# **Steering System**

GENERAL

STEERING COLUMN AND SHAFT STEERING COLUMN / SHAFT MECHANICAL POWER STEERING SYS-TEM

POWER STEERING GEAR BOX POWER STEERING HOSES POWER STEERING OIL PUMP



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**STEERING SYSTEM** 

# ST -2

# GENERAL

#### SPECIFICATIONS E8600541

| Items  | Specifications   |
|--|--|
| Shaft and joint type<br>Steering gear type<br>Rack stroke<br>Power steering pump type<br>Oil pump displacement<br>2.0(I4), 2.0(D-ENG)<br>2.7(V6) | Cross joint, tilt column with pop-up weight<br>Rack and pinion<br>140 ± 1 mm (lock to lock : 3.06 turns)<br>Vane type<br>9.6cc/rev. MAX. (0.59 in <sup>3</sup> /rev. MAX.)<br>10.5cc/rev. MAX. (0.64 in <sup>3</sup> /rev. MAX.) |

#### SERVICE STANDARD

| Items  | Specifications   |
|--|--|
| Steering wheel free play                       | 0~30mm (0~1.1 in.)                                     |
| Steering angle                                 |  |
| Inner wheel                                    | $38^{\circ}1' \pm 1^{\circ}30'$                        |
| Outer wheel                                    | 32°5′  |
| Difference between LH and RH                   | 2° or less   |
| Stationary steering effort                     | 29N (3.0kg, 6.5lbs) or less                            |
| Belt deflection [under 98N (10kg, 22lb) force] |  |
| New belt                                       | 8.8~11.0mm   |
| Use belt                                       | 12.5~14.3mm  |
| Oil pump relief pressure                       |  |
| Oil pump relief pressure<br>2.0 (I4), 2.7 (V6) | 8.6~9.1 MPa (88~93 kg/cm², 1251~1322 psi)              |
| 2.0 (D-ENG)                                    | 9.1~9.6 MPa (93~98 kg/cm <sup>2</sup> , 1322~1393 psi) |
| Total pinion preload                           | 0.6~1.3 Nm (6~13 kg.cm, 5.2~11.3 lb.in.)               |
| Tie rod swing resistance                       | 2~5 Nm (20~50 kg.cm, 1.4~3.6 lb.ft)                    |

#### TIGHTENING TORQUE

| Item  | Nm      | kg⋅cm     | lb-ft       |
|---|---------|-----------|-------------|
| Power steering column and shaft                     |         |           |             |
| Steering column and shaft mounting bolt             | 13 ~ 18 | 130 ~ 180 | 9.6 ~ 13.3  |
| Power steering wheel lock nut                       | 40 ~ 50 | 400 ~ 500 | 28.9 ~ 37   |
| Pinion gear and joint assembly                      | 15 ~ 20 | 150 ~ 200 | 10.8 ~ 14.8 |
| Steering column shaft and universal joint assembly  | 15 ~ 20 | 150 ~ 200 | 10.8 ~ 14.8 |
| Dust cover mounting bolt                            | 4 ~ 6   | 40 ~ 60   | 3.0 ~ 4.0   |
| Power steering gear box                             |         |           |             |
| Gear box mounting bolt                              | 60 ~ 80 | 600 ~ 800 | 44 ~ 59     |
| Tie rod end ball joint and knuckle arm mounting nut | 45 ~ 60 | 450 ~ 600 | 32.5 ~ 43.4 |
| Feed tube to gear box                               | 10 ~ 16 | 100 ~ 160 | 7.4 ~ 11.8  |
| Gear box to valve body                              | 20 ~ 30 | 200 ~ 300 | 14.8 ~ 21.7 |
| Yoke plug lock nut                                  | 50 ~ 70 | 500 ~ 700 | 37 ~ 50     |

# GENERAL

| Item                                   | Nm      | kg⋅cm     | lb-ft       |
|--|---------|-----------|-------------|
| Power steering oil pump                |         |           |             |
| Pressure hose to oil pump              | 65 ~ 75 | 650 ~ 750 | 47.9 ~ 54.2 |
| Oil pump adjusting bolt                | 35 ~ 50 | 350 ~ 500 | 25.3 ~ 37   |
| Oil pump mounting bolt                 |         |           |             |
| 2.0 (D-ENG)                            | 17 ~ 26 | 170 ~ 260 | 12.3 ~ 18.8 |
| 2.0 (I4), 2.7 (V6)                     | 35 ~ 50 | 350 ~ 500 | 25.8 ~ 37   |
| Oil pump bracket mounting bolt         | 35 ~ 50 | 350 ~ 500 | 25.8 ~ 37   |
| Power steering hose                    |         |           |             |
| Power steering reservoir mounting bolt | 17 ~ 26 | 170 ~ 260 | 12.3 ~ 18.8 |
| Power steering hose mounting bolt      | 4 ~ 6   | 40 ~ 60   | 3.0 ~ 4.0   |
| Power steering tube mounting bolt      | 4 ~ 6   | 40 ~ 60   | 3.0 ~ 4.0   |

## LUBRICANTS EAAE2CD4

| Item                                       | Recommended lubricant                        | Quantity                           |
|--|--|------------------------------------|
| Horn contact ring of steering wheel        | CENTOPLX278<br>(KLUBER KOREA)                | As required                        |
| Bearing of steering shaft                  | ALVANIA #2 OR #3<br>(KEUK DONG SHELL, KOREA) | As required                        |
| Ball joint of tie rod end                  | SHOWA SUNLIGHT<br>MB-2 OR equivalent         | As required                        |
| Steering gear housing                      | ONE-LUBER RP GREASE<br>(KYODOYUSHI, JAPAN)   | As required                        |
| Inner ball joint of gear box               | LONG TIME PD2<br>(OPTIMOL, GERMAN)           | As required                        |
| Contact area of gear box bellows & tie rod | SILICON GREASE 9<br>(SPEC NO : MS511-41)     | As required                        |
| Power steering fluid                       | PSF-3  | 0.75~0.8 liter<br>(0.79~0.84 qts.) |

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# <u>ST -4</u>

SPECIAL TOOLS E5C0D1D3

# STEERING SYSTEM

| Tool (Number and name)                         | Illustration                   | Use                                 |
|--|--------------------------------|-------------------------------------|
| 09222-32100<br>Valve stem oil seal installer   |                                | Installing the pinion gear bearing  |
|  | HCT5602                        |                                     |
| 09432-21600<br>Bearing installer               |                                | Installing the pinion gear bearing  |
|  | EPA9005D                       |                                     |
| 09434-14200<br>Counter shaft bearing installer |                                | Installing the gear box oil seal.   |
| انه (مسئولیت محدود)                            | ерквочол                       |                                     |
| 09561-11002 00000 00000000000000000000000000   | لین سامانه <u>دیجیتال</u> تعمی | Removing the steering wheel.        |
| Steering wheel puller                          | HCT5607                        |                                     |
| 09565-11100<br>Preload socket                  | EPA9005G                       | Measuring the mainshaft preload.    |
| 09555-21000                                    | ~                              | Removing & installing the oil seal. |
| Bar  | EPKB040B                       |                                     |

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# GENERAL

| Tool (Number and name)  | Illustration | Use   |
|---|--------------|---|
| 09568-34000<br>Ball joint puller  | EPA9005J     | Separating the tie rod end ball joint.  |
| 09572-21000<br>Oil pressure gauge   |              | Measuring the power steering oil pressure<br>(use with 09572-21200, 09572-22100)                                |
| 09572-21200<br>Oil pressure gauge adapter                                   | ЕРА9005К     | Measuring the power steering oil pressure<br>(use with 09572-21000, 09572-22100)                                |
| (Sosse Carlo and Source) and a<br>09572-22100<br>Oil pressure gauge adapter |              | Measuring the power steering oil pressure<br>(use with 09572-21000, 09572-21200)                                |
| 09573-21000<br>Oil seal installer gauge                                     | ЕРА9005М     | Installing the back-up washer and oil seal.<br>(use with 09573-21100, 09573-21200,<br>09517-11000, 09555-21000) |

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ST -6

**STEERING SYSTEM** 

| Tool (Number and name)            | Illustration | Use   |
|-----------------------------------|--------------|---|
| 09573-21100<br>Oil seal installer | EPKB040D     | Installing the back-up washer and oil seal.<br>(use with 09573-21000, 09573-21200,<br>09555-21000)  |
| 09573-21200<br>Oil seal guide     | ЕРКВ040Е     | <ol> <li>Removing the gear box oil seal and back<br/>washer (use with 09573-21000)</li> <li>Installing the gear box oil seal and<br/>back washer (use with 09555-21000,<br/>09573-21000)</li> </ol> |

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# GENERAL

## ST -7

# TROUBLESHOOTING E27B3F31

| Symptom  | Probable cause   | Remedy (see page)   |
|--|--|---|
| Excessive play in steering   | Loose yoke plug<br>Loose steering gear mounting bolts<br>Loose or worn tie rod end   | Retighten<br>Retighten<br>Retighten or replace as necessary<br>(See page ST-8)  |
| Steering wheel operation<br>is not smooth (Insufficient<br>power assist) | V-belt slippage<br>Damaged V-belt<br>Low fluid level<br>Air in the fluid<br>Twisted or damaged hoses<br>Insufficient oil pump pressure<br>Sticky flow control valve<br>Excessive internal oil pump leakage<br>Excessive oil leaks from rack and pinion<br>in gear box<br>Distorted or damaged gear box or valve<br>body seals  | Readjust (See page ST-10)<br>Replace (See page ST-10)<br>Replenish (See page ST-11)<br>Bleed air (See page ST-11)<br>Correct the routing or replace<br>Repair or replace the oil pump<br>(See page ST-12)<br>Replace<br>Replace the damaged parts<br>Replace the damaged parts<br>Replace |
| Steering wheel does not<br>return properly                               | Excessive turning resistance of tierod end<br>Yoke plug excessively tight<br>Tie rod and/or ball joint cannot turn smoothly<br>Loose mounting of gear box mounting bracket<br>Worn steering shaft joint and/or body grommet<br>Distorted rack<br>Damaged pinion bearing<br>Twisted or damaged hoses<br>Damaged oil pressure control valve<br>Damaged oil pump input shaft bearing  | Replace<br>Adjust<br>Replace (See page ST-8)<br>Retighten<br>Correct or replace<br>Replace<br>Replace<br>Replace<br>Replace<br>Replace<br>Replace<br>Replace  |
| Noise  | Hissing Noise in Steering Gear<br>There is some noise with all power steering systems. Oe of the most common<br>is a hissing sound when the steering wheel is turned and the car is not moving.<br>This noise will be most evident when turning the wheel while the brakes are being<br>applied. There is no relationship between this noise and steering performance. Do<br>not replace the valve unless the "hissing" noise becomes extreme. A replaced valve<br>will also make a slight noise, and is not always a solution for the condition |   |
| Rattling or chucking noise in the rack and pinion                        | Interference with hoses from vehicle body<br>Loose gear box bracket<br>Loose tie rod end and/or ball joint<br>Worn tie rod and/or ball joint   | Reposition<br>Retighten<br>Retighten<br>Replace (See page ST-8)   |
| Noise in the oil pump  | Low fluid level<br>Air in the fluid<br>Loose pump mounting bolts   | Replenish (See page ST-11)<br>Bleed air (See page ST-11)<br>Retighten   |

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# STEERING SYSTEM

#### ST -8

GENERAL E050AFD8

#### CHECKING STEERING WHEEL FREE PLAY

- 1. Start the engine with the steering wheel in the straight ahead position, apply a force of 5 N (1.1 lb) to the steering wheel in the peripheral direction.
- 2. Measure the play at the circumference of the steering wheel.

#### Standard value

Steering wheel free play : 0~30 mm (0~1.1 in)





EPKE001A

2. If the measured value is not within the standard value, adjust the linkage.

# CHECKING THE TIE ROD END BALL JOINT STARTING TORQUE

1. Disconnect the tie rod(A) and knuckle(B) by using the special tool (09568-34000).

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KPKA001A

3. If the play exceeds the standard value, inspect the connection between the steering shaft and tie rod ends.

#### CHECKING STEERING ANGLE

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

#### Standard value

Wheel angle Inner wheel :  $38^{\circ}1' \pm 1^{\circ}30'$  Outer wheel :  $32^{\circ}5'$ 



KPQE130A

2. Shake the ball joint stud several times to check for looseness.

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#### GENERAL

3. Mount the nuts on the ball joint, and then measure the ball joint starting torque.

#### Standard value

0.5~2.5 Nm (5~25 kg·cm, 0.36~1.78 lb·ft)



4. If the starting torque exceeds the upper limit of the standard value, replace the tie rod end.

KPQE200A

5. Even if the starting torque is below the lower limit of the standard value, check the play of the ball joint and replace if necessary.

#### CHECKING STATIONARY STEERING EFFORT

- 1. Place the vehicle on a level surface and place the steering wheel in the straight ahead position.
- 2. Increase the engine speed to  $1000 \pm 100$  rpm.

#### **NOTE**

After checking, reset the engine speed to the standard value (idling speed).

 Measure the turning force with a spring scale(A) by turning the steering wheel(B) clockwise and counterclockwise one and a quarter turns.

#### Standard value

Stationary steering effort : 29 N (3.0 kg, 6.5lbs) or less



EPKE003A

- 4. Check that there is no sudden change of force while turning the steering wheel.
- 5. If the stationary steering effort is excessive, check and adjust the following points.
  - 1) Damage or cracks on the dust cover of the lower arm ball joint and tie rod end.
  - 2) Pinion preload of the steering gear box and starting torque of the tie rod end ball joint.
  - 3) Starting torque of the ball joint.

#### CHECKING STEERING WHEEL RETURN

Check the steering wheel return and confirm the following points :

- 1. The force required to turn the steering wheel and the wheel return should be the same for both left and right in case of moderate or sharp turns.
- When the steering wheel is turned 90° and held for a couple of seconds while the vehicle is being driven at 35kph, the steering wheel should return 70° or more.

#### 🚺 ΝΟΤΕ

If the steering wheel is turned very quickly, steering may be momentarily difficult. This is not a malfunction because the oil pump output will be somewhatdecreased.





KPQE760A

EPKE085A

#### CHECKING POWER STEERING BELT TENSION

 Press the V belt, applying a pressure of 98N (10kg, 22lb) at the specified point and measure the deflection to confirm that it is within the standardvalue.

#### Standard value

New belt : 8.8 ~ 11.0 mm Used belt : 12.5 ~ 14.3 mm

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 Put a bar(A) or equivalent, between the bracket(B) and the oil pump(C) and adjust the tension so that the belt deflection is within the standard value.



EPQF010A

KPQE100A

- Tighten the bolt adjusting the power steering "V"belt tension.
- Check the belt deflection and adjust it again if necessary.

# M CAUTION

After turning the V belt in the normal rotation direction more than once, recheck the belt deflection.

- 2. If the belt deflection is beyond the standard value, adjust the belt tension as follows.
  - Loosen the bolt adjusting(A) the power steering "V"belt tension.

ST -10

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ST -11

#### GENERAL

#### CHECKING POWER STEERING FLUID LEVEL

- 1. Position the vehicle on a level surface.
- 2. Start the engine. With the vehicle kept stationary, turn the steering wheel several times continuously to raise the fluid temperature to  $50 60^{\circ}C(122 \text{ to } 140^{\circ}\text{F})$ .
- 3. With the engine at idle, turn the steering wheel fully clockwise and counterclockwise several times.
- 4. Make sure there is no foaming or cloudiness in the reservoir fluid.
- 5. Stop the engine to check for any difference in fluid level between a stationary and a running engine.

#### 🔟 ΝΟΤΕ

- 1. If the fluid level varies 5 mm (0.2 in.) or more, bleed the system again.
- 2. If the fluid level suddenly rises after stopping the engine, further bleeding is required.
- 3. Incomplete bleeding will produce a chattering sound in the pump and noise in the flow control valve, and lead to decreased durabilityof the pump.



- 4. Disconnect the high-tension cables and ignition coils. While operating the starter motor intermittently, turn the steering wheel all the way to the left and then to the right several times to drain the fluid.
- 5. Connect the return hose and fix it with a clip.
- 6. Fill the power steering fluid reservoir with the specified fluid.

PSF-3 : 0.75~0.8 lit.

- 7. Start the engine. Check for fluid leaks from the hose, then stop the engine.
- 8. Pour the fluid into the bottom of the oil filter in the power steering fluid reservoir.
- 9. Bleed the air.

#### AIR BLEEDING

- 1. Fill the power steering fluid reservoir up to the "MAX" position with specified fluid.
- 2. Jack up the front wheels.

Disconnect the ignition coil high tension cable, and then, while operating the starter motor intermittently (for 15 to 20 seconds), turn the steering wheel all the way to the left and then to the right five or six times.

#### 🔟 NOTE

- 1. When bleeding fluid, replenish with the fluid so that the level does not fall below the bottom of the filter.
- 2. If air bleeding is done while the vehicle is idling, the air will be broken up and absorbed into the fluid. Be sure to do the bleeding only while cranking.
- 4. Connect the high tension cable, and then start the engine (idling).
- 5. Turn the steering wheel to the left and then to the right, until there are no air bubbles in the oil reservoir.

# 🚺 ΝΟΤΕ

KPQE210A

Do not hold the steering wheel turned all the way to either side for more than ten seconds.

- 6. Confirm that the fluid is not milky and that the level is between "MAX" and "MIN" mark on the reservoir.
- 7. Check that there is a little change in the fluid level when the steering wheel is turned left and right.

# REPLACING POWER STEERING FLUID

HOT MAX

HOT MIN

- 1. Jack up the front wheels of the car and support them with jackstands.
- 2. Disconnect the return hose from the oil reservoir and plug the oil reservoir.
- 3. Connect a hose to the disconnected return hose, and drain the oil into a container.

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STEERING SYSTEM

#### ST -12

#### 🔟 ΝΟΤΕ

- 1. If the fluid level varies 5mm (0.2 in.) or more, bleed the system again.
- 2. If the fluid level suddenly rises after stopping the engine, further bleeding is required.
- Incomplete bleeding will produce a chattering sound in the pump and noise in the flow control valve, and lead to decreased durability of the pump.

#### \Lambda CAUTION

Do not keep the shut-off valve on the pressure gauge closed for more than ten seconds.

5. Remove the special tools, and tighten the pressure hose(B) against the oil pump (A) using the specified torque.

#### Tightening torque

65~75 Nm (650~750 kg.cm, 47.9~54.2 lb.ft)



EPQF230A

6. Air bleed the system. (see page ST-11)

Standard value

standard value range.

2.

3.

4.

Oil pump pressure Relief pressure : 2.0(I4), 2.7(V6) : 8.6~9.1 MPa (88~93 kg.cm<sup>2</sup>, 1251~1322 psi) 2.0(D-ENG) : 9.1~9.6 MPa (93~98 kg.cm<sup>2</sup>, 1322~1393 psi)

Increase the engine speed to 1,000 rpm.

Bleed the air, and then start the engine and turn the steering wheel several times, measure the fluid tem-

perature by Temperature gauge so that the fluid temperature can rise to approximately 50°C (122°F).

Close the shut-off valve of the special tool and mea-

sure the fluid pressure to confirm that it is within the

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STEERING COLUMN AND SHAFT

# STEERING COLUMN AND SHAFT

# **STEERING COLUMN / SHAFT**

## COMPONENTS ECD7C10D



#### LF QI 240/

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**STEERING SYSTEM** 

## ST -14

#### REMOVAL EFDE98AA

1. Disconnect the negative (-) terminal(A) from the battery.







Remove the steering wheel lock nut(A).

KPQE140A

4. After aligning the marks on the steering shaft and wheel(A), remove the steering wheel using the special tool (09561-11002).



3.

Do not hammer on the steering wheel to remove it: it may damage the steering column.





KPQE090A

KPQE150A

ST -15

# STEERING COLUMN AND SHAFT

- 5. Remove the steering column upper(A) and lower shrouds(B).
- $\label{eq:relation} 7. \quad \text{Remove the connectors of the multifunction switch}(A).$





KPQE180B

KPQE160A

- 6. Disconnect two tightening bolt(A) and remove the lower crash pad(B).
- 8. After removing three bolts(A) in the illustration, remove the multifunction switch assembly(B).



KPQE170A

KPQE190A

# ST -16

# STEERING SYSTEM

9. Remove the bolts connecting the steering column shaft(A) and the universal joint(B) as shown in the illustration.

# DISASSEMBLY AND REASSEMBLY EB385B2E

#### KEY LOCK ASSEMBLY

 If it is necessary to remove the key lock assembly(A), use a punch to make a groove on the head of the special bolt(B), and then use a screwdriverto remove the key lock assembly mounting bracket(C).



EPQF250A

2.

- 10. After removing the mounting bolts and nuts on the steering column and shaft assembly, remove the steering column and shaft assembly(A).
- Disassemble the key lock assembly(A) from the steering column and shaft assembly(B).



EPKE020A

#### INSPECTION E76BFABD

- 1. Check the steering column shaft for damage and deformation.
- 2. Check connections for play, damage and smooth operation.
- 3. Check the ball joint bearing for wear and damage.

EPKE022A

EPKE021A

3. Reassembly is the reverse of disassembly.

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# STEERING COLUMN AND SHAFT

#### UNIVERSAL JOINT ASSEMBLY

 Remove the bolt(A) connecting the universal joint assembly(B) and the steering column and shaft assembly(C). INSTALLATION EDD4EDB1

Assembly is the reverse of removal.





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EPKE024A

EPKE023A

3. Reassembly is the reverse of disassembly.

# MECHANICAL POWER STEERING SYSTEM

# POWER STEERING GEAR BOX

#### COMPONENTS ED4EE5EF

ST -18



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# MECHANICAL POWER STEERING SYSTEM



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STEERING SYSTEM

#### ST -20

#### **REMOVAL** EFF4F37B

- 1. Disconnect the cover fixing clip(A) on the universial joint indoor driver isde, loosen the noise covers(B).
- 5. After removing the split pin, disconnect the tie rod(A) from the knuckle(B) by using the special tool (09568-34000).



KPQE300A

KPQE710A

- 3. Lift up the vehicle.
- 4. Remove the front tires (RH/LH).

ST -21

# MECHANICAL POWER STEERING SYSTEM

- 8. Remove the front muffler assembly(A).
- 10. Remove the bracket(A) holding the end tubes of the pressure tube and the return tube.



11. Remove the mounting clamp of power steering gear box, and also remove the clamp holding the pressure tube and the return tube.

KPQE310A

9. Disconnect the end tube of the pressure hose(A) and the end hose of the return hose(B) from the gear box.





KPQE340A

KPQE320A

STEERING SYSTEM

#### ST -22

12. Remove the mounting bolt(A) from the power steering gear box.

#### INSPECTION AND ADJUSTMENT BEFORE DISASSEMBLY E10ABCAB

Fix a brass plate or aluminum plate for protection to the jaws of a vise and mount the gear box(A) in a vise(B).

# 

When mounting the gear box in a vise, let the installation section of it be fixed to the jaws. If other section is fixed the gear box may be damaged.



KPQE330A

13. Pull the power steering gear box assembly(A) toward the right side of the vehicle.

# **NOTE**

When removing the gear box, pull it out carefully and slowly so as not to cause damage to the Bellows(B).

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#### TOTAL PINION PRELOAD

1. Rotate the pinion gear for approximately 4 to 6 seconds for one rotation to measure the total pinion preload.

#### Standard value

Total pinion preload : 0.6~1.3 Nm (6~13 kg.cm, 0.4~1.0 lb.ft)



Measure the pinion preload through the entire stroke of the rack.

KPQE350A

# MECHANICAL POWER STEERING SYSTEM



KPQE370A

- 2. If the measured value is out of specifications, first adjust the yoke plug, then recheck the total pinion preload.
- 3. If you adjust the yoke plug but do not obtain the total pinion preload, check or replace the yoke plug components

#### TIE ROD SWING RESISTANCE

- 1. Rotate the tie rod severely ten times.
- 2. Measure the tie rod(A) swing resistance with a spring scale(B).

#### Standard value

Total rod swing resistance : 8~22 N (1.9~4.6 lb) [2~5 Nm (20~50 kg.cm, 17~43 lb.in)]



replace the tie rod assembly.

#### A CAUTION

3.

Even if the measured value is below the standard value, the tie rod that swings smoothly without excessive play may be used. If the measured value is below 4.3 N (0.9 lb) [100 Ncm (8.7 lb.in.)], replace the tie rod.

If the measured value exceeds the standard value,

#### **BELLOWS INSPECTION**

- 1. Inspect the bellows for damage or deterioration.
- 2. Make sure the bellows are secured in the correct position.
- 3. If the bellows are defective, replace them with new ones.

#### DISASSEMBLY EBD6CEFF

1. Remove the tie rod end(A) from the tie rod(B).

times. esistance with a spring --50 kg.cm,

EPQF390A

# 021-62999292

STEERING SYSTEM

#### ST -24

3.

- 2. After mounting the tie rod end(A) in a vise, remove the dust cover(B) from the ball joint.
- 4. Remove the bellows clip(A).



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Remove the bellows band(A).



EPKE013I

5. Pull the bellows out toward the tie rod.

#### 🚺 ΝΟΤΕ

7.

KPQE400A

KPQE410A

Check for rust on the rack when the bellows are replaced.

- 6. Remove the feed tube from the rack housing.
  - While moving the rack slowly, drain the fluid from the rack housing.
- 8. Unstake the tab washer(A) which fixes the tie rod(B) and rack(C) with a chisel.



EPQF420A

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ST -25

# MECHANICAL POWER STEERING SYSTEM

9. Remove the tie rod(A) from the rack(B).

# A CAUTION

Remove the tie rod(A) from the rack(B), taking care not to twist the rack.

 Remove the lock nut(A), yoke plug(B), rack support spring(C), rack support yoke(D) and bushing(E) from the gear box.

 $(\emptyset$ A В Ċ D È В EPKE013N 12. Remove the valve body housing(A) by loosening the EPQF430A two bolts(B). 10. Remove the yoke plug locking nut(A), and then remove the yoke plug. Ø A EPQF450A KPQE440A

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#### ST -26

- 13. Remove the rack bushing and the rack from the rack housing.
- 14. Remove the O-ring(A) from the rack bushing(B).





15. Remove the oil seal(A) from the rack bushing(B).



C A

EPQF905A

17. Using the special tool, remove the oil seal and ball bearing from the valve body housing.

B

18. Remove the oil seal and O-ring from the rack housing.

# CAUTION

Be careful not to damage the pinion valve cylinder inside of the rack housing.

**19.** Using the special tool(06573-21200, 0955<mark>5-210</mark>00), remove the oil seal(A) from the rack housing.

# $\underline{}$ CAUTION

EPQF904A

Be careful not to damage the rack cylinder inside of the rack housing.



EPKE210B

# STEERING SYSTEM

16. Remove the pinion vlave assembly(A) from the valve body housing(B) with a soft hammer(C).

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# **MECHANICAL POWER STEERING SYSTEM**

#### INSPECTION E5CC6AAB

#### 1. Rack

Ø

- Check for rack tooth face damage or wear
- Check for oil seal contact surface damage
- Check for rack bending or twisting
- Check for oil seal ring damage or wear
- Check for oil seal damage or wear

#### 3. Bearing

- Check for seizure or abnormal noise during rotating a bearing
- Check for excessive play
- Check for missing needle bearing rollers

#### 4. Others

- Check for damage of the rack housing cylinder bore
- Check for boot damage, cracking or aging

#### REASSEMBLY ECB64D96

1. Apply the specified fluid to the entire surface of the rack oil seal.

Recommended fluid : PSF-3

2. Install the oil seal(A) to the specified position in the rack housing.



EPQF231A

3. Apply the specified fluid to the entire surface of the rack bushing oil seal.

Recommended fluid : PSF-3

EPA9013Z

# 021-62999292

#### ST -27

# 021-62999292

STEERING SYSTEM

#### ST -28

4. Install the oil seal(A) in the rack bushing(B).



- 8. Install the oil seal and the ball bearing in the valve body.
- 9. After appling the specified fluid and grease to the pinion valve assembly(A), install it in the rack housing assembly.



EPQF231B

- 5. Apply the specified fluid to the entire surface of the O-ring and install it in the rack bushing.
- 6. Apply the specified grease to the rack teeth.

Recommended grease Multipurpose grease SAE J310, NLGI No.2 10. After applying the specified fluid to the oil seal, install it in the rack housing, and fix the valve body assembly(A) and O-ring in the gear box(B).

**NOTE** Do not plug the vent hole(A) in the rack with grease.





EPQF460A

EPKE230E

EPKE014E

7. Insert the rack into the rack housing and install the rack bushing and rack stopper.

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# **MECHANICAL POWER STEERING SYSTEM**

# ST -29

- 11. Install the tab washer and the tie rod and stake the tab washer(A) end at two points over the tie rod.
  - 🔟 ΝΟΤΕ
  - 1. Align the tab washer pawls with the rack grooves.
  - 2. Always use a new tab washer.

With the rack placed in the center position, attach the yoke plug to the rack housing. Tighten the yoke plug to 15 Nm (150 kg.cm, 11 lb.ft). Loosen the yoke plug approximately from 30° to60° and tighten the locking nut to the specified torque.

#### **Tightening torque**

50~70 Nm (500~700 kg.cm, 37~52 lb.ft)



EPKE230K

15. Apply the specified grease to the bellows mounting position (fitting groove) of the tie rod.

Recommended grease : Silicone grease







EPKB230H

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#### ST -30

#### STEERING SYSTEM

16. Install the new attaching band to the bellows.

# 🔟 ΝΟΤΕ

When the bellows are installed, a new band must be used.

- 17. Install the bellows in position, taking care not to twist it.
- 18. Fill the dust cover inner side and lip with the specified grease, and fix the dust cover in position with the clip ring attached in the grooveof the tie rod end.

#### **Recommended greas**

- A : POLY LUB GLY 801K or equivalent
- B : SHOWA SUNLIGHT MB2 or equivalent
- Dust cover inner side and lip : THREE BOND

19. Install the tie rods so that the length of the left and right tie rods equals the standard value.

#### Standard value

Tie rod free length : 112.2mm





EPKE043A

# **MECHANICAL POWER STEERING SYSTEM**

#### INSTALLATION EE55FA84

1. Push in the power steering gear box assembly(A) on the right side of the vehicle.





new strap.

4.

3. Connect the dust cover to its mounting plate with a

versal joint assembly(A) by using the bolt(B).

Connect the steering gear box assembly to the uni-







KPQE290A

- 5. Installation is the reverse of removal.
- 6. After installation, air bleed the system. (see page ST-11)

# 021- 62 99 92 92

# ST -32

# STEERING SYSTEM

# POWER STEERING HOSES

# COMPONENTS EA4CBF16



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ST -33

# **MECHANICAL POWER STEERING SYSTEM**

#### REMOVAL E3A3C1E5

- 1. Support the specified point of the vehicle with a lift.
- 4. Disconnect the pressure tube fitting(A) at the gear box side. (when removing the pressure tube)



KPQE320C

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#### ST -34

7.

6. Lower the vehicle.

#### **STEERING SYSTEM**

9. Disconnect the pressure hose connector from the oil pump. (when removing the pressure hose)





KPQE120A

- 10. Disconnect the pressure hose assembly. (when removing the pressure hose)
- Remove the return tube and hose. (when removing 8. return hose)





KPQE630A

KPQE510A

- 11. Remove the color tube mounting clip bolt. (when removing the color tube)
- 12. Disconnect the remove the color tube from the power steering oil reservoir tank side hose. (when working on the color tube)

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KPQE801B

- Remove the clamp of the return tube and hose. (when removing return tube and hose)

ST -35

# **MECHANICAL POWER STEERING SYSTEM**

#### INSTALLATION E803DBC5

- 1. Support the specified portion of the vehicle with a lift.
- 5. Raise the vehicle with a lift.





KPQE801C

- KPQE801A
- 2. Insert the color tube from the front pump upper part to the lower part and install mounting bolts. (when installing the color tube)
- 3. Connect the color tube to the power steering oil reservoir tank side hose, return tube and hose side and fix it with clips. (when installing the color tube)
- 4. Place the pressure hose and tube assembly in position and connect it to the oil pump. (when installing the pressure hose and tube)



 Fix the return hose(A) and pressure tube(B) fitting to the power steering gear box.



EPQF320B

EPQF120A

# 021-62999292

#### **STEERING SYSTEM**

7. Fix the power steering pressure tube and return tube mounting clamp(A) with a bolt.



KPQE322A

8. Lower the vehicle.

ST -36



KPQE801B

- 9. Add power steering fluid(PSF-3). (see page ST-11)
- 10. Air bleed the system. (see page ST-11)

# POWER STEERING OIL PUMP

#### **COMPONENTS** E8CFAAC2



ST -37

# 021-62999292

STEERING SYSTEM

#### ST -38

#### REMOVAL E3DFD8C7

- 1. Loosen the bolt fixing the wiring bracket, and then move the wiring sideward.
- 3. Loosen the tension adjusting bolt(A) on the power steering "V" belt.



EPQF020A

 Remove the pressure hose(A) from the oil pump(B), and then disconnect the suction hose(C) from the suction connector and drain the fluid into a container. (see page ST-11, Replacing power steering fluid)



KPQE100A

4. Remove the "V" belt(A) from the power steering oil pump pulley.



KPQE080A

EPQF030A

ST -39

# **MECHANICAL POWER STEERING SYSTEM**

5. Loosen the power steering oil pump mounting bolt and the tension adjusting bolt, and then remove the steering oil pump assembly(A).

С

Remove the power steering oil pump mounting

6.

bracket(A).

#### DISASSEMBLY E8B230EC

1. Remove two two bolts(A) from the oil pump body, and then remove the suction pipe(B) and O-ring(C).



KPQE531A

- 2. Loosen the four bolts and remove the oil pump cover assembly.
- 3. Remove the cam ring.
- 4. Remove the rotor and vanes.
- 5. Remove the oil pump side plate.



KPQE060A

KPQE070A

KPQE540A

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#### ST -40

6. Remove the inner O-ring(A) and outer O-ring(B).

- STEERING SYSTEM
- 8. Remove the oil seal(A) from the oil pump body.





KPQE550A

 Remove the snap ring and take out the pulley and the drive shaft assembly(A).



9. Remove the connector from the oil pump body, and take out the flow control valve and the flow control spring.



EPQF570B

ST -41

#### **MECHANICAL POWER STEERING SYSTEM**

#### INSPECTION EBD6687B

- 1. Check the free length of the flow control spring.
- Free length of the flow control spring : 36.5mm

#### REASSEMBLY EEDE15E7

1. Install the flow control spring, the flow control valve and the connector into the pump body.



KPQE580A

#### 021-62999292

#### ST -42

3. Install the pump pulley(A).

#### STEERING SYSTEM

5. Install the cam ring attending to the groove and the direction of the front housing.



KPQE610A

# 021-62999292

# **MECHANICAL POWER STEERING SYSTEM**

- 8. Install the O-ring and the oil pump cover assembly.
- 9. Install the suction pipe(A) and O-ring.



KPQE530A

KPQE070A



#### KPQE030B

3. Insert a stick(C) or similar thing between the bracket(A) and the oil pump(B) to produce tension and confirm that velt deflection is within the standard value.

С



1. Install the oil pump(A) to the oil pump bracket.



KPQE010A

4. Add power steering fluid. (see page to ST-11)

В

- 5. Air bleed the system. (see page to ST-11)
- 6. Check the oil pump pressure. (see page to ST-12)
- suction hose(A) and the pressure hose(B).

# 🚺 NOTE

2.

Install the hose being careful so that it does not twist and come in contact with other components.

Hang the "V" belt on the oil pump and connect the

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