STEERING SYSTEM

SECTION ST

CONTENTS

Refer to section MA for:

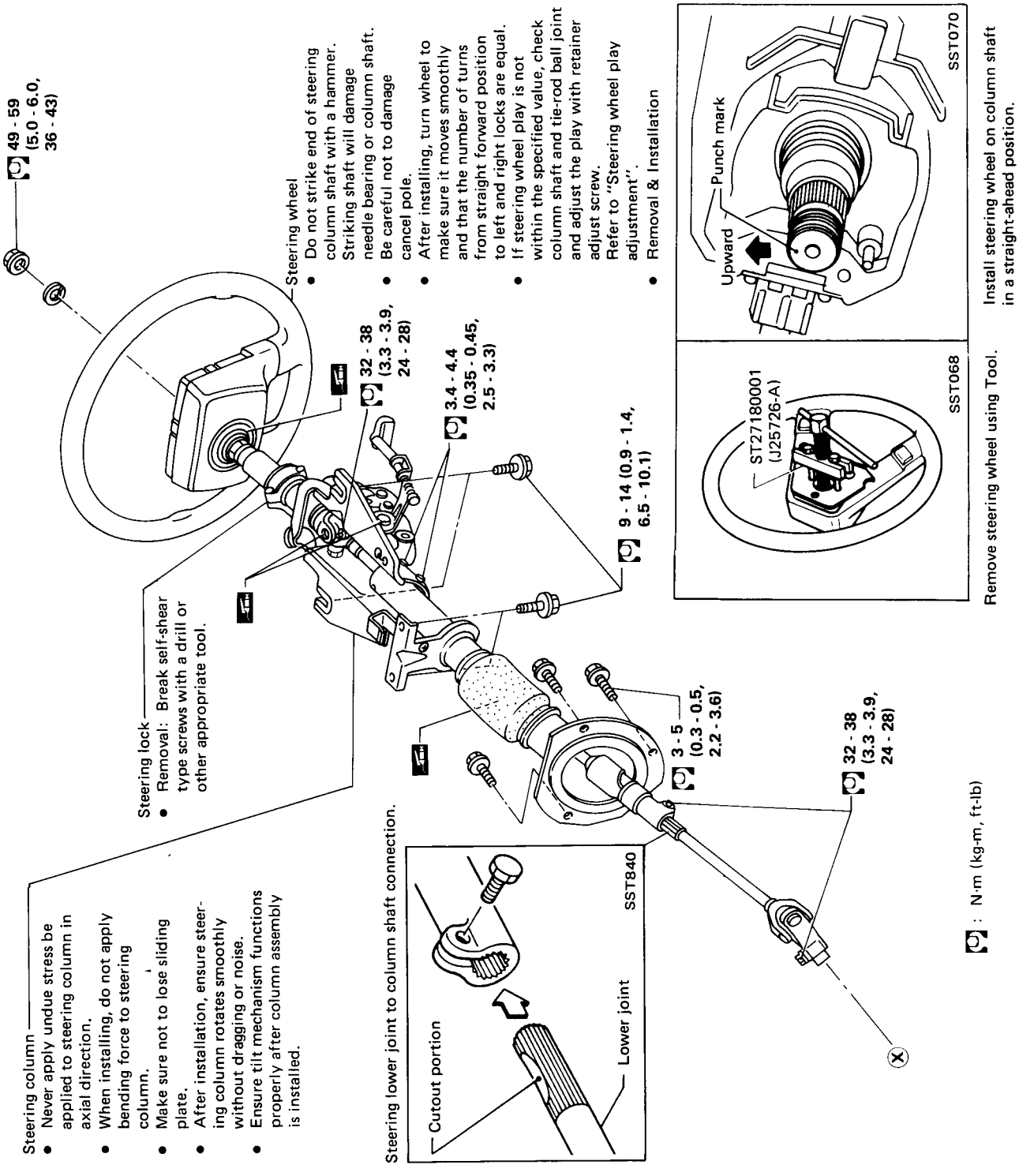
CHECKING WHEEL ALIGNMENT

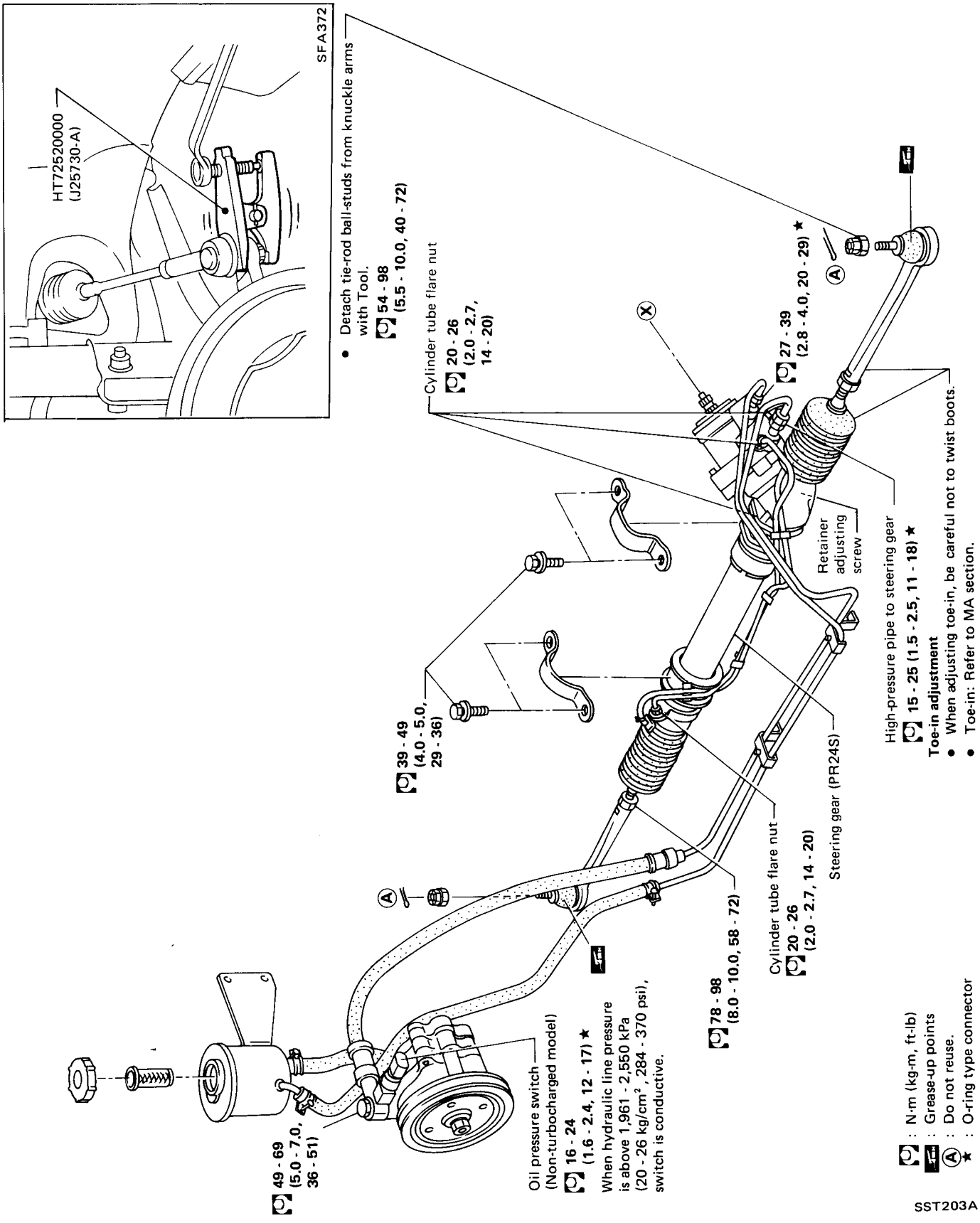
- Toe-in
- Front wheel turning angle

BASIC MECHANICAL SYSTEM

- Checking drive belts

- Fully turn steering wheel to the right and disconnect whole hydraulic line to steering gear assembly, then remove steering gear.
- Whenever disconnecting hydraulic lines, cover openings to prevent foreign material from entering.
- Be careful not to damage hydraulic line connection.
- Do not reuse O-ring in hydraulic system.
- When connecting hydraulic line, apply a coat of oil (Automatic transmission fluid "Dexron Type") to O-rings.
- If disconnecting hydraulic line, always perform leak test and bleed air from line after filling it with oil.
- After properly installing steering gear and linkage, check wheel alignment. Refer to section MA.

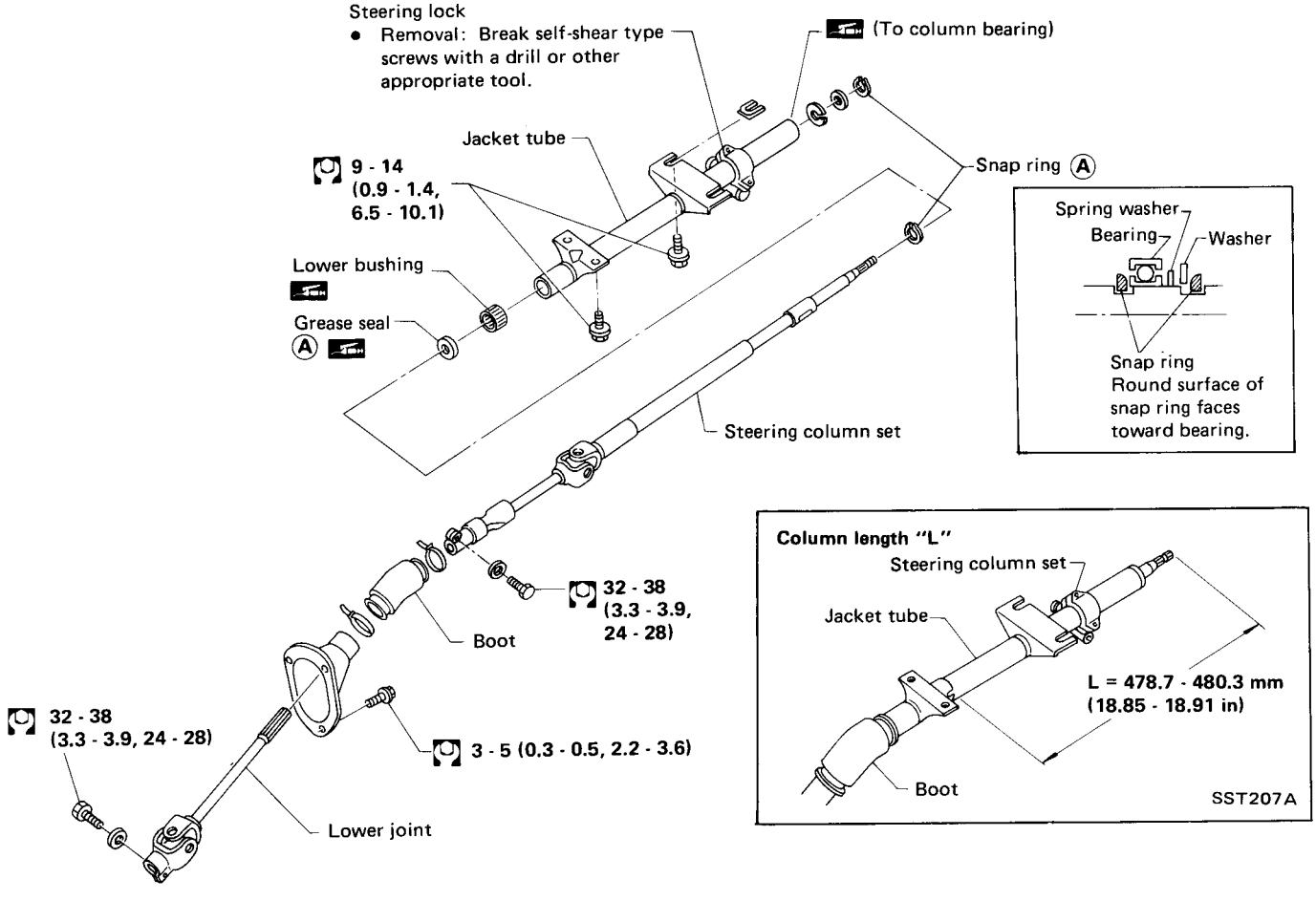



SFA372
HT72520000
(J25730-A)
Detach tie-rod ball-studs from knuckle arms with Tool.
54 - 98
(5.5 - 10.0, 40 - 72)
Cylinder tube flare nut
20 - 26
(2.0 - 2.7, 14 - 20)
27 - 39
(2.8 - 4.0, 20 - 29) ★
39 - 49
(4.0 - 5.0, 29 - 36)
Retainer adjusting screw
High-pressure pipe to steering gear
15 - 25 (1.5 - 2.5, 11 - 18) ★
Toe-in adjustment
When adjusting toe-in, be careful not to twist boots.
Toe-in: Refer to MA section.
Cylinder tube flare nut
20 - 26
(2.0 - 2.7, 14 - 20)
Steering gear (PR24S)
78 - 98
(8.0 - 10.0, 58 - 72)
Oil pressure switch
(Non-turbocharged model)
16 - 24
(1.6 - 2.4, 12 - 17) ★
When hydraulic line pressure is above 1,961 - 2,550 kPa (20 - 26 kg/cm², 284 - 370 psi), switch is conductive.
49 - 69
(5.0 - 7.0, 36 - 51)
: N·m (kg-m, ft-lb)
: Grease-up points
: Do not reuse.
: O-ring type connector
SST203A

- Never in any case should undue stress be applied to steering column in axial direction.
- When installing, do not apply bending force to steering column.
- Be careful not to lose sliding plate.
- When the vehicle comes into light collision, check dimension "L", between steering column upper end and jacket tube crashable area.

  Column length "L" = 478.7 mm - 480.3 mm (18.85 - 18.91 in)
  (Measure "L" at neutral position of steering column if equipped with tilt mechanism)
- Check steering column for smooth rotation without binding and noise. If it does not rotate smoothly, check as follows:

Non-tilt Type Column

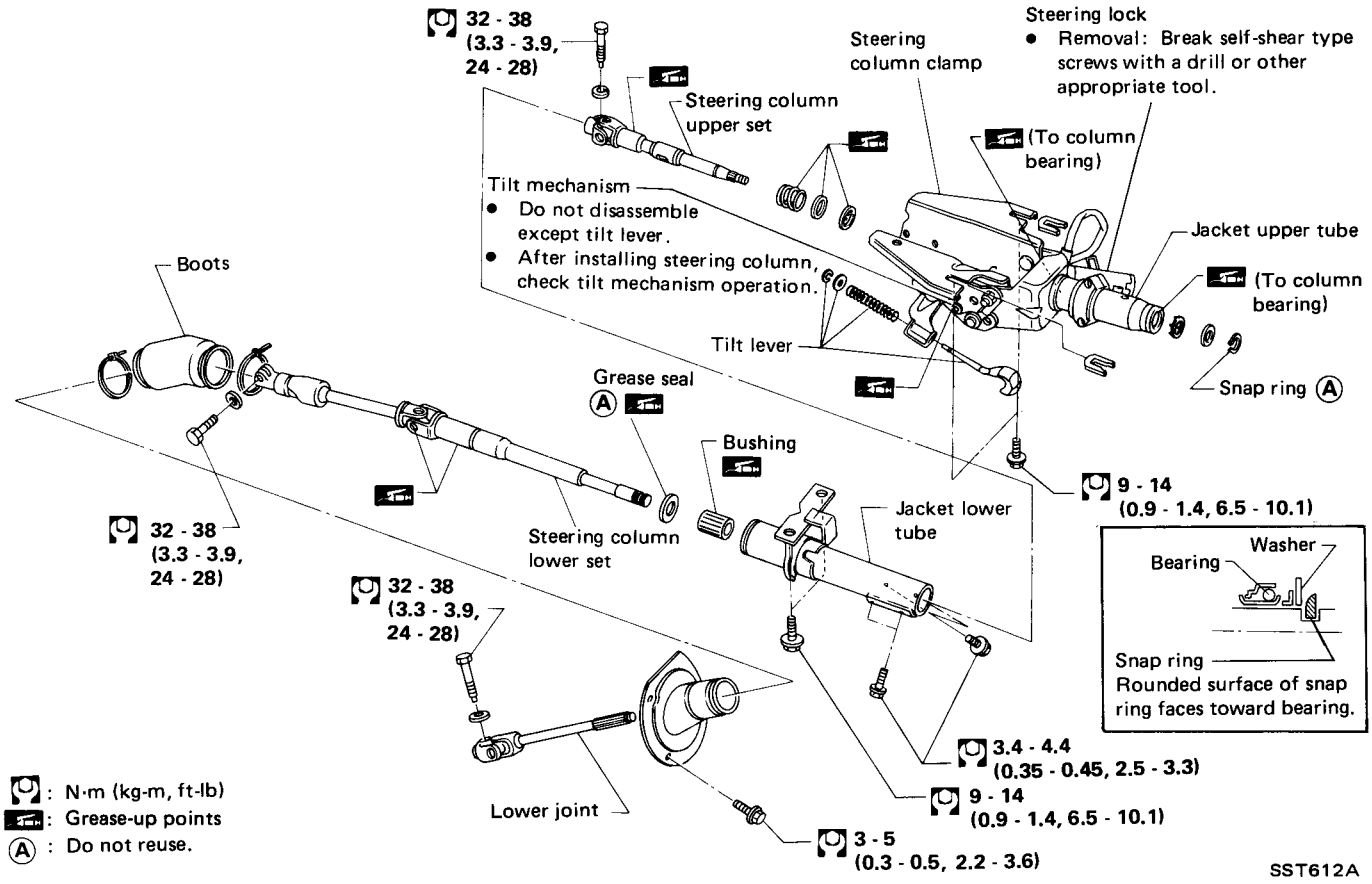


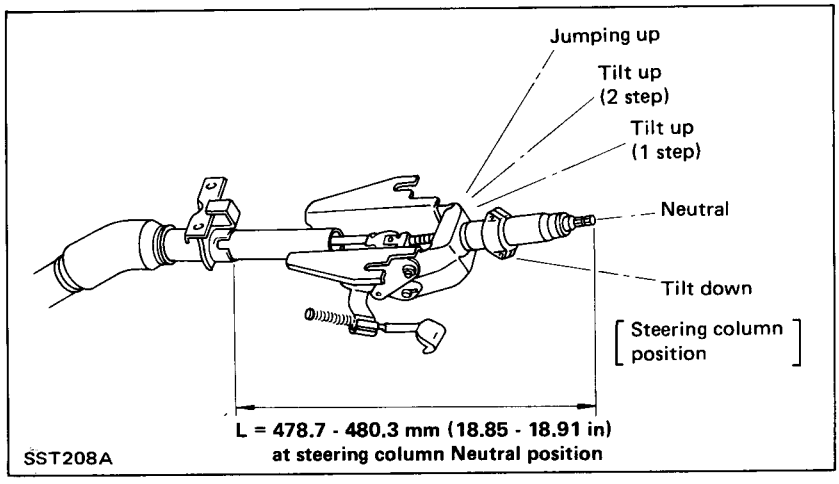
: N·m (kg-m, ft-lb)
: Grease-up points
(A) : Do not reuse.

SST205A

STEERING COLUMN

Tilt Type Column





POWER STEERING SYSTEM —Checking

Fluid Level Check

Check the fluid level when the fluid is cold.
Refer to MA section.

Power Steering Pump Belt Tension

Refer to MA section.

Fluid Leakage Check

1. Run engine at idle speed or 1,000 rpm.
   Make sure temperature of fluid in 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 steering wheel at "lock" position for more than 15 seconds at a time.**
- **If fluid leaks at connectors, replace O-ring (if equipped). Do not overtighten connector as this can damage O-ring and connector.**

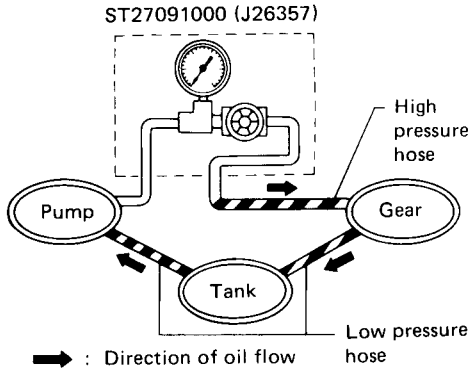
Bleeding Hydraulic System

1. Raise front end of vehicle until wheels clear ground.
2. While adding fluid, 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.

Hydraulic System Check

Before starting, check belt tension, driving pulley and tire pressure. (Refer to MA section.)

1. Set Tool. Open shut off valve. Then bleed air. (See "Bleeding Hydraulic System".)



SST834

2. Run engine.

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

3. Check pressure with steering wheel fully turned to left and right position.

CAUTION:

Do not hold steering wheel at lock position for more than fifteen seconds.

Oil pump maximum pressure:
6,669 - 7,257 kPa
(68 - 74 kg/cm², 967 - 1,052 psi at idling)

4. If oil pressure is below the standard, slowly close shut-off valve and check pressure.
   - If pressure raises to standard, gear is damaged.
   - If pressure remains below standard, pump is damaged.
     Gear may be damaged.
5. If oil pressure is above the standard, pump may be damaged.

CAUTION:

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

6. After checking hydraulic system, remove Tool and add fluid as necessary, then completely bleed air out of system.

POWER STEERING SYSTEM —Checking

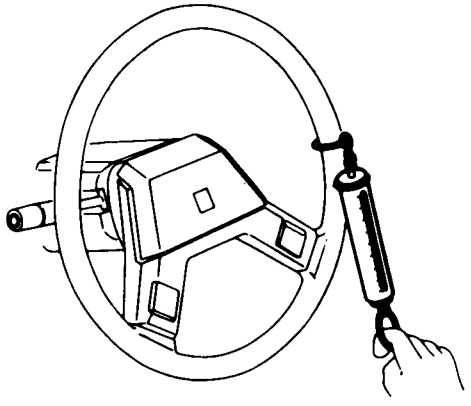
Turning Force Check

1. Park vehicle on a level, dry surface and set parking brake.
2. 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 must be inflated to normal pressure.**

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

Steering wheel turning force:
Less than 39.2 N (4.0 kg, 8.8 lb)



SST474

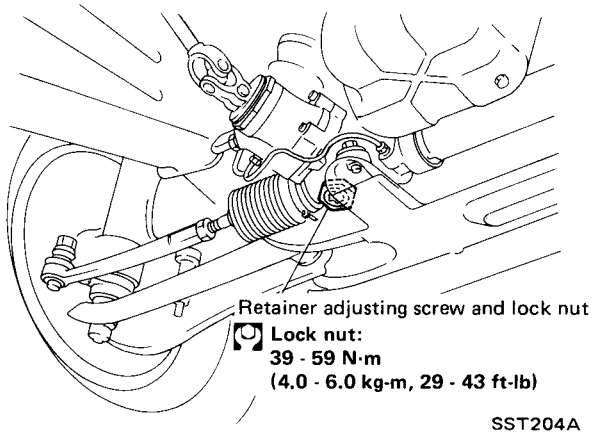
Steering Wheel Play Adjustment

Steering wheel axial play:
0 mm (0 in)
Steering wheel play:
Less than 35 mm (1.38 in)

If steering wheel play is not within specifications, check condition of column shaft and tie-rod ball points. If they are in good order, adjust rack retainer.

Rack retainer adjustment:

a) Adjust only when steering wheel play is outside specifications.
b) Prior to adjustment, completely loosen adjustment screw, clean old locking sealer and apply new locking sealer.
Tighten the screw to approximately 3 N·m (0.3 kg-m, 2.2 ft-lb) and back off by 20 to 25°. Measure steering wheel play to make sure it is within specifications. Then tighten lock nut.



Retainer adjusting screw and lock nut
Lock nut:
39 - 59 N·m
(4.0 - 6.0 kg-m, 29 - 43 ft-lb)

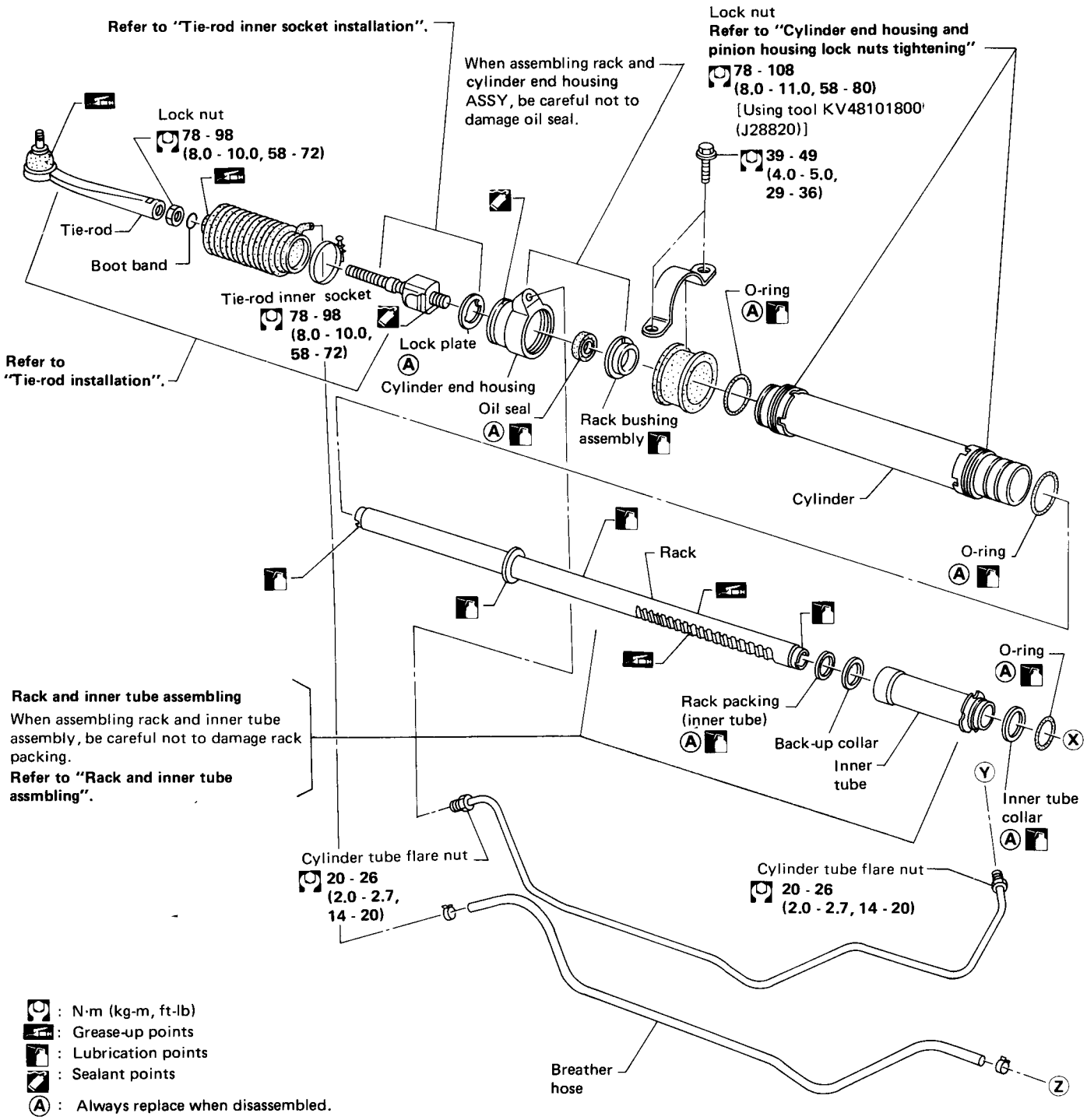
SST204A

c) After adjustment, drive vehicle at low speeds to check for proper operation of steering system.

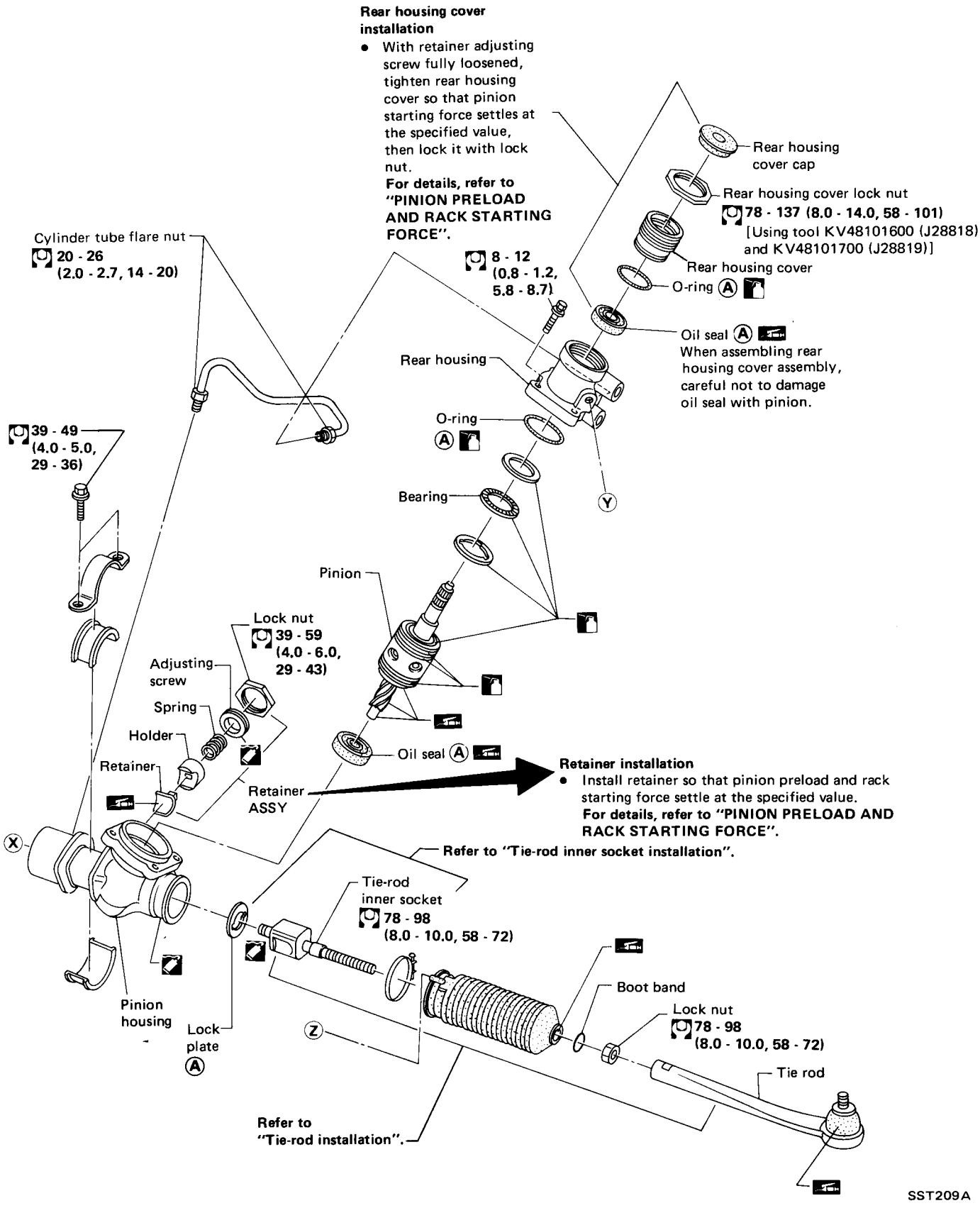
POWER STEERING GEAR AND LINKAGE

Disassembly and Assembly

- Do not disassemble unless repairing to stop oil leak, replacing tie-rod and tie-rod inner socket ball joint, or for various adjustments.
- Do not reuse O-rings or oil seals.
- When assembling, apply a coat of oil to mating surfaces of O-rings and oil seals.
- When assembling, be careful not to damage oil seals.
- Before starting work, thoroughly clean all parts in cleaning solvent or automatic transmission fluid "Dexron Type" and blow dry with compressed air, if available.
- After assembling tie-rod inner socket to rack & housing assembly, check rack stroke (refer to "Rack stroke").



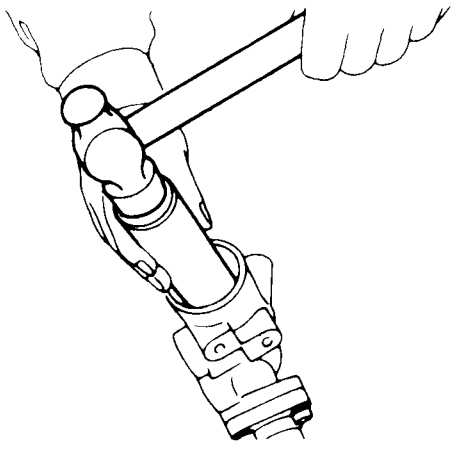
Disassembly and Assembly (Cont'd)



Disassembly and Assembly (Cont'd)

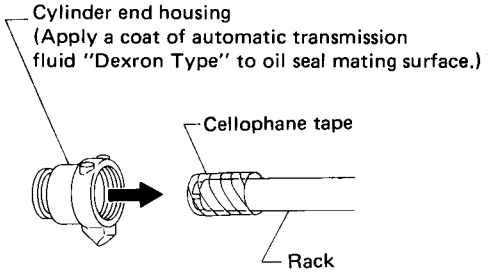
ASSEMBLY

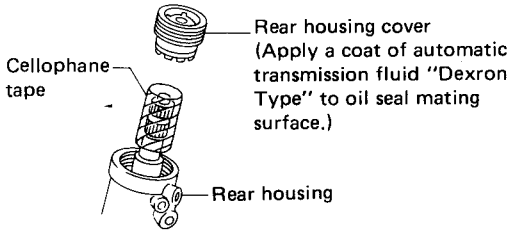
- Before starting work, thoroughly clean all parts in cleaning solvent or automatic transmission fluid "Dexron Type" and blow dry with compressed air, if available.
- Do not reuse old oil seal, packing and O-ring. Always install new ones.
- When installing oil seals, use suitable tool.



SST548

- When installing cylinder end housing or rear housing cover, wrap cellophane tape around rack end or pinion serrations to prevent oil seal from being damaged.





SST210A

- Apply oil to O-rings as well as frictional surfaces of oil seals and packings.

1. Assemble inner tube assembly to rack.

- Be careful not to scratch rack packing. Refer to "Rack and inner tube assembling".

2. Assemble rack & inner tube assembly, cylinder, cylinder end housing and pinion housing.

- Be careful not to damage oil seal.
- Pay attention to direction for the cylinder end housing and pinion housing to prevent undue stress from being applied to hydraulic pipes.
- Cylinder end housing and pinion housing lock nut.

  : **78 - 108 N·m (8.0 - 11.0 kg-m, 58 - 80 ft-lb)**

  Refer to "Cylinder end housing and pinion housing lock nut tightening".

3. Install tie-rod inner socket, boot and tie-rod to rack & housing assembly, and then check rack stroke.

- Refer to "Tie-rod inner socket installation", "Tie-rod installation", and "Rack stroke".

4. Install pinion complete and rear housing complete.

- Be careful not to damage oil seal.
- After adjusting pinion preload, tighten rear housing cover lock nut.

  : **Rear housing cover lock nut: 78 - 137 N·m (8 - 14 kg-m, 58 - 101 ft-lb)**

  Refer to "Pinion preload adjustment".

5. Install retainer assembly.

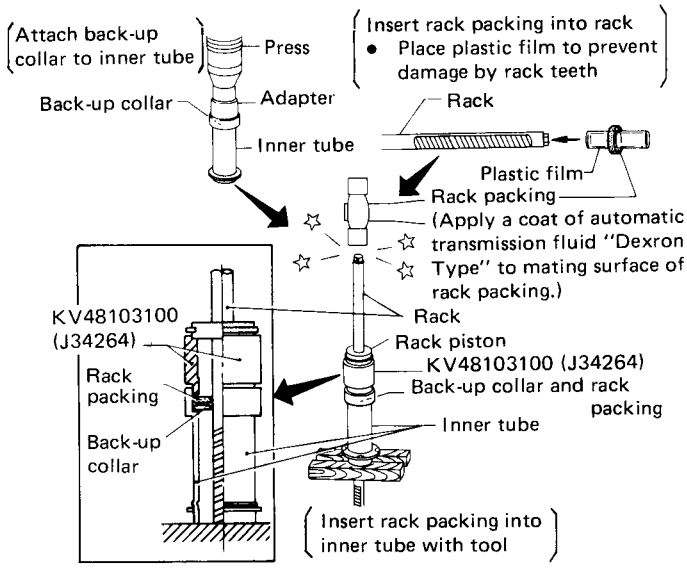
- Make sure pinion preload and rack steering force adjusted to specifications. Refer to "Retainer adjustment".

6. Check rack for smooth movement over its entire stroke, without binding and noise.

7. Install hydraulic piping and breather hose.

Disassembly and Assembly (Cont'd)

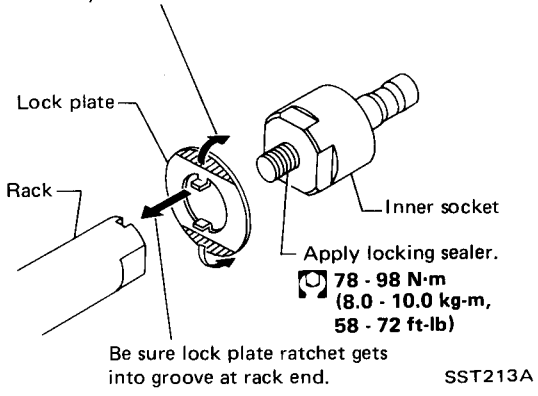
Rack and inner tube assembling



SST846A

Tie-rod inner socket installation

After tightening inner socket, bend lock plate securely and remove burrs.



SST213A

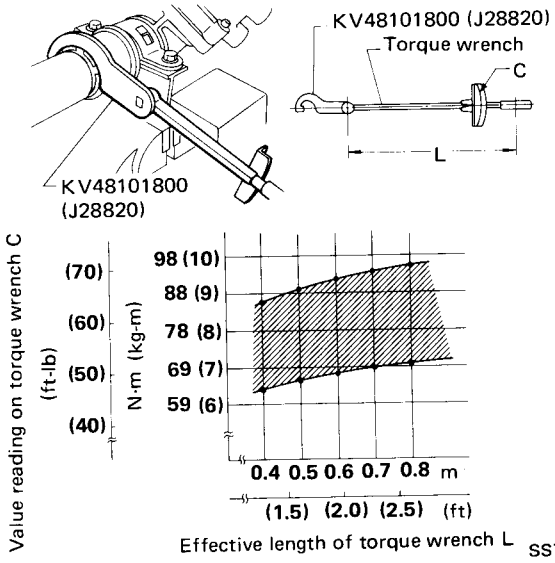
Cylinder end housing and pinion housing lock nut tightening

: **Lock nut:**

Without Tool

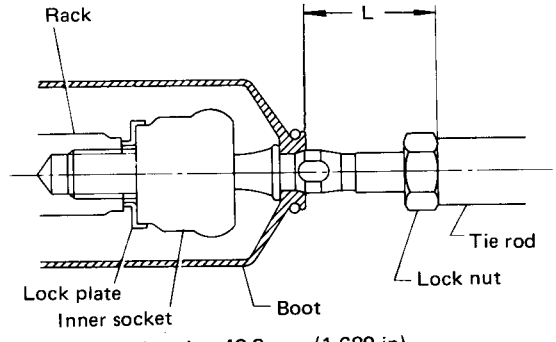
78 - 108 N·m

(8.0 - 11.0 kg-m, 58 - 80 ft-lb)



SST212A

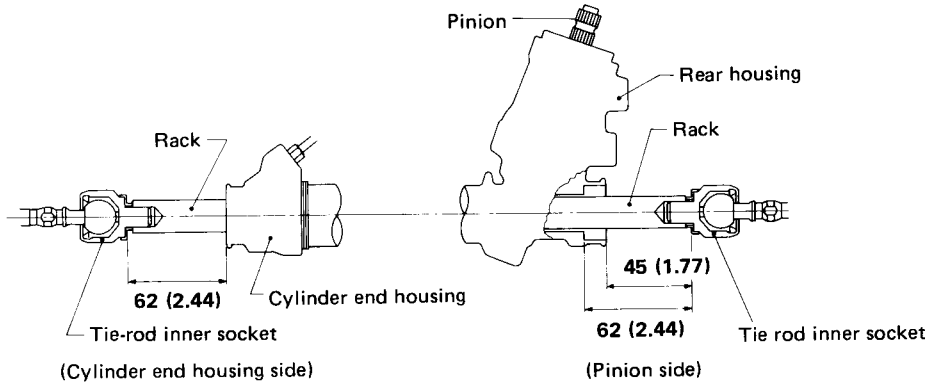
Tie-rod installation



- Standard dimension L = 42.9 mm (1.689 in)
- When installing tie-rod or adjusting toe-in, be careful not to twist boots.
- Toe-in: Refer to MA section.

SST214A

Rack stroke



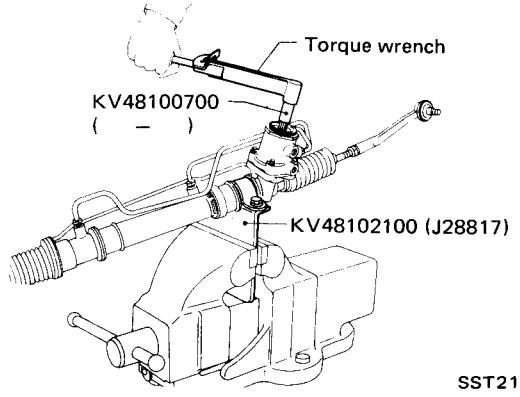
Unit: mm (in)

SST215A

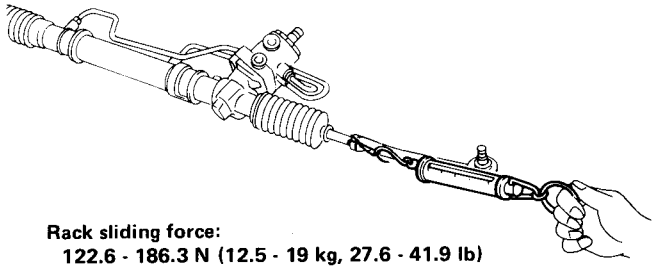
PINION PRELOAD AND RACK STARTING FORCE

- After disconnecting hydraulic line and draining fluid, measure them.

Pinion rotating torque:
Less than 1.9 N·m (19 kg-cm, 16 in-lb)



SST216A



Rack sliding force:
122.6 - 186.3 N (12.5 - 19 kg, 27.6 - 41.9 lb)
in neutral position

SST217A

- If they are not within specifications, adjust retainer adjusting screw.
- If retainer adjustment cannot be made properly, fully loosen retainer adjusting screw, and then adjust pinion preload.
  Then readjust retainer adjusting screw.
- If pinion preload adjustment cannot be made properly, replace steering gear assembly.

Retainer adjustment

1. Remove retainer adjusting screw and clean old locking sealer off the threads.
2. Apply new locking sealer to the threads. Tighten the screw to approximately 3 N·m (0.3 kg-m, 2.2 ft-lb) and back it off by 20 to 25°.
3. If pinion and rack preloads are within specified ranges, tighten lock nut securely. (Check rack for smooth movement over its entire stroke.)

Pinion rotating torque:
Less than 1.9 N·m (19 kg-cm, 16 in-lb)

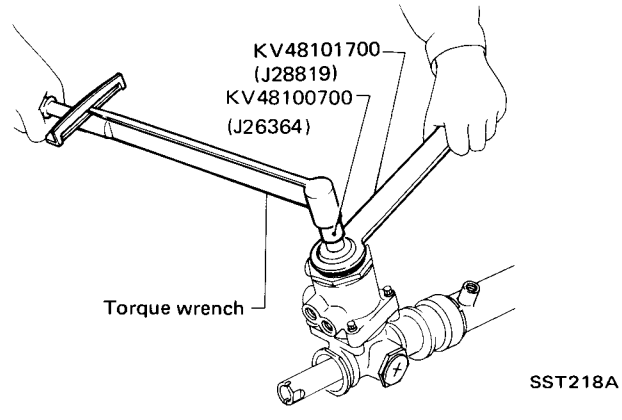
Rack sliding force:
122.6 - 186.3 N
(12.5 - 19 kg, 27.6 - 41.9 lb)
in neutral position

: Retainer adjusting screw lock nut:
39 - 59 N·m
(4.0 - 6.0 kg-m, 29 - 43 ft-lb)

Pinion preload adjustment

Before making pinion preload adjustment, make sure retainer adjusting screw is loosened completely.

1. Screw in rear housing cover completely and back it off by 180 to 360°. Then turn pinion a few rotations and then measure pinion starting torque.



SST218A

Pinion starting torque T_1 :
Less than 0.7 N·m (7 kg-cm, 6.1 in-lb)

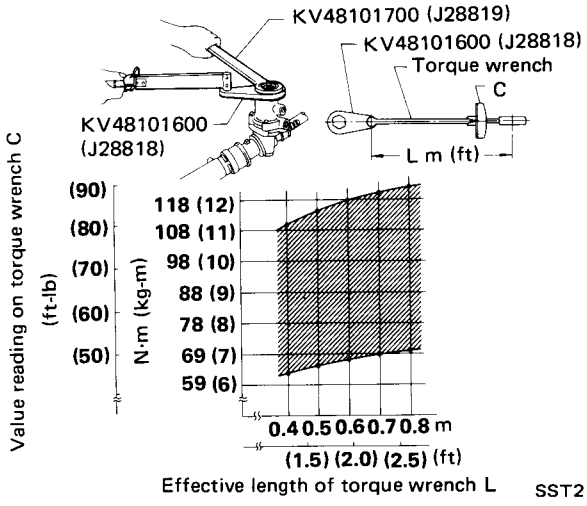
Free play should not be allowed for pinion.

Inspection and Adjustment (Cont'd)

2. Screw in rear housing cover until pinion starting torque reaches "T_2"; then tighten lock nut.

   $T_2 = T_1 + 0.5$ N·m (5 kg-cm, 4.3 in-lb)

   : **Lock nut**
   78 - 137 N·m
   (8.0 - 14.0 kg-m, 58 - 101 ft-lb)



SST219A

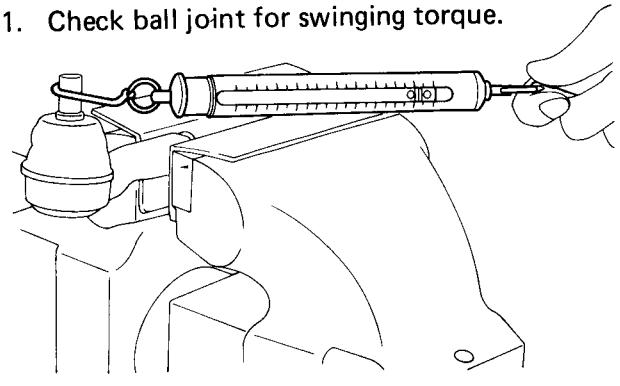
3. Measure pinion starting torque T_3 to make sure it is within specified range.

   T_3:
   Less than 0.8 N·m (8 kg-cm, 6.9 in-lb)
   and
   T_1 + [0.10 - 0.25 N·m (1.0 - 2.5 kg-cm, 0.87 - 2.17 in-lb)]

4. If T_3 does not meet the above two values, repeat step 2 and re-adjust pinion preload.

TIE-ROD OUTER SOCKET

1. Check ball joint for swinging torque.


SST130A

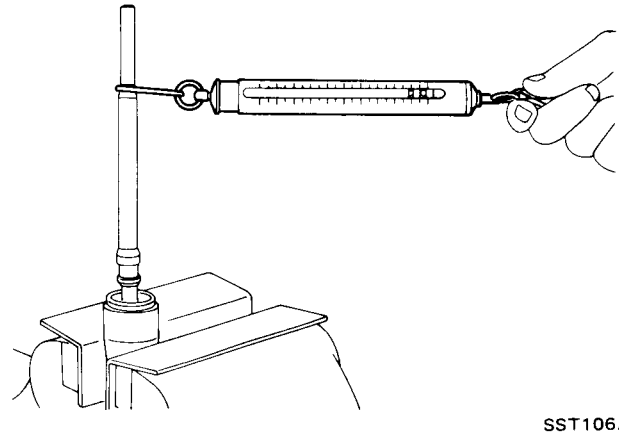
Tie-rod outer socket:
Swinging torque
0.15 - 2.94 N·m
(1.5 - 30 kg-cm, 1.3 - 26.0 in-lb)

2. Check condition of dust cover. If it is cracked excessively, replace.

TIE-ROD INNER SOCKET

Check inner socket for swinging torque and axial play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit.

Tie-rod inner socket:
Swinging torque
0.1 - 7.8 N·m
(1 - 80 kg-cm, 0.9 - 69.4 in-lb)
Axial play
0 mm (0 in)


SST106A

BOOT

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

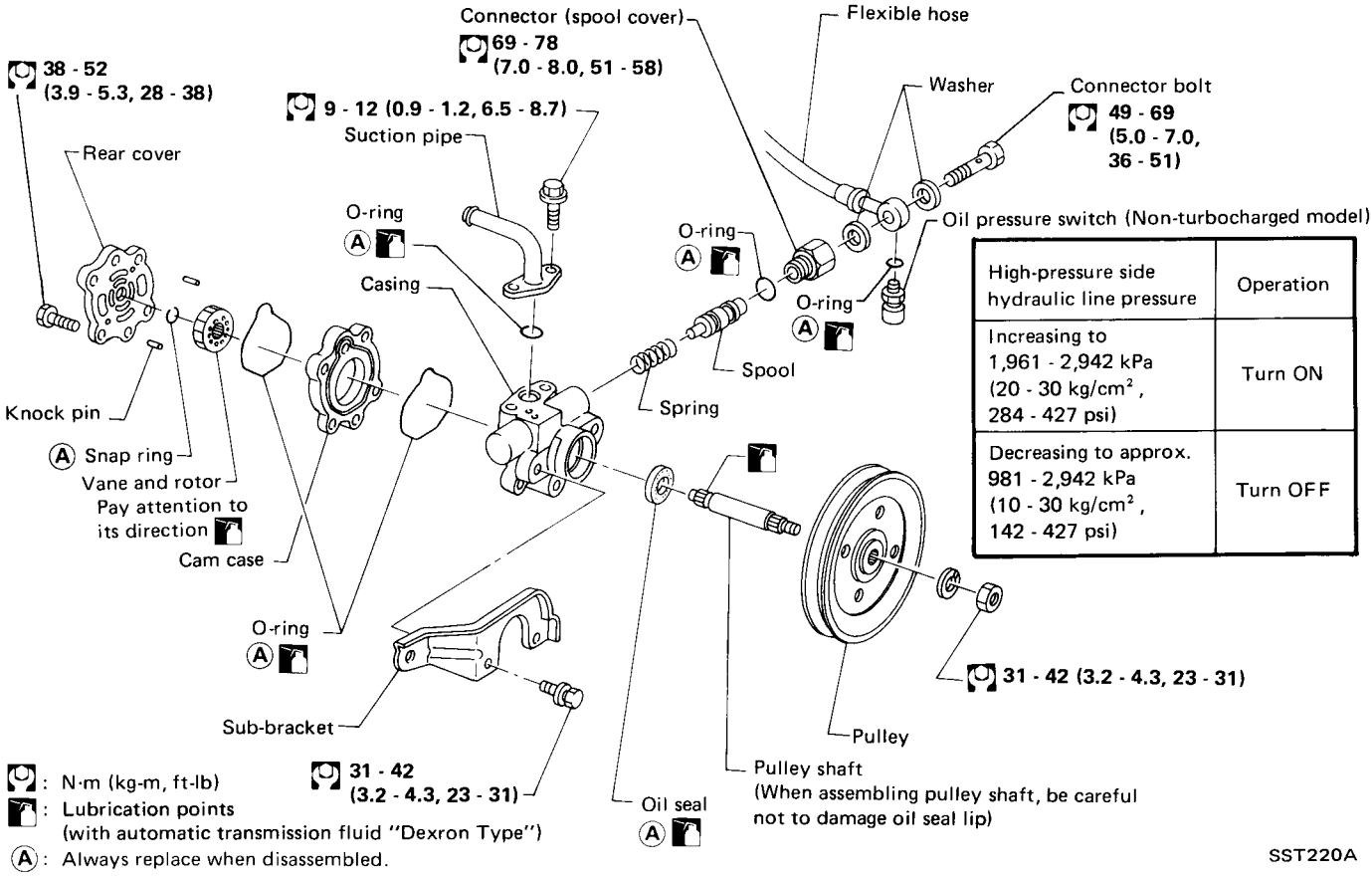
CYLINDER TUBES AND BREATHER HOSE

Check cylinder tubes and breather hose for scratches or other damage.
Replace if necessary.

STEERING GEAR COMPONENT PARTS

Thoroughly examine steering gear component parts. If those parts are damaged, cracked or worn, replace steering gear as an assembly.

POWER STEERING OIL PUMP



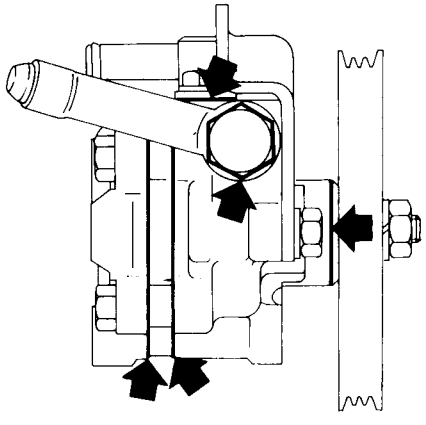
High-pressure side hydraulic line pressure	Operation
Increasing to 1,961 - 2,942 kPa (20 - 30 kg/cm², 284 - 427 psi)	Turn ON
Decreasing to approx. 981 - 2,942 kPa (10 - 30 kg/cm², 142 - 427 psi)	Turn OFF

SST220A

Pre-disassembly Inspection

The power steering oil pump should be disassembled only if any of the following conditions are observed.

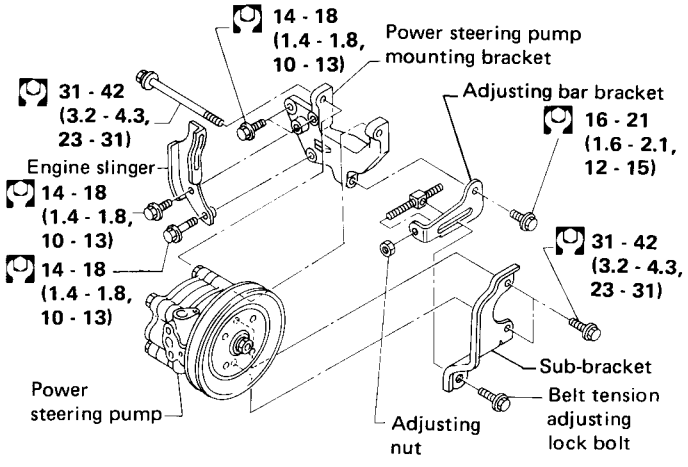
- **Oil leak at the following points**



SST126A

- **Deformed or damaged pulley**

Oil Pump Installation



SST221A

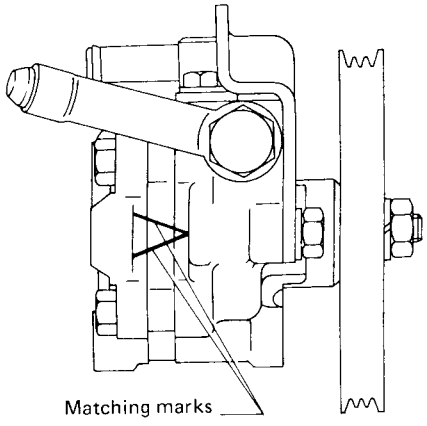
- **After installing oil pump, adjust belt tension. Refer to MA section.**

Diassembly

CAUTION:

- **The parts which can be disassembled are strictly limited. Never disassemble parts other than the specified ones.**
- **Disassembly should be performed in a place as clean as possible.**
- **Do not use a rag. Be sure to use nylon or paper cloth.**
- **When disassembling and reassembling, do not allow any foreign material to enter or contact any parts.**

1. Inscribe matching marks as shown below.

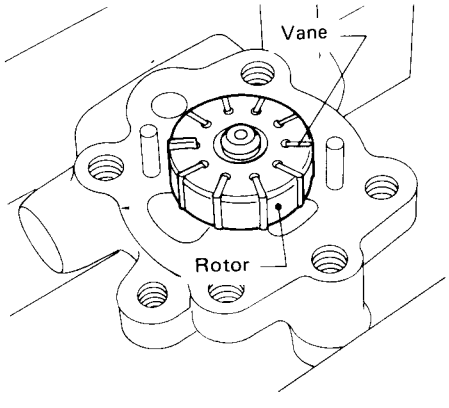


SST127A

2. Remove rear cover.
3. Remove O-rings from cam case.

CAUTION:

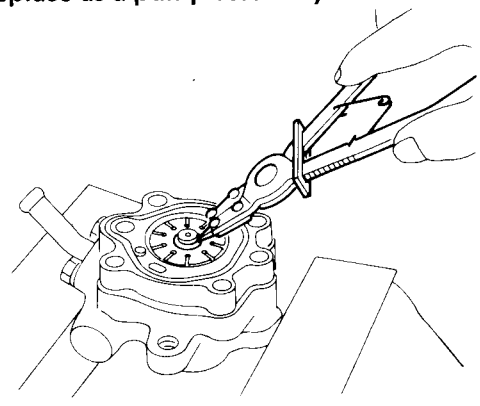
When removing cam case, be sure that the vane does not come off the rotor.



SST032A

4. Remove snap ring, then draw pulley shaft out.

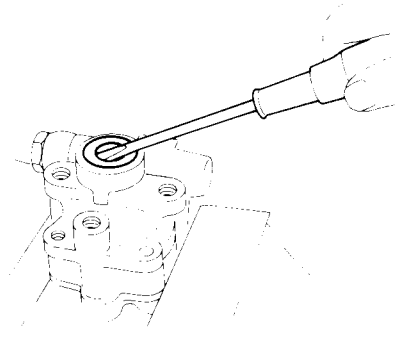
- **Be careful not to drop pulley shaft.**
- **Be careful not to damage rotor. If damaged, replace as a pump assembly.**



SST033A

5. Install cam case and rear cover, then remove oil seal.

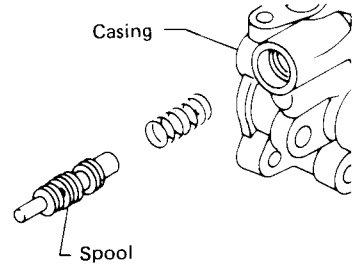
- **Be careful not to damage casing.**



SST034A

6. Remove joint.

- **Be careful not to drop spool.**



SST036A

7. Remove suction pipe, then remove O-ring.

Inspection

Wash clean all disassembled parts (inside pump) in suitable cleaning solvent.

INSIDE PARTS

If there are any cracks or flaws in the following parts, replace pump assembly.

- Inside of cam case
- Matching surface of casing, rear cover and/or cam case.
- Vane and rotor
- Pulley shaft

PULLEY AND PULLEY SHAFT

- **If pulley is cracked or deformed, replace it.**
- **If an oil leak is observed around pulley shaft oil seal, replace it.**
- **If serration of pulley or pulley shaft is deformed or worn, replace it.**

OIL PRESSURE SWITCH
(Non-turbocharged model)

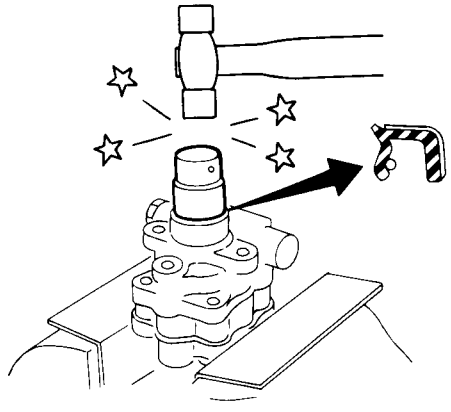
High-pressure side hydraulic line pressure kPa (kg/cm^2, psi)	Operation
Increasing to 1,961 - 2,942 (20- 30, 284 - 427)	Turn ON
Decreasing to Approx. 981 - 2,942 (10 - 30, 142 - 427)	Turn OFF

Refer to "Hydraulic System Check" in "POWER STEERING SYSTEM — Checking".

Assembly

Assemble oil pump in the reverse order of disassembly, noting the following instructions.

- Before installing O-rings and oil seal, apply a thin coat of power steering fluid to them.
- Make certain that O-rings and oil seal are installed properly.
- Always install new O-rings and an oil seal.
- Be careful of oil seal direction.

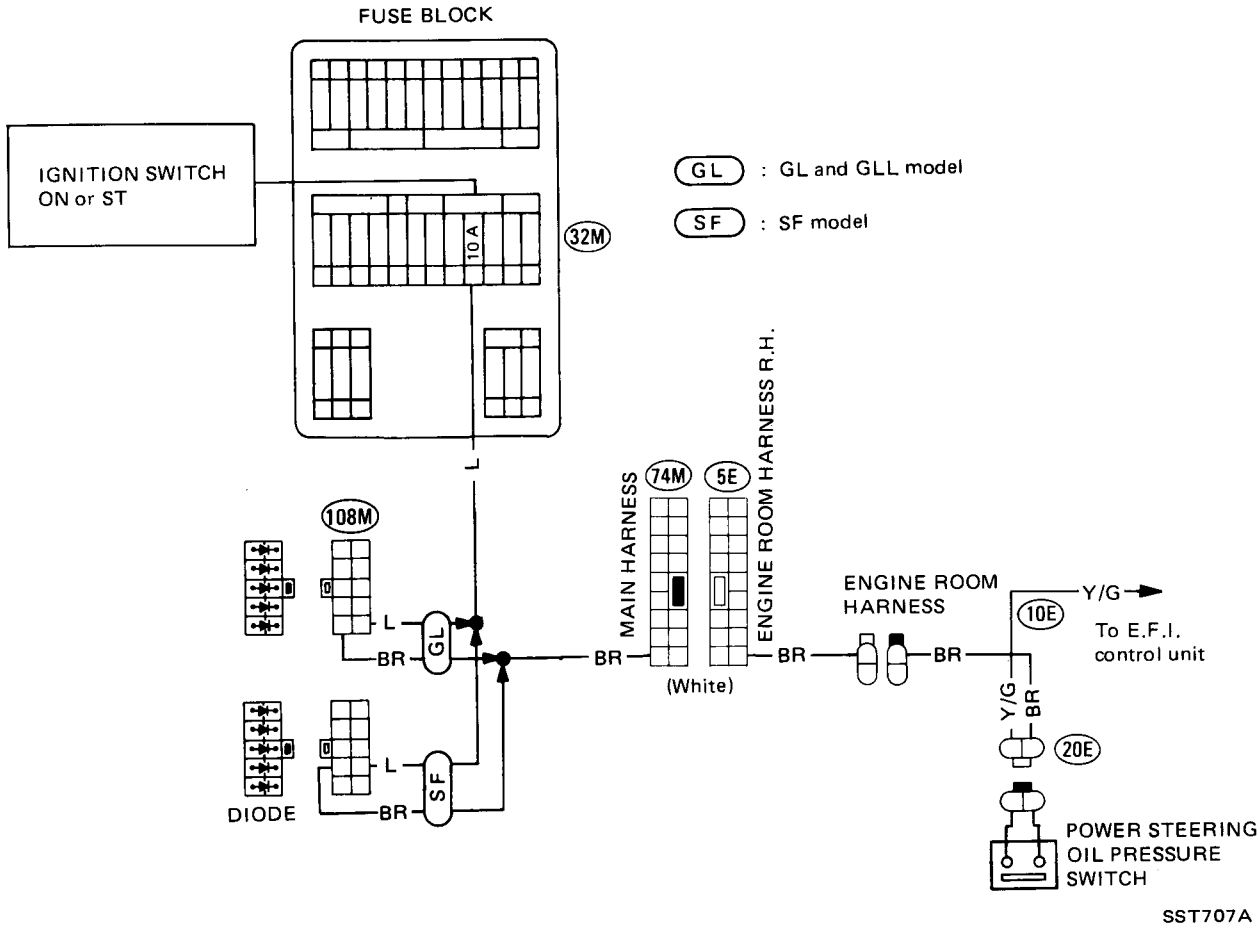


SST038A

- When assembling vanes to rotor, rounded surfaces of vanes must be facing cam case.

POWER STEERING OIL PUMP

Wiring Diagram —Oil Pressure Switch



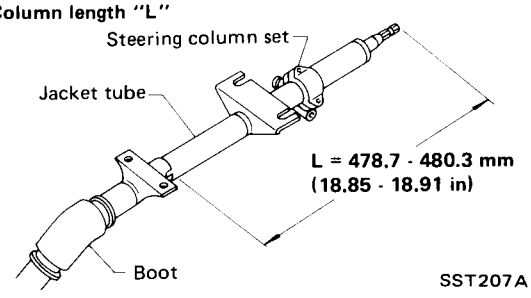
General Specifications

Steering gear type	PR24S [Power steering]
Steering column Type	Collapsible

Column length: L mm (in)

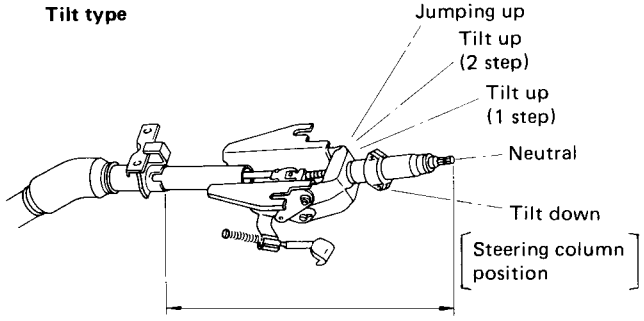
Non-tilt type

Column length "L"



SST207A

Tilt type



SST208A

L = 478.7 - 480.3 mm (18.85 - 18.91 in) at steering column Neutral position

Turn of steering wheel (Lock to lock)	2.8
Steering overall gear ratio	17.1
Power steering fluid Type	Automatic transmission fluid "DEXRON type"
Capacity ℓ (US pt, Imp pt)	Approx. 0.9 (1-7/8, 1-5/8)
Normal operating temperature °C (°F)	60 - 80 (140 - 176)

Inspection and Adjustment

GENERAL

Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	Less than 35 (1.38)
Power steering system Steering wheel turning force at 360° position from Neutral N (kg, lb)	Less than 39.2 (4.0, 8.8)
Oil pump belt deflection (Measured when engine is cold) mm (in)/98 N (10 kg, 22 lb)	New: 10 - 13 (0.39 - 0.51) Used: 13 - 16 (0.51 - 0.63) Limit: 21 (0.83) — Replace belt to new one.
Oil pump maximum pressure kPa (kg/cm², psi)	6,669 - 7,257 (68 - 74, 967 - 1,052)

Oil pressure switch operation

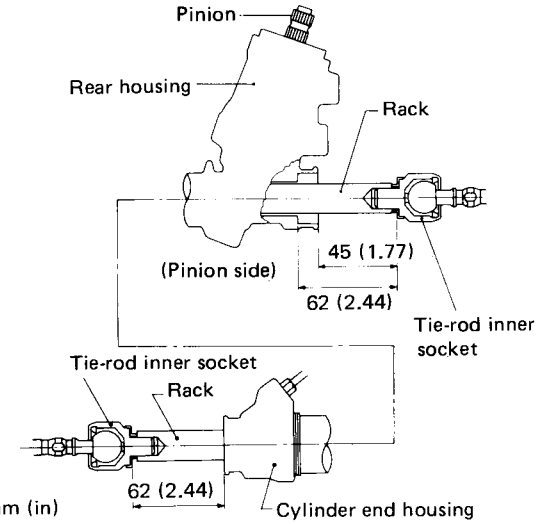
Hydraulic line pressure kPa (kg/cm², psi)	Operation
Increasing to 1,961 - 2,942 (20 - 30, 284 - 427)	Turn ON
Decreasing to 981 - 2,942 (10 - 30, 142 - 427)	Turn OFF

Inspection and Adjustment (Cont'd)

STEERING GEAR AND LINKAGE (PR24S)

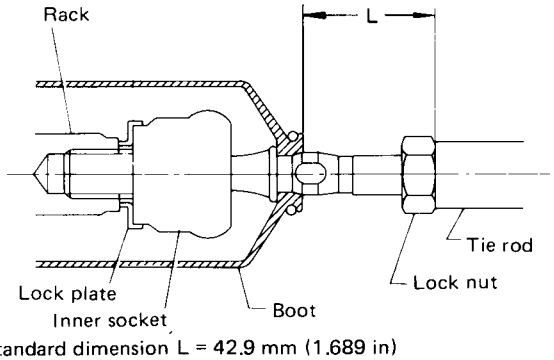
Tie-rod outer ball joint Swinging torque N·m (kg-cm, in-lb)	0.15 - 2.94 (1.5 - 30, 1.3 - 26.0)
Tie-rod inner ball joint Swinging torque N·m (kg-cm, in-lb)	0.1 - 7.8 (1 - 80, 0.9 - 69.4)
Axial play mm (in)	0 (0)

Rack stroke



Unit: mm (in) SST223A

Tie-rod standard length mm (in)



- Standard dimension L = 42.9 mm (1.689 in)
- When installing tie-rod or adjusting toe-in, be careful not to twist boots.
- Toe-in: Refer to MA section.

SST214A

Pinion rotating torque (Pinion and rack gear assembly without fluid) N·m (kg-cm, in-lb)	Less than 1.9 (19, 16)
Rack sliding force in neutral position (Pinion and rack gear assembly without fluid) N (kg, lb)	122.6 - 186.3 (12.5 - 19, 27.6 - 41.9)

Tightening Torque

STEERING COLUMN

Unit	N·m	kg-m	ft-lb
Steering wheel nut	49 - 59	5.0 - 6.0	36 - 43
Steering column to body	9 - 14	0.9 - 1.4	6.5 - 10.1
Hole cover to dash panel	3 - 5	0.3 - 0.5	2.2 - 3.6
Column joint fixing bolt (Lower joint, column set)	32 - 38	3.3 - 3.9	24 - 28
Jacket lower tube to steering column clamp	3.4 - 4.4	0.35 - 0.45	2.5 - 3.3

STEERING GEAR & LINKAGE (PR24S)

Unit	N·m	kg-m	ft-lb
Tie-rod lock nut	78 - 98	8.0 - 10.0	58 - 72
Tie-rod inner socket to rack (With sealant)	78 - 98	8.0 - 10.0	58 - 72
Cylinder end housing & pinion housing lock nut (Without Tool)	78 - 108	8.0 - 11.0	58 - 80
Rear housing cover lock nut	78 - 137	8.0 - 14.0	58 - 101
Retainer lock nut	39 - 59	4.0 - 6.0	29 - 43
Cylinder tube flare nut	20 - 26	2.0 - 2.7	14 - 20
Gear & linkage mounting	39 - 49	4.0 - 5.0	29 - 36
Tie-rod to knuckle arm	54 - 98	5.5 - 10.0	40 - 72

OIL PUMP

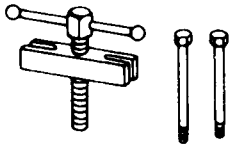
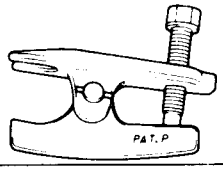
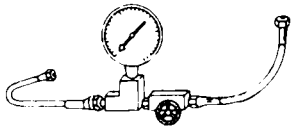
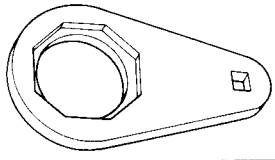
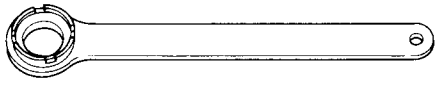
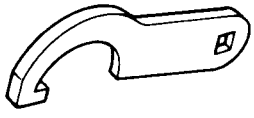
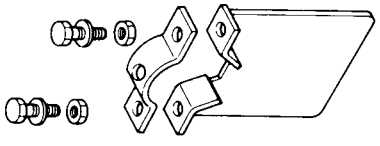
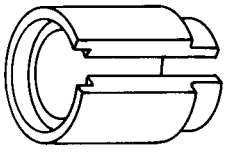
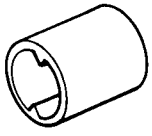
Unit	N·m	kg-m	ft-lb
Mounting bracket to engine	14 - 18	1.4 - 1.8	10 - 13
Oil pump to mounting bracket (Through bolt)	31 - 42	3.2 - 4.3	23 - 31
Oil pump casing to sub bracket	31 - 42	3.2 - 4.3	23 - 31
Adjusting bar bracket to mounting bracket	16 - 21	1.6 - 2.1	12 - 15
Sub bracket to adjusting bar	16 - 21	1.6 - 2.1	12 - 15
Pulley lock nut	31 - 42	3.2 - 4.3	23 - 31
Rear cover fixing bolt	38 - 52	3.9 - 5.3	28 - 38
Connector (Spool cover)	69 - 78	7.0 - 8.0	51 - 58
Connector (to flexible hose)	49 - 69	5.0 - 7.0	36 - 51
Suction pipe to casing	9 - 12	0.9 - 1.2	6.5 - 8.7

Tightening Torque (Cont'd)

HYDRAULIC LINE AND OIL PRESSURE SWITCH

Unit	N·m	kg-m	ft-lb
Low-pressure pipe to steering gear	27 - 39	2.8 - 4.0	20 - 29
High-pressure pipe to steering gear	15 - 25	1.5 - 2.5	11 - 18
High-pressure pipe connector bolt (At oil pump)	49 - 69	5.0 - 7.0	36 - 51
Oil pressure switch	16 - 24	1.6 - 2.4	12 - 17

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name	Unit application
		PR24S
ST27180001 (J25726-A)	Steering wheel puller 	X
HT72520000 (J25730-A)	Ball joint remover 	X
ST27091000 (J26357)	Pressure gauge 	X
KV48101600 (J28818)	Rear housing lock nut wrench 	X
KV48101700 (J28819)	Rear cover wrench 	X
KV48101800 (J28820)	Cylinder lock nut wrench 	X
KV48102100 (J28817)	Power steering stand 	X
KV48103100 (J34264)	Rack packing installer 	X
KV48100700 (J26364)	Torque adapter 	X