

STEERING SYSTEM

SECTION **ST**

CONTENTS

PRECAUTIONS AND PREPARATION	2	Installation.....	10
Precautions.....	2	Disassembly and Assembly.....	11
Special Service Tools.....	3	Inspection.....	12
Commercial Service Tools.....	4	POWER STEERING GEAR AND LINKAGE	13
ON-VEHICLE SERVICE	5	Removal and Installation.....	13
Checking and Adjusting Drive Belts.....	5	Disassembly.....	16
Checking Fluid Level.....	5	Inspection.....	16
Checking Fluid Leakage.....	5	Assembly.....	16
Bleeding Hydraulic System.....	5	POWER STEERING OIL PUMP	19
Checking Steering Wheel Turning Force.....	6	Disassembly and Assembly.....	19
Checking Steering Wheel Play.....	7	Pre-disassembly Inspection.....	19
Checking Neutral Position on Steering Wheel.....	7	Disassembly.....	20
Front Wheel Turning Angle.....	7	Inspection.....	20
Checking Gear Housing Movement.....	7	Assembly.....	21
Checking Hydraulic System.....	8	SERVICE DATA AND SPECIFICATIONS (SDS)	22
STEERING WHEEL AND STEERING COLUMN	9	General Specifications.....	22
Removal.....	9	Inspection and Adjustment.....	22

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PRECAUTIONS AND PREPARATION



Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision, which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.

STEERING SYSTEM


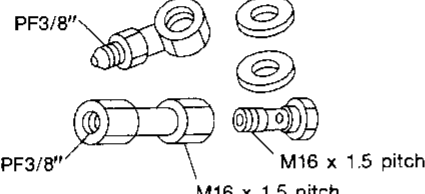
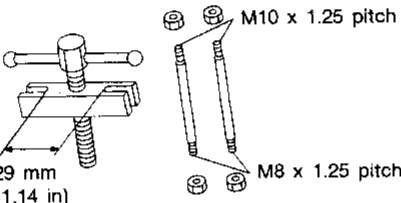
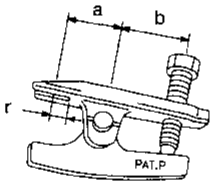
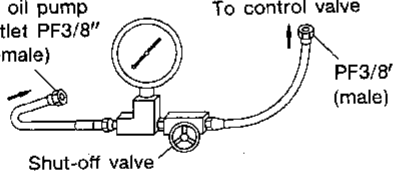
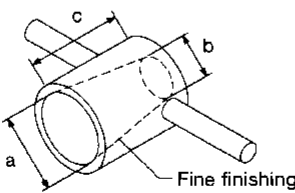
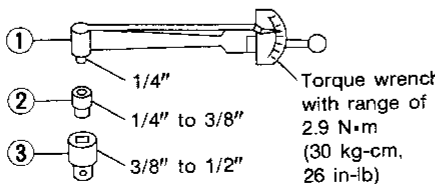
- Before disassembly, thoroughly clean the outside of the unit.
- Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Place disassembled parts in order, on a parts rack, for easier and proper assembly.
- Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.
- Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.
- Before assembly, apply a coat of recommended ATF* to hydraulic parts. Petroleum jelly may be applied to O-rings and seals. Do not use any grease.
- Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.

*: Automatic Transmission Fluid type DEXRON™ II or equivalent.

PRECAUTIONS AND PREPARATION

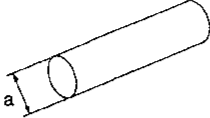
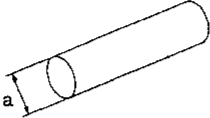
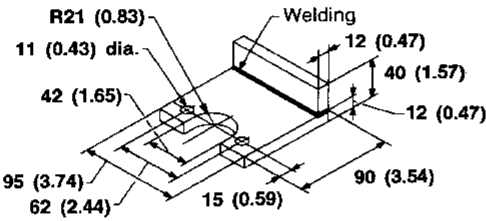
Special Service Tools

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	GI MA EM
KV48100700 (J26364) Torque adapter	 <p>Measuring pinion rotating torque</p> <p>NT169</p>	LC EC FE
KV48102500 (J26357-10) Pressure gauge adapter	 <p>Measuring oil pressure</p> <p>NT542</p>	CL MT AT
ST27180001 (J25726-A) Steering wheel puller	 <p>Removing and installing steering wheel</p> <p>NT544</p>	FA RA
HT27520000 (J25730-B) Ball joint remover	 <p>Removing ball joint</p> <p>NT546</p> <p>a: 33 mm (1.30 in) b: 50 mm (1.97 in) r: R11.5 mm (0.453 in)</p>	BR ST
ST27091000 (J26357 and J26357-10) Pressure gauge	 <p>Measuring oil pressure</p> <p>NT547</p>	RS BT HA
KV48104400 (—) Rack seal ring reformer	 <p>Reforming teflon ring</p> <p>NT550</p> <p>a: 50 mm (1.97 in) dia. b: 36 mm (1.42 in) dia. c: 100 mm (3.94 in)</p>	EL IDX
ST3127S000 (See J25765-A) ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter	 <p>Measuring turning torque</p> <p>NT541</p>	

PRECAUTIONS AND PREPARATION

Commercial Service Tools

Tool name	Description
Rear oil seal drift	 <p>NT063</p> <p>Installing rear oil seal</p> <p>a: 28 mm (1.10 in) dia.</p>
Pinion oil seal drift	 <p>NT063</p> <p>Installing pinion oil seal</p> <p>a: 40 mm (1.57 in) dia.</p>
Oil pump attachment	 <p>NT179</p> <p>Disassembling and assembling oil pump</p> <p>Unit: mm (in)</p>

Checking and Adjusting Drive Belts

Refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

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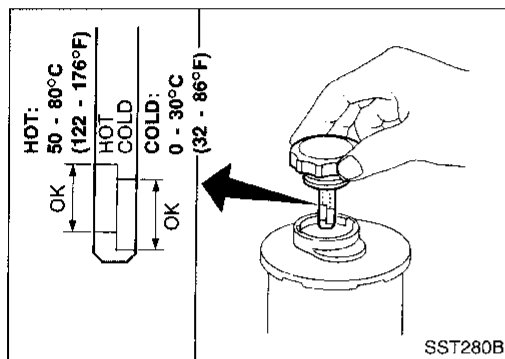
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Checking Fluid Level

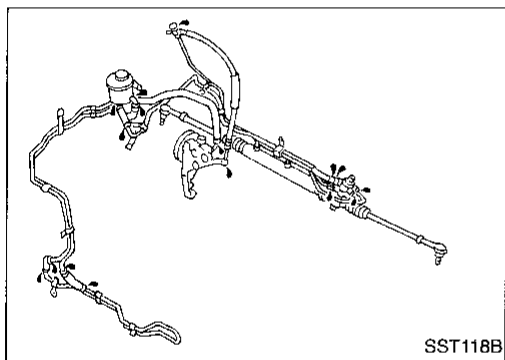
Check fluid level with engine off.

Check fluid level with dipstick on reservoir cap.

Use "HOT" range at fluid temperatures of 50 to 80°C (122 to 176°F). Use "COLD" range at fluid temperatures of 0 to 30°C (32 to 86°F).

CAUTION:

- Do not overfill.
- Recommended fluid is Automatic Transmission Fluid type DEXRON™ II or equivalent.



Checking Fluid Leakage

Check the lines for improper attachment, leaks, cracks, damage, chafing or deterioration.

1. Run engine between idle speed and 1,000 rpm.

Make sure fluid temperature in reservoir tank rises to 60 to 80°C (140 to 176°F).

2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each "lock" position for five seconds and carefully check for fluid leakage.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

4. If fluid leakage at any line is noticed, loosen flare nut and then retighten.

Do not overtighten flare nut as this can damage O-ring, washer and threads.

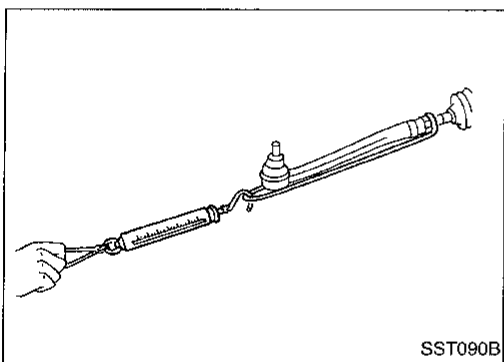
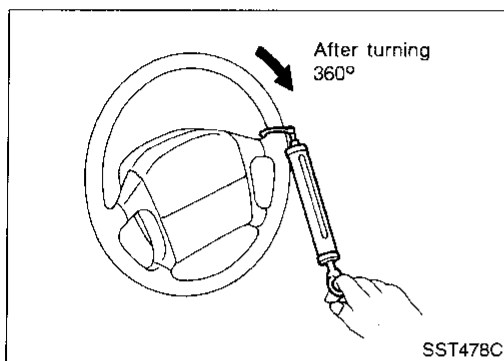
5. Check rack boots for accumulation of power steering fluid.

Bleeding Hydraulic System

1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into oil tank to specified level. Then, quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
Repeat steering wheel operation until fluid level no longer decreases.
3. Start engine.
Repeat step 2 above.

Bleeding Hydraulic System (Cont'd)

- Incomplete air bleeding will cause the following to occur. When this happens, bleed air again.
 - (1) Air bubbles in reservoir tank
 - (2) Clicking noise in power steering pump
 - (3) Excessive buzzing in power steering pumpFluid noise may occur in the valve or power steering pump. This is common when the vehicle is stationary or while turning the steering wheel slowly. This does not affect performance or durability of the system.



Checking Steering Wheel Turning Force

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 to 80°C (140 to 176°F).]

Tires need to be inflated to normal pressure.

4. Check steering wheel turning force when steering wheel has been turned 360° from neutral position.

Steering wheel turning force:

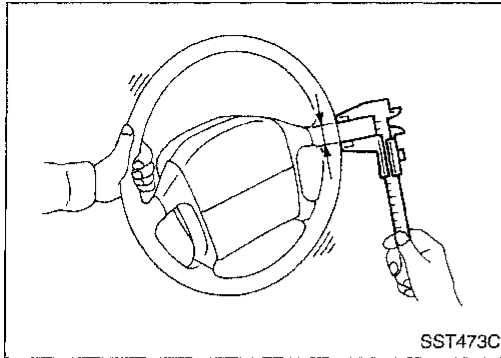
39 N (4 kg, 9 lb) or less

5. If steering wheel turning force is out of specification, check rack sliding force.
 - a. Disconnect steering column lower joint and knuckle arms from the gear.
 - b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.
 - c. Pull tie-rod slowly to move it from neutral position to ± 11.5 mm (± 0.453 in) at a speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.

Rack sliding force:

186 - 284 N (19 - 29 kg, 42 - 64 lb)

6. If rack sliding force is not within specification, replace steering gear assembly.
7. If rack sliding force is OK, inspect steering column. Refer to ST-12.



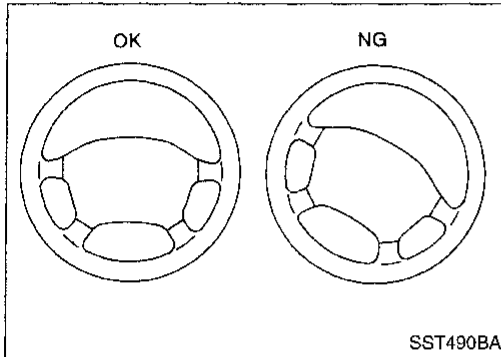
Checking Steering Wheel Play

- With wheels in a straight-ahead position, check steering wheel play.

Steering wheel play:

35 mm (1.38 in) or less

- If it is not within specification, check the following for loose or worn components.
 - (1) Steering gear assembly
 - (2) Steering column
 - (3) Front suspension and axle



Checking Neutral Position on Steering Wheel

Pre-checking

- Make sure that wheel alignment is correct.

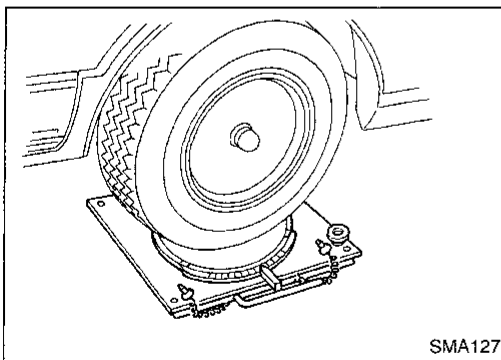
Wheel alignment:

Refer to FA section ("Inspection and Adjustment", "SERVICE DATA AND SPECIFICATIONS").

- Verify that the steering gear is centered before removing the steering wheel.

Checking

1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is still not correct:
 - a. Loosen tie-rod lock nuts.
 - b. Move tie-rods in the opposite direction by the same amount on both left and right sides.
This will compensate for error in the neutral position.



Front Wheel Turning Angle

1. Rotate steering wheel all the way right and left; measure turning angle.

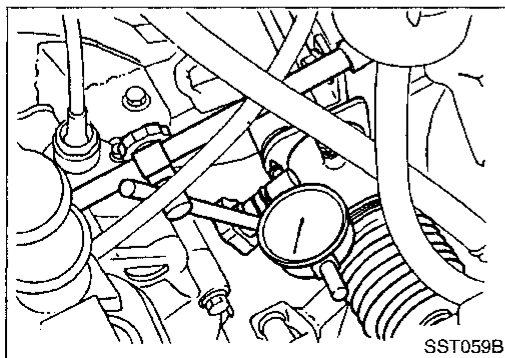
Turning angle of full turns:

Refer to FA section ("Inspection and Adjustment", "SERVICE DATA AND SPECIFICATIONS").

2. If it is not within specification, check rack stroke.

Rack stroke "S":

Refer to SDS, ST-23.



Checking Gear Housing Movement

1. Check the movement of steering gear housing during stationary steering on a dry paved surface.

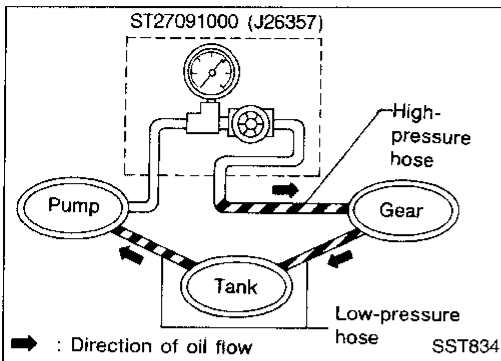
- Apply a force of 49 N (5 kg, 11 lb) to steering wheel to check the gear housing movement.

Turn off ignition key while checking.

Movement of gear housing:

±2 mm (±0.08 in) or less

2. If movement exceeds the limit, replace mounting insulator after confirming proper installation of gear housing mounting brackets.



Checking Hydraulic System

Before starting, check belt tension, driving pulley and tire pressure.

1. Set Tool. Open shut-off valve. Then bleed air. Refer to "Bleeding Hydraulic System", ST-5.
2. Run engine.

Make sure fluid temperature in reservoir tank rises to 60 to 80°C (140 to 176°F).

WARNING:

Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in the power steering pump increases to maximum. This will raise fluid temperature abnormally.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

CAUTION:

Do not hold the steering wheel in a locked position for more than 15 seconds.

**Power steering pump maximum standard pressure:
7,649 - 8,238 kPa (78 - 84 kg/cm², 1,109 - 1,194 psi)**

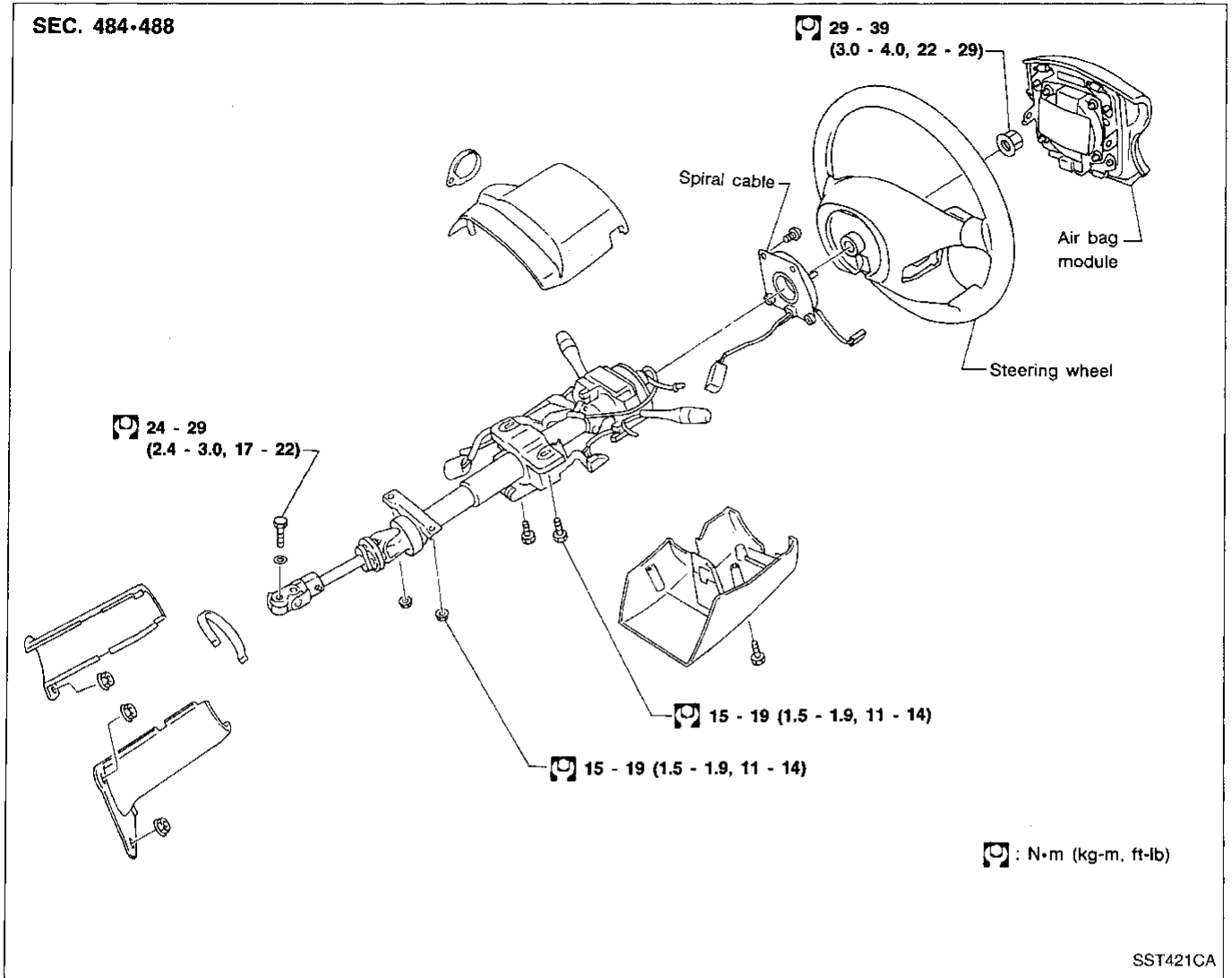
4. If power steering pressure is below the standard pressure, slowly close shut-off valve and check pressure.

CAUTION:

Do not close shut-off valve for more than 15 seconds.

- When pressure reaches standard pressure, gear is damaged.
 - When pressure remains below standard pressure, pump is damaged.
5. If power steering pressure is higher than standard pressure, check power steering pump flow control valve.
 6. After checking hydraulic system, remove Tool and add fluid as necessary. Then completely bleed air out of system. Refer to ST-5.

STEERING WHEEL AND STEERING COLUMN



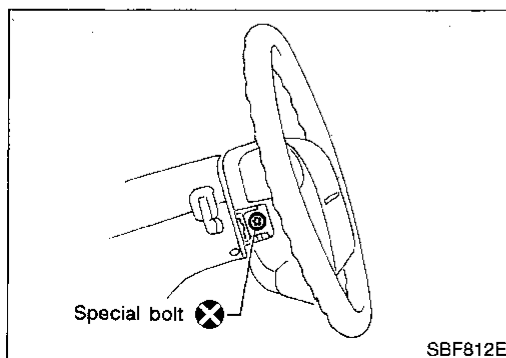
CAUTION:

- The rotation of the spiral cable (SRS "Air bag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.
- Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.

Removal

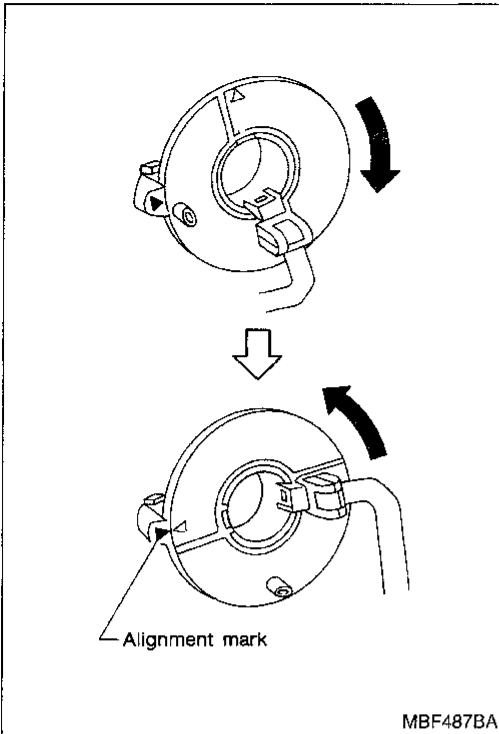
STEERING WHEEL

Remove air bag module and spiral cable. Refer to RS section ("Removal — Air Bag Module and Spiral Cable", "SUPPLEMENTAL RESTRAINT SYSTEM").



STEERING WHEEL AND STEERING COLUMN

Removal (Cont'd)

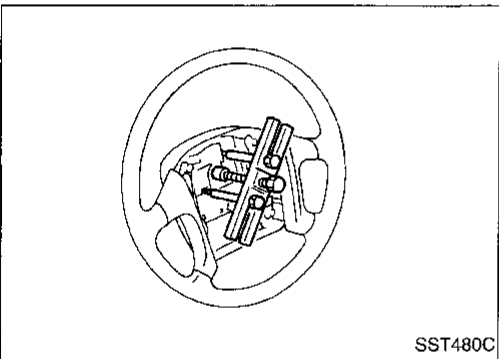


- Align spiral cable correctly when installing steering wheel.
 - a. Set the front wheels in the straight-ahead position.
 - b. Make sure that the spiral cable is in the neutral position. The neutral position is detected by turning left 2.5 revolutions from the right end position. Align the two marks (X).

CAUTION:

The spiral cable may snap due to steering operation if the cable is installed in an improper position.

Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. (The spiral cable can be turned up to 2.5 turns from the neutral position to both the right and left.)



- Remove steering wheel with Tool.

Installation

STEERING WHEEL

Refer to RS section ("Installation — Air Bag Module and Spiral Cable", "SUPPLEMENTAL RESTRAINT SYSTEM").

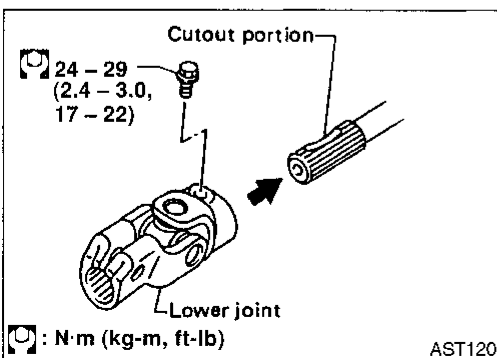
STEERING COLUMN

- When installing steering column, fingertighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.

- When attaching lower coupling joint, be sure tightening bolt faces cutout portion.

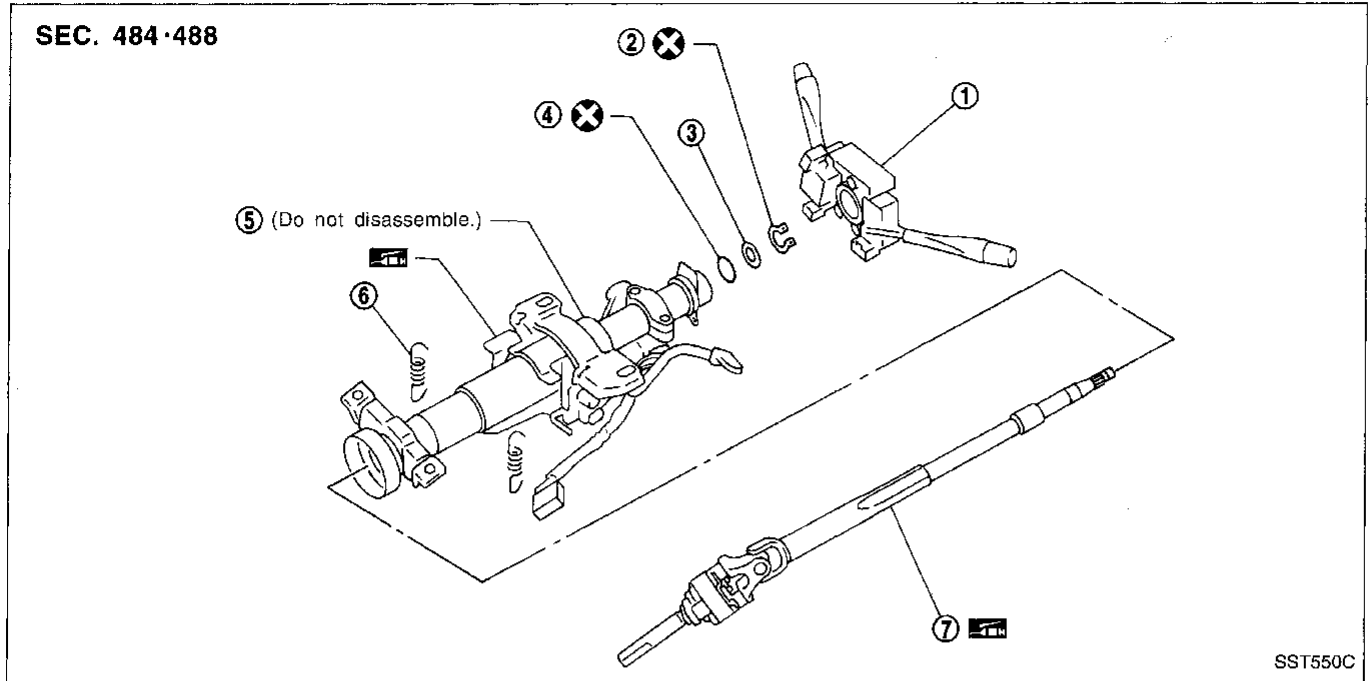
CAUTION:

After installation, turn steering wheel to make sure it moves smoothly. Ensure the number of turns from the straight forward position to left and right locks are the same. Be sure that the steering wheel is in a neutral position when driving straight ahead.

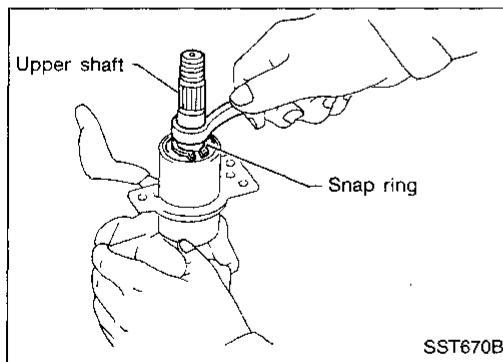


STEERING WHEEL AND STEERING COLUMN

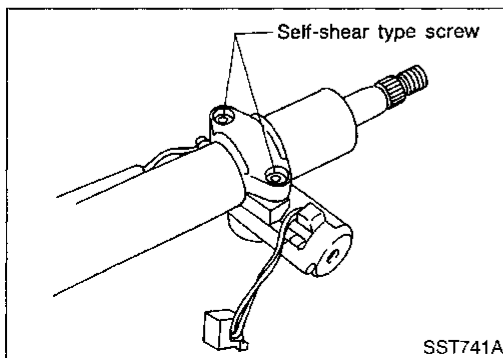
Disassembly and Assembly



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| ① Combination switch | ④ O-ring | ⑥ Spring |
| ② Snap ring | ⑤ Jacket tube assembly | ⑦ Column shaft assembly |
| ③ Washer | | |



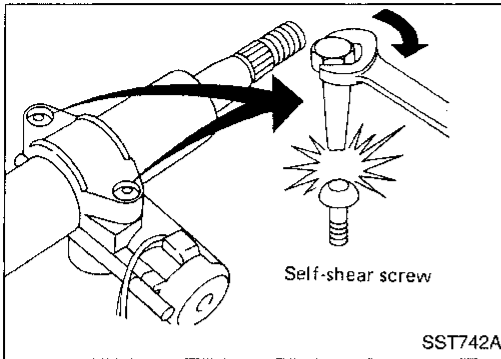
- When disassembling and assembling, unlock steering lock with key.
- Remove combination switch.
- Ensure that rounded surface of snap ring faces toward bearing when snap ring is installed.
- Install snap ring on upper shaft with a suitable tool.



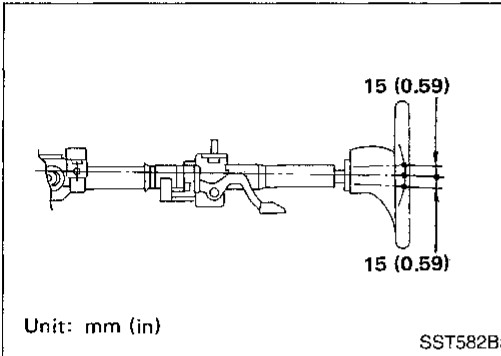
- Steering lock
 - a. Break self-shear type screws with a drill or other appropriate tool.

STEERING WHEEL AND STEERING COLUMN

Disassembly and Assembly (Cont'd)

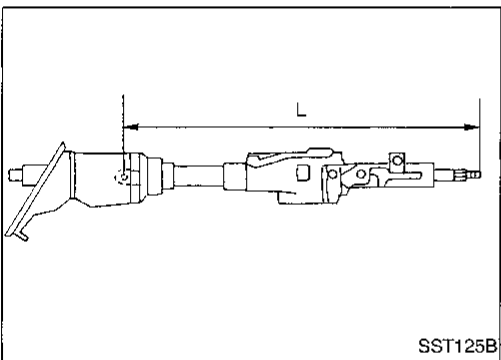


- b. Install self-shear type screws and then cut off self-shear type screw heads.



Tilt mechanism

- After installing steering column, check tilt mechanism operation.



Inspection

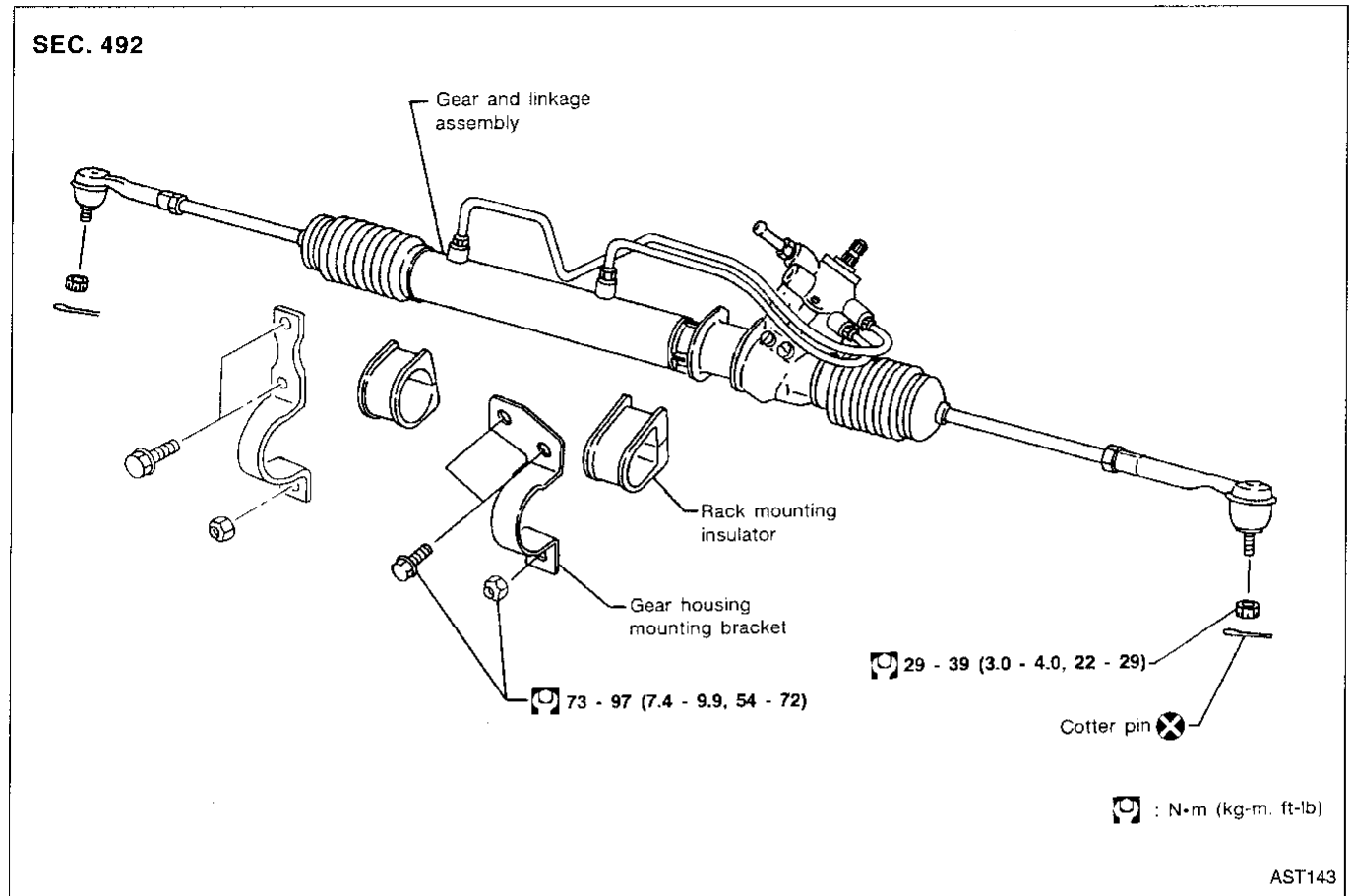
- When steering wheel does not turn smoothly, check the steering column as follows and replace damaged parts.
 - a. Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.
 - b. Check jacket tube for deformation or breakage.
- When the vehicle is involved in a light collision, check column length "L". If it is not within specifications, replace steering column as an assembly.

Column length "L":

526.2 - 527.8 mm (20.72 - 20.78 in)

POWER STEERING GEAR AND LINKAGE

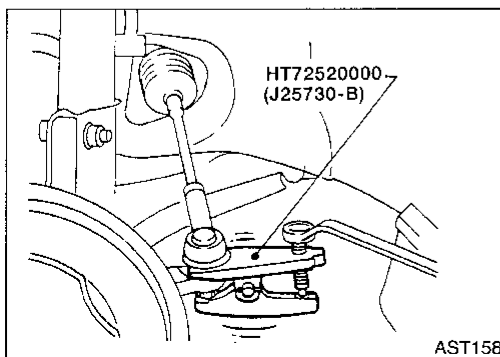
Removal and Installation



CAUTION:

The rotation of the spiral cable (SRS "Air bag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.

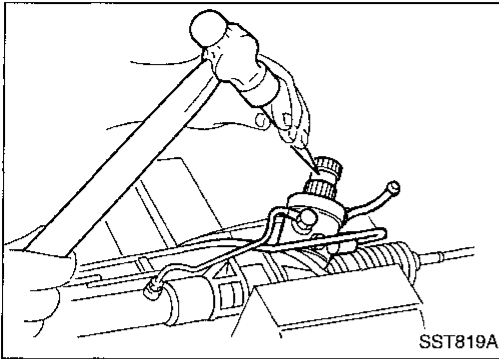
- Loosen upper clamp on dust boot in engine compartment.
- Remove lower bolt from coupling joint.



- Detach tie-rod outer sockets from knuckle arms with Tool.

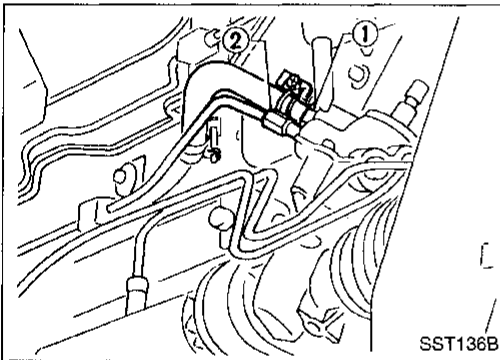
POWER STEERING GEAR AND LINKAGE

Removal and Installation (Cont'd)



- After removing steering gear from vehicle, mark pinion shaft and pinion housing to record neutral position.

- To install, set left and right dust boots to equal deflection, and align matching marks on pinion shaft and pinion housing.



- The O-ring in the low-pressure line ① is larger than that in the high-pressure line ②. Take care to install the proper O-ring.
- Observe specified tightening torque when tightening high-pressure and low-pressure line flare nuts. Excessive tightening can damage threads or O-rings.

Flare nut tightening torque:

Low-pressure side ①

29 - 39 N·m (3.0 - 4.0 kg·m, 20 - 29 ft·lb)

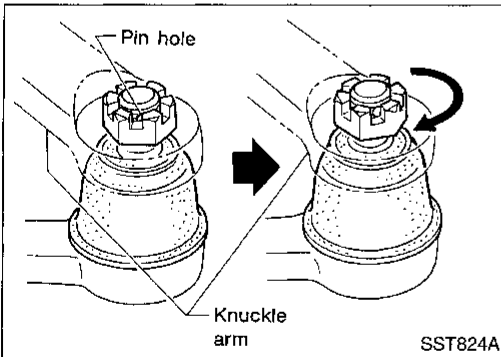
High-pressure side ②

15 - 25 N·m (1.5 - 2.5 kg·m, 11 - 18 ft·lb)

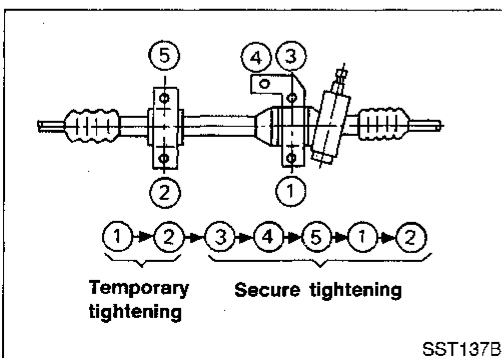
- Initially, tighten nut on tie-rod outer socket and knuckle arm to 29 to 39 N·m (3 to 4 kg·m, 22 to 29 ft·lb). Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

CAUTION:

Tightening torque must not exceed 49 N·m (5 kg·m, 36 ft·lb).

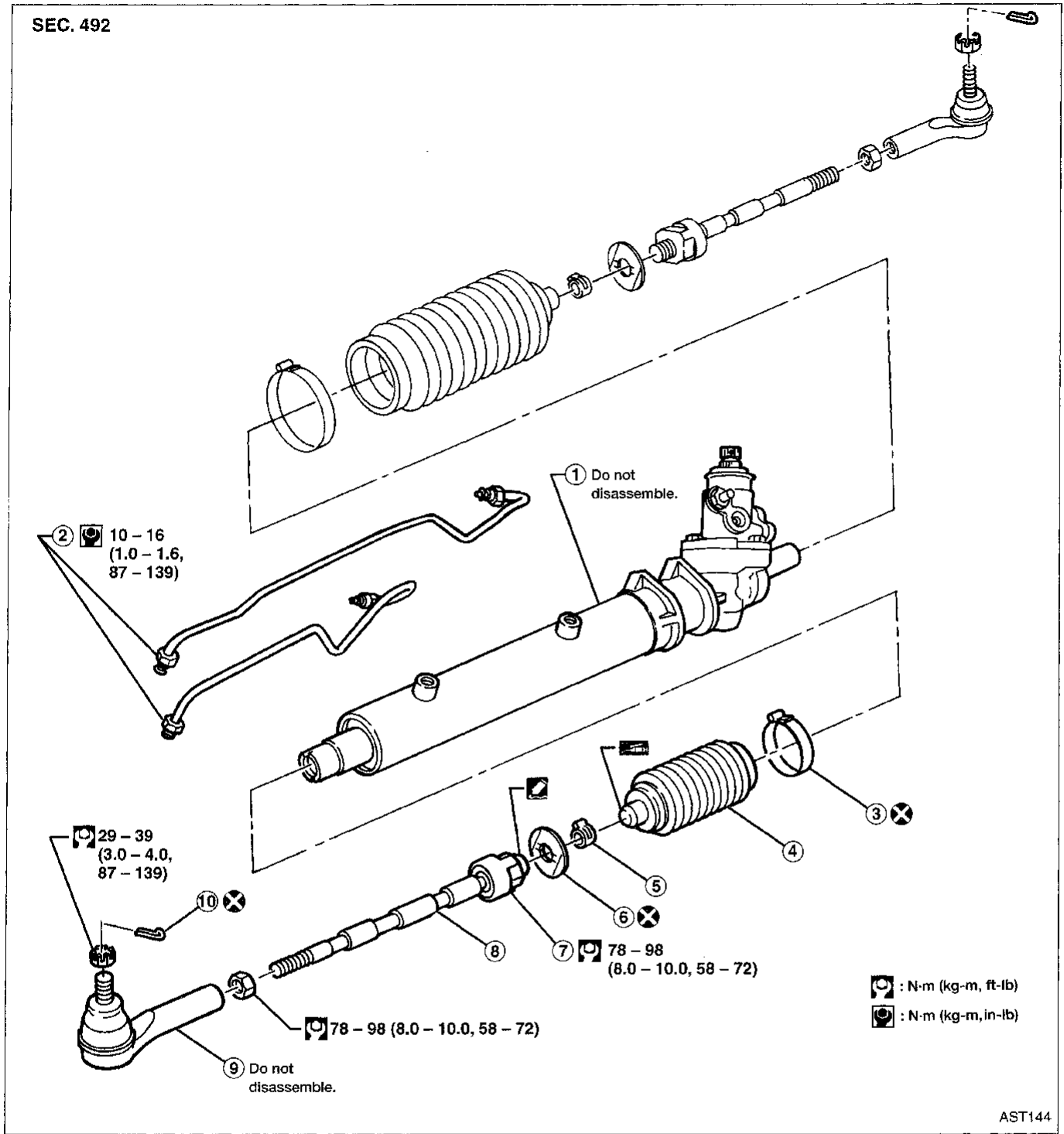


- Tighten gear housing mounting bracket bolts in the order shown.



POWER STEERING GEAR AND LINKAGE

SEC. 492



- ① Steering gear
- ② Gear housing tube
- ③ Boot clamp
- ④ Dust boot

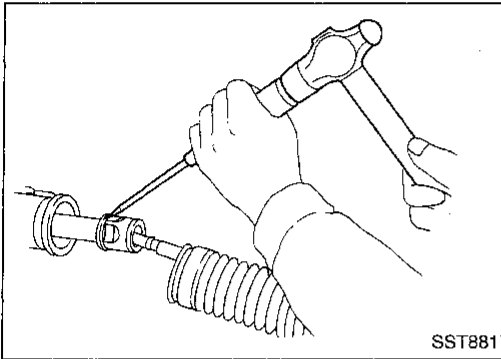
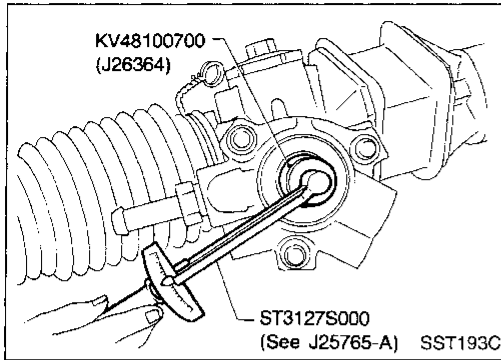
- ⑤ Boot band
- ⑥ Lock plate
- ⑦ Tie-rod inner socket

- ⑧ Tie-rod
- ⑨ Tie-rod outer socket
- ⑩ Cotter pin

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POWER STEERING GEAR AND LINKAGE



Disassembly

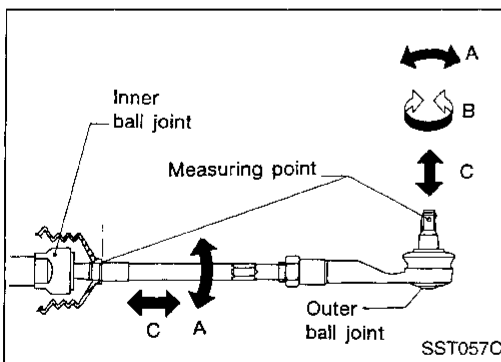
1. Prior to disassembling, measure pinion rotating torque. Record the pinion rotating torque as a reference. Refer to step 6 of "Assembly" for reference torque data.
 - Before measuring, disconnect gear housing tube and drain fluid.
 - Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.
2. Remove tie-rod outer sockets and boots.
3. Loosen tie-rod inner socket by prying up staked portion, and removing socket.

Inspection

Thoroughly clean all parts in cleaning solvent or automatic transmission fluid type DEXRON™II or equivalent. Blow dry with compressed air, if available.

BOOT

Check condition of boot. If cracked excessively, replace it.



TIE-ROD OUTER AND INNER SOCKETS

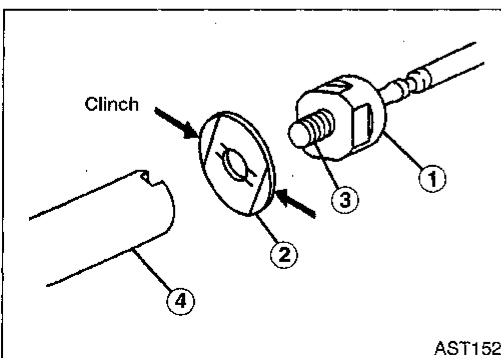
- Check outer and inner ball joints for swinging force "A" and axial end play "C".

Refer to SDS, ST-22.

- Check outer ball joint for rotating torque "B".

Refer to SDS, ST-22.

- Check condition of dust cover. If excessively cracked, replace outer tie-rod.



Assembly

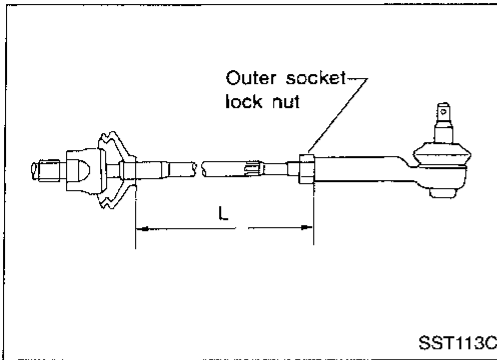
1. Install new lock plate.
 - Attach lock plate ② to tie-rod inner socket ①.
 - Apply locking sealant to inner socket threads. Screw inner socket into rack ④ and tighten to specified torque.
 - Clinch two places of lock plate at tie-rod inner socket.

CAUTION:

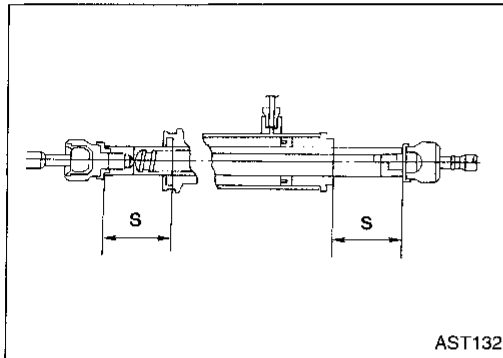
To prevent scratching the boot, remove burrs from lock plate.

POWER STEERING GEAR AND LINKAGE

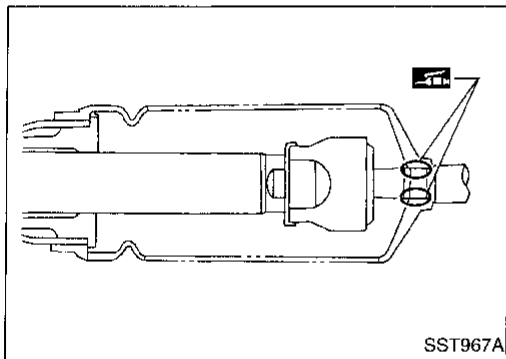
Assembly (Cont'd)



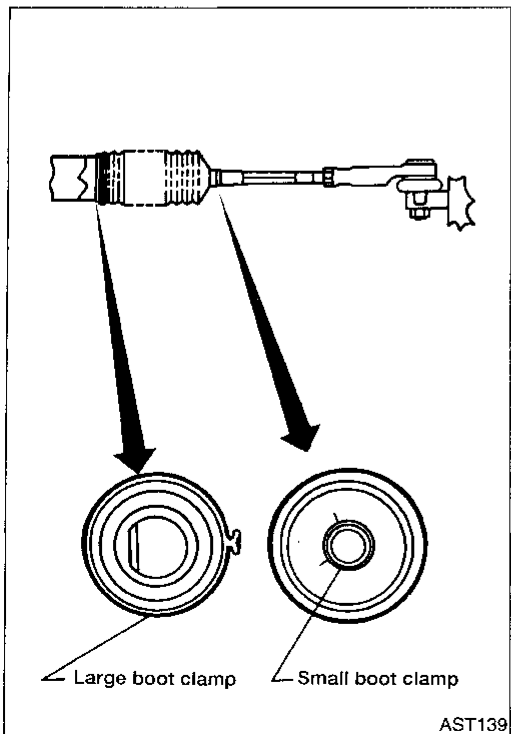
2. Tighten outer socket lock nut.
Tie-rod length "L":
Refer to SDS, ST-22.



3. Measure rack stroke.
Rack stroke "S":
Refer to SDS, ST-23.



4. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.



5. Install boot clamps.
 - Install large boot clamp using suitable tool and crimp securely.
 - Install small boot clamp as shown.

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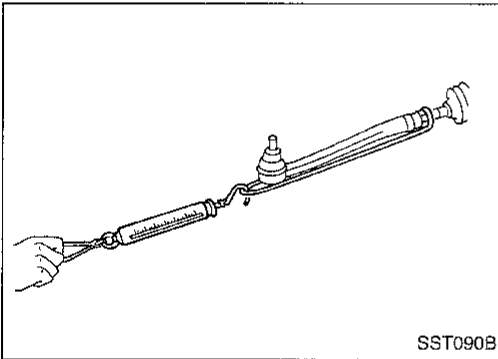
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POWER STEERING GEAR AND LINKAGE

Assembly (Cont'd)

6. Measure pinion rotating torque.
 - Within $\pm 100^\circ$ from the neutral position:**
 - Average rotating torque**
0.78 - 1.47 N·m (80 - 15.0 kg-cm, 6.9 - 13.0 in-lb)
 - Maximum torque deviation**
0.4 N·m (4 kg-cm, 3.5 in-lb)
 - Except for above measuring range:**
 - Maximum rotating torque**
2.1 N·m (21 kg-cm, 18 in-lb)
 - Maximum force deviation**
0.6 N·m (6 kg-cm, 5.2 in-lb)
- If pinion rotating torque is not within the specifications, replace steering gear assembly.

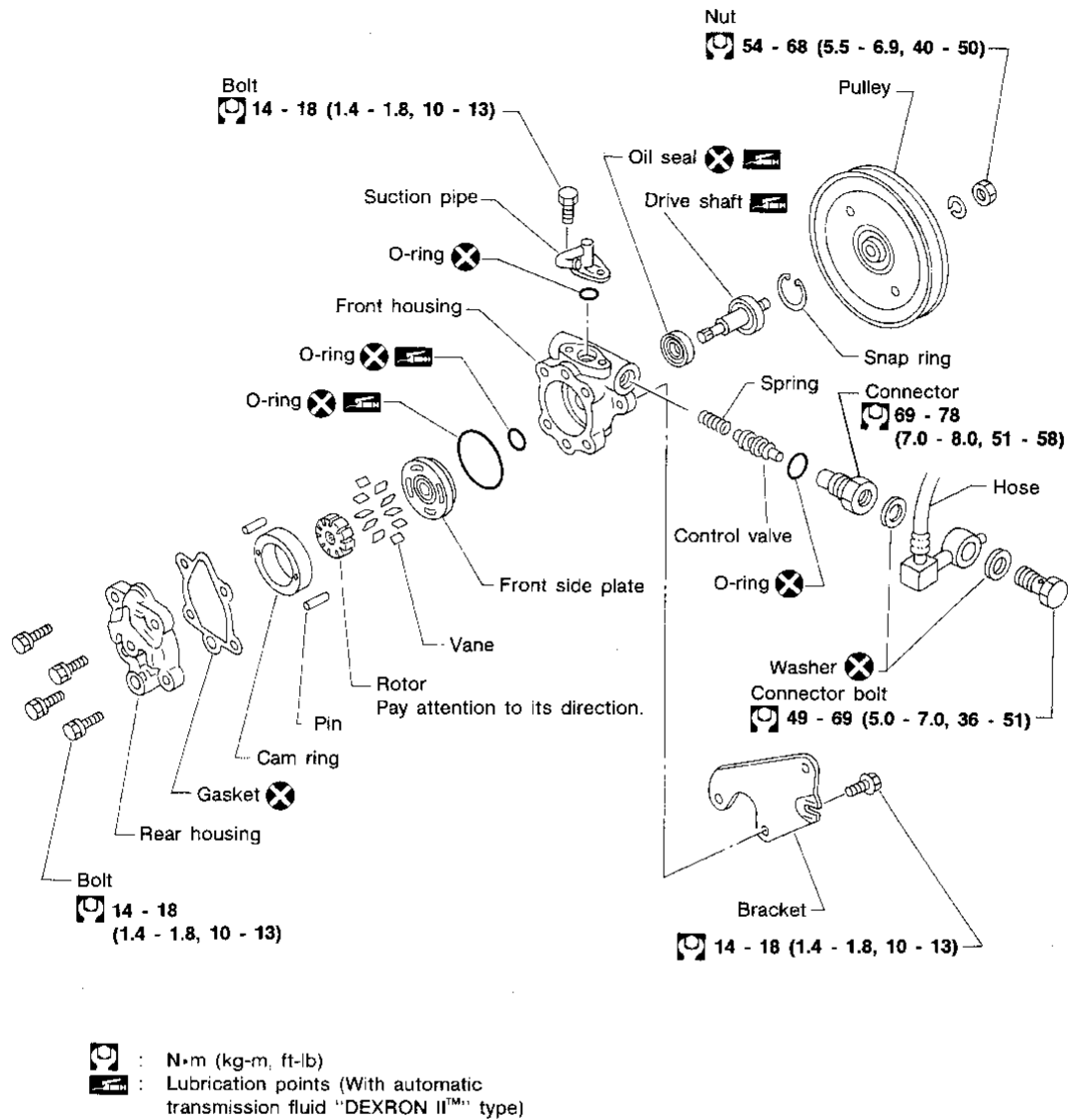


7. Check rack sliding force on vehicle as follows:
 - a. Install steering gear onto vehicle, but do not connect tie-rod to knuckle arm.
 - b. Connect all piping and fill with steering fluid.
 - c. Start engine and bleed air completely.
 - d. Disconnect steering column lower joint from the gear.
 - e. Keep engine at idle and make sure steering fluid has reached normal operating temperature.
 - f. Check rack sliding force while pulling tie-rod slowly in the ± 11.5 mm (± 0.453 in) range from the neutral position.
 - Rack sliding force:**
186 - 284 N (19 - 29 kg, 42 - 64 lb)
 - g. Check sliding force outside above range.
 - Rack sliding force:**
Not more than 324 N (33 kg, 73 lb)
- If rack sliding force is not within specification, replace gear assembly.

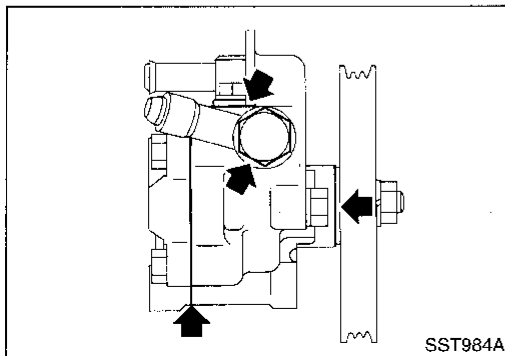
POWER STEERING OIL PUMP

Disassembly and Assembly

SEC. 490



AST145



Pre-disassembly Inspection

Disassemble the power steering pump only if the following items are found.

- Fluid leak from any point shown in the figure.
- Deformed or damaged pulley.
- Poor performance.

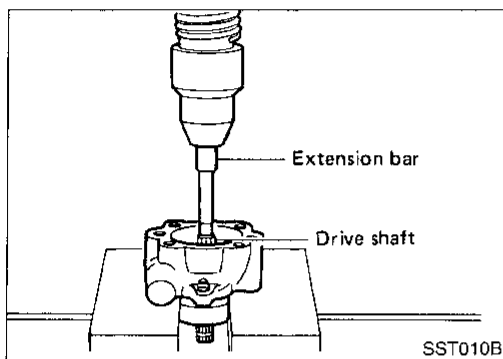
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POWER STEERING OIL PUMP

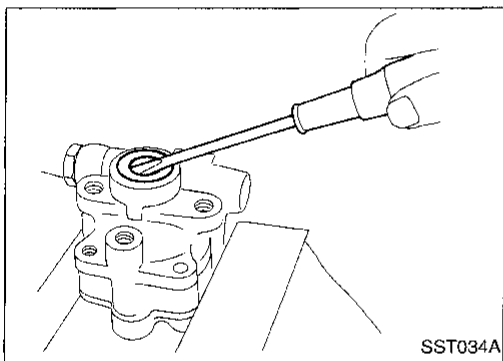
Disassembly

CAUTION:

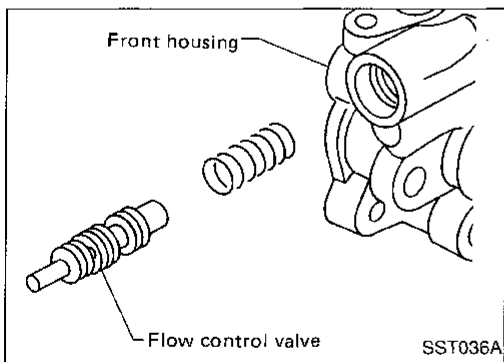
- Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.
- Disassemble in as clean a place as possible.
- Clean your hands before disassembly.
- Do not use rags; use nylon cloths or paper towels.
- When disassembling and reassembling, do not let foreign matter enter or contact the parts.



- Remove snap ring, then draw drive shaft out.
Be careful not to drop drive shaft.



- Remove oil seal.
Be careful not to damage front housing.



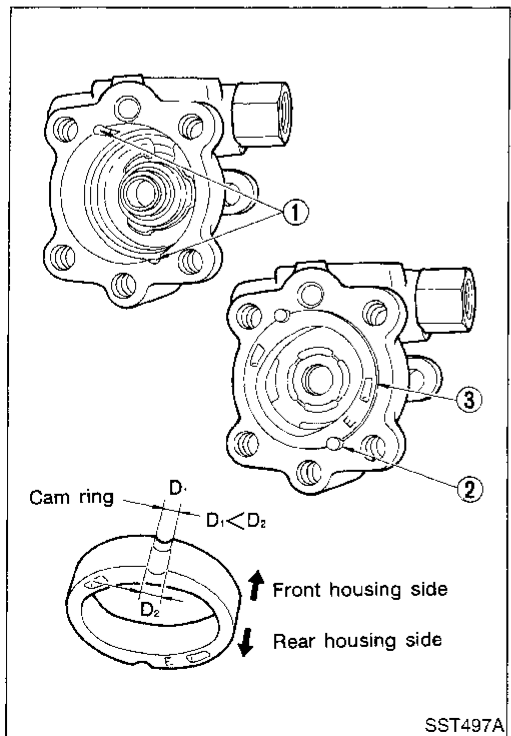
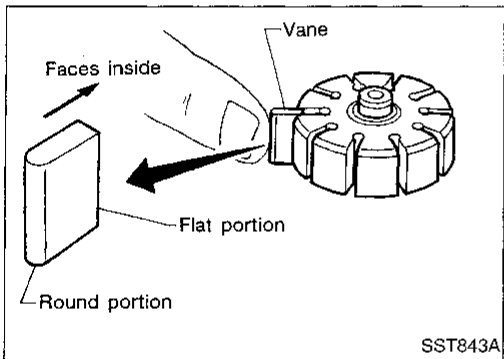
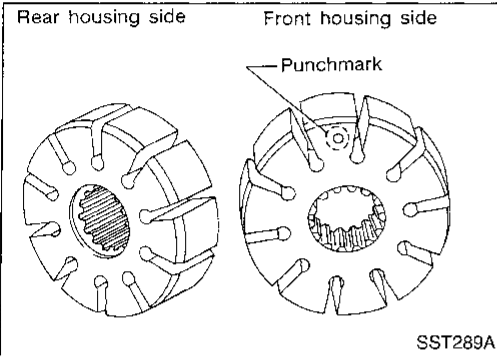
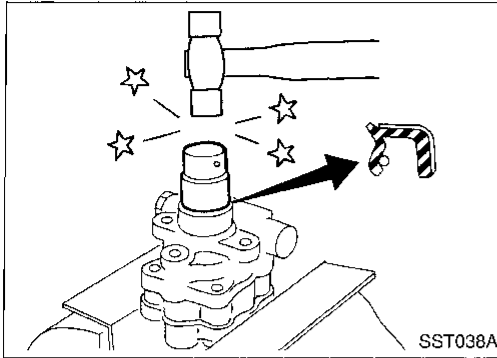
- Remove connector and flow control valve with spring.
Be careful not to drop flow control valve.

Inspection

PULLEY AND PULLEY SHAFT

- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- If serration on pulley or pulley shaft is deformed or worn, replace it.

POWER STEERING OIL PUMP



Assembly

Assemble power steering pump, noting the following instructions.

- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.
- Coat each part with ATF when assembling.

- Pay attention to the direction of rotor.

- When assembling vanes to rotor, rounded surfaces of vanes must face cam ring side.

- Insert pin ② into pin groove ① of front housing and front side plate. Then install cam ring ③ as shown at left.

Cam ring:

D_1 is less than D_2

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SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Applied model	All
Steering model	Power steering
Steering gear type	PR26K
Steering overall gear ratio	17.2
Turns of steering wheel (Lock to lock)	2.83
Steering column type	Collapsible, tilt

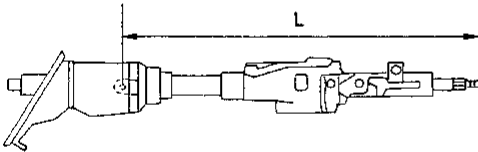
Inspection and Adjustment

GENERAL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less
Movement of gear housing mm (in)	±2 (±0.08) or less

STEERING COLUMN

Steering column length "L" mm (in)	526.2 - 527.8 (20.72 - 20.78)
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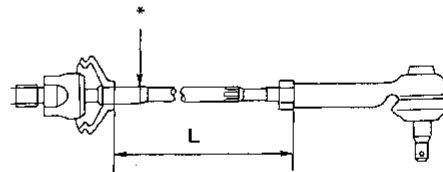


SST125B

STEERING GEAR AND LINKAGE

Steering gear type	PR26K	
Tie-rod outer ball joint Swinging force "A" at cotter pin hole	N (kg, lb)	6.9 - 64.7 (0.7 - 6.6, 1.5 - 14.6)
		Rotating torque "B"
	N-m (kg-cm, in-lb)	0.3 - 2.9 (3 - 30, 2.6 - 26.0)
Axial end play limit "C"	mm (in)	0.1 (0.004) or less
Tie-rod inner ball joint Swinging force* "A"	N (kg, lb)	15.7 - 140.2 (1.6 - 14.3, 3.5 - 31.5)
		Axial end play limit "C"
	mm (in)	0.3 (0.012) or less
Tie-rod standard length "L"	mm (in)	136.8 (5.39)

*: Measuring point



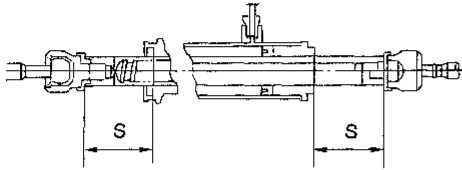
SST371B

SERVICE DATA AND SPECIFICATIONS (SDS)

Inspection and Adjustment (Cont'd)

STEERING GEAR AND LINKAGE (Cont'd)

Steering gear type	PR26K
Rack stroke "S"	66 (2.60)
	mm (in)



SST086BA

Pinion gear preload without gear fluid N·m (kg-cm, in-lb)	
Within ±100° from the neutral position	
Average rotating torque	0.78 - 1.47 (8.0 - 15.0, 6.9 - 13.0)
Within ±100° from the neutral position	
Maximum torque deviation	0.4 (4, 3.5)
Except above range	
Maximum torque deviation	0.6 (6, 5.2)

POWER STEERING

Rack sliding force	N (kg, lb)	
Under normal operating oil pressure		186 - 284 (19 - 29, 42 - 64)
Steering wheel turning force (Measured at one full turn from the neutral position)	N (kg, lb)	39 (4, 9) or less
Fluid capacity (Approximate)	ℓ (US qt, Imp qt)	0.9 (1, 3/4)
Oil pump maximum pressure	kPa (kg/cm ² , psi)	7,649 - 8,238 (78 - 84, 1,109 - 1,194)

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