

POWER STEERING

SR03-001

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POWER STEERING SYSTEM

TROUBLESHOOTING

EN07Z0703F300001

Symptom	Possible cause	Remedy/Prevention
Fluid leakage	Pump	Replace pump.
Fluid leakage (Gear box, steering booster)	Oil seal, O-rings other than those for the seal lock nut and drain plug	Repair oil seal or O-ring.
	Seal lock nut, drain plug	Replace lock nut or plug.
Fluid leakage	Line joints	Replace leaky parts.
Hard steering (Excessive steering effort) (One side is hard)	Steering gear is faulty	Hydraulic test. Replace piston sub-assembly.
Hard steering (Excessive steering effort) (Both sides are hard)	Steering gear pump faulty	Hydraulic test. Measure pump discharge pressure. Replace pump.
	Incorrect preload of the sector shaft bearing	Measure system hydraulic pressure. Replace piston sub-assembly.
		Adjust sector shaft preload.
Hard steering (Excessive steering effort) (Hard, when starting to steer) NOTICE Basic inspection items	Incorrect preload of the sector shaft bearing	Adjust sector shaft preload.
- Fluid level, Fluid cleanliness - Air in fluid - Tire pressure - Front alignment - Steering linkage - Universal joint		
Abnormal noise (Pump) NOTICE Basic inspection items	Air sucked in at input pipe	Repair and bleed air or replace pump.
- Fluid level, fluid cleanliness - Air mixed in fluid - Pump piping - Steering linkage		
Abnormal noise	Gear box	Replace piston sub-assembly.

NOTE: ○ : Indicates a possible cause

▽: Indicates trouble that occurs upon engine starting in cold weather. Wait until the engine is heated.

															Appearance	
○		○		○		○		○		○		○		○	○	Operation of the steering wheel is not smoothly.
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Turning force of the steering wheel is heavy both direction right and left.
	○	○	○	○												Turning force of the steering wheel is unbalance right and left.
○	○		○	○	○											Detective return of the steering wheel in both direction left and right.
	○	○	○	○	○											Detective return of the steering wheel in only one direction.
		○		○												The steering wheel tends to turn by itself in one direction, when released.
				○	○	○								○	○	Considerable variations for operating force of steering wheel.
			○	○	○					○	○			○	○	Excessive play of steering wheel and the vehicle is unstable.
			○	○	○									○		Vibration does not stop.
				○	○	○				○	○	○	○	○	○	Operating force is heavy while the engine in idling.
					○	○								○		Oil temperature rise in a moment.
					○	○					○			○	○	The oil pump noise.
						○					○					The oil pressures high , when not operating the steering wheel.
							○			○	○	○	○	○	○	The oil pressure does not rise.
											○					The oil pressure is higher than setting pressure of relief valve.
					○	○				○	○					The oil pressure rise slowly.
					○	○					○					Abnormal function of the pump (seizing, etc).
					○	○									○	The oil spill from reservoir.
Others					Lines		Steering gear assembly				Oil pump				Reservoir	Cause
Insufficient lubrication of the main-sliding							Crush or foreign matter is in lines				Suck a air due to diminish in quantity the oil					Countermeasure
Reduced inflation pressure of tire							Innate the air to lines				The oil filter clogged					Check the oil level, replenishment the oil
Over loading or one-side loading of cargo							Insufficient air bleeding				Lowering of function due to wear					Clean the filter, change the oil
Looseness the relative bolt or nut and contact of parts							Wrong connection the lines				Malfunction of the pump part due to wear					Repair or replace
Improper front wheel alignment							Abnormal condition of steering linkages				Malfunction of the pump part due to seize					Replace
Tighten, repair							Malfunction of the pump part due to vanes stick				Malfunction of the pump part due to bearing damage					—
Adjust							Large clearance between rotor and side plate				The flow control valve is not close with dust					Replace
Lubrication							The flow control valve is closed with dust				Malfunction of relief valve due to dust					Repair
							Oil leak in gear case due to seal damage				Oil leak from the spool valve due to wear					Repair or replace
							Malfunction of the spool valve due to spring tension is weaken				Malfunction of the spool valve due to spring condition					Replace
							Maladjustment of backlash				Malfunction of the spool valve due to mal-sliding condition					Repair or replace
							Loose the adjuster or lock nut of adjust bolt									Adjust
							Inside of the gear case is damaged by any foreign matter									Adjust and tighten
																Replace
																Replace or clean
																Check, tighten
																Air bleeding
																Repair
																Check, repair
																Adjust
																Tighten, repair
																Proper loading
																Adjust

AIR BLEEDING

EN07Z0703H200001

1. FILL THE OIL RESERVOIR WITH POWER STEERING FLUID.

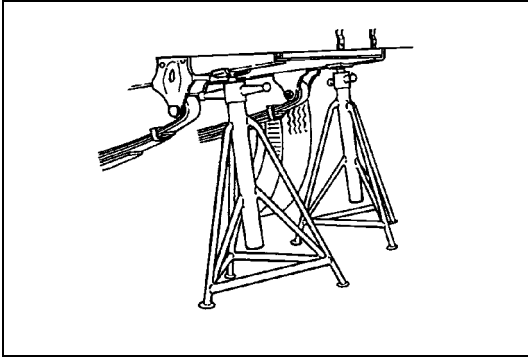
NOTICE

- Use only specified fluid.
- Do not overfill the oil reservoir.
- Replace old fluid with new fluid after overhauling power steering gear unit or power steering pump.
- Specified fluid....Refer to recommended lubricant list.

2. JACK UP THE FRONT AXLE AND SUPPORT THE FRAME WITH STANDS.

NOTICE

Block the rear wheels.

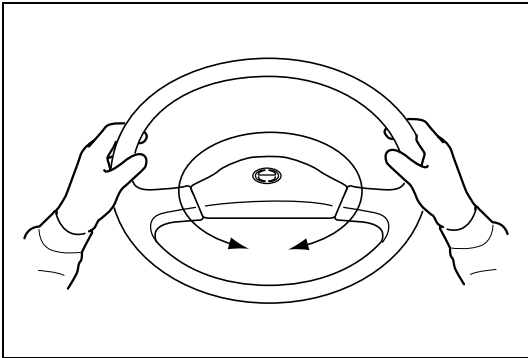


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3. TURN THE STEERING WHEEL FULLY IN BOTH DIRECTIONS SEVERAL TIMES.

4. CHECK THE FLUID LEVEL IN THE OIL RESERVOIR.

(1) Add the fluid, if necessary.



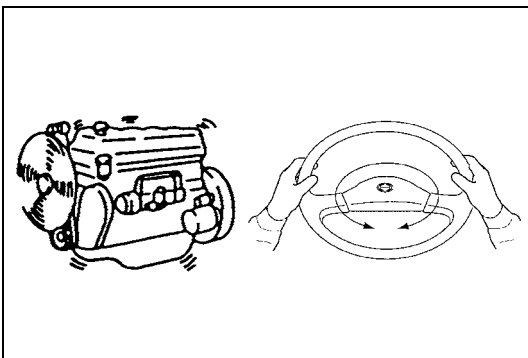
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5. START THE ENGINE AND TURN THE STEERING WHEEL FULLY IN BOTH DIRECTIONS SEVERAL TIMES WITH ENGINE IDLING.

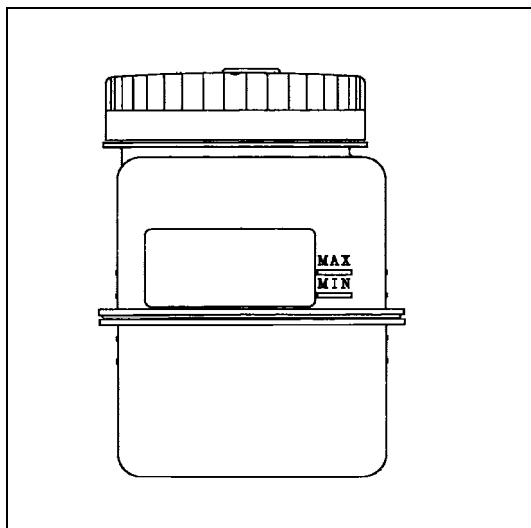
NOTICE

The fluid in the oil reservoir should be continuously replenished while air bleeding so that the oil reservoir never become empty.

6. RETURN THE STEERING WHEEL TO STRAIGHT AHEAD.



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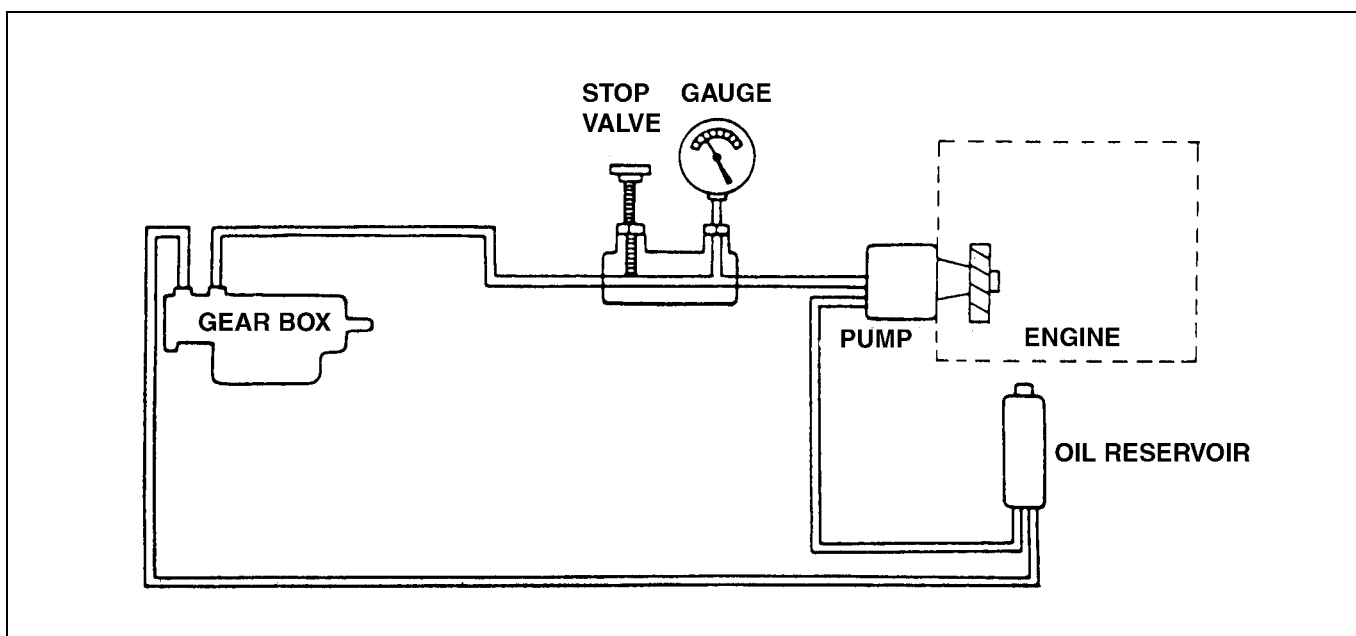
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7. RECHECK THE FLUID LEVEL WHEN THE ENGINE IS STOPPED.

- (1) If necessary, add or decrease the power steering fluid to match the between "MAX" and "MIN".

HYDRAULIC TEST

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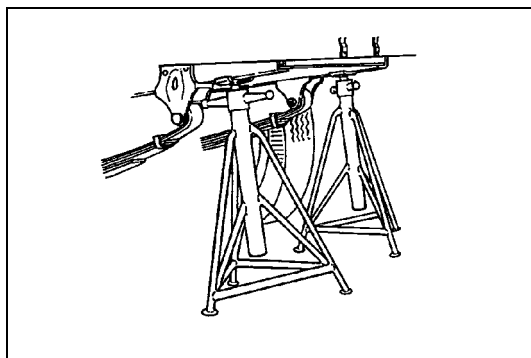


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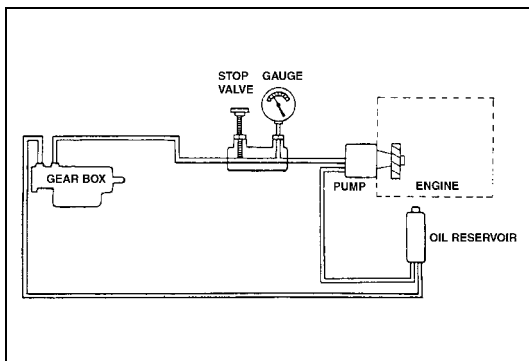
HYDRAULIC TEST

1. JACK UP THE FRONT AXLE AND SUPPORT THE FRAME WITH STANDS.

NOTICE
Block the rear wheels.



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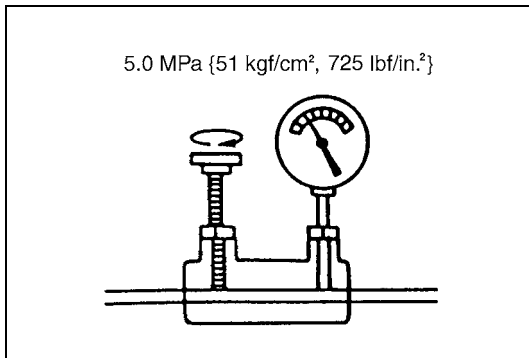


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2. SET THE STOP VALVE AND OIL PRESSURE GAUGE AS SHOWN IN THE FIGURE.

NOTICE

After setting the stop valve and oil pressure gauge, perform the air bleeding in the system according to "AIR BLEEDING".



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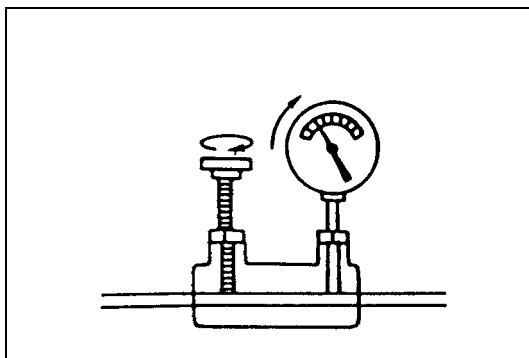
3. CHECK THE FLOW CONTROL VALVE OPERATION.

- (1) Start the engine and idle then close the stop valve until the fluid pressure is at 5.0 MPa {51 kgf/cm², 725 lbf/in.²}.
- (2) Run the engine up to 1,500 r/min, then reduce the engine speed suddenly.

NOTICE

This operation should be repeated more than 5 times.

- (3) Good, if the set pressure of 5.0 MPa {51 kgf/cm², 725 lbf/in.²} is recovered immediately.
If the set pressure is not recovered immediately, stop the engine and replace the flow control valve assembly.
- (4) Open the stop valve fully.



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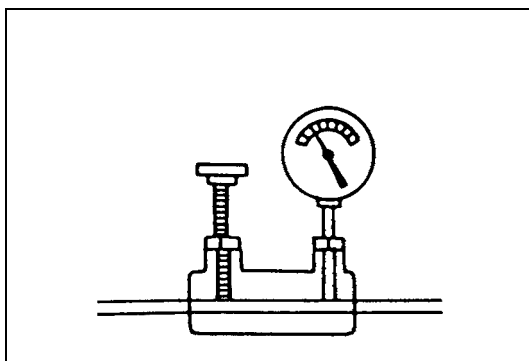
4. CHECK THE RELIEF VALVE OPERATION.

- (1) Run the engine up to 2,000 r/min.
- (2) Close the stop valve until the fluid pressure is at 14.7 MPa {150 kgf/cm², 2,132 lbf/in.²}.

NOTICE

Be careful not to exceed 14.7 MPa {150 kgf/cm², 2,132 lbf/in.²}

- (3) Good, if the fluid pressure is maintained at 14.0-14.7 MPa {143-150 kgf/cm², 2,030-2,132 lbf/in.²}.
- (4) If pressure is higher, stop the engine and replace the flow control valve assembly.



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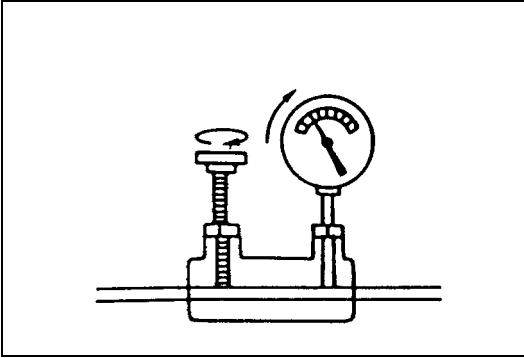
5. MEASURE THE SYSTEM HYDRAULIC PRESSURE.

- (1) Make sure that the stop valve is fully open.
- (2) Start the engine and idle and then turn the steering wheel to a full stop.
- (3) Apply a force of approx. 147.1 N {15 kgf, 33 lbf} to the steering wheel and measure the hydraulic pressure.
- (4) Repeat the measurement by fully turning the steering wheel in the opposite direction.

Hydraulic pressure:

14.0-14.7 MPa {143-150 kgf/cm², 2,030-2,132 lbf/in.²}

- (5) If the above pressure is not attained, measure the discharge pressure or stop the engine and repair the power steering gear unit.



SHTS07Z070300009

6. MEASURE THE DISCHARGE PRESSURE.

- (1) Make sure that the stop valve is fully open.
- (2) Start the engine and idle and measure the discharge pressure with the stop valve fully close.

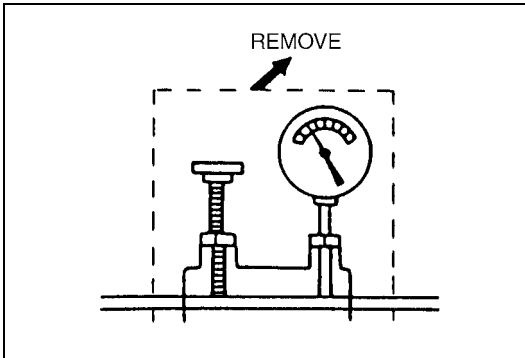
Discharge Pressure:

14.0-14.7 MPa {143-150 kgf/cm², 2,030-2,132 lbf/in.²}

NOTICE

Do not allow the stop valve to remain closed for more than 15 seconds.

- (3) Open the stop valve fully.



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7. REMOVE THE STOP VALVE AND OIL PRESSURE GAUGE.

- (1) Stop the engine and remove the stop valve and oil pressure gauge.

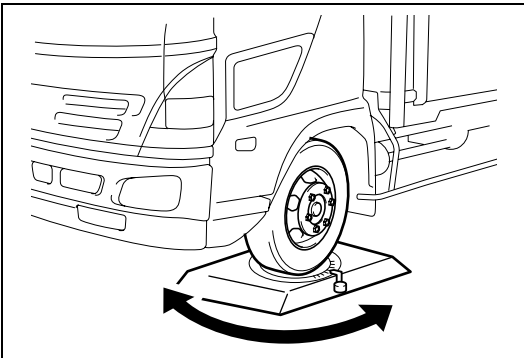
NOTICE

After removing stop valve and oil pressure gauge, perform the air bleeding in according to "AIR BLEEDING".

8. INSPECT THE STEERING SYSTEM FOR OPERATION ABILITY.

- (1) Place the front wheels on turn tables then start the engine and idle.
- (2) Check to see that the steering wheel turned smoothly without any jolts or abnormal resistance, when it is turned fully in both directions.
- (3) Measure the steering wheel turning force.

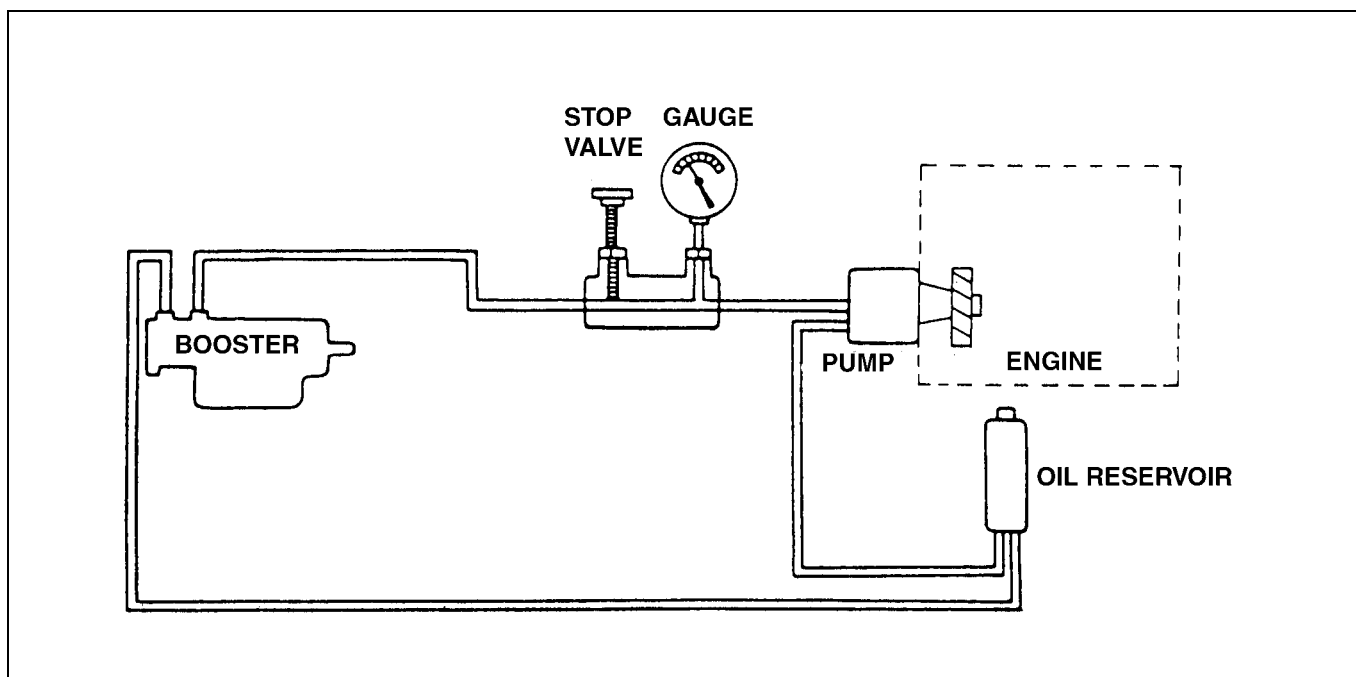
Turning force: Less than 40 N {4.1 kgf, 8.9 lbf}



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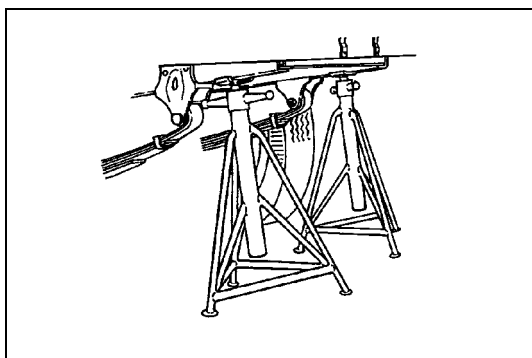
HYDRAULIC TEST (STEERING BOOSTER)

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HYDRAULIC TEST

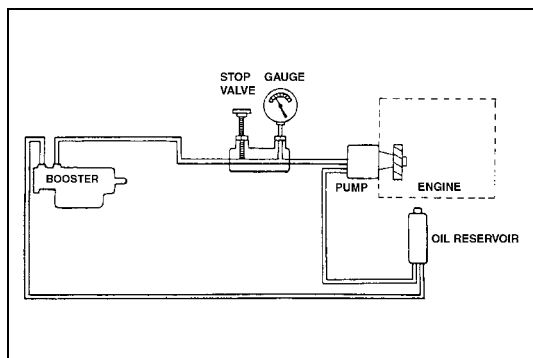


SHTS07Z070300002

1. JACK UP THE FRONT AXLE AND SUPPORT THE FRAME WITH STANDS.

NOTICE

Block the rear wheels.



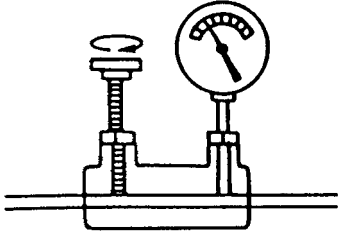
SHTS07Z070300014

2. SET THE STOP VALVE AND OIL PRESSURE GAUGE AS SHOWN IN THE FIGURE.

NOTICE

After setting the stop valve and oil pressure gauge, perform the air bleeding in the system according to "AIR BLEEDING".

5.0 MPa {51 kgf/cm², 725 lbf/in.²}



SHTS07Z070300008

3. CHECK THE FLOW CONTROL VALVE OPERATION.

- (1) Start the engine and idle then close the stop valve until the fluid pressure is at 5.0 MPa {51 kgf/cm², 725 lbf/in.²}
- (2) Run the engine up to 1,500 r/min, then reduce the engine speed suddenly.

NOTICE

This operation should be repeated more than 5 times.

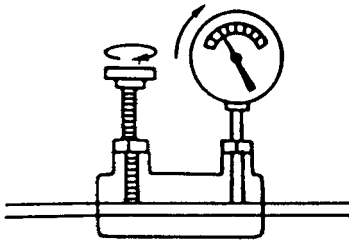
- (3) Good, if the set pressure of 5.0 MPa {51 kgf/cm², 725 lbf/in.²} is recovered immediately.
If the set pressure is not recovered immediately, stop the engine and replace the flow control valve assembly.
- (4) Open the stop valve fully.

4. CHECK THE RELIEF VALVE OPERATION.

- (1) Run the engine up to 2,000 r/min.
- (2) Close the stop valve fully.
- (3) Good, if the fluid pressure is maintained at 14.0-14.7 MPa {143-150 kgf/cm², 2,030-2,132 lbf/in.²}.
- (4) If pressure is higher, stop the engine and replace the flow control valve assembly.

NOTICE

Be careful not to exceed 14.7 MPa {150 kgf/cm², 2,132 lbf/in.²}



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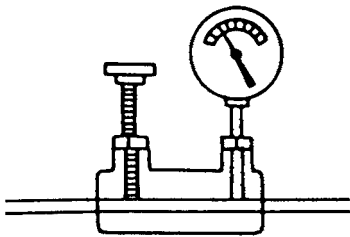
5. MEASURE THE SYSTEM HYDRAULIC PRESSURE.

- (1) Make sure that the stop valve is fully open.
- (2) Run the engine up to 2,000 r/min.
- (3) Repeat the measurement by fully turning the steering wheel in the opposite direction.

Hydraulic pressure:

14.0-14.7 MPa {143-150 kgf/cm², 2,030-2,132 lbf/in.²}

- (4) If the above pressure is not attained, measure the discharge pressure or stop the engine and repair the steering booster unit.



SHTS07Z070300010

6. MEASURE THE DISCHARGE PRESSURE.

- (1) Make sure that the stop valve is fully open.
- (2) Start the engine and idle and measure the discharge pressure with the stop valve fully close.

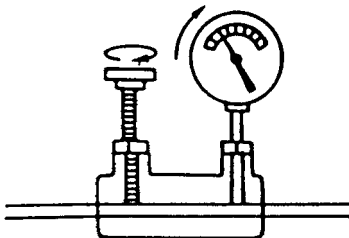
Discharge Pressure:

14.0-14.7 MPa {143-150 kgf/cm², 2,030-2,132 lbf/in.²}

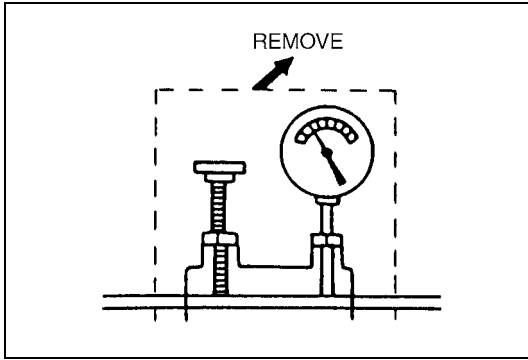
NOTICE

Do not allow the stop valve to remain closed for more than 15 seconds.

- (3) Open the stop valve fully.



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7. REMOVE THE STOP VALVE AND OIL PRESSURE GAUGE.

- (1) Stop the engine and remove the stop valve and oil pressure gauge.

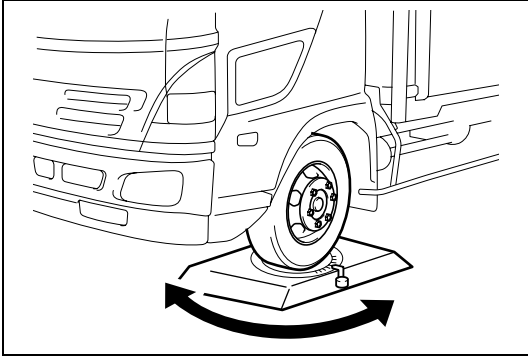
NOTICE

After removing stop valve and oil pressure gauge, perform the air bleeding in according to "AIR BLEEDING".

8. INSPECT THE STEERING SYSTEM FOR OPERATION ABILITY.

- (1) Place the front wheels on turn tables then start the engine and idle.
- (2) Check to see that the steering wheel turned smoothly without any jolts or abnormal resistance, when it is turned fully in both directions.
- (3) Measure the steering wheel turning force.

Turning force: Less than 24.5 N {2.5 kgf, 5.5 lbf}



SHTS07Z070300012

POWER STEERING GEAR UNIT

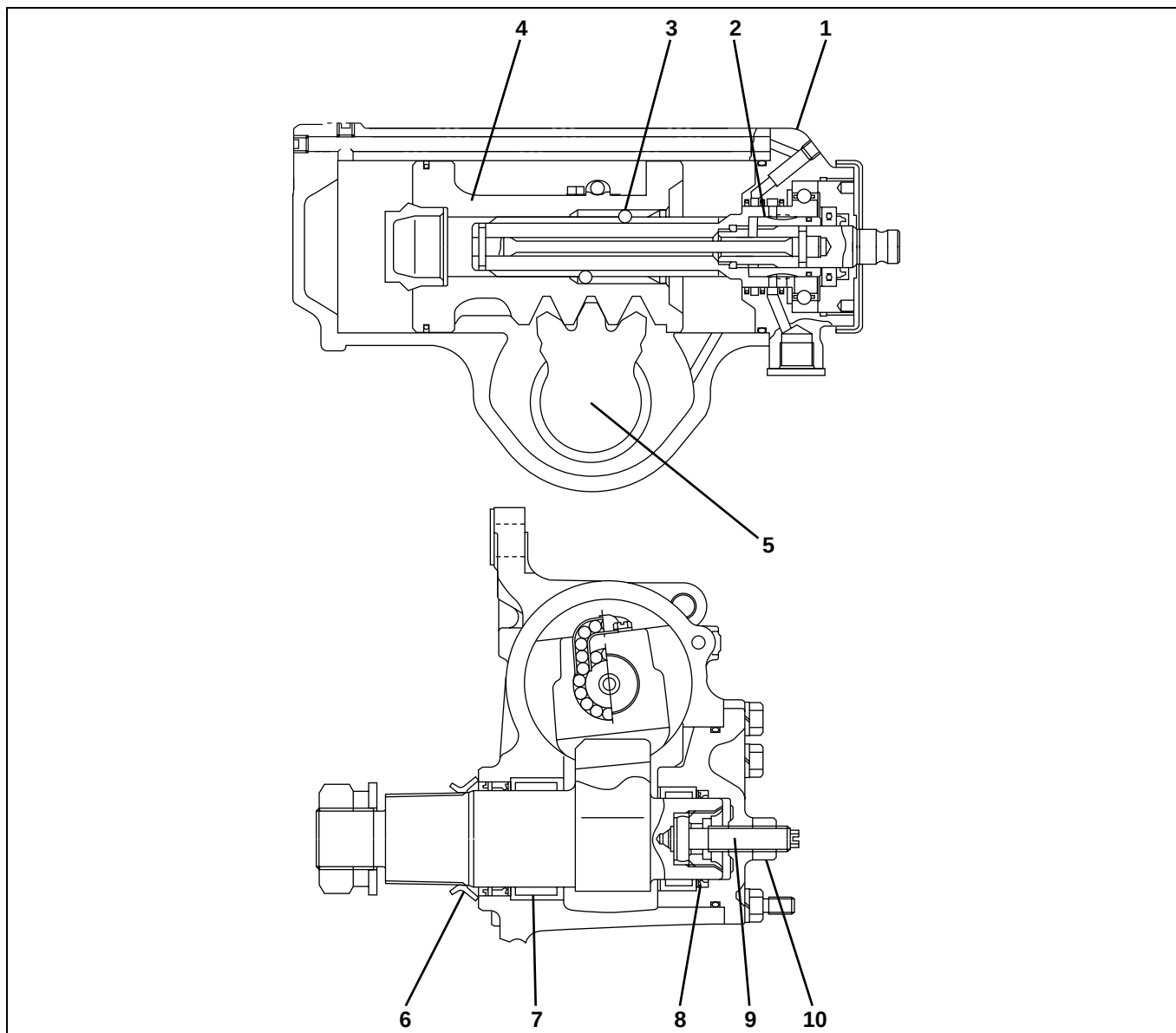
DATA AND SPECIFICATIONS

EN07Z0703I200001

Type	MODEL	FR, FS, SH, SS, ZS	Integral type power steering
		FY	Integral type power steering with steering booster
Gear ratio	MODEL	FR, FS, SH, SS, ZS	21.4-23.8
		FY	22.4
Cylinder inside diameter	MODEL	FR, FS, SH, SS, ZS	110 mm {4.331 in.}
		FY	100 mm {3.937 in.}

DESCRIPTION

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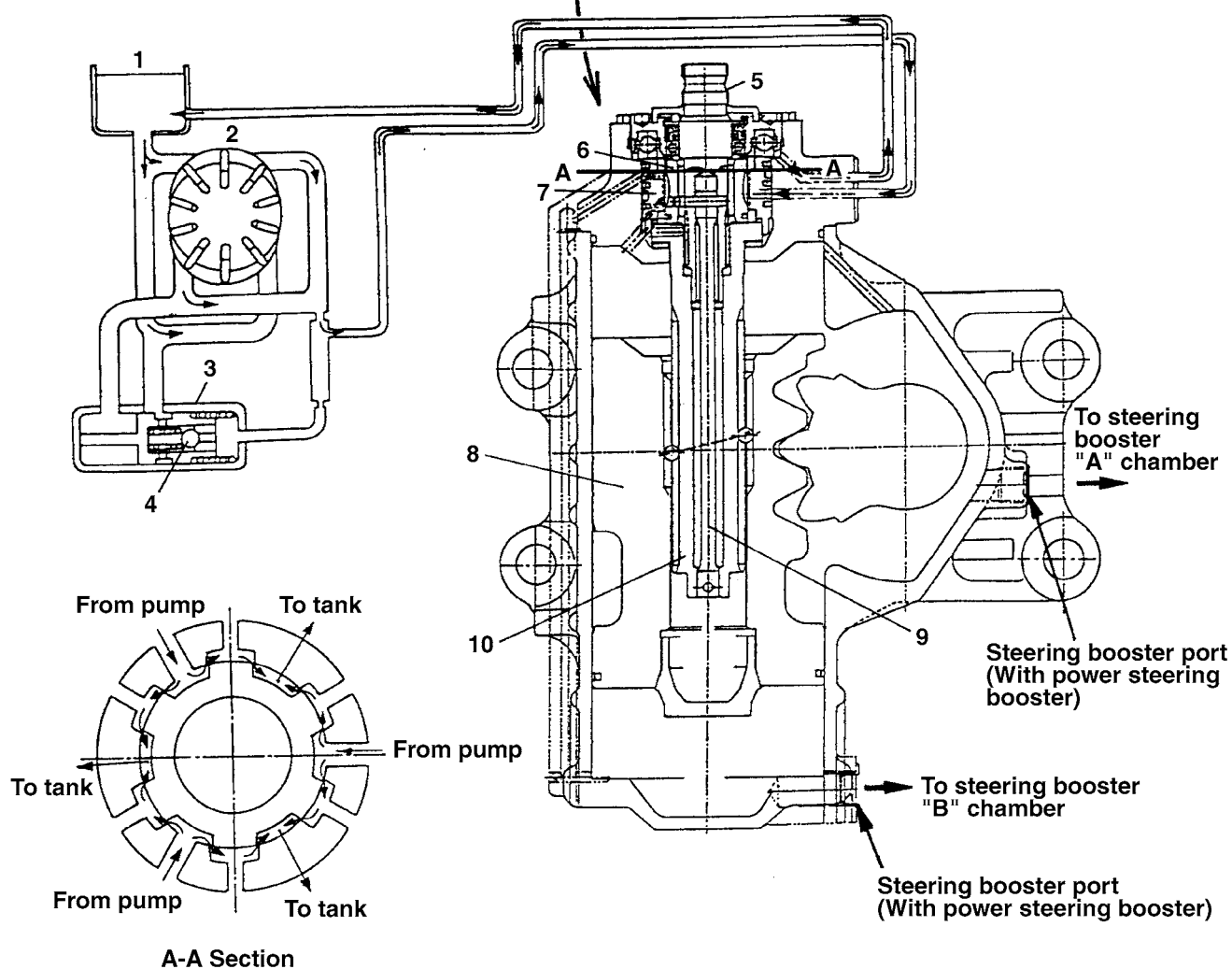
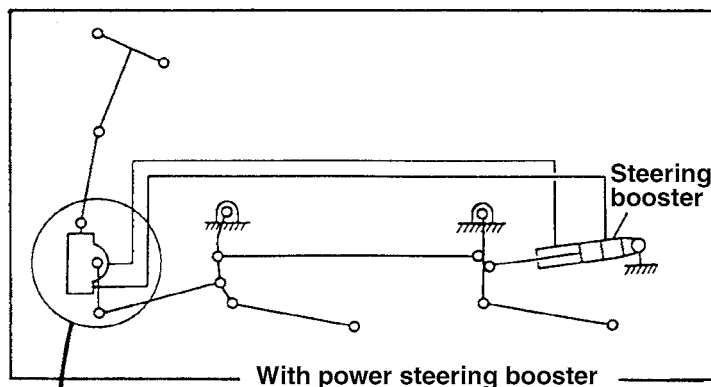
SHTS07Z070300015

1	Valve housing assembly	6	Dust cover
2	Worm valve assembly	7	Needle roller bearing
3	Steel ball	8	Oil seal
4	Ball nut assembly	9	Adjusting screw
5	Sector shaft	10	Adjusting screw lock nut

OPERATION

EN07Z0703C100002

Neutral position

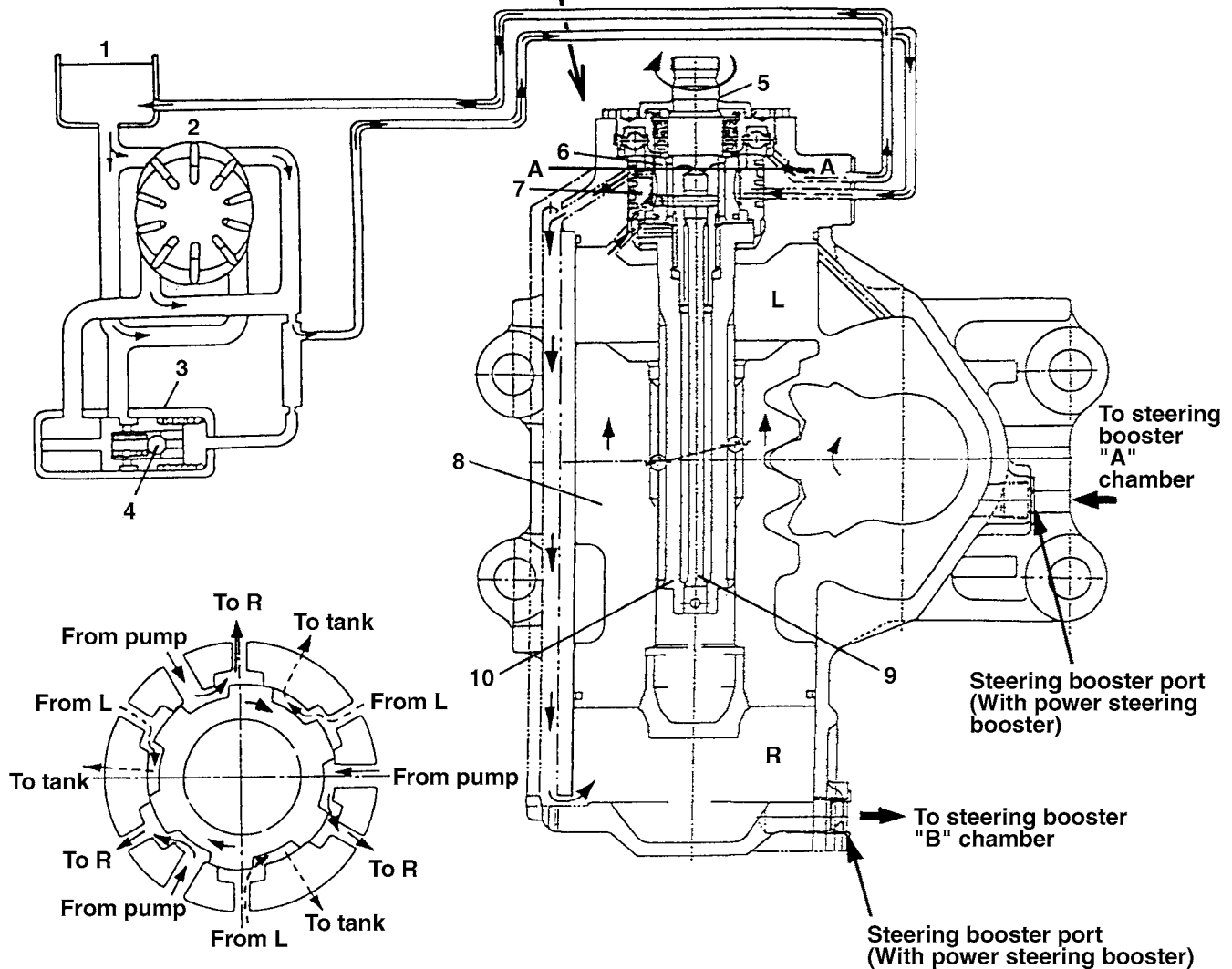
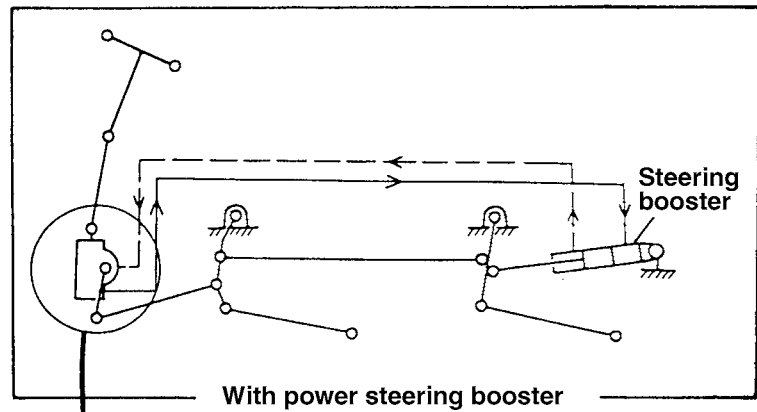


SHTS07Z070300016

- 1 Oil reservoir
- 2 Oil pump
- 3 Flow control valve assembly
- 4 Relief valve
- 5 Stud shaft

- 6 Spool valve
- 7 Sleeve
- 8 Ball nut
- 9 Torsion bar
- 10 Worm shaft

Power steering fluid circuit when turning the vehicle to the right. (Left turn is the reverse of the right turn.)
Case of the right-hand drive vehicle



SHTS07Z070300017

- | | |
|---|-----------------------------|
| 1 | Oil reservoir |
| 2 | Oil pump |
| 3 | Flow control valve assembly |
| 4 | Relief valve |
| 5 | Stud shaft |

- | | |
|----|-------------|
| 6 | Spool valve |
| 7 | Sleeve |
| 8 | Ball nut |
| 9 | Torsion bar |
| 10 | Worm shaft |

SPECIAL TOOL

EN07Z0703K100001

Prior to starting a power steering gear unit overhaul, it is necessary to have the following special tools.

Tool and accessory set: 09030-4180

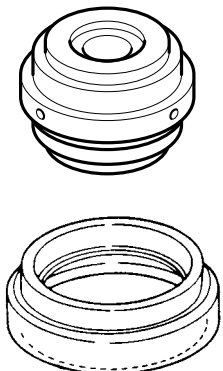
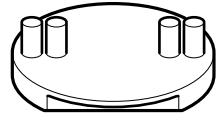
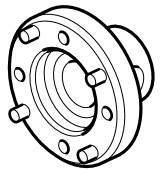
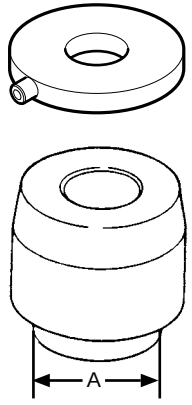
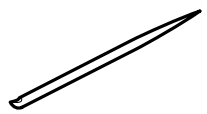
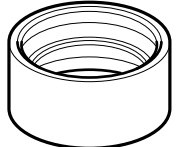
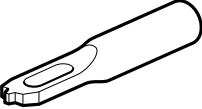
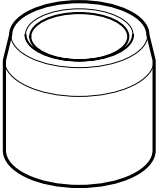
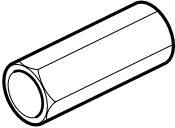
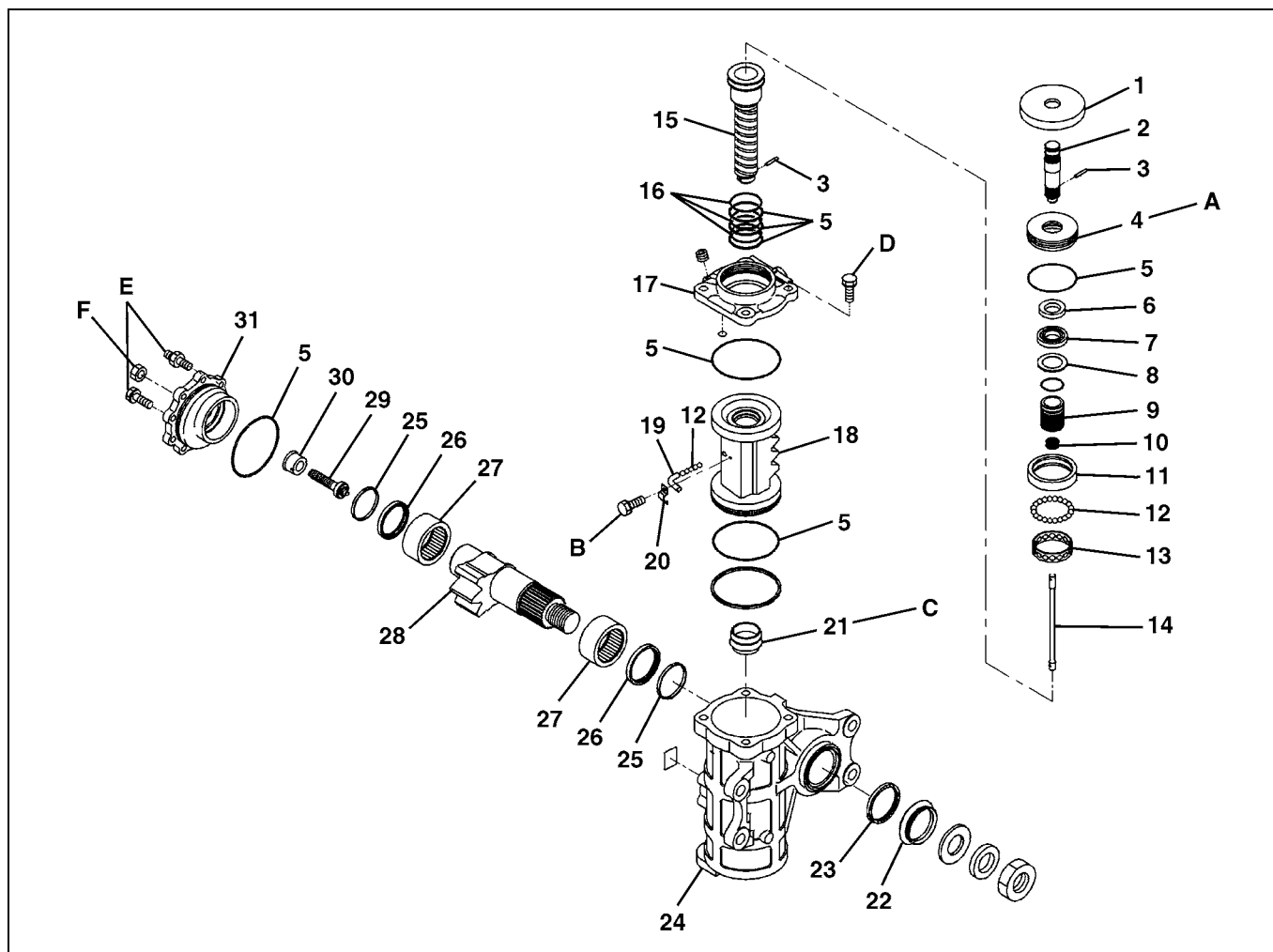
Illustration	Part number	Tool name	Remarks
	09657-1870	TOOL ASSEMBLY - For 85 mm {3.346 in.} - For 90-110 mm {3.544-4.330 in.} (Used together with tool assembly)	
	09659-1400	ATTACHMENT ASSEMBLY	
	09603-1560	WRENCH ASSEMBLY	
	09657-1860	INSERTER ASSEMBLY A: For 40 mm {1.575 in.} For 45 mm {1.772 in.} For 48 mm {1.890 in.} For 53 mm {2.087 in.} For 58 mm {2.283 in.} (Used together with inserter assembly)	
	09659-1410	PRESS FITTER	
	09699-1360	NEEDLE	
	09657-1840	INSERTER	

Illustration	Part number	Tool name	Remarks
	09694-1020	CAULKING TOOL	
	09657-1850	INSERTER	
	09712-1130	BAR	

COMPONENT LOCATOR

EN07Z0703D100001

RIGHT-HAND DRIVE VEHICLE



SHTS07Z070300028

1	Dust cover	17	Valve housing
2	Stab shaft	18	Power piston (Ball nut)
3	Pin	19	Ball tube
4	Plug	20	Tube clip
5	O-ring	21	Plug
6	Oil seal	22	Dust cover
7	Ball bearing	23	Oil seal
8	Washer	24	Steering body
9	Rotor	25	Back up ring
10	Needle roller bearing	26	Y-packing
11	Side race	27	Needle roller bearing
12	Ball bearing	28	Sector shaft
13	Ball bearing cage	29	Adjusting screw
14	Torsion bar	30	Retainer
15	Worm shaft	31	Side cover
16	Seal ring		

Tightening torque

Unit: N·m {kgf·cm, lbf·ft}

A	226-245 {2,305-2,498, 167-180}	D	118-127 {1,203-1,295, 87-93}
B	4.4-5.4 {45-55, 3.3-4.0}	E	74-83 {755-846, 55-61}
C	294-392 {2,998-3,997, 217-289}	F	112-127 {1,142-1,295, 83-93}

This exploded view diagram illustrates the assembly of a mechanical component, likely a pump or valve. The parts are numbered 1 through 31. Key sub-assemblies are labeled A, B, C, D, E, and F. The diagram shows the following components and their assembly sequence:

- Part 1:** A large circular flange or cover plate.
- Part 2:** A small pin or screw.
- Part 3:** A small pin or screw.
- Part 4:** A circular gasket or seal.
- Part 5:** A circular gasket or seal.
- Part 6:** A small ring or washer.
- Part 7:** A small ring or washer.
- Part 8:** A small ring or washer.
- Part 9:** A small ring or washer.
- Part 10:** A small pin or screw.
- Part 11:** A small ring or washer.
- Part 12:** A small ring or washer.
- Part 13:** A small ring or washer.
- Part 14:** A long pin or screw.
- Part 15:** A long pin or screw.
- Part 16:** A spring.
- Part 17:** A circular flange or cover plate.
- Part 18:** A central shaft or pin.
- Part 19:** A small pin or screw.
- Part 20:** A small pin or screw.
- Part 21:** A small pin or screw.
- Part 22:** A small ring or washer.
- Part 23:** A small ring or washer.
- Part 24:** A central shaft or pin.
- Part 25:** A small ring or washer.
- Part 26:** A small ring or washer.
- Part 27:** A small ring or washer.
- Part 28:** A small pin or screw.
- Part 29:** A small pin or screw.
- Part 30:** A small pin or screw.
- Part 31:** A small pin or screw.

The assembly is shown in a disassembled state, with dashed lines indicating the alignment and sequence of assembly. The components are arranged in a vertical column, with the main body (24) at the bottom and the cover (1) at the top. The sub-assemblies A, B, C, D, E, and F are shown in exploded view, indicating their relative positions and assembly order.

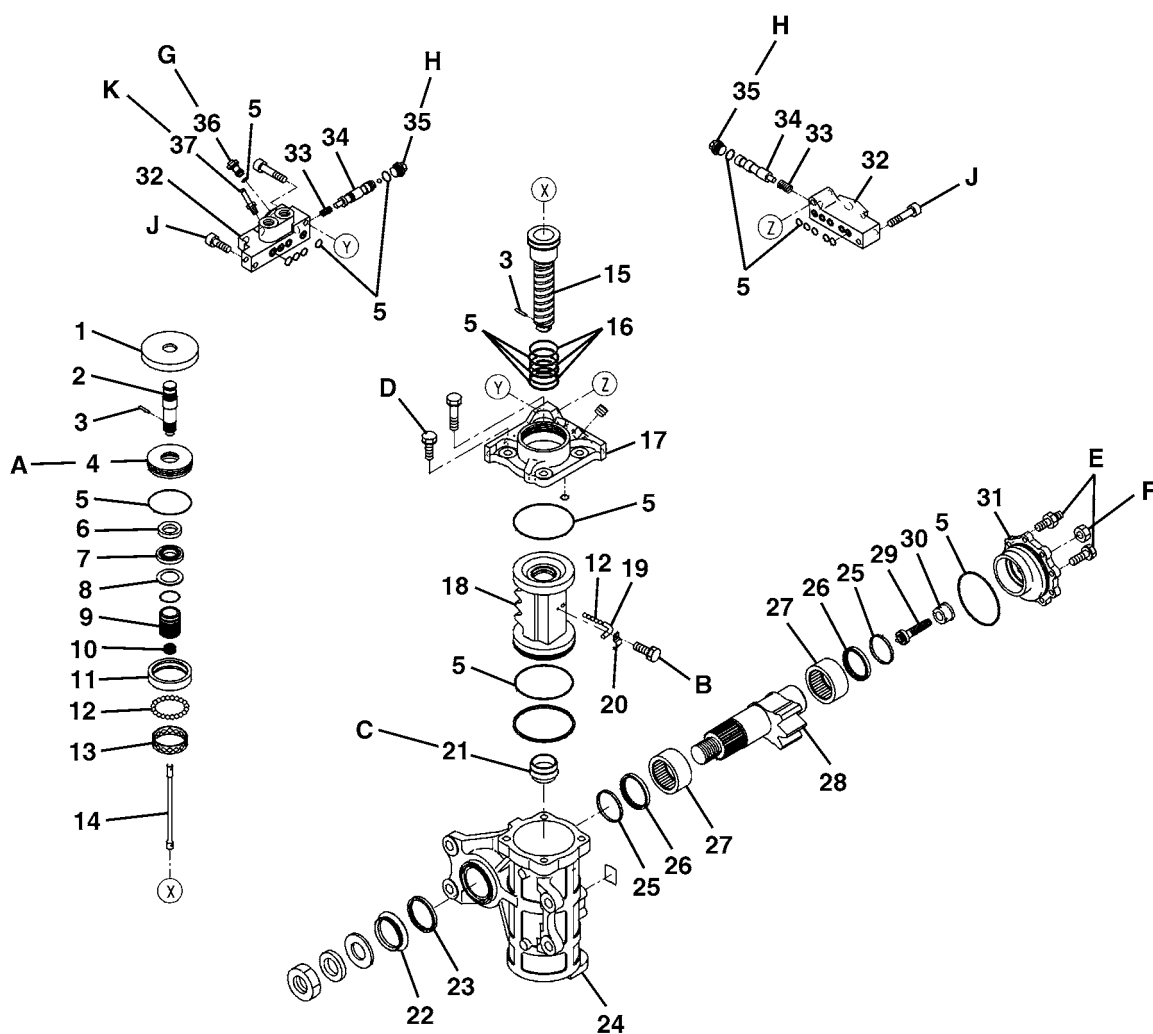
SHTS07Z070300029

1	Dust cover	17	Valve housing
2	Stab shaft	18	Power piston (Ball nut)
3	Pin	19	Ball tube
4	Plug	20	Tube clip
5	O-ring	21	Plug
6	Oil seal	22	Dust cover
7	Ball bearing	23	Oil seal
8	Washer	24	Steering body
9	Rotor	25	Back up ring
10	Needle roller bearing	26	Y-packing
11	Side race	27	Needle roller bearing
12	Ball bearing	28	Sector shaft
13	Ball bearing cage	29	Adjusting screw
14	Torsion bar	30	Retainer
15	Worm shaft	31	Side cover
16	Seal ring		

Unit: N·m {kgf·cm, lbf·ft}

A	226-245 {2,305-2,498, 167-180}	D	118-127 {1,203-1,295, 87-93}
B	4.4-5.4 {45-55, 3.3-4.0}	E	74-83 {755-846, 55-61}
C	294-392 {2,998-3,997, 217-289}	F	112-127 {1,142-1,295, 83-93}

MODEL: FY (LEFT-HAND DRIVE VEHICLE)



SHTS07Z070300030

1	Dust cover	20	Tube clip
2	Stub shaft	21	Plug
3	Pin	22	Dust cover
4	Plug	23	Oil seal
5	O-ring	24	Steering body
6	Oil seal	25	Back up ring
7	Ball bearing	26	Y-packing
8	Washer	27	Needle roller bearing
9	Rotor	28	Sector shaft
10	Needle roller bearing	29	Adjusting screw
11	Side race	30	Retainer
12	Ball bearing	31	Side cover
13	Ball bearing cage	32	Power steering control valve body
14	Torsion bar	33	Spring
15	Worm shaft	34	Spool valve
16	Seal ring	35	Plug
17	Valve housing	36	Valve assembly
18	Power piston (Ball nut)	37	Connector
19	Ball tube		

Tightening torque

Unit: N·m {kgf·cm, lbf·ft}

A	226-245 {2,305-2,498, 167-180}	F	112-127 {1,142-1,295, 83-93}
B	4.4-5.4 {45-55, 3.3-4.0}	G	24.5-34.3 {250-350, 18-25}
C	294-392 {2,998-3,997, 217-289}	H	29.4-39.2 {300-400, 22-29}
D	118-127 {1,203-1,295, 87-93}	J	49.0-53.9 {500-550, 36-40}
E	74-83 {755-846, 55-61}	K	8.8-12.7 {90-130, 6.5-9.4}

OVERHAUL

EN07Z0703H200002

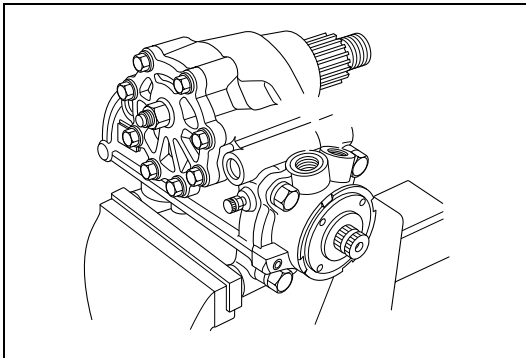
NOTICE

OBSERVE THE FOLLOWING INSTRUCTIONS BEFORE DISASSEMBLY AND ASSEMBLY.

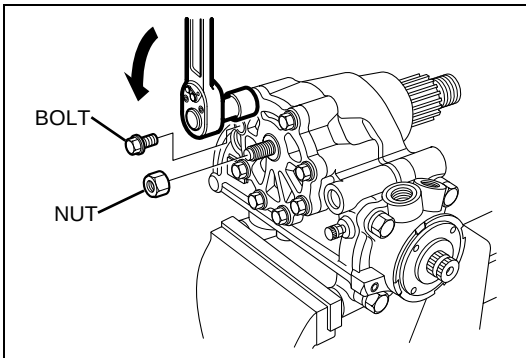
1. All functional parts should be clean. Blow dirty parts off with dry compressed air, then clean them with volatile metal cleanser. Never use brushes or cloth.
2. Handle rubber parts, seals, etc., in clean condition. Any worn part should be replaced immediately. Volatile metal cleanser may attack rubber parts, so they should never be used. Always use fluid.
3. For disassembling and assembling, only use the specified fluid.
4. Standard tools can generally be used for assembling and disassembling, although special tools may be required. When using special tools, read the instruction carefully, and never use standard tools in place of special tools.

IMPORTANT POINTS - DISASSEMBLY

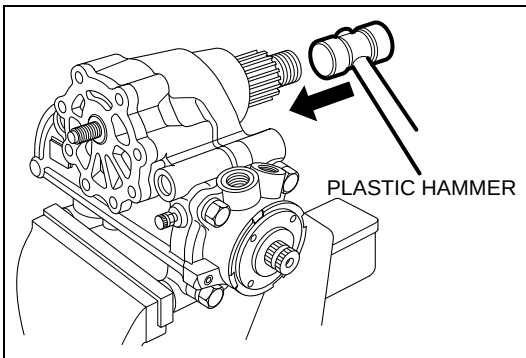
1. BEFORE DISASSEMBLY, SECURE THE POWER STEERING IN THE VISE, AND THEN CENTER THE POWER PISTON.



SHTS07Z070300031



SHTS07Z070300032



SHTS07Z070300033

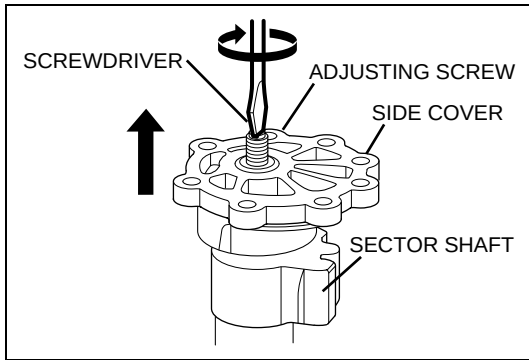
2. REMOVE THE SIDE COVER ASSEMBLY AND SECTOR SHAFT.

- (1) Loosen and remove the nut fixing the adjusting screw to the side cover.
- (2) Remove the eight bolts and washers fitting the side cover to the steering body.

- (3) Confirm that the power piston is located in the center, and then gently tap the output end of the sector shaft with a plastic (or wooden) hammer to remove the sector shaft assembly and the side cover together from the steering body.

NOTICE

Never use a steel hammer when removing the sector shaft (as the threads will be damaged).

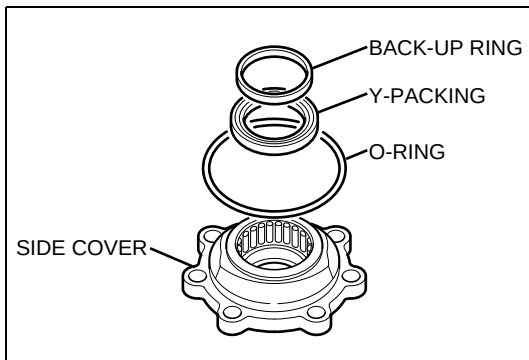


SHTS07Z070300034

- (4) Turn the adjusting screw clockwise using a screwdriver to raise and separate the side cover assembly from the sector shaft assembly.

NOTICE

- Do not secure the sector shaft directly in the vise.
- Always use a cloth etc. to protect the sector shaft.



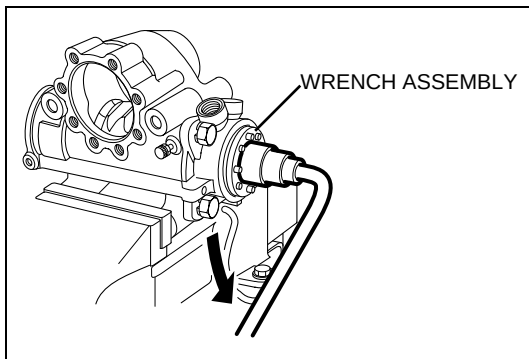
SHTS07Z070300035

- (5) Remove the O-ring from the groove around the outside of the side cover using the special tool. Then remove the Y-packing from behind the needle roller bearing and the back-up ring using the special tool.

NOTICE

It is not necessary to remove the needle bearing unless it is damaged.

SST: Needle (09699-1360)



SHTS07Z070300036

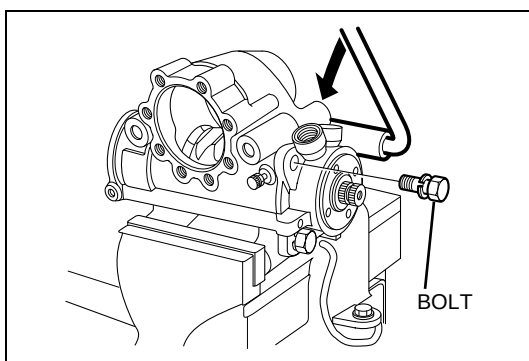
3. REMOVE THE VALVE HOUSING AND BALL NUT ASSEMBLY.

- (1) Remove the dust cover from the valve housing.
- (2) Loosen the plug and seal assembly in the valve housing section using the special tool. At this time, only back off the plug and seal assembly 180°. Do not remove it.

NOTICE

If the plug and seal assembly is removed, the steel balls (bearing) in the valve housing may spring out.

SST: Wrench Assembly (09603-1560)

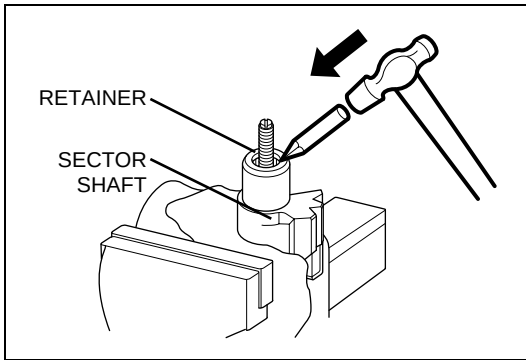


SHTS07Z070300037

- (3) Remove the bolts to remove the worm shaft assembly and valve housing assembly from the steering body.

NOTICE

- Do not damage the internal surface of the steering body when removing the worm shaft assembly and valve housing assembly.
- Do not let the steel balls spring out.
- Never damage the power piton.



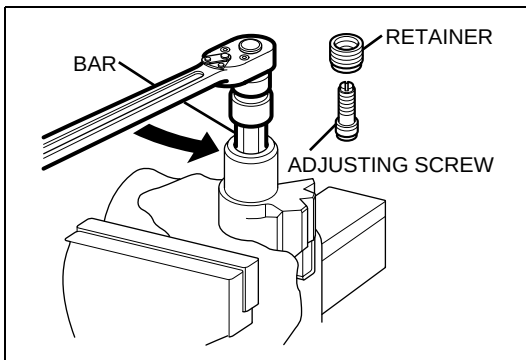
SHTS07Z070300038

4. REMOVE THE ADJUSTING SCREW AND SECTOR SHAFT.

- (1) Uncaulk the retainer at two caulked positions.

NOTICE

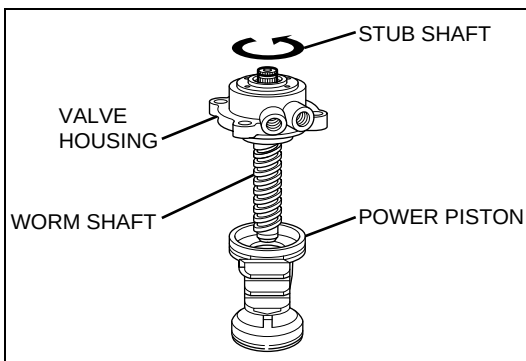
- Do not disassemble the sector shaft assembly unless it is damaged.
- Do not secure the sector shaft directly in the vise. Always use a cloth etc. to protect the sector shaft.



SHTS07Z070300039

- (2) Remove the retainer using the special tool. Remove the adjusting screw at the same time.

SST: Bar (09712-1130)



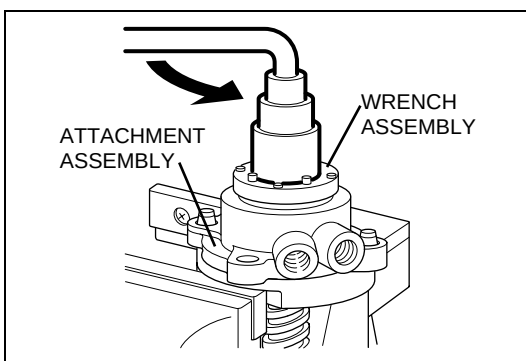
SHTS07Z070300040

5. REMOVE THE WORM SHAFT ASSEMBLY, VALVE HOUSING AND POWER PISTON ASSEMBLY.

- (1) Place the assembly on the work bench with the power piston side down. Turn the stub shaft while holding the valve housing, and remove the worm shaft from the power piston.
- (2) Let the steel balls assembled in the power piston and ball race of the worm shaft drop into the power piston.

NOTICE

Do not tilt the piston as it contains the steel balls. Do not lose the steel balls.



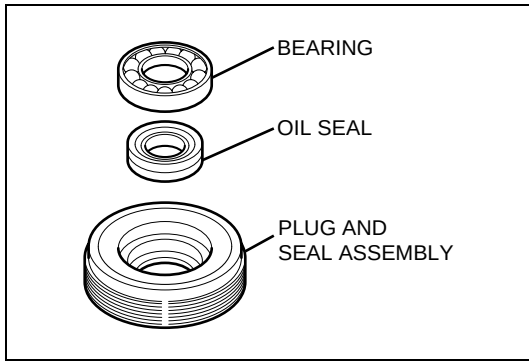
SHTS07Z070300041

- (3) Secure the special tool in the vise.
SST: Attachment Assembly (09659-1400)

- (4) Remove the O-rings fitted on the contact surfaces of the steering body of the valve housing.

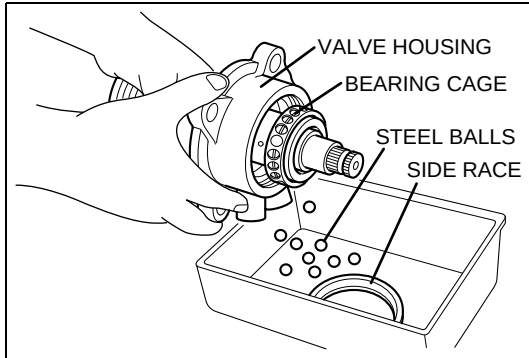
- (5) Attach the valve housing to the attachment assembly, and remove the previously loosened plug and seal assembly.

SST: Wrench Assembly (09603-1560)



SHTS07Z070300042

- (6) Remove the ball bearing and oil seal from the plug and seal assembly.



SHTS07Z070300043

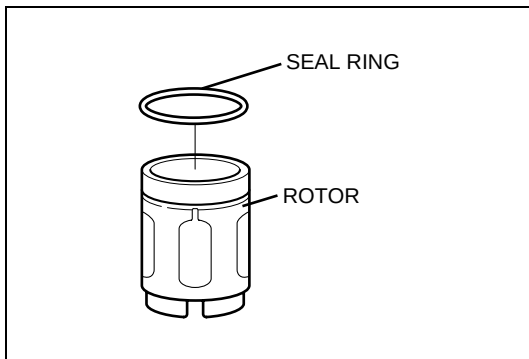
6. REMOVE THE WORM SHAFT ASSEMBLY AND VALVE HOUSING.

- (1) Prepare a plastic box, etc. Hold the valve housing over the box and remove the worm shaft assembly by pushing it from the power piston side as shown in figure. The side race, steel balls, and bearing cage will come apart and fall into the box.

NOTICE

- Do not lose any steel balls.
- If only one side race and/or steel ball is lost, the worm shaft and valve housing assembly must be replaced.

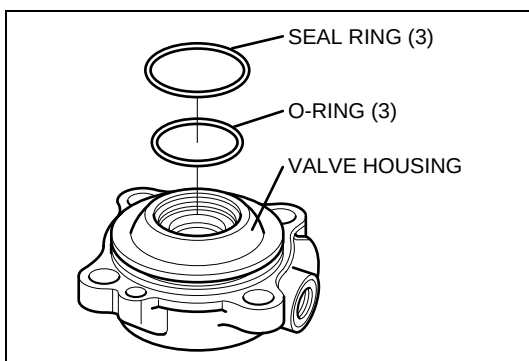
Number of the steel balls: 18 pieces.



SHTS07Z070300044

- (2) Remove the rotor from the worm shaft assembly, and then remove the seal ring from the rotor using the special tool.

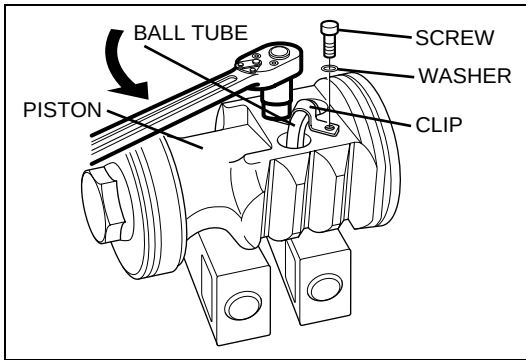
SST: Needle (09699-1360)



SHTS07Z070300045

- (3) Remove the three seal rings and three O-rings from the valve housing using the special tool.

SST: Needle (09699-1360)



SHTS07Z070300046

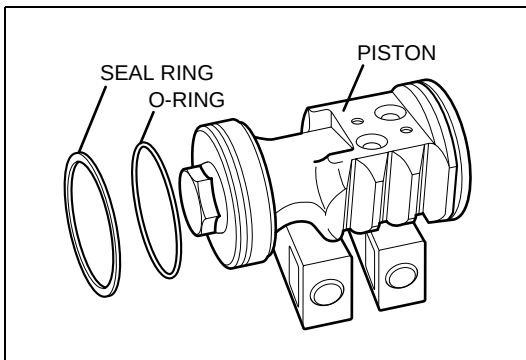
7. REMOVE THE POWER PISTON.

- (1) Place the piston's steel balls in a separate container.
- (2) Loosen the screw of the tube clip securing the ball tube using a wrench. Remove the ball tube from the power piston by pinching it with your fingers and shaking it.

NOTICE

- Never insert a screwdriver etc., between the ball tube and the piston to pry them apart.
- Check for any steel balls remaining in the ball tube.

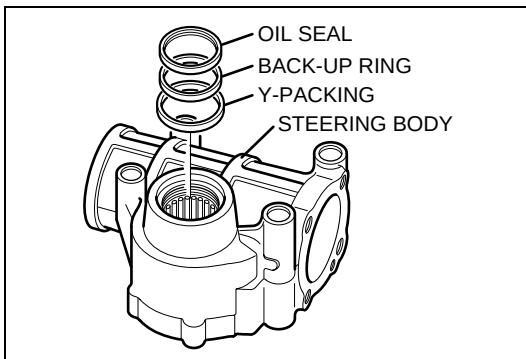
Number of the steel balls: 32 pieces.



SHTS07Z070300047

- (3) Remove the seal ring and O-ring from the power piston using the special tool.

SST: Needle (09699-1360)



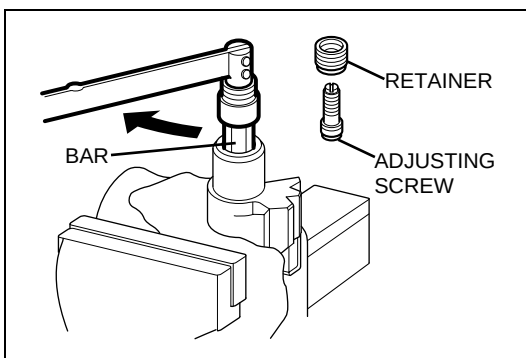
SHTS07Z070300048

8. REMOVE THE STEERING BODY.

- (1) Remove the oil seal, back-up ring, and Y-packing from the section of the steering body contacting the sector shaft.

NOTICE

Do not remove the needle roller bearing and taper plug unless they are damaged.

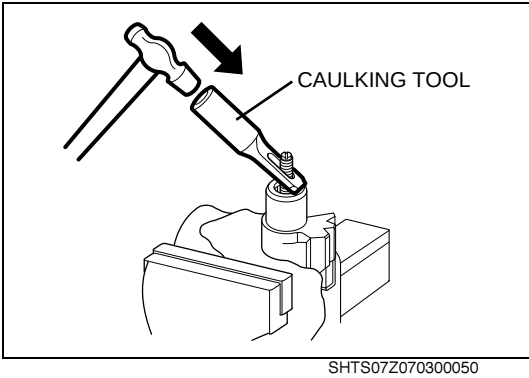


SHTS07Z070300049

IMPORTANT POINTS - ASSEMBLY**1. INSTALL THE SECTOR SHAFT.**

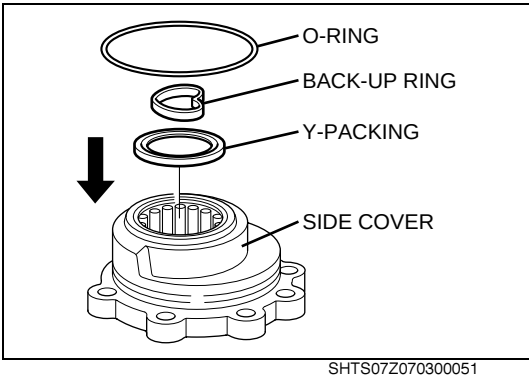
- (1) Secure the sector shaft in the vise while protecting the geared base of the shaft with a rag.
- (2) Fill the assembly with grease through the adjusting screw hole. Then, insert the adjusting screw, and fix the retainer using the special tool.

SST: Bar (09712-1130)



NOTICE
How to tighten the retainer; After fully tightening, back off the retainer 180° and then, after retightening it to 39 N·m {400 kgf·cm, 29 lbf·ft}, back it off 20°. Ensure the adjusting screw rotates smoothly.

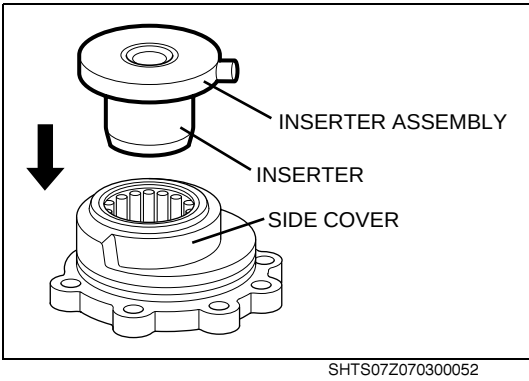
(3) After tightening the retainer, securely caulk it at two positions using the special tool.
SST: Caulking Tool (09694-1020)



2. INSTALL THE SIDE COVER.
(1) Insert the Y-packing and back-up ring in the bottom of the needle roller bearing press fitted inside the side cover.

NOTICE

- The back-up ring can be assembled easily if inserted by pinching it with the fingers as shown in figure.
- After filling the groove with grease, assemble the Y-packing so that the lip faces to the needle roller bearing side.

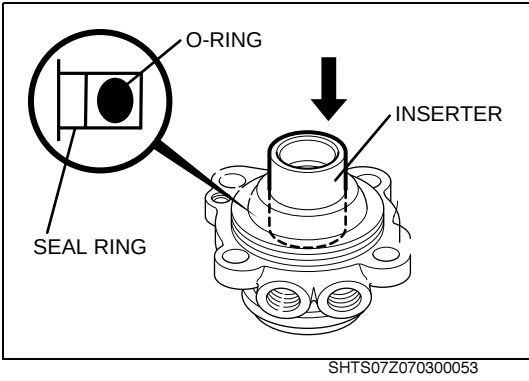


(2) Form the back-up ring using the special tool.
SST: Inserter Assembly (09657-1860)

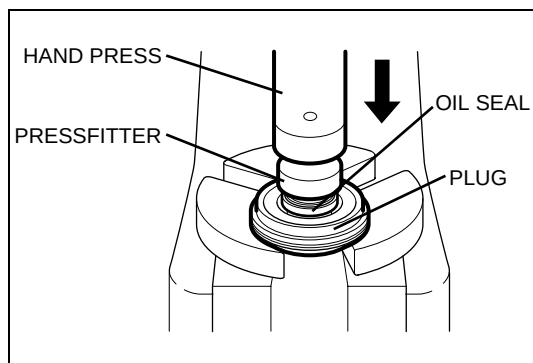
NOTICE
There are five kinds of inserters as below, and install the back-up ring using the inserter for the diameter 48 mm {1.890 in.}.

Unit: mm {in.}

INSERTER DIAMETER
40 {1.575}
45 {1.772}
48 {1.890}
53 {2.087}
58 {2.283}



3. INSTALL THE VALVE HOUSING.
(1) Insert an O-ring and a seal ring into each of the three narrower grooves of the five grooves in the valve housing.
(2) Then, form the seal ring using the special tool.
SST: Inserter (09657-1850)



SHTS07Z070300054

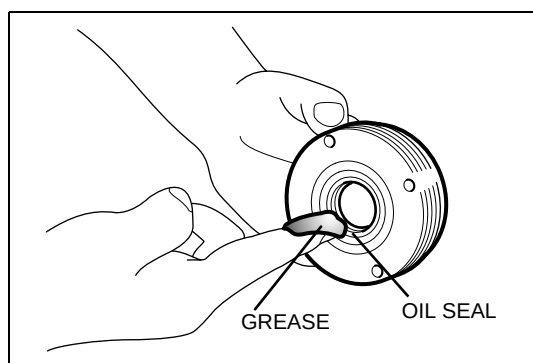
4. INSTALL THE PLUG AND SEAL ASSEMBLY.

- (1) Press fit the oil seal into the inside of the plug and seal assembly using the special tool.

NOTICE

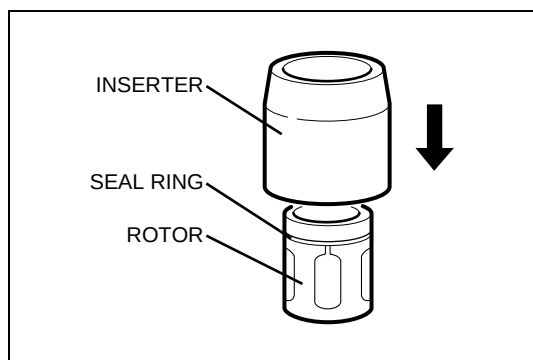
Always use a hand press when press fitting the oil seal.

SST: Press Fitter (09659-1410)



SHTS07Z070300055

- (2) Apply grease to the oil seal and then install the ball bearing.

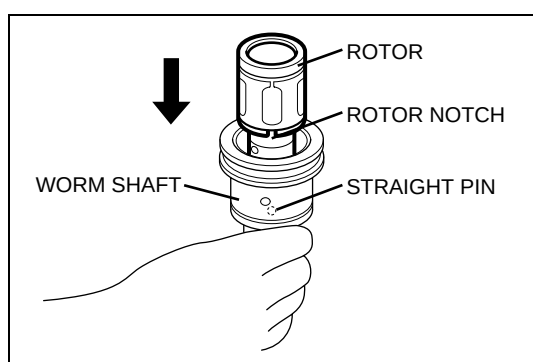


SHTS07Z070300056

5. INSTALL THE WORM SHAFT AND THE VALVE HOUSING.

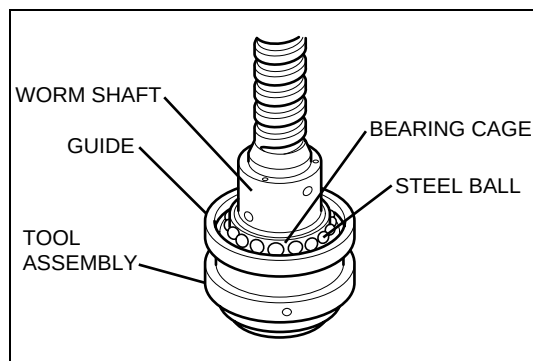
- (1) Form the seal ring using the special tool after assembling the seal ring in the outer groove of the rotor.

SST: Inserter (09657-1850)



SHTS07Z070300057

- (2) Insert the rotor between the stub shaft and the worm shaft. At this time, assemble it so that the straight pin in the bottom fits in the rotor notch.



SHTS07Z070300058

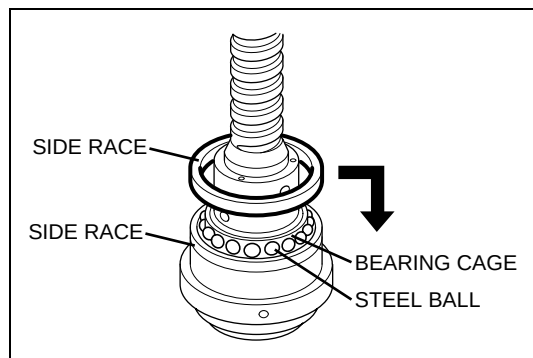
- (3) Fit the guide into the special tool and insert the previously assembled worm shaft assembly into the guide with the input side down.
SST: Tool Assembly (09657-1870)

NOTICE

There are two kinds of guide as below, and install worm shaft assembly using the guide for power piston diameter 90-110 mm {3.544-4.330 in.}.

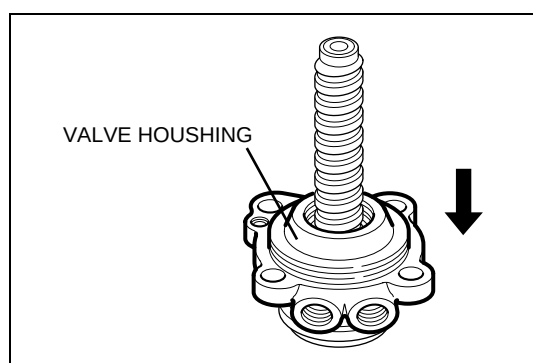
Unit: mm {in.}

POWER PISTON DIAMETER
85 {3.346}
90-110 {3.544-4.330}



SHTS07Z070300059

- (4) Install the race of bearing side (one side), the bearing cage and the steel balls, and allow the tool assembly to slide down and set the balls in position.
 (5) Remove the guide and fit the other side race.

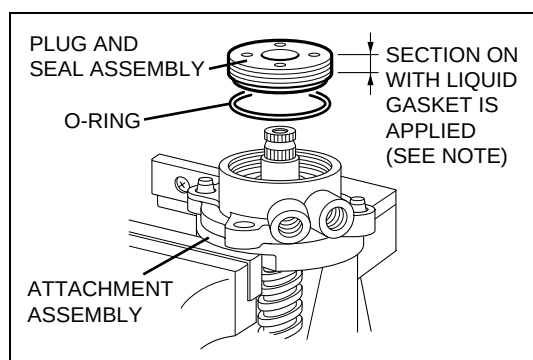


SHTS07Z070300060

- (6) Assemble the valve housing to the worm shaft assembly and previously assembled bearing sub-assembly by inserting it from the worm shaft side.

NOTICE

- When fitting the valve housing, do not damage the seal ring in the valve housing.
- Inserter (09657-1850) can be used to form the seal rings of the valve housing part.



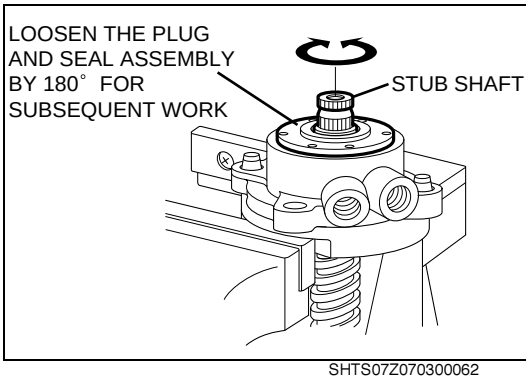
SHTS07Z070300061

- (7) Secure the special tool in the vise.
SST: Attachment Assembly (09659-1400)

- (8) Fit the previously assembled worm shaft assembly and valve housing onto the attachment assembly, place the O-ring in the inner groove of the valve housing, and screw the plug and seal assembly into the valve housing.

NOTICE

- Apply liquid gasket (equivalent to ThreeBond 1102) to the screw section of the plug and seal assembly.
- The O-ring must not be fitted in the thread escape groove of the valve housing.
- When assembling the plug and seal assembly, do not let the stub shaft serration damage the oil seal.



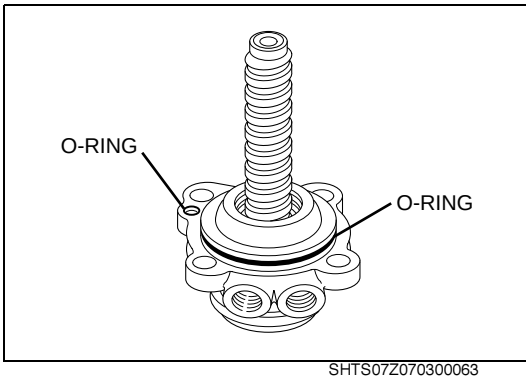
- (9) Tighten the plug and seal assembly using the special tool.

SST: Wrench Assembly (09603-1560)

NOTICE

Check that the stub shaft rotates smoothly and uniformly while holding the valve housing.

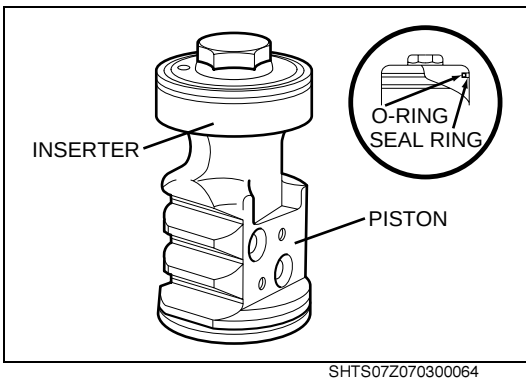
- (10) Loosen the plug and seal assembly by approx 180°.



- (11) Install O-rings in the groove around the outside of the valve housing, and in the oil port recess.

NOTICE

Do not twist the O-rings.



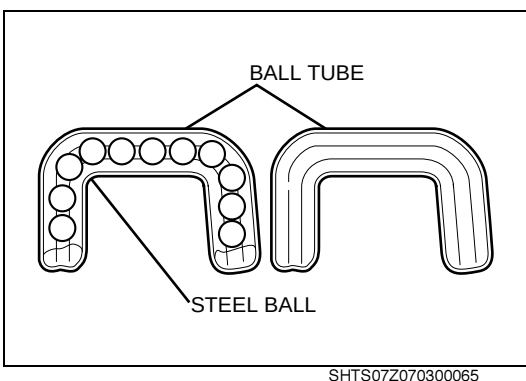
6. INSTALL THE POWER PISTON.

- (1) Fit the O-ring and seal ring in the groove around the outside of the power piston and form the seal ring using the special tool.

NOTICE

Do not twist the O-ring or stretch the seal ring.

SST: Inserter (09657-1840)

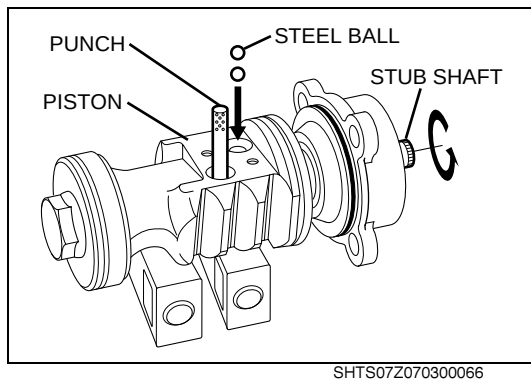


- (2) Place the power piston on the bench.

- (3) Fill the ball tube with grease, lay 10-11 steel balls in the tube, and place the other side of the ball tube on top.

NOTICE

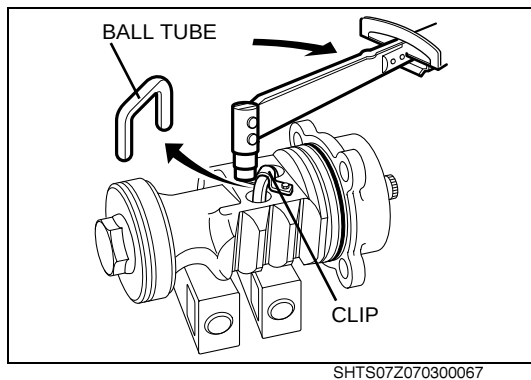
Never fix the piston in a vise.



- (4) Insert the worm shaft and valve housing assembly in the center hole of the power piston, align the power piston and worm shaft ball races, and drop the remaining steel balls one by one through the piston's ball tube hole.

NOTICE

- Drop the steel balls while turning the stub shaft to facilitate assembly.
- Steel balls sometimes come out of the hole on the other side of the ball tube after a certain number are inserted. Plug the hole with a punch to prevent the steel balls from coming out.
- When installing the steel balls, the worm shaft and valve housing assembly must not be drawn out to its extreme position, as the steel balls may drop outside the ball race.

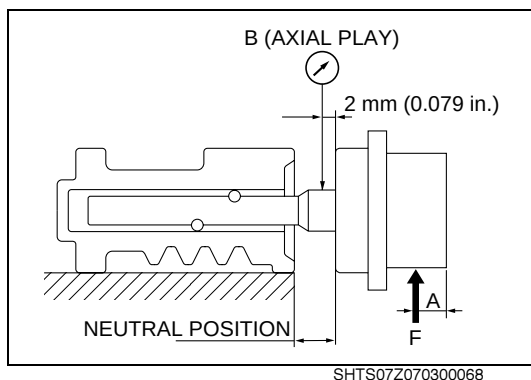


- (5) After inserting the steel balls in the power piston, insert the ball tube into the power piston and fix it using the clip, washer, and screw.

NOTICE

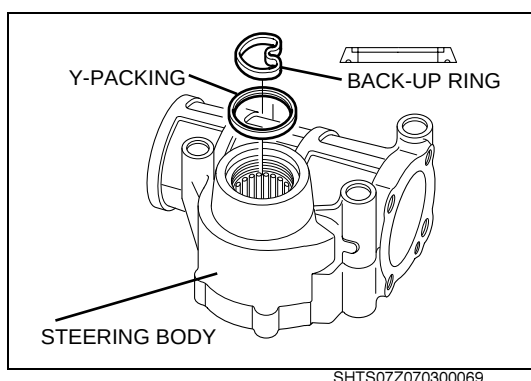
Always push in the ball tube by hand. Never force or strike it. If forced or struck, the ball tube may be deformed, the edge may be nipped, or otherwise damaged, causing malfunctions.

- (6) Tighten the screw to the specified torque.



- (7) Measure the axial play between the power piston and the worm shaft assembly.

A (point of application)	20 mm {0.787 in.}
F (force)	5 kg
B (axial play)	0.5 mm {0.0197 in.} or less

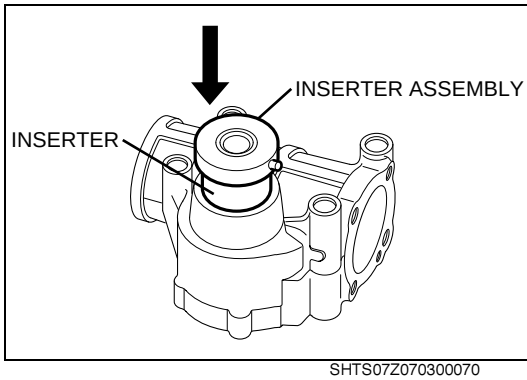


7. INSTALL THE STEERING BODY.

- (1) Fit the Y-packing and back-up ring in the groove in front of the needle roller bearing (in the hole for the steering body output shaft).

NOTICE

- Back-up ring installation is facilitated by pinching the ring with the fingers as shown in figure.
- After filling the groove with grease, assemble the Y-packing so that the lip faces to the needle roller bearing.



- (2) Form the back-up ring using the special tool.

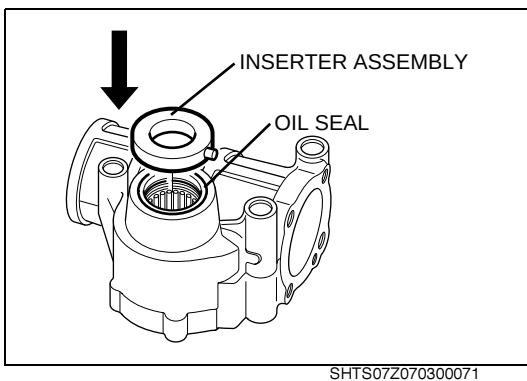
SST: Inserter Assembly (09657-1860)

NOTICE

There are five kinds of inserters as below, and install the back-up ring using the inserter for the diameter 58 mm {2.283 in.}.

Unit: mm {in.}

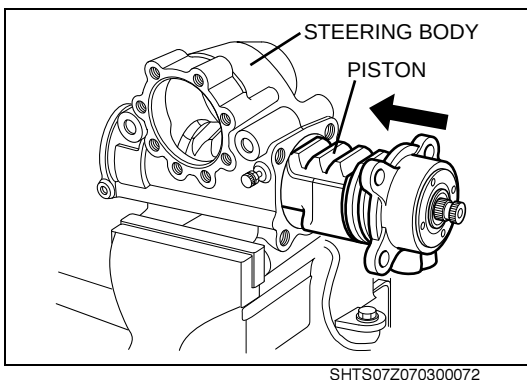
INSERTER DIAMETER
40 {1.575}
45 {1.772}
48 {1.890}
53 {2.087}
58 {2.283}



- (3) Press fit the oil seal into the steering body using the special tool.

SST: Inserter Assembly (09657-1860)

- (4) Fill the oil seal with grease.

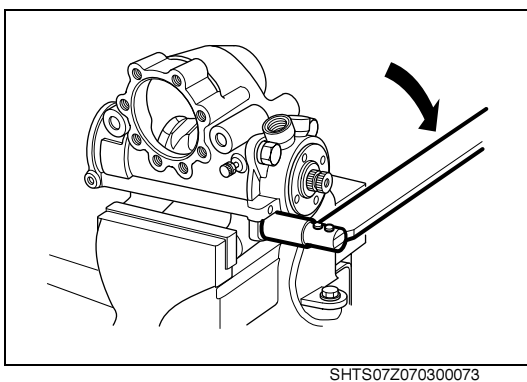


8. INSTALL THE VALVE HOUSING AND BALL NUT ASSEMBLY.

- (1) Secure the steering body in the vise.
- (2) Fit the worm shaft and valve housing assembly by inserting it into the steering body with the power piston gear placed on the side of the sector shaft. Hold the power piston lightly by hand so that it does not rotate.

NOTICE

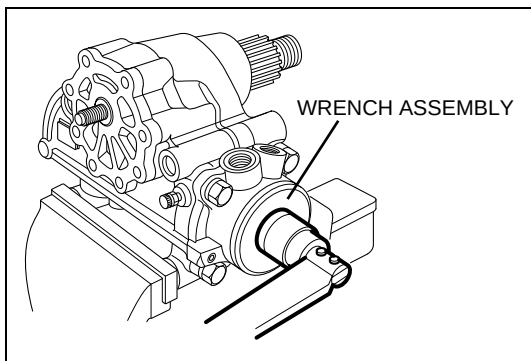
- When inserting the worm shaft and valve housing assembly, do not damage the piston seal ring.
- Be careful that the O-ring does not fall out.



- (3) Align the steering body and valve housing oil passage holes and tighten the bolt to the specified torque.

NOTICE

Insert a bar into the bolt hole to align the body and housing oil passage holes. Prevent housing rotation to prevent the O-ring from being cut or dislodged.



SHTS07Z070300074

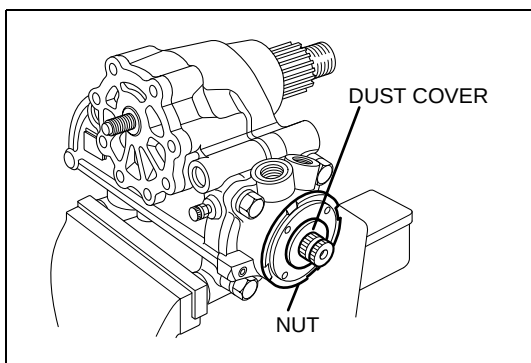
- (4) Tighten the plug and seal assembly (which was previously loosened through 180°) to the specified torque using the wrench assembly.

SST: Wrench Assembly (09603-1560)

NOTICE

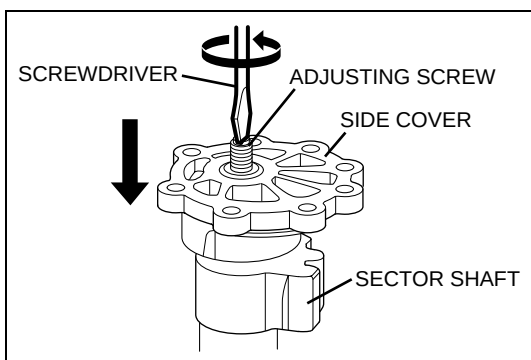
After applying a thin and uniform coat of liquid gasket to 3-5 whole threads of the screw part of the plug and seal assembly and tightening it with the indicated torque, apply turning stopper punches every 180°.

Liquid gasket: Equivalent to ThreeBond 1102



SHTS07Z070300075

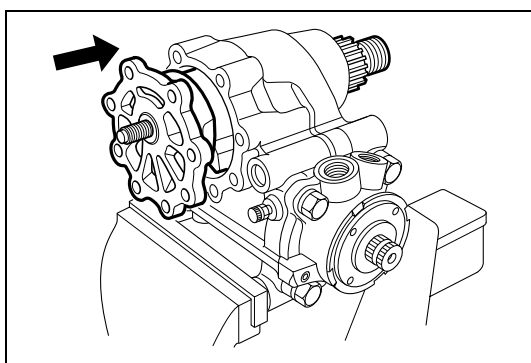
- (5) Attach the dust cover to the valve housing.



SHTS07Z070300076

9. INSTALL THE SIDE COVER ASSEMBLY AND SECTOR SHAFT.

- (1) Assemble the side cover assembly to the sector shaft assembly by aligning the screw hole in the center of the side cover with the adjusting screw and turning the adjusting screw. Install the O-ring around the outside of the side cover.

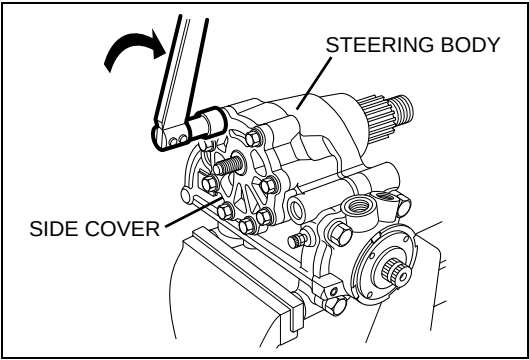


SHTS07Z070300077

- (2) Insert the sector shaft into the steering body so that its gear and the power piston gear engage in the center.

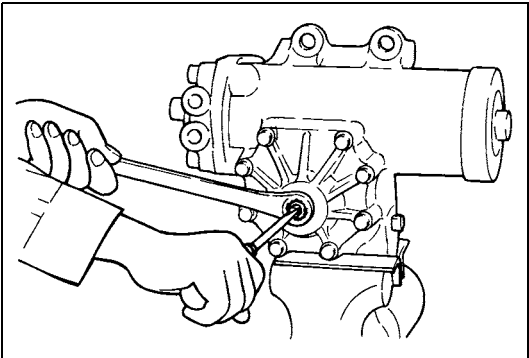
NOTICE

When inserting the sector shaft, do not let the sector shaft serration damage the lip of the Y-packing. Damage may affect oil tightness.



SHTS07Z070300078

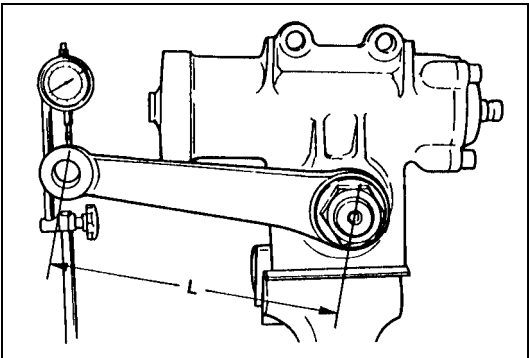
- (3) Assemble the side cover to the steering body using the bolts. Tighten them to the specified torque.



SHTS07Z070300079

10. MEASURE THE SECTOR SHAFT BACKLASH.

- (1) Align the marks on the sector shaft with pitman arm.
(2) Install the pitman arm and tighten the nut finger tight.

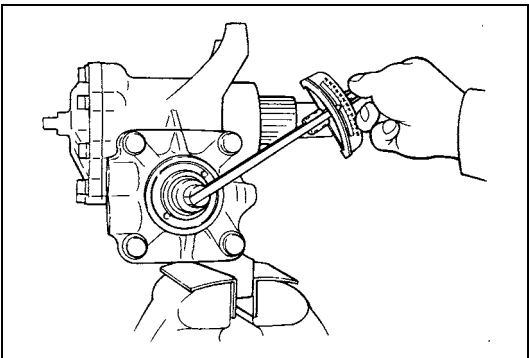


SHTS07Z070300080

- (3) Use a dial gauge to check to see that the sector shaft backlash in neutral position.

L	Backlash
270 mm {10.63 in.}	0.05-0.25 mm {0.002-0.009 in.}

- (4) If measurement is not within specification, readjust the backlash with adjusting screw.



SHTS07Z070300081

11. INSPECT THE WORM VALVE ASSEMBLY ROTATION CONDITION.

- (1) Check to see that the worm valve assembly rotate smoothly without any shocks, abnormal resistance, noise and drag, when the worm valve assembly rotates full lock in both direction.

12. TIGHTEN THE PITMAN ARM LOCK NUT.

INSPECTION AND REPAIR

EN07Z0703H300003

METALLIC PARTS

Inspection item	Location	Remedy
Steering body	• The internal surface of the cylinder	Repair or replace the steering body if there is evidence of abrasion or stepped wear. Check visually and by touch for any flaws that may affect smooth piston stroke.
	• Side cover assembly surface	Repair or replace the steering body if there is evidence of any flaws, rust or gouging that may affect oil tightness (check visually and by touch).
	• Y-packing groove in the sector shaft hole	Repair or replace the steering body if there is evidence of any flaws, rust or gouging that may affect oil tightness (check visually and by touch).
Sector shaft	• Gear	Replace the gear if it is severely flawed or worn. Chipped gears must also be replaced. (Check visually and by touch)
	• Gear shaft and serrations	Check for cracks using magnetic-particle test equipment and a color penetration test. Replace any cracked parts.
	• Needle roller bearing contact surface	Check for wear, flaws or gouging (visually and by touch). Repair or replace if necessary.
	• Y-packing contact surface	Repair or replace if any flaws, rust or gouging affecting oil tightness are found (check visually and by touch).
	• Adjusting screw	Measure the axial clearance of the adjusting screw with a dial gauge. 0.01-0.1 mm is acceptable, but if excessive, the screw must be disassembled for inspection. Also check whether the adjusting screw rotates smoothly. If not, the screw must be disassembled and inspected.
Power piston	• Cylinder contact surface	Any wear or abrasion that affects smooth piston stroke must be corrected, or the power piston must be replaced.
	• Rack gear	Replace the rack gear if severely flawed, worn or chipped.
	• Steel ball race surface	Any wear or flaw that disturbs smooth rotation and movement of steel balls must be corrected, or the race must be replaced. (Visual inspection)
	• Seal ring and O-ring	Replace the seal ring or O-ring if any flaws or tears affecting oil tightness are found.
Ball tube	• Steel ball rotation surface	Replace the ball tube if any wear, flaws or gouging that affect smooth ball rotation are found on the inside at the tube.
	• Tang (end)	Replace the ball tube if any warping, bending, flaws or pits that affect smooth ball rotation are found on the tang.

Inspection item	Location	Remedy
Worm shaft (stub shaft)	• Steel ball race surface	Repair or replace the race if any wear, flaws or pits that affect smooth ball rotation are found.
	• Seal ring	Any wear, flaw, or gouge affecting oil tightness must be corrected or the seal ring must be replaced.
	• Y-packing contact surface	Any wear, flaw, rust, or gouge which may affect oil tightness must be corrected or the packing must be replaced.
	• Thrust bearing (steel ball) contact surface	Check the bearing for wear, flaws or pits if shaft rotation is stiff or uneven. Repair or replace if found.
Thrust bearing (steel ball) and bearing cage	• Bearing race and steel ball	Check the bearing for wear, flaws or pits if shaft rotation is stiff or uneven. Repair or replace if found.
	• Bearing cage	Replace the cage if any flaws or damage affecting smooth rotation are found.
Rotor	• External surface	Repair or replace the rotor if any wear, flaws or gouging affecting smooth rotation are found.
	• Chamber	Replace the chamber if any flaws, breaks, or chips affecting steering characteristics are found.
	• Seal ring groove	Replace the seal ring if any flaws or tears affecting oil tightness are found.
Side cover	• Steering body contact surface	Repair or replace the side cover if any flaws, gouging or rust affecting oil tightness are found.
	• Y-packing groove	Repair or replace the side cover if any flaws, gouging or rust affecting oil tightness are found.
	• O-ring groove	Repair or replace the side cover if any flaws, gouging or rust affecting oil tightness are found.
Plug and seal assembly	• Thrust bearing side race contact surface	Repair or replace the plug and seal assembly if any flaws, rust or gouging affecting uniform tightening are found.
	• Y-packing press fitted section	Replace the plug and seal assembly if any flaws, rust or gouging affecting oil tightness are found.
	• O-ring contact surface	Replace the plug and assembly if any flaws, rust or gouging affecting oil tightness are found.
Bearings		Check that the bearing rotates smoothly. Replace the bearing if rotation is stiff or uneven.

POWER STEERING BOOSTER UNIT

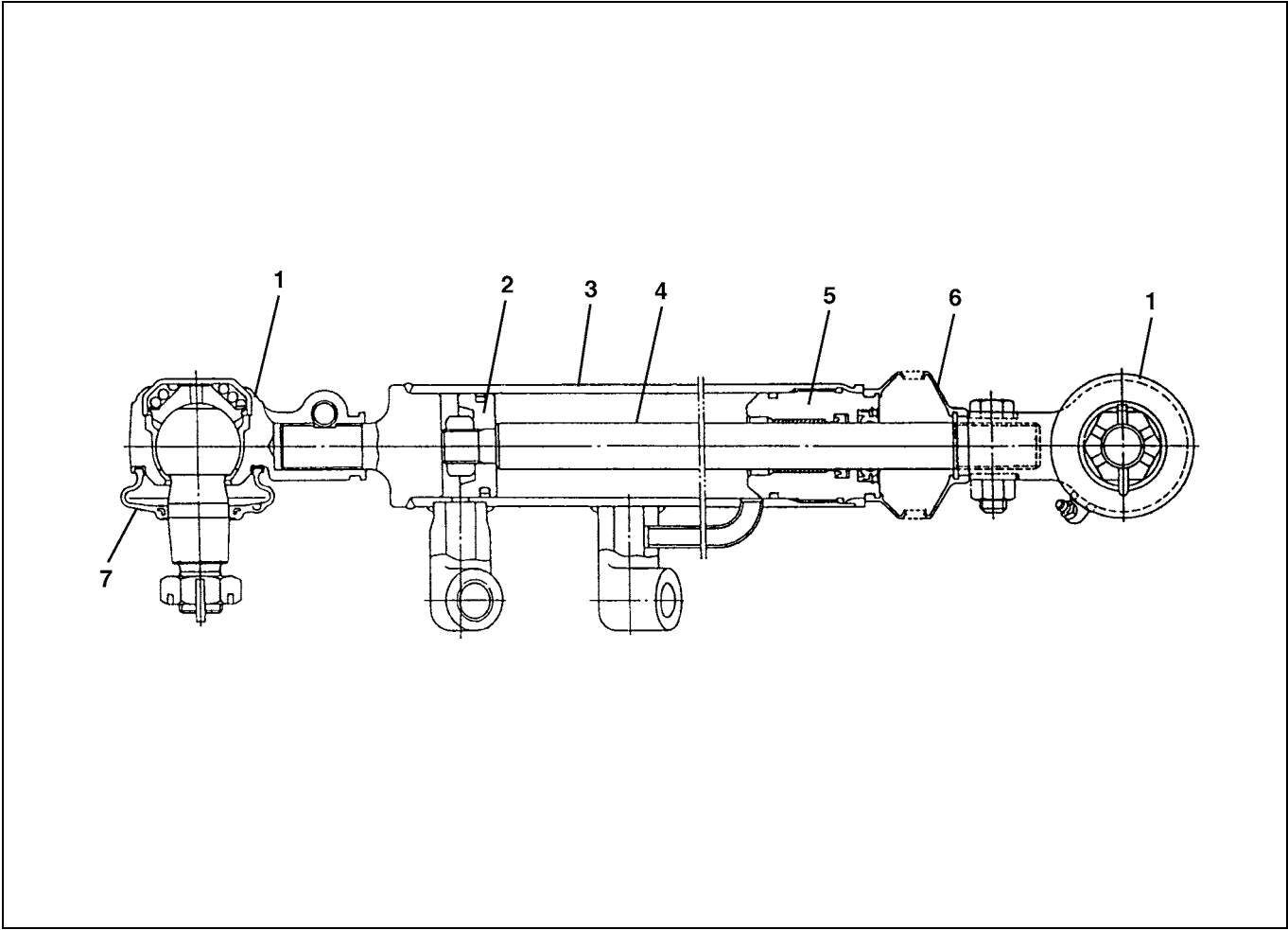
DATA AND SPECIFICATIONS

EN07Z0703I200002

Bore	50 mm {1.968 in.}
Stroke	280 mm {11.024 in.}
Piston rod diameter	22 mm {0.866 in.}

DESCRIPTION

EN07Z0703C100003



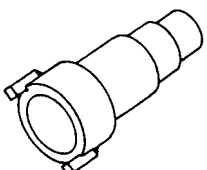
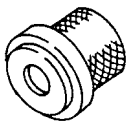
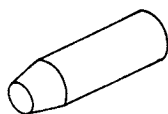
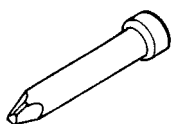
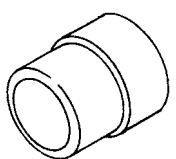
SHTS07Z070300082

1	Ball joint socket	5	Guide assembly
2	Piston	6	Boot
3	Cylinder	7	Dust seal
4	Rod		

SPECIAL TOOL

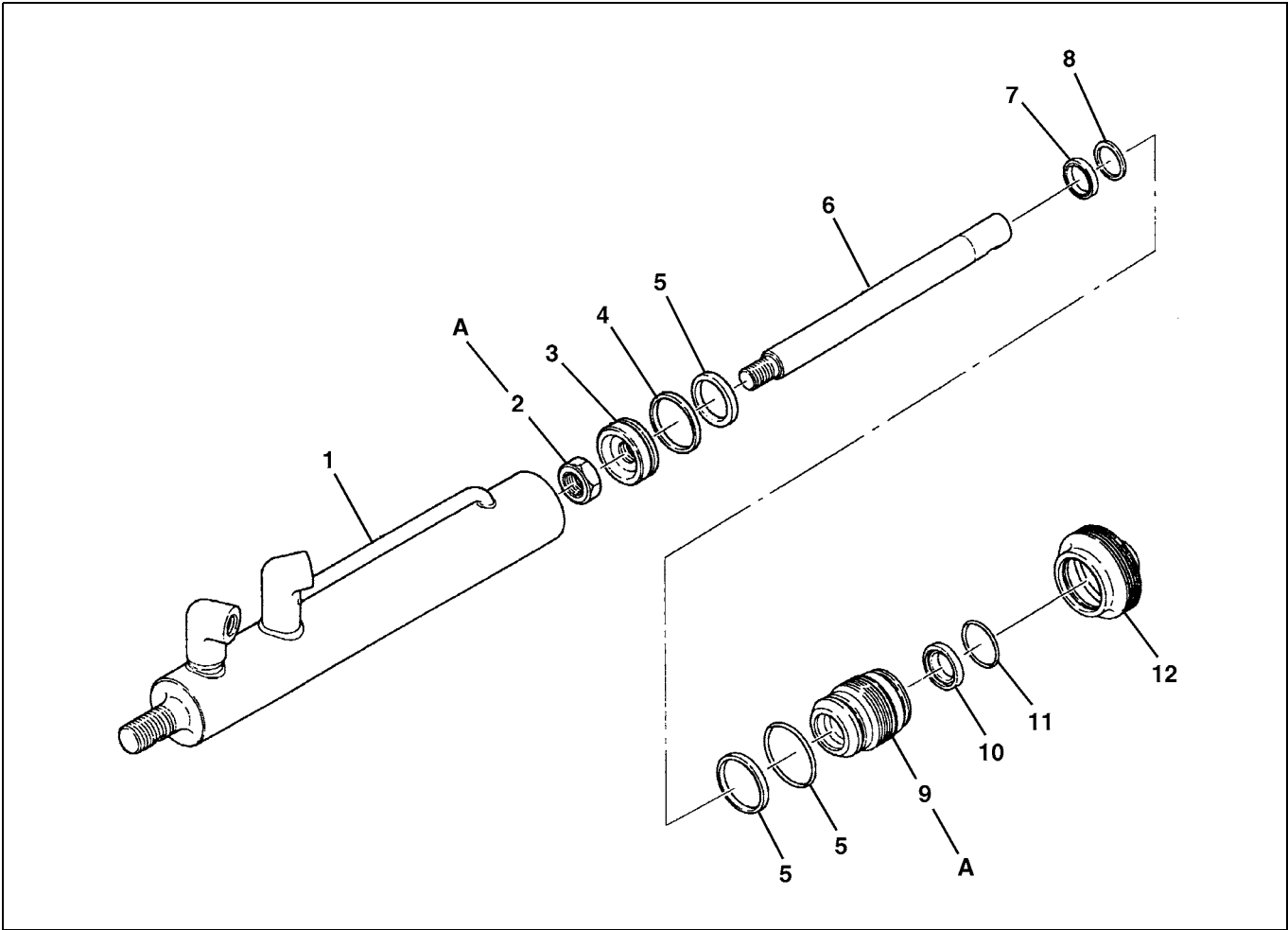
EN07Z0703K100002

Prior to starting a power steering booster unit overhaul, it is necessary to have these special tools.

Illustration	Part number	Tool name	Remarks
	09603-1540	GUIDE REMOVER	
	09657-1780	DUST SEAL INSTALLING JIG	
	09657-1770	ROD CAP	
	09434-1120	ROD END STAKING JIG	
	09657-1760	PISTON INSTALLING JIG	

COMPONENT LOCATOR

EN07Z0703D100002



SHTS07Z070300088

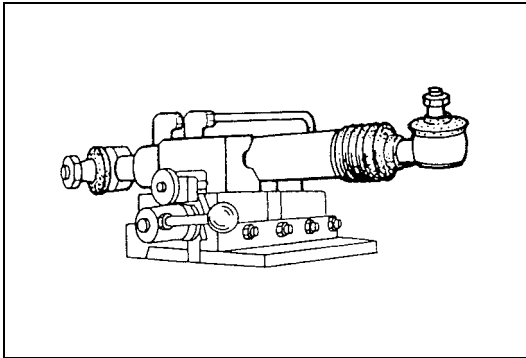
1	Cylinder	7	Dust seal
2	Nut	8	Back up ring
3	Piston	9	Guide assembly
4	Slipper seal	10	Dust seal
5	O-ring	11	Ring retainer
6	Rod		

Tightening torque		Unit: N·m {kgf·cm, lbf·ft}	
A	98 {1,000, 72}		

OVERHAUL

EN07Z0703H200003

IMPORTANT POINTS - DISASSEMBLY

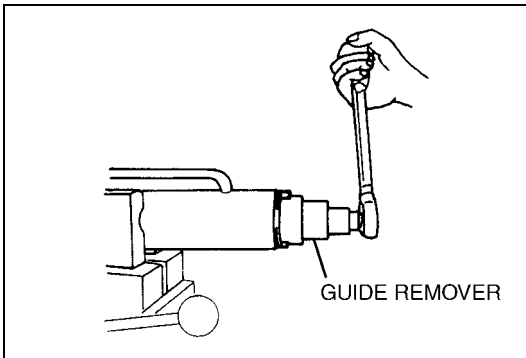


SHTS07Z070300089

1. INSTALL THE POWER CYLINDER IN VICE.

- (1) When disassembling the power cylinder, hold in a vice using wood block to prevent damage.

2. REMOVE THE BALL JOINT SOCKET.



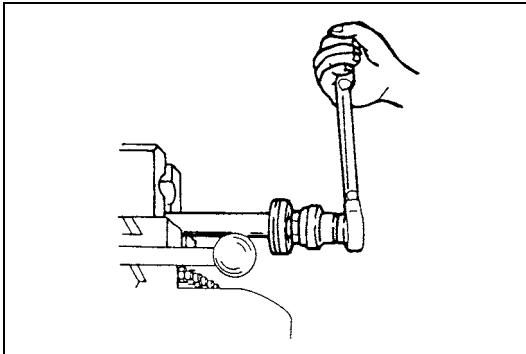
SHTS07Z070300090

3. LOOSEN THE GUIDE ASSEMBLY.

- (1) Raise staked portion of the guide and using the special tool, loosen the guide assembly.

Do not remove the guide assembly from the rod side but remove integral with the rod from the cylinder.

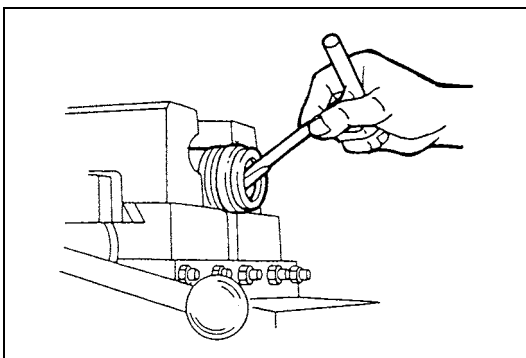
SST: Guide Remover (09603-1540A)



SHTS07Z070300091

4. REMOVE THE PISTON.

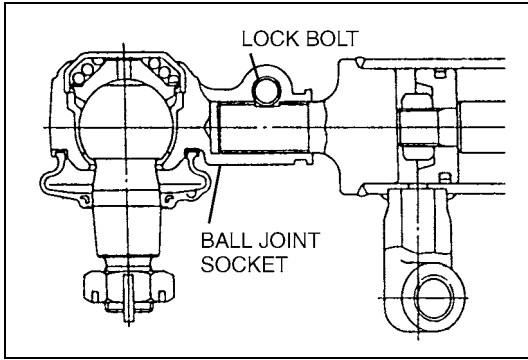
- (1) Loosen the nut and remove the piston and guide assembly. Do not reuse the nut. Be sure to replace it with a new one. Correct the piston side threaded portion of the rod by dies.



SHTS07Z070300092

5. REMOVE THE RETAINER RING AND DUST SEAL.

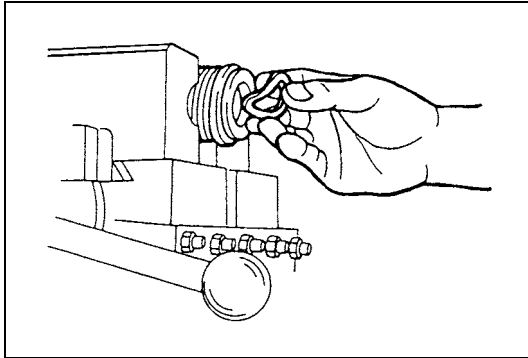
- (1) Remove the retainer ring, dust seal, etc. from the guide assembly, using care not to damage grooves and rod sliding surface.



SHTS07Z070300093

6. REMOVE THE BALL JOINT SOCKET.

- (1) Loosen the lock bolt of ball joint socket, then turn the ball joint socket to counterclockwise and remove it.

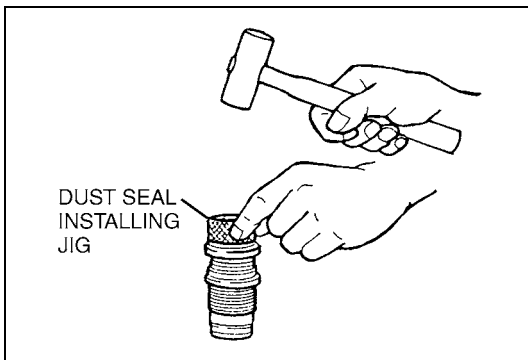


SHTS07Z070300094

IMPORTANT POINTS - ASSEMBLY

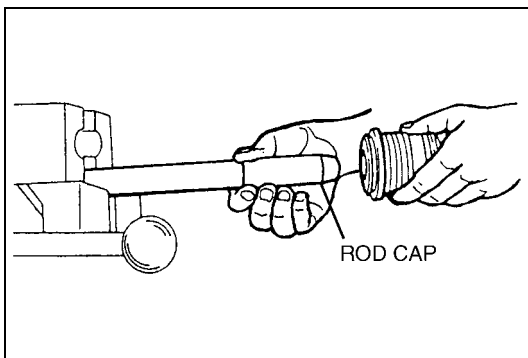
1. ASSEMBLE THE GUIDE ASSEMBLY.

- (1) Install the dust seal.
When inserting the dust seal, bend it to heart shape.



SHTS07Z070300095

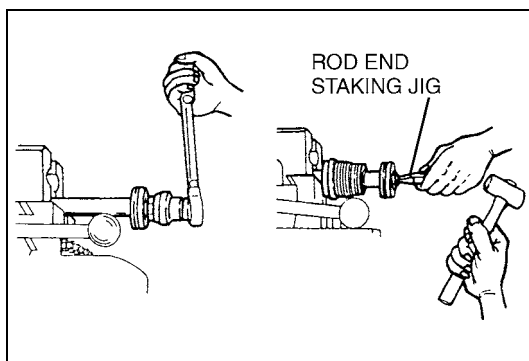
- (2) Install the dust seal.
Install the dust seal using the special tool.
SST: Dust Seal Installing Jig (09657-1780A)



SHTS07Z070300096

2. INSTALL THE GUIDE ASSEMBLY.

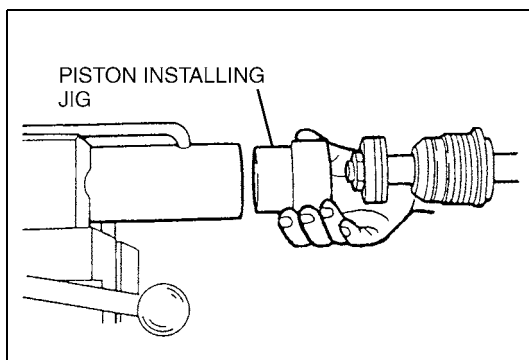
- (1) Using the special tool, at the piston rod end, insert the guide assembly.
SST: Rod Cap (09657-1770A)



SHTS07Z070300097

3. INSTALL THE PISTON.

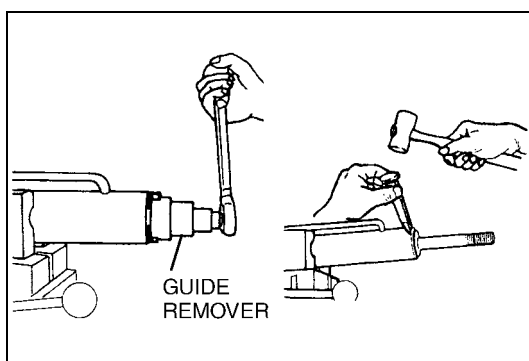
- (1) Install the piston, and then tighten the nut.
- (2) Staking the rod end (three places) using the special tool.

SST: Rod End Staking Jig (09434-1120A)

SHTS07Z070300098

4. INSTALL THE PISTON AND ROD.

- (1) Apply hydraulic oil to inside of cylinder.
- (2) Install the piston and rod using the special tool.

SST: Piston Installing Jig (09657-1760A)

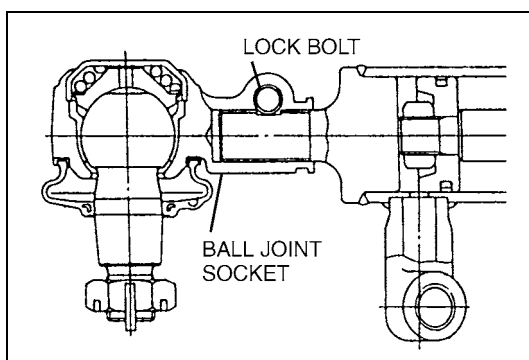
SHTS07Z070300099

5. STAKING THE GUIDE ASSEMBLY.

- (1) Tighten the guide assembly using the special tool.

SST: Guide Remover (09603-1540A)

- (2) Secure the guide assembly on the cylinder by staking the tube end on the outer circumference groove of the guide assembly.



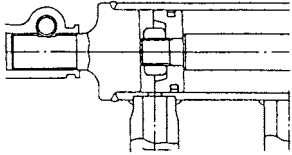
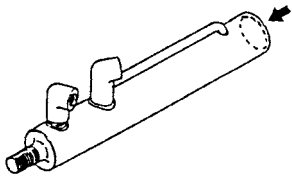
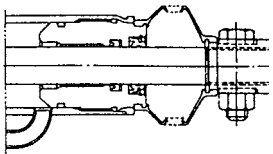
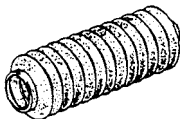
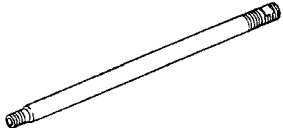
SHTS07Z070300100

6. INSTALL THE BALL JOINT SOCKET.

INSPECTION AND REPAIR

EN07Z0703H300004

Unit: mm {in.}

Inspection item	Standard	Limit	Remedy	Inspection procedure
Clearance between piston and cylinder	0.064 - 0.137 {0.0025-0.0054}	0.18 {0.0071}	Replace the piston and/or cylinder.	Measure 
Cylinder: Scratches on inner surface.	—	—	Replace, if necessary.	Visual check 
Clearance between rod and guide assembly	0.024-0.112 {0.0009-0.0044}	0.12 {0.0047}	Replace the rod and/or guide.	Measure 
Rod: Bent and/or damaged.	—	—	Replace, if necessary.	Visual check 
Boots: Damaged.	—	—	Replace, if necessary.	Visual check 

POWER STEERING PUMP

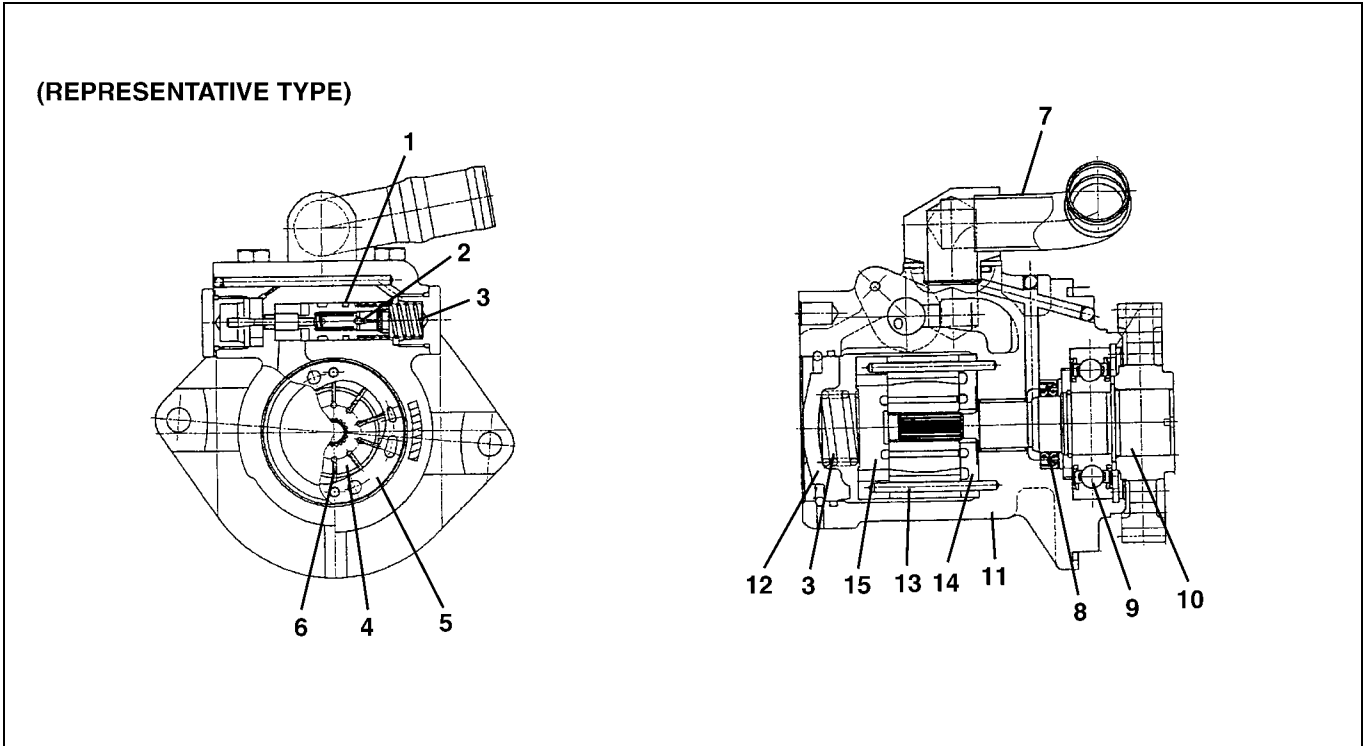
DATA AND SPECIFICATIONS

EN07Z0703I200003

Type		Vane type
Speed range		707-5,200 r/min
Relief pressure		14.0-14.7 MPa {143-150 kgf/cm ² , 2,030-2,132 lbf/in. ² }
Flow rate	Front single axle model	18.5-21.5 L/min. {4.89-5.67 U.S.gal, 4.07-4.72 Imp.gal} at 2,000 r/min.
	Front tandem axle model	26-29 L/min. {6.87-7.66 U.S.gal, 5.72-6.38 Imp.gal} at 2,000 r/min.

DESCRIPTION

EN07Z0703C100004

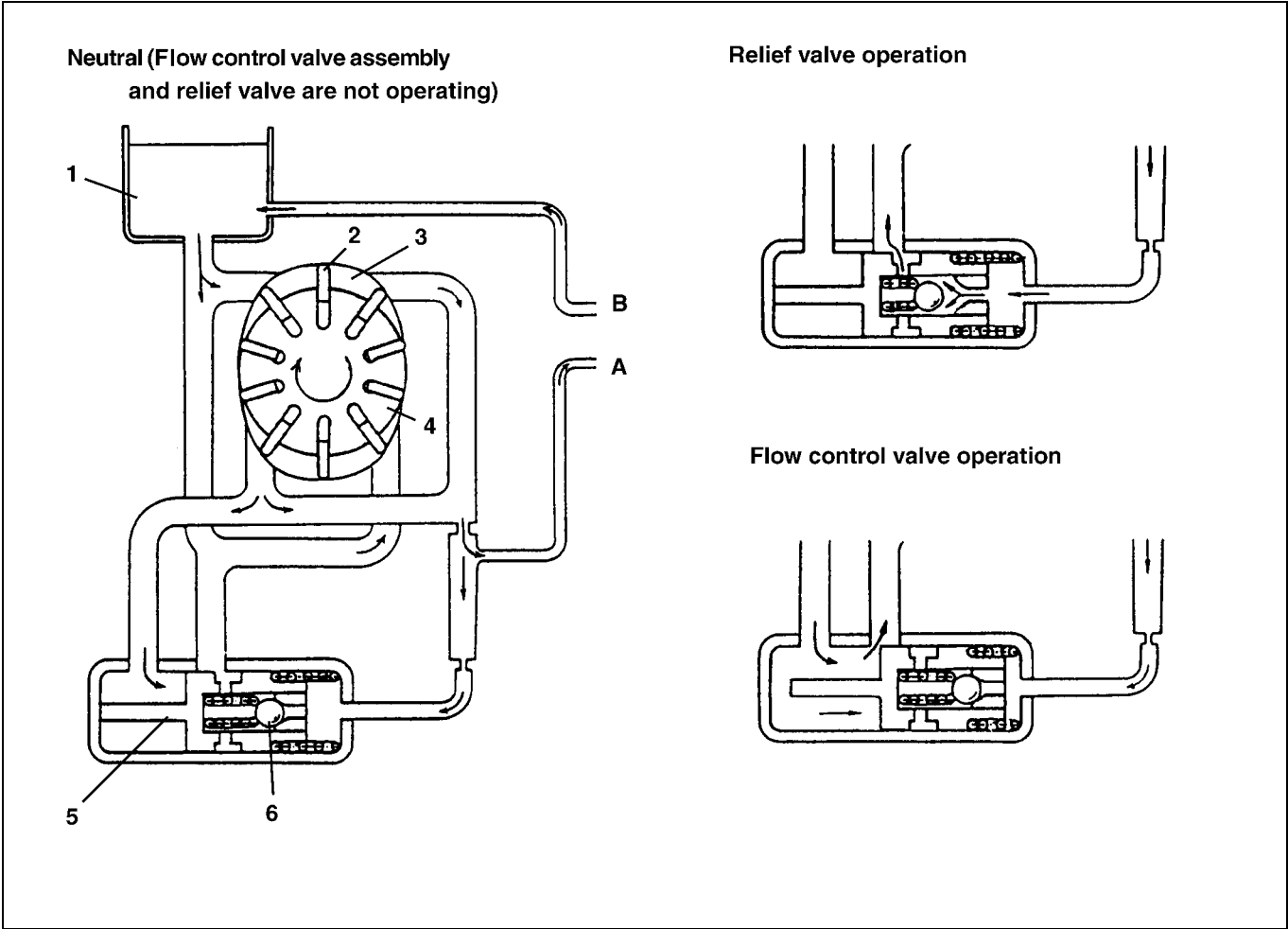


SHTS07Z070300106

1	Flow control valve assembly	9	Ball bearing
2	Relief valve	10	Pump shaft
3	Spring	11	Pump body
4	Rotor	12	Pump cover
5	Cam ring	13	Dowel
6	Vane	14	Front plate
7	Suction connector	15	Rear plate
8	Oil seal		

OPERATION

EN07Z0703C100005

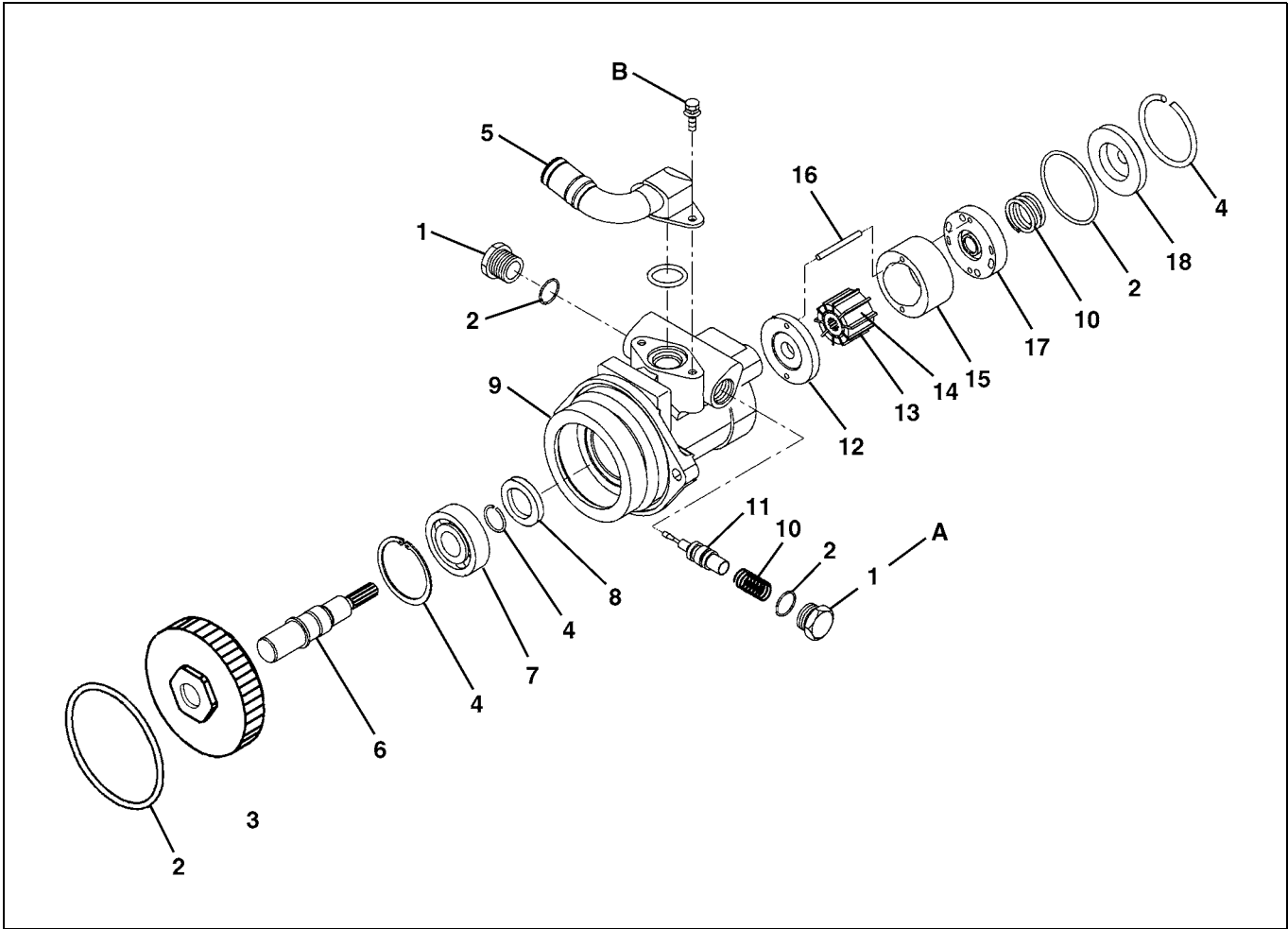


SHTS07Z070300107

1	Reservoir	5	Flow control valve assembly
2	Vane	6	Relief valve
3	Cam ring	A	To power steering gear unit
4	Rotor	B	From power steering gear unit

COMPONENT LOCATOR

EN07Z0703D100003



SHTS07Z070300108

1	Plug	7	Bearing	13	Vane
2	O-ring	8	Oil seal	14	Rotor
3	Drive gear	9	Pump body	15	Cam ring
4	Retainer ring	10	Spring	16	Dowel
5	Suction connector	11	Flow control valve	17	Rear plate
6	Pump shaft	12	Front plate	18	Pump cover

Tightening torque		Unit: N·m {kgf·cm, lbf·ft}	
A	108-127 {1,100-1,295, 80-93}	B	29-39 {295-397, 22-28}

OVERHAUL

EN07Z0703H200004

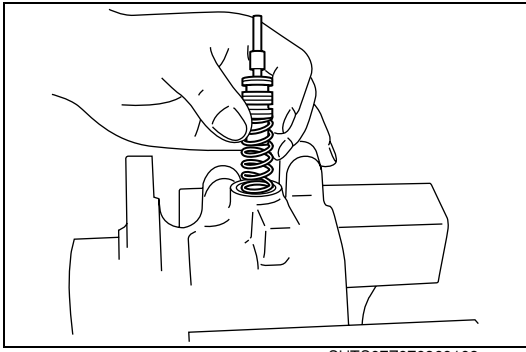
IMPORTANT POINTS - DISASSEMBLY

1. REMOVE THE FLOW CONTROL VALVE ASSEMBLY.

- (1) Remove the plug, spring and flow control valve assembly.

NOTICE

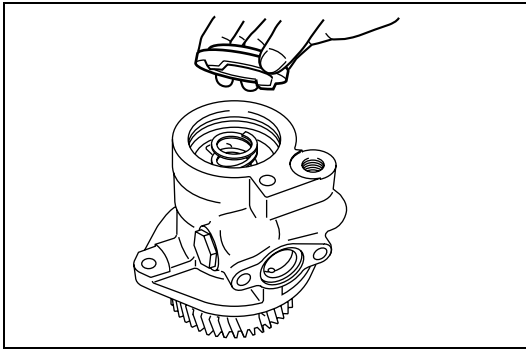
Be careful not to drop, scratch or nick the flow control valve assembly.



SHTS07Z070300109

2. REMOVE THE BODY COVER.

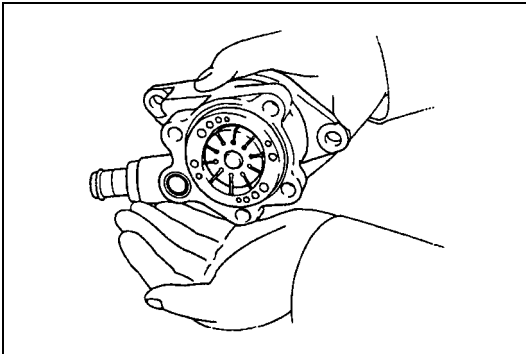
- (1) Remove the retainer ring.
- (2) Remove the body cover and spring.



SHTS07Z070300110

3. REMOVE THE VANE PUMP CORE.

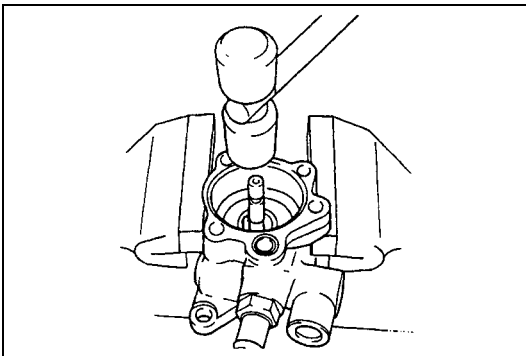
- (1) As shown in the figure, face the vane pump core side downward and remove the rear plate and vane pump core. The vane pump core consists of the cam ring, rotor and vane. Since dimensional checks of these parts have been completed, handle the vane pump core carefully. Remove the front plate.



SHTS07Z070300111

4. REMOVE THE PUMP SHAFT ASSEMBLY.

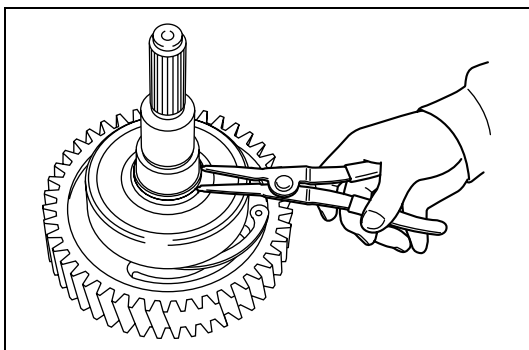
- (1) Remove the retainer ring from the pump body, and push and remove the spline edge surface of the pump shaft by hand or by using a plastic hammer. Be careful not to damage the oil seal lip. This process completes disassembly. Carry out inspection.



SHTS07Z070300112

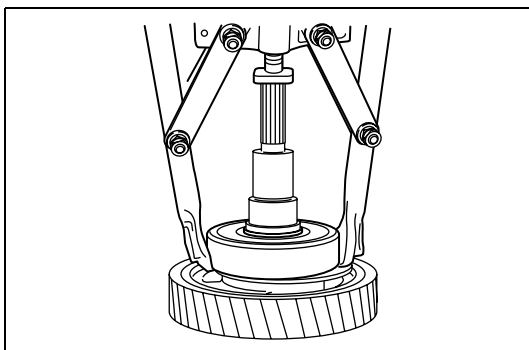
REPLACEMENT**1. REPLACE THE BALL BEARING, IF NECESSARY.**

- (1) Use a pair of snap ring pliers to remove the retainer ring.



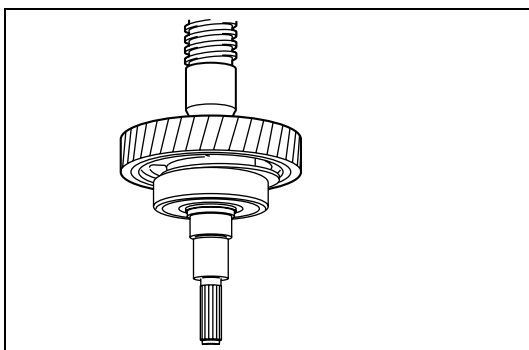
SHTS07Z070300113

- (2) Use a press, press out the ball bearing.



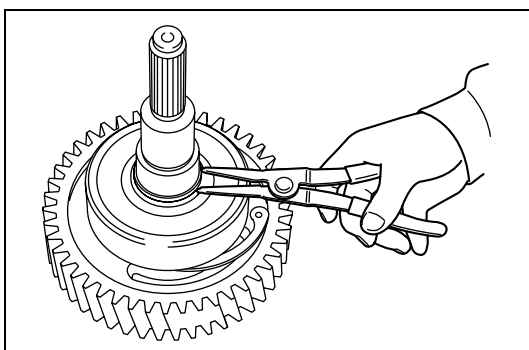
SHTS07Z070300114

- (3) Use a press to press in the ball bearing.



SHTS07Z070300115

- (4) Use snap ring pliers to install the retainer ring.



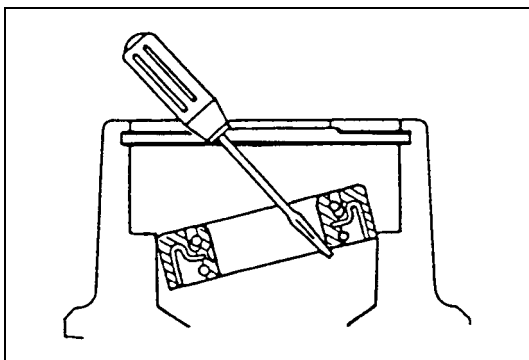
SHTS07Z070300116

2. REPLACE THE OIL SEAL, IF NECESSARY.

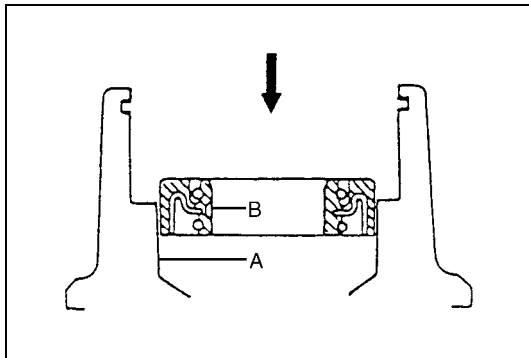
- (1) Use a screw driver to remove the oil seal.

NOTICE

Do not scrape or damage the inside of pump body.



SHTS07Z070300117



SHTS07Z070300118

- (2) Insert the oil seal as shown in the figure.

NOTICE

To prevent oil leakage from oil seal due to lip wear, apply lithium base grease to A and B.

- (3) Using a press, press in the oil seal into the pump body.

IMPORTANT POINTS - ASSEMBLY**NOTICE**

- Before assembling, clean all the parts and lubricate them with fluid.
- When assembling the power steering pump, be sure to use new O-rings.

1. INSTALL THE FLOW CONTROL VALVE ASSEMBLY.

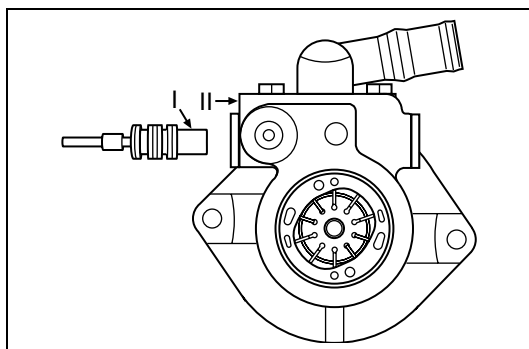
- (1) Apply fluid to the valve and check to see that it falls smoothly into the valve hole by its own weight.
If a problem is detected, replace the flow control valve assembly.

NOTICE

- There are three different valve diameters, therefore be careful that the mark on both valve and the pump body are always matched.
- Rank indication of flow control valve is not found on the valve built-in the power steering pump assembly. On flow control valve of spare parts, the rank is indicated.
- On the body of "A"rank, the rank is not indicated.

I: Letter on the valve, II : Letter of the body

March mark	I	A	B	C
	II	—	B	C

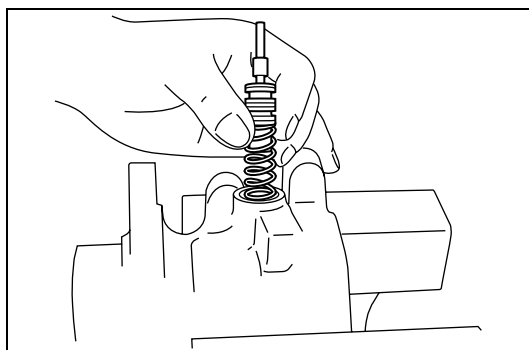


SHTS07Z070300119

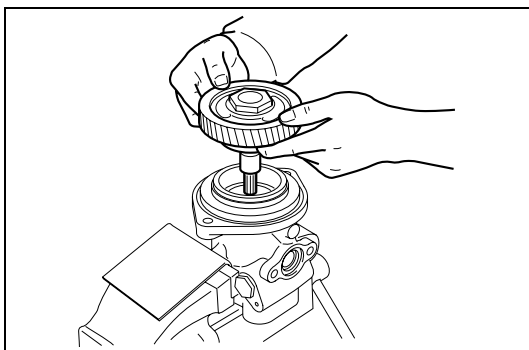
- (2) Install the spring and the flow control valve assembly, and tighten the plug.

NOTICE

Apply lithium base grease to an O-ring.



SHTS07Z070300120



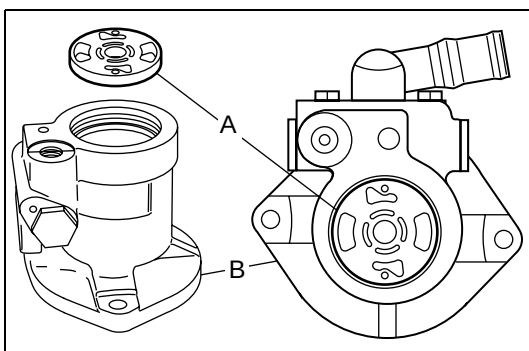
SHTS07Z070300121

2. INSTALL THE PUMP SHAFT.

- (1) Using a press, press in the pump shaft with bearing into the pump body.
- (2) Install the retainer ring.

NOTICE

When installing the retainer ring, face the chamfer side toward ball bearing.



SHTS07Z070300122

3. INSTALL THE FRONT PLATE.

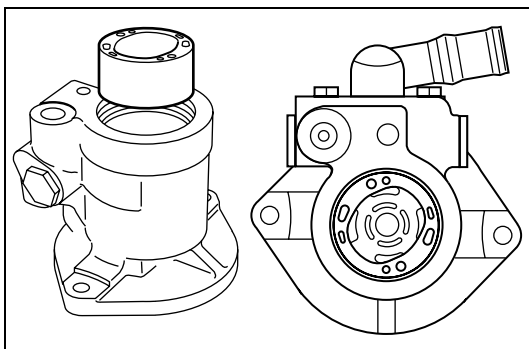
- (1) As shown in the figure, insert the front plate into the pump body and the dowel into the standard hole and the long one of front plate

A: Front plate

B: Pump body

NOTICE

When inserting the front plate, the face with a stamped "RR" indication should be turned to the rear side and also the long hole be faced against the suction pipe side for the installation.



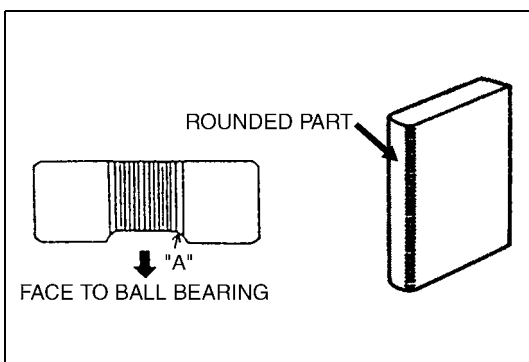
SHTS07Z070300123

4. INSTALL THE CAM RING.

- (1) Insert the cam ring into the pump body through the standard hole and elliptic one with the dowel, as shown in the figure.

NOTICE

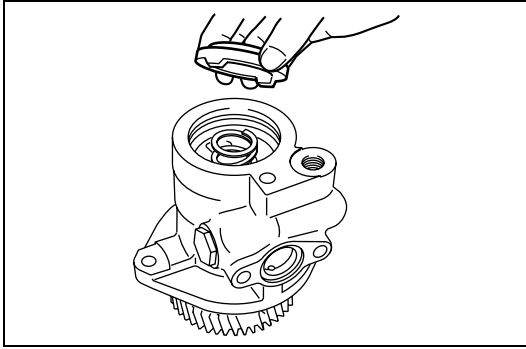
At this moment, the stamped side should be faced against ball bearing side and also the long hole turned against suction pipe side.



SHTS07Z070300124

5. INSTALL THE ROTOR AND VANE.

- (1) Insert the rotor with the cut spline "A" side facing toward the ball bearing.
- (2) Insert the vanes with the rounded part facing outward.



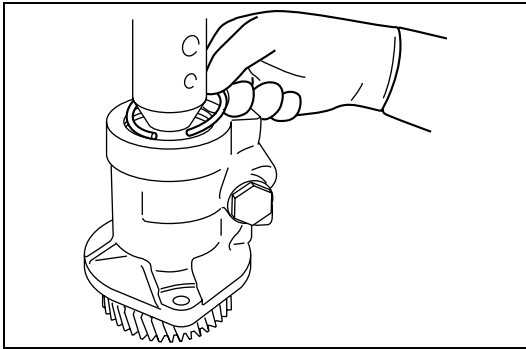
6. INSTALL THE REAR PLATE, SPRING, O-RING AND PUMP COVER.

- (1) Put the rear plate on the cam ring through the standard hole and elliptic one with the dowel.

NOTICE

At this moment, the stamped side should be faced against ball bearing side and also the long hole turned against suction pipe side.

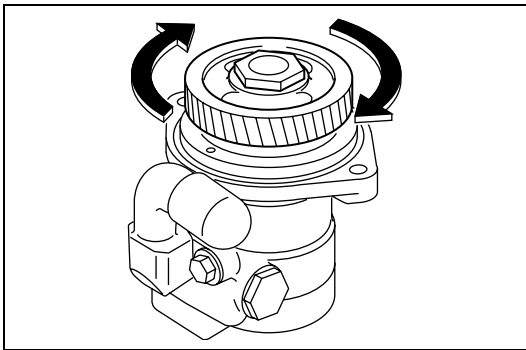
- (2) Put the spring on the rear plate and insert the O-ring into the groove of the pump body.



- (3) Using a press, press in the pump cover and then install the retainer ring securely.

NOTICE

- Be careful to see that the O-ring is not pinched by the rear cover.
- With the pump cover pressed in completely fit the retainer ring to pump body.

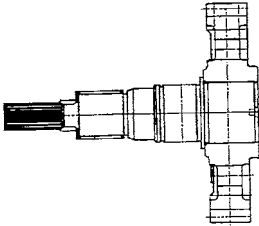
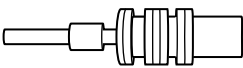
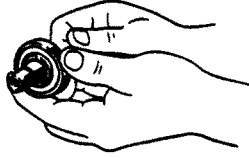
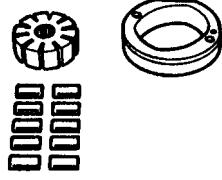
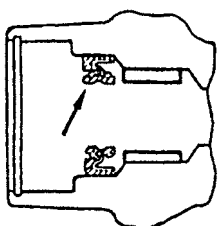
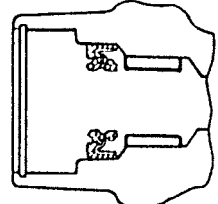


7. INSPECT PUMP SHAFT ROTATING CONDITION.

- (1) Check to see that the pump shaft rotates smoothly without abnormal noise.

INSPECTION AND REPAIR

EN07Z0703H300005

Inspection item	Standard	Limit	Remedy	Inspection procedure
Shaft: Damage	—	—	Replace, if necessary.	Visual check 
Side plate: Abrasion and flaw	—	—	Replace, if necessary.	Visual check 
Flow control valve assembly: Wear and damage	—	—	Replace, if necessary.	Visual check 
Ball bearing: Scratched and damage	—	—	Replace, if necessary.	Visual check 
Cam ring inner surface: Rotor surface: Vane surface: Wear, scratches and scoring	—	—	Replace, if necessary.	Visual check 
Oil seal: Wear and damage	—	—	Replace, if necessary.	Visual check 
Bushing: Scratched and damage	—	—	Replace the pump body, if necessary.	Visual check 

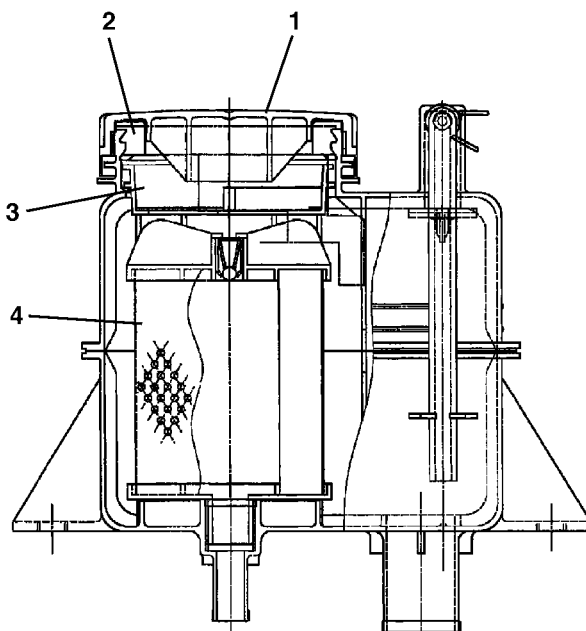
OIL RESERVOIR

DESCRIPTION

EN07Z0703C100006

EXCEPT FY LEFT-HAND DRIVE MODEL

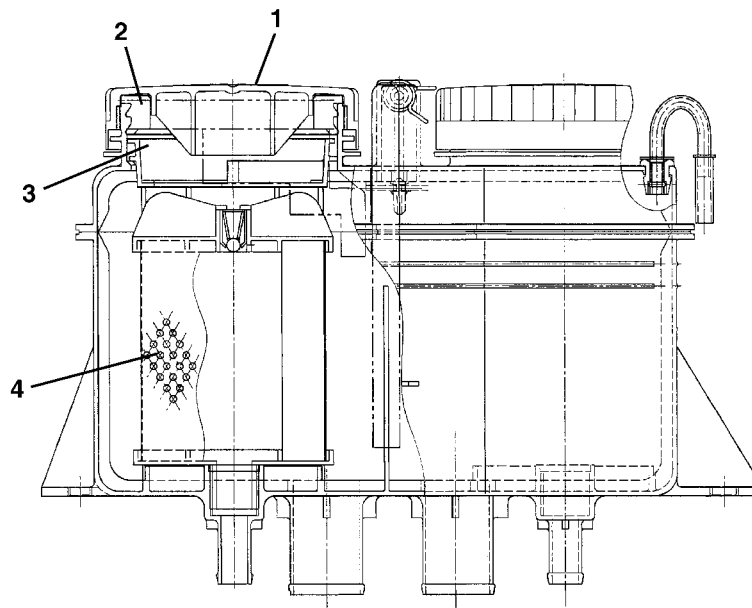
(REPRESENTATIVE TYPE)



SHTS07Z070300135

- | | |
|---|-------------------|
| 1 | Oil reservoir cap |
| 2 | Oil seal |

- | | |
|---|--------------|
| 3 | Oil strainer |
| 4 | Oil filter |

EXCEPT FY LEFT-HAND DRIVE MODEL

SHTS07Z070300136

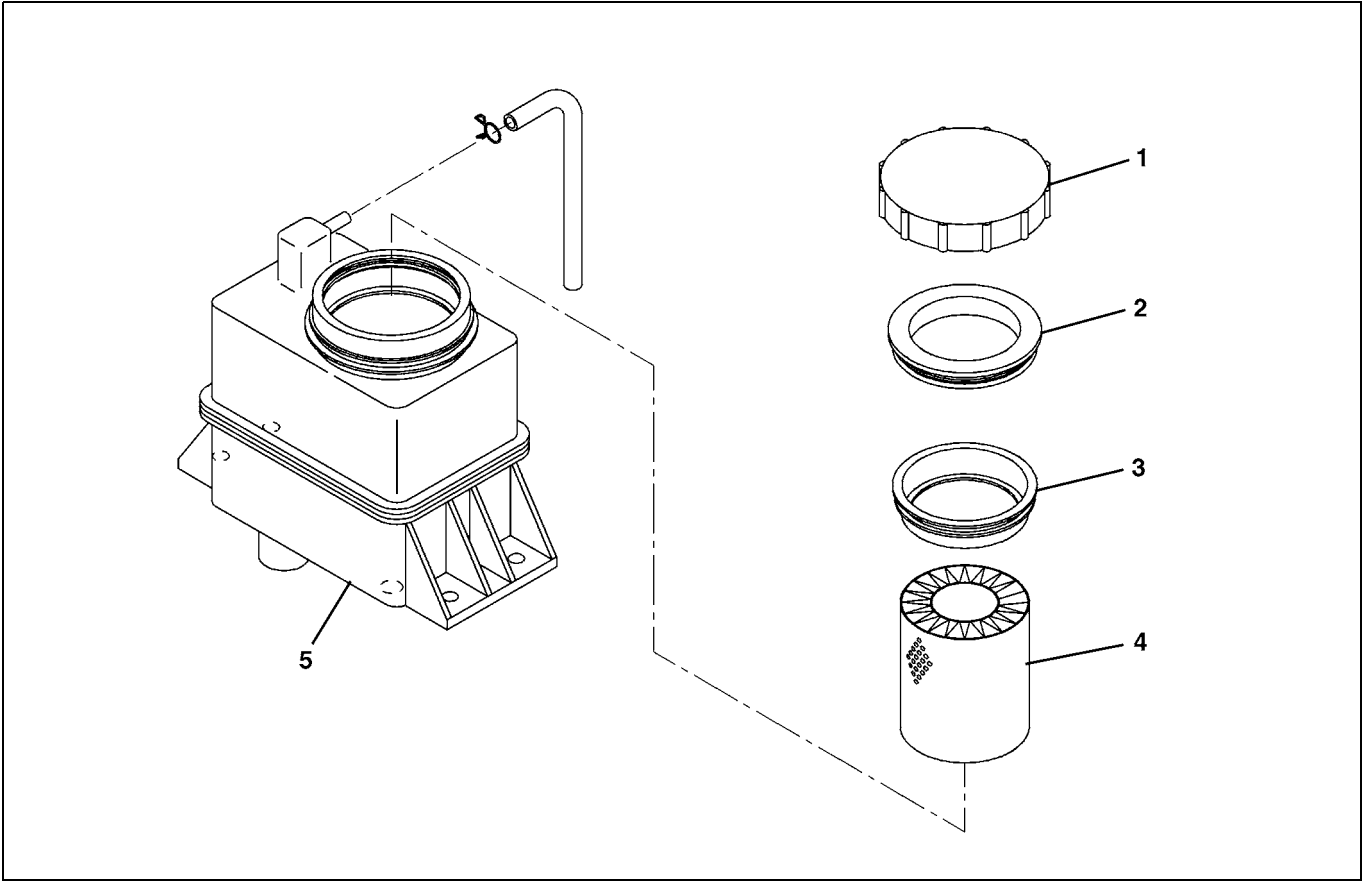
- | | |
|---|-------------------|
| 1 | Oil reservoir cap |
| 2 | Oil seal |

- | | |
|---|--------------|
| 3 | Oil strainer |
| 4 | Oil filter |

COMPONENT LOCATOR

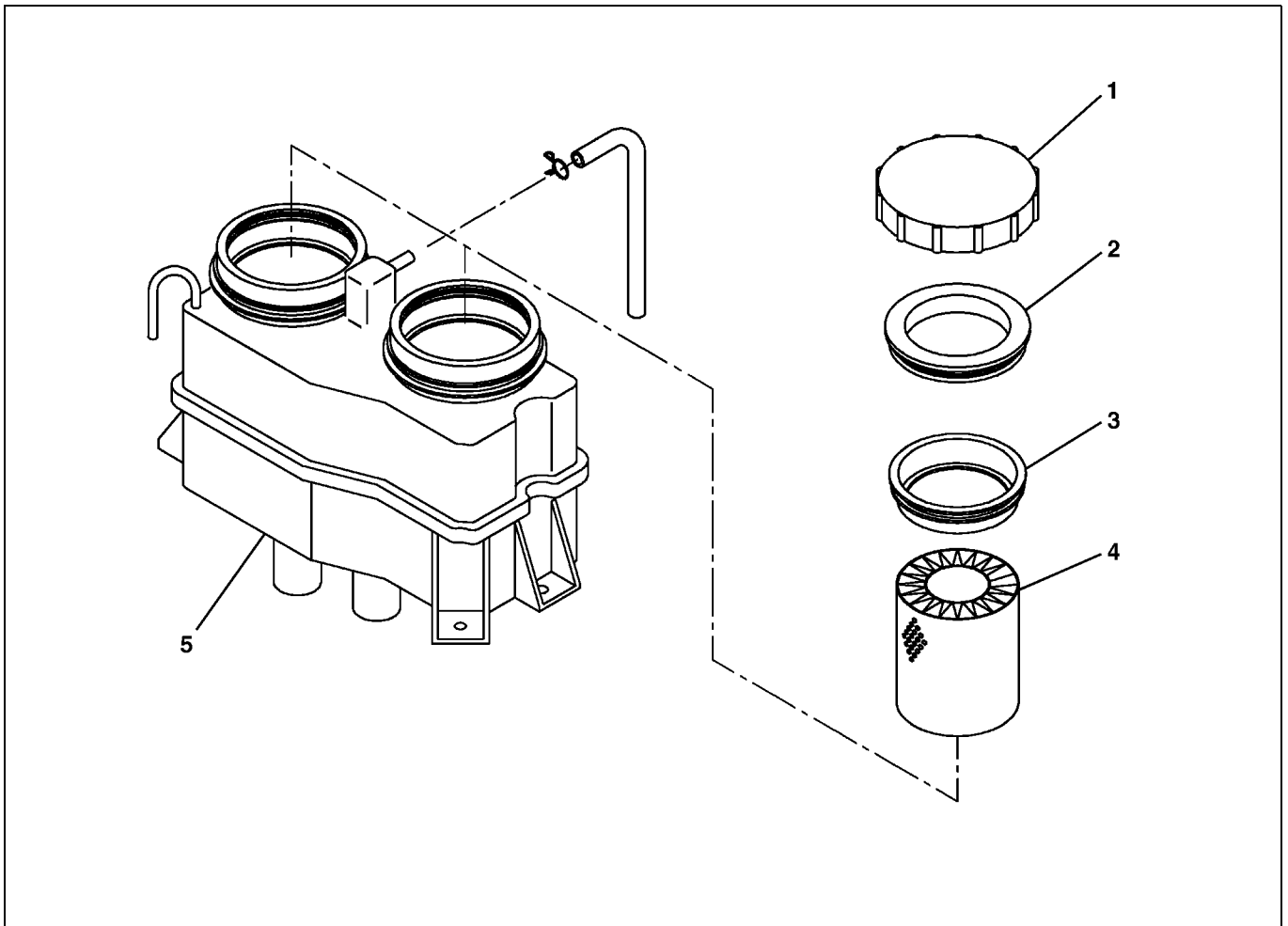
EN07Z0703D100004

EXCEPT FY LEFT-HAND DRIVE MODEL



SHTS07Z070300137

1	Oil reservoir cap	4	Oil filter
2	Oil seal	5	Oil reservoir
3	Oil strainer		

FOR FY LEFT-HAND DRIVE MODEL

SHTS07Z070300138

1	Oil reservoir cap	4	Oil filter
2	Oil seal	5	Oil reservoir
3	Oil strainer		

OVERHAUL

EN07Z0703H200005

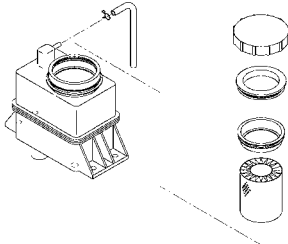
IMPORTANT POINT - ASSEMBLY

NOTICE

- Use only compressed air to clean the oil filter.
- The oil filter is made of synthetic resin, so never wash it with hot water, solvent or detergent.
- Before assembling, clean all the parts.

INSPECTION AND REPAIR

EN07Z0703H300006

Inspection item	Standard	Limit	Remedy	Inspection procedure
Oil strainer: Clogged and damage	—	—	Clean or replace, if necessary.	Visual check 
Oil reservoir: Damage	—	—	Replace, if necessary.	