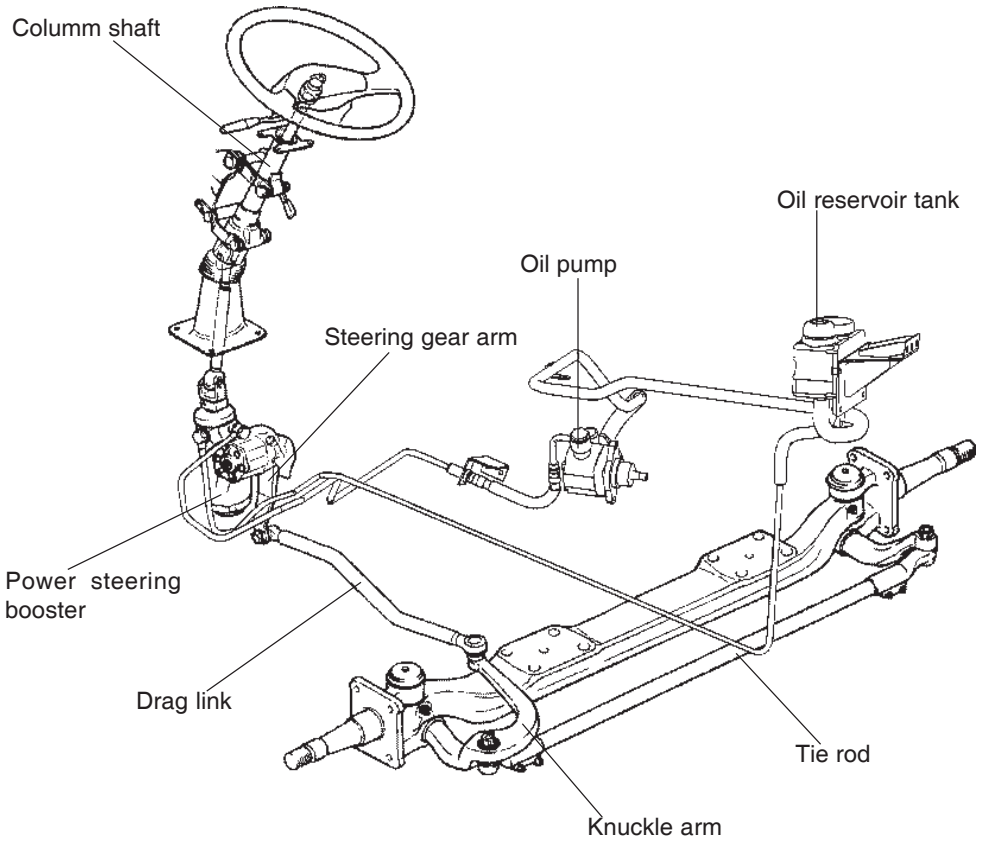
STEERING

GENERAL

The steering system allows the driver to freely change the traveling direction of the vehicle. The steering force of the steering wheel is transmitted through the steering shaft, power steering booster, pitman arm and drag link to the knuckle arm to steer the vehicle.
The system has an integral type power steering booster installed in the gear box to reduce the steering effort.
The power steering system hydraulic pressure circuits are as shown below.

Oil tank → Oil pump → Power steering booster
Piping

Integral power steering booster
The integral power steering booster to reduce the steering effort consists of the power cylinder section (output section) serving also as the steering gear and the control valve section (control section).

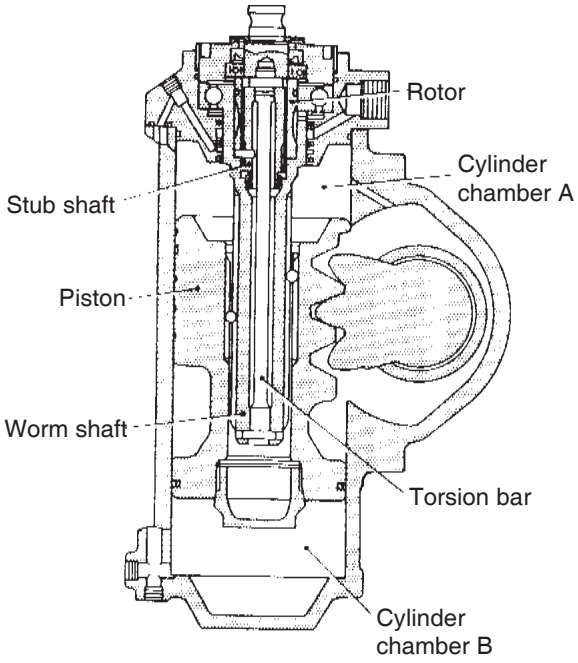


56AR0177

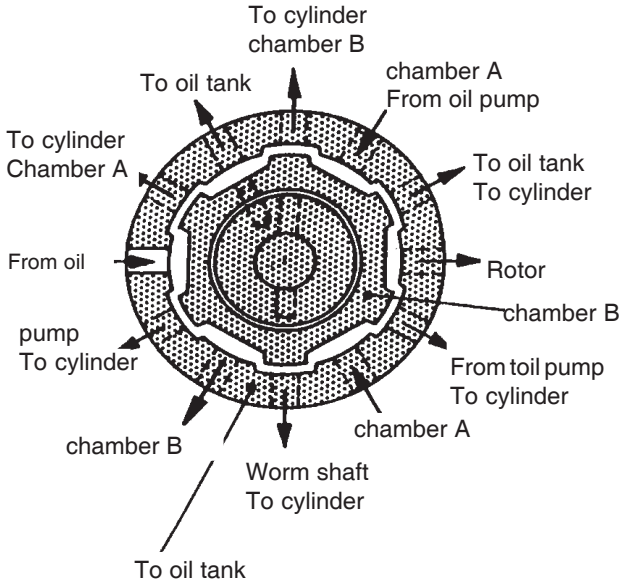
(1) When traveling straight ahead

Operation of integral power steering booster (when traveling straight ahead)

When there is no steering torque from the steering wheel, no relative displacement occurs between the stub shaft and worm shaft, so that the rotor remains in the neutral position of the worm shaft. Therefore, the hydraulic fluid delivered from the oil pump directly passes through the worm shaft groove to return to the oil tank. In other words, no operating pressure difference is produced between the cylinder chambers A and B and as a result, the piston remains in the neutral position and does not move.



56AR0149



56AR0150

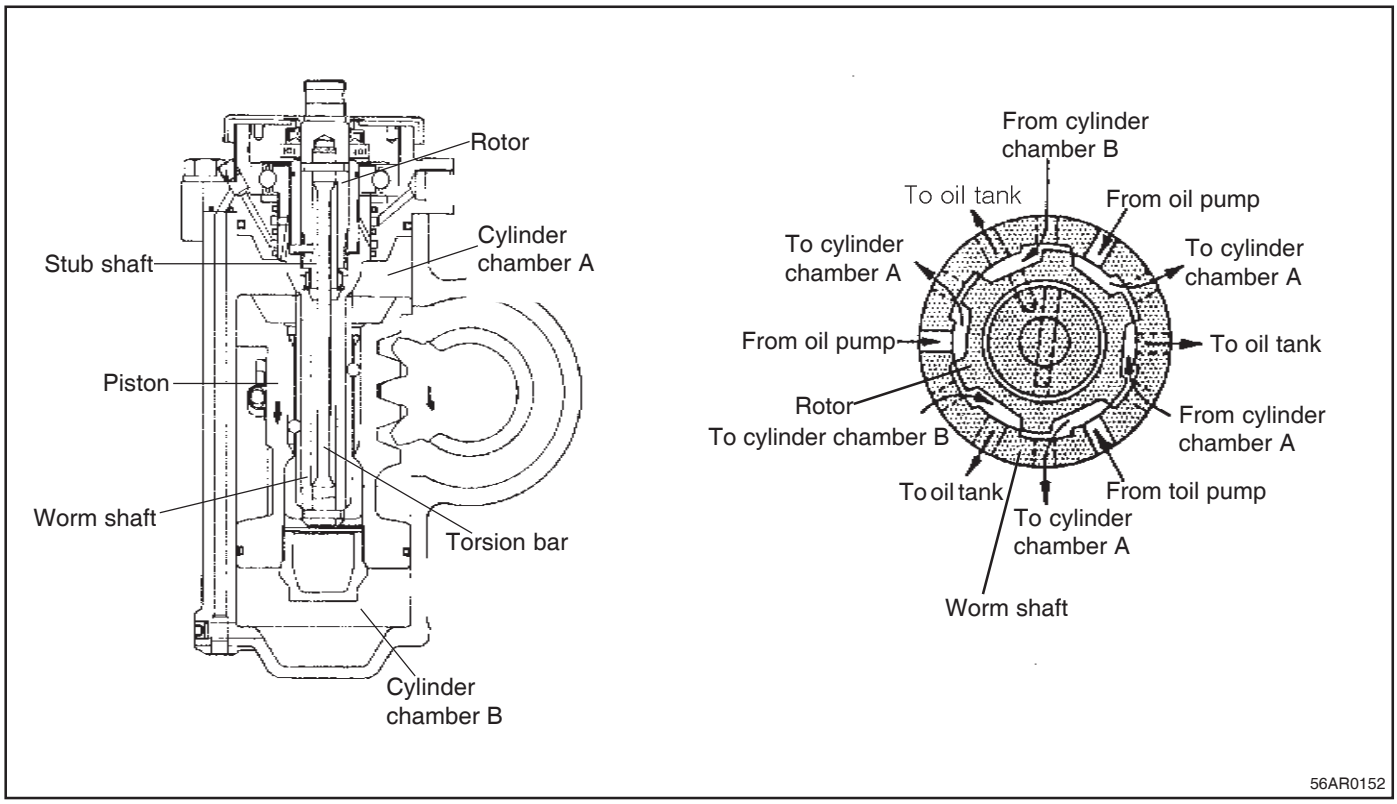
(2) Right turn

Operation of integral power steering booster
(when right turn is made)

When the steering wheel is turned clockwise, the load from the tires acts on the worm shaft to twist the torsion bar. As a result, the rotor turns clockwise with respect to the worm shaft, decreasing the axial direction groove clearance. This limits flow of the hydraulic oil to the oil tank and now the hydraulic oil from the oil pump enters the cylinder chamber A to cause the piston to move to the cylinder chamber B.

The hydraulic oil in the cylinder chamber moves, the torsion bar that has been twisted returns to the neutral position. The force that has caused twisting of the torsion bar during steering is transmitted to the steering wheel as a steering reaction force which gives the driver a sense of steering response.

A left turn is also made on the same operating principles as the right turn but in opposite direction.



(3) Manual steering

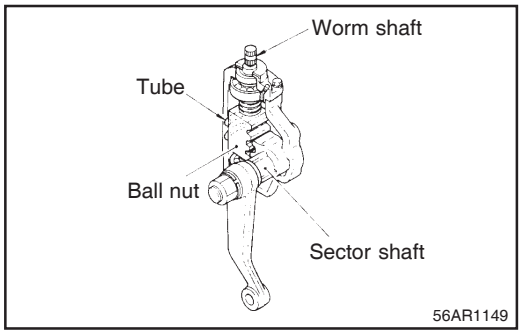
Even if the hydralic pressure ceases to act on the power steering booster due to a stalled engine, defective oil pump, oil leaks or other causes, the mechanical power is directly transmitted from the stub shaft to the worm shaft by the stopper mechanism provided between the stub shaft and worm, allowing manual steering.

Steering gear assembly (recirculating ball type)

In this steering gear assembly, many balls are interposed between the worm shaft screw and the ball nut to transmit the turning effort of the worm shaft through the ball nut to the sector shaft.

The ball nut is fitted with a pair of tubes. Each end of the tube is tongue-shaped and is connected to the end of ball passage to recirculate the balls.

Sliding friction is replaced by rolling friction by interposing the balls between the worm shaft and the ball nut, allowing the driver to operate the steering gear with a light steering effort.



SPECIFICATIONS

Item \ Vehicle model	HD120
Steering wheel	
Type	2-spoke type
Steering shaft	Universal joint type(Telescopic-Tilt type)
Power steering booster	
Type	Intergral type
Cylinder inner diameter	∅90
Piston operating area	63.6cm²
Regulsated pressure	105kg/cm²
Oil capacity	1ℓ
Power steering oil pump	
Type	Vane type
Delivery rate	15cc/rev.
Fluid flow rate	12ℓ /min.
Relief set pressure	105 kg/cm²
Allowable rpm range	500~6000 rpm
Power steering oil tank	
Type	Oil pump separating type
Capacity	1.4ℓ

SERVICE STANDARDS

SERVICE STANDARDS TABLE

Unit:mm

Maintenance item			Nominal Value (Basic diameterine)	Limit	Remedy
Steering wheel and shaft	Steering wheel play		20-40		Adjust
	Steering upper shaft	Play in axial direction (vertical)	0.2 or less		Correct or replace assembly
	Play of joint in turning direction (play of needle bearing and spider)		1.5' or less		Replace assembly
	Play of yoke spline tube and steering lower shaft (spline shaft) in turning direction		30' or less		Replace asembly
Steering linkage	Sleeve lever shaft and bushing to clearance (Brg type)		0.015 to 0.111	0.4 [38]	Replace
	Conecting link pin and bushing to clearance		0.045 to 0.175 [42]	0.4	Replace
Steering gear sector	Sector shaft O.D.	Pitman arm side	38	37.9	Replace
		Side cover side			
	Ball nut rack spline and sector shaft to clearance			0.2 to 0.5	
	Worn shaft starting torque kg·cm	After sector shaft installation	4 to 8		Lower cover Bending adjusting
		Before sector shaft installation	4 to 7		Adjust of Adjustment screw
Intergral power steering booster	Play of ball nut assembly in axial direction			0.04	Replace
	Body to ball nut clearance		0.11 [90]	0.16	Replace
	Rotor to worm shaft clearance		0.01 to 0.03 [35.5]	0.03 more than	Replace
	Sector shaft O.D.	Pitman arm side	57.975	57.875	Replace
		Side cover side	47.975	47.875	Replace
	Backlash between ball nut rack and sector shaft gear		0.1 to 0.35		Adjust
Power steering	Ridge wear on pressure plate and side plate surfaces in friction with rotor and vane			0.01	No sticking wear and streaks Replace

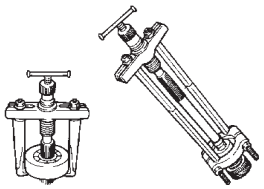
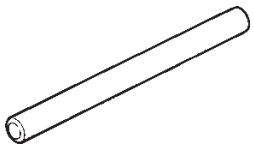
Unit:mm

Maintenance item		Nominal Value (Basic diameterine)	Limit	Remedy
Power steering	Flow control valve to rear body clearance		0.03	No sticking wear and streaks Replace as flow control valve assembly or rear body assembly
	Pump relief set pressure Mpa (kg/cm²) at 1,800 rpm	105		Replace as flow control valve assembly or rear body assembly

Tightening Torque Table

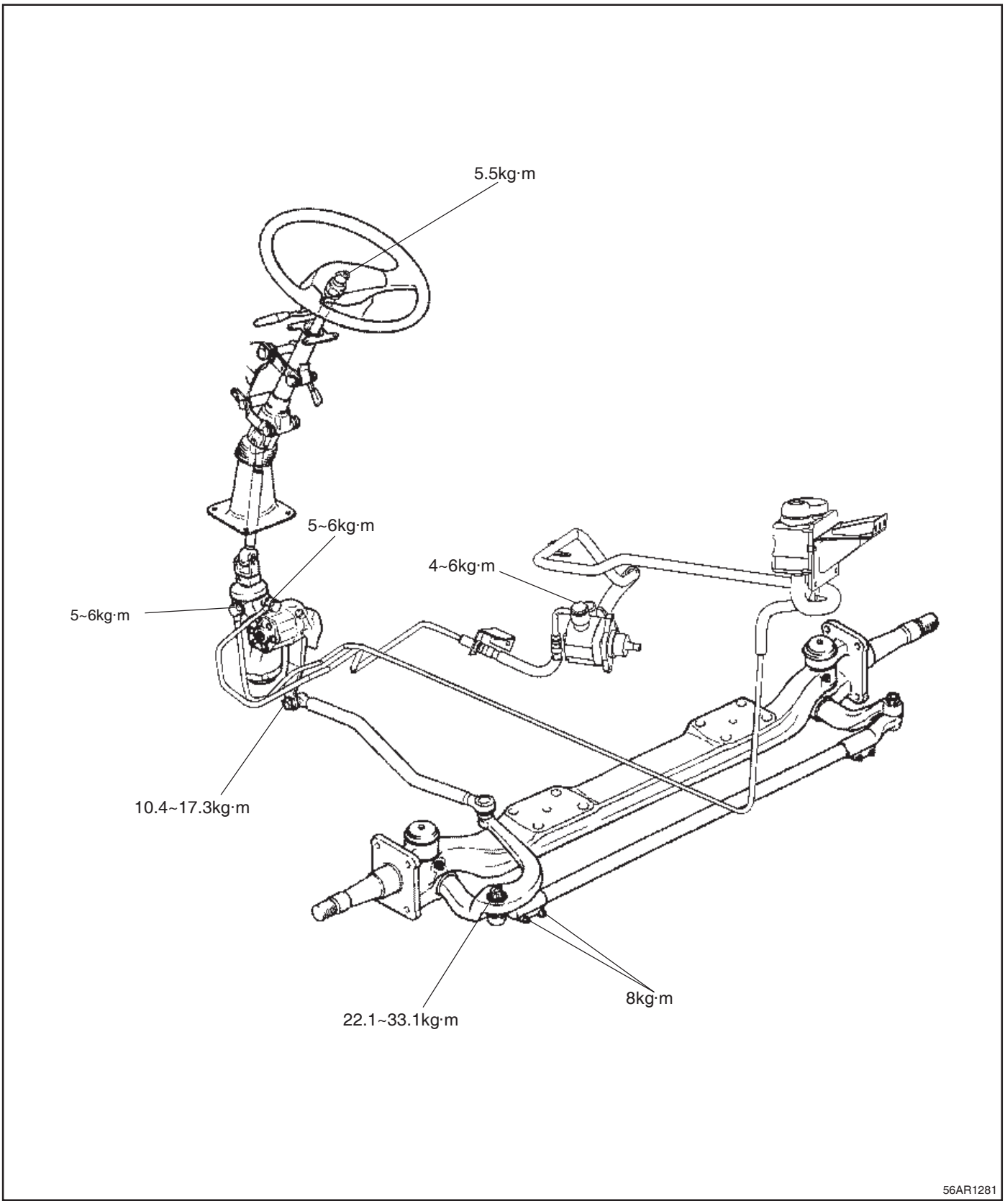
Location tightened		Screw size O.D. x pitch (mm)	Tightening torque (kg.m)
Steering shaft	Steering wheel nut	M20 x 1.5	5.5
	Worm shaft and yoke mounting bolt	M10 x 1.25	5 to 5.5
	Lock plate bolt	M5 x 0.8	0.4 to 6.0
	Grease nipple	M6 x 0.75	0.3 to 0.5
Link and bracket	Steering shaft	M12 x 1.25	3.7
	Lock lever bolt	M18 x 1.25	1
	Steering lever	M12 x 1.25	2
Linkage	Ball stud castle nut	M20 x 1.5	20.7 to 34.5
Intergral power steering booster	Pitman arm nut	M36 x 1.5	40 to 45
	Ball tube screw	M6 x 1.0	0.45 to 0.55
	Taper plug	PT 1/8	0.9 to 1.3
	Retainer	M32 x 1.5	Tighten fully, turn back by 180°, tighten again to 39 (4), then turn back by 20° and stake.
	Adjusting screw lock nut	M14 x 1.5	12 to 13
	Side cover bolt	M12 x 1.25	5.5 to 6.5
	Adjustingplug	M80 x 1.5	23 to 25
	Valve housing bolt	M16 x 1.5	12 to 13
	Lock ring	M80 x 1.5	Tighten lock ring with 12kg·m, and secure 2 points not to be removed.
	Plug	M48 x 1.5	30 to 40
Power steering oil pump	Cartridge assembly screw	-	0.6 to 0.9
	Rear body bolt		5 to 6
	Flow control valve plug		5 to 6
	Hose connector bolt		1.8 to 2.5
	Oil pump gear tighten nut		9
Power steering oil tank	Plate screw	M6 x 1.0	0.4 to 0.5

SPECIAL TOOLS

Tool (Number and name)	Illustration	Use
Puller set 09431-83100	 ASST0030	Removal of gear and bearing
Drift 09517-83300	 ASST0020	Removal of oil seal and bearing

SERVICE PROCEDURE

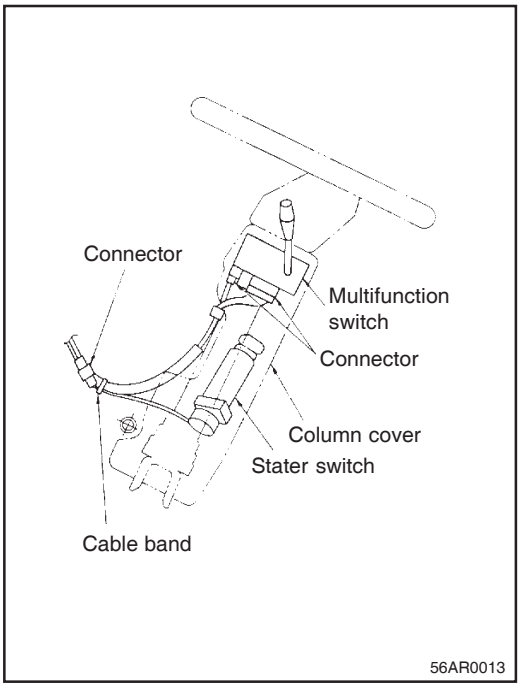
REMOVED AND INSTALLATION



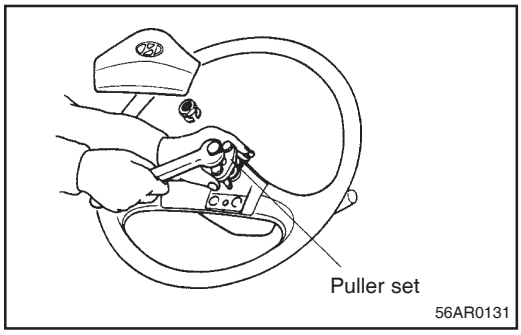
STEERING SHAFt

Removal

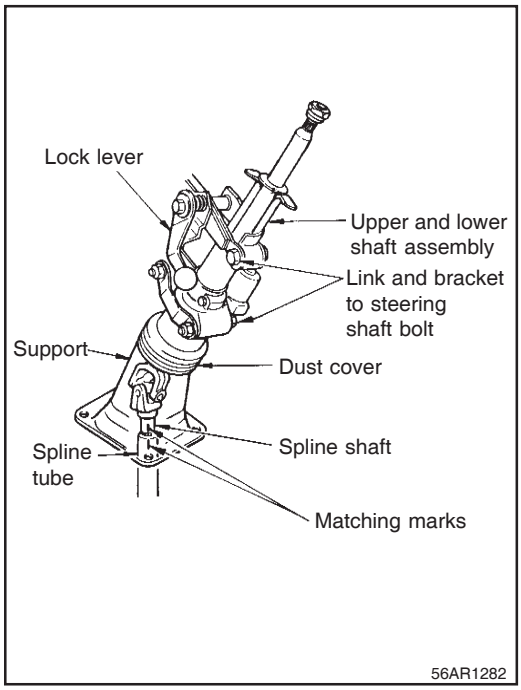
(1) Remove the negative terminal of the battery.
(2) Remove the column cover.
(3) Remove the cable band and remove all starter switch connectors.
(4) Remove the multifunction switch connector.
(5) Insert the key and turn to the ON position.
Remove the engine stop cable from the starter switch.



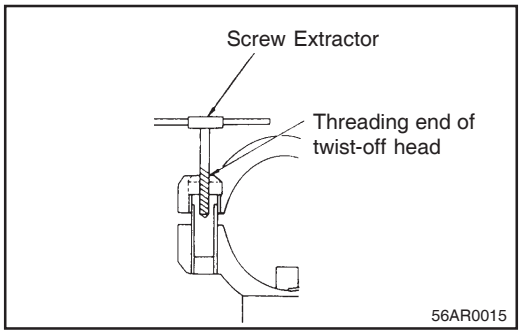
(6) Remove the steering wheel using the special tool, puller set.
(7) Remove the multifunction switch.



(8) Fix the steering using lock lever and put matching marks to the spline shaft and spline tube.
(9) Remove the dust cover from the column end and remove the support attaching bolts.
(10) Remove the link and bracket to steering shaft bolts.

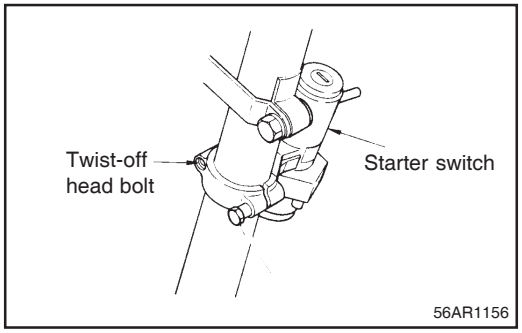


(11) Remove the steering upper shaft assembly and spline shaft assembly together with the starter switch.
(12) Hold the column end in a vise and drill a 5.5 to 6.0 mm diameter, 10 to 15 mm deep hole in the end of the twist-off head bolt from which the head has been removed.
(13) Turn the special tool, Screw Extractor, counterclockwise to thread it into the hole until the bolt is removed.
(14) Remove the starter switch from the steering column.

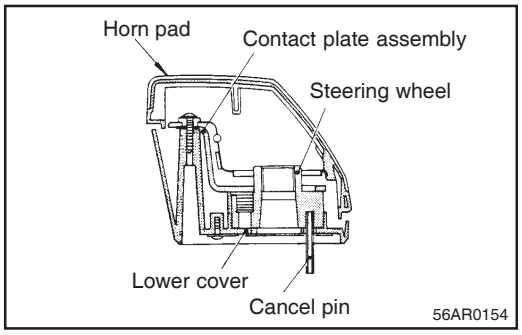


Installation

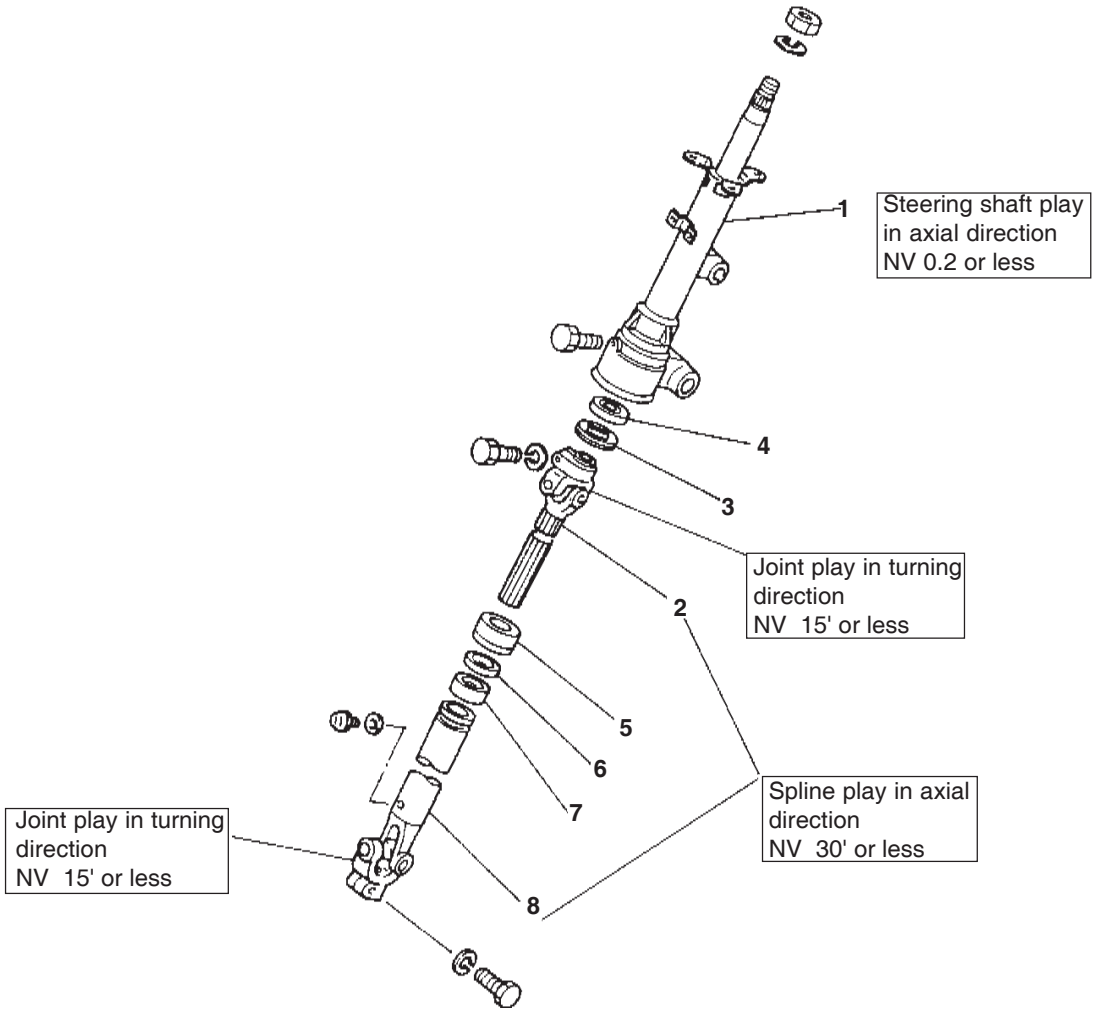
(1) Install a new twist off head bolt and tighten it to 13 to 15 Nm (1.3 to 1.5 kgfm) to twist off the bolt head.
(2) After installation, make sure that the steering lock functions properly.
(3) If no abnormality is found, reverse the removal procedure to make installation.



(4) Install the steering wheel as shown in the illustration.



Disassembly, inspection and correction



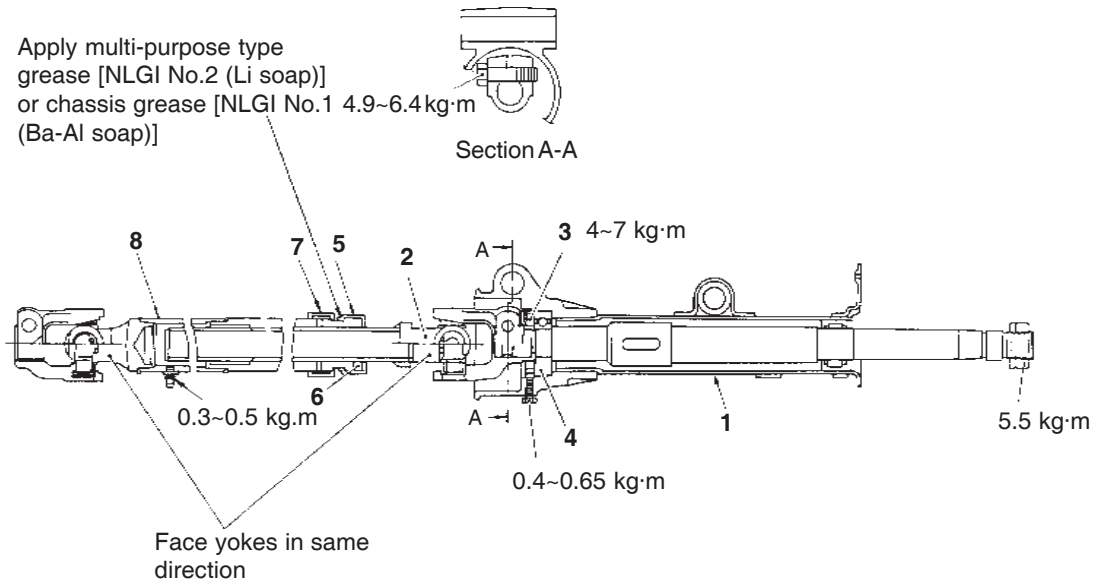
NV ... Nominal Value

Disassembly sequence

1. Steering upper shaft assembly
2. Spline shaft assembly
3. Lock plate
4. Bearing
5. Dust cover
6. Dust seal
7. Rubber cover
8. Spline tube assembly

56AR1283

Reassembly



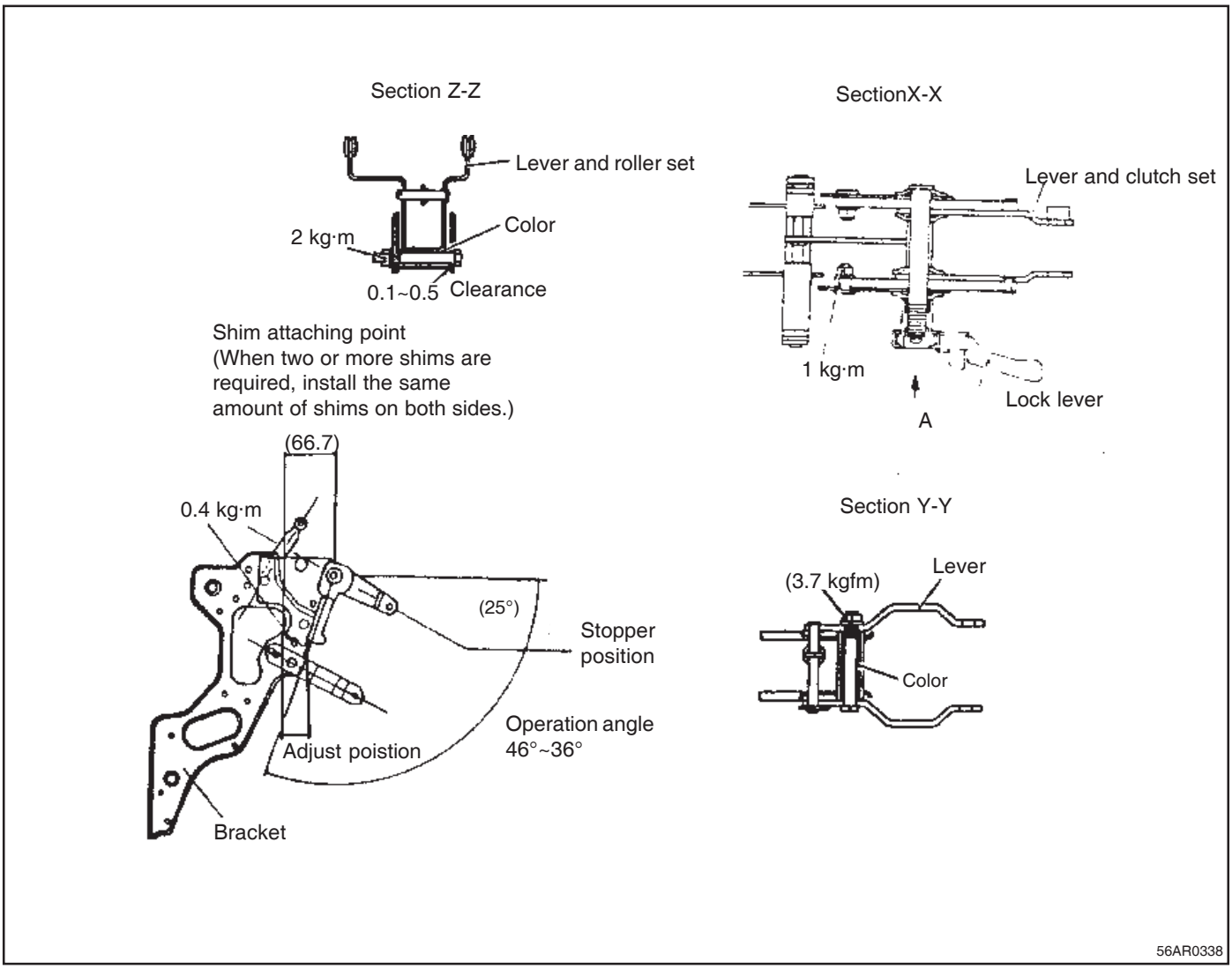
Assembly sequence

8→7→6→5→2

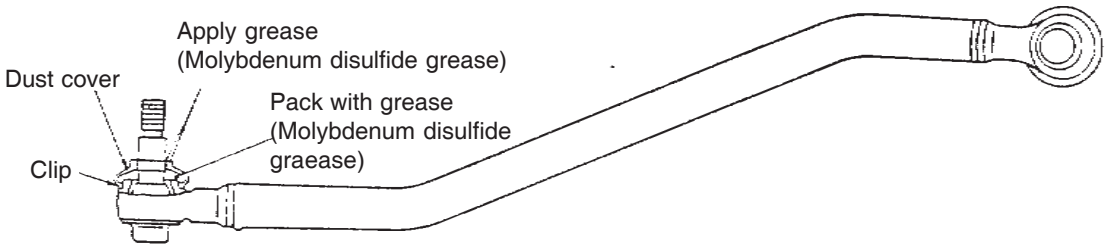
1→4→3↑

56AR1284

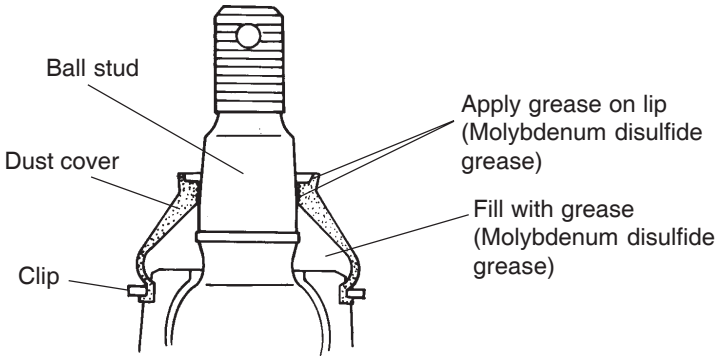
Link and Bracket Section



DRAG LINK



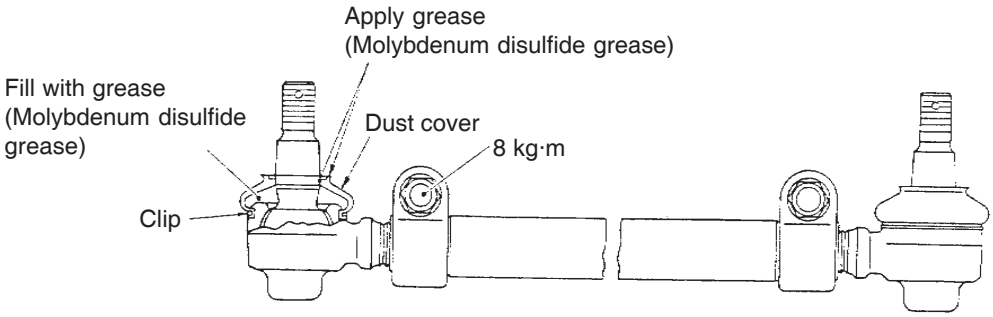
56AR0003



NOTE
Do not remove parts other than dust cover and clip.

56AR1229

TIE ROD



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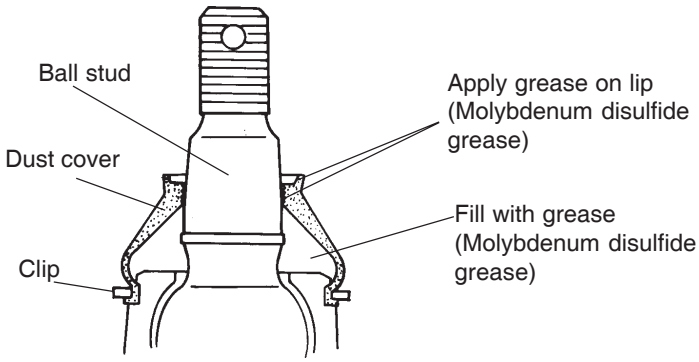


NOTE
Do not remove parts other than dust cover and clip.

56AR1229

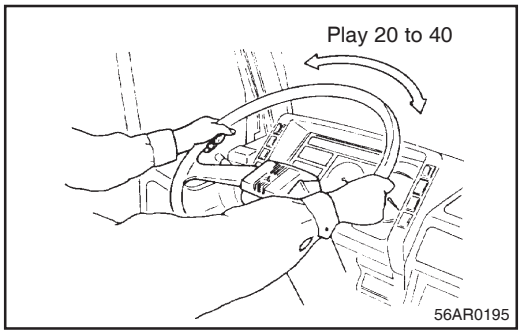
ADJUSTMENT AFTER INSTALLATION

Steering wheel play

Place the vehicle in straight ahead position and start the engine. Lightly turn the steering wheel clockwise and counter-clockwise and check that the outside circumference play does not exceed the nominal value range.

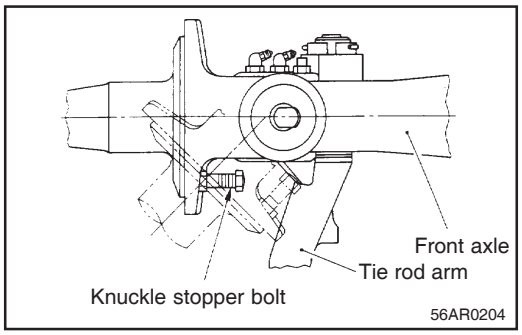
NOTE

If the steering wheel play is out of the range, adjust installation of parts and backlash.



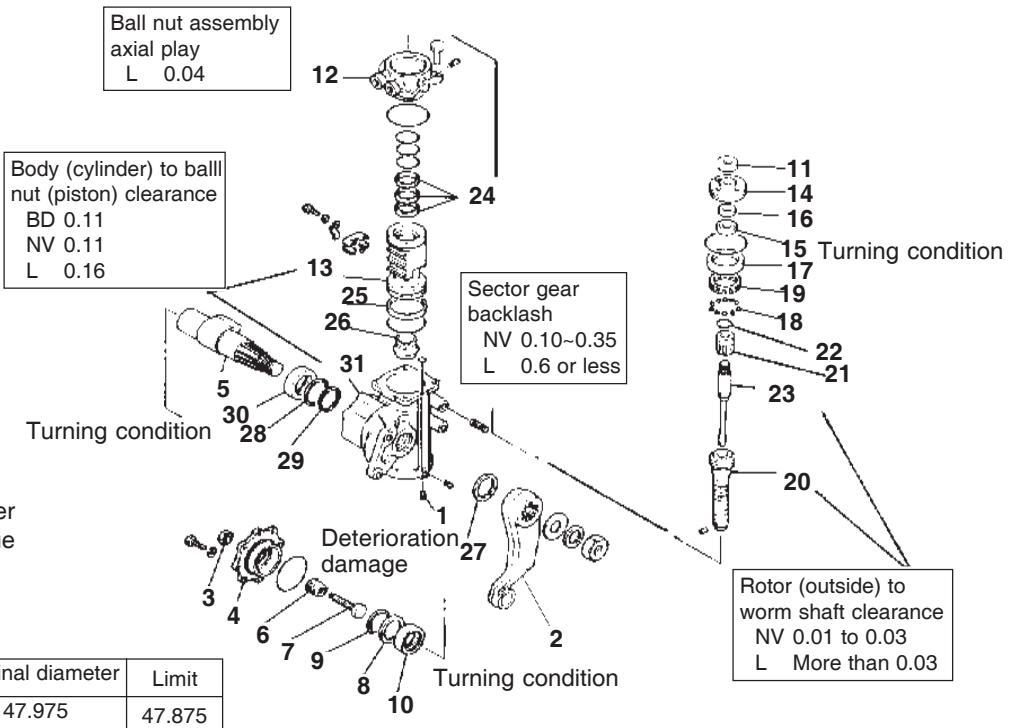
Adjustment of steering angle

Set the front wheels on the turning radius gauges and adjust the steering angle to the specified value by knuckle stopper bolt.



Integral power steering booster

Disassembly, inspection and correction



Sector shaft O.D.

Item	Nominal diameter	Limit
Packing section	47.975	47.875
Bearing section	47.975	47.875

Disassembly sequence

1. Taper plug
2. Pitman arm
3. Lock nut
4. Side cover
5. Sector shaft
6. Retainer
7. Adjusting screw
8. Y-packing
9. Backup ring
10. Needle bearing
11. Dust covcer
12. Valve housing
13. Piston (Ball nut)
14. Adjusting plug
15. Ball bearing
16. Y-paking
17. Side rail
18. Steel ball
19. Bearing cage
20. Worm shaft
21. Rotor
22. Seal ring
23. Stub shaft assembly
24. Seal ring
25. Seal ring
26. Plug
27. Oil seal
28. Y-packing
29. Backup ring
30. Needle bearing
31. Body

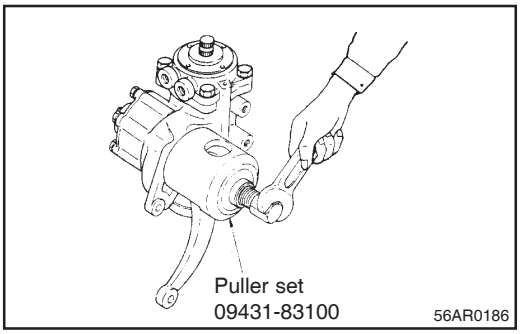
For parts with an encircled number, refer to Disassembly Procedure that follows.

56AR0185

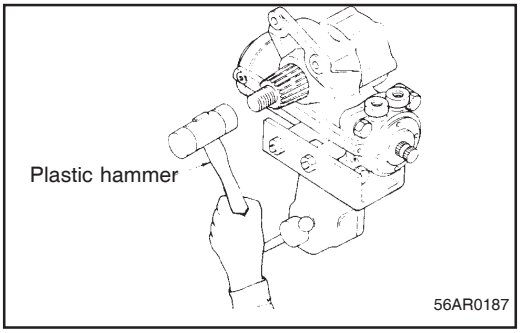
NOTE

1. **Align the stamped mark on the sector shaft end with the body center mark to place the sector shaft in the neutral position.**
2. **Loosen the lock nut of the adjusting screw beforehand.**
3. **Do not disassembly the ball nut assembly, adjusting screw, needle nut bearing, etc. except when necessary.**

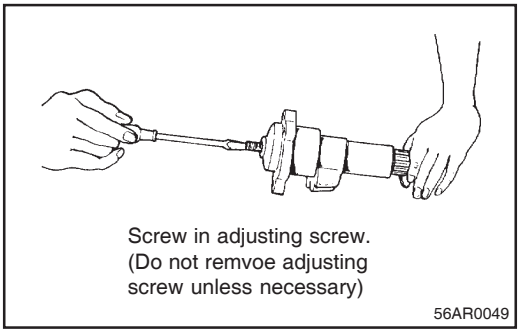
(1) Removal of pitman arm
Remove the pitman arm from the steering gear using the special tool, puller set.



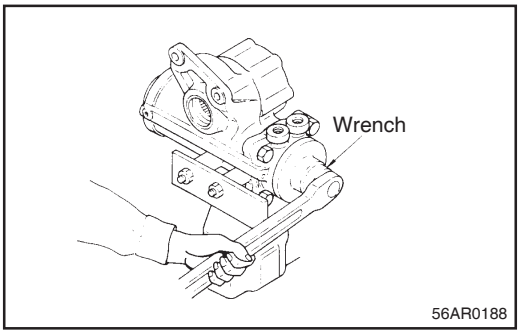
(2) Removal of side cover and sector shaft
Drive out the sector shaft and side cover as a unit from the body, lightly striking with a plastic hammer.



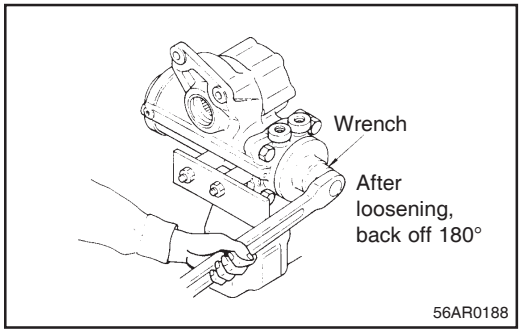
(3) Separation of sector shaft from side cover
Screw in the adjusting screw to remove the side cover from the sector shaft.



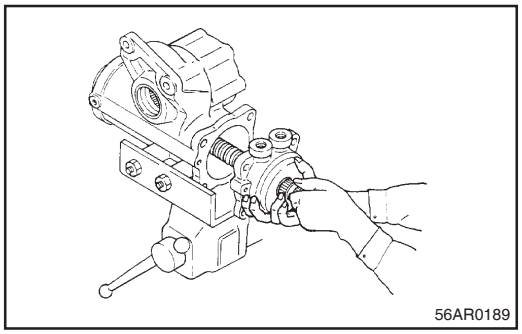
(4) Removal of ring nut
Remove the lock ring, using the wrench.



(5) Removal of adjusting plug
Remove the adjusting plug, using the Wrench.



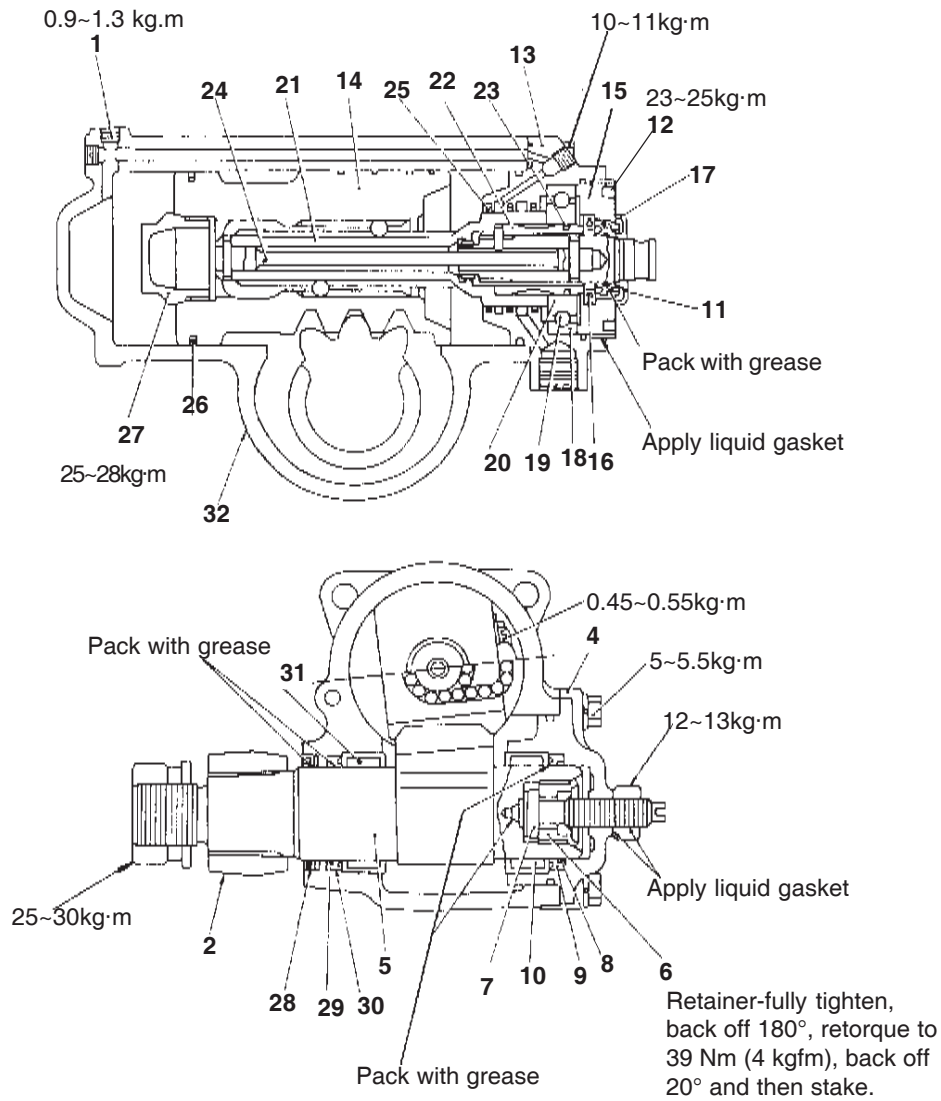
(6) Removal of ball nut assembly
Remove the ball nut assembly as a unit from the body. When removing, make sure that the assembly is slowly removed to prevent the piston from turning to cause damage to the inside surface of the body.


56AR0189

NOTE

1. **Thoroughly clean the disassembled metallic parts in a cleaning oil. Handle carefully the piston section to prevent damage.**
2. **To remove the adjusting screw, loosen the staken retainer and remove the screw.**

Reassembly and Adjustment



Assembly sequence

25 23 16←17 28←31←30←29←1

21→20→19→18→13→23→22→15→12→11→32→3→2

14→27→26

5→7→6

4→8→9→10

For parts with encircled number, refer to Reassembly Procedcure that follows.

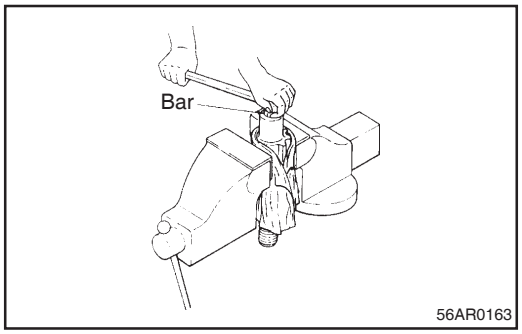
NOTE

1. **Replace the packings, O-rings, seal rings, etc. wih new ones.**
2. **As a sealant, use the THREEBOND No.1102, and as a grease, use the Limax No.2 or equivalents.**

56AR0190

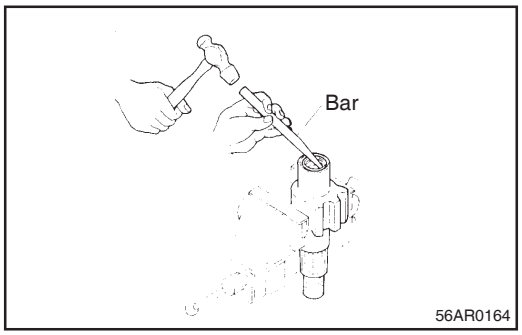
(1) Tightening of retainer

Fully tighten and then back off 180°.
Retorque to 39 Nm (4kgfm).
Back off 20° and make sure that the adjusting screw turns smoothly.



(2) Staking of retainer end portion (2 places)

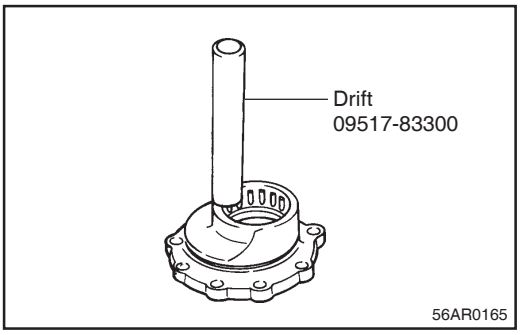
To press-fit the Y-packing to the adjusting plug, use the Bar.



(3) Installation of Y-packing and backup ring

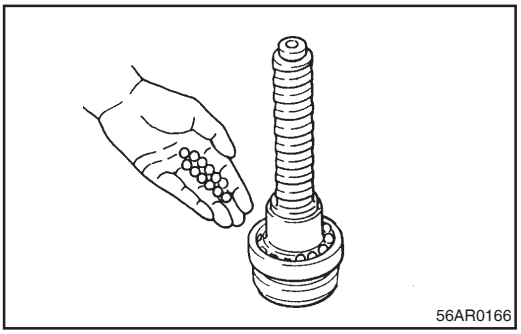
Insert the Y-packing and backup ring and then insert the special tool, Drift, to correct the bend of the backup ring.

NOTE
When the body section is installed, use the special tool, Drift for correction.

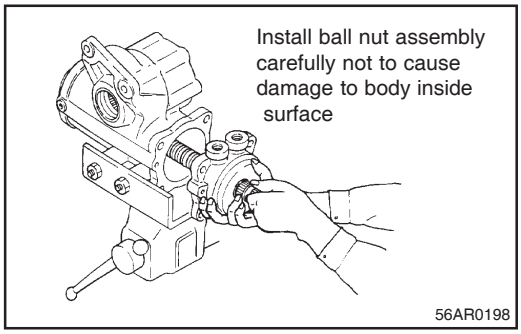


(4) Assembly of thrust bearing

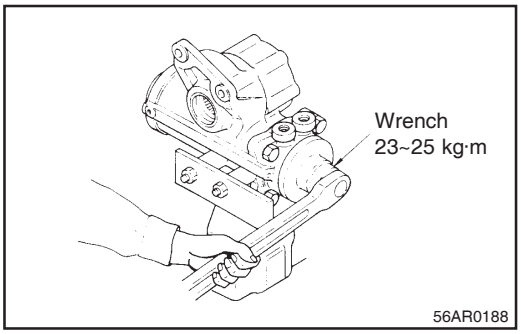
Insert the side race, bearing cage and steel balls.



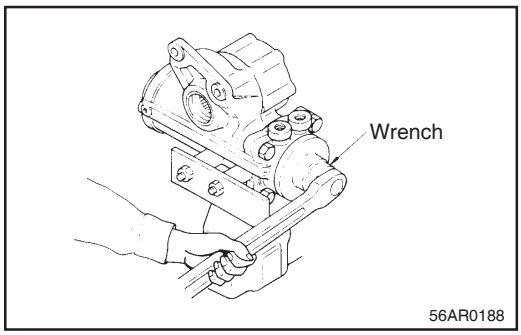
(5) Installation of O-ring and seal ring.
(6) Installation of ball nut assembly



(7) Tightening of adjusting plug

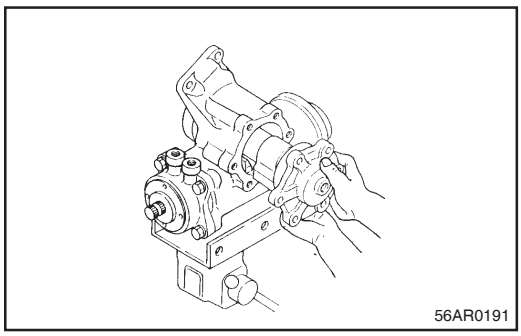


(8) Tightening of ring nut.



(9) Installation of sector shaft.

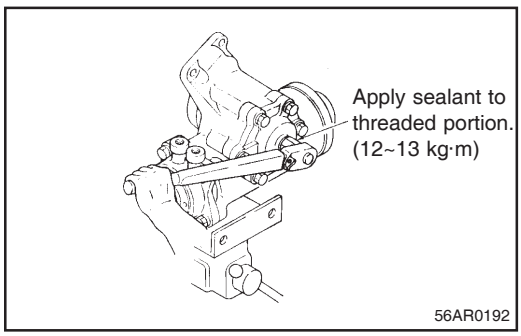
Put the rack (ball nut) and gear (sector shaft) in mesh in the neutral position.



(10) Tightening of lock nut

NOTE

Apply grease to the Y-packing and backup ring at installation.

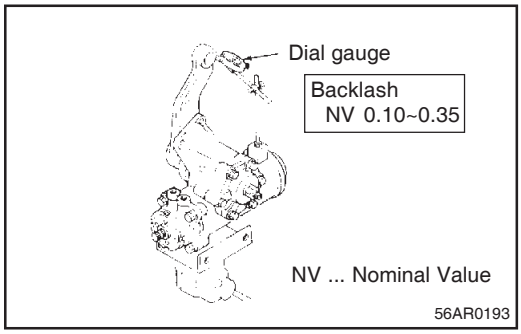


(11) Adjustment of sector gear backlash

Place the gears in the neutral meshing position and measure the backlash at the pitman arm end (L=250 mm). If necessary, adjust by the adjusting screw.

NOTE

1. **After adjustment, move the pitman arm again to make sure that the piston (ball nut) moves smoothly over the entire operating angle range (pitman arm).**
2. **The starting torque of the sector gear is less than 145 Ncm (15 kg·m) when the pump delivery rate is 12 lit./ min, (Adjust by the adjusting plug.)**



POWER STEERING OIL PUMP

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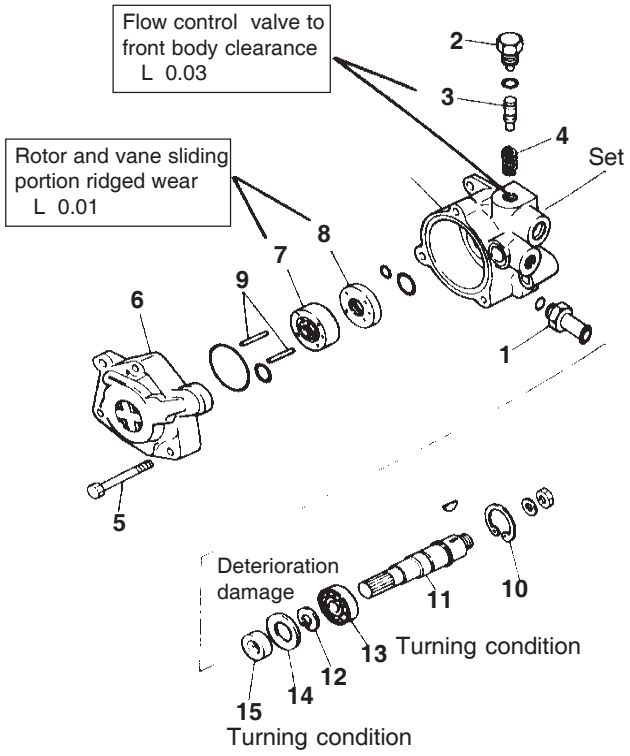


Disassembly sequence
1. Hose connector
2. Plug
3. Flow control valve assembly
4. Flow control spring
5. Bolt
6. Rear body
7. Cartridge assembly
8. Pressure plate
9. Straight pin
10. Retaining ring (snap ring)
11. Drive shaft
12. Retaining rind (snap ring)
13. Ball bearing
14. Retaining ring (snap ring)
15. Oil seal
16. Front

For parts with an encircled number, refer to Disassembly Procedure that follows.

NOTE
1. **Do not disassemble the flow control vlve but reuse unless defective.**
2. **Do not remve the oil seal except for replacement. If remved, repalce with a new one.**

56AR1204

Disassembly procedure

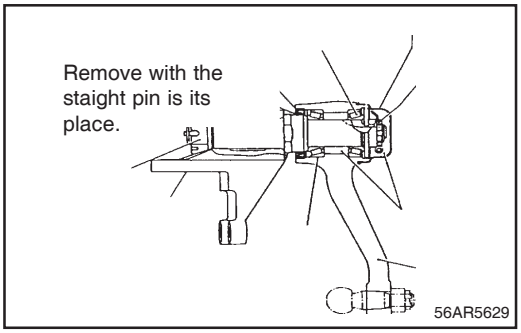
Removal of cartridge assembly

(1) Before disassembly, put matching marks on the periphery.

(2) Remove the cartridge assembly, pressure plate and straight pin and put matching marks on the periphery of the cartridge assembly.

NOTE

The rotor, vane and cam ring have been precision machined as a unit. Take care not to damage them. If replacement is necessary, replace as a cartridge assembly.



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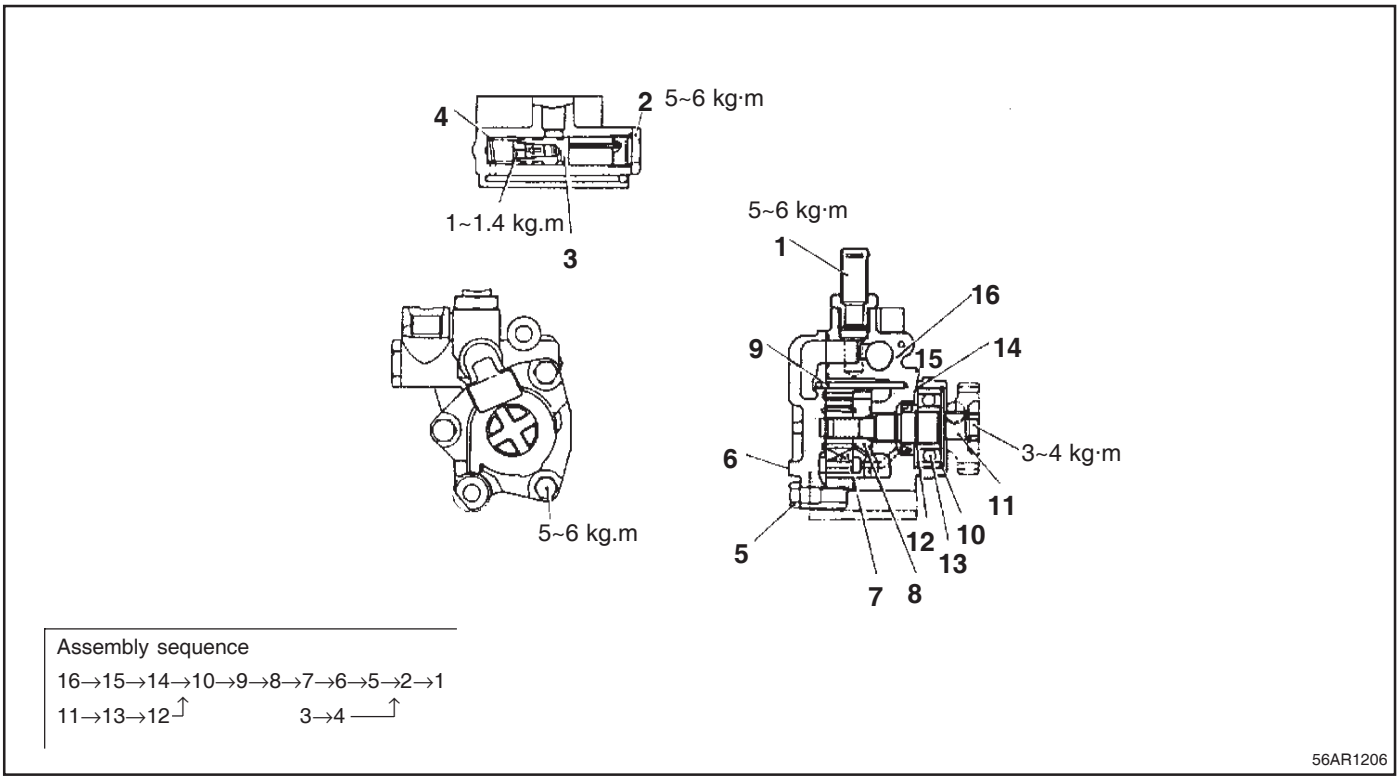
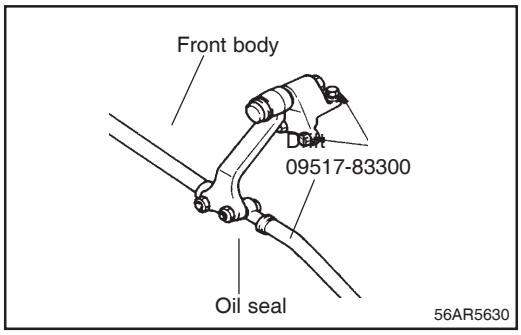
Reassembly

(1) On occasion of periodic maintenance, replace the oil seals. O-rings and other rubber parts, using a repair kit.

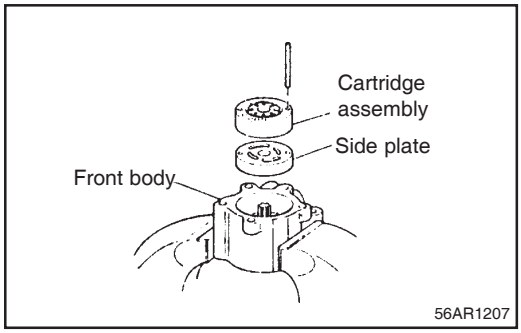
(2) Install parts, aligning the alignment marks put at disassembly and noting the rotor direction and vane turning direction. Check to see that the rotor and vane slide smoothly without excessive play



Pressing of oil seal



Installation of cartridge



NOTE

1. **When installing the parts. Check correct matching of pin holes.**

Pressure change by shims
Approx. 605 kPa (6.2 kg/cm²) per 0.5 mm thick shim
Approx. 245 kPa (2.5 kg/cm²) per 0.2 mm thick shim

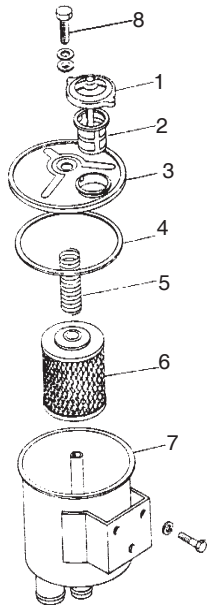
Adjustment

Adjustment of Relief Set Pressure of Flow Control Valve Assembly. When the valve assembly was disassembled, be sure to adjust the relief pressure by the following procedures after reassembly. Adjust by adding or removing shims. Addition of shims will lower the pressure.

Standard value of valve assembly relief pressure
9.3~11.3 Mpa (95~115 kg/cm²) (pump speed 1,800 rpm)

POWER STEERING OIL TANK

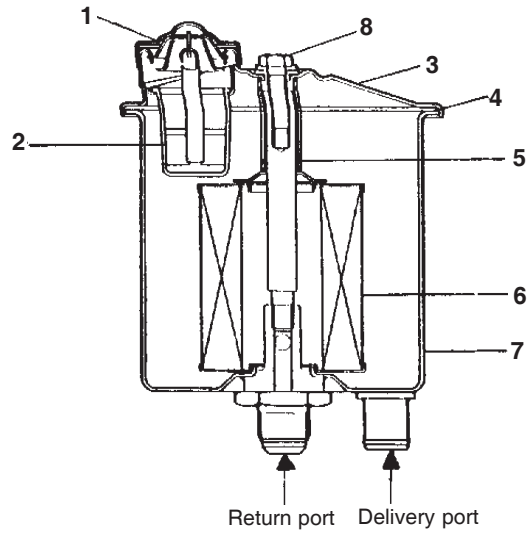
Disassembly



1. Cap
2. Oil strainer
3. Reservoir cover
4. Reservoir gakset
5. Spring
6. Filter element
7. Reservoir body
8. Bolt

56AR0174

Reassembly



Assembly sequence
8→7→6→5→4→3→2→1

56AR0139

Adjustment after Installation

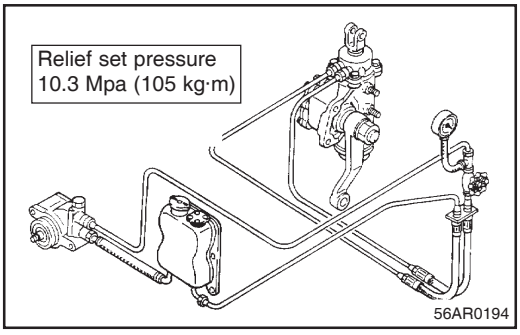
Bleeding

(1) Fill the oil tank with hydraulic fluid to the brim of the filler cap.
(2) With the front wheels reised on jacks and the engine running at idle, turn the steering wheel clockwise and counterclockwise and add the fluid if the level is low.
(3) After the tank fluid level established, increase the engine speed and repeatedly turn the steering wheel until no more air bubbles come out in the tank.
(4) After bleeding, check each section for leaks and check that the oil tank is filled up to the level mark.

Peformance Verification tests

To make sure that the power steering booster and oil pump are working well, perform tests on the floolwing.

(1) If the fluid pressure when the steering wheel is released with the engine running at idle is (5 kg.cm²) or more, check the power steering booster, oil pump and oil circuit for cloging.
(2) If the relief pressure readings are beyond the values given below, the relief valve is in faulity operation. If the reading is below the assembly standard value, the relief valve or spring is defective.



56AR0194

Test item	Test procedure	Assembly standard
Checking smooth operation	Raise front wheels and turns steering wheel fully clockwise and counterclockwise several times.	Steering wheel to operate smoothly on entire stroke.
Measuring hydraulic pressure	1) Mount combination of an oil pressure gauge capable of measuring more than (135 kg/cm²) and a stop valve between the pump delivery port and booster inlet and bleed the system. 2) With the engine running at idle, turn the steering wheel clockwise and counterclockwise to raise the fluid temperature to 50~60°C. 3) With the engine running at idle, fully open the stop valve. 4) Release the steering wheel and measure the fluid pressure.	5 kg/cm² or less
Measuring relief pressure	1) Slowly increase the engine speed to 1000 to 1200 rpm, close the stop valve and measure the maximum fluid pressure. 2) Do not keep the stop valve fully closed for more than 15 seconds.	Relief set pressure 105 kg/cm²

TROUBLESHOOTING

Symptom	Probable cause	Remdy
Hard steering	Steering ger mechanism defective	
	o Angular contact bearing damaged	Replace
	o Worm and ball nut worn	Replace
	o Insufficient oil quanity	Add oil
	o Improper oil viscosity	Replace oil
	o Incorrect rear cover hsim adjustment	Adjust rear cover shim
	o Incorrect rack starting torque adjustment	Adjust worm and ball nut starting torque
	Powser steering booster gear mechanism defective	
	o Thrust bearing damaged	Replace screw and housing assembly
	o Ball of ball scre worn	Replace screw and housing assembly
	o Low fluid level in oil tank	Add fluid
	o Air not compeletely bled	Bleed air
	o Improper fluid viscosity	Replace fluid
	o Trouble in power steering booster system	Repair or repalce
	o Incorrect pipe connections	Correct
	o Defective oil pump	Repair or replace
	o Flow control valve in faulty operation	Correct
	o Oil pump malfunctioning	Correct or replace
	Steering linkage defective	
	o Universal joint abnormally worn, damaged or poorly lubricated	Replace steering shaft assembly or apply grease
	o Deformed link	Replace link
	Front axle defective	
	o King pin poorly lubricated	Apply grese
	o Poor front wheel alignments (toe-in, camber, caster)	Correct wheel alignments
	o Front wheel tires underinflated	Adjust
	o Thrust bearings damaged	Replace
	Other troubles	
	o Cargo one-sided toward the front of the bed	Distribute cargo evenly throughout the bed
Unstable steering bacause of excessive free play of steering wheel	Steering gear mechanism defective	
	o Worn rack and gear unit of worm and ball nut	Replace
	o Sector shaft worn	Replace sector shaft
	o Worm and ball nut worn	Replace
	o Loosen steering gear mounting bolts	Tighten to the specified torue

Symptom	Probable cause	Remdy
Unstable steering bacause of excessive free play of steering wheel	Power steering booster gear mechanism defective o Worn rack and rear in ball screw unit	Replace screw and housing sector shaft
	o Worn bearing in sector shaft	Replace bearing
	o Worn ball in ball screw	Replace screw and housing assembly
	o Loose power steering booster mounting bolts	Tighten to the specified torque
	o Air trapped and air not completely bled	Add fluid, retighten all parts, and bleed air
	Steering linkage defective o Looseness in universal joint	Pack with grease if the problem still persists, replace steering shaft assembly
	o Looseness in drag link ball stud	Replace knuckle arm, pitman arm or drag link
	o Looseness in tie rod end ball stud	Replace tie rod end
	Front axle defective o Worn wheel hub bearing	Replace
	o Worn king pin or bushing	Replace king pin or bushing
	Other troubles o Uneven brake application	Readjust or replace lining
	o Cargo one-sided toward the front of the bed	Distribute cargo evenly throughout the bed
Vehicle pulls to one side	Front axle steering system defective o Improper wheel alignment	Correct
	o Deformed front axle	Replace
	o Worn or damaged wheel hub bearing	Replace
	o Worn or damaged king pin	Replace king pin or bushing
	o Steering wheel is off-center	Correct
	o Steering gear defective	Repair or replace
	o Power steering booster defective	Correct or replace
	Other troubles o Cargo one-sided	Distribute cargo evenly
	o Sagging or broken leaf spring	Replace
	o Uneven brake application	Correct
	o Right and left tires unevenly inflated	Adjust

Symptom	Probable cause	Remdy
Vehicle pulls to one side	o Right and left tires greatly different in the degree of wear	Replace tires
	o Right and left tires different in outer diameter	Replace with equal diameter tires
	o Right and left wheel bases greatly different	Correct wheel base
	o Bent rear axle housing	Replace axle housing
Steering wheel jerks	Front axle assembly defective	
	o Excessive clearance between king pin and bushing	Replace king pin or bushing
	o Worn or deteriorated wheel hub bearing	Replace
	o Improper wheel alignment (particularly camber and caster)	Correct wheel alingment
	o Looseness in knuckle arm or tie rod ball stud	Replace knuckle arm or tie rod end
	o Excessively uneven tire pressure	Adjsut tire pressure
	o Knuckle arm, tie rod arm, backing plate and knuckle, etc. improperly tightened	Tighten to specified torque
	o U-bolt, nut, etc. of front spring loose	Tighten to specified torue
	o Lateral and radial runouts of front tires, and incorrect static and dynamic balance	Correct wheel balance
	Steering gear steering system defective	
	o Improper play in worm and ball nut and sector shaft	Adjust
	o Angular contact bearing worn	Replace
	o Loosen drag link ball stud	Replace knuckle arm, pitman arm or drag link
	o Sector shaft worn	Replace sector shaft
	o Worm and ball nut worn	Replace
	Power steering booster steering system defective	
	o Improper play in ball screw unit and sector shaft	Adjust
	o Worn thrust bearing	Replace
	o Defective power steering booster	Correct or replace
	o Looseness in ball stud of drag link	Replace knuckle arm, pitman arm or drag link
	o Worn sector shaft and bearing	Replace sector shaft and bearing
	o Worn ball and groove in ball screw	Replace screw and housing assembly

Symptom	Probable cause	Remdy
Steering wheel jerks	Other troubles	
	o Excessive runout of propeller shaft	Correct or replace
	o Reduction pinion and gear damaged and in poor tooth contact	Replace pinion and gear or corect tooth contact
	o Excessive tire runout	Correct or replace
Power steering booster system defective		
Hard steering in both clockwise and counter-clockwise directions	Low pressure due to fluid leaks	Retighten leaky parts or replace seal ring, O-ring, etc.
	Valve malfunctioning	Check and correct valve or repalce screw and housing assembly
	Piston damaged or foreign substance trapped	Check for foreign substance in hydralic fluid, and check and correct inside surface of body and sliding surface of piston, or replace screw and housing assembly
Hard steering particularly in middle	Rack mesh torque out of adjustment	Adjust stub shaft rotating torque
Great difference in steering effort between clockwise and counter-clockwise rotations	Clogged hydraulic circuit	Check and correct hydraulic circuit or repalce screw and housing assembly
Hard steering particularly during idling	Air trapped due to low fluid level	Bleed air and then add fluid
Hard steering particularly at beginning	Valve malfunctioning	Check and correct valve or replace screw and hosuing assembly
Hard steering due to problems not in power steering booster	Defective oil pump	Correct or replace oil pump
	Clogged hydraulic piping	Correct or replace piping
	Insufficient grease in steering linkage joints	Pack joints with grease
	Insufficient front tire inflation pressure	Adjust to the specified air pressure
	Incorrect front wheel alignments	Measure wheel alignments if incorrect, adjust to the specified values

Symptom	Probable cause	Remdy
Hard steering due to problems not in power steering booster	King pin thrust bearing damaged	Correct or replace
	King pin short of grease	Apply grease to king pin
	Cargo one-sided toward front	Distribute cargo evenly
Steering wheel oscillations	Power steering booster defective o Valve and roll edge damaged or control seal ring or O-ring damaged	Replace screw and housing assembly
	o Improper fluid in power steering system	Replace with the specified hydraulic fluid
	Problems not in power steering booster o Uneven tire pressure	Adjust to specified pressure
	o Incorrect front wheel alignment	Measure wheel alignment If incorrect, adjust to specified values
	o Front wheels out of balance	Replace with wheel balancer or replace tires or wheels
	o Worn drag link or tie rod end ball joint	Replace drag link assembly or tie rod end
	o Worn king pin and king pin bushing	Disassembly and replace If defective
Poor returnability of steering wheel	Incorrect steering gear rack starting torque adjustment	Adjust main shaft starting torque
	Power steering booster defective o Rack torque out of adjustment	Adjust stub shaft torque
	o Clogged hydraulic circuit	Check and correct circuit or replace screw and housing assembly
	o Clogged hydraulic piping	Correct or replace piping
	Front wheel alignment off	Measure wheel alignment If incorrect, adjust to specified values
Vehicle wanders due to excessive free play of steering wheel	Steering gear defective o Sector shaft gear worn	Adjust steering wheel free play with adjusting screw or replace cross shaft
	o Damaged or worn worm and ball nut serrating	Replace worm and ball nut

Symptom	Probable cause	Remdy
Vehicle wanders due to excessive free play of steering wheel	Problems in power steering booster o Worm sector shaft gear	Adjust with adjusting screw or replace sector shaft
	o Damaged or worn stub shaft serrations	Replace screw and housing assembly
	Other problems o Worn front wheel bearings	Replace
	o Mounted or joined parts loose	Retighten to specified torque or replace detective parts
Insufficient steering angle or clockwise and counterclockwise steering angles differ	Incorrect pitman arm mounting angle	Mount at correct position
	Knuckle stopper bolt out of adjustment	Using tuning radius gauge, adjust clockwise and counter-clockwise steering angles with knuckle stopper bolts
Fluid leaks	Fluid leaks from steering gear	Retighten leaky parts to specified torque, or replace oil seal and apply liquid packing
	Fluid leaks from power steering booster	Retighten leaky parts to specified toque or replace O-ring, seals, etc.
	Fluid leaks from oil pump o Defective oil pump housing	Disassemble, check and replace if defective
	o Defective gasket, oil seal	Disassemble, check and replace if defective
	o Loose bolts	Retighten to specified torque
	Fluid leaks from oil tank o Fluid leaks from oil tank due to overfilling	Adjust to specified level
	o Fluid leaks from oil tank due to trapped air	Bleed air and adjust to specified level
	o Improperly welded pipes	Braze or replace
	Loose hydraulic piping and connections	Retighten to specified torque or replace

Symptom	Probable cause	Remdy
Abnormal hydraulic pressure in oil pump	Maximum generated hydraulic pressure insufficient due to defective oil pump	Disassemble, check, correct, or replace defective parts
	Excessively high generated pressure at engine idling due to crushed or clogged hydraulic line	Correct o replace hose or pipe
Strange sound, vibration or noise from oil pump * The oil pump poduces some howling sound which is not an indication of any functional problem (particularly when turning the steering wheel while the vehicle in standstill)		
Grinding noise	Air in oil pump	Check fluid level and hose clip, bleed air, or replace oil pump
	Seizure of parts in oil pump	Replace oil pump
Squeaking noise	Seizure of parts in oil pump	Replace oil pump
Low whirring noise	Loose pump bracket and mounting bolts and nuts	Retighten to specified torque
	Defective pump	Replace oil pump