To stabilize the relationship between the load and fluctuation, push with the specified load by wheel size in the order of "Position A", "Position B", and "Position A" using the push-pull gauge. Note that the pushed load on each position shall be extracted.

Wheel size	Specified load
16 inches	120 N
18 inches	100 N

## TIE-ROD LOOSENESS CHECK

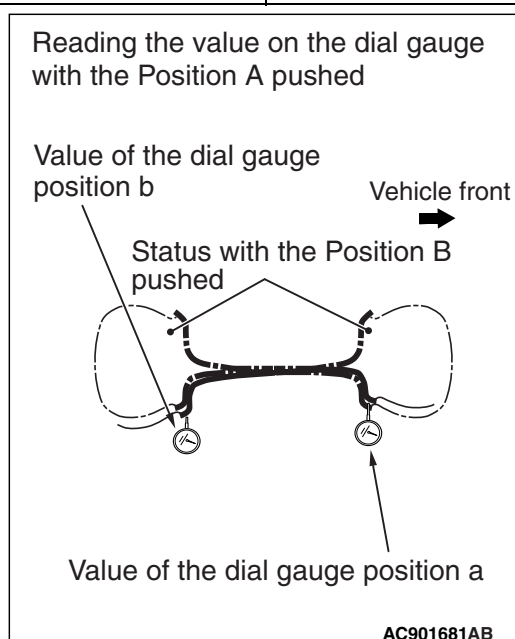
5. Using the push-pull gauge, carry out the procedure below to read the value on the dial gauge and calculate the looseness.

*NOTE: The +/- sign acquired with the calculation result shall be used as it is.*



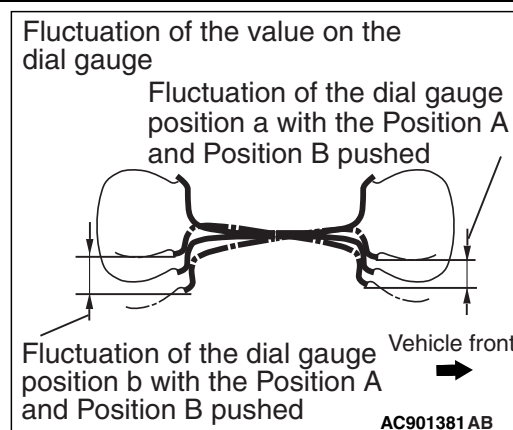
- (1) While pushing the "Position B" with the specified load by wheel size, read the values on the dial gauges at the "Position a" and "Position b". The values of the dial gauges at this time shall respectively be "aB" and "bB".

Wheel size	Specified load
16 inches	120 N
18 inches	100 N



- (2) Remove the load in the "Position B". Then while pushing the "Position A" with the specified load by wheel size, read the values on the dial gauge in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aA" and "bA".

Wheel size	Specified load
16 inches	120 N
18 inches	100 N



- (3) Make calculation taking the value differences of the dial gauge positions a and b which were read while pushing the "Position A" and "Position B" as each fluctuation.

- Fluctuation of the dial gauge position a:  $aA - aB$
- Fluctuation of the dial gauge position b:  $bA - bB$

- (4) Calculate each fluctuation difference of the dial gauge positions a and b acquired above for looseness. Perform the procedure above twice.

Fluctuation of the dial gauge position a –  
Fluctuation of the dial gauge position b

- (5) Calculate the average of the looseness calculated twice.

6. If the average exceeds the standard value, check the tie-rod oscillating torque and tie-rod end for looseness. (Refer to GROUP 37 – Power Steering Gear and Linkage Check.)

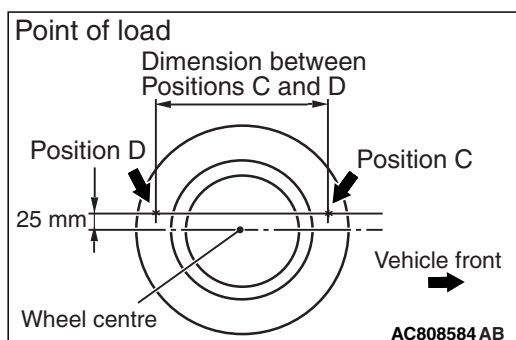
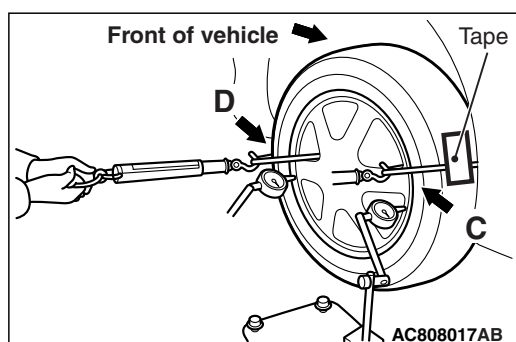
**Standard value: Within  $\pm 2.0$  mm**

*NOTE: Measure the tie-rod looseness on the right side and left side respectively.*

### When a spring scale is used

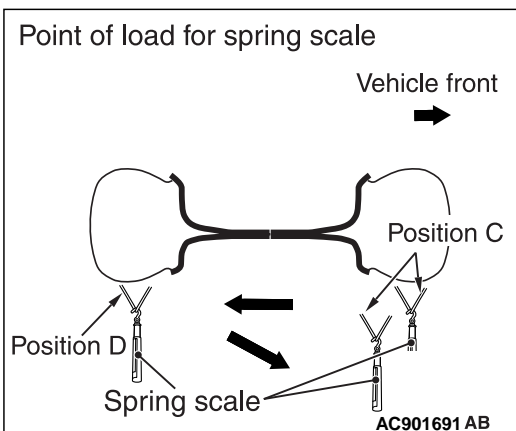
1. Carry out the confirmation before the looseness check with the same manner as the check using a push-pull gauge.

## TIE-ROD LOOSENESS CHECK



2. At the position that is 25 mm above from the wheel centre, bind the tyre and the wheel rim with a cord for both the front and rear sides, and fix them with a tape not to loose vertically.
3. Set the spring scale to the cord bound as above. At this time, the point to pull shall be in the dimension between the "Position C" and "Position D" by wheel size, and the position on the vehicle front side shall be the "Position C" and the vehicle rear side shall be the "Position D".

Wheel size	C – D dimension
16 inches	500 – 525 mm
18 inches	555 mm

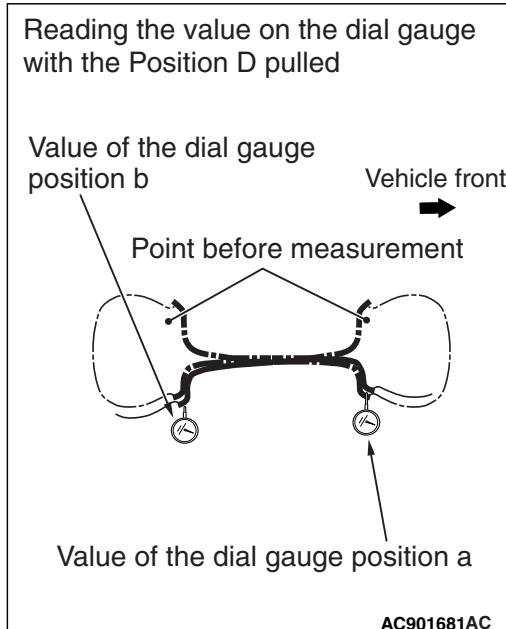


4. To stabilize the relationship between the load and fluctuation, pull with the specified load by wheel size in the order of "Position C", "Position D", and "Position C" using the spring scale. Note that the pulled load on each position shall be extracted.

Wheel size	Specified load
16 inch steel wheel	120 N
16 inch aluminium wheel	100 N
18 inch	80 N

5. Using the spring scale, carry out the procedure below to read the value on the dial gauge and calculate the looseness.

*NOTE: The +/- sign acquired with the calculation result shall be used as it is.*

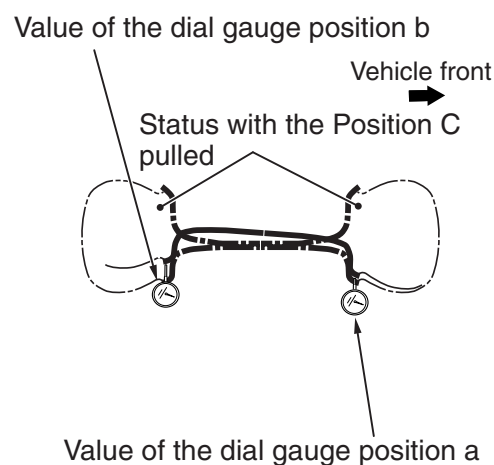


- (1) While pulling the "Position D" with the specified load by wheel size, read the values on the dial gauges in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aD" and "bD".

Wheel size	Specified load
16 inch steel wheel	120 N
16 inch aluminium wheel	100 N
18 inch	80 N

## TIE-ROD LOOSENESS CHECK

Reading the value on the dial gauge with the Position C pulled



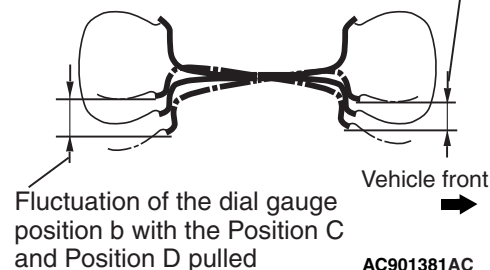
AC901382 AC

- (2) Remove the load at the "Position D". Then while pulling the "Position C" with the specified load by wheel size, read the values on the dial gauge in the "Position a" and "Position b". The values on the dial gauges at this time shall respectively be "aC" and "bC".

Wheel size	Specified load
16 inch steel wheel	120 N
16 inch aluminium wheel	100 N
18 inch	80 N

Fluctuation of the value on the dial gauge

Fluctuation of the dial gauge position a with the Position C and Position D pulled



AC901381 AC

- (3) Make calculation taking the value differences of the dial gauge positions a and b which were read while pulling the "Position C" and "Position D" as each fluctuation.
- Fluctuation of the dial gauge position a:  $aC - aD$
  - Fluctuation of the dial gauge position b:  $bC - bD$
- (4) Calculate each fluctuation difference of the dial gauge positions a and b acquired above for looseness. Perform the procedure above twice.
- Fluctuation of the dial gauge position a –  
Fluctuation of the dial gauge position b
- (5) Calculate the average of the looseness calculated twice.
6. If the average exceeds the standard value, check the tie-rod oscillating torque and tie-rod end for looseness. (Refer to GROUP 37 – Power Steering Gear and Linkage Check.)

**Standard value: Within  $\pm 2.0$  mm**

**NOTE:** Measure the tie-rod looseness on the right side and left side respectively.