

STEERING

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SR

SR-2

1 STEERING WHEEL

1-1 REMOVAL AND INSTALLATION

1-1-1 PREPARATION TOOLS

Instrument	Torque wrench
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SR-STW-D-P-00011

1-1-2 OPERATION BEFORE REMOVAL

1. Remove the battery negative terminal. (for the vehicle equipped air bag)

CAUTION

- After removing of battery negative terminal for the vehicle equipped with air bag , wait at least 60 seconds to start next operation.

NOTE

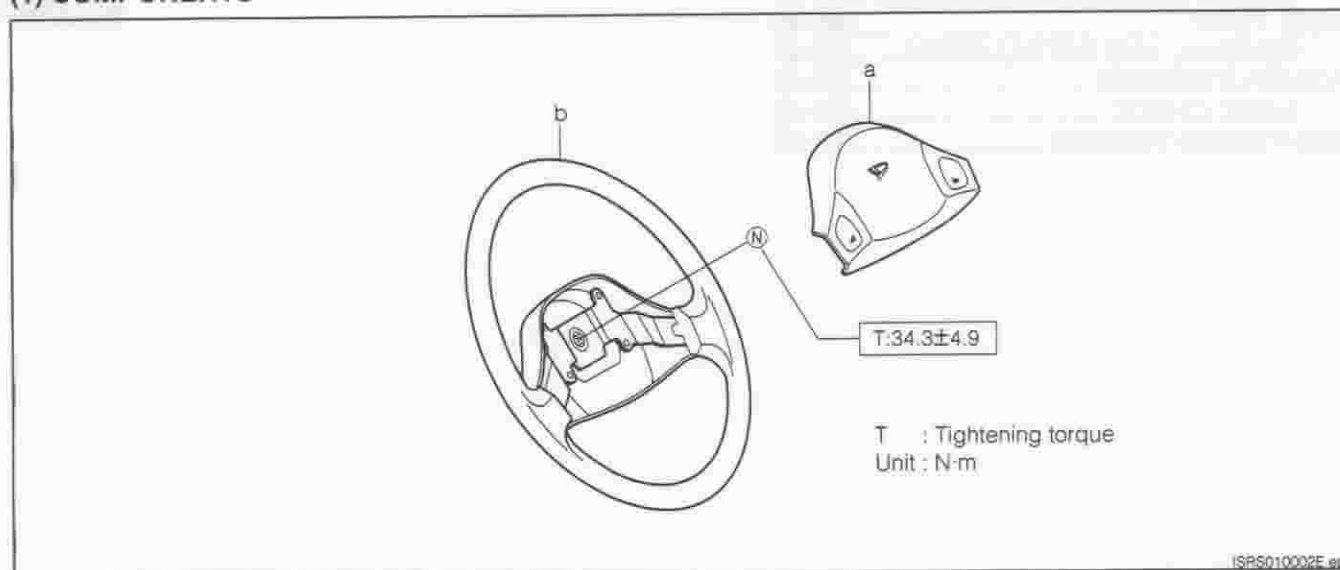
- Keep recorded data of the diagnostic system code and radio or the like beforehand as they may be erased when the battery negative terminal is removed .

2. Remove the steering wheel pad S/A W/air bag. (only for the vehicle equipped air bag)

SR-STW-D-B-00011

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



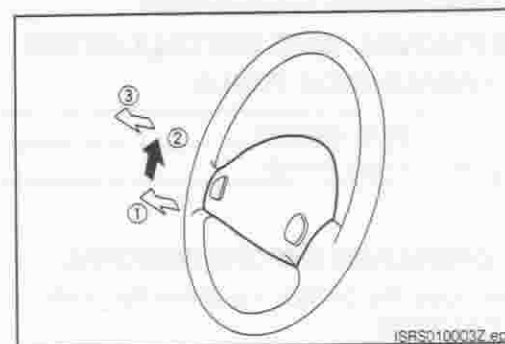
(2) REMOVAL AND INSTALLATION PROCEDURES

- 1 2 a Pad S/A, steering wheel (For the vehicle not equipped air bag)
- 2 1 b Wheel S/A, steering

SR-STW-D-T-00011

1-1-4 POINTS OF REMOVAL

1. Removal of steering wheel pad S/A (For the vehicle not equipped air bag)
 - (1) Pull out the lower part of steering wheel pad S/A toward you.
 - (2) Remove the steering wheel S/A by pulling toward you while holding it up.



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SR-STW-D-D-00011

1-1-5 OPERATION AFTER INSTALLATION

1. Install the steering wheel pad S/A W/air bag. (only for the vehicle equipped air bag)
2. Connect the battery negative terminal.

SR-STW-D-A-00011

SR-4

2 STEERING COLUMN

2-1 REMOVAL AND INSTALLATION

2-1-1 PREPARATION TOOLS

Tool	Screw extractor
Instrument	Torque wrench

SR-STC-D-P-00011

2-1-2 OPERATION BEFORE REMOVAL

1. Remove the battery negative terminal.

CAUTION

- After removing of battery negative terminal for air bag equipped vehicle, wait 60 seconds to start working.

NOTE

- Keep recorded data of the diagnostic system code and radio or the like beforehand as they may be erased when the battery negative terminal is removed .

2. Remove the steering wheel pad S/A W/air bag. (only for the vehicle equipped air bag)
3. Remove the steering wheel S/A.

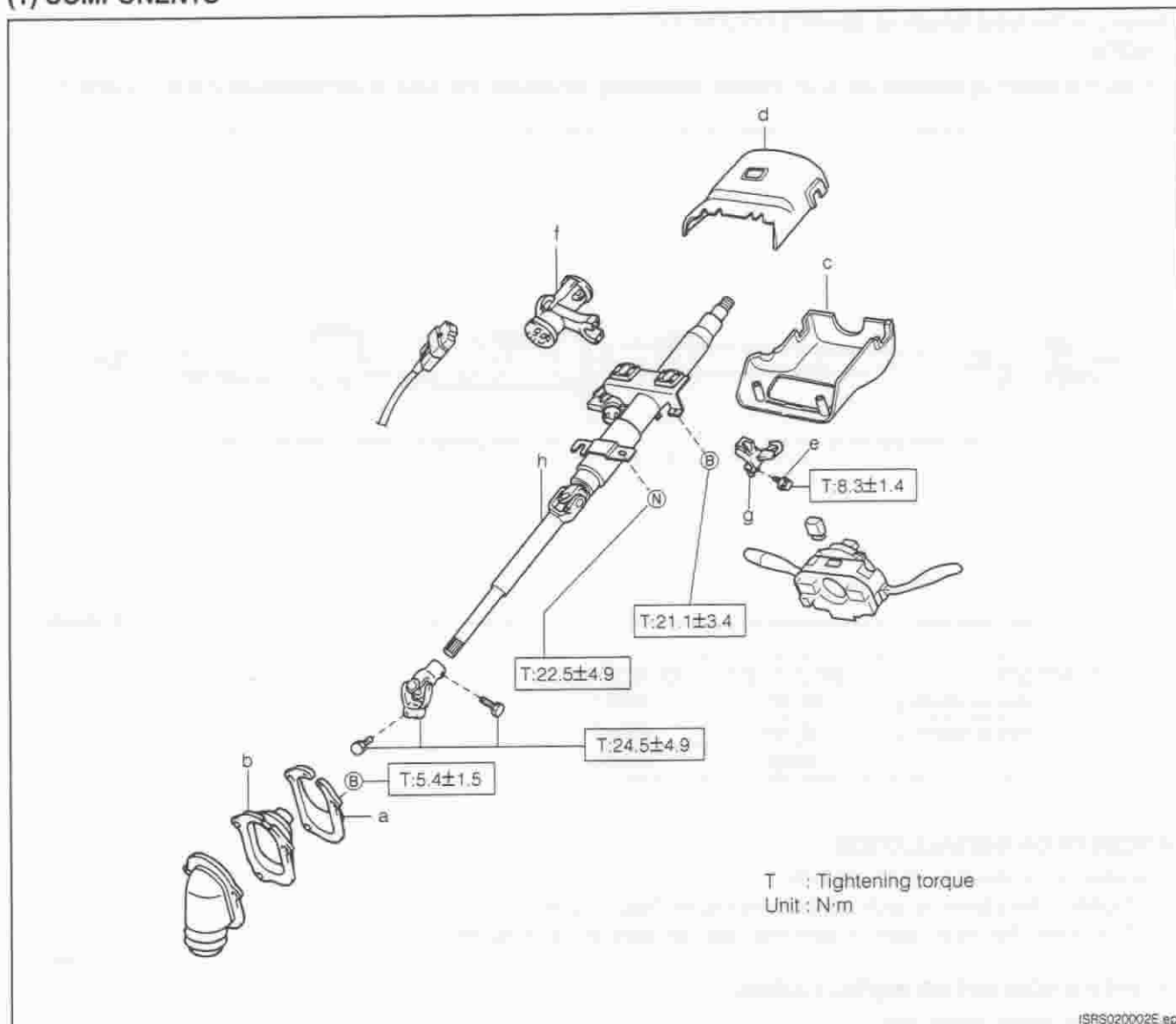
Refer to SR-2.

4. Remove the front floor foot rest. (only for the vehicle equipped foot rest.)
5. Remove the instrument panel finish lower panel.
6. Remove the turn signal switch Ay.
7. Remove the spiral cable S/A.

SR-STC-D-B-00011

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

- | | | | | | | | |
|---|---|---|------------------------------|---|---|---|--|
| 1 | 8 | a | Retainer, dust cover | 6 | 3 | f | Bracket Ay, steering column upper w/switch |
| 2 | 7 | b | Cover, main shaft lower dust | ⑦ | 2 | g | Housing, steering column |
| 3 | 6 | c | Cover, steering column lower | 8 | 1 | h | Column Ay, steering |
| 4 | 5 | d | Cover, steering column upper | | | | |
| 5 | ④ | e | Bolt, steering lock nut set | | | | |

SR-STC-D-T-00011

2-1-4 POINTS OF REMOVAL

- Removal of steering lock set bolt
 - Put a mark at the tapered tip end of the bolt, using a center punch.
 - Make a hole at the marked section, using a 3 to 4 mm diameter drill.
 - Remove the bolt, using a screw extractor.

SR-STC-D-D-00011

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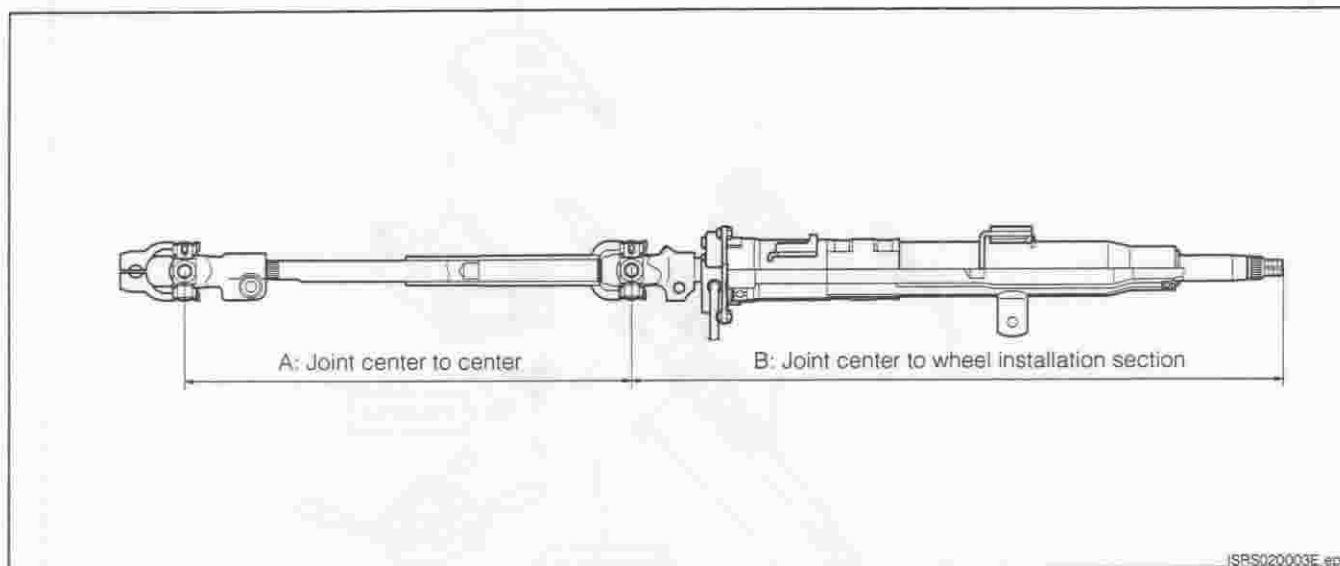
2-1-5 INSPECTION

(1) STEERING COLUMN

1. Measure the total length of steering column Ay.

NOTE

- As the steering column Ay is an impact absorbing structure, the tube is compressed if it is impacted.



Engine type		Section A (mm)	Section B (mm)
EJ	Manual steering	324±5	439±5
	Power steering	327±5	439±5
K3		326±5	439±5

SR-STC-D-C-00011

2-1-6 POINTS OF INSTALLATION

1. Installation of steering lock set bolt
 - (1) Tighten the steering lock set bolt with specified torque.
 - (2) Cut down the head part of steering lock set bolt at notched section.

SR-STC-D-S-00011

2-1-7 OPERATION AFTER INSTALLATION

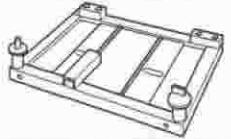
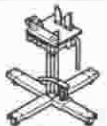
1. Install the spiral cable S/A.
2. Install the turn signal switch Ay.
3. Install the instrument panel finish lower panel.
4. Install the front floor foot rest. (only for the vehicle equipped foot rest)
5. Install the steering wheel S/A.
Refer to SR-2.
6. Install the steering wheel pad S/A W/air bag. (only for the vehicle equipped air bag)
7. Connect the battery negative terminal.

SR-STC-D-A-00011

3 STEERING GEAR

3-1 REMOVAL AND INSTALLATION

3-1-1 PREPARATION TOOLS

	Shape	Part number, part name	Use
SST		09994-87201-000 Holder, engine frame	For removal/installation of engine frame
		09611-87701-000 Puller, Tie-rod end	For separation of tie-rod end and steering knuckle
Tool		Engine support bridge	For suspending engine and transaxle
		Engine support bridge	For suspending engine and transaxle
		Chain block	For suspending engine and transaxle (for addition to engine support bridge)
		High-transmission jack	For removal/installation of transaxle
Instrument	Torque wrench		
Lubricant	Power steering fluid		

SR-STG-D-P-00011

SR-8

3-1-2 OPERATION BEFORE REMOVAL

1. Removal of power steering fluid

CAUTION

- Plug the hose so that power steering fluid may not spill out and smear the painted surface.

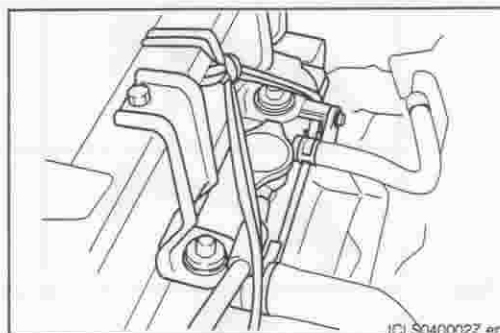
Refer to SR-45.

2. Remove the battery negative terminal.

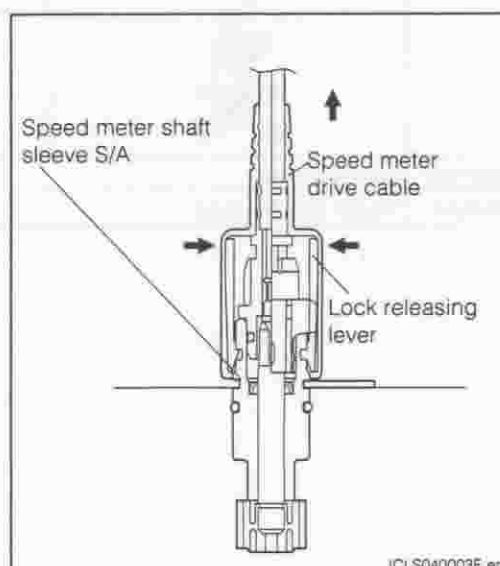
NOTE

- Keep recorded data of the diagnostic system code and radio or the like beforehand as they may be erased when the battery negative terminal is removed.

3. Separate the bonding cables.
4. Remove the air cleaner case.
5. Radiator separation
 - (1) Remove the radiator bracket.
 - (2) Fix the radiator and radiator fan together to upper support with string or the like.

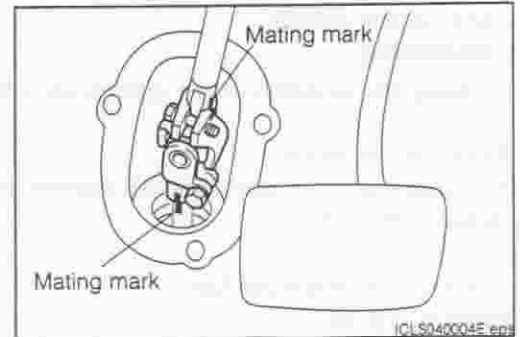


6. Separation of clutch cable (For MT vehicle)
 - (1) Separate the clutch cable in the transaxle side.
7. Removal of speedometer drive cable Ay (for the vehicle equipped mechanical meter)
 - (1) Remove the lock inside of the boot of the installing section in the side of transaxle by picking up from the outside of boot.
 - (2) Pull out the cable.



8. Separation of universal joint

- (1) Marking the universal joint and the steering gear with mating marks, separate them at the jointing section.



9. Support of engine and transaxle

- (1) Install engine hanger No.1 and No.2.

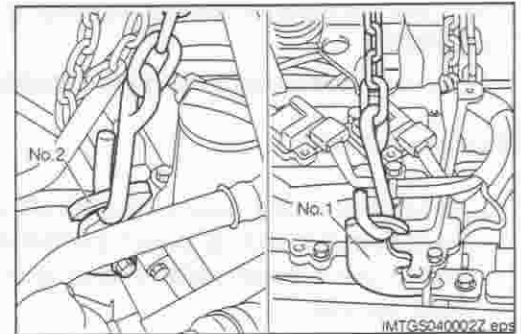
WARNING

- Be sure not to operate while exhaust manifold is hot for danger of burn.

NOTE

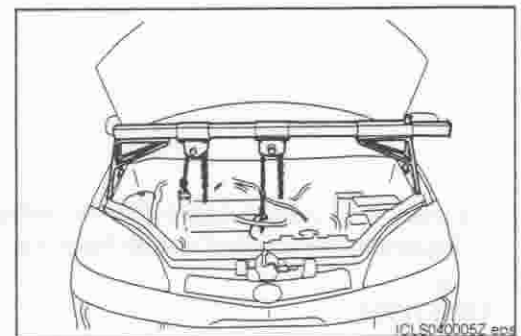
- Engine hanger No.1, No.2 and fitting bolts are supply parts.

TIGHTENING TORQUE: $20.0 \pm 6.0 \text{ N}\cdot\text{m}$



- (2) Hold the engine Ay and transaxle Ay with them directly connected using engine support bridge.

TOOL: Engine support bridge



SR-10

10. Jack up the vehicle.

WARNING

- Keep the position of the jackup point to avoid causing serious accident due to inclining of the vehicle.

11. Remove the wheel.

12. Remove the lower arm bracket connecting rod.

Refer to MTG-5.

13. Remove the stabilizer bar.

Refer to FS-26.

14. Remove the exhaust pipe.

WARNING

- Be sure not to operate while exhaust manifold is hot for being in danger of burn.

15. Remove the suspension lower arm S/A.

Refer to FS-20.

16. Separation of propeller shaft (For 4WD vehicle)

Separate the transfer side of propeller shaft and hang it from vehicle.

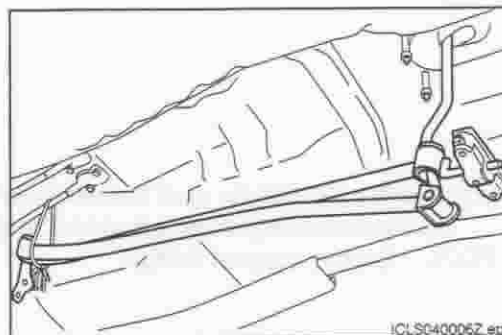
CAUTION

- Be very careful not to apply the load to the center support bearing and the second joint portion.

Refer to DPS-26.

17. Separation of shift & select rod (For MT vehicle)

- (1) Separate the shift & select control rod and extension rod in the side of transmission and hang them down from vehicle.

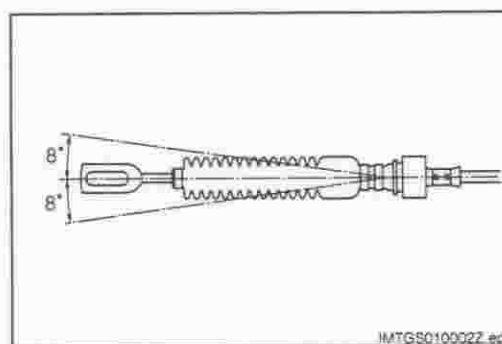


18. Separation of control cable (For AT vehicle)

- (1) Separate the control cable from the control shaft lever Ay.

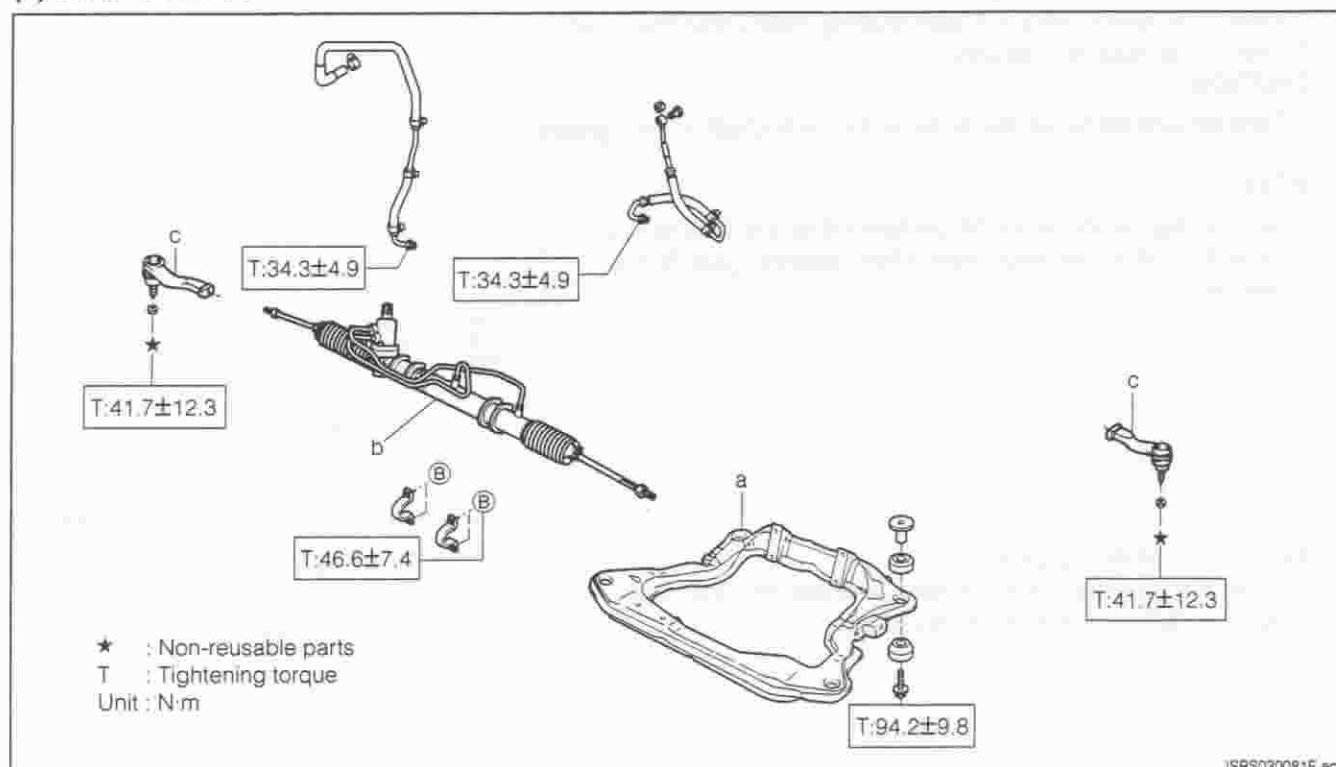
CAUTION

- Control cable ends (shift lever side and transmission side) shall be neither swung more than 8 degree nor loaded.



3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

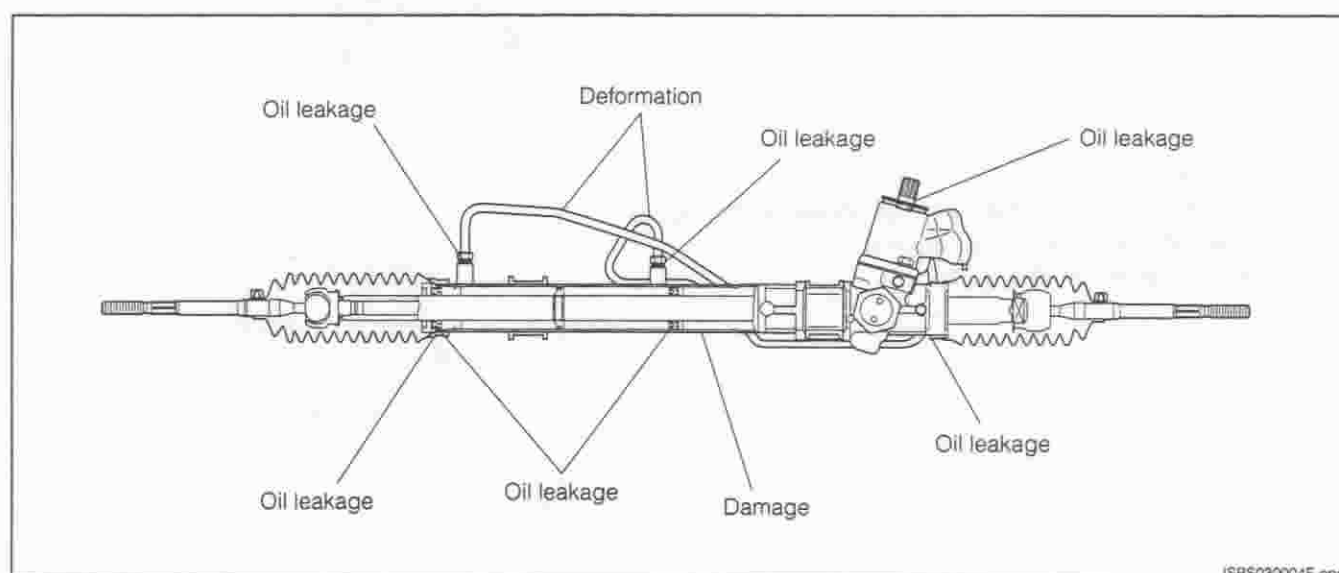
- ① ③ a Frame
- ② ② b Gear Ay, steering
- ③ ① c End S/A, tie-rod

SR-STG-D-T-00011

3-1-4 INSPECTION

(1) Steering gear S/A

1. Check each portion for no abnormal condition.



SR-12

3-1-5 POINTS OF INSTALLATION

1. Installation of tie-rod end S/A

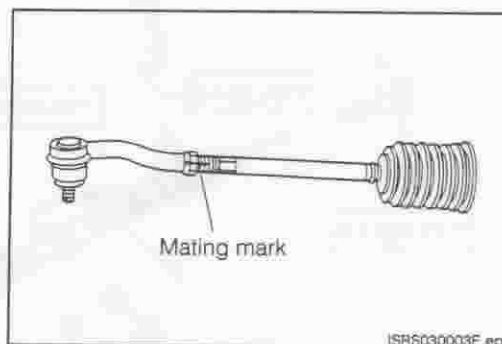
- (1) Install the tie-rod end S/A with mating marks matched each other.
- (2) Fasten the nuts temporarily.

CAUTION

- Care should be taken not to twist the rack shaft when tightening.

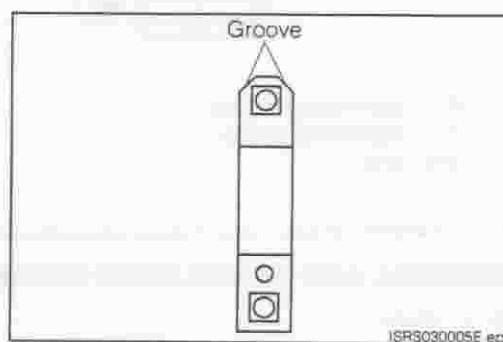
NOTE

- Regular tightening shall be performed at the time of the inspection of wheel alignment after steering gear S/A is installed.



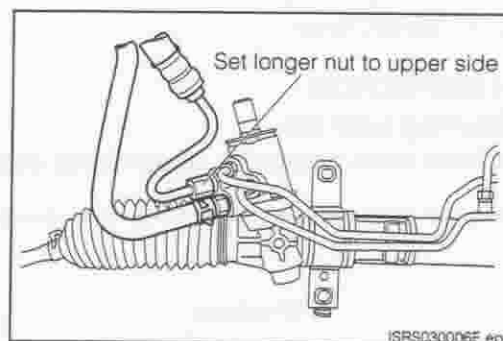
2. Installation of steering gear

- (1) Install the steering rack housing bracket into the steering gear S/A with the notch faced up.



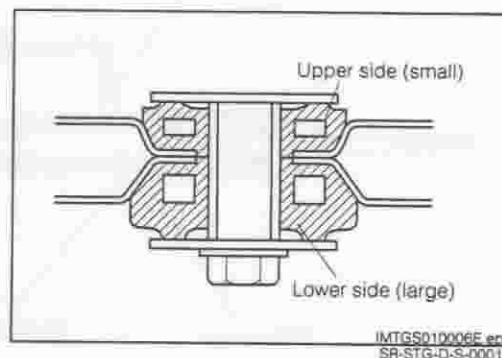
- (2) Install the steering gear S/A into the frame.

- (3) Connect the pressure feed hose and the return hose to the power steering gear S/A. (only for the vehicle equipped power steering)



3. Installation of frame

- (1) Install the bushes into the frame as shown in the figure. (for the vehicle mounted EJ engine)
- (2) Install the frame into the body.



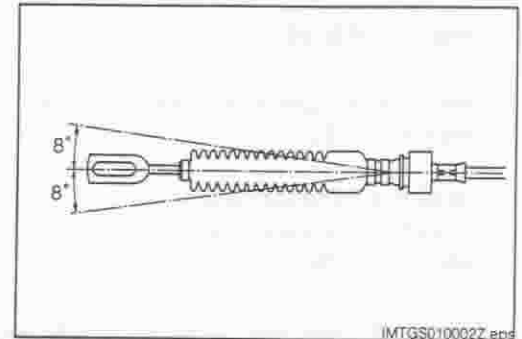
3-1-6 OPERATION AFTER INSTALLATION

1. Connect the control cable. (For AT vehicle)

CAUTION

- The control cable end (both shift lever side and transmission side) shall be neither swung more than 8 degree nor loaded.

Refer to AT-35.



SR-14

2. Connect the shift rod and select rod. (For MT vehicle)
Refer to MT-15.

3. Install the propeller shaft. (For 4WD vehicles)

CAUTION

- Be very careful not to apply load to the center support bearing and second joint section.

Refer to DPS-26.

4. Install the suspension lower arm S/A.
Refer to FS-20.

5. Install the exhaust pipe.

6. Install the stabilizer bar.
Refer to FS-26.

7. Install the lower arm bracket connecting rod.
Refer to MTG-5.

8. Install the wheels.

TIGHTENING TORQUE: $103.0 \pm 14.7\text{N}\cdot\text{m}$

9. Jack down the vehicle.

10. Remove the engine support bridge.

11. Remove the engine hanger.

12. Connection of the universal joint

(1) Connect the joint parts with mating marks aligned.

CAUTION

- In case the mating mark disappeared, match the location of the roll connector when matching the wheel center. (for the vehicle equipped air bag)

13. Connect the speedometer cable. (for the vehicle equipped mechanical meter)

14. Connect the clutch cable. (for MT vehicle)

15. Install the radiator.

16. Install the air-cleaner case.

17. Connect the bonding cable.

18. Connect the battery negative terminal.

19. Fill with power steering fluid.

Refer to SR-45.

20. Perform the air bleeding.

21. Perform the basic inspection of the clutch pedal.

Refer to CL-3.

22. Perform the basic inspection of wheel alignment.

Refer to FS-2.

SR-STG-D-A-00011

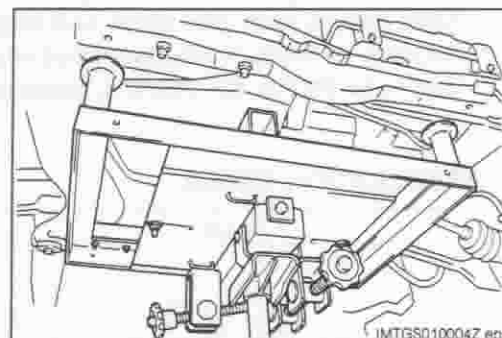
3-1-7 POINTS OF REMOVAL

1. Separation of frame

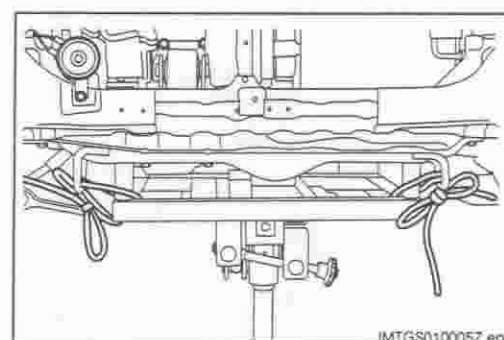
(1) Support the frame with the high-transmission jack applied to the frame.

SST: 09994-87201-000

TOOL: High transmission jack



(2) Fix the frame with string or chain so that it may not be out of place.



(3) Remove the fitting bolts of frame.

(4) Operating high-transmission jack, lower the front frame with it inclined backward.

2. Removal of the steering gear

(1) Separate the pressure feed hose and the return hose from the power steering gear S/A. (only for the vehicle equipped power steering)

(2) Removing the steering gear from the frame, and then take it out to the lateral direction.

CAUTION

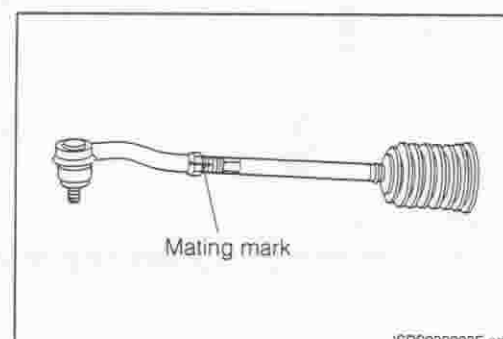
- When the power steering gear S/A is taken out, care should be taken not to scratch the return pressure tube.

3. Removal of tie-rod end S/A

(1) Putting mating marks to steering rack end and tie-rod end, remove the tie-rod end.

NOTE

- Mating marks shall be made in such a way that the discrimination of the right and left may be easy.



SR-16

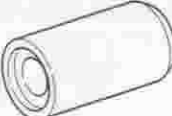
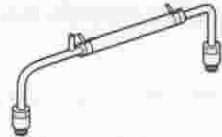
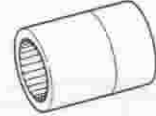
3-2 DISASSEMBLY AND ASSEMBLY (Power Steering)

CAUTION

- Taking care of environment so that dust, dirt, and iron powder may not enter because the hydraulic power steering is a precision hydraulic instrument, operate with empty hands.
- Keep always each part clean and cleanse dirt on hand fingers prior to job starting.
- Replace all kinds of disassembled seals with new parts.
- Don't use thinner for cleaning plastic and rubber parts.

SR-STG-B-Z-00011

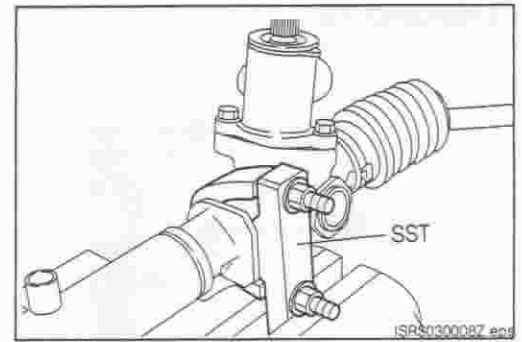
3-2-1 PREPARATION TOOLS

	Shape	Part number, part name	Use
SST		09612-00012-000 Stand, rack & pinion steering rack housing	For securing steering gear
		09922-10010-000 Wrench, variable open	For removal/installation of lock nut and steering rack
		09238-87701-000 Replacer, crankshaft bearing	For installation of type T oil seal and needle roller bearing
		09631-20070-000 Guide, seal ring	For installation of type T oil seal
		09631-20081-000 Tool, seal ring	For installation of type T oil seal
		09631-12071-000 Tool, steering rack oil seal test	For air-tightness test
		09616-87702-000 Socket, steering pinion bearing adjusting	For adjustment of preload
Instrument	Torque wrench		
Lubricant	Power steering fluid, sealant, molybdenum disulfide lithium base grease, Three Bond 1324		

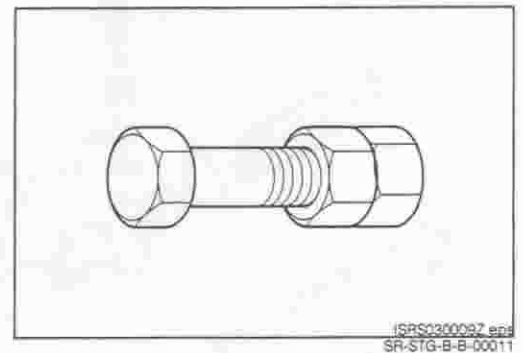
SR-STG-B-P-00021

3-2-2 OPERATION BEFORE DISASSEMBLY

1. Fix the steering gear S/A to a vice.
SST: 09612-00012-000



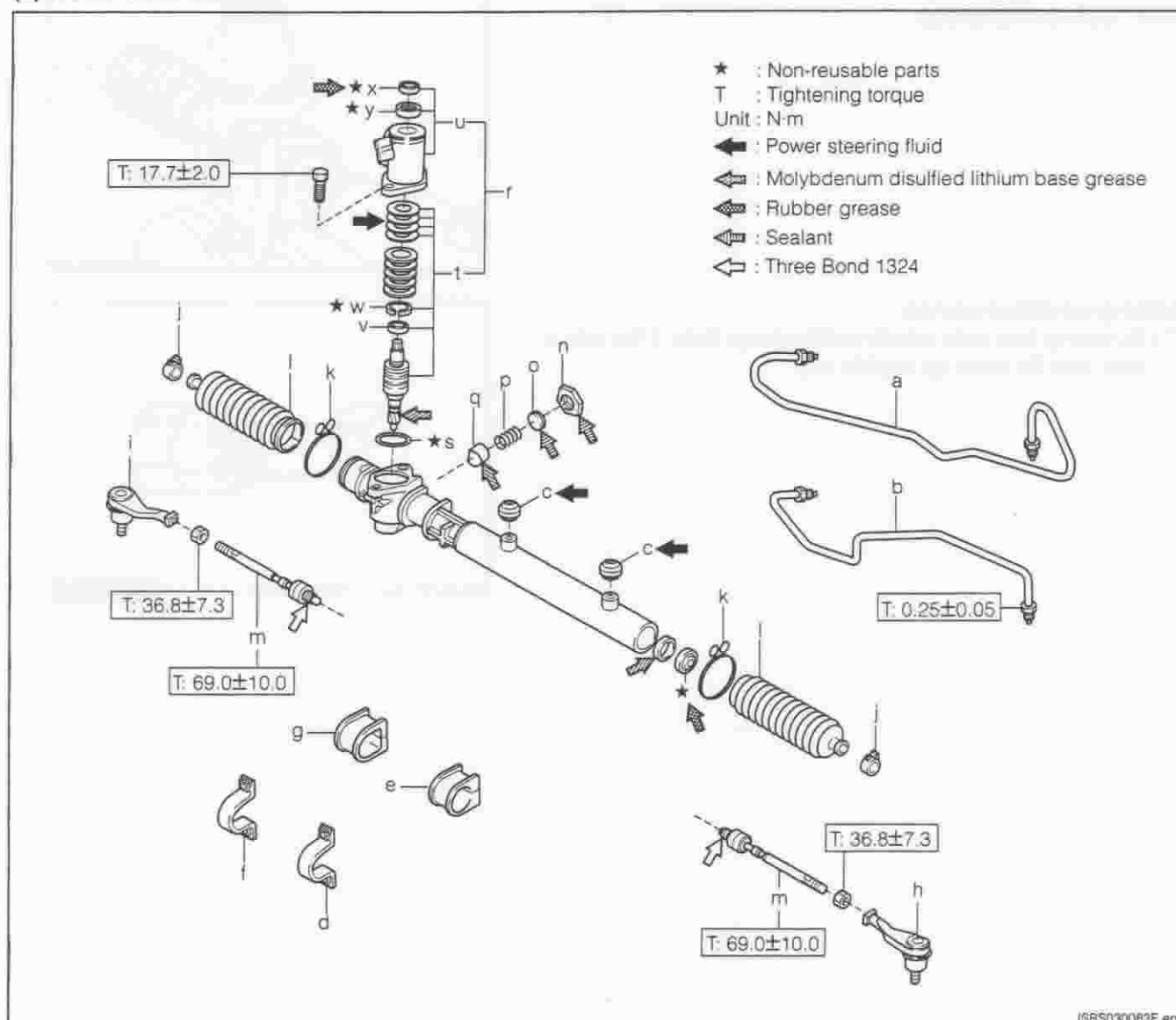
2. Making simplified spinner
(1) Screwing two nuts which width across flats 17mm into a bolt, and fix them as double nut.



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3-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

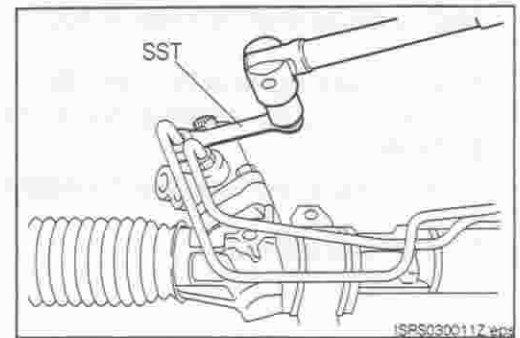
- | | | | |
|---------|---------------------------------------|--------|-----------------------------------|
| ① 25 a | Tube, right turn pressure | ⑭ ⑫ n | Nut, lock |
| ② 24 b | Tube, left turn pressure | ⑮ ⑪ o | Cap, rack guide spring |
| 3 23 c | Sheet, union | ⑯ ⑩ p | Spring, compression |
| ④ 22 d | Bracket, steering rack housing, No.2 | ⑰ 9 q | Guide, rack |
| 5 21 e | Grommet, steering rack housing, No.1 | ⑱ ⑧ r | Valve A/y, power steering control |
| ⑥ 20 f | Bracket, steering rack housing, right | ⑲ 7 s | Ring, O |
| 7 19 g | Grommet, steering rack housing, No.2 | ⑳ 6 t | Valve S/A, power steering control |
| ⑧ 18 h | End S/A, tie-rod left | 21 ⑤ u | Housing S/A, control valve |
| ⑨ 17 i | End S/A, tie-rod right | 22 ④ v | Seal, type T oil |
| 10 16 j | Clip | 23 3 w | Ring, snap |
| 11 15 k | Band, steering boot, No.3 | 24 ① x | Seal, type T oil |
| 12 ⑭ l | Boot, steering rack | 25 ② y | Bearing, needle roller |
| ⑬ 13 m | End S/A, steering rack No.1 | | |

SR-STG-B-T-00021

3-2-4 POINTS OF DISASSEMBLY

1. Remove the right turn pressure tube and the left turn pressure tube.

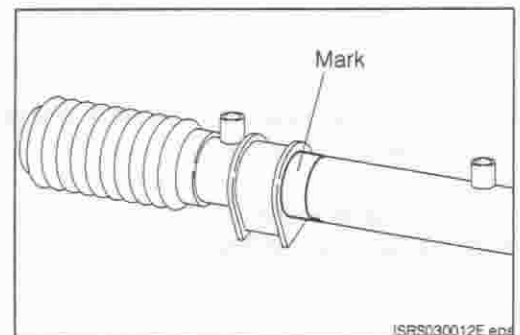
SST; 09633-00020-000



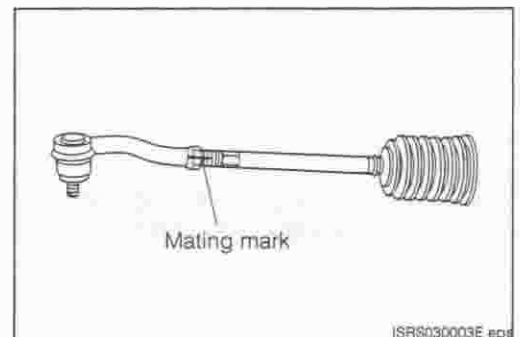
WARNING

- If the steering rack is operated with tube removed, residual fluid may splash. So take care of fluid splash not to enter in your eye or the other.

2. Removal of steering rack housing No.2 bracket
(1) Remove the bracket, with the bracket and housing marked with mating marks.



3. Removal of tie-rod end S/A
(1) Remove the tie-rod end, with the steering rack end and tie-rod end marked with mating marks.



SR-20

NOTE

- Mating marks shall be made in such a way that the discrimination of the right and left may be easy.

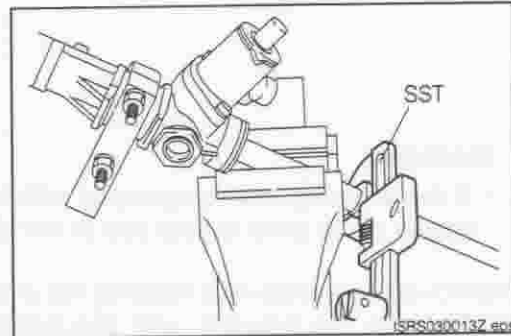
4. Removal of steering rack No.1 end S/A

(1) After exposing the steering rack by turning the control rack S/A, fix the tooth section to a vice.

CAUTION

- When fixing to the vice, insert a copper plate or the like so that the teeth may have no damage.

SST: 09616-87702-000

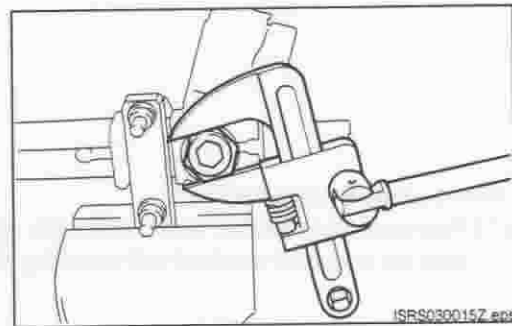


(2) Remove the steering rack No.1 end S/A.

SST: 09922-10010-000

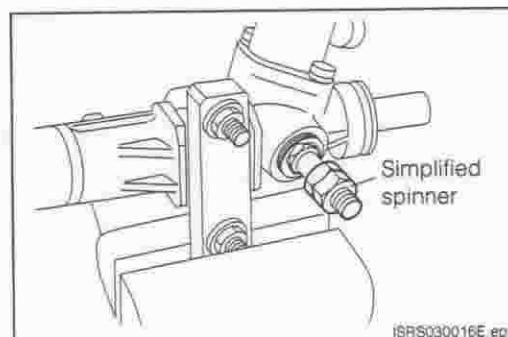
5. Remove the lock nut.

SST: 09922-10010-000



6. Remove the rack guide spring cap.

TOOL: SIMPLIFIED SPINNER



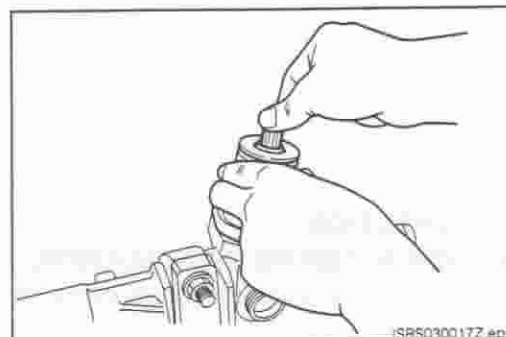
7. Removal of power steering control valve Ay

(1) While holding the power steering control valve S/A, remove the power steering control valve Ay.

CAUTION

- If you hold up only the valve housing S/A, the seal in the valve housing may be scratched.

TOOL: Torx® SOCKET (T40)

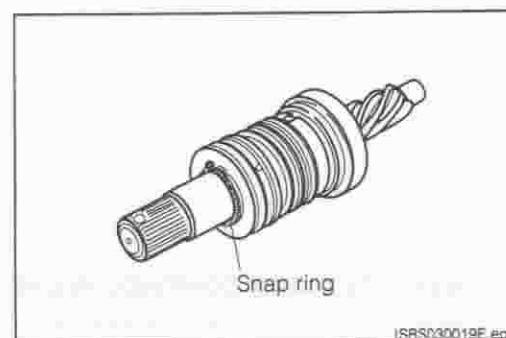
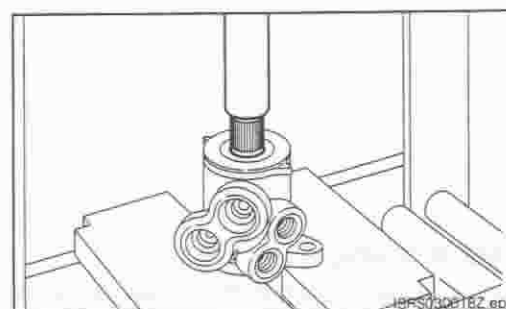


8. Removal of power steering control valve S/A

(1) Take out the power steering control valve S/A by pushing it out from the control valve housing S/A using a press machine.

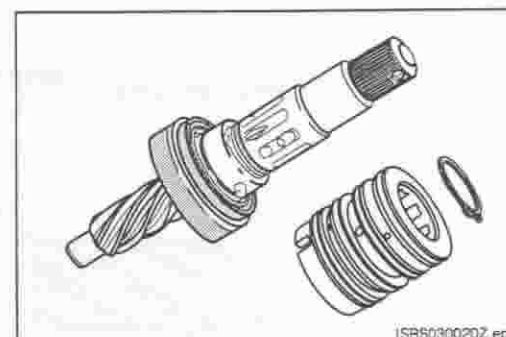
CAUTION

- Since the seal in the valve housing may be scratched by the spline of valve S/A, the valve S/A shall be pushed out straightly downward.



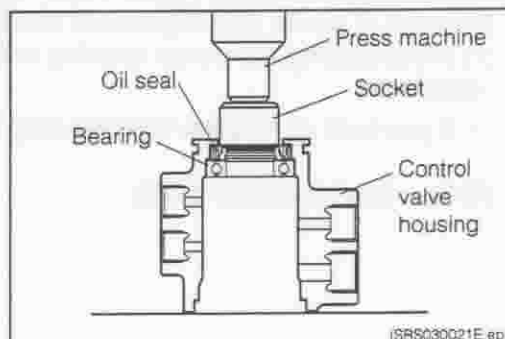
CAUTION

- By removing the snap ring, the power steering control valve S/A is disassembled into the sleeve section and the valve section.
- Since the oil seal of the valve section may be scratched during disassembling, in the case of disassembling by removing snap ring, replace the power steering control valve S/A.



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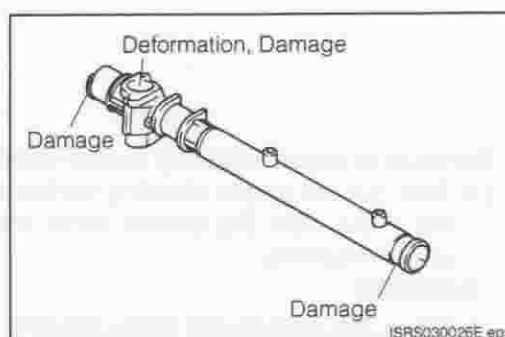
9. Removal of type T oil seal and the needle roller bearing
(1) Remove the type T oil seal and the needle roller bearing using a socket (17mm) and a press machine.



3-2-5 INSPECTION

(1) POWER STEERING RACK HOUSING

1. Check each portion for no abnormal condition.



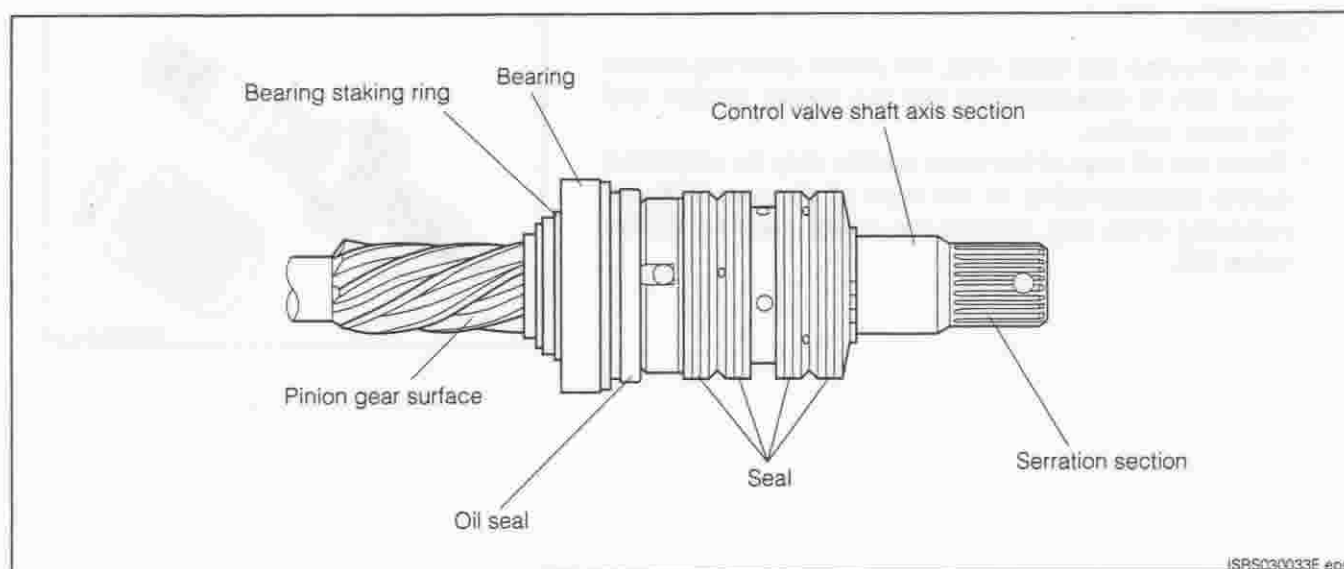
(2) RACK GUIDE

1. Check each portion for no abnormal condition.



(3) POWER STEERING CONTROL VALVE

1. Check each portion for no abnormal condition.



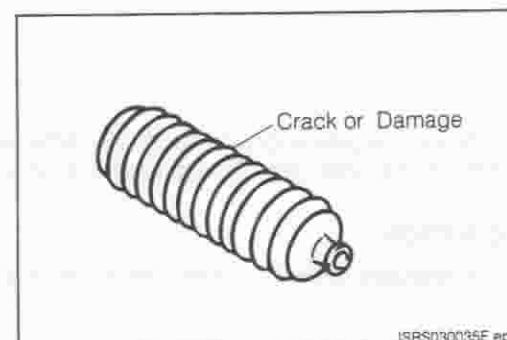
(4) STEERING RACK END

1. Check each portion for no abnormal condition.



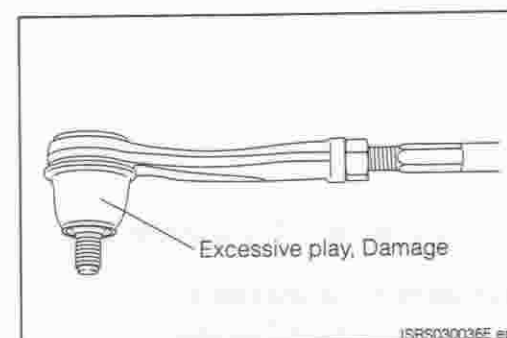
(5) STEERING RACK BOOT

1. Check each portion for no abnormal condition.



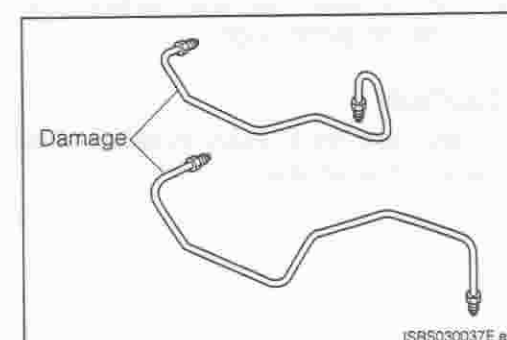
(6) TIE-ROD END

1. Check each portion for no abnormal condition.



(7) TURN PRESSURE TUBE

1. Check each portion for no abnormal condition.



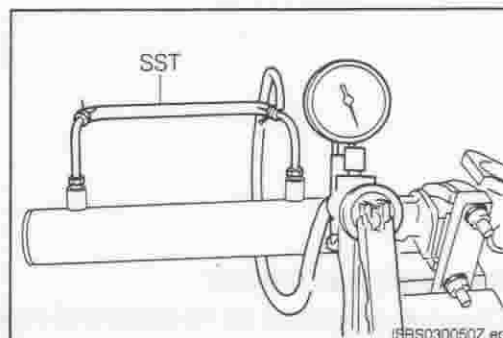
SR-24

(8) Air tight test

(1) Install SST to the power steering rack housing.

SST: 09631-12071-000

(2) Attach Mighty bag to SST.

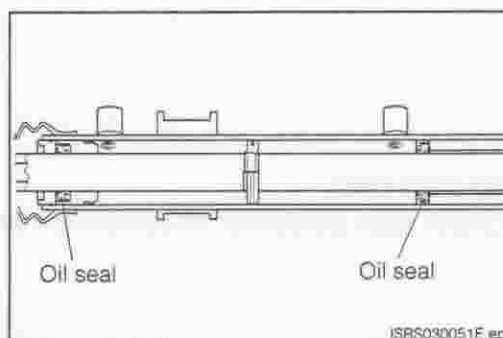


(3) Apply negative pressure of 53.3kPa (400mmHg), and maintain it for 30 seconds.

SPECIFIED VALUE: Check to see if no variation of pointer indication exist.

CAUTION

- If leakage is found, check each oil seal and replace.



(4) Remove the SST and Mighty bag.

SR-STG-B-C-00021

3-2-6 POINTS OF ASSEMBLY

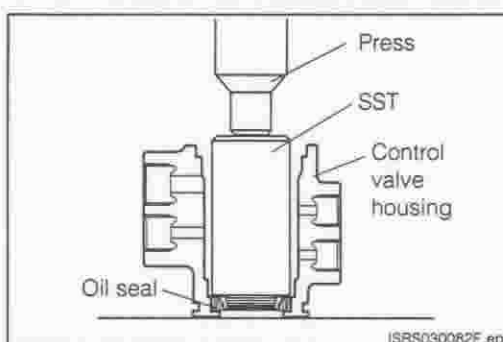
1. Installation of type T oil seal

(1) Using a press machine, perform press-fit of type T oil seal into control valve housing S/A.

SST: 09238-87701-000

CAUTION

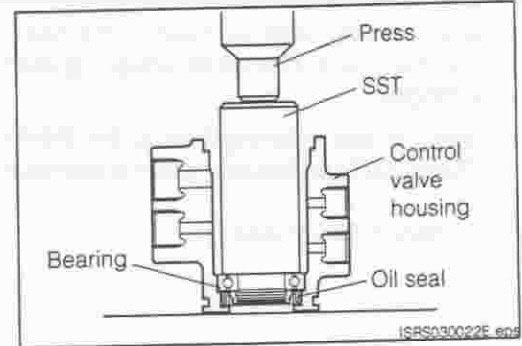
- Take care not to apply excessive load for avoiding damage of the oil seal.



2. Installation of needle roller bearing

- (1) Using a press machine, perform press-fitting of the needle roller bearing into the control valve housing S/A.

SST: 09238-87701-000



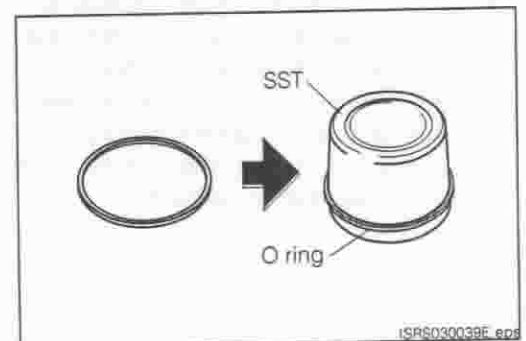
3. Installation of type T oil seal

- (1) Expanding the type T oil seal. Then, fit it into the ring groove of the control valve S/A.

CAUTION

- Fit it without torsion.
- Do not get the ring damaged by nail or the like when expanding it.
- Do not expand the ring excessively.

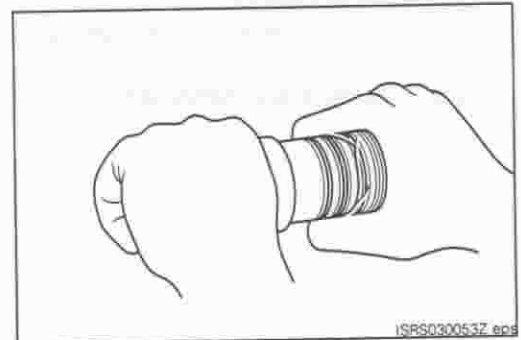
SST: 09631-20070-000



- (2) Let the expanded type T oil seal shrink while adapting itself by pressing down by hand.

CAUTION

- Do not damage it by nail or the like.



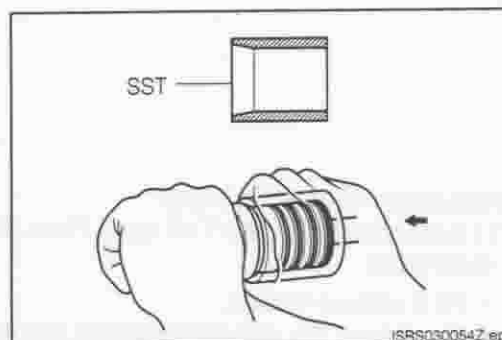
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- (3) Apply power steering fluid to the type T oil seal.
- (4) Let the seal shrink while adapting itself.

CAUTION

- Apply power steering fluid to the inside of SST.
- Clean SST sufficiently with no damage nor adhesion of dust.

SST: 09631-20081-000



4. Installation of control valve housing S/A

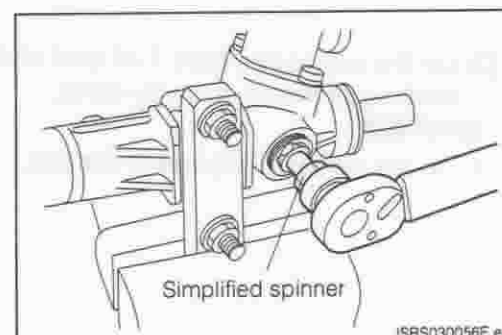
- (1) Get the serration part of power steering control valve S/A taped with protection tape.
- (2) With the all surface of the oil seal applied with power steering fluid, install the control valve housing S/A.
- (3) Tap the top part of the control valve housing S/A with plastic hammer to settle it.



5. Adjustment of preload

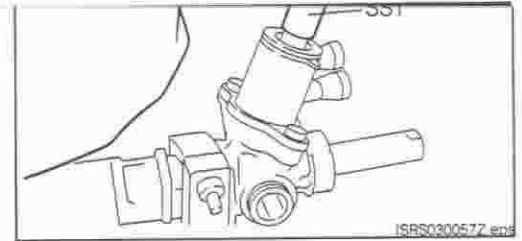
- (1) Fasten the rack guide spring cap with specified torque.

TOOL: SIMPLIFIED SPINNER



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Use the stopper and the rack guide end surface.

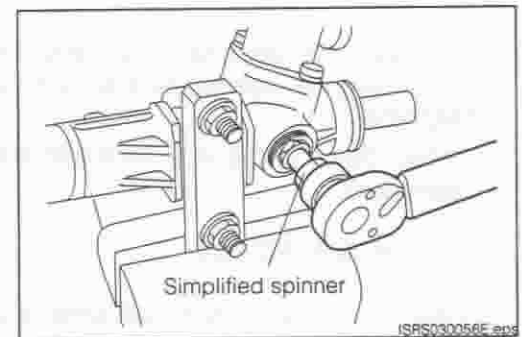


(4) Loosen the rack guide spring cap until the rack guide compression spring come to fail to function.

NOTE

- Loosen it to such a degree that the rack end surface may be operated smoothly by pushing with hand.

TOOL: SIMPLIFIED SPINNER



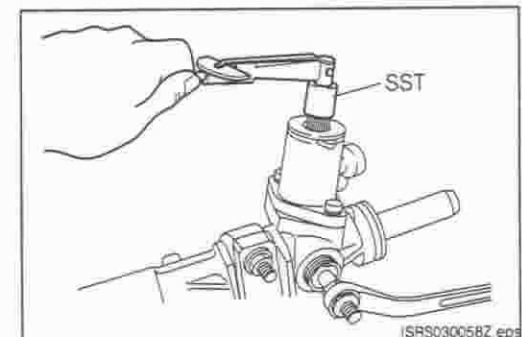
CAUTION

- Fasten the rack guide spring cap so that the preload when the steering pinion is turned may be the standard value.

SPECIFIED VALUE: $0.9 \pm 0.1 \text{ N}\cdot\text{m}$ (during turning)

SST: 09616-87702-000

TOOL: SIMPLIFIED SPINNER



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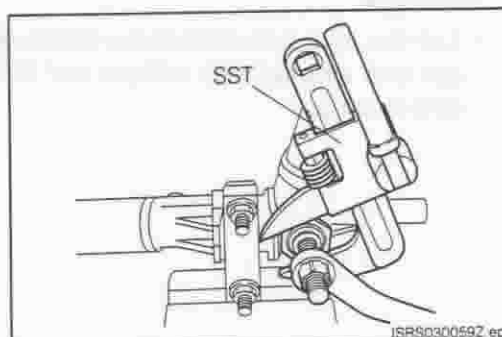
6. Installation of lock nut

- (1) Remove perfectly bond left when disassembling.
- (2) Apply bond to the end surfaces of both the thread part of lock nut and the rack housing side.
- (3) Install lock nut.

SST: 09922-10010-000

TOOL: SIMPLIFIED SPINNER

ADHESIVE: Sealant



7. The second check of preload

- (1) Inspect the preload when the steering pinion is turned.

SPECIFIED VALUE: $0.9 \pm 0.1 \text{ N}\cdot\text{m}$ (during turning)

SST: 09616-87702-000

8. Installation of steering rack No.1 end S/A

- (1) Exposing the steering rack by turning the control valve S/A, fix the tooth section to a vice.

CAUTION

- When fixing to the vice, fix it with copper plate or the like inserted so that the tooth part may not be damaged.

SST: 09616-87702-000

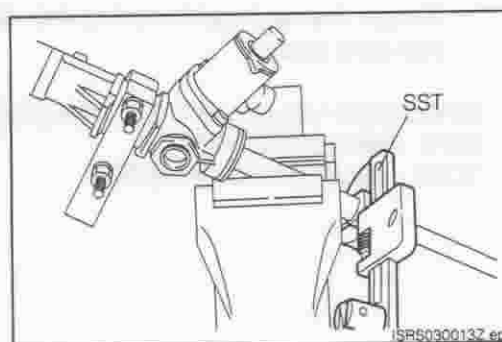
- (2) Remove perfectly bond left when disassembling.

- (3) Apply bond to the thread part of steering rack end S/A.

ADHESIVE: Three Bond 1324

- (4) Install the steering rack No.1 end S/A.

SST: 09922-10010-000

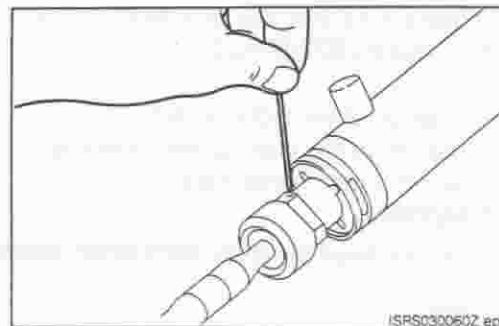


9. Installation of the steering rack boot

- (1) Inserting wire or the like into the vent hole, make sure the hole being not blocked with grease.

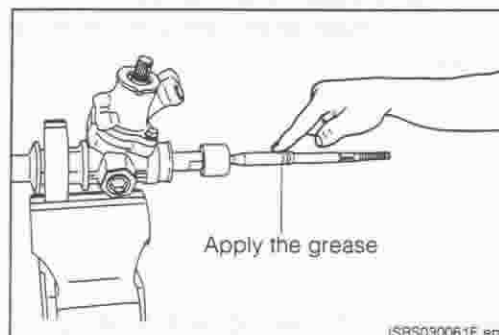
NOTE

- The ports of the steering rack equalize pressure difference in the both sides of rack boot right and left. For this reason, if the port is blocked, the pressure in the boot when steering is turned may vary so that the boot may be deflected or broken.



- (2) Apply the grease to the rack boot groove of the rack end S/A.

ADHESIVE: Molybdenum disulfide lithium base grease



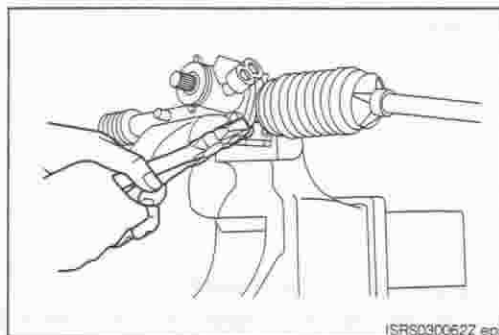
- (3) Install the steering rack boot.

10. Installation of the steering rack boot No.3 band.

- (1) Get the larger diameter part wrapped double with the steering rack boot No.3 band.
- (2) Tighten it with 3 times of winding of its binding parts, with them pulled with about 98N (10kgf) of force using a pair of pliers.

CAUTION

- After the work, make sure that the boot can not turn even if a force is applied grabbing the larger end.
- Do not tighten excessively for fear that the boot band may be broken.



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(3) Make sure that the rack boot can smoothly expand and compress by turning the control valve shaft.
SST: 09616-87702-000

11. Installation of tie-rod end S/A

(1) Matching the mating marks made in disassembling, install the tie-rod end S/A.

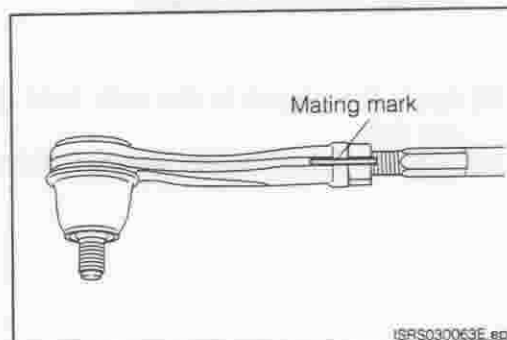
12. Fasten the nuts temporarily.

CAUTION

- Do not twist the rack shaft when assembling

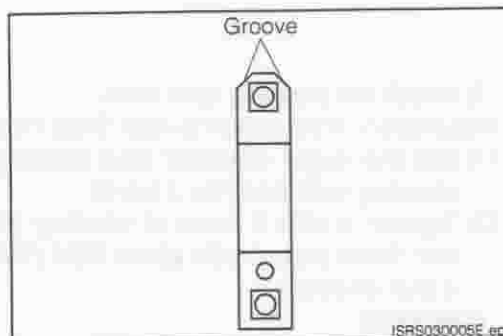
NOTE

- Regular tightening shall be made at the time of inspection of wheel alignment after steering gear S/A installation.



13. Installation of steering rack housing No.2 bracket

(1) Matching marks made when removed, install the steering rack housing No.2 bracket, with the notch upward.



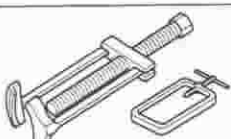
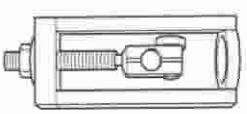
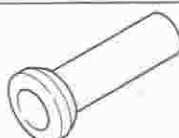
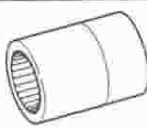
14. Installation of union seat

(1) Insert the union seat into the power steering rack housing with its tapered surface faced upward.

SA-STG-B-S-00021

3-3 DISASSEMBLY AND ASSEMBLY (Manual Steering)

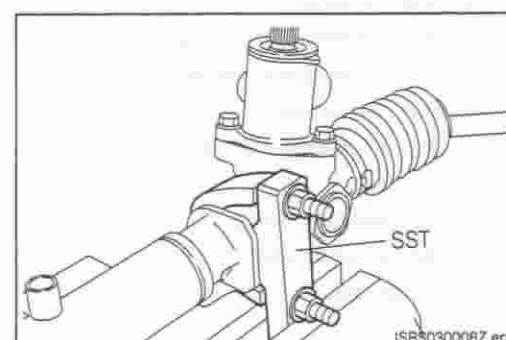
3-3-1 PREPARATION TOOLS

	Shape	Part number, part name	Use
SST		09612-00012-000 Stand, rack & pinion steering rack housing	For securing steering gear
		09922-10010-000 Wrench, variable open	For removal of lock nut
		09602-87301-000 Puller, counter gear bearing	For removal of steering housing cover
		09631-87201-000 Remover, steering pinion bearing	For removal of steering pinion
		09950-20017-000 Puller, universal	For removal of radial ball bearing
		09309-87201-000 Replacer, transmission bearing	For installation of type K oil seal and steering gear housing cover
		09616-87701-000 Socket, steering pinion bearing adjusting	For adjustment of preload
Instrument	Torque wrench		
Lubricant	grease		

SR-STG-G-P-00021

3-3-2 OPERATION BEFORE DISASSEMBLY

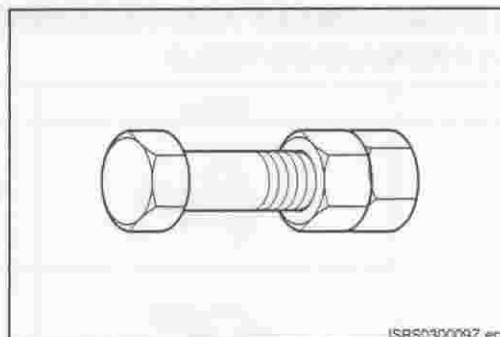
1. Fix the steering gear S/A to a vice.
SST: 09612-00012-000



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2. Making simplified spinner.

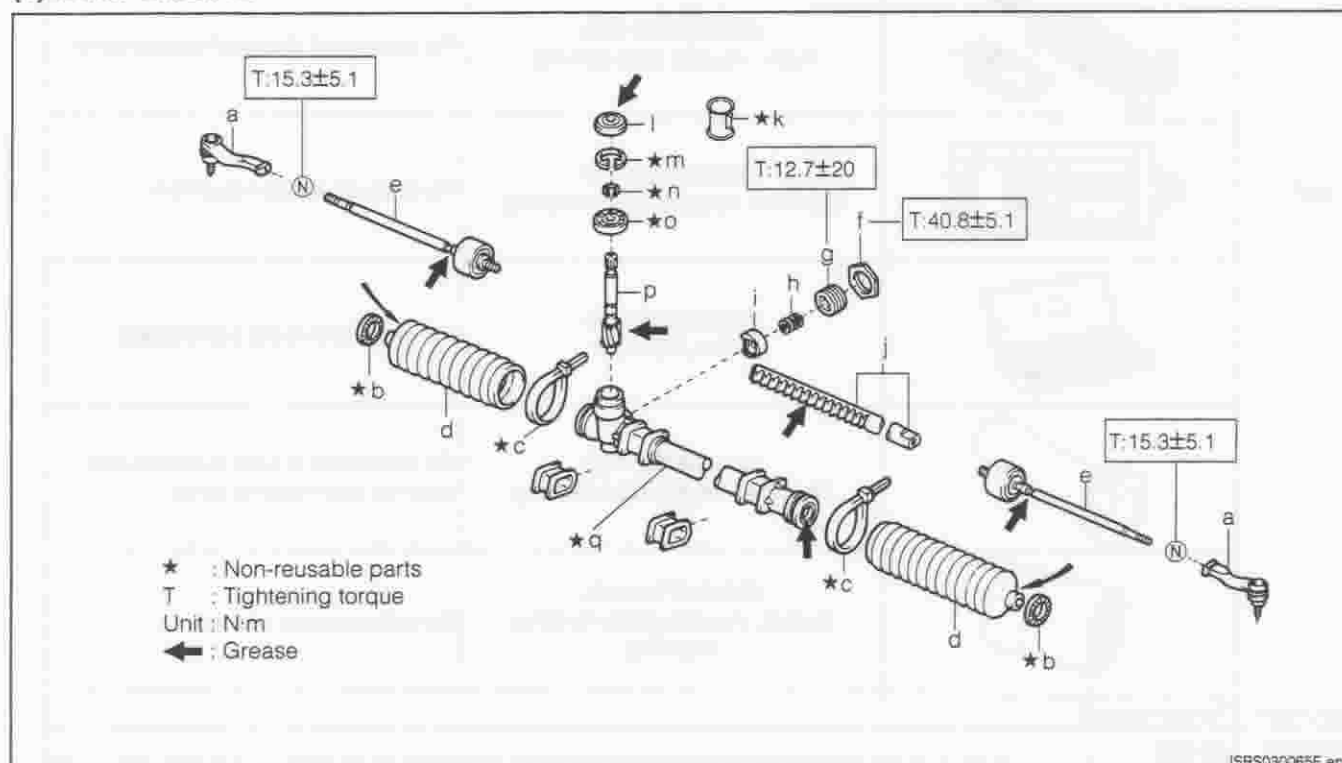
- (1) Screw two nuts which width across flats is 17mm into a bolt and fix them as double nut.



ISRS0300097.eps
SR-STG-G-B-00021

3-3-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



ISRS0300055E.eps

(2) DISASSEMBLY AND ASSEMBLY PROCEDURE

- ① ⑰ a End S/A, tie-rod
 2 16 b Band, steering rack boot, No.2
 3 15 c Band, steering rack boot, No.1
 4 14 d Boot, steering rack
 5 13 e End S/A, steering rack No.1
 ⑥ ⑫ f Nut, lock
 ⑦ ⑪ g Cap, rack guide spring
 8 10 h Spring, compression
 9 9 i Guide, rack

- ⑩ 8 j Rack, steering
 ⑪ ⑦ k Cover, steering gear housing
 ⑫ ⑥ l Seal, type K oil
 ⑬ 5 m Ring, snap
 ⑭ 4 n Ring, shaft snap
 ⑮ ③ o Bearing, radial ball
 ⑯ ② p Pinion, steering
 17 1 q Housing S/A, steering rack

SR-STG-G-T-00021

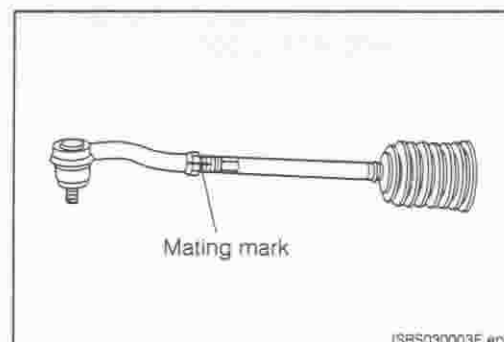
3-3-4 POINTS OF DISASSEMBLY

1. Removal of tie-rod end S/A.

- (1) Putting mating marks on the steering rack end and tie-rod end, remove the tie-rod end.

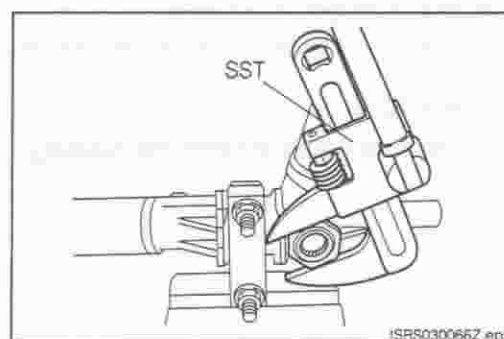
NOTE

- Mating marks shall be made in such a way that the discrimination of the right and left may be easy.



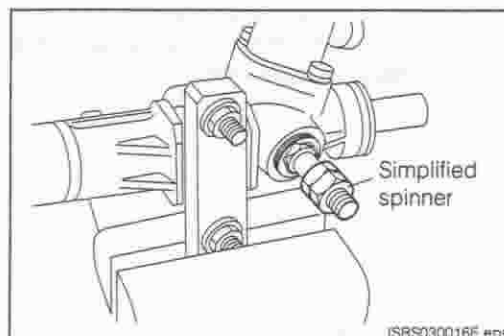
2. Remove the lock nut.

SST: 09922-10010-000



3. Remove the rack guide spring cap.

TOOL: SIMPLIFIED SPINNER

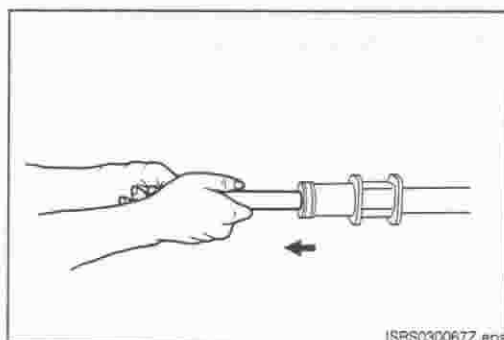


4. Removal of steering rack

- (1) Pull out the steering rack toward the housing.

CAUTION

- Be sure to pull out it toward the housing for fear that the rack end edge should scratch the rack bush.

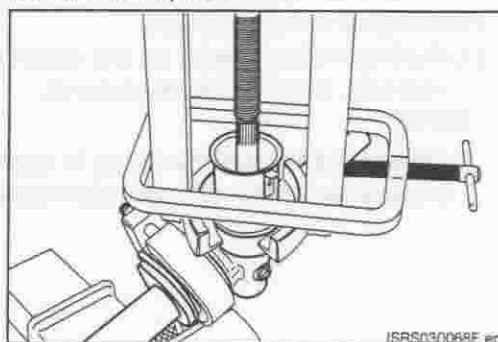


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(2) Cleaning the steering rack with cleaning oil, remove grease left in tooth space.

5. Remove the steering gear housing cover.

SST: 09602-87301-000



6. Removal of type K oil seal

(1) Using a screw driver or the like, remove the type K oil seal.

CAUTION

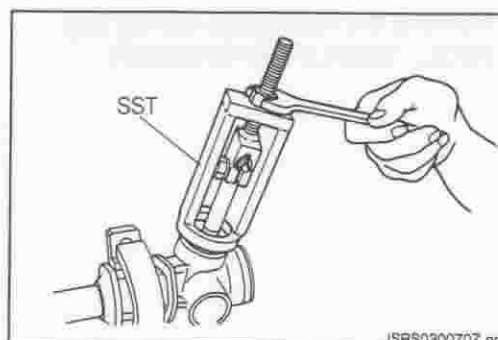
- Be sure not to scratch the housing.



7. Removal of steering pinion

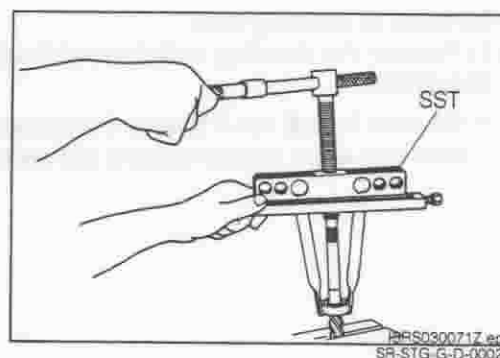
(1) Remove the steering pinion with the bearing.

SST: 09631-87201-000



8. Remove the radial ball bearing.

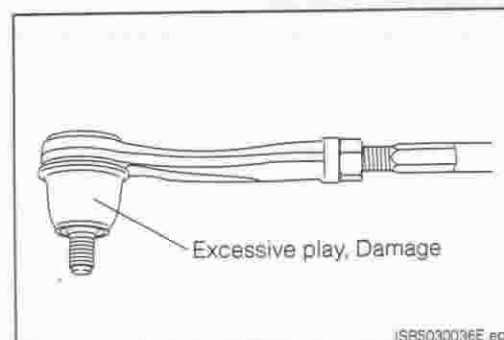
SST: 09950-20017-000



3-3-5 INSPECTION

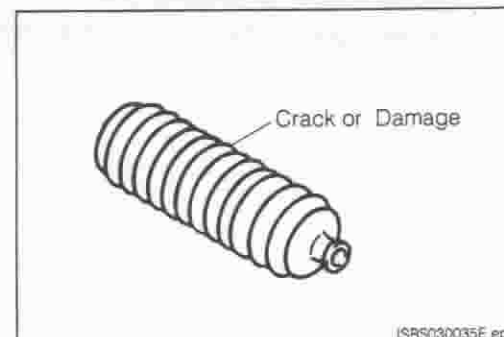
(1) TIE-ROD END S/A

1. Check each portion for no abnormal condition.



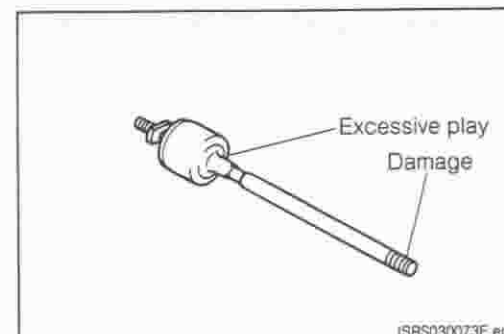
(2) STEERING RACK BOOT

1. Check each portion for no abnormal condition.



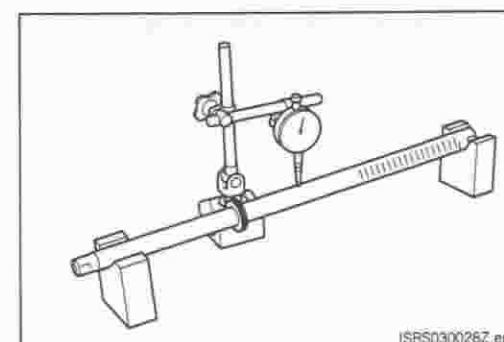
(3) STEERING RACK No.1 END S/A

1. Check each portion for no abnormal condition.



(4) STEERING RACK

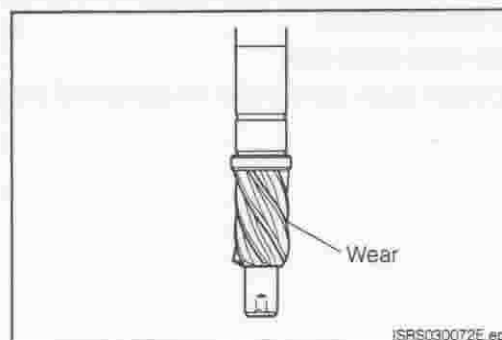
1. Check each portion for no abnormal condition.
2. Measure the deflection of steering rack.
ALLOWABLE LIMIT: MAX 0.15mm (center part of rack)



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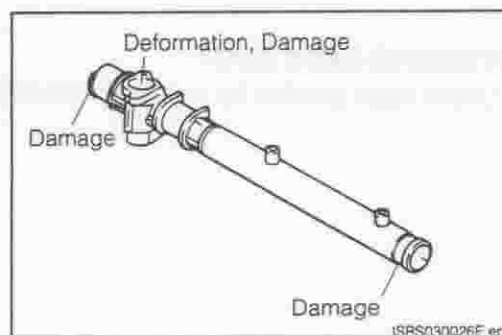
(5) STEERING PINION

1. Check each portion for no abnormal condition.



(6) STEERING RACK HOUSING S/A

1. Check each portion for no abnormal condition.



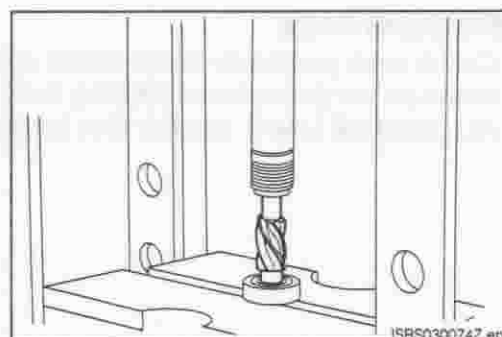
(7) STEERING RACK END S/A

1. Check each portion for no abnormal condition.



3-3-6 POINTS OF ASSEMBLY

1. Installation of radial ball bearing
(1) Perform the press-fit of the radial ball bearing into the steering pinion using a hydraulic press.

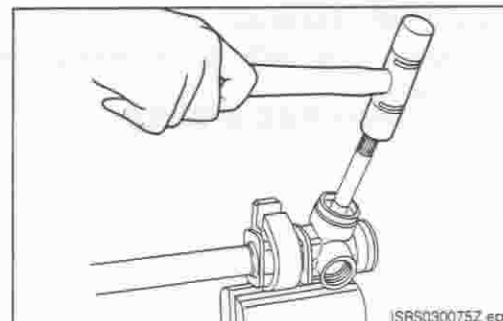


2. Installation of steering pinion

- (1) Install the steering pinion into the steering rack housing S/A using a plastic hammer.

CAUTION

- When a plastic hammer is used, do not apply excessive force.



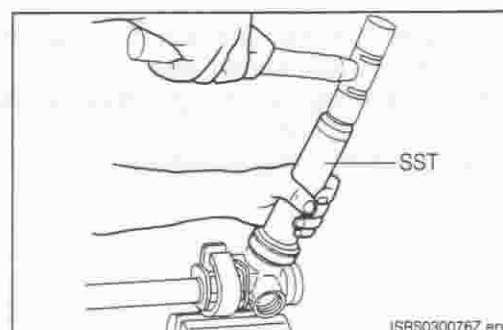
3. Installation of type K oil seal

- (1) Install the type K oil seal using a plastic hammer.

CAUTION

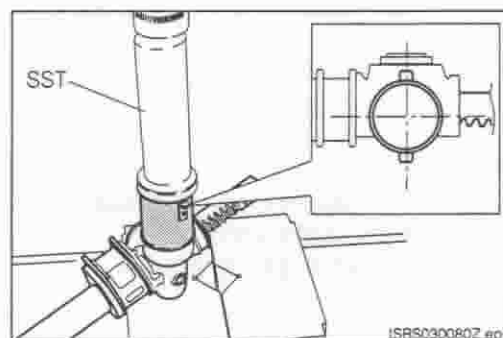
- Do not let grease adhere to the fitting section of oil seal in the housing.

SST: 09309-87201-000



4. Install the steering gear housing cover.

SST: 09309-87201-000



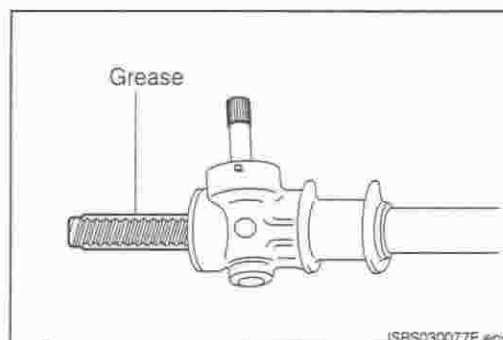
5. Installation of steering rack

- (1) Apply grease on the teeth and surrounding surface of the steering rack.

- (2) Insert the steering rack from the housing side of the steering rack housing S/A.

CAUTION

- Do not scratch the rack bush.

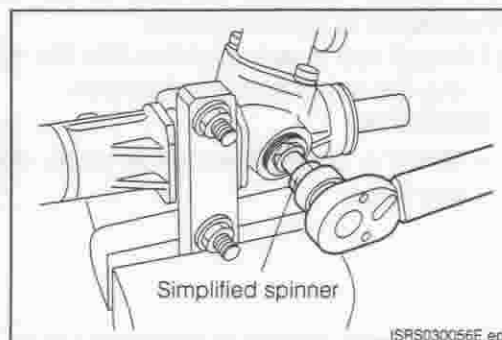


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6. Adjustment of preload

- (1) Tighten the rack guide spring cap with specified torque.

TOOL: SIMPLIFIED SPINNER



- (2) Return the rack guide spring cap about for 50°.

- (3) Turning the steering pinion, operate the steering rack for once or twice of full stroke travel to break in the steering rack.

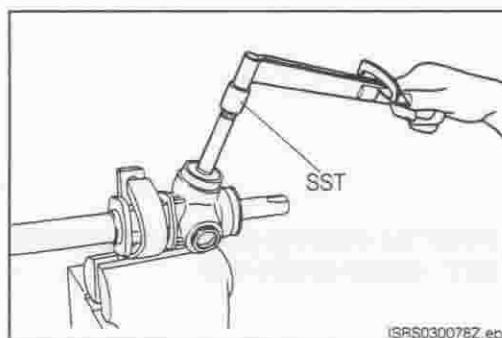
SST: 09616-87701-000

- (4) Fasten the rack guide spring cap so that the preload when the steering pinion is turned may become the specified value.

SPECIFIED VALUE: $1.5 \pm 0.5 \text{ N}\cdot\text{m}$ (during turning)

SST: 09616-87701-000

TOOL: SIMPLIFIED SPINNER

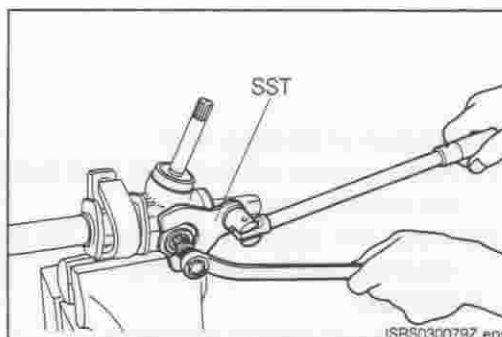


7. Fastening of lock nut

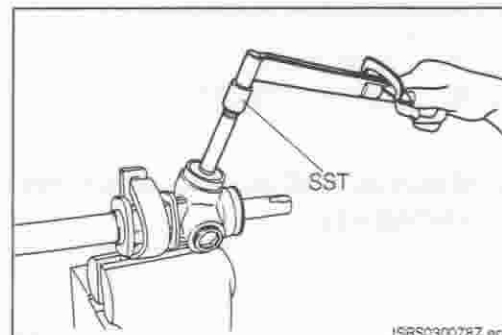
- (1) Tighten lock nut, with the rack guide spring cap prevented from turning.

SST: 09922-10010-000

TOOL: SIMPLIFIED SPINNER



8. The second check of preload
(1) Check the preload when steering pinion is turned.
SPECIFIED VALUE: $1.5 \pm 0.5 \text{ N}\cdot\text{m}$ (during turning)
SST: 09616-87701-000



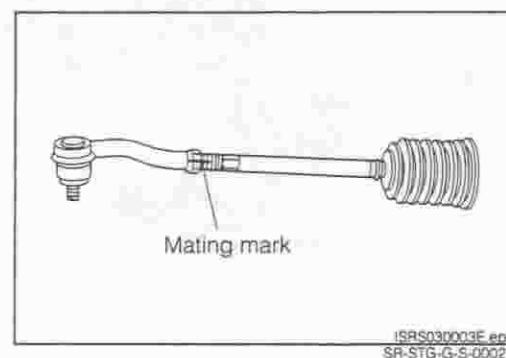
9. Installation of tie-rod end S/A
(1) Install the tie-rod end S/A, with the mating marks matched each other.
10. Fasten the nut temporarily.

CAUTION

- Take care not to twist the rack shaft when tightening.

NOTE

- Regular tightening shall be made at the time of the inspection of wheel alignment after installing the steering gear S/A.



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4 VANE PUMP

4-1 REMOVAL AND INSTALLATION

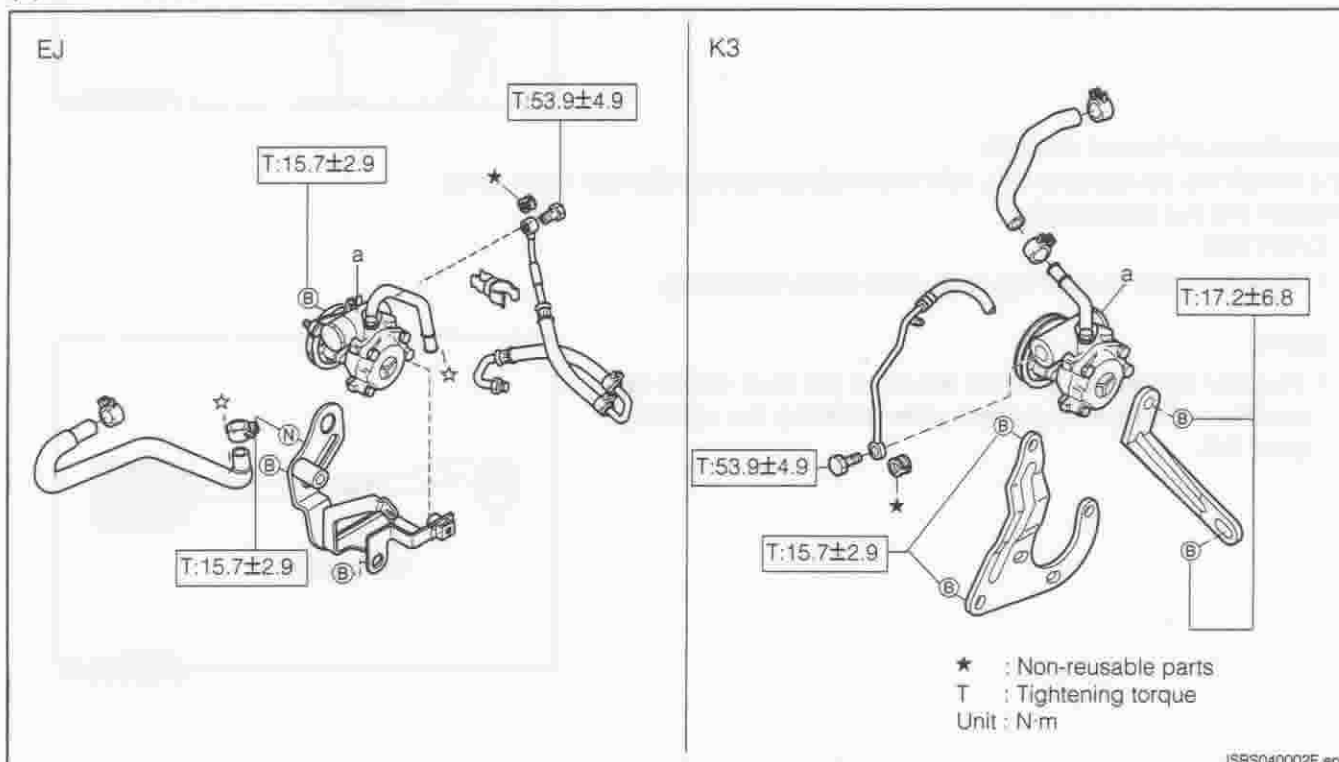
4-1-1 PREPARATION TOOLS

Instrument	Torque wrench
Lubricant	Power steering fluid

SR-VPU-D-P-00011

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



ISRS040002E.eps

(2) REMOVAL AND INSTALLATION PROCEDURES

- 1 1 a Pump Ay, vane

SR-VPU-D-T-00011

4-1-3 OPERATION BEFORE REMOVAL

1. Remove the power steering fluid.

CAUTION

- Plug the hose so that power steering fluid spilled out may not smear the paint finishing surface.

Refer to SR-45.

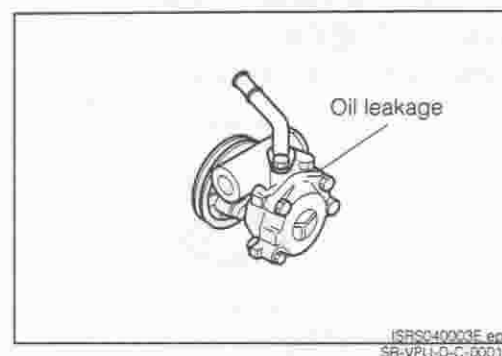
2. Remove the air cleaner hose. (For EJ engine vehicles)
3. Remove the V belt.

SR-VPU-D-B-00011

4-1-4 INSPECTION

(1) VANE PUMP

1. Check each portion for no abnormal condition.



4-1-5 OPERATION AFTER INSTALLATION

1. Install the V belt.
2. Fill with power steering fluid.
Refer to SR-45.
3. perform air-bleeding after filling of the power steering fluid.
Refer to SR-45.

SR-VPJ-D-A-00011

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5 POWER STEERING

5-1 BASIC CHECK

5-1-1 PREPARATION TOOLS

	Shape	Part number, part name	Use
SST		09990-87704-000 Gauge, P/S pressure	For inspection of vane pump output pressure
Instrument	Belt tension gauge		
Lubricant	Dexron® III (or II)		

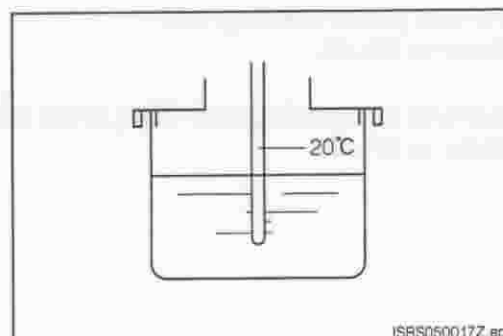
SR-PS-I-P-00021

5-1-2 STEERING FLUID

(1) CHECK

① CONDITION

1. Warm up steering fluid.
Holding the engine revolution less than 1000rpm, turn steering wheel several times from lock to lock.
Get the steering fluid temperature to be about 20°C.



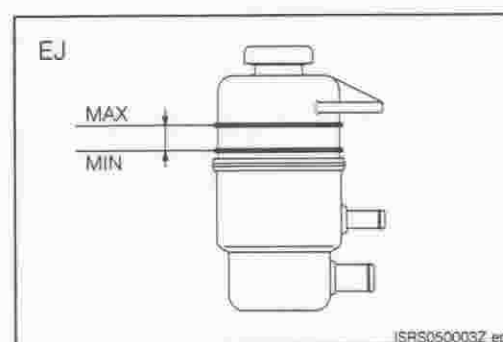
2. Check the condition of the steering fluid.
SPECIFIED VALUE: No impurity and bubbling.

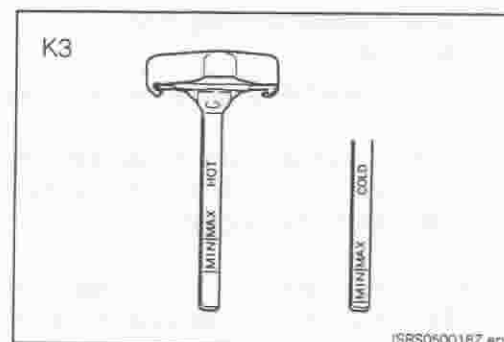
NOTE

- The case of bubbling or white impurity means that the power steering system has air mixing or the fluid level is low.

② QUANTITY

1. Get the steering fluid temperature to be about 20°C.
2. Check the quantity of steering fluid.
SPECIFIED VALUE: It shall be within the range (between max and min)





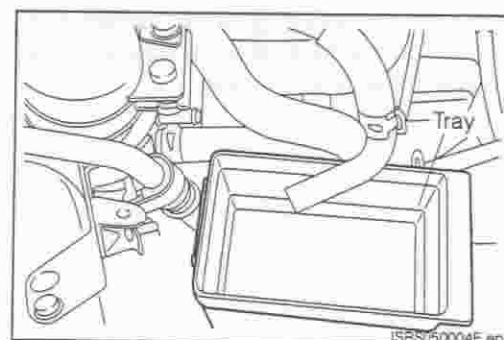
(2) REPLACEMENT

CAUTION

- Do not get power steering fluid applied to the body so that it may not damage the paint finishing surface.

① Removal of power steering fluid

1. Removing the hose between the oil reservoir and the steering gear S/A (side of return) , receive the fluid using a tray or the like.



2. Start the engine.

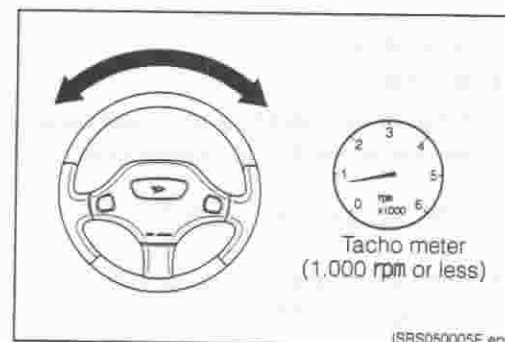
CAUTION

- Do not get engine revolution higher.

3. With the steering wheel turned to the lock position, hold it for 2 to 3 seconds.
4. Turn it to the reverse lock position quickly.
5. Repeating this 2 to 3 times, remove the power steering fluid.

CAUTION

- Do not get engine revolution up.



6. As soon as power steering fluid run out, stop the engine.

CAUTION

- If the engine keep running after the power steering fluid run out, the vane pump will get damaged. Therefore quick engine stop is required.

7. Install the hose between the oil reservoir and the steering gear S/A (between returns) .

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② Filling with power steering fluid.

CAUTION

- During the filling operation, take care of the oil reservoir not to run out of power steering fluid.

1. Fill the oil reservoir with power steering fluid.
2. Until power steering fluid come to the specified quantity, repeat filling and cranking for 2 to 3 times.

LUBRICANT: DEXRON® III or II

3. performing cranking for 1 to 2 seconds, get the vane pump supplied with power steering fluid.
SPECIFIED VALUE: Be sure of the oil level being within the specified oil level (between max and min) .

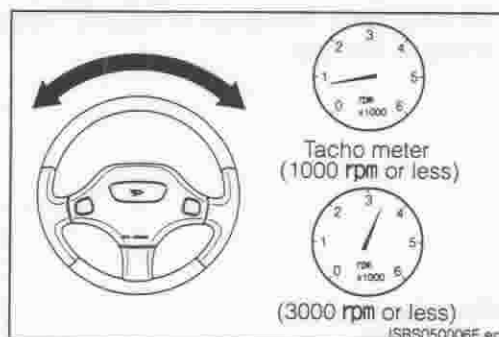
③ Air bleeding

1. Start engine.

CAUTION

- Do not get engine revolution up.

- (1) With the steering wheel turned to the lock position, hold it for 2 to 3 seconds.
2. Turn it to the reverse lock position quickly.
3. Repeat this 2 to 3 times.



4. When the movement of oil level in the oil reservoir get stopped, hold it as it is steered statically to either left or right for 5 to 6 seconds.

SPECIFIED VALUE: There shall be no abnormal noise, remarkable white impurity, nor bubbling.

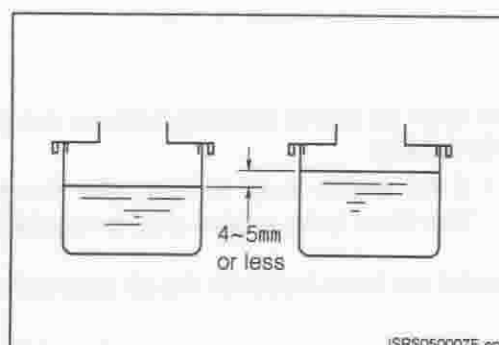
④ Check of oil level

CAUTION

- If the oil temperature of power steering fluid is low, judgement may be mistaken due to remained bubble, therefore the oil temperature should be raised by performing static steering.

SPECIFIED VALUE: 40-80°C

1. perform static steering for 5 to 6 times with engine revolution being 3,000rpm.



2. Check the oil level condition in the oil reservoir.

SPECIFIED VALUE: Be sure that the oil level movement during the static steering is within 4 to 5mm.

Be sure that there is no bubbling mixed in.

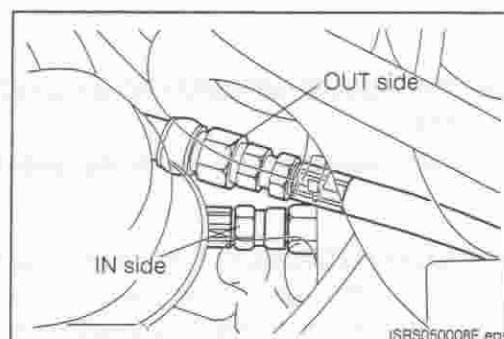
Be sure that there is neither abnormal noise, remarkable white impurity, nor foaming.

SR-PS-I-X-00021

5-1-3 HYDRAULIC PRESSURE

(1) CONNECTION OF FLUID GAUGE

1. Install the pressure gauge to the vane pump.
SST: 09990-87704-000
2. Separate the pressure feed hose (IN side) from the vane pump.
Connect the IN side of the pressure gauge to the vane pump with the thread section taped with sealing tape.
Connect the OUT side of the pressure gauge to the pressure feed hose with the thread section taped with sealing tape.



3. Perform air bleeding.
Refer to SR-45.
4. Performing static steering, raise the oil temperature.
SPECIFIED VALUE: 50°C

(2) VANE PUMP

NOTE

- If any abnormality is found, replace the vane pump.

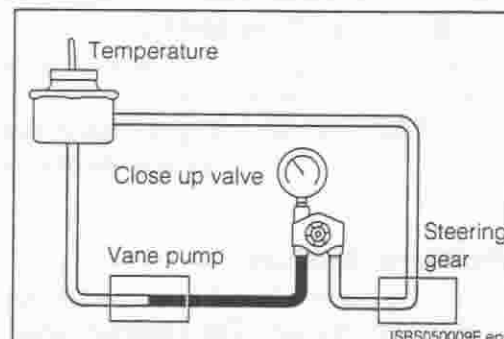
① MAXIMUM HYDRAULIC PRESSURE GENERATED BY THE PUMP

1. Close up the valve of the pressure gauge
2. Start engine.
3. Measure the oil pressure during the engine idling.

SPECIFIED VALUE: 6.2-6.9MPa

CAUTION

- When measuring, if the valve is kept closing for long time, the vane pump may be damaged as the result of oil temperature raising.

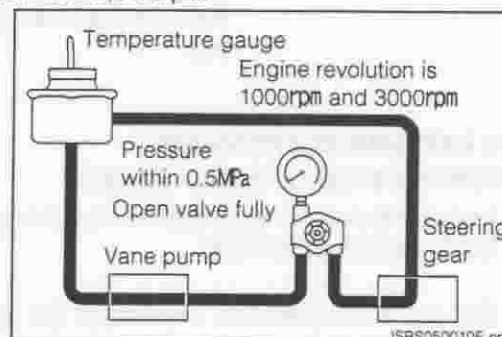


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② FLUID PRESSURE DIFFERENCE WITHOUT LOAD

1. Open fully the valve of the pressure gauge.
2. Measure the oil pressure when the engine revolution is 1,000rpm and 3,000rpm.
3. Calculate the difference between these values.

SPECIFIED VALUE: Within 0.5MPa



(3) OIL PRESSURE GENERATED BY STEERING GEAR

NOTE

- If any abnormality is found, disassemble and repair the steering gear.

① MAXIMUM HYDRAULIC PRESSURE GENERATED BY THE GEAR

1. Open fully the valve of the pressure gauge.
2. Turn the steering wheel fully to either left or right.
3. Measure the oil pressure during the engine idling.

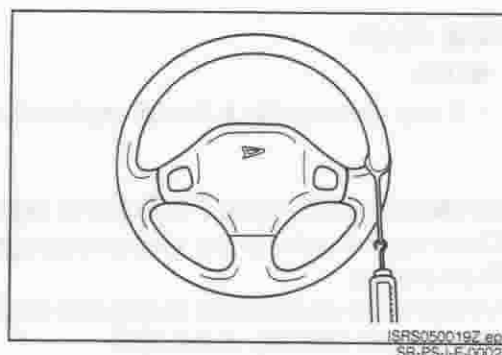
SPECIFIED VALUE: 4.4-4.9MPa

SR-PS-I-A-00021

5-1-4 STEERING EFFORT FOR STATIC STEERING

1. After turning the steering wheel once for both direction of left and right, return it to straight forward position.
2. Applying a spring scale to the steering wheel, measure the steering effort when pulling it to the tangential direction.

SPECIFIED VALUE: 3 kgf MAX



5-1-5 IDLING REVOLUTION CONTROL SYSTEM

(1) IDLING REVOLUTION SPEED

1. Inspect the idling condition when the steering wheel is turned as static steering from straight forward position to the lock position.

SPECIFIED VALUE: Idling revolution speed shall not decrease noticeably.

Engine revolution shall not become unstable.

(2) PRESSURE SWITCH

1. Check the continuity between the pressure switch connector and the body earth.

SPECIFIED VALUE: The continuity shall be as the table shows.

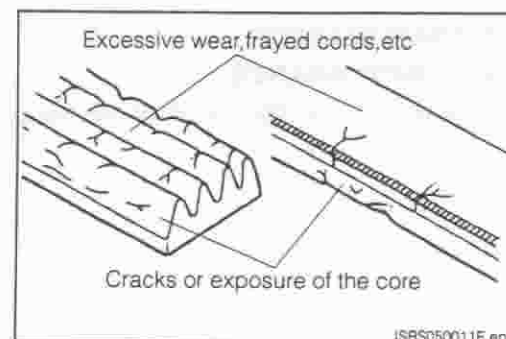
Steering wheel position	Specified condition
Straight ahead position	No continuity
Turned position	Continuity

SR-PS-I-R-00021

5-1-6 DRIVE BELT(EJ)

(1) APPEARANCE OF BELT

1. Check each portion for no abnormal condition.



(2) TENSION

① CHECK

1. Measure the tension of the part shown in the figure, using belt tension gauge.

NOTE

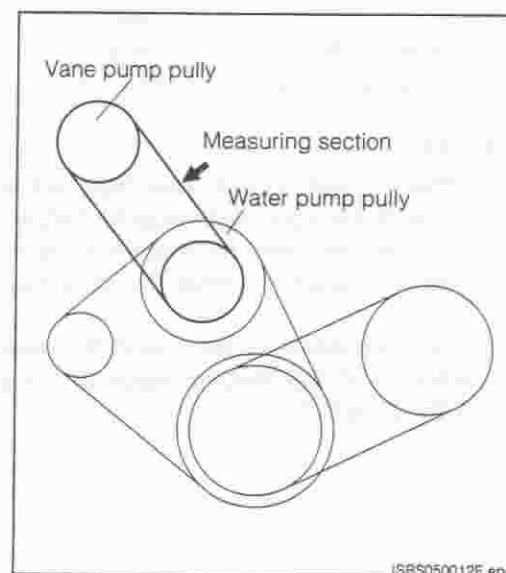
- Measuring of the amount of V belt deflection is the alternative way.
- In the case of using V belt deflection, measure it by pushing the part shown in the figure with the force of 98 N (10 kgf) .

SPECIFIED VALUE: BELT TENSION

	New belt	Used belt
Belt tension(N)	369.5 ± 75.5	269.5 ± 122.5
Belt deflection amount(mm)	6.5 - 9.0	7.5 - 11.5

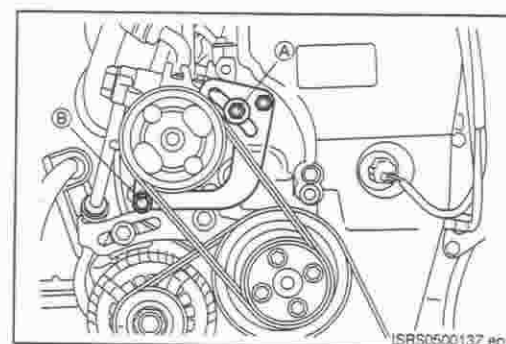
NOTE

- When replacing with new belt, adjust it to the median value of the specified value for "NEW BELT".
- For the belt used for more than 5 minutes, make sure that the value is within the specified value for "USED BELT".
- For installation of belt used for more than 5 minutes, adjust it to the median value of the specified value for "USED BELT".



② ADJUSTMENT

1. Loosen bolt A and B.



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2. Adjust the tension force by moving the vane pump.
3. Tighten bolts.

TIGHTENING TORQUE: A: $29.0 \pm 5.8 \text{ N}\cdot\text{m}$
B: $52.0 \pm 10.4 \text{ N}\cdot\text{m}$

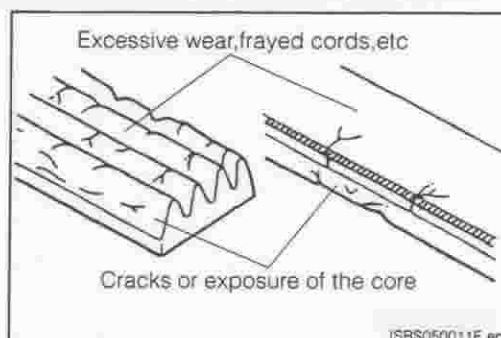
4. Check belt tension again.

SR-PS-I-V-00021

5-1-7 DRIVE BELT(K3)

(1) BELT APPEARANCE

1. Check each portion for no abnormal condition.



(2) TENSION

① CHECK

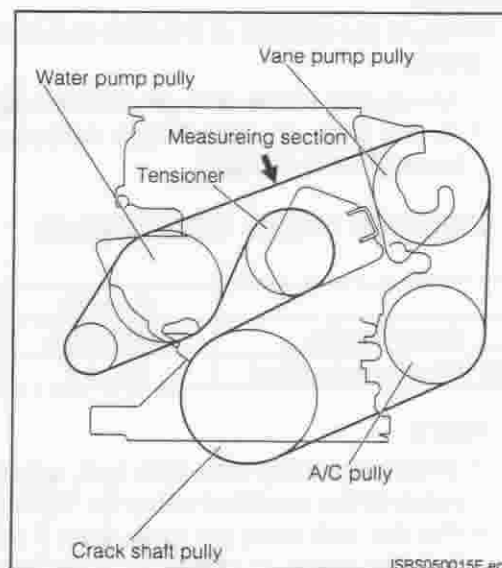
1. Measure the deflection of the belt by pushing the part shown in the figure with the force of 98N (10kgf).

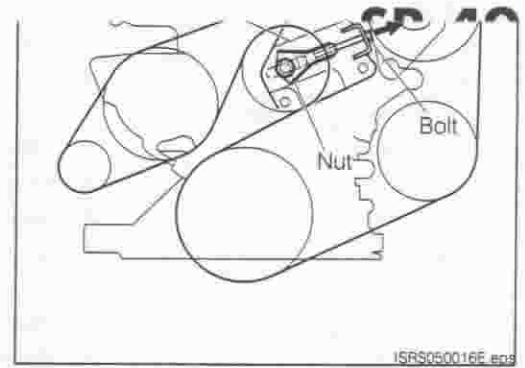
SPECIFIED VALUE: BELT TENSION

	New belt	Used belt
Belt tension(N)	590 ± 100	390 ± 50
Belt deflection amount(mm)	10.5 - 12.5	14.5 - 16.5

NOTE

- When replacing with new belt, adjust it to the median value of the specified value for "NEW BELT".
- For the belt used for more than 5 minutes, make sure that the value is within the specified value for "USED BELT".
- For installation of belt used for more than 5 minutes, adjust it to the median value of the specified value for "USED BELT".





2. Tighten the nuts by hand without looseness of the belt.

CAUTION

- In the case that the pulley is fixed with the tension adjusted while the pulley is clattering, the belt or pulley may interfere with the other part. Be sure, therefore, to tighten it by hand.

3. Moving the pulley tensioner by turning bolt, adjust the tension.
4. Tighten nuts.

TIGHTENING TORQUE: $44 \pm 8.8\text{N}\cdot\text{m}$

5. Perform the second check of the belt tension.

SA-PS-I-W-00021

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6 TIGHTENING TORQUE

Tightening components		N·m	kgf·cm
Steering wheel	× Steering column	34.3 ± 4.9	350 ± 50
Steering lock set bolt		8.3 ± 1.4	85 ± 15
Steering	× P-Pmember (bolt)	21.1 ± 3.4	215 ± 35
Steering column Ay	× P-Pmember (nut)	22.5 ± 4.9	230 ± 50
Steering column Ay	× universal joint (K3)	24.5 ± 4.9	250 ± 50
universal joint	× Steering gear	24.5 ± 4.9	250 ± 50
Steering rack housing bracket	× Frame	44.1 ± 4.9	450 ± 50
Pressure feed hose	× Steering gear	34.3 ± 4.9	350 ± 50
Dust cover retainer	× Floor	5.4 ± 1.5	55 ± 15
Steering rack end	× Steering rack (P/S)	69.0 ± 10.0	700 ± 100
Steering rack end	× Steering rack (M/S)	93.7 ± 15.2	950 ± 150
Tie-rod end lock nut		36.8 ± 7.4	375 ± 75
Control valve housing	× Power steering housing	17.7 ± 2.0	180 ± 20
Turn pressure tube	× Power steering housing	24.5 ± 4.9	250 ± 50
Lock nut (spring cap)	× Power steering housing	44.1 ± 4.9	450 ± 50
Vane pump	× Vane pump bracket	15.7 ± 2.9	160 ± 30
Vane pump	× Stay (K3)	17.2 ± 6.8	175 ± 70
Pressure feed hose	× Vane pump	53.9 ± 4.9	550 ± 50

SR-TQE-Z-Z-00011