

GROUP 37

POWER STEERING

CONTENTS

GENERAL INFORMATION	37-3	ON-VEHICLE SERVICE	37-16
GENERAL SPECIFICATIONS	37-3	STEERING WHEEL FREE PLAY CHECK	37-16
SERVICE SPECIFICATIONS	37-4	STEERING ANGLE CHECK	37-16
LUBRICANTS	37-4	TIE-ROD LOOSENESS CHECK	37-17
SEALANT	37-5	BALL JOINT DUST COVER CHECK	37-22
POWER STEERING DIAGNOSIS	37-5	TIE ROD END BALL JOINT ROTATION TORQUE CHECK	37-22
INTRODUCTION TO POWER STEERING DIAGNOSIS	37-5	STATIONARY STEERING EFFORT CHECK	37-23
POWER STEERING DIAGNOSIS TROUBLESHOOTING STRATEGY	37-5	STEERING WHEEL RETURN TO CENTER CHECK	37-23
SYMPTOM CHART	37-5	DRIVE BELT TENSION CHECK	37-24
SYMPTOM PROCEDURES	37-6	FLUID LEVEL CHECK	37-24
SPECIAL TOOLS	37-14	FLUID REPLACEMENT	37-24
		POWER STEERING SYSTEM AIR BLEEDING	37-25
		OIL PUMP PRESSURE TEST	37-26
		POWER STEERING PRESSURE SWITCH CHECK	37-27
		STEERING COLUMN SHAFT ASSEMBLY SHOCK ABSORBING MECHANISM CHECK	37-28

Continued on next page

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

 **WARNING**

- *Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).*
- *Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.*
- *MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.*

NOTE

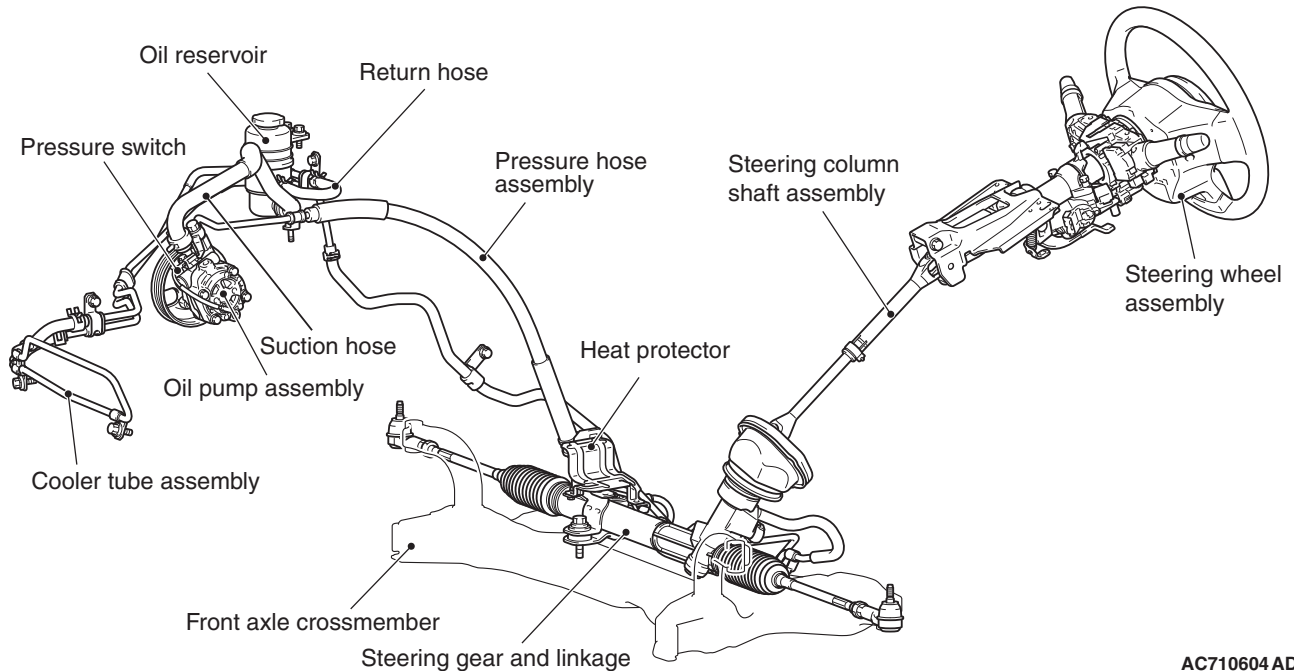
The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, air bag module, side-airbag module, curtain air bag module, side impact sensors, seat belt pre-tensioners, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

STEERING WHEEL*	37-29	INSPECTION.....	37-41
REMOVAL AND INSTALLATION	37-29	DISASSEMBLY AND ASSEMBLY	37-42
STEERING SHAFT*	37-33	POWER STEERING OIL PUMP	
REMOVAL AND INSTALLATION	37-33	ASSEMBLY.....	37-45
DISASSEMBLY AND ASSEMBLY	37-36	REMOVAL AND INSTALLATION	37-45
POWER STEERING GEAR BOX AND		INSPECTION.....	37-46
LINKAGE*	37-38	POWER STEERING HOSES	37-47
REMOVAL AND INSTALLATION	37-38	REMOVAL AND INSTALLATION	37-47

GENERAL INFORMATION

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- The steering wheel has three spokes. All vehicles are equipped with SRS (Supplemental Restraint System).
- The steering column has a shock absorbing mechanism and a tilt steering mechanism.
- The steering system uses a vane oil pump with a fluid flow control system, so that steering effort varies with engine speed.



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GENERAL SPECIFICATIONS

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Item		Specification
Steering wheel	Type	Three-spoke type
	Outside diameter mm (in)	365 (14.4)
	Maximum number of turns	3.16
Steering column	Column mechanism	Shock absorbing mechanism and Tilt steering mechanism
Power steering type		Integral type (Engine speed-dependent type)
Oil pump	Type	Vane type
	Basic discharge amount cm ³ /rev. (cu in/rev)	9.0 (0.55)
	Reservoir type	Separate type (Resin made)
Steering gear	Type	Rack and pinion
	Stroke ratio (Rack stroke/Steering wheel maximum turning radius) mm/rev (in/rev)	65.97 (2.6)
	Rack stroke mm (in)	150 (5.9)

SERVICE SPECIFICATIONS

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Item		Standard value	Limit
Steering wheel free play mm (in)	With engine running	–	30 (1.2) or less
	With engine stopped	16.5 (0.65) or less	–
Steering angle	Inner wheel	33° 10' ± 1° 30' (Left/right deviation within 2° 00')	–
	Outer wheel (reference value)	28° 10'	–
Toe-in mm (in)		0 ± 2 (0 ± 0.08)	–
Tie rod end ball joint breakaway torque N· m (in-lb)		2.9 (26) or less	–
Engine idle speed r/min		700 ± 100	–
Stationary steering effort N (lb) [Fluctuation allowance N (lb)]		32 (7.2) or less [5.9 (1.33) or less]	–
Oil pump pressure MPa (psi)	Oil pump relief pressure	8.1 –8.8 (1,175 –1,276)	–
	Pressure under no-load conditions	1.0 (145)	–
	Steering gear retention hydraulic pressure	8.1 –8.8 (1,175 –1,276)	–
Oil pressure switch operating pressure MPa (psi)	OFF →ON	2.5 –3.0 (363 –435)	–
	ON →OFF	1.5 –3.0 (218 –435)	–
Steering gear total pinion torque N· m (in-lb) [Change in torque N· m (in-lb)]		0.6 –1.6 (5.3 –14.2) [0.4 (3.5) or less]	–
Band crimped width mm (in)		2.4 –2.8 (0.09 –0.11)	–

LUBRICANTS

M1372000400855

Item		Specified lubricant	Quantity dm ³ (qt)
Power steering fluid		Genuine MITSUBISHI power steering fluid or ATF DEXRON III or DEXRON II	1.0 (1.06)
Steering gear	Bearing	Genuine MITSUBISHI power steering fluid or ATF DEXRON III or DEXRON II	As required
	O-ring and seal ring		
	Oil seal		
	Special tool (MB991213)		
	Pinion and valve assembly seal ring part		
	Bellows	Silicon grease	As required
Oil pump	Friction surface of rotor vane, cam ring and pump cover	Genuine MITSUBISHI power steering fluid or ATF DEXRON III or DEXRON II	As required
	O-ring		

SEALANT

M1372000500896

Item		Specified sealant	Quantity dm ³ (qt)
Steering gear	Bellows	3M™ AAD Part No.8663 or equivalent	As required

POWER STEERING DIAGNOSIS

INTRODUCTION TO POWER STEERING DIAGNOSIS

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Hydraulic power steering is used for all vehicles. Faults in the power steering can include excessive play of the steering wheel, difficult steering wheel operation, noise, vibration, and oil leaks, etc. Possible causes of these faults can include defects in the gear box, oil pump or steering linkage.

POWER STEERING DIAGNOSIS TROUBLESHOOTING STRATEGY

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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 power steering fault.

1. Gather information from the customer.

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

SYMPTOM CHART

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Symptom	Inspection procedure	Reference page
Excessive play of steering wheel	1	P.37-6
Difficult steering wheel operation (insufficient power assist)	2	P.37-7
Rattling noise	3	P.37-8
Shrill noise	4	P.37-9
Squealing noise	5	P.37-9
Hissing noise	6	P.37-9
Droning noise	7	P.37-10
Squeaking noise	8	P.37-11
Vibration	9	P.37-12
Oil leakage from hose connection	10	P.37-12
Oil leakage from hose assembly	11	P.37-12
Oil leakage from oil reservoir	12	P.37-13
Oil leakage from oil pump	13	P.37-13
Oil leakage from steering gear	14	P.37-13

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Excessive Play of Steering Wheel

DIAGNOSIS

STEP 1. Check for looseness at the steering shaft coupling section and at the steering wheel linkage.**Q: Is there any looseness?****YES** : Repair or replace the part. Then go to Step 3.**NO** : Go to Step 2.

STEP 2. Check the steering wheel free play.

(1) With the engine running (hydraulic operation), set the front wheels straight ahead.

(2) Measure the play on the steering wheel circumference before the wheels start to move when slightly moving the steering wheel in both directions.

Limit: 30 mm (1.2 inch) or less

(3) If the free play exceeds the limit value, set the steering wheel straight ahead with the engine stopped. Load approximately 5 N (1.1 pound) towards the steering circumference and check the play.

Standard value (steering wheel play with engine stopped): 16.5 mm (0.65 inch) or less**Q: Does the play exceed the standard value?****YES** : Remove the steering gear box (Refer to [P.37-38](#)) and check the total pinion torque (Refer to [P.37-38](#)). Then go to Step 3.**NO** : Go to Step 3.

STEP 3. Check the steering wheel play.

Verify that the steering wheel play is not excessive.

Q: Is the steering wheel play excessive?**YES** : Repeat from Step 1.**NO** : The procedure is complete.

INSPECTION PROCEDURE 2: Difficult Steering Wheel Operation (Insufficient Power Assist)

DIAGNOSIS

STEP 1. Check the power steering oil pump drive belt tension.

Refer to GROUP 11A –On-vehicle service –Drive Belt Tension Check [P.11A-7](#).

Q: Is the power steering oil pump drive belt tension within the standard value?

YES : Go to Step 2.

NO : Adjust the tension (Refer to GROUP 11A –On-vehicle service –Drive belt tension check [P.11A-7](#)). Then go to Step 10.

STEP 2. Check the drive belt for damage.

Q: Is the drive belt damaged?

YES : Replace the drive belt (Refer to GROUP 11A – On-vehicle service –Drive belt tension check [P.11A-7](#)). Then go to Step 10.

NO : Go to Step 3.

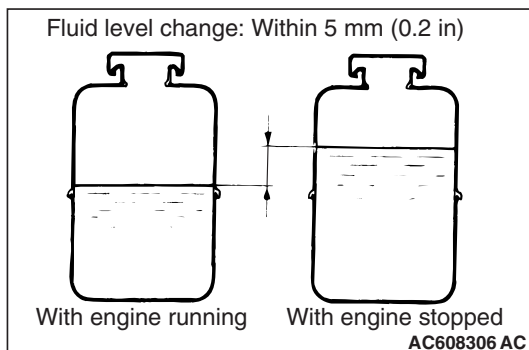
STEP 3. Check the fluid level.

- (1) Park the vehicle on a flat, level surface, and then start the engine.
- (2) Turn the steering wheel several times to raise the temperature of the fluid to approximately 50 –60° C (122 – 140° F).
- (3) With the engine running, turn the wheel all the way to the left and right several times.
- (4) Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the change of the fluid level is 5 mm (0.2 inch) or more, bleed the air from the system (Refer to [P.37-25](#)).

Q: Is the fluid foamy?

YES : Go to Step 4.

NO : Go to Step 10.



STEP 4. Check for entry of air.

Q: Has air entered?

YES : Bleed the air (Refer to [P.37-25](#)). Then go to Step 10 .

NO : Go to Step 5.

STEP 5. Check each hose for crushing or twisting.

Q: Is any hose crushed or twisted?

YES : Repair or replace the hose (Refer to [P.37-47](#)). Then go to Step 10.

NO : Go to Step 6.

STEP 6. Check for oil leaks.**Q: Are there oil leaks?****YES** : Repair it. Then go to Step 10.**NO** : Go to Step 7.**STEP 7. Check the wheel alignment (camber and caster).**Refer to GROUP 33 –On-vehicle Service –Front Wheel Alignment Check and Adjustment [P.33-8](#).**Q: Is the alignment incorrect?****YES** : Adjust it (Refer to [P.33-8](#)). Then go to Step 10.**NO** : Go to Step 8.**STEP 8. Check the gear box rack piston seal for damage.****Q: Is there damage?****YES** : Replace it (Refer to [P.37-42](#)). Then go to Step 10.**NO** : Go to Step 9.**STEP 9. Check for excessive tie rod end ball joint breakaway torque.**Refer to [P.37-22](#).**Q: Is there fault?****YES** : Replace the part (Refer to [P.37-42](#)). Then go to Step 10 .**NO** : Go to Step 10.**STEP 10. Check the steering wheel operation.**

Verify that the steering wheel operation is not difficult.

Q: Is the steering wheel operation difficult?**YES** : Repeat from Step 1.**NO** : The procedure is complete.**INSPECTION PROCEDURE 3: Rattling Noise****DIAGNOSIS****STEP 1. Check for proper oil pump and steering gear installation.****Q: Is the oil pump and the steering gear installation correct?****YES** : Go to Step 2.**NO** : Repair it (Refer to [P.37-45](#), [P.37-38](#)). Then go to Step 4.**STEP 2. Check for interference of other parts with the steering column and the power steering hoses.****Q: Is there interference?****YES** : Correct the interference. Then go to Step 4.**NO** : Go to Step 3.**STEP 3. Check for noise from inside the oil pump or the steering gear.****Q: Is there noise?****YES** : Replace the part (Refer to [P.37-45](#), [P.37-42](#)). Then go to Step 4 .**NO** : Go to Step 4.

STEP 4. Check for rattling noise.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 4: Shrill Noise

DIAGNOSIS

STEP 1. Check for entry of air.

Q: Is the power steering fluid foamy?

YES : Bleed the air (Refer to [P.37-25](#)). Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check for seizure in the oil pump.

Q: Is there seizure?

YES : Replace the part (Refer to [P.37-45](#)). Then go to Step 3 .

NO : Go to Step 3.

STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 5: Squealing Noise

DIAGNOSIS

STEP 1. Check the drive belt tension.

Refer to GROUP 11A –On-vehicle service –Drive belt tension check [P.11A-7](#).

Q: Is the drive belt tension incorrect?

YES : Adjust the belt tension (Refer to GROUP 11A –On-vehicle service –Drive belt tension check [P.11A-7](#)). Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check for seizure in the oil pump.

Q: Is there seizure?

YES : Replace the part (Refer to [P.37-45](#)). Then go to Step 3 .

NO : Go to Step 3.

STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 6: Hissing Noise

DIAGNOSIS

STEP 1. Check for entry of air.

Q: Is the power steering fluid foamy?

YES : Bleed the air (Refer to [P.37-25](#)). Then go to Step 4.

NO : Go to Step 2.

STEP 2. Check each hose for crushing or twisting.

Q: Is any hose crushed or twisted?

YES : Replace the hose (Refer to [P.37-47](#)). Then go to Step 4 .

NO : Go to Step 3.

STEP 3. Check the steering gear for damage.**Q: Is there damage?****YES :** Replace the part (Refer to [P.37-42](#)). Then go to Step 4 .**NO :** Go to Step 4.**STEP 4. Retest the system.**

Confirm that no noise is generated.

Q: Is there noise?**YES :** Repeat from Step 1.**NO :** The procedure is complete.

INSPECTION PROCEDURE 7: Droning Noise

DIAGNOSIS**STEP 1. Check the oil pump or oil pump bracket installation.****Q: Is the oil pump or the oil pump bracket installation correct?****YES :** Go to Step 2.**NO :** Repair it (Refer to [P.37-45](#), [P.37-38](#)). Then go to Step 3.**Q: Is there damage?****YES :** Replace the oil pump (Refer to [P.37-45](#)). Then go to Step 3 .**NO :** Go to Step 3.**STEP 3. Retest the system.**

Confirm that no noise is generated.

Q: Is there noise?**YES :** Repeat from Step 1.**NO :** The procedure is complete.**STEP 2. Check the oil pump for damage.***NOTE: If a slight "beat noise" is produced by the oil pump when the steering wheel is turned fully and held in that position, this is not a malfunction.*

INSPECTION PROCEDURE 8: Squeaking Noise

DIAGNOSIS

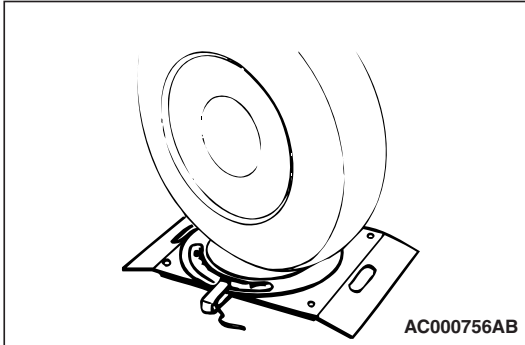
STEP 1. Check for interference of the wheel and the vehicle body.

If interfering, adjust the steering angle.

- (1) Place the front wheel on a turning radius gauge and measure the steering angle.

Standard value:

Inner wheel	33° 10' ± 1° 30' (Left/right deviation within 2° 00')
Outer wheel (reference value)	28° 10'



- (2) If the steering angle is not within the standard value, adjust the toe-in.

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

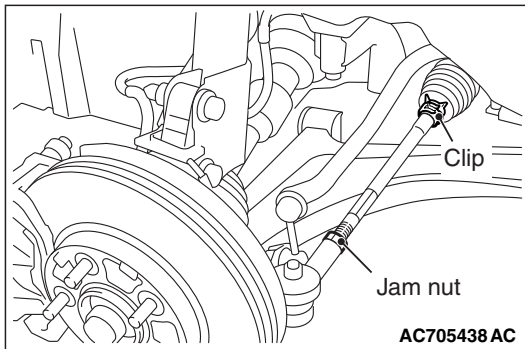
- (3) Adjust the toe-in by undoing the clip and jam nut, and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).

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.

Q: Is the steering angle normal?

YES : Go to Step 2.

NO : Adjust the steering angle (Refer to P.37-16). Then go to Step 3.



STEP 2. Check the steering gear for damage.

Q: Is there damage?

YES : Repair or replace the part (Refer to P.37-42). Then go to Step 3.

NO : Go to Step 3.

STEP 3. Retest the system.

Confirm that no noise is generated.

Q: Is there noise?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 9: Vibration

NOTE: A slight vibration may be felt when the stationary steering effort is made due to the condition of the road surface. To check whether the vibration actually exists or not, test-drive the vehicle on a dry concrete or asphalt surface. A very slight amount of vibration is not a malfunction.

DIAGNOSIS**STEP 1. Check for entry of air.**

Q: Is the power steering fluid foamy?

YES : Bleed the air (Refer to [P.37-25](#)). Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check the steering gear for damage.

Q: Is there damage?

YES : Replace the part (Refer to [P.37-42](#)). Then go to Step 3 .

NO : Go to Step 3.

STEP 3. Retest the system.

Confirm that no vibration is generated.

Q: Is there vibration?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 10: Oil Leakage from Hose Connection**DIAGNOSIS****STEP 1. Check for loosening of the return tube flare nut.**

Q: Is the flare nut loose?

YES : Tighten it to standard value (Refer to [P.37-47](#)). Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check the hose connection and the clamp installation.

Q: Are they correct?

YES : Go to Step 3.

NO : Repair or replace the part (Refer to [P.37-47](#)). Then go to Step 3.

STEP 3. Retest the system.

Check that no oil is leaking.

Q: Is there oil leakage?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 11: Oil Leakage from Hose Assembly**DIAGNOSIS****STEP 1. Check the hose for damage or clogging.**

Q: Is the hose damaged or clogged?

YES : Replace it (Refer to [P.37-47](#)). Then go to Step 2.

NO : Go to Step 2.

STEP 2. Retest the system.

Check that no oil is leaking.

Q: Is there oil leakage?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 12: Oil Leakage from Oil Reservoir

DIAGNOSIS

STEP 1. Check the oil reservoir for damage.

Q: Is there damage?

YES : Replace the oil reservoir (Refer to [P.37-47](#)).
Then go to Step 3.

NO : Go to Step 2.

STEP 2. Check for overflowing.

Q: Is there oil overflowing from the reservoir?

YES : Adjust fluid level. Then go to Step 3.

NO : Go to Step 3.

STEP 3. Retest the system.

Q: Is there oil leakage?

YES : Repeat from to Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 13: Oil Leakage from Oil Pump

DIAGNOSIS

STEP 1. Check the oil pump body for damage.

Q: Is there damage?

YES : Replace the part (Refer to [P.37-45](#)). Then
go to Step 3 .

NO : Go to Step 2.

STEP 2. Check the O-ring or oil seal for damage.

Q: Is there damage?

YES : Replace the part (Refer to [P.37-45](#)). Then
go to Step 3 .

NO : Go to Step 3.

STEP 3. Retest the system.

Check that no oil is leaking.

Q: Is there oil leakage?

YES : Repeat from Step 1.

NO : The procedure is complete.

INSPECTION PROCEDURE 14: Oil Leakage from Steering Gear

DIAGNOSIS

STEP 1. Check the steering gear housing for damage.

Q: Is there damage?

YES : Replace the part (Refer to [P.37-42](#)). Then
go to Step 3 .

NO : Go to Step 2.

STEP 2. Check the oil-ring or oil seal for damage.

Q: Is there damage?

YES : Replace the part (Refer to [P.37-42](#)). Then
go to Step 3 .

NO : Go to Step 3.

STEP 3. Retest the system.

Check that no oil is leaking.

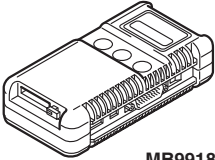
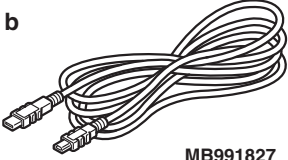
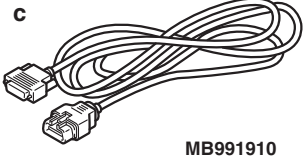
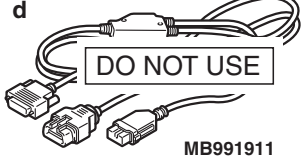
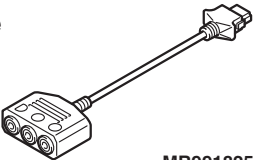
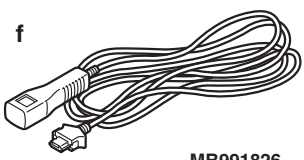
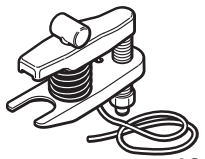
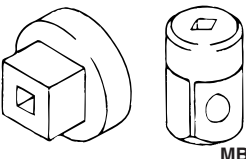
Q: Is there oil leakage?

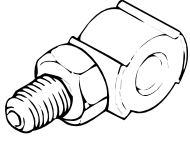

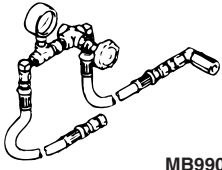
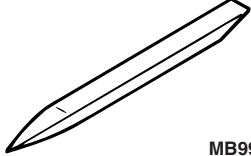
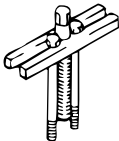
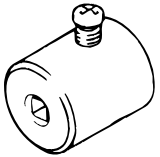
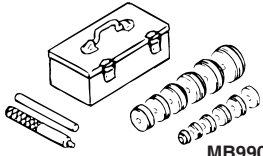
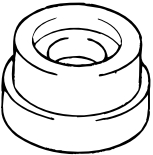
YES : Repeat from Step 1.

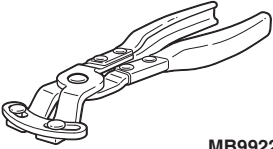

NO : The procedure is complete.

SPECIAL TOOLS

M1372000601539

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>MB991824</p> <p>b</p>  <p>MB991827</p> <p>c</p>  <p>MB991910</p> <p>d</p>  <p>MB991911</p> <p>e</p>  <p>MB991825</p> <p>f</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>a: MB991824 b: MB991827 c: MB991910 d: MB991911 e: MB991825 f: MB991826</p> <p>M.U.T.-III Sub Assembly</p> <p>a: Vehicle communication interface (V.C.I.)</p> <p>b: M.U.T.-III USB Cable</p> <p>c: M.U.T.-III Main Harness A (Vehicles with CAN communication system)</p> <p>d: M.U.T.-III Main Harness B (Vehicles without CAN communication system)</p> <p>e: M.U.T.-III main harness C (for Daimler models only)</p> <p>f: M.U.T.-III trigger Harness</p>	<p>MB991824-KIT</p> <p><i>NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.</i></p>	<p>CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p> <p>Power steering system air bleeding (Calibration by using the scan tool)</p>
 <p>AC106827</p>	<p>MB991897 or MB992011</p> <p>Ball joint remover</p>	<p>MB991113-01, MB990635-01 or</p> <p>General service tool</p>	<p>Knuckle and tie rod end ball joint disconnection</p> <p><i>NOTE: Steering linkage puller (MB990635 or MB991113) is also available to disconnect knuckle and tie rod end ball joint.</i></p>
 <p>MB990326</p>	<p>MB990326</p> <p>Preload socket</p>	<p>General service tool</p>	<p>Tie rod end ball joint breakaway torque check</p>

Tool	Tool number and name	Supersession	Application
 <p align="center">MB991548</p>	MB991548 Power steering oil pressure gauge adapter (Pump side)	MB991548-01	Oil pump pressure test
 <p align="center">MB991549</p>	MB991549 Power steering oil pressure gauge adapter (Hose side)	MB991549-01	
 <p align="center">MB990662</p>	MB990662 Power steering oil pressure gauge	MB990662-01	
 <p align="center">MB990784</p>	MB990784 Ornament remover	General service tool	Cover removal
 <p align="center">MB990803</p>	MB990803 Steering wheel puller	General service tool	Steering wheel removal
 <p align="center">MB991006</p>	MB990228 or MB991006 Preload socket	MB990228-01	Steering gear total pinion torque check
 <p align="center">MB990925</p>	MB990925 Bearing and oil seal installer set	MB990925-01 or general service tool	<ul style="list-style-type: none"> • Oil seal and bearing installation • MB990927, MB990938, MB990939 (For details, refer to GROUP 26 – Special Tools P.26-6).
 <p align="center">MB991203</p>	MB991203 Oil seal and bearing installer	Tool not available	Oil seal and bearing installation

Tool	Tool number and name	Supersession	Application
 MB992209	MB992209 Bellows band crimping tool	MB992209	Bellows band installation
 MB992249	MB992249	Variable spanner	Tie-rod removal and installation

ON-VEHICLE SERVICE

STEERING WHEEL FREE PLAY CHECK

M1372001001080

1. With the engine running (hydraulic pressure applied), position the front wheel in the straight ahead position.
2. Measure the side to side steering wheel play until the front wheels actually start moving while turning the steering wheel slightly in the left and right directions.

Limit: 30 mm (1.2 inch) or less

3. If the steering wheel play exceeds the limit value, check the steering shaft joint or steering linkage for looseness, and replace or repair the faulty components if necessary.
4. If the steering wheel play still exceeds the limit value after Step 3 is performed, position the steering wheel in the straight ahead position, and then apply the force (approximately 5 N) in the circumferential direction.

Standard value (steering wheel play with the engine stopped): 16.5 mm (0.65 inch) or less

5. If the steering wheel play is outside the standard value after Step 4 is performed, remove the steering gear and linkage (Refer to [P.37-38](#)), and check and adjust the pinion total rotation torque. (Refer to [P.37-38](#)).

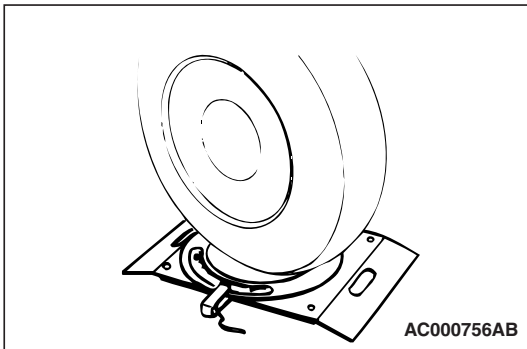
STEERING ANGLE CHECK

M1372001101485

CAUTION

After adjusting the steering angle, perform calibration to make the ASC-ECU learn the neutral position of the steering wheel sensor. (Refer to **GROUP 35C –On-vehicle Service, Steering Wheel Sensor Calibration P.35C-289.**)

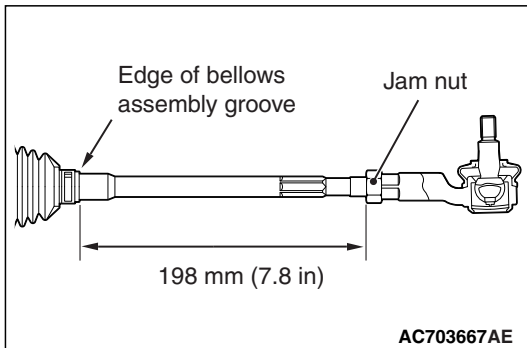
1. Check that the wheel alignment is normal. (Refer to **GROUP 33 –On-vehicle Service, Wheel Alignment Check and Adjustment (Refer to P.33-8.)**)



- Place the front wheel onto the turning radius gauge, and measure the steering angle.

Standard value:

Inner wheel	33° 10' ± 1° 30' (Left/right deviation within 2° 00')
Outer wheel (reference value)	28° 10'



- If the measured value is not within the standard value, adjust the tie-rod ends (right and left), and repeat Steps 1 and 2.
- If the measured value is not within the standard value after performing Step 3, replace the steering gear and linkage assembly. (Refer to P.37-38.)

TIE-ROD LOOSENESS CHECK

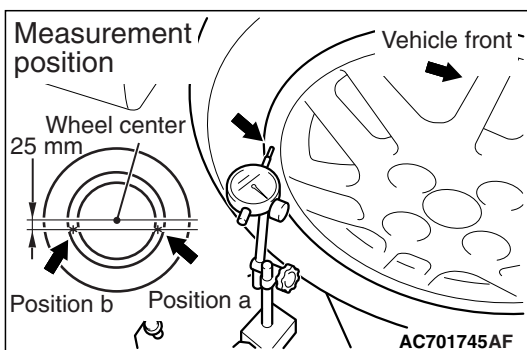
M1372018200210

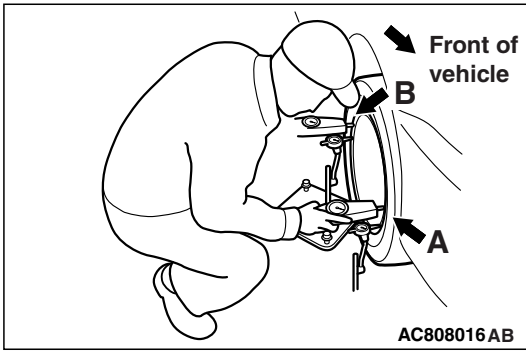
When an abnormal noise is generated by the steering system, check the tie-rod for looseness. For the tie-rod looseness check, using a push-pull gauge and a spring scale, carry out the items below.

- 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.

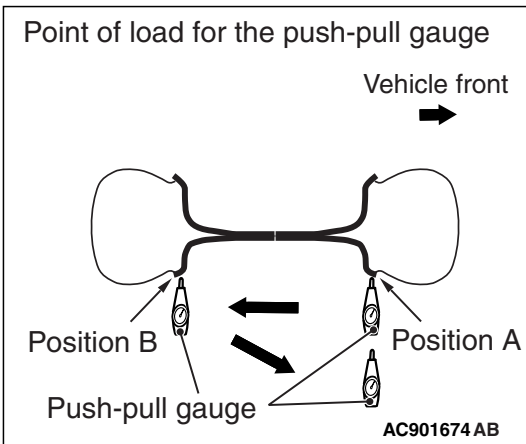
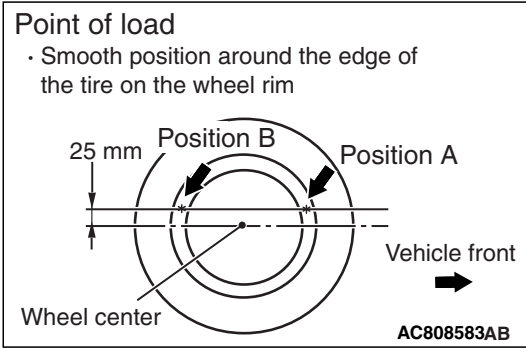
WHEN THE PUSH-PULL GAUGE IS USED

- 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 P.26-7.)
 - Raise the vehicle at the jack up point on the side sill of the inspection side, and lift the tire for approximately 30 mm. At this time, check that the tire 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 center. (Install the dial gauges to the smooth position that is around the edge of the tire.)





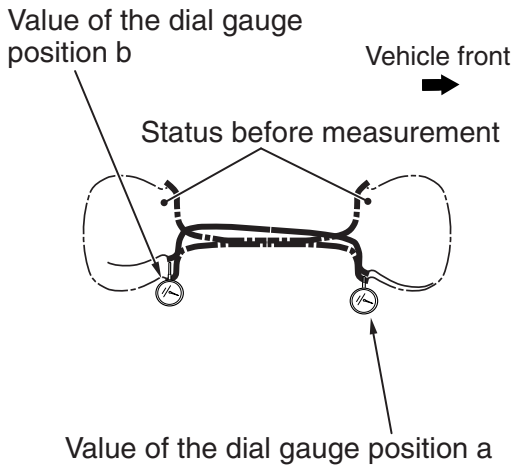
- The push-pull gauge shall be set to the smooth position that is 25 mm above from the wheel center and the edge of the tire on the wheel rim. Then the position on the vehicle front side shall be the "Position A" and the vehicle rear side shall be the "Position B".



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

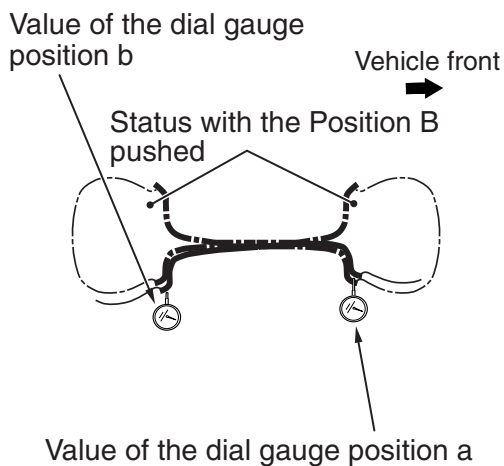
Reading the value on the dial gauge with the Position B pushed



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".

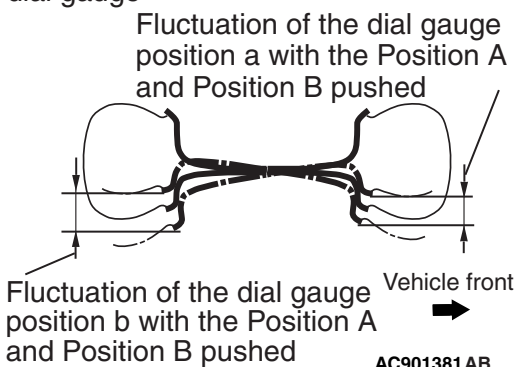
Reading the value on the dial gauge with the Position A pushed



AC901681AB

- (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.

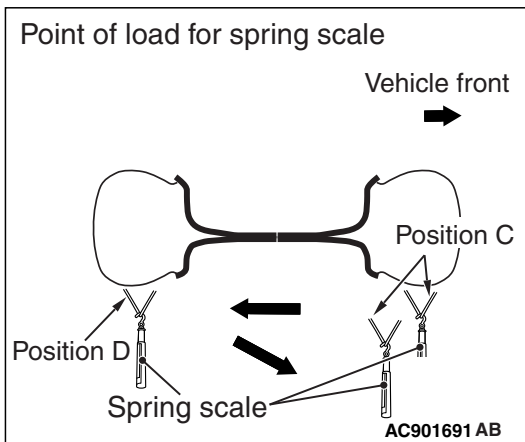
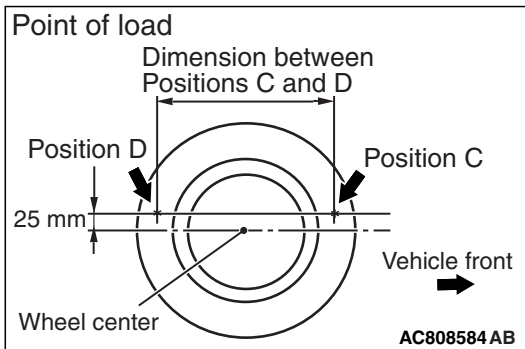
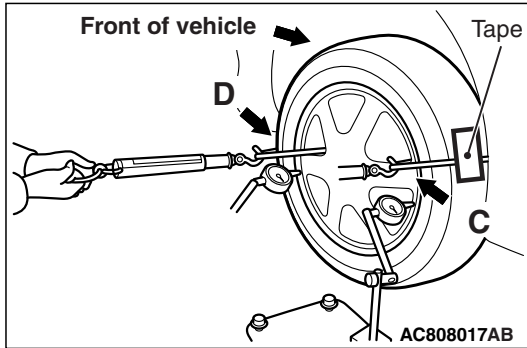
Fluctuation of the dial gauge position a – Fluctuation of the dial gauge position b
- (5) Calculate the average of the looseness calculated twice.
6. If the average exceeds the standard value, check the ball joint rotation torque. (Refer to P.37-22.)

Standard value: Within ± 2.0 mm

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

WHEN A SPRING SCALE IS USED

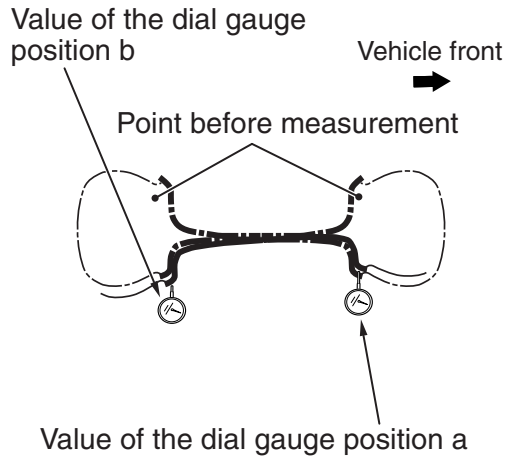
1. Carry out the confirmation before the looseness check with the same manner as the check using a push-pull gauge.
2. At the position that is 25 mm above from the wheel center, bind the tire and the wheel rim with a cord for both the front and rear sides, and fix them with a tape not to loose vertically.
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.

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

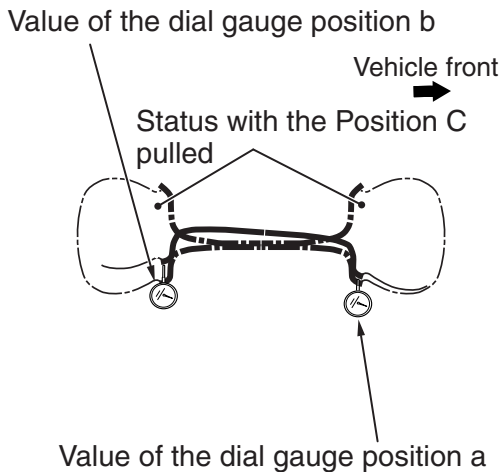
Reading the value on the dial gauge with the Position D pulled



AC901681AC

- (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".

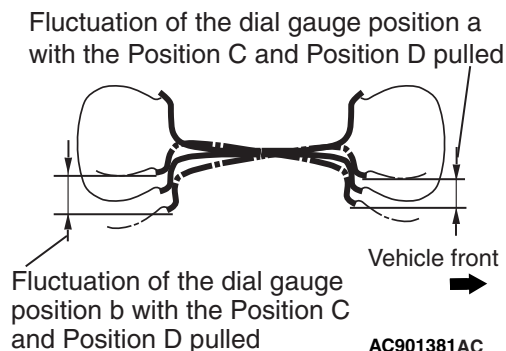
Reading the value on the dial gauge with the Position C pulled



AC901382AC

- (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".

Fluctuation of the value on the dial gauge



AC901381AC

- (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 ball joint rotation torque. (Refer to [P.37-22](#), [P.37-41](#).)

Standard value: Within ± 2.0 mm

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

BALL JOINT DUST COVER CHECK

M1372008600819

1. Using your fingers, press the dust cover to check for cracks or damage.
2. If there are any cracks in the dust cover or it is damaged, replace the tie-rod end (Refer to [P.37-42](#)).

NOTE: If the dust cover has a crack or damage, the ball joint could be damaged.

TIE ROD END BALL JOINT ROTATION TORQUE CHECK

M1372001500833

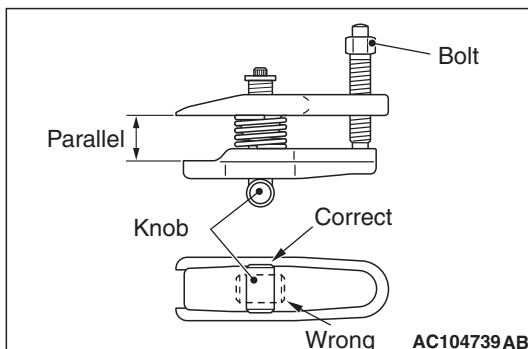
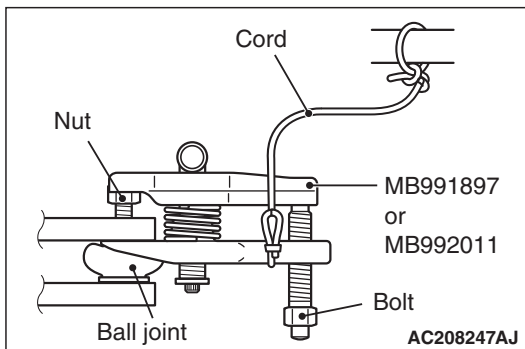
Required Special Tools:

- MB990326: Preload Socket
- MB991897 or MB992011: Ball Joint Remover

⚠ CAUTION

- **Loosen the jam nut (tie-rod end connection) from the ball joint, but do not remove here. Use the special tool.**
- **To prevent the special tool from dropping off, suspend it with a cord.**

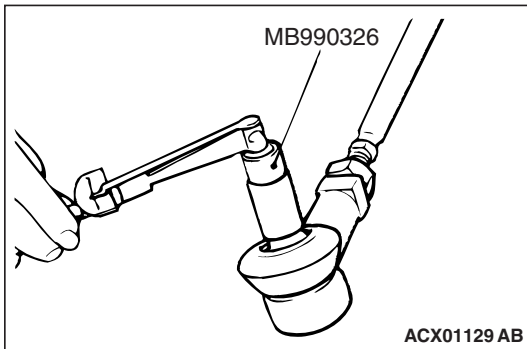
1. Install special tool MB991897 or MB992011 as shown in the figure.



2. Turn the bolt and knob to make the special tool jaws parallel, then hand-tighten the bolt. After tightening, check that the jaws are still parallel.

NOTE: To adjust the special tool jaws to be parallel, set the orientation of the knob as shown in the figure.

3. Unscrew the bolt to disconnect the ball joint.



4. Move the ball joint stud several times and install the nut on the stud. Using the special tool MB990326, measure the ball joint rotation torque.

Standard value: 2.9 N· m(26 in-lb) or less

5. If the rotation torque exceeds the standard value, replace the tie rod end (Refer to P.37-42).
6. If the rotation torque is under the standard value, check the ball joint for end play or ratcheting. If no end play or ratcheting, the ball joint can be re-used.
7. Install the tie rod end to the knuckle, then tighten a new jam nut to the specified torque.

Tightening torque: 52 ± 2 N· m (38 ± 1 ft-lb)

STATIONARY STEERING EFFORT CHECK

M1372001701067

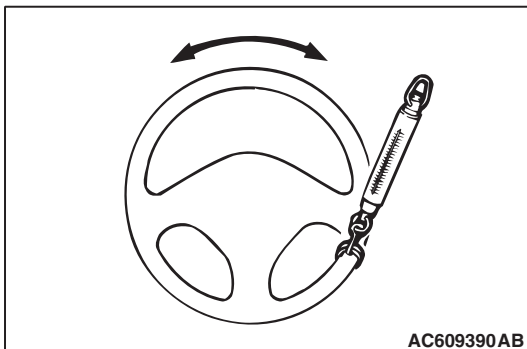
1. Park the vehicle on a level paved road, position the steering wheel in the straight ahead position.
2. Start the engine, and maintain the engine speed at 1,000 ± 100 r/min.
3. Position the spring scale on the circumference of the steering wheel, and measure the steering force at the time when the steering wheel is turned to right or left side (within the range of one and a half turns) from the center position.

Standard value:

Steering force: 32 N (7.2 lb) or less

Fluctuation band: 5.9 N (1.33 lb) or less

4. If not within the standard value, check and adjust the suspected components.



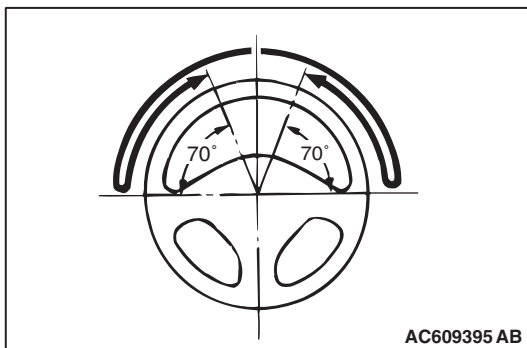
STEERING WHEEL RETURN TO CENTER CHECK

M1372001800793

Conduct a road test:

1. Make both gradual and sudden turns and check the steering wheel return.
2. At a vehicle speed of approximately 22 mph (35 km/h), turn the steering wheel 90 degrees, hold a few seconds, then release. If the steering wheel then returns 70 degrees or more, the return can be judged satisfactory.

NOTE: There will be a momentary feeling or "heaviness" when the wheel is turned quickly, but this is not abnormal (Oil pump discharge amount is especially apt to be insufficient during idling).



DRIVE BELT TENSION CHECK

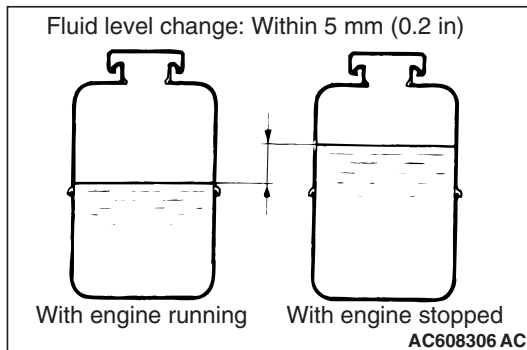
M1372001901180

Refer to GROUP 11A –On-vehicle service –Drive belt tension check [P.11A-7](#).

FLUID LEVEL CHECK

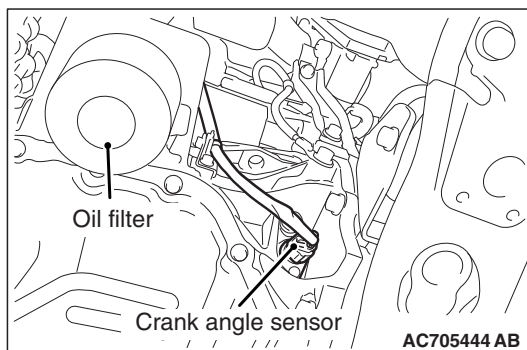
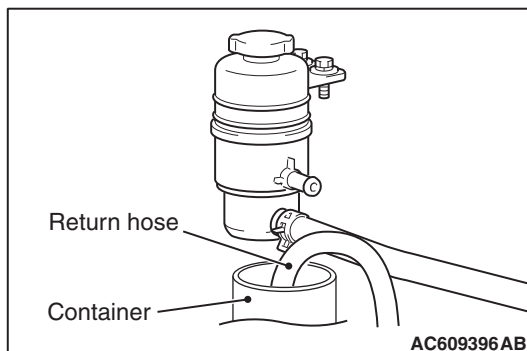
M1372002000756

1. Park the vehicle on a flat, level surface.
2. Start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50 –60° C (122 –140° F).
3. With the engine running, turn the wheel all the way to the left and right several times.
4. Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the change of the fluid level is 5 mm (0.2 inch) or more, air bleeding should be done (Refer to [P.37-25](#)).

**FLUID REPLACEMENT**

M1372002101273

1. Raise and support the front wheels.
2. Disconnect the return hose connection, and then connect a vinyl hose to the return hose, and drain the fluid into a container.
3. Disconnect the crank angle sensor connector.
4. While operating the starter motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.
5. Connect the return hose securely, and then secure with the clip.
6. Fill the oil reservoir with GENUINE MITSUBISHI POWER STEERING FLUID to the lower position of the filler, and then bleed the air (Refer to [P.37-25](#)).



POWER STEERING SYSTEM AIR BLEEDING

M1372002201269

Perform air bleeding procedure as necessary after replacing the steering gear or the steering fluid lines.

Required Special Tools:

- MB991955: M.U.T.-III Sub Assembly

1. Raise and support the front wheels.
2. Disconnect the crank angle sensor connector.

⚠ CAUTION

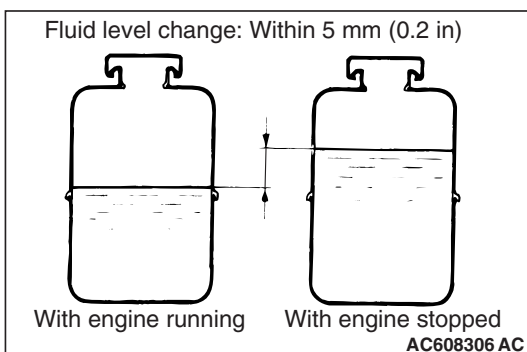
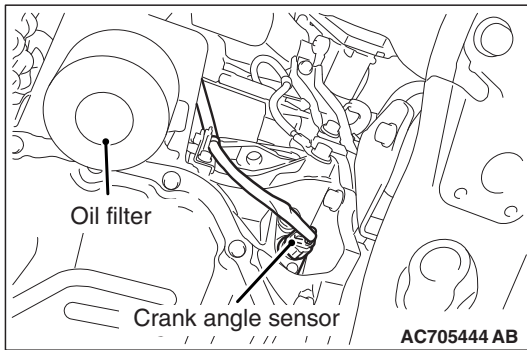
Perform air bleeding only while cranking the engine. If air bleeding is performed while the engine is running, air could enter the fluid. During air bleeding, refill the steering fluid supply so that the level never falls below the lower mark on the dipstick.

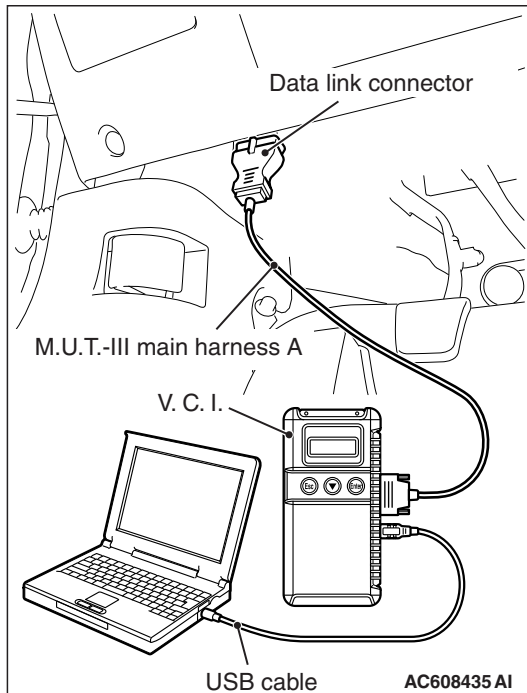
3. Turn the steering wheel all the way to the left and right five or six times while using the starter motor to crank the engine intermittently several times (for 15 to 20 seconds).
4. Connect the crank angle sensor connector.
5. Start the engine (idling).
6. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
7. Confirm that the fluid is not milky, and that the level is between the high and low dipstick marks.
8. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.

⚠ CAUTION

If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled. If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause reduce the life of the power steering components.

9. Confirm that the change in the fluid level is no more than 5 mm (0.2 inch) when the engine is stopped and when it is running.
10. If the change of the fluid level is 5 mm (0.2 inch) or more, the air has not been completely bled from the system. The air bleeding procedure must be repeated.





11. Use the scan tool MB991958, check if the DTC is set. If it is set, erase it.

OIL PUMP PRESSURE TEST

M1372002300962

Required Special Tools:

- MB990662: Power Steering Oil Pressure Gauge
- MB991548: Oil Pressure Gauge Adapter A (Pump Side)
- MB991549: Oil Pressure Gauge Adapter B (Hose Side)

1. Disconnect the pressure hose from the oil pump, and then connect the special tools MB991548, MB990662 and MB991549.
2. Bleed air, then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 –60° C (122 –140° F).
3. Start the engine and idle it at 700 ± 50 r/min.

⚠ CAUTION

The pressure gauge shut-off valve must not remain closed for more than 10 seconds.

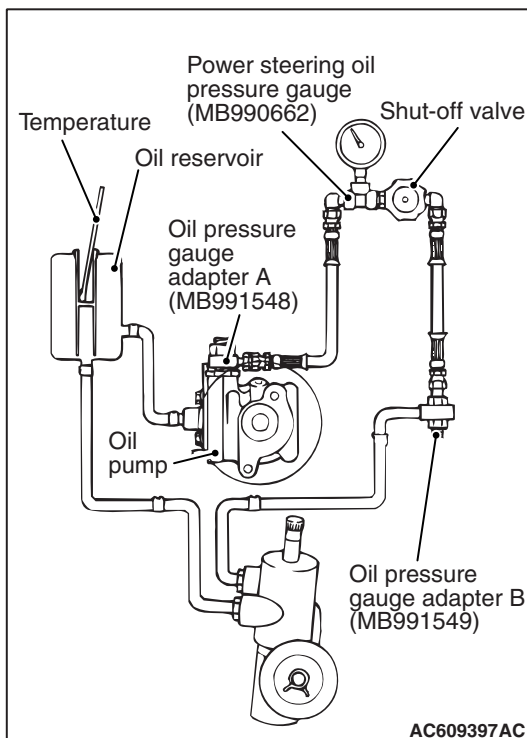
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range. Open it again immediately after checking the pressure.

Standard value: 8.1 –8.8 MPa (1,175 –1,276 psi)

5. If it is not within the standard value, replace the oil pump.
6. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

Standard value: 1.0 MPa (145 psi)

7. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear, so check these parts and repair as necessary.



8. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

Standard value: 8.1 –8.8 MPa (1,175 –1,276 psi)

9. If not the standard value, overhaul the steering gear. Remeasure fluid pressure.

10. Remove the special tools MB991548, MB990662 and MB991549, and then tighten the pressure hose to the specified torque.

Tightening torque: 57 ± 7 N· m (42 ± 5 ft-lb)

11. Bleed the system (Refer to [P.37-25](#)).

POWER STEERING PRESSURE SWITCH CHECK

M1372007200722

Required Special Tools:

- MB990662: Power Steering Oil Pressure Gauge
- MB991548: Oil Pressure Gauge Adapter A (Pump Side)
- MB991549: Oil Pressure Gauge Adapter B (Hose Side)

1. Disconnect the pressure hose from the oil pump, and then connect the special tools MB991548, MB990662 and MB991549.

2. Bleed air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50° C –60° C (122° F – 140° F).

3. The engine should be idling.

4. Disconnect the connector for the oil pressure switch, and place an ohmmeter at the switch.

5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure, then check whether or not the hydraulic pressure that activates the switch is the standard value.

2.5 –3.0 MPa (363 –435 psi)

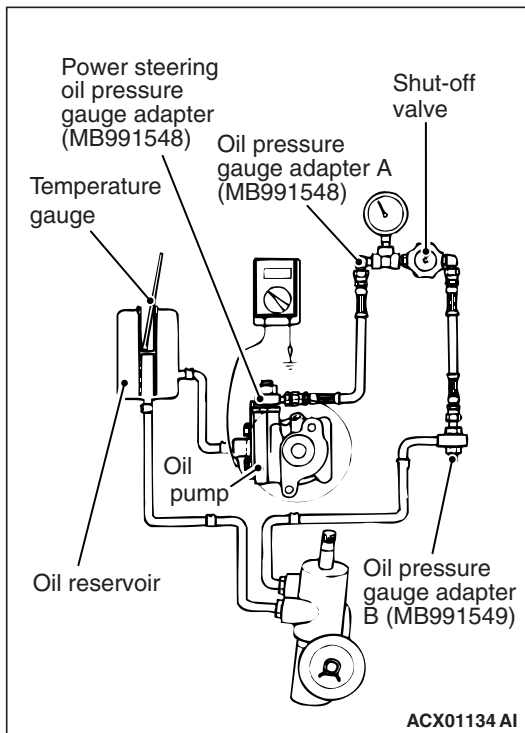
6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether or not the hydraulic pressure that deactivates the switch is the standard value.

1.5 –3.0 MPa (218 –435 psi)

7. Remove special tools MB991548, MB990662 and MB991549, connect the pressure hose to the oil pump, and then tighten the eye bolt to the specified torque.

Tightening torque: 57 ± 7 N· m (42 ± 5 ft-lb)

8. Bleed the system. (Refer to [P.37-25](#)).



STEERING COLUMN SHAFT ASSEMBLY SHOCK
ABSORBING MECHANISM CHECK

M1372013500647

⚠ WARNING

- ***If the vehicle continues to be driven after the collision absorbing mechanism has operated, the steering column shaft may be damaged while it is in use.***
- ***If there is a slack in the mounting base, do not attempt to repair it. Replace the steering column shaft assembly.***

If a collision accident occurs or severe impact is applied on the steering wheel, the collision energy absorbing mechanism may have operated. Once the mechanism has operated, it will be inoperative even if it has suffered no apparent damage. Determine if the steering column shaft can be reused by the following procedure. If the collision energy absorbing mechanism has already operated, replace the steering shaft assembly (Refer to P.37-33). If any excessive radial freeplay on the steering wheel is found with the tilt lever in the lock position, always inspect the steering shaft assembly.

Inspection procedure:

1. Remove the lower and upper column covers.

⚠ CAUTION

After inspection, do not release the tilt lever until the steering shaft assembly has been installed.

2. Ensure that the tilt lever is in the lock position.
3. Loosen the two upper steering column mounting bolts by two turns.
4. Hold the one-way capsules as shown, and then try to rock them. If there is a slack in either of the capsules, replace the steering column shaft assembly (Refer to P.37-33).

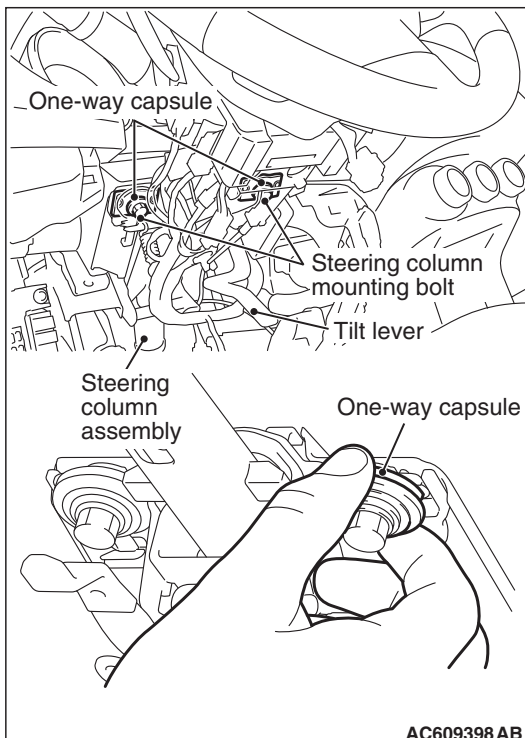
Reference:

The mounting base is fixed to the column bracket with the rivet. Before the collision energy absorbing mechanism operates, the column bracket is secured to the mounting base. After operation, the rivet will break off causing a slack.

⚠ CAUTION

- **Be careful that nothing is pinched between the mounting base and the body.**
 - **After inspection, do not release the tilt lever until the steering shaft assembly has been installed.**
5. After inspection, if there is no fault, tighten the two steering column upper side mounting bolts (2 bolts) to the specified torque.

Tightening torque: 12 ± 3 N·m (106 ± 27 in-lb)



STEERING WHEEL

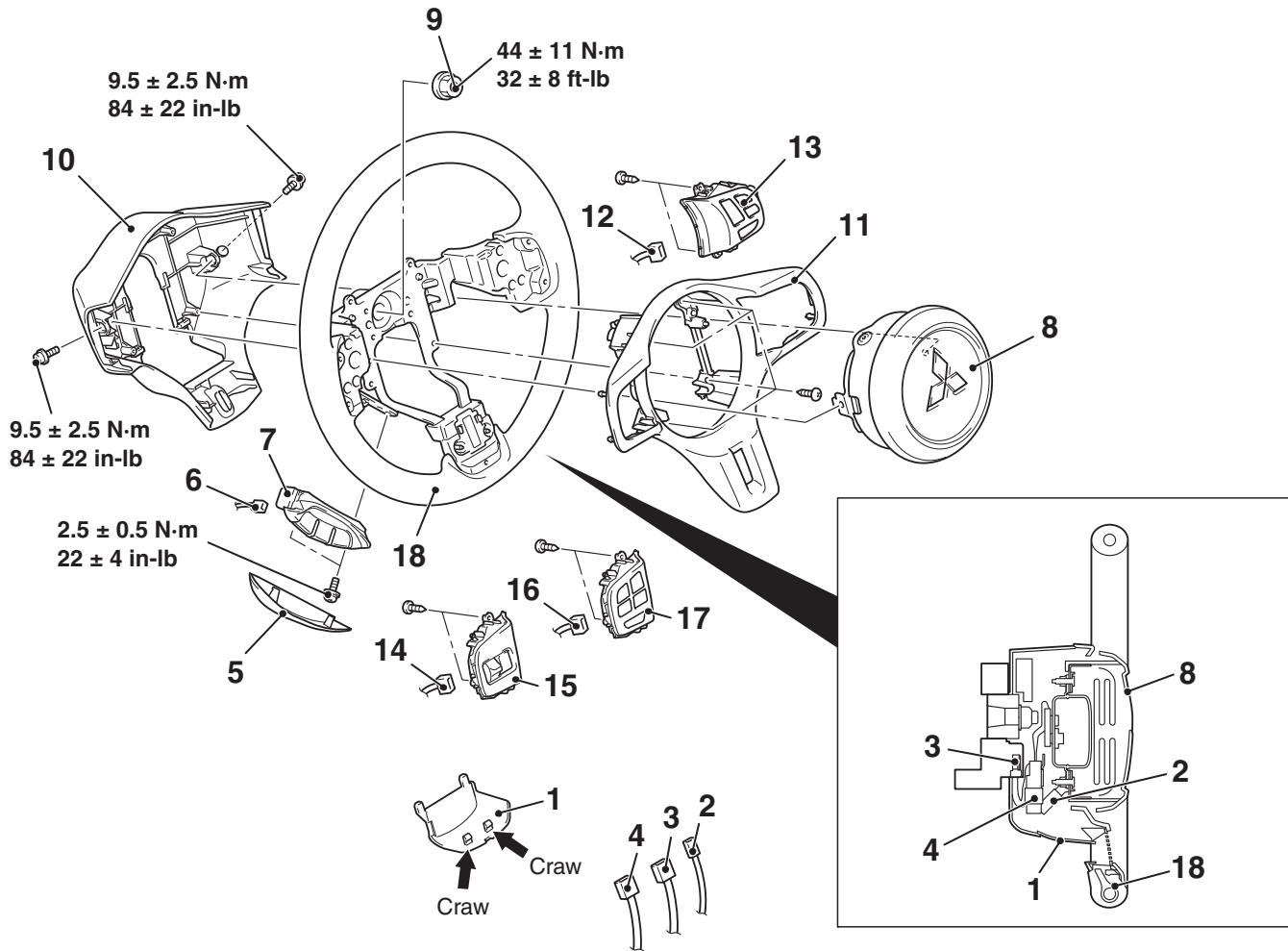
REMOVAL AND INSTALLATION

M1372011401498

CAUTION

- Before removing the steering wheel assembly and driver's air bag module, always refer to GROUP 52B –Service Precautions P.52B-24 and Driver's Air bag Module and Clock Spring P.52B-413.
- After removing the steering wheel, always 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.)

<p>Pre-removal Operation Steering Wheel at Straight-ahead Position Check</p>	<p>Post-installation Operation</p> <ul style="list-style-type: none"> • Steering Wheel at Straight-ahead Position Check • Steering Wheel looseness Check
---	---



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- | | | | | |
|-------|--|-------|-------|---|
| <<A>> | Removal steps | | | |
| >>B<< | 1. Cover | | | |
| >>B<< | 2. Horn connector connection | | | |
| >>B<< | 3. Steering switch connector connection | | | |
| <> | 4. Driver's air bag module connector connection | | | |
| >>B<< | 5. Steering wheel voice control switch cover <Vehicles with steering wheel voice control switch> | <<C>> | >>A<< | |
| | | | | 6. Steering wheel voice control switch connector connection <Vehicles with steering wheel voice control switch> |
| | | | | 7. Steering wheel voice control switch <Vehicles with steering wheel voice control switch> |
| | | | | 8. Driver's air bag module |
| | | | | 9. Flange nut |
| | | | | 10. Lower cover |

TSB Revision

Removal steps (Continued)

11. Garnish
12. Cruise control switch connector connection
13. Cruise control switch
14. AWC switch connector connection <Except with steering wheel audio remote control switch>
15. AWC switch <Except with steering wheel audio remote control switch>
16. Steering wheel audio remote control switch connector connection <Vehicles with steering wheel audio remote control switch>

Removal steps (Continued)

17. Steering wheel audio remote control switch <Vehicles with steering wheel audio remote control switch>
18. Steering wheel assembly

<<D>> >>A<<

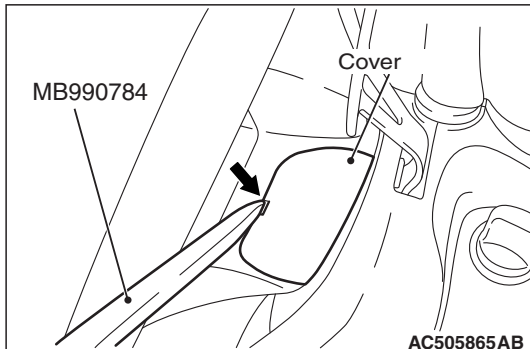
Required Special Tools:

- MB990784: Ornament Remover
- MB990803: Steering wheel puller

REMOVAL SERVICE POINTS**<<A>> COVER REMOVAL**

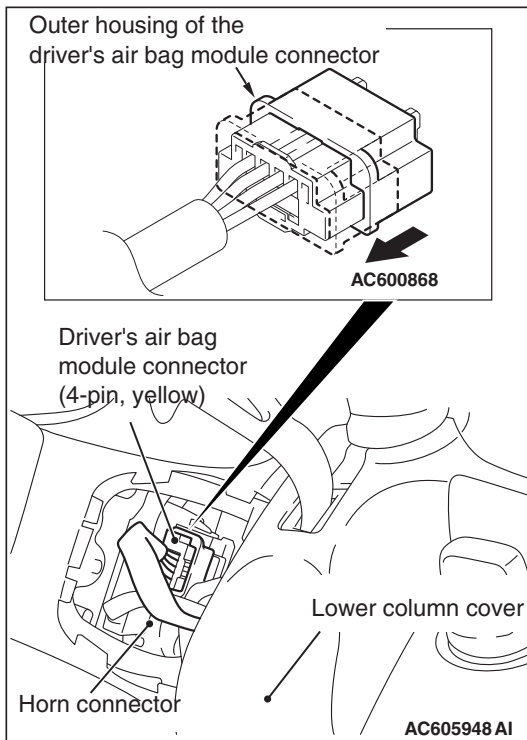
Insert the special tool MB990784 at the indicated position to remove the cover.

NOTE: The special tool MB990784 can be inserted through the notch behind the area shown.



<>DRIVER'S AIR BAG MODULE CONNECTOR DISCONNECTION

Slide the outer housing of the driver's air bag module connector in the arrow direction shown and disconnect the connector.

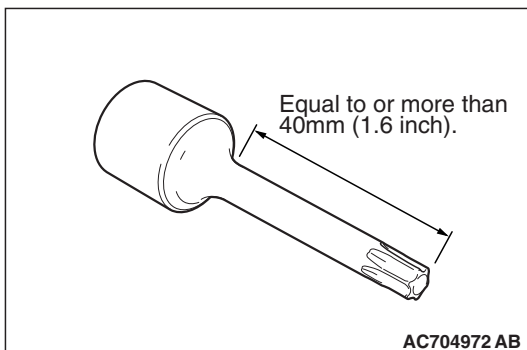


<<C>> DRIVER'S AIR BAG MODULE REMOVAL

⚠ CAUTION

- Never use an electric tester to diagnose the air bag module circuit. Never attempt to disassemble the air bag module.
- Store the removed air bag module in a clean, dry place with the pad surface facing upward.
- When discarding the air bag module, deploy the air bag as specified in the service procedure. (Refer to GROUP 52B –Air bag module and seat belt pre-tensioner disposal procedure [P.52B-443.](#))
- With the driver's air bag module mounting torx screw, loosen the screw, but do not remove it.

Using the torx wrench (T30), remove the driver's air bag module.

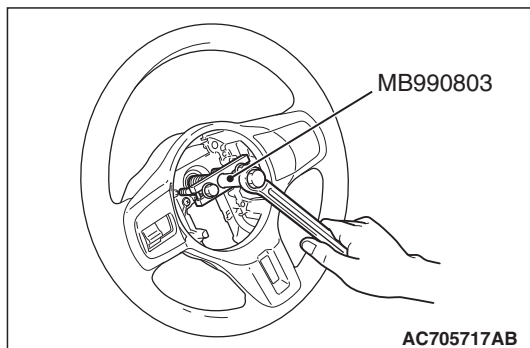


<<D>> STEERING WHEEL ASSEMBLY REMOVAL

1. Position the steering wheel in a straight ahead position.

⚠ CAUTION

- Use the special tool to remove the steering wheel since the steering column collision adsorbing mechanism may be damaged.
2. Use special tool MB990803 to remove the steering wheel.



INSTALLATION SERVICE POINTS

>>A<< STEERING WHEEL ASSEMBLY/DRIVER'S AIR BAG MODULE INSTALLATION

After centering the clock spring (Refer to 52B –Air bag module clock spring), install the steering wheel assembly.

>>B<<DRIVER'S AIR BAG MODULE CONNECTOR CONNECTION/STEERING SWITCH CONNECTOR CONNECTION/HORN CONNECTOR CONNECTION

Connect the connector securely and route the harnesses not to lie off the cover hole.

STEERING SHAFT

REMOVAL AND INSTALLATION

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CAUTION

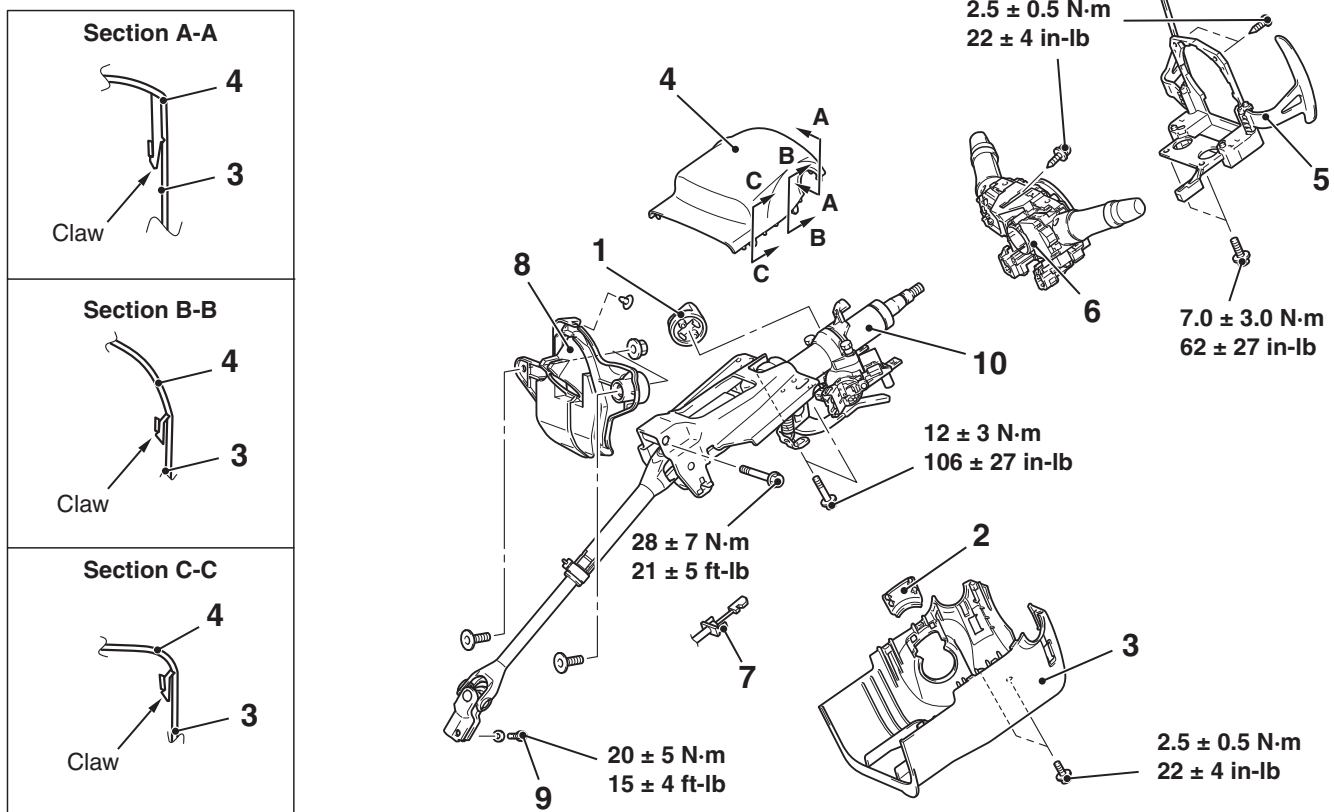
- Before removing the steering wheel assembly and driver's air bag module/knee air bag module, always refer to GROUP 52B –Service Precautions P.52B-24 and Driver's Air bag Module and Clock Spring P.52B-413 or Knee Air bag Module P.52B-425.)
- After installation, perform a calibration for the ASC-ECU to learn the steering wheel sensor neutral point. (Refer to GROUP 35C –On-vehicle Service –Steering Wheel Sensor Calibration P.35C-289.)

Pre-removal Operation

- Steering Wheel at Straight-ahead Position Check
- Steering Wheel Assembly Removal (Refer to P.37-29.)
- Instrument Panel Cover Lower Removal (Refer to GROUP 52A –Instrument Lower Panel P.52A-9.) <MR>
- Knee Air Bag Module Removal (Refer to GROUP 52B –Knee Air Bag Module P.52B-425.)

Post-installation Operation

- Instrument Panel Cover Lower Installation (Refer to GROUP 52A –Instrument Lower Panel P.52A-9.) <MR>
- Steering Wheel Assembly Installation (Refer to P.37-29.)
- Steering Wheel at Straight-ahead Position Check



Note: claw position is symmetrical

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<<A>>

Removal steps

1. Knob cap <Vehicles with KOS>
2. Ignition key cover
3. Steering column lower cover

Removal steps (Continued)

- Receiver antenna module removal (Refer to GROUP 42B –Exterior Transmitter Antenna Assembly, Interior Transmitter Antenna Assembly, Receiver Antenna Module P.42B-242.) <Vehicles with KOS>

Removal steps (Continued)

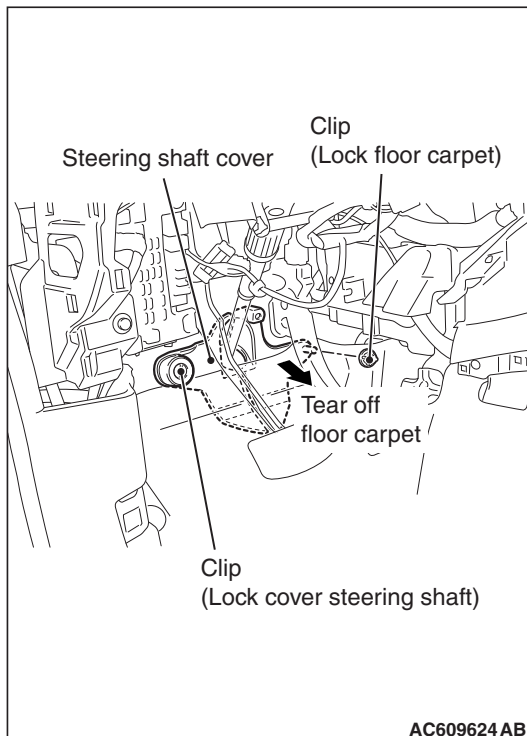
- WCM removal (Refer to GROUP 42C –WCM P.42C-131.) <Vehicles with WCM>
- 4. Steering column upper cover
- 5. Paddle shift assembly <Vehicles with paddle shift>
- 6. Clock spring column switch assembly
- 7. Key interlock cable (Refer to GROUP 22C –Key interlock and shiftlock mechanisms P.22C-408).
- <> 8. Steering shaft cover
- >>B<< 9. Steering column bolt (steering column shaft assembly and steering gear and linkage connection)
- <<C>> >>A<< 10. Steering column shaft assembly

REMOVAL SERVICE POINTS**<<A>> KNOB CAP REMOVAL**

Remove the knob cap while pressing the two projections.

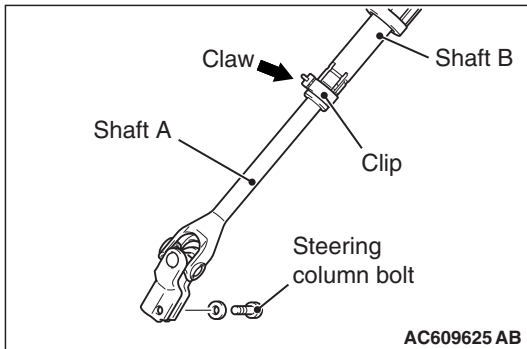
<> STEERING SHAFT COVER REMOVAL

1. Remove the clip (for securing the floor carpet), and turn back the floor carpet.
2. Remove the clip (for securing the steering shaft cover), and then remove the steering shaft cover.



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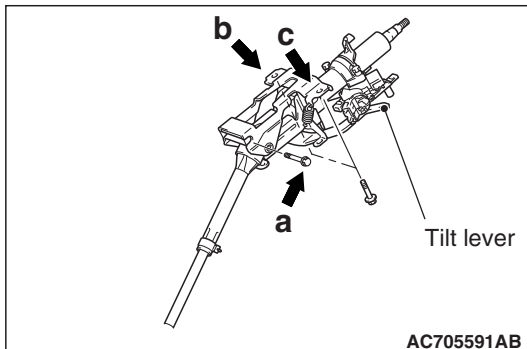
<<C>> STEERING COLUMN SHAFT ASSEMBLY DISCONNECTION



1. Remove the steering column bolt connecting the steering gear to the steering column assembly.
2. Disconnect the steering gear from the steering column assembly while sliding the shaft A to the shaft B with the clip claw as shown in the figure is pinched.
3. Remove the steering column mounting bolt.

INSTALLATION SERVICE POINTS

>>A<< STEERING COLUMN SHAFT ASSEMBLY INSTALLATION



1. Ensure that the tilt lever is in the lock position.
2. Temporarily tighten the mounting bolts in the order of a, b, and c, and then tighten them in the order of c, b, and a to the specified torque.

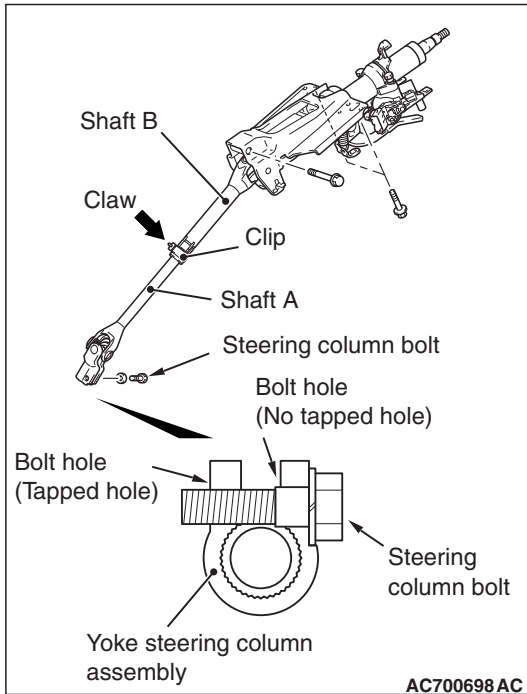
Tightening torque a: 28 ± 7 N·m (21 ± 5 ft-lb)

Tightening torque b,c: 12 ± 3 N·m (106 ± 27 in-lb)

>>B<< STEERING COLUMN BOLT (STEERING COLUMN SHAFT ASSEMBLY AND STEERING GEAR & LINKAGE CONNECTION) INSTALLATION

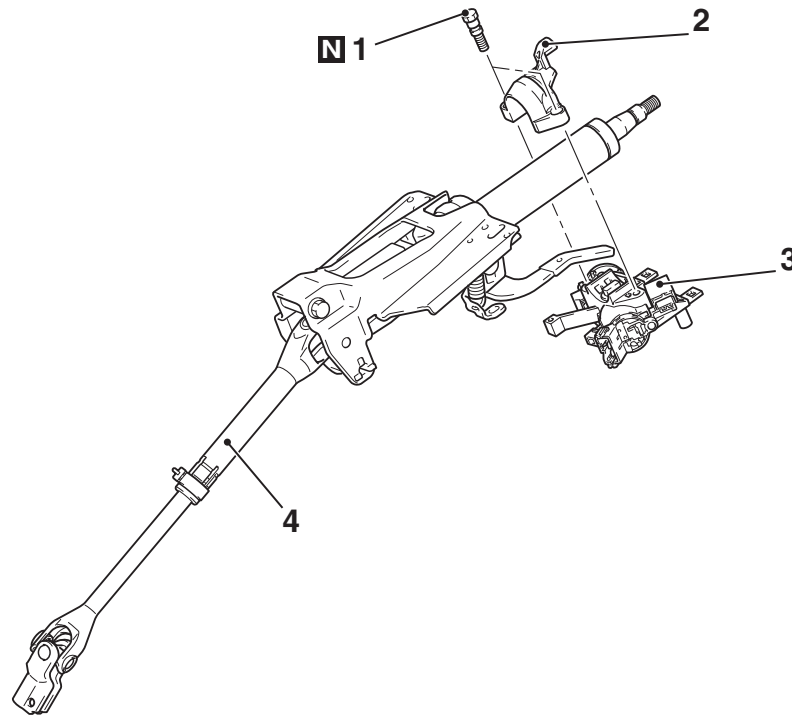
1. While sliding shaft A from shaft B with the clip claw as shown in the figure being pinched, connect the steering column shaft assembly and the steering gear and linkage.
2. Insert the steering column bolt from the no tapped bolt hole, and tighten it to the specified torque.

Tightening torque : 20 ± 5 N· m (15 ± 4 ft-lb)



DISASSEMBLY AND ASSEMBLY

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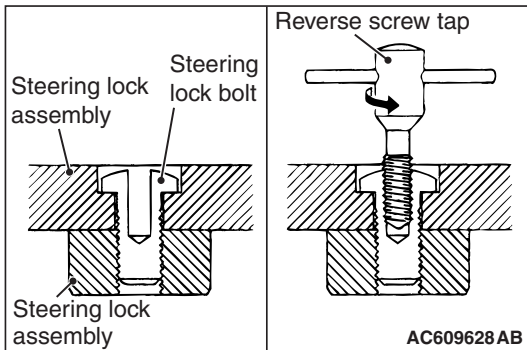
- <<A>> >>A<<
 >>A<<
- Disassembly steps**
1. Steering lock bolt
 2. Steering lock bracket

- >>A<<
- Disassembly steps**
3. Steering lock cylinder assembly
 4. Steering column shaft assembly

DISASSEMBLY SERVICE POINT

<<A>> STEERING LOCK BOLT REMOVAL

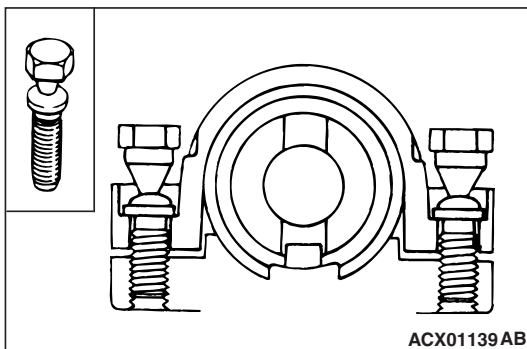
1. Use a drill to make a hole just deeply enough for the tap to stand on the steering lock bolt.
2. Use a left-hand thread tap to remove the steering lock bolt.



ASSEMBLY SERVICE POINT

>>A<< STEERING LOCK CYLINDER ASSEMBLY/STEERING LOCK BRACKET/STEERING LOCK BOLT INSTALLATION

1. When installing the steering lock assembly to the steering column shaft assembly, temporarily assemble the steering lock assembly while aligning it with the boss on the column.
2. Make sure that the steering lock operates normally, and then tighten the steering lock bolt until its head is broken off.



POWER STEERING GEAR BOX AND LINKAGE

REMOVAL AND INSTALLATION

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⚠ CAUTION

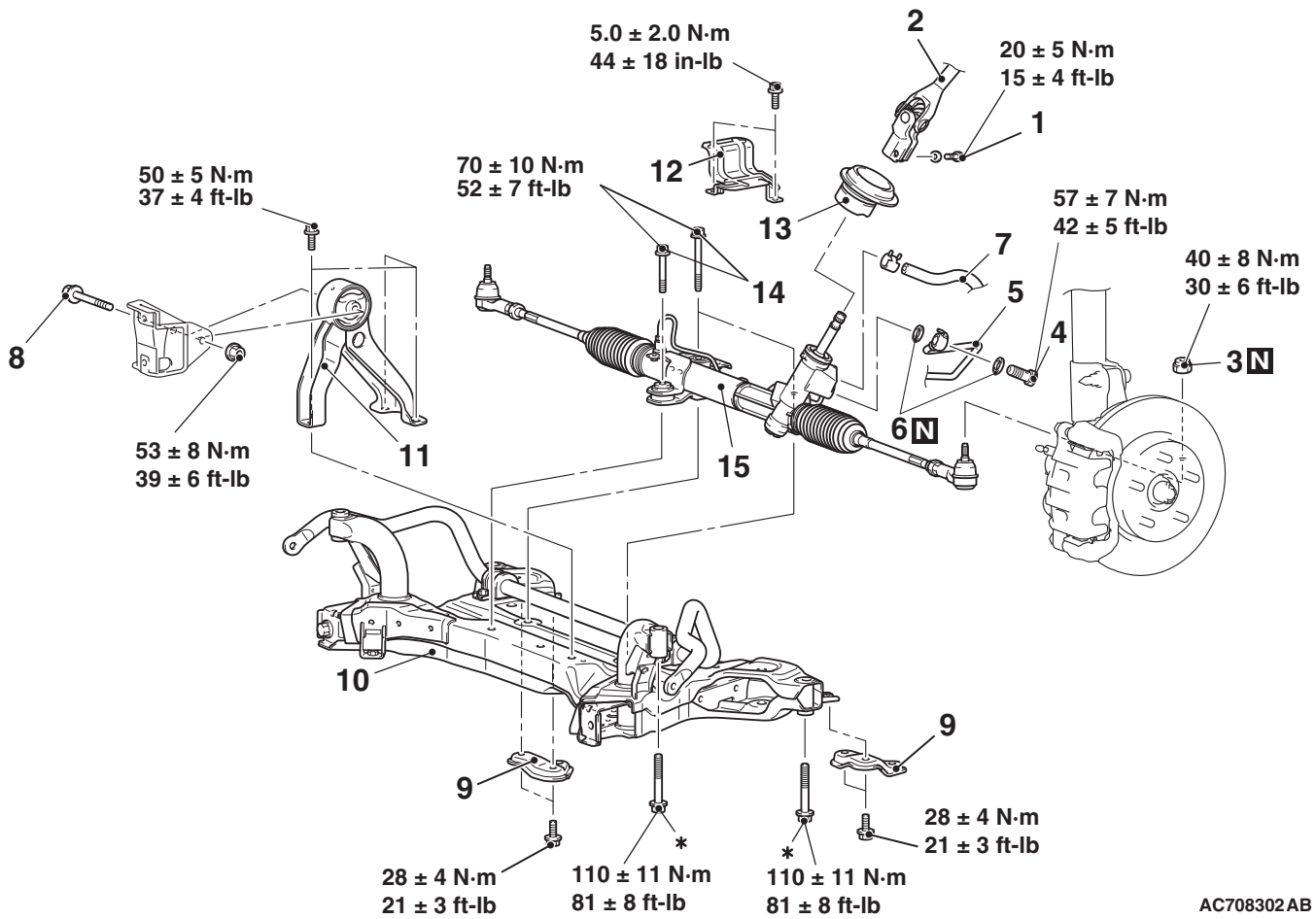
- Before removing the steering wheel assembly and driver's air bag module, always refer to GROUP 52B –Service Precautions P.52B-24 and Driver's Air bag Module and Clock Spring P.52B-413. Also, position the front wheels in a straight ahead direction. If you fail to do this, clock spring for SRS may get damage, making the SRS (air bag) inoperative, and it may cause a serious injury to the driver.
- *: 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.
- After installation, 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).

Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37-24).
- Steering Wheel Assembly and Air Bag Module Removal (Refer to P.37-29).
- Steering Shaft Cover Removal (Refer to P.37-33).
- Engine Room Under Cover Front (A, B), Engine Room Side Cover, Front Floor Panel Rear Removal (Refer to GROUP 51 –Under Cover P.51-15).
- Lower Arm Removal (Refer to GROUP 33 –Lower Arm P.33-15).
- Centermember and Front Roll Stopper Assembly Removal (Refer to GROUP 32 –Engine Roll Stopper and Centermember P.32-10).

Post-installation Operation

- Centermember and Front Roll Stopper Assembly Installation (Refer to GROUP 32 –Engine Roll Stopper and Centermember P.32-10).
- Lower Arm Installation (Refer to GROUP 33 –Lower Arm P.33-15).
- Engine Room Under Cover Front (A, B), Engine Room Side Cover Installation (Refer to GROUP 51 –Under Cover P.51-15).
- Steering Shaft Cover Removal (Refer to P.37-33).
- Steering Wheel Assembly and Air Bag Module Installation (Refer to P.37-29).
- Using your Fingers, Press the Dust Cover of Joints to Check for a Crack or Damage.
- Power Steering Fluid Filling (Refer to P.37-24).
- Air Bleeding of Power Steering Fluid (Refer to P.37-25).
- Steering Wheel at Straight-ahead Position Check



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Removal steps

1. Steering column bolt (steering column shaft assembly and steering gear and linkage connection)
2. steering column shaft assembly and steering gear and linkage connection
3. Jam nut (Tie-rod end and knuckle connection)
4. Eye bolt
5. Pressure hose connection

<<A>>

<>

>>A<<

Removal steps (Continued)

6. Gasket
7. Return hose connection
8. Rear roll stopper center bolt
9. Front axle crossmember stay
10. Front axle crossmember
11. Rear roll stopper
12. Heat protector
13. Joint cover grommet
14. Flange bolt
15. Steering gear and linkage

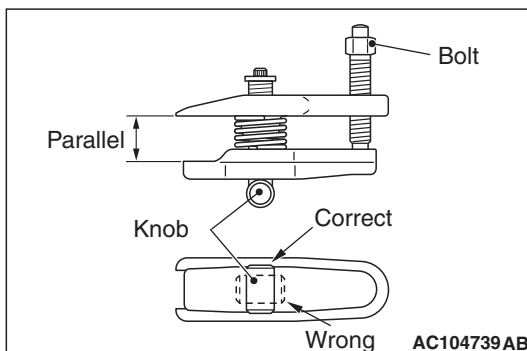
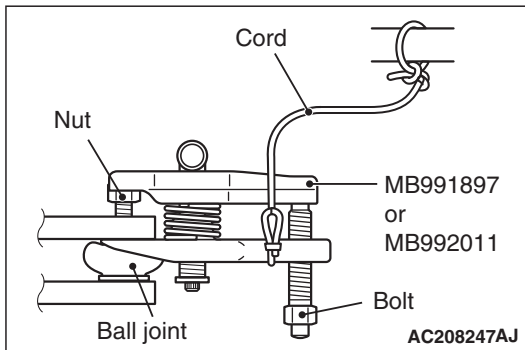
REMOVAL SERVICE POINTS

<<A>> JAM NUT (TIE-ROD END AND KNUCKLE CONNECTION) REMOVAL

⚠ CAUTION

- Loosen the jam nut (tie-rod end connection) from the ball joint, but do not remove here. Use the special tool.
- To prevent the special tool from dropping off, suspend it with a cord.

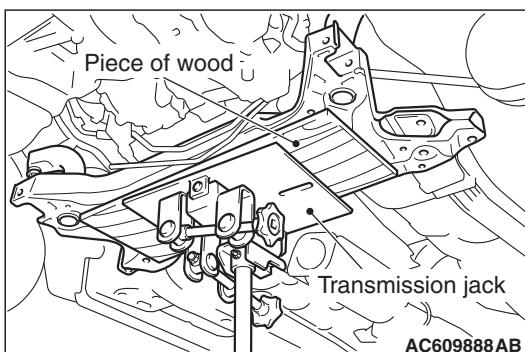
1. Install special tool MB991897 or MB992011 as shown in the figure.



2. Turn the bolt and knob to make the special tool jaws parallel, then hand-tighten the bolt. After tightening, check that the jaws are still parallel.

NOTE: To adjust the special tool jaws to be parallel, set the orientation of the knob as shown in the figure.

3. Unscrew the bolt to disconnect the ball joint.



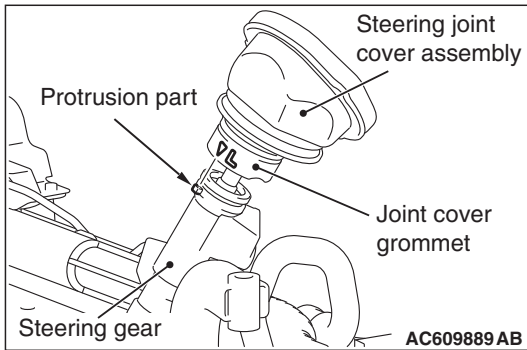
<> FRONT AXLE CROSSMEMBER REMOVAL

1. Jack up and support the crossmember, and remove it.
2. Check the hoses and harnesses for roughness, and then remove the front suspension crossmember with the rear roll stopper and the steering gear and linkage installed.

INSTALLATION SERVICE POINT

>>A<< JOINT COVER GROMMET INSTALLATION

Install by aligning the marks of joint cover grommet and steering gear and linkage as shown in the figure.



INSPECTION

M1372011001423

PINION TOTAL ROTATION TORQUE CHECK

Required Special Tools:

- MB991006: Preload Socket

⚠ CAUTION

Secure the steering gear and linkage to the special mounting point. Fixing the steering gear and linkage to another point could deform or damage the gear housing.

1. Using the special tool preload socket (MB991006) to rotate the pinion at a rate of one turn per 4 to 6 seconds, and then measure the pinion total rotation torque.

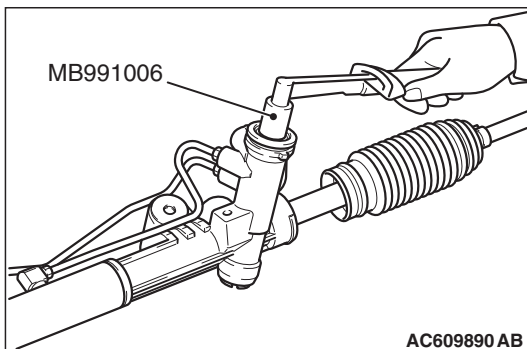
Standard value:

Total rotation torque: 0.6 –1.6 N· m (5.3 –14.2 in-lb)

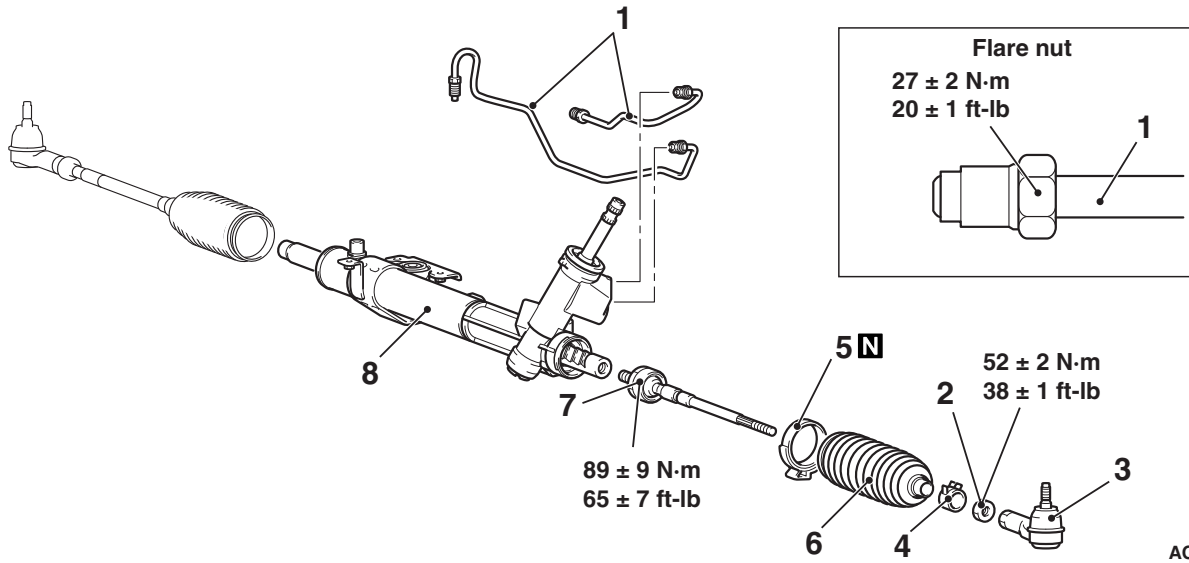
Torque fluctuation: 0.4N· m (3.5 in-lb) or less

NOTE:

- During measurement, remove the bellows from the gear housing.
 - Rotate the pinion by 180° in left and right directions from the neutral position, and measure the pinion total rotation torque.
2. If the measurement value is outside the standard value, replace the gear housing (Refer to [P.37-42](#)).



DISASSEMBLY AND ASSEMBLY

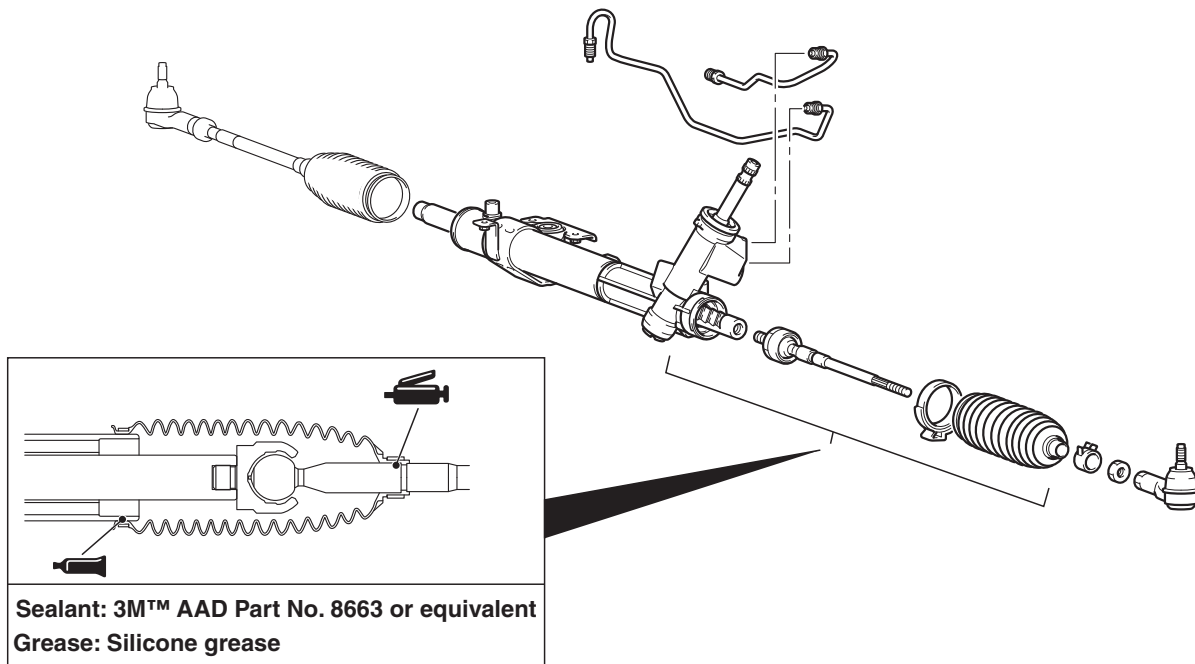


- Disassembly steps**
- >>C<< 1. Feed pipe
 - >>C<< 2. Jam nut
 - >>C<< 3. Tie-rod end
 - >>B<< 4. Clip
 - >>B<< 5. Band
 - >>B<< 6. Bellows

- Disassembly steps**
- <<A>> >>A<< 7. Tie-rod
 - <<A>> >>A<< 8. Gear housing

- Required Special Tool:**
- MB992209: Boot band clipping tool
 - MB992249: Variable spanner

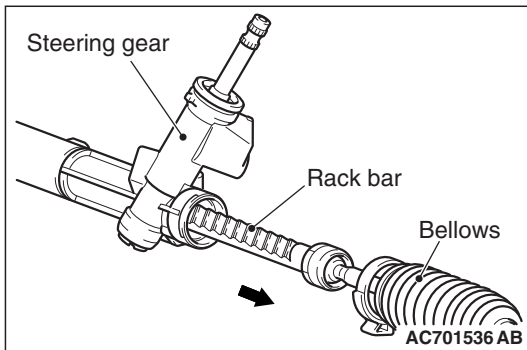
LUBRICATION AND SEALING POINTS



DISASSEMBLY SERVICE POINT

<<A>> TIE-ROD REMOVAL

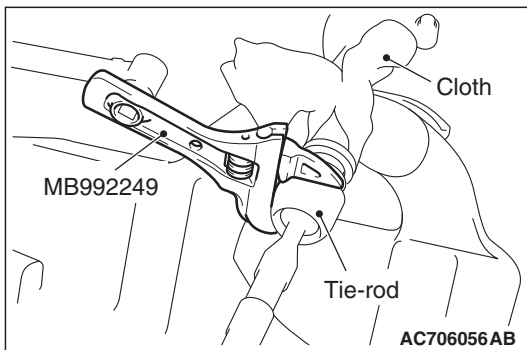
1. Move the bellows and pull the rack bar toward arrow direction.



⚠ 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 POINT

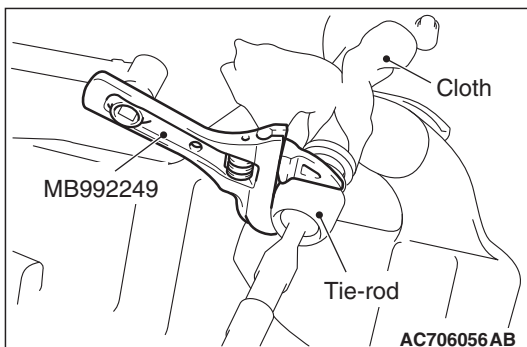
>>A<< TIE-ROD INSTALLATION

⚠ 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.

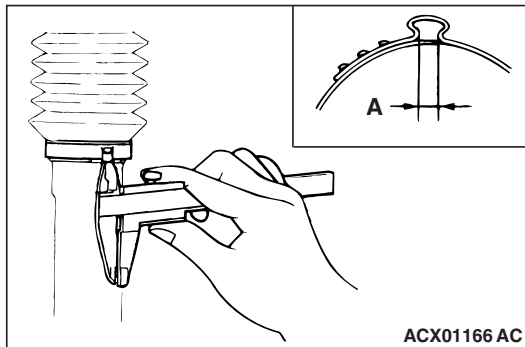
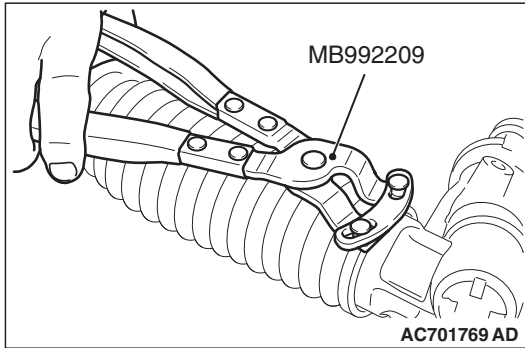
Tightening torque: 89 ± 9 N·m



>>B<< BAND INSTALLATION

⚠ CAUTION

- Secure the rack housing, and firmly crimp the bellows band by the bellows band clipping tool (special tool: MB992209).
 - Crimp the bellows band securely until the special tool (MB992209) contacts the stopper.
1. Using the special tool (MB992209), crimp the bellows band.



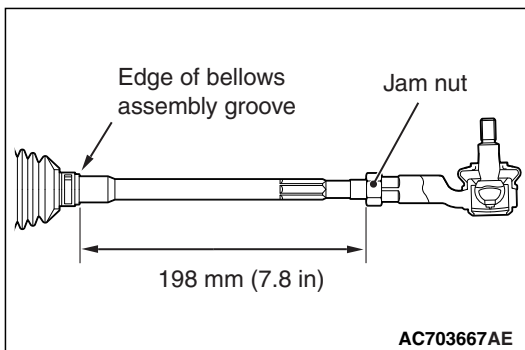
2. Check that the crimping width of the band (A) is within the range of the standard value.

Standard value (A): 2.4 –2.8 mm (0.09 –0.11 in)

>>C<< TIE-ROD END/JAM NUT INSTALLATION

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

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



POWER STEERING OIL PUMP ASSEMBLY

REMOVAL AND INSTALLATION

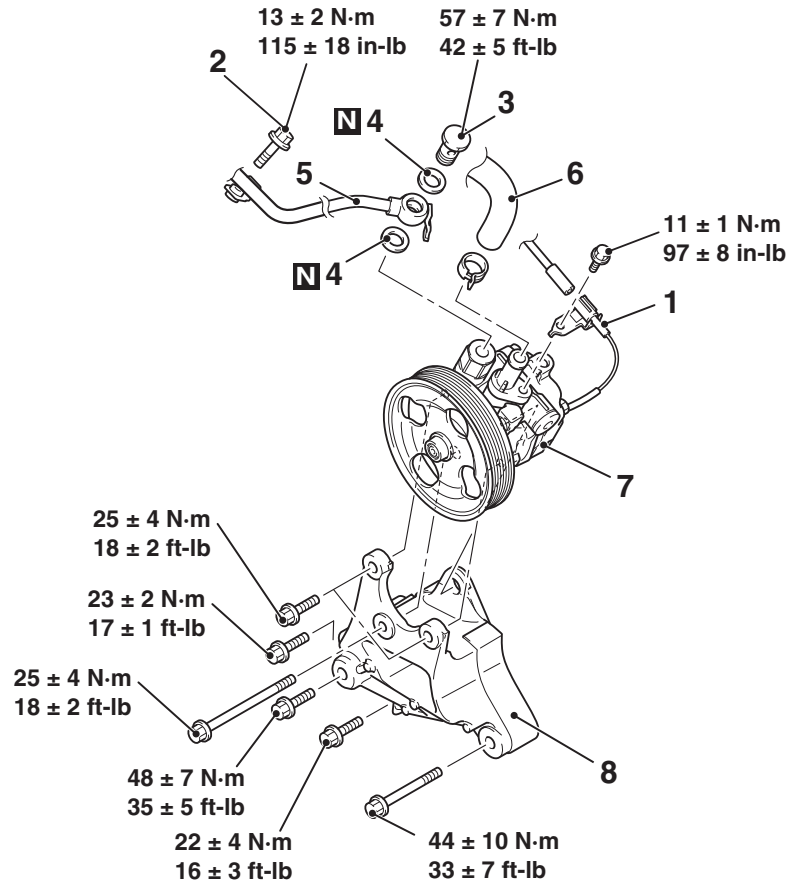
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Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37-24.)
- Radiator Condenser Tank removal (Refer to GROUP 14 – Radiator P.14-32.)
- Generator and Others belt Removal (Refer to GROUP 11A –Crankshaft Pulley P.11A-21.)
- Generator Assembly, Auto-tension and Idler Pulley Disconnection (Refer to GROUP 11B –Generator and Ignition System P.11B-10.)

Post-installation Operation

- Generator assembly, Auto-tension and Idler Pulley Connection (Refer to GROUP 11B –Generator and Ignition System P.11B-10.)
- Generator and Others belt Installation (Refer to GROUP 11A –Crankshaft Pulley P.11A-21.)
- Radiator Condenser Tank Installation (Refer to GROUP 14 –Radiator P.14-32.)
- Drive Belt Tension Adjustment (Refer to GROUP 11A – On-vehicle Service –Drive Belt Tension Check P.11A-7.)
- Power Steering Fluid Refilling and Bleeding (Refer to P.37-25.)



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Removal steps

1. Pressure switch connector connection
2. Clamp bolt
3. Eye bolt
4. Gasket

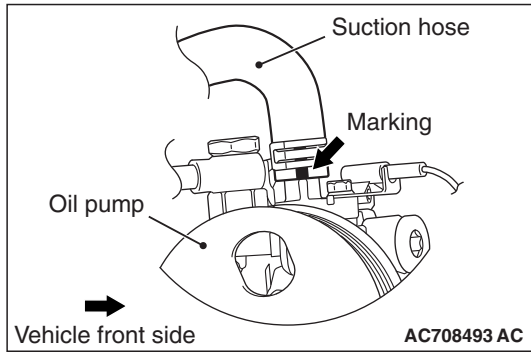
>>A<<

Removal steps (Continued)

5. Pressure hose assembly connection
6. Suction hose connection
7. Oil pump assembly
8. Oil pump bracket

INSTALLATION SERVICE POINT**>>A<< SUCTION HOSE INSTALLATION**

Install the suction hose with its marking located as shown in the figure.

**INSPECTION**

- Check the drive belt for cracks.
- Check the pulley for uneven rotation.

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POWER STEERING HOSES

REMOVAL AND INSTALLATION

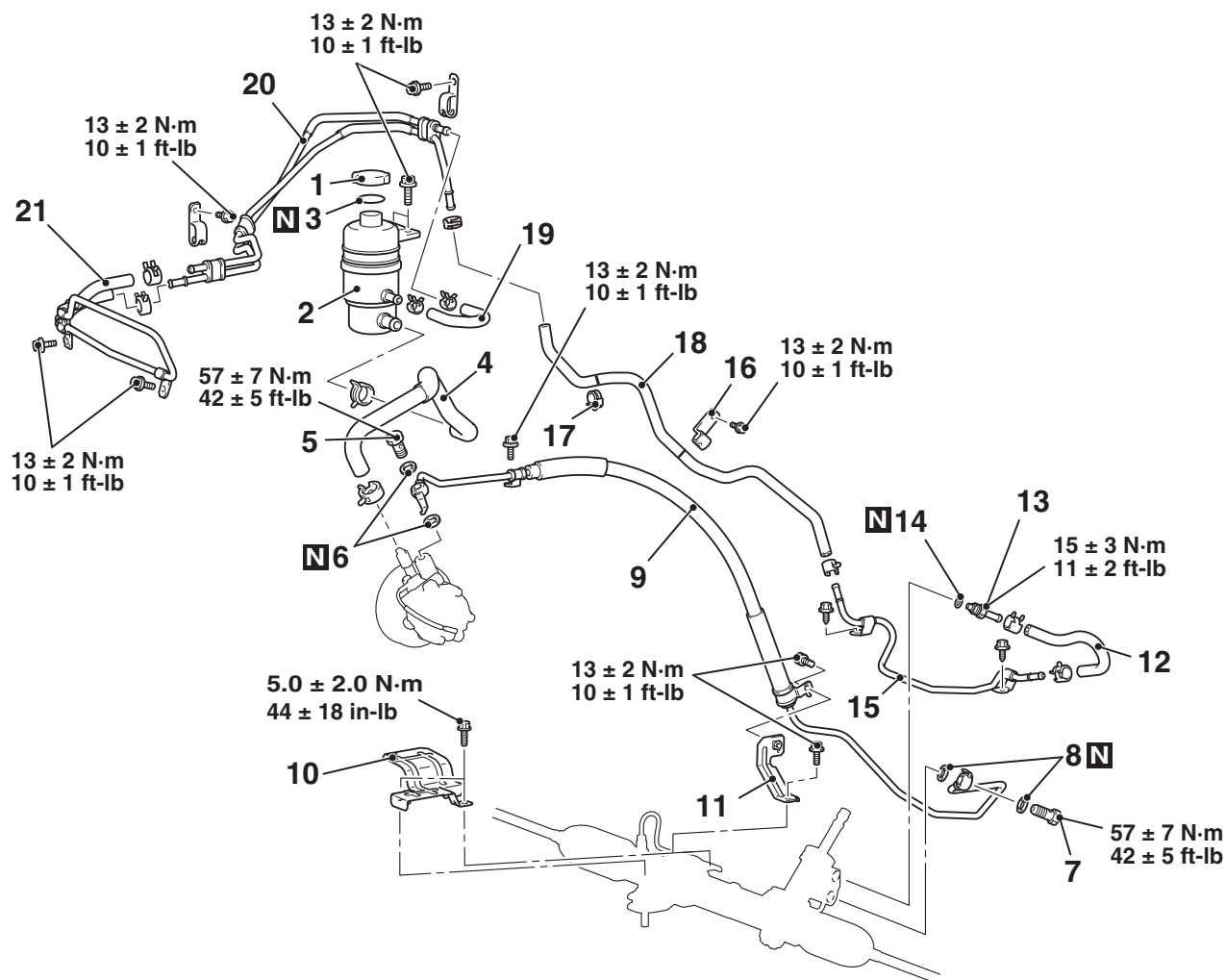
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Pre-removal Operation

- Power Steering Fluid Draining (Refer to P.37-24.)
- Front Bumper and Radiator Grille Assembly Removal (Refer to GROUP 51 –Front Bumper Assembly and Radiator Grille P.51-3.)
- Headlight (RH) Removal (Refer to GROUP 54A –Headlight P.54A-202.)
- Strut Tower Bar Removal (Refer to GROUP 42A –Strut Tower Bar P.42A-14.)

Post-installation Operation

- Strut Tower Bar Installation (Refer to GROUP 42A –Strut Tower Bar P.42A-14.)
- Headlight (RH) Installation (Refer to GROUP 54A –Headlight P.54A-202.)
- Front Bumper and Radiator Grille Assembly Installation (Refer to GROUP 51 –Front Bumper Assembly and Radiator Grille P.51-3.)
- Power Steering Fluid Refilling and Bleeding (Refer to P.37-25.)



AC900205 AC

Removal steps

1. Cap
2. Oil reservoir
3. O-ring
- >>D<< 4. Suction hose
5. Eye bolt
6. Gasket
7. Eye bolt
8. Gasket
- >>C<< 9. Pressure hose assembly
10. Heat protector
11. Pressure hose bracket

>>B<<

>>B<<

>>B<<

>>B<<

>>B<<

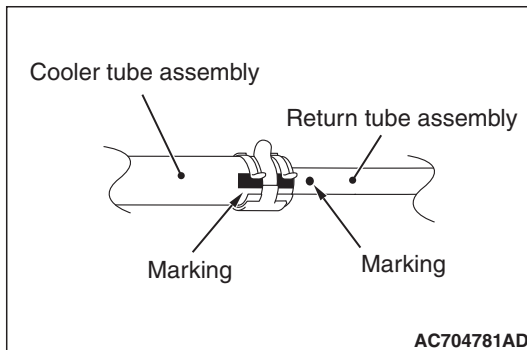
>>A<<

Removal steps (Continued)

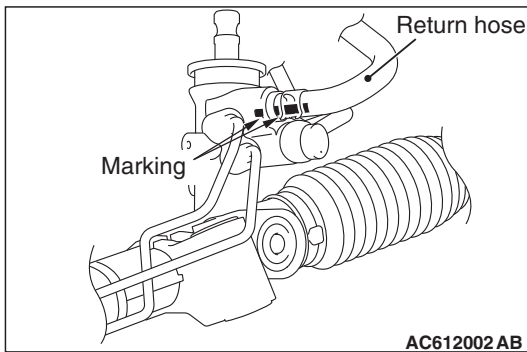
12. Return hose
13. Return tube assembly
14. Gasket
15. Return tube
16. Clip
17. Hose clamp
18. Return hose
19. Return hose
20. Return tube assembly
21. Cooler tube assembly

INSTALLATION SERVICE POINTS**>>A<< COOLER TUBE ASSEMBLY INSTALLATION**

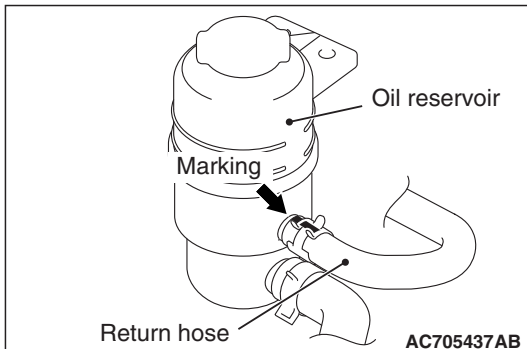
Install by aligning the mating marks of cooler tube assembly and return tube assembly.

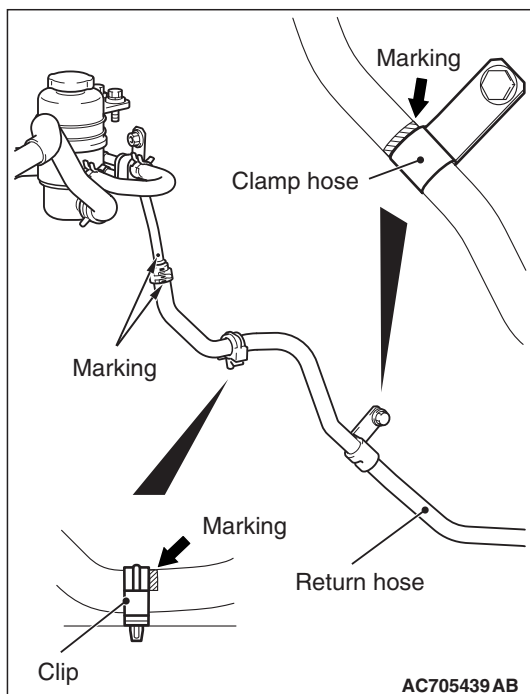
**>>B<< RETURN HOSE/HOSE CLAMP/CLIP INSTALLATION**

1. Install the return hose by aligning the mating marks.



2. Install the return hose with its marking located as shown in the figure.

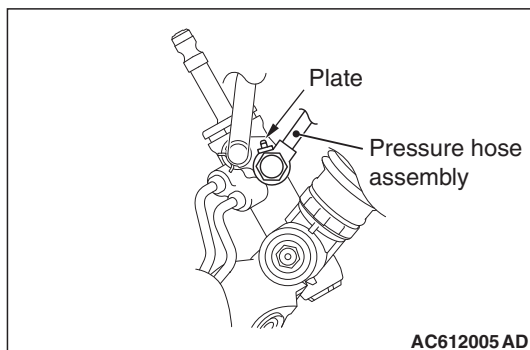




3. Using clips and hose clamps, install the return hose with its marking located as shown in the figure.

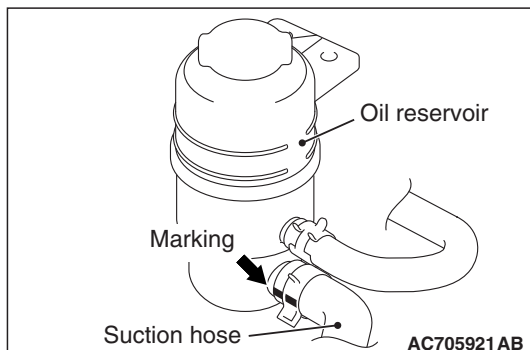
>>C<< PRESSURE HOSE ASSEMBLY INSTALLATION

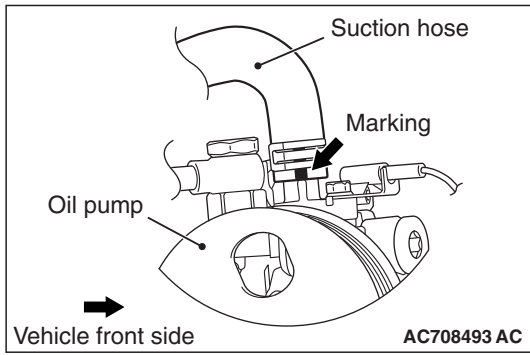
Install the pressure hose assembly plate with its marking located as shown in the figure.



>>D<< SUCTION HOSE INSTALLATION

1. Install the suction hose with its marking located as shown in the figure.





2. Install the suction hose with its marking located as shown in the figure.