

STEERING

	Page
TROUBLESHOOTING	16-2
SPECIAL TOOLS AND TEST EQUIPMENT	16-2
STEERING CHECK	16-3
ADJUSTMENT OF STEERING FREEPLAY	16-3
STEERING MAIN SHAFT (4x2)	16-4
STEERING MAIN SHAFT (4x4)	16-13
STEERING MAIN SHAFT WITH TILT	
STEERING	16-23
STEERING GEAR HOUSING (4x2)	16-33
STEERING GEAR HOUSING (4x4)	16-40
POWER STEERING	16-48
On-Vehicle Inspection	16-48
Vane Pump	16-51
Gear Housing (4x2)	16-60
Gear Housing (4x4)	16-68
STEERING LINKAGE (4x2)	16-73
Pitman Arm	16-73
Tie Rod	16-74
Relay Rod	16-74
Knuckle Arm	16-75
Steering Damper	16-76
STEERING LINKAGE (4x4)	16-77
Pitman Arm	16-77
Tie Rod	16-78
Steering Damper	16-78
Drag Link	16-79
Knuckle Arm	16-79

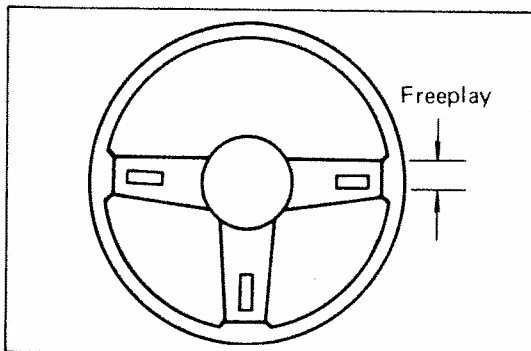
TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Hard steering	Tires improperly inflated	Inflate tires to proper pressure	13-3, 28
	Power steering belt loose	Tighten belt	16-59
	Oil level in reservoir low	Check reservoir	16-3
	Insufficient lubricant	Lubricate suspension and steering linkage	2-12
	Excessive caster	Check front end alignment	13-3, 28
	Steering linkage worn or bent	Check linkage	16-73, 77
	Ball joints worn	Replace ball joints	13-23
	Steering knuckle bearing worn	Replace knuckle bearing	13-40
	Steering column binding	Inspect steering column	16-4, 13
	Steering gear out of adjustment or broken	Adjust or repair steering gear	16-3
	Power steering unit faulty	Check power steering unit	16-48
Poor return	Tires improperly inflated	Inflate tires to proper pressure	13-3, 28
	Insufficient lubricant	Lubricate suspension and steering linkage	2-12
	Wheel alignment incorrect	Check front end alignment	13-3, 28
	Steering column binding	Inspect steering column	16-4, 13
	Steering gear out of adjustment or broken	Adjust or repair steering gear	16-3
Excessive play	Tie rods or linkage worn	Inspect linkage	16-73, 77
	Steering gear loose	Tighten gear bolts	
	Steering shaft coupling worn	Inspect coupling	16-4, 13
	Ball joints worn	Replace ball joints	13-23
	Steering knuckle bearing worn	Replace knuckle bearing	13-40
	Steering gear out of adjustment or broken	Adjust or repair steering gear	16-3

SPECIAL TOOLS AND TEST EQUIPMENT

Tool	SST No.	Use
Steering wheel puller	09609-20010	To remove steering wheel
Tie rod end puller	09611-20014	To disconnect relay rod
Pitman arm puller	09610-55012	To remove pitman arm
Bearing lock nut wrench	09617-30040 or Commercial	To remove worm bearing lock nut
Bearing adjusting screw wrench	09616-30020 or Commercial	To remove worm bearing adjusting screw
Bearing puller	09612-30012 or Commercial	To remove worm bearing outer race
Bearing driver	09612-30012 or Commercial	To install worm bearing outer race
Worm bearing adjusting socket	09616-00010 or 00002-00800	To measure worm bearing preload
Bearing puller	09612-65013 or Commercial	To remove worm bearing outer race
Bearing driver	09608-35013 or Commercial	To install worm bearing outer race
Bushing driver	09307-12010 or Commercial	To replace sector shaft bushing
Flare nut wrench	09631-22020 or Commercial	To loosen and tighten pressure and return lines
Power steering pump gauge	00001-00008	To measure steering fluid pressure
Power steering overhaul tool set	09630-00010 or 00002-00800	To overhaul vane pump and gear housing
Bearing driver	09631-60010	To install gear housing bearing and teflon ring (RN 4x4)
Tie rod end puller	09611-22011	To disconnect tie rod
Tie rod end puller	09611-22011	To disconnect shimmy damper

STEERING CHECK

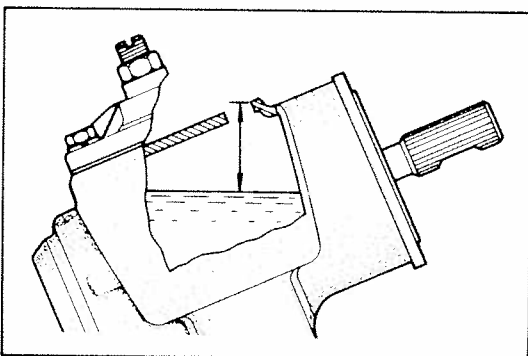


1. CHECK THAT STEERING WHEEL FREEPLAY IS CORRECT

With the vehicle stopped and pointed straight ahead, rock the steering wheel gently back and forth with light finger pressure. Freeplay should not exceed the maximum limit.

Maximum play: 30 mm (1.18 in.)

If incorrect, adjust or repair as required.



2. CHECK STEERING GEAR BOX OIL LEVEL

Oil level:

4x2 18 – 28 mm (0.71 – 1.10 in.) from top

4x4 12 – 17 mm (0.47 – 0.67 in.) from top

If low, fill with gear oil and check for oil leaks.

ADJUSTMENT OF STEERING FREEPLAY

1. LIFT AND SUPPORT FRONT END

Raise the vehicle enough to lift the front wheels off the ground.

2. POINT WHEELS STRAIGHT AHEAD

3. ADJUST STEERING GEAR BOX

(a) Loosen the lock nut.

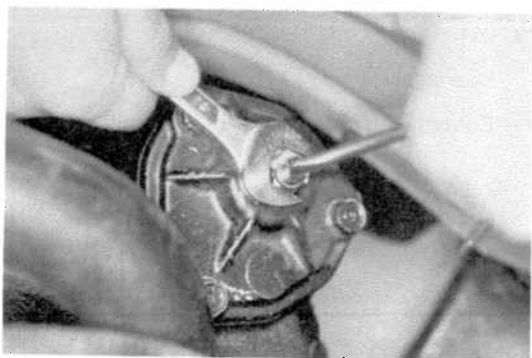
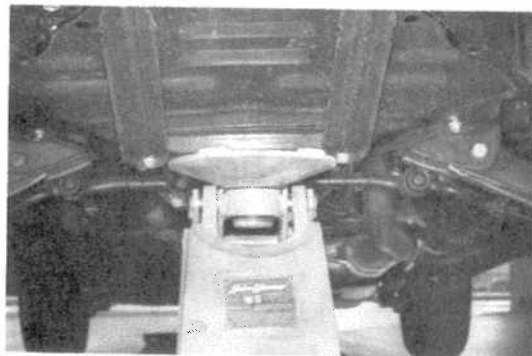
(b) Turn the adjusting screw clockwise to decrease wheel freeplay and counterclockwise to increase it.

NOTE: Turn the adjusting screw in small increments and check wheel freeplay between small adjustments.

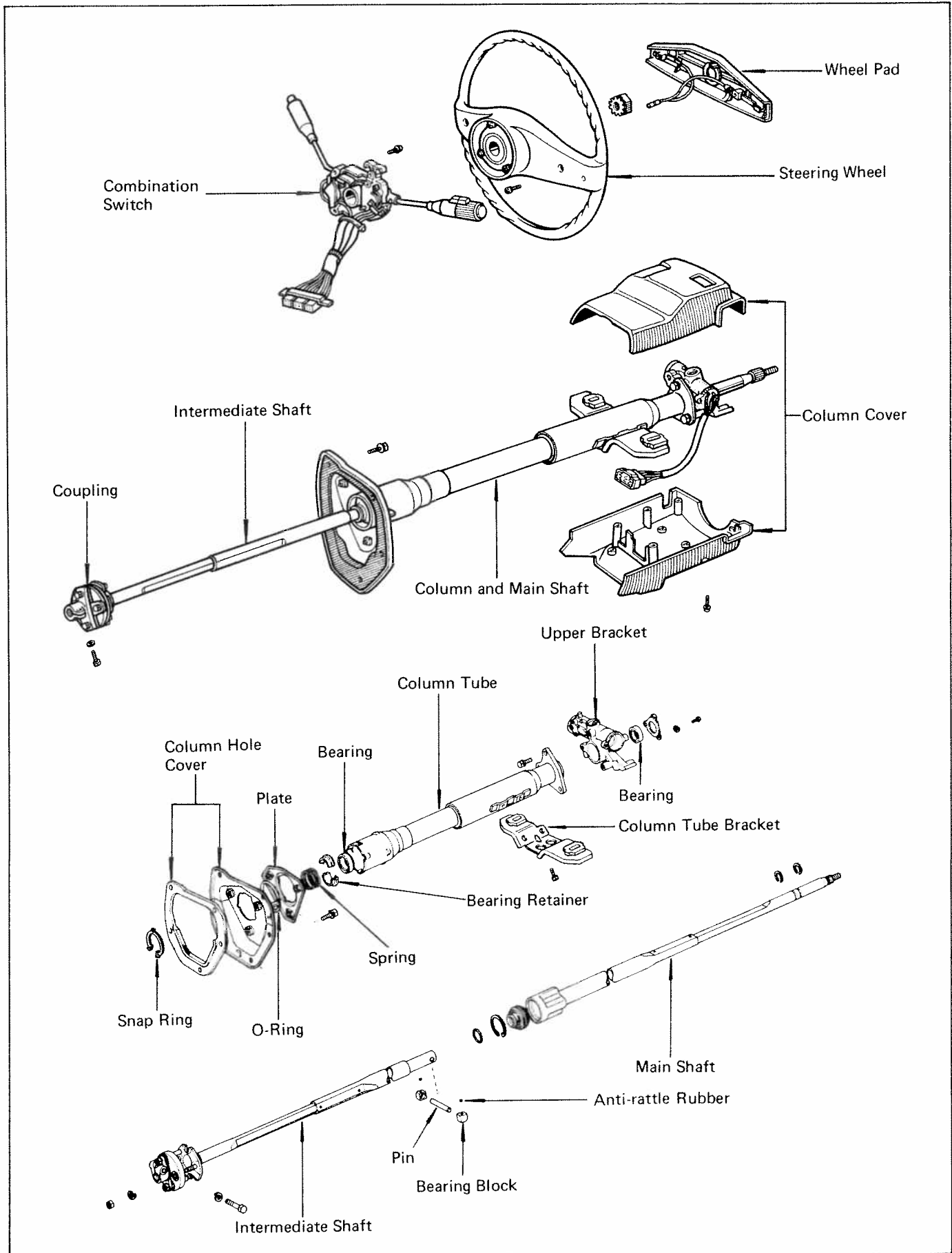
4. CHECK THAT STEERING DOES NOT BIND

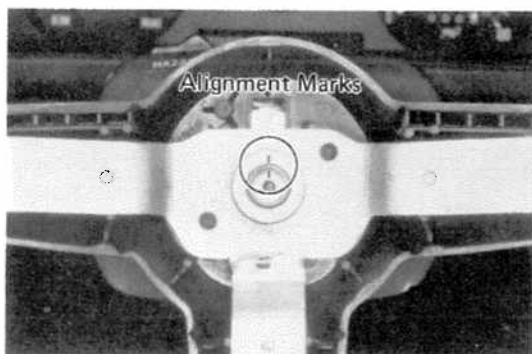
Turn the steering wheel half way around in both directions. Check that the freeplay is correct and steering is smooth and without rough spots.

5. HOLD ADJUSTING SCREW AND TIGHTEN LOCK NUT



STEERING MAIN SHAFT (4x2)





REMOVAL OF STEERING MAIN SHAFT

1. REMOVE NEGATIVE CABLE FROM BATTERY

2. REMOVE STEERING WHEEL

- (a) Remove horn button screws on the back of the steering wheel and pull off the button.
- (b) Place alignment marks on the steering wheel and shaft to ensure correct reassembly.
- (c) Remove the steering wheel nut.
- (d) Using a steering wheel remover*, remove the steering wheel.

*SST 09609-20010

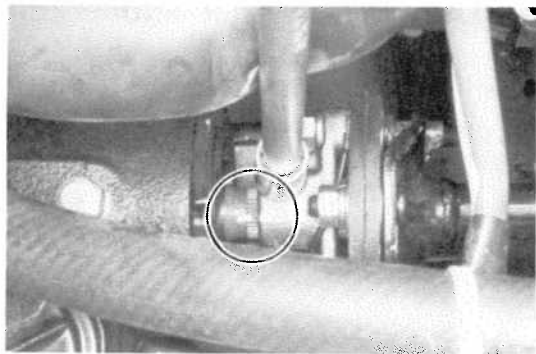
3. REMOVE STEERING LOWER COVER AND UPPER COVER

4. REMOVE COMBINATION SWITCH

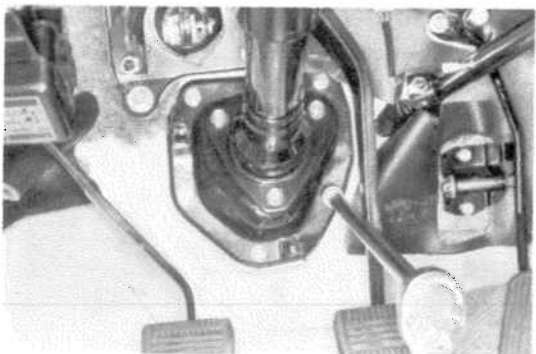


5. REMOVE COUPLING BOLT

- (a) Place an alignment mark on the coupling and worm shaft to ensure correct reassembly.
- (b) Loosen the coupling bolt.

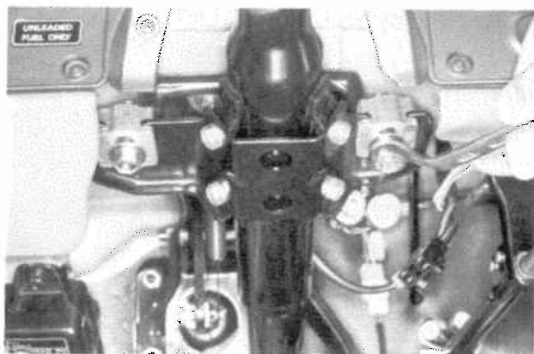


6. REMOVE FIVE MOUNTING BOLTS FROM COLUMN HOLE COVER



7. REMOVE COLUMN BRACKET MOUNTING BOLTS AND PULL OUT MAIN SHAFT

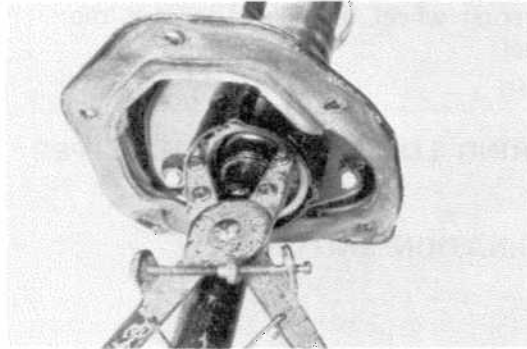
- (a) Remove two bracket mounting bolts.
- (b) Carefully pull out the main shaft with the intermediate shaft.



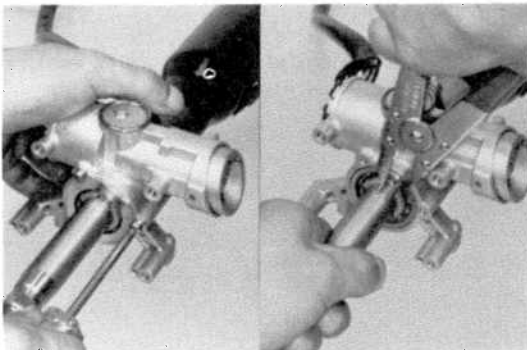


DISASSEMBLY OF STEERING MAIN SHAFT

1. REMOVE STEERING COLUMN BRACKET

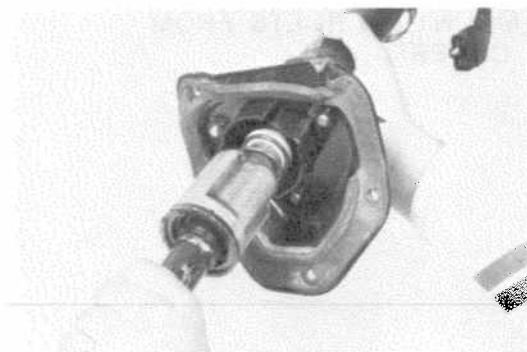


2. REMOVE SNAP RING FROM COLUMN TUBE

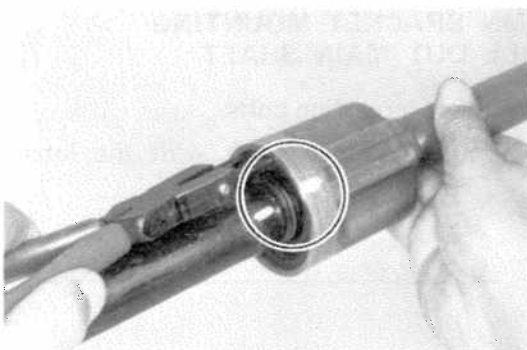


3. REMOVE UPPER BEARING RETAINER AND SNAP RING

- (a) Remove the bearing retainer from the upper bracket.
- (b) Using snap ring pliers, remove the snap ring.

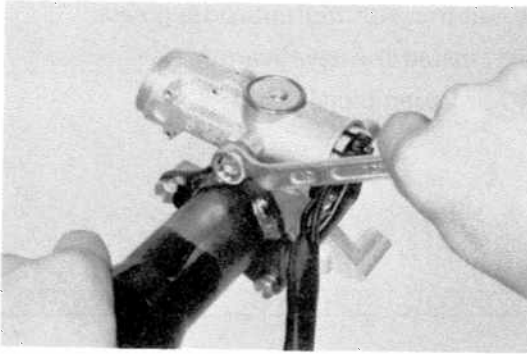


4. PULL OUT STEERING MAIN SHAFT TOGETHER WITH INTERMEDIATE SHAFT

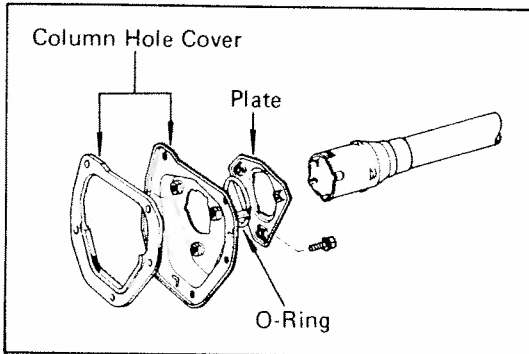


5. REMOVE INTERMEDIATE SHAFT FROM MAIN SHAFT

- (a) Place an alignment mark on the main shaft and intermediate shaft.
- (b) Using snap ring pliers, remove the snap ring.
- (c) Pull the intermediate shaft out of the main shaft.



6. REMOVE UPPER BRACKET FROM COLUMN TUBE



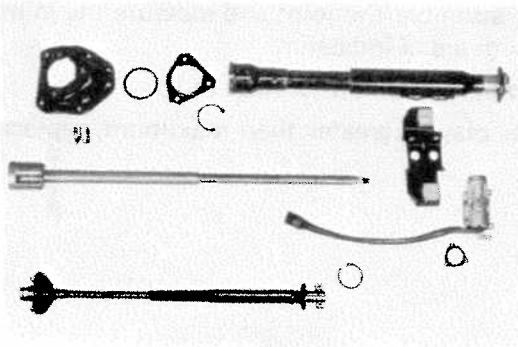
7. REMOVE COLUMN HOLE COVER FROM COLUMN TUBE

Remove the following parts from the column tube.

- (a) Column hole cover
- (b) O-ring
- (c) Plate

INSPECTION AND REPAIR OF STEERING MAIN SHAFT

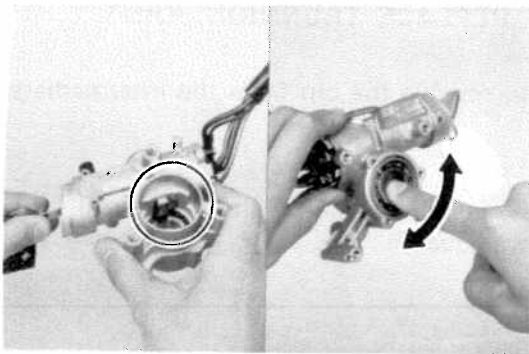
1. CHECK ALL PARTS FOR WEAR OR DAMAGE



2. CHECK THAT STEERING LOCK MECHANISM OPERATES PROPERLY

3. CHECK BEARING ROTATION CONDITION

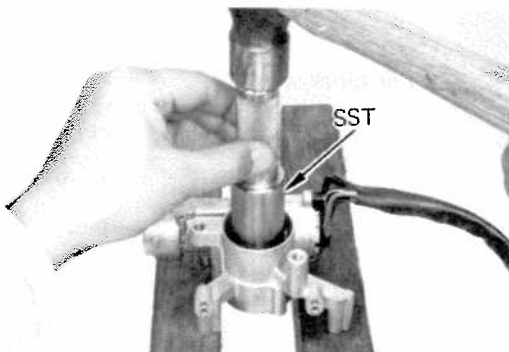
If the bearing does not rotate smoothly, replace the bearing.

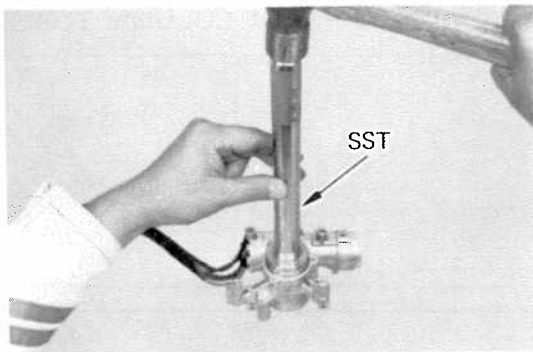


4. IF NECESSARY, REPLACE BEARING

- (a) Using a driver*, remove the bearing.

*SST 09620-30010 or Commercial driver

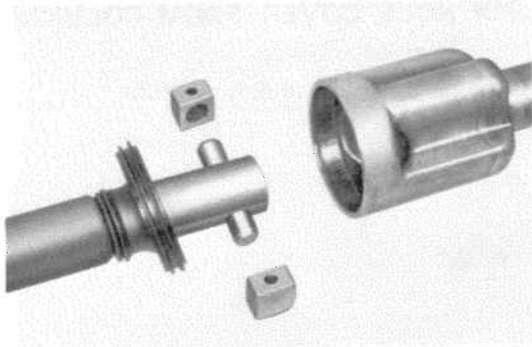




(b) Coat the new bearing with multipurpose grease.

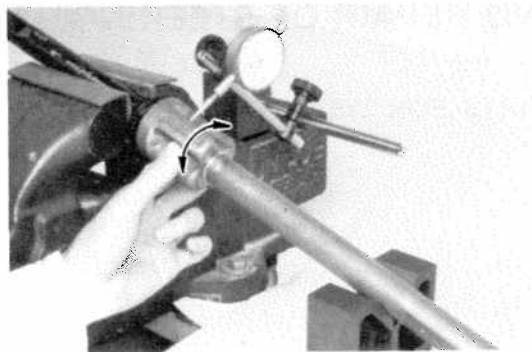
(c) Using a driver*, install the new bearing.

*SST 09620-30010 or Commercial driver



5. INSPECT TRUNNION JOINT

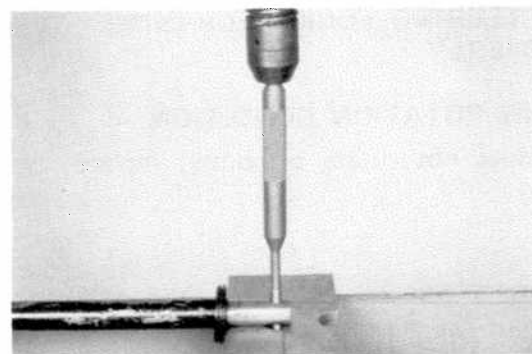
(a) Check the point parts for wear or damage.



(b) Temporarily assemble the joint and measure the joint radial play with a dial indicator.

Maximum radial play: 0.06 mm (0.0024 in.)

If the joint radial play is greater than maximum, replace the joint parts.



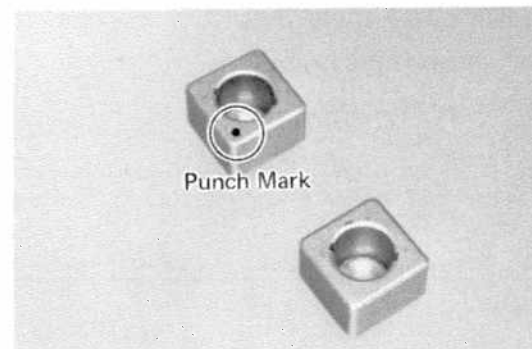
6. IF NECESSARY, REPLACE TRUNNION JOINT PARTS

(a) Using a press, remove the pin from the intermediate shaft.

(b) Replace the boot with a new one.

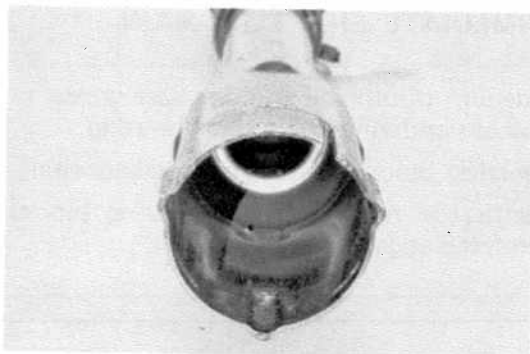
(c) Using a press, install the pin to the shaft until both protrusions are equal.

(d) Select a bearing block that will allow minimum radial play.



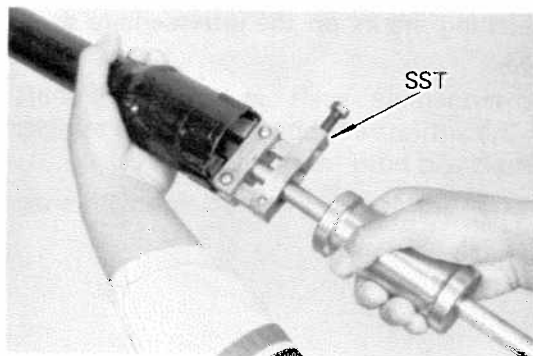
Bearing block width

Punch mark	Part No.	Width mm (in.)
Yes	45224-30040	15.97–16.00 (0.6287–0.6299)
No	45225-30040	16.00–16.03 (0.6299–0.6311)

**7. INSPECT MAIN SHAFT LOWER BEARING**

Check the lower bearing for wear or damage.

If the bearing is damaged or worn, replace it.

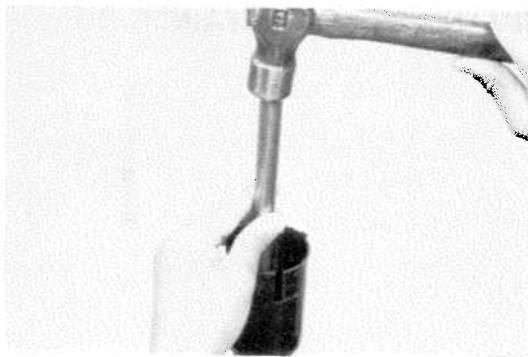
**8. IF NECESSARY, REPLACE MAIN SHAFT LOWER BEARING**

- (a) Using a puller*, remove the lower bearing from the column tube.

*SST 09308-00010 or Commercial puller

- (b) Apply multipurpose grease to the bearing.

- (c) Using a drift, drive the bearing into the column tube.

**ASSEMBLY OF STEERING MAIN SHAFT
(See illustration on page 16-4)****1. INSTALL COLUMN HOLE COVER TO COLUMN TUBE**

Install the following parts on the column tube.

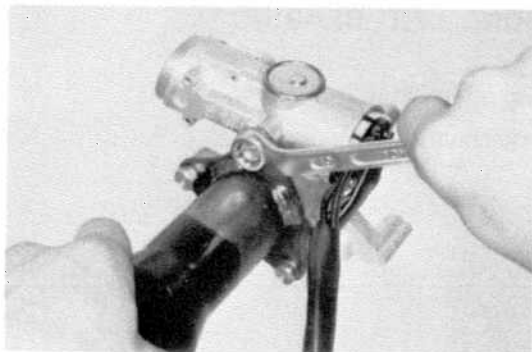
- (a) Plate
- (b) O-ring
- (c) Column hole cover

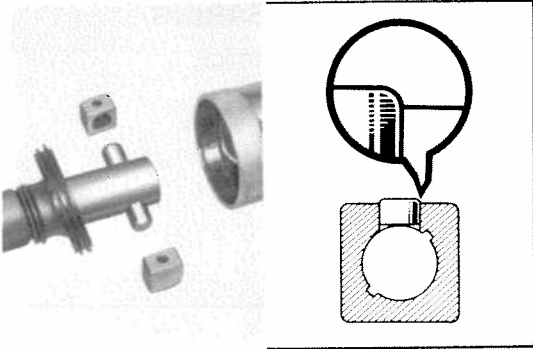
NOTE: Align the protrusion so that it fits into the column tube groove.

2. INSTALL UPPER BRACKET TO COLUMN TUBE

Install the upper bracket and tighten the bolts.

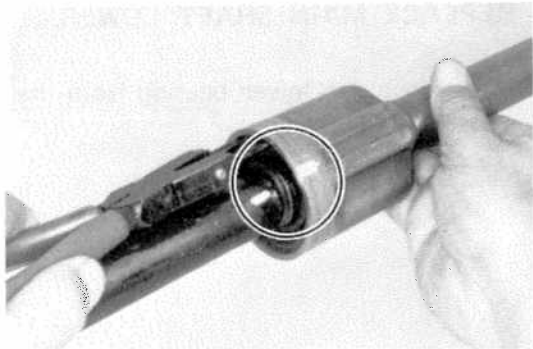
Torque: 40 – 70 kg-cm (35 – 60 in.-lb)



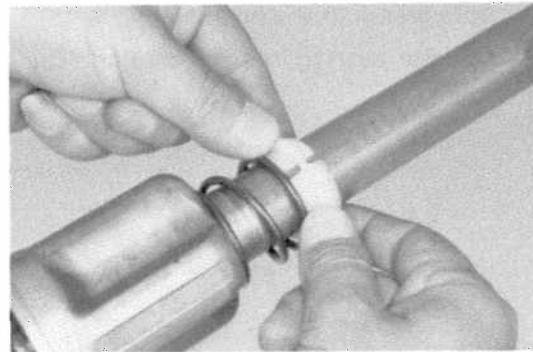


3. INSTALL INTERMEDIATE SHAFT TO MAIN SHAFT

- (a) Coat molybdenum disulphide lithium base grease to the bearing blocks and inner main shaft housing
- (b) Install the bearing blocks on the intermediate shaft.
- (c) Insert the antirattle rubbers in the bearing blocks with the chamfered edge facing outward.
- (d) Align the matching marks on the intermediate shaft and main shaft.
- (e) Insert the intermediate shaft in the main shaft housing with the antirattle rubbers positioned at right angle to the shaft and both facing same direction.
- (f) Push in the boot and install the snap ring with snap ring pliers.

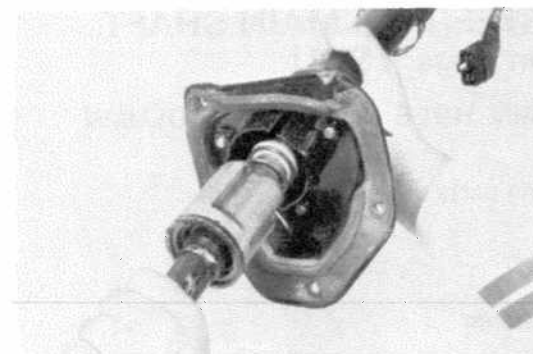


4. INSTALL SPRING AND SPRING RETAINER TO MAIN SHAFT



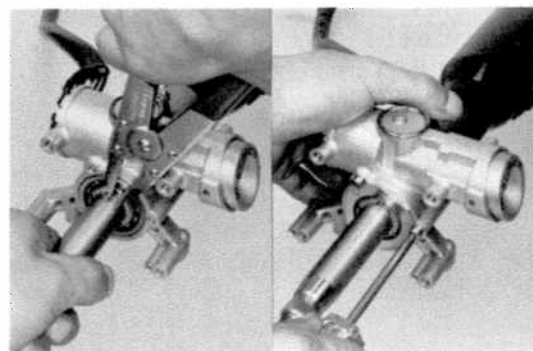
5. INSERT MAIN SHAFT IN COLUMN TUBE

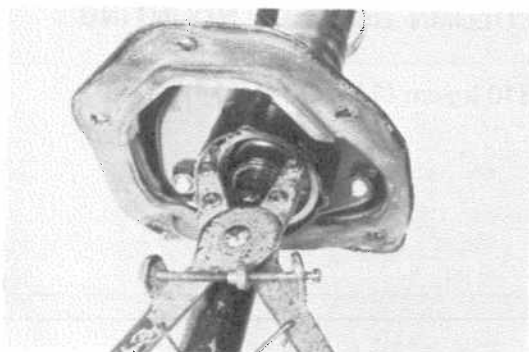
Push the main shaft into the column tube.



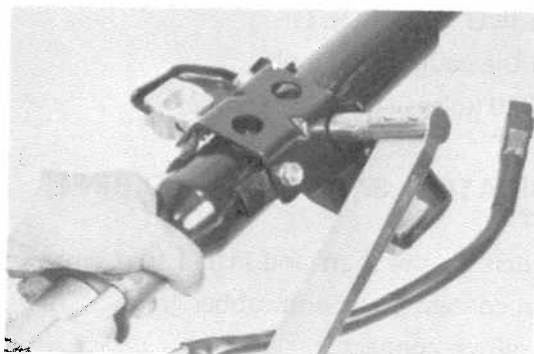
6. INSTALL SNAP RING AND BEARING RETAINER

- (a) Using snap ring pliers, install the snap ring.
- (b) Install the upper bearing retainer.





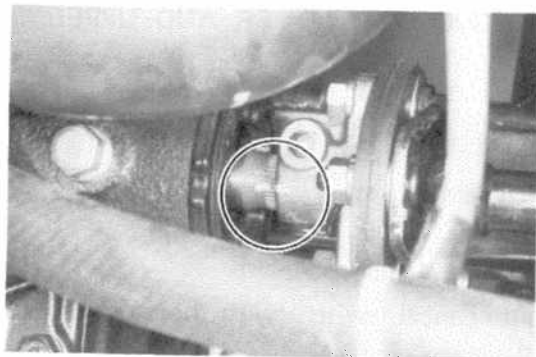
7. INSTALL SNAP RING TO COLUMN TUBE



8. INSTALL COLUMN TUBE BRACKET

Tighten the column tube bracket mounting bolts.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

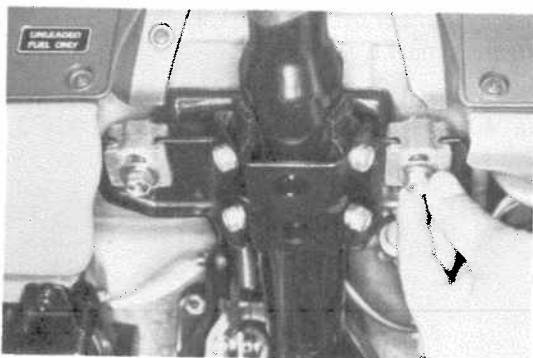


INSTALLATION OF STEERING MAIN SHAFT
(See illustration on page 16-4)

1. PLACE COLUMN AND MAIN SHAFT IN INSTALLED POSITION

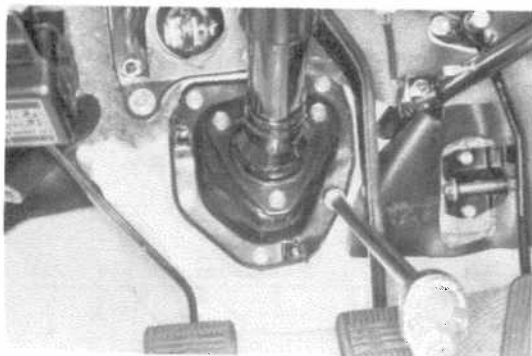
2. INSTALL COUPLING ON WORM SHAFT (RN 4x2)

Line up the marks on the coupling and worm shaft.



3. INSTALL COLUMN BRACKET MOUNTING BOLTS BY HAND

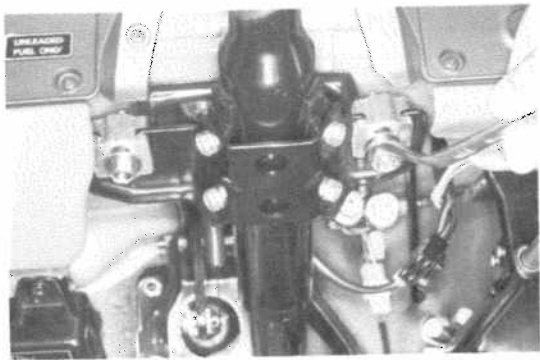
Install two bracket mounting bolts finger tight only.



4. INSTALL STEERING COLUMN HOLE COVER

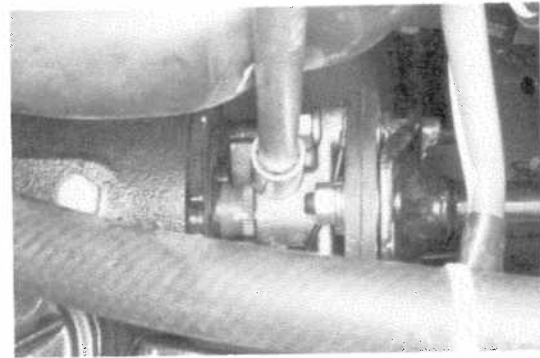
Tighten the bolts.

Torque: 60 – 90 kg-cm (53 – 78 in.-lb)



5. TORQUE TWO COLUMN BRACKET MOUNTING BOLTS

Torque: 190 – 310 kg-cm (14 – 22 ft-lb)



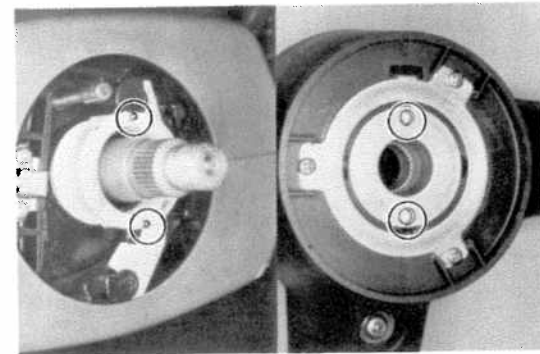
6. INSTALL COUPLING SET BOLT

Install and tighten the coupling set bolt.

Torque: 200 – 300 kg-cm (15 – 21 ft-lb)

7. INSTALL COMBINATION SWITCH ON STEERING COLUMN SHAFT

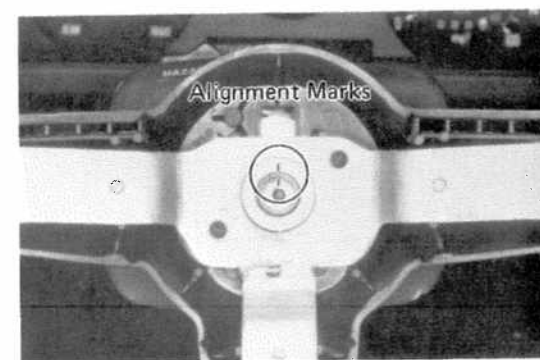
- (a) Place the switch on the shaft and install four screws.
- (b) Coat the horn contact plate with rubber grease.
- (c) Connect the switch connector.



8. INSTALL STEERING LOWER COVER AND UPPER COVER

9. INSTALL STEERING WHEEL

- (a) Align the auto-cancel switch with holes on the steering wheel.
- (b) Install the steering wheel on the shaft, making sure to align the alignment marks.
- (c) Check that the auto-cancel action is correct by operating the turn signal and turning the steering wheel until the turn signal switches off.

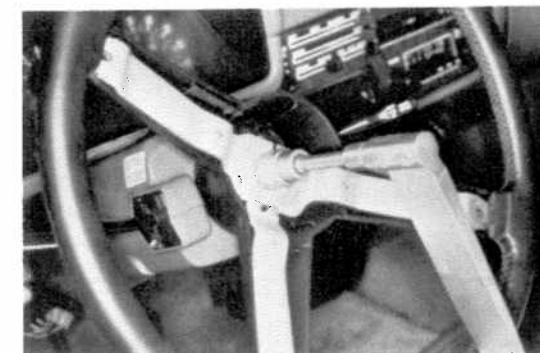


- (d) Install and torque the steering wheel nut.

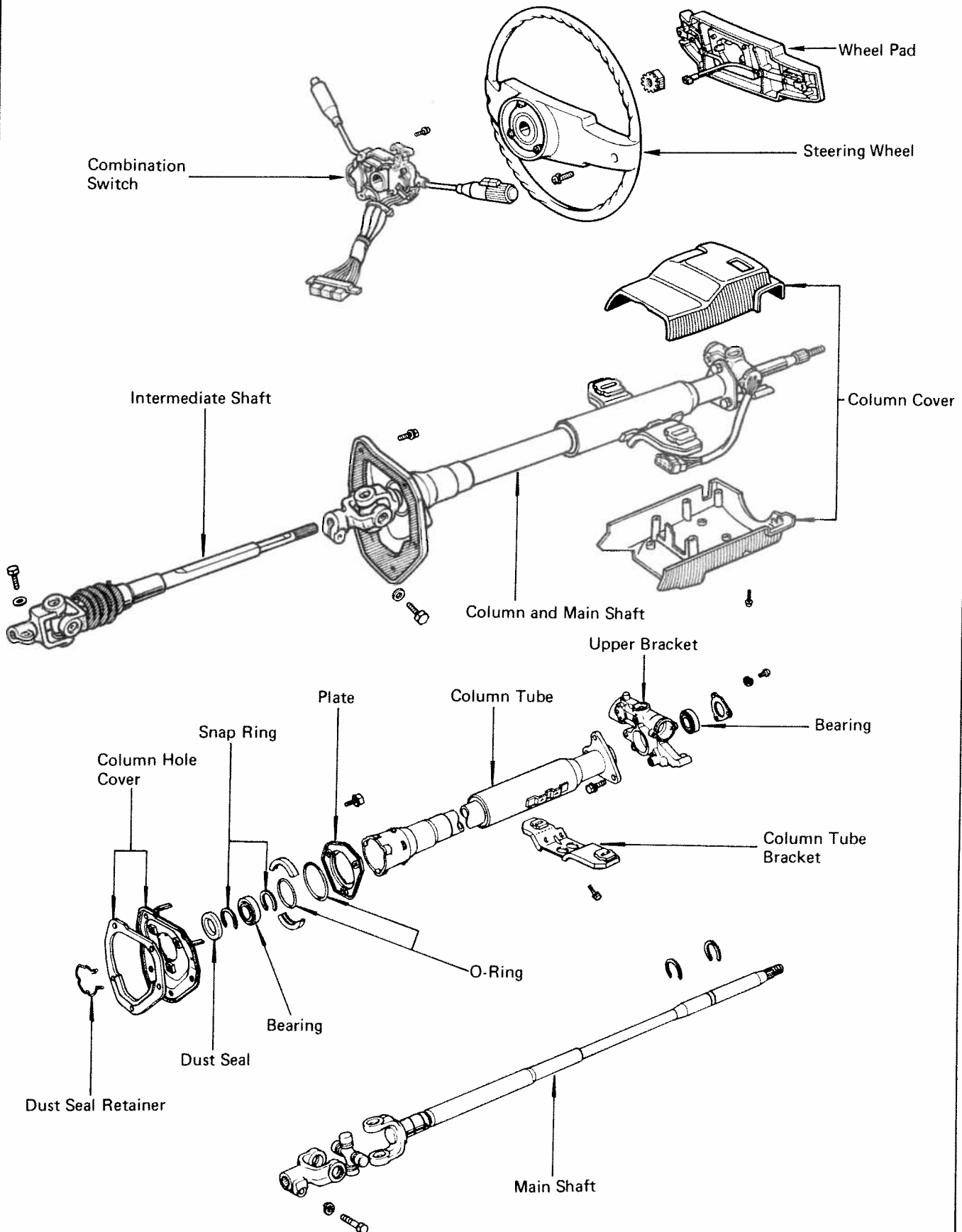
Torque: 300 – 400 kg-cm (22 – 28 ft-lb)

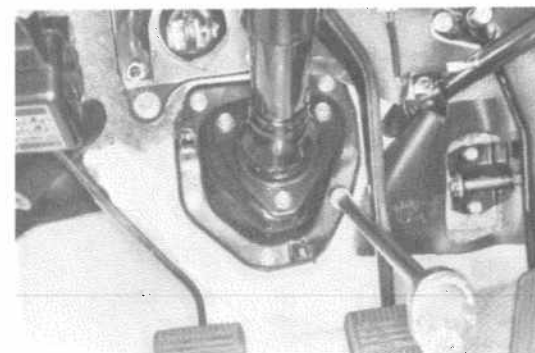
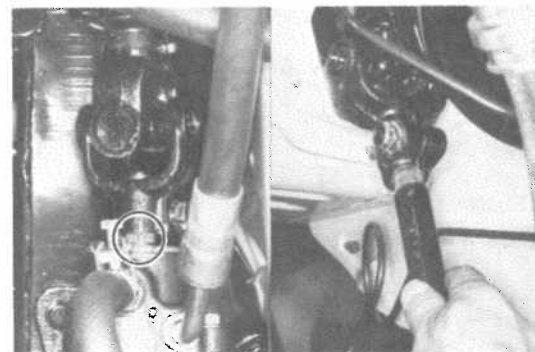
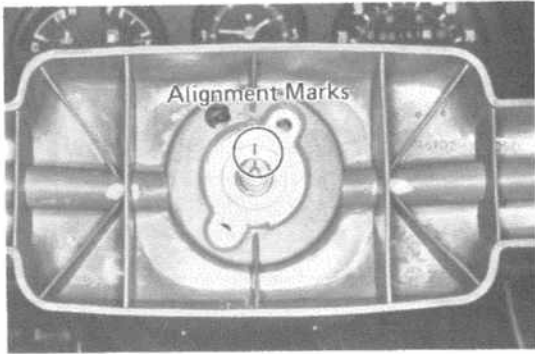
- (e) Install the horn button.

10. CONNECT NEGATIVE CABLE TO BATTERY



STEERING MAIN SHAFT (4x4)





REMOVAL OF STEERING MAIN SHAFT

1. REMOVE NEGATIVE CABLE FROM BATTERY

2. REMOVE STEERING WHEEL

- (a) Remove horn button screws on the back of the steering wheel and pull off the button.
- (b) Place alignment marks on the steering wheel and shaft to ensure correct reassembly.
- (c) Remove the steering wheel nut.
- (d) Using a steering wheel remover*, remove the steering wheel.

*SST 09609-20010

3. REMOVE STEERING LOWER COVER AND UPPER COVER

4. REMOVE COMBINATION SWITCH

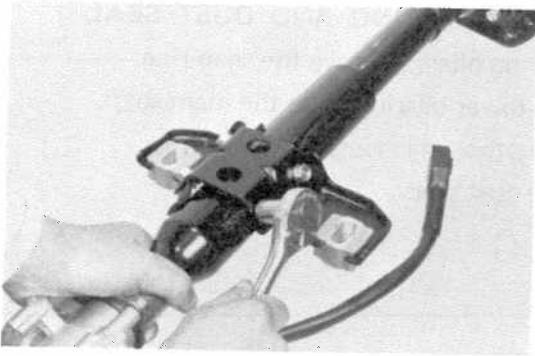
5. REMOVE INTERMEDIATE SHAFT

- (a) Place an alignment mark on the joint yoke and worm shaft to ensure correct reassembly.
- (b) Loosen the joint yoke bolts.
- (c) Compress and remove the intermediate shaft and remove it.

6. REMOVE FIVE MOUNTING BOLTS FROM COLUMN HOLE COVER

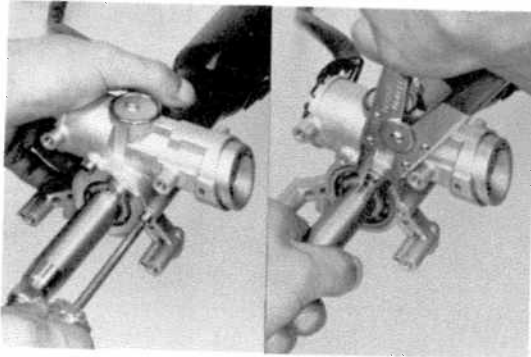
7. REMOVE COLUMN BRACKET MOUNTING BOLTS AND PULL OUT MAIN SHAFT

Remove two bracket mounting bolts. Carefully pull out the main shaft.



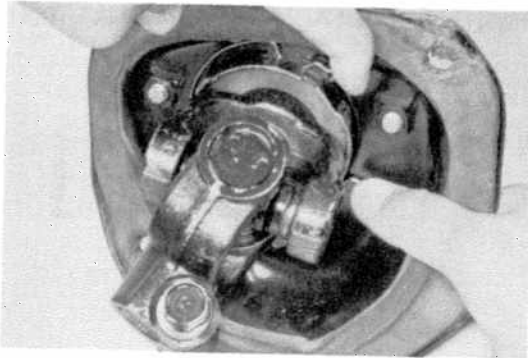
DISASSEMBLY OF STEERING MAIN SHAFT

1. REMOVE STEERING COLUMN BRACKET

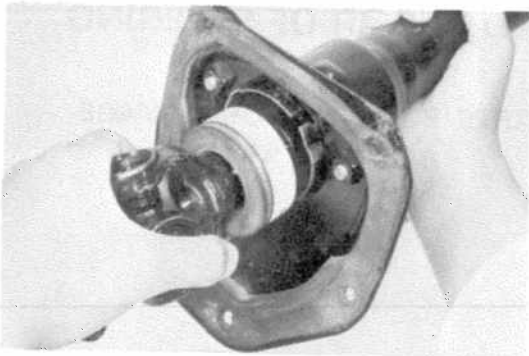


2. REMOVE UPPER BEARING RETAINER AND SNAP RING

- (a) Remove the bearing retainer from the upper bracket.
- (b) Using snap ring pliers, remove the snap ring.



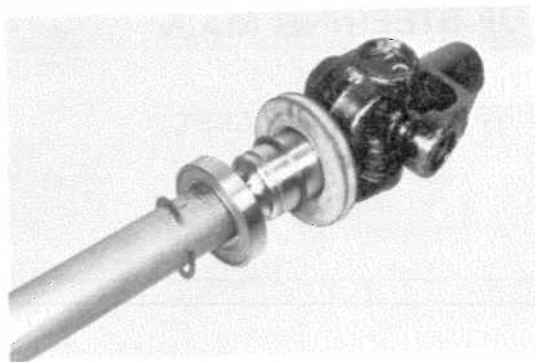
3. REMOVE DUST SEAL RETAINER



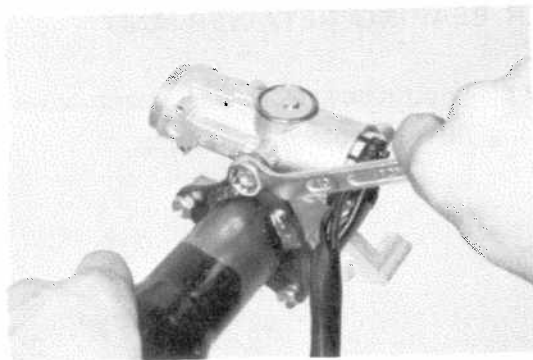
4. PULL OUT STEERING MAIN SHAFT



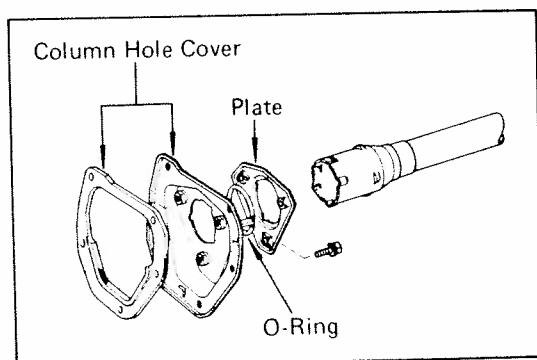
5. REMOVE LOWER BEARING SUPPORTS AND O-RING



6. REMOVE LOWER BEARING AND DUST SEAL
 - (a) Using snap ring pliers, remove the snap ring.
 - (b) Pull out the lower bearing from the main shaft.
 - (c) Remove the other snap ring.
 - (d) Remove the dust seal.



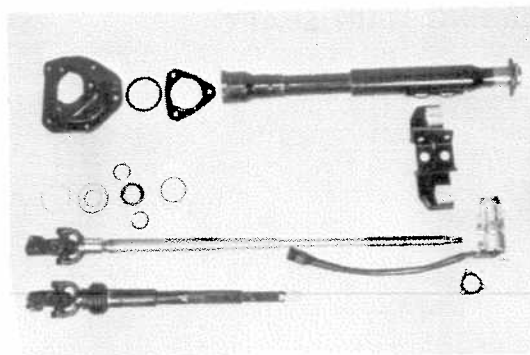
7. REMOVE UPPER BRACKET FROM COLUMN TUBE



8. REMOVE COLUMN HOLE COVER FROM COLUMN TUBE

Remove the following parts from the column tube.

- (a) Column hole cover
- (b) O-ring
- (c) Plate



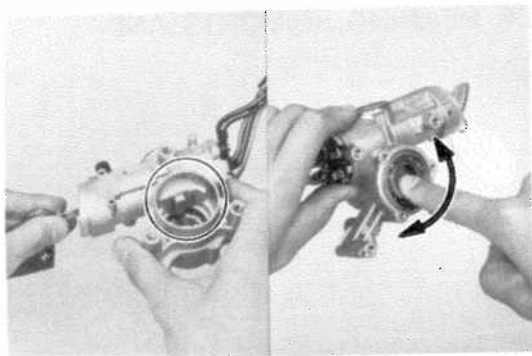
INSPECTION AND REPAIR OF STEERING MAIN SHAFT

1. CHECK ALL PARTS FOR WEAR OR DAMAGE

2. CHECK THAT STEERING LOCK MECHANISM OPERATES PROPERLY

3. CHECK BEARING ROTATION CONDITION

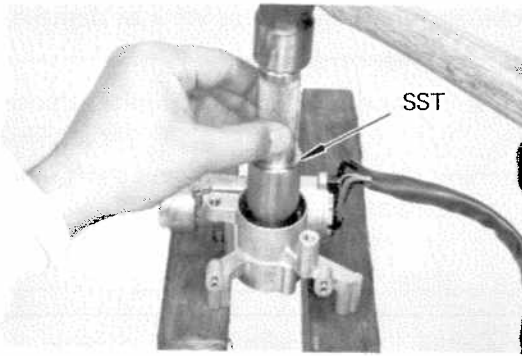
If the bearing does not rotate smoothly, replace the bearing.



4. IF NECESSARY, REPLACE BEARING

(a) Using a driver*, remove the bearing.

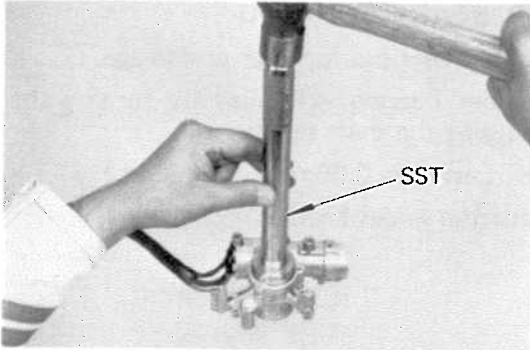
*SST 09620-30010 or Commercial driver



(b) Coat the new bearing with multipurpose grease.

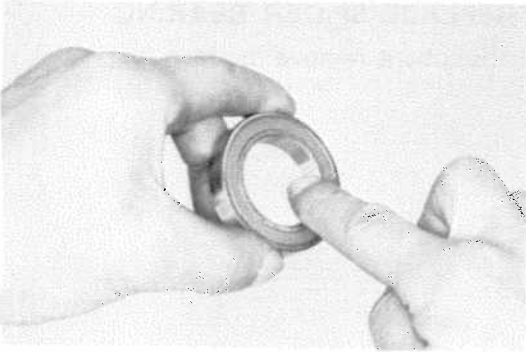
(c) Using a driver*, install the new bearing.

*SST 09620-30010 or Commercial driver

**5. INSPECT MAIN SHAFT LOWER BEARING**

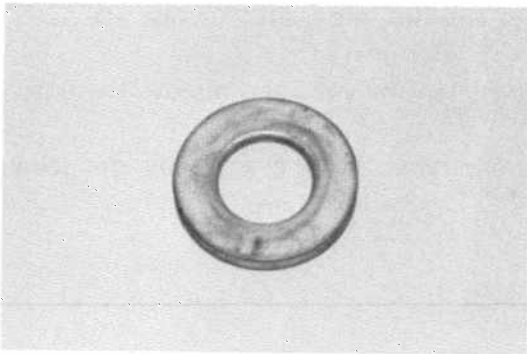
Check the lower bearing for wear or damage.

If the bearing is worn or damaged, replace it.

**6. INSPECT DUST SEAL**

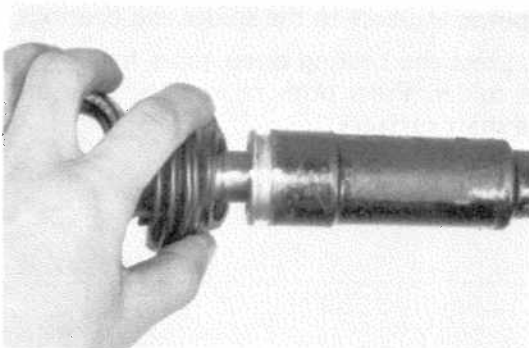
Check the dust seal for wear or damage.

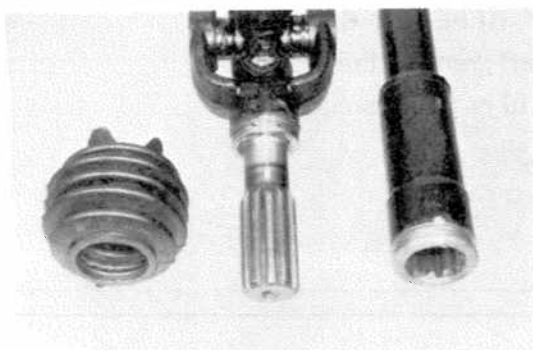
If the dust seal is worn or damaged, replace it.

**7. INSPECT INTERMEDIATE SHAFT**

(a) Place alignment marks on the yoke and shaft.

(b) Pull the yoke out of the shaft.





- (c) Check the yoke and shaft splines for wear or damage.
- (d) Check the boot for wear or damage.
- (e) Coat the yoke spline and boot lip, with multipurpose grease.
- (f) Align the matching marks on the yoke and shaft, and assemble the intermediate shaft.

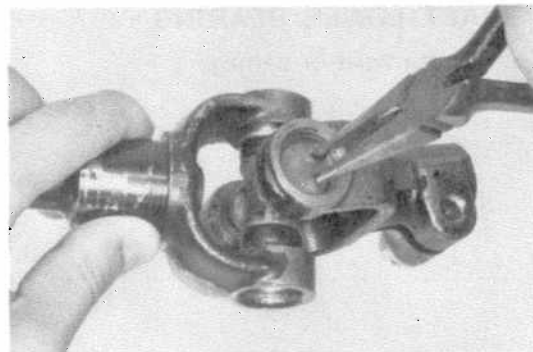


8. INSPECT SPIDER BEARINGS (4 x 4)

- (a) Inspect the spider bearings for wear or damage.
- (b) Check the spider bearing axial play by turning the yoke while holding the shaft tightly.

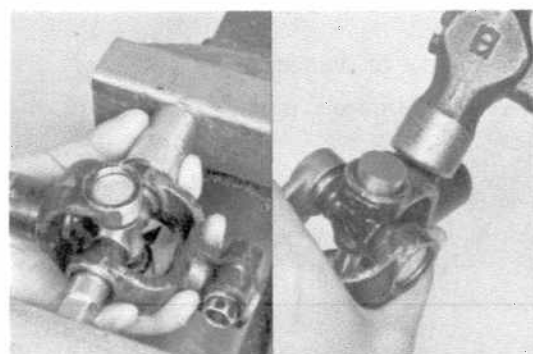
Bearing axial play: Less than 0.05 mm (0.0020 in.)

If necessary, replace the spider bearing.



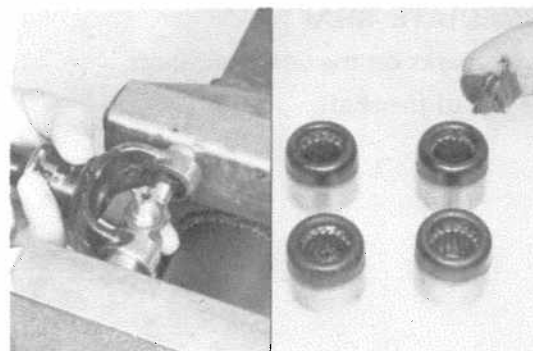
9. IF NECESSARY, REPLACE SPIDER BEARING

- (a) Using needle nose pliers, remove the snap ring.

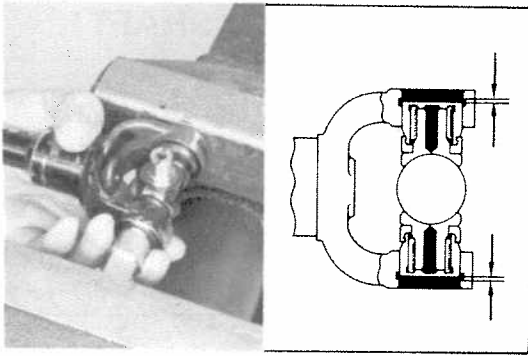


- (b) Using a socket and vice, press out the yoke side outer race.
- (c) Using a hammer, tap the yoke and remove the outer race.

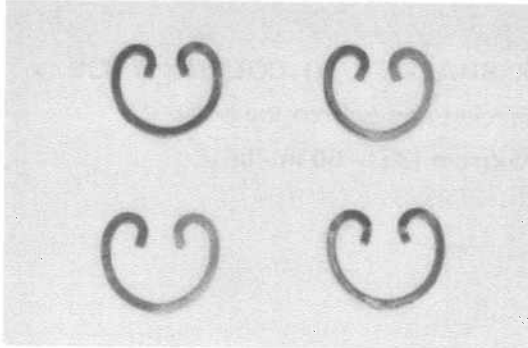
NOTE: Remove the other bearing races by the same procedure.



- (d) Apply multipurpose grease to the spider and bearings.
- (e) Using a vice, press the bearing outer races from both sides on the spider. Press both races until they are level with the shaft surfaces.



- (f) Using a socket and vice, adjust both races so that the snap ring grooves are at maximum and equal widths.



- (g) Select two snap rings with the same thickness, which will allow 0 – 0.05 mm (0 – 0.0020 in.) axial play.

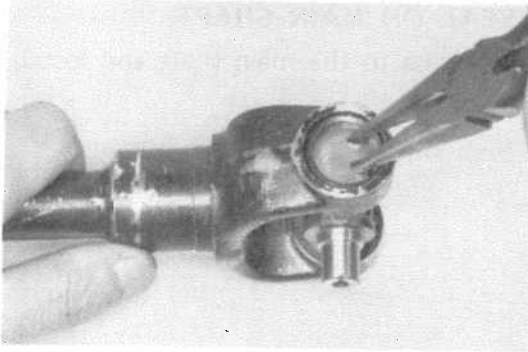
NOTE: Do not reuse the snap rings.

Thickness of snap ring

Mark	Thickness	mm (in.)
None	1.175–1.225	(0.0463–0.0482)
Brown	1.225–1.275	(0.0482–0.0502)
Blue	1.275–1.325	(0.0502–0.0522)

- (h) Using needle nose pliers, install the snap rings.

NOTE: Install the bearing outer races in the yoke side by the same procedure.

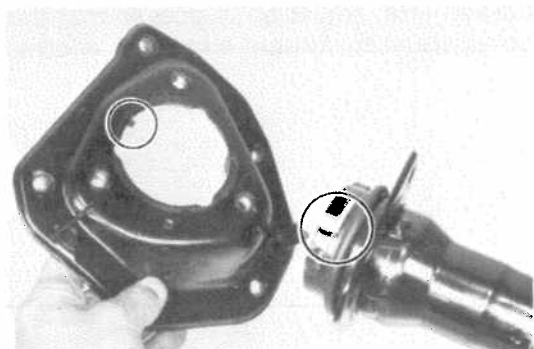


- (i) Using a hammer, tap the shaft and yoke until the clearance between the bearing outer race and snap ring is zero.

- (j) Check the spider bearing.

- Check that the spider bearing moves smoothly.
- Check the spider bearing axial play.

Bearing axial play: Less than 0.05 mm (0.0020 in.)



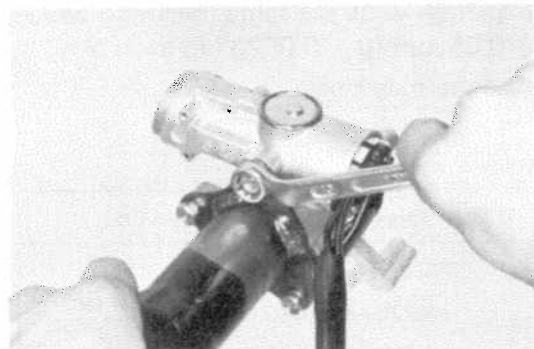
ASSEMBLY OF STEERING MAIN SHAFT (See illustration on page 16-13)

1. INSTALL COLUMN HOLE COVER ON COLUMN TUBE

Install the following parts on the column tube.

- (a) Plate
- (b) O-ring
- (c) Column hole cover

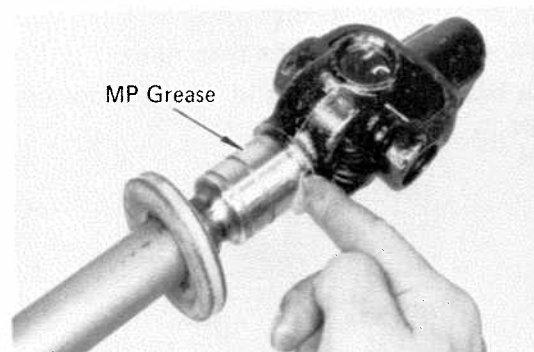
NOTE: Align the protrusion so that it fits into the column tube groove.



2. INSTALL UPPER BRACKET TO COLUMN TUBE

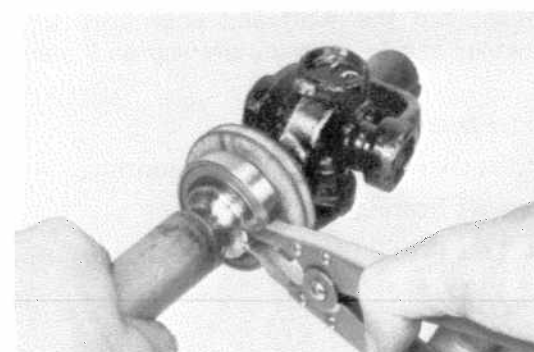
Install the upper bracket and tighten the bolts.

Torque: 40 – 70 kg-cm (35 – 60 in.-lb)



3. INSTALL DUST SEAL ON MAIN SHAFT

Apply multipurpose grease to the main shaft and install the dust seal.

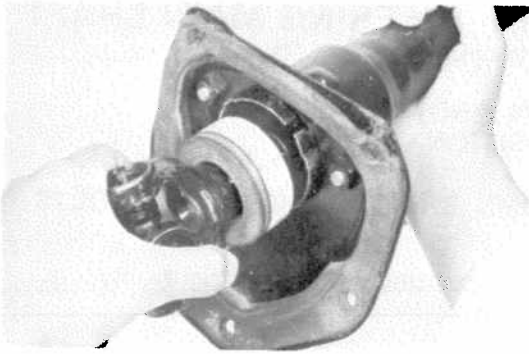


4. INSTALL LOWER BEARING ON MAIN SHAFT

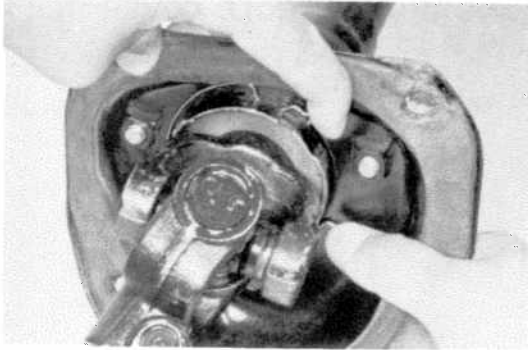
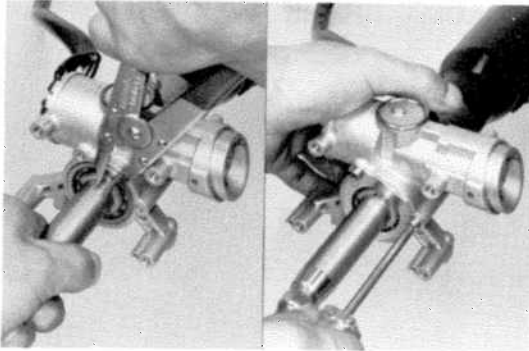
- (a) Using snap ring pliers, install the snap ring.
- (b) Install the lower bearing to the main shaft.
- (c) Install the other snap ring.



5. INSTALL O-RING AND BEARING SUPPORTS ON LOWER BEARING

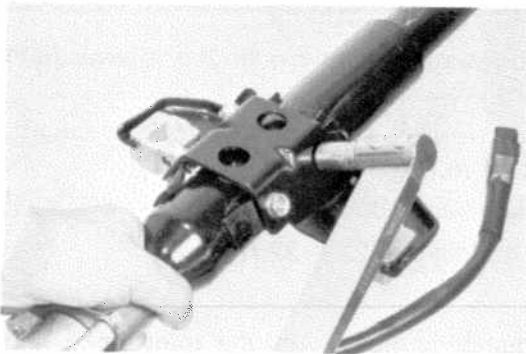
**6. INSERT MAIN SHAFT IN COLUMN TUBE**

Push the main shaft into the column tube.

**7. INSTALL DUST SEAL RETAINER TO COLUMN TUBE****8. INSTALL SNAP RING AND BEARING RETAINER**

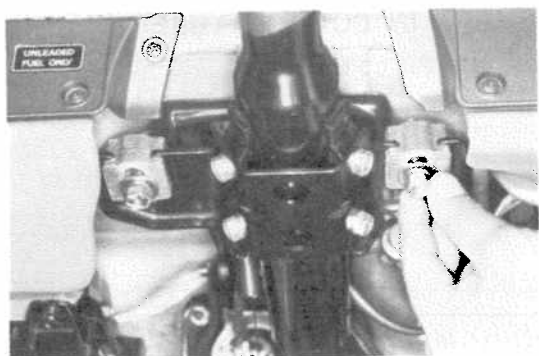
(a) Using snap ring pliers, install the snap ring.

(b) Install the upper bearing retainer.

**9. INSTALL COLUMN TUBE BRACKET**

Tighten the column tube bracket mounting bolts.

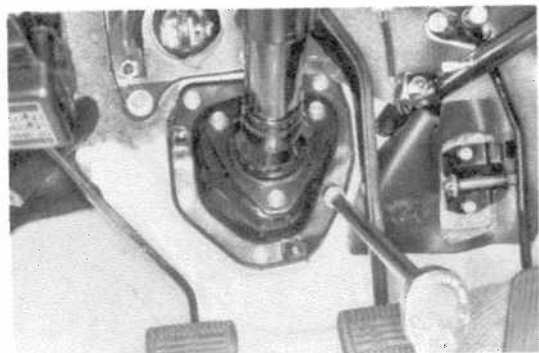
Torque: 150 – 220 kg-cm (11 – 15 ft-lb)



INSTALLATION OF STEERING MAIN SHAFT (See illustration on page 16-13)

1. PLACE COLUMN AND MAIN SHAFT IN INSTALLED POSITION
2. INSTALL COLUMN BRACKET MOUNTING BOLTS BY HAND

Install two bracket mounting bolts finger tight only.



3. INSTALL STEERING COLUMN HOLE COVER

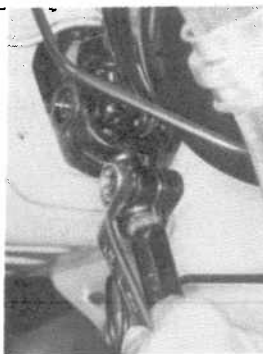
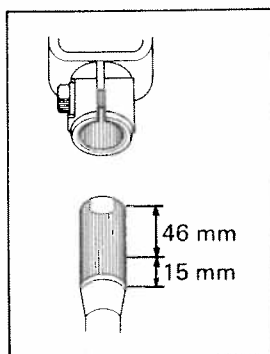
Tighten the bolts.

Torque: 60 – 90 kg-cm (53 – 78 in.-lb)



4. TORQUE TWO COLUMN BRACKET MOUNTING BOLTS

Torque: 190 – 310 kg-cm (14 – 22 ft-lb)



5. INSTALL INTERMEDIATE SHAFT

- (a) Align the non-toothed portions of the intermediate shaft and joint yoke.
- (b) Insert the intermediate shaft into the yoke to a depth of 46 mm (1.81 in.)
- (c) Tighten the joint yoke bolt.

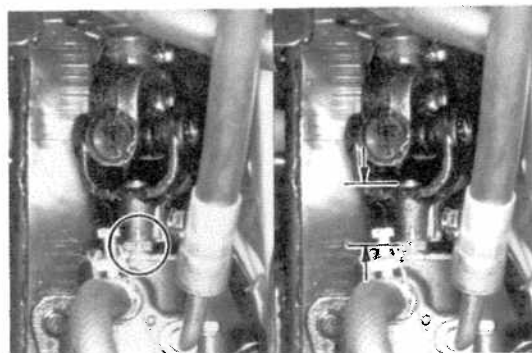
Torque: 300 – 450 kg-cm (22 – 32 ft-lb)

- (d) Align the matching marks on the joint yoke and worm shaft.
- (e) Compress and install the intermediate shaft onto the worm shaft.

Depth: Manual steering 27 mm (1.06 in.)
Power steering 34 mm (1.34 in.)

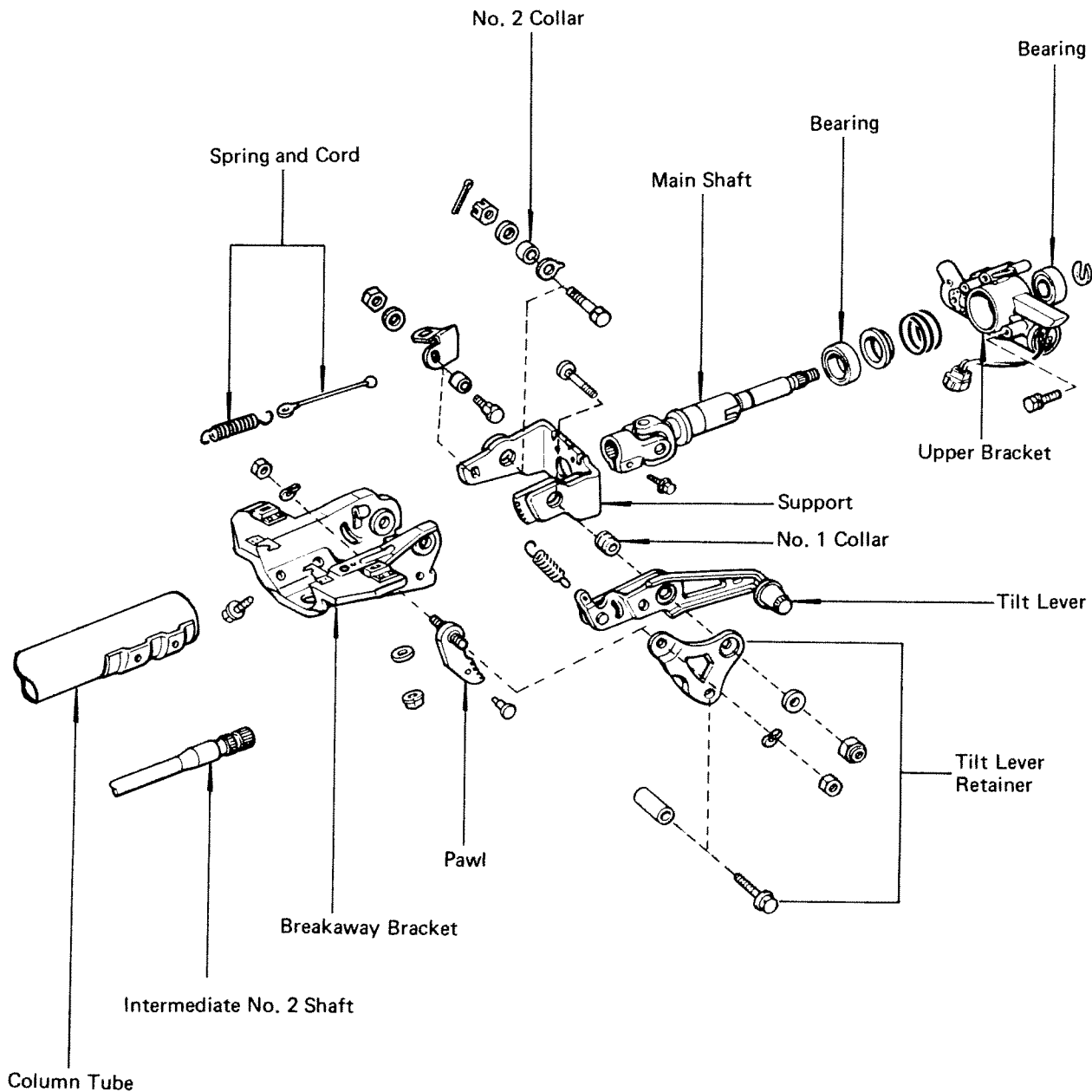
- (f) Tighten the joint yoke bolt.

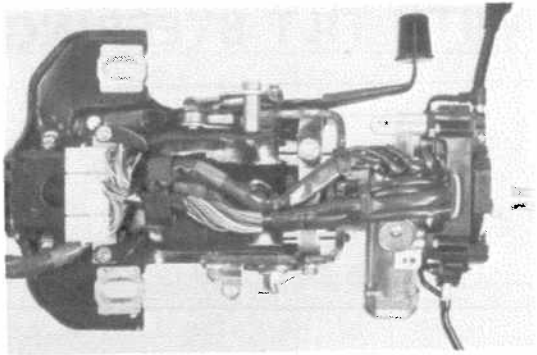
Torque: 300 – 450 kg-cm (22 – 32 ft-lb)



6. INSTALL COMBINATION SWITCH, COLUMN COVER AND STEERING WHEEL (See page 16-12)

STEERING MAIN SHAFT WITH TILT STEERING





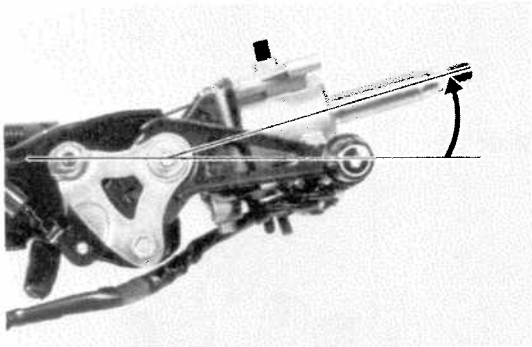
REMOVAL OF STEERING MAIN SHAFT (See page 16-5 or 16-14)

DISASSEMBLY OF STEERING MAIN SHAFT AND TILT MECHANISM

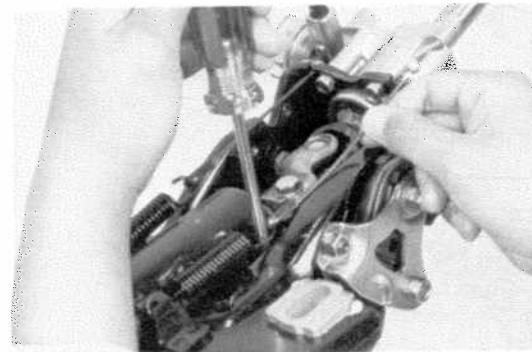
1. REMOVE COMBINATION SWITCH

2. REMOVE TENSION SPRINGS AND CORDS

(a) Tilt the main shaft fully upward.

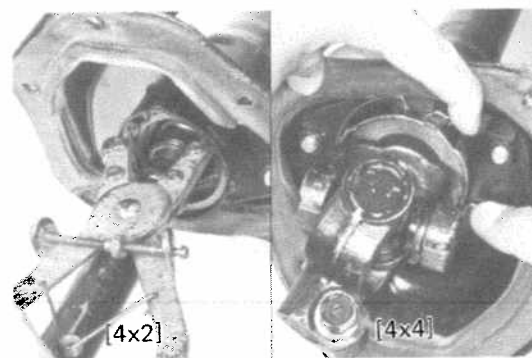


(b) Pry the spring and remove the cord and spring.



3. REMOVE SNAP RING FROM COLUMN TUBE (4x2)

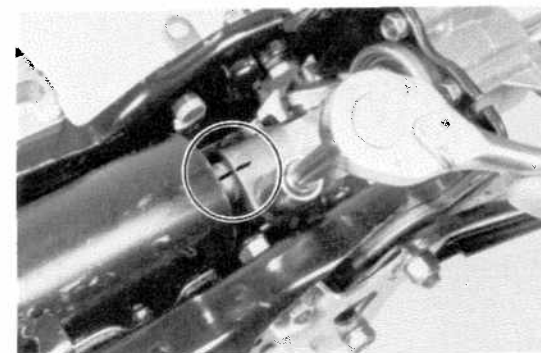
REMOVE DUST SEAL RETAINER FROM COLUMN
TUBE (4x4)

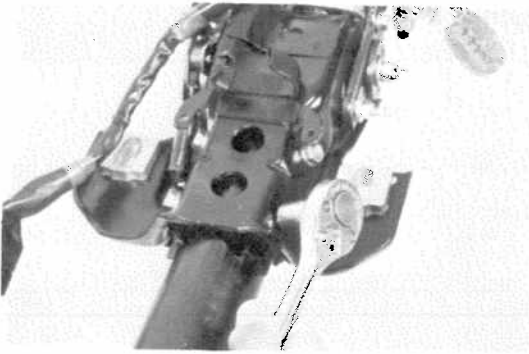


4. DISCONNECT INTERMEDIATE SHAFT AND MAIN SHAFT

(a) Place an alignment mark on the intermediate shaft
and universal joint.

(b) Remove the joint bolt, and pull out the intermediate
shaft from the column tube.

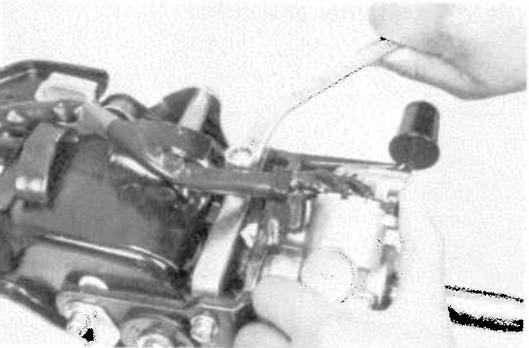




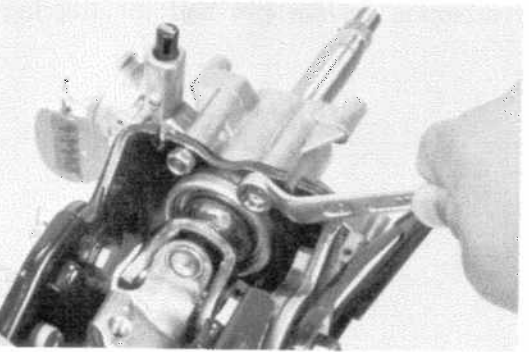
5. REMOVE COLUMN TUBE FROM BREAKAWAY BRACKET

Remove four bracket bolts.

6. REMOVE COLUMN HOLE COVER FROM COLUMN TUBE (See page 16-7)

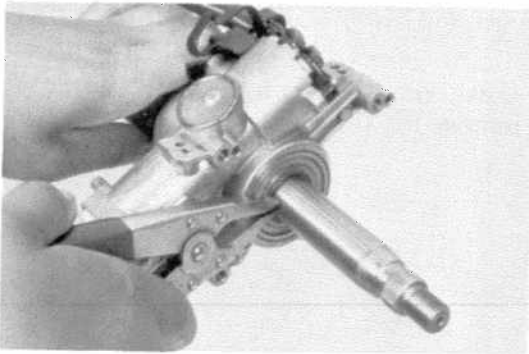


7. REMOVE SUPPORT BRACKET



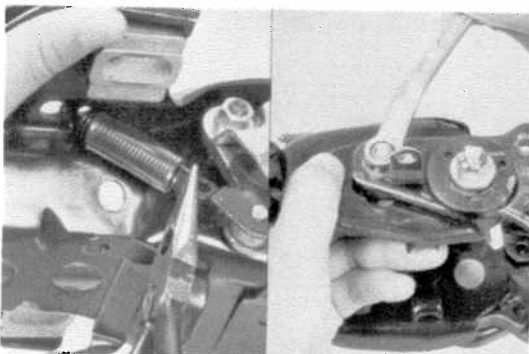
8. DISCONNECT UPPER BRACKET FROM TILT STEERING SUPPORT

Remove three bolts and disconnect the bracket from support.



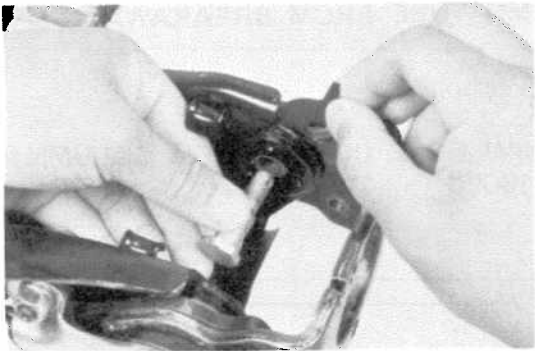
9. REMOVE MAIN SHAFT FROM UPPER BRACKET

- (a) Using snap ring pliers, remove the snap ring.
- (b) Pull out the main shaft from the bracket.

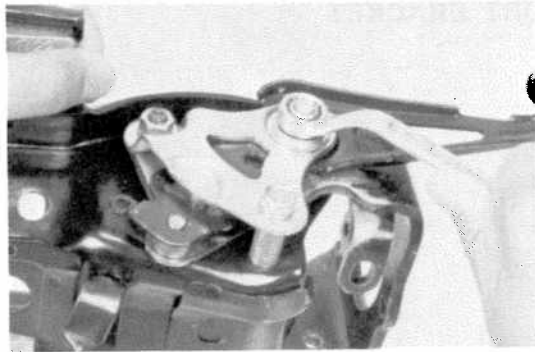


10. DISASSEMBLE TILT STEERING SUPPORT AND BREAKAWAY BRACKET

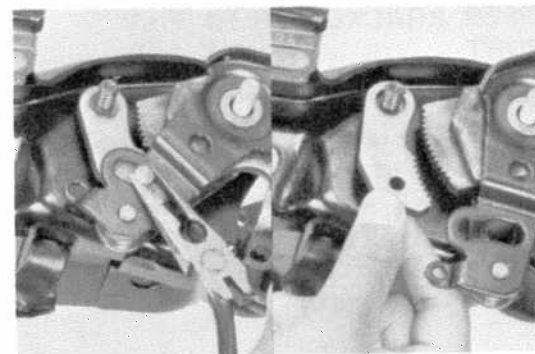
- (a) Remove the tension spring from the tilt lever.
- (b) Remove the support stopper bolt.



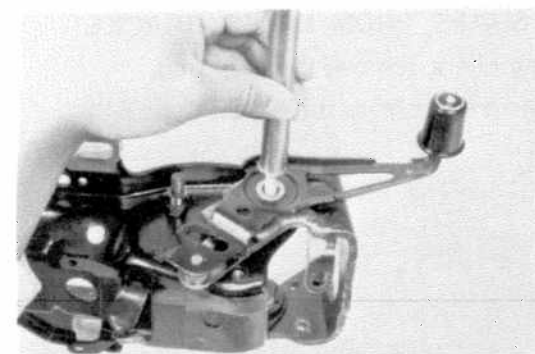
(c) Remove the bolt and support shim.



(d) Remove the tilt lever retainer and collar.



(e) Remove the reclining release pin and tilt steering pawl.

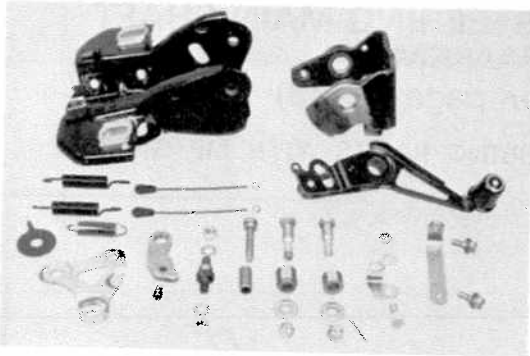


(f) Using a brass bar and hammer, drive out the serration bolt.

(g) Separate the breakaway bracket from the tilt steering support, and remove the tilt lever and collars.

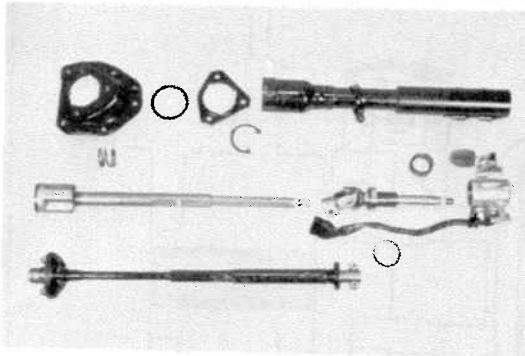


(h) Remove the tilt steering pawl set bolt.

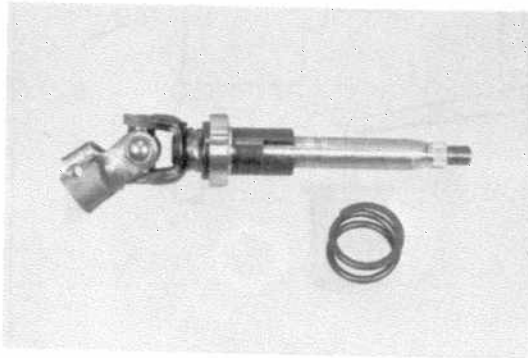


INSPECTION AND REPAIR OF STEERING MAIN SHAFT

1. INSPECT TILT STEERING PARTS FOR WEAR OR DAMAGE

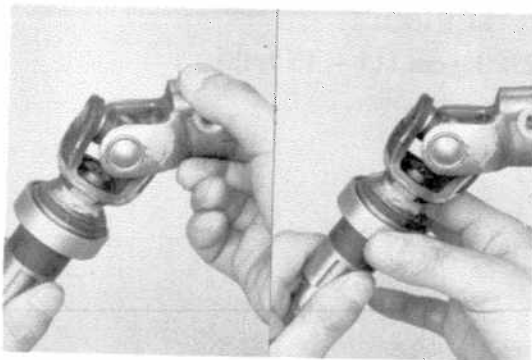


2. INSPECT UPPER BRACKET, MAIN SHAFT AND INTERMEDIATE SHAFT FOR WEAR OR DAMAGE
(See page 16-7)

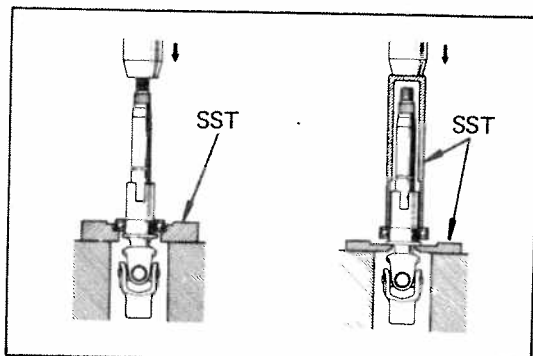


3. INSPECT MAIN SHAFT, THRUST COLLAR AND SPRING

- (a) Inspect the main shaft for bending.
- (b) Inspect the collar for damage.
- (c) Inspect the spring for deformation.



- (d) Inspect the universal joint for play or binding.
 - (e) Inspect the lower bearing rotating condition.
- If the bearing does not rotate smoothly, replace it.



4. IF NECESSARY, REPLACE LOWER BEARING

- (a) Using a press and plate*, remove the lower bearing from the main shaft.

*SST 09527-21011 or Commercial tool

- (b) Pack multipurpose grease into the bearing.

- (c) Using a press, plate and driver*, assemble the lower bearing and main shaft.

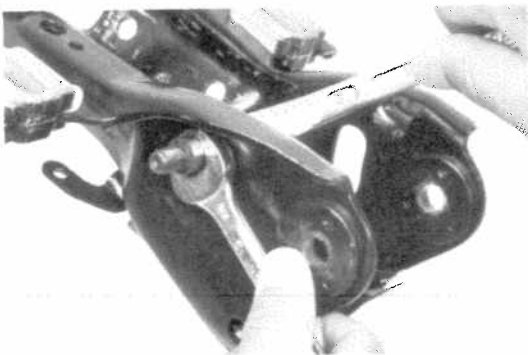
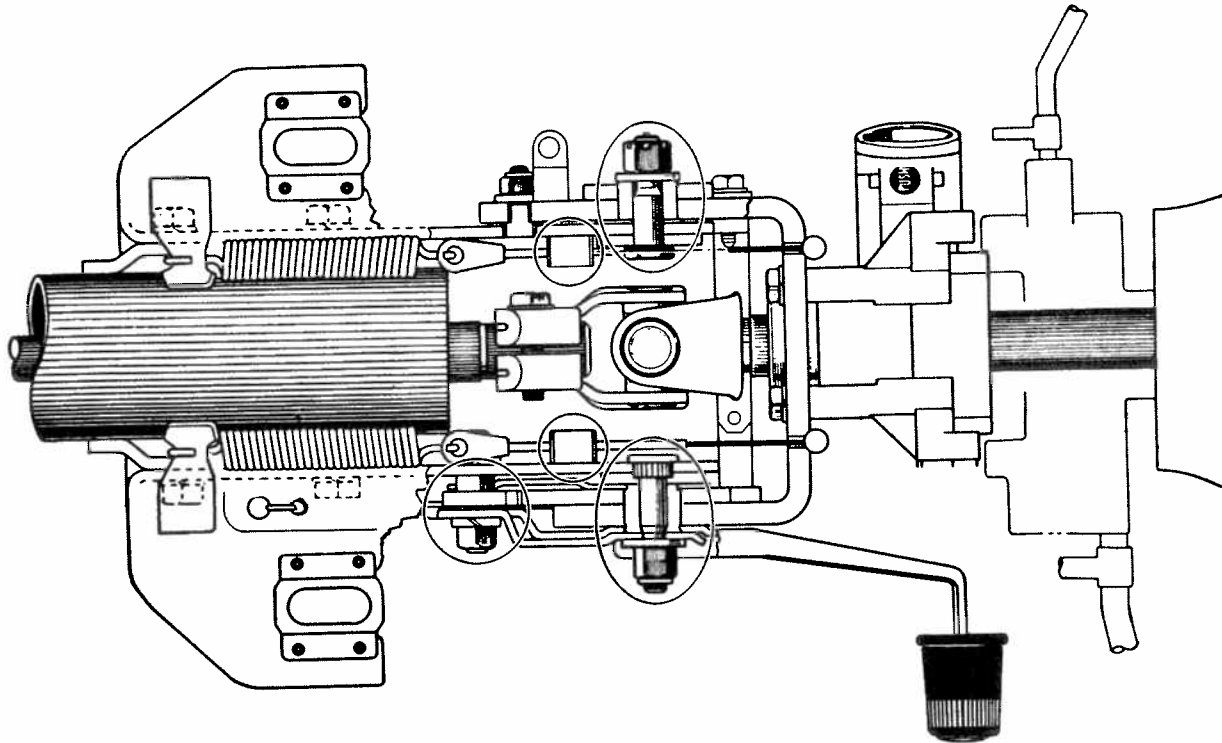
*SST 09236-28011 and 09612-22010 or Commercial tools

ASSEMBLY OF STEERING MAIN SHAFT AND TILT MECHANISM

(See illustration on page 16-23)

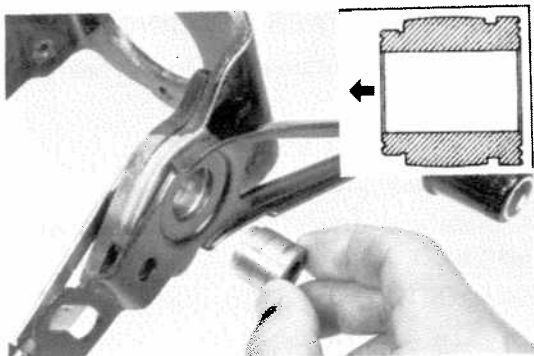
1. COAT ALL RUBBING PARTS WITH MP GREASE

Parts Requiring MP Grease



2. ASSEMBLE PAWL SET BOLT

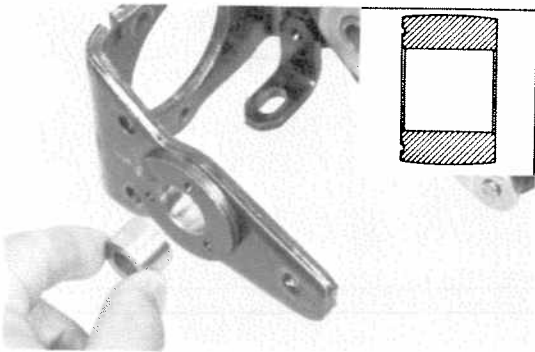
Torque: 150 – 220 kg-cm (11 – 15 ft-lb)



3. ASSEMBLE TILT LEVER TO SUPPORT

(a) Select a collar No.1 which will eliminate all play between the support and collar, and install it.

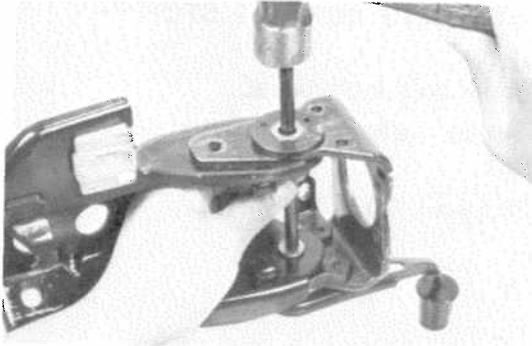
Part No.	Outer diameter mm (in.)	
45813-22010	17.996–18.003	(0.7085–0.7088)
45813-22020	18.003–18.010	(0.7088–0.7091)
45813-22030	18.010–18.017	(0.7091–0.7093)
45813-22040	18.017–18.024	(0.7093–0.7096)
45813-22050	17.989–17.996	(0.7082–0.7085)



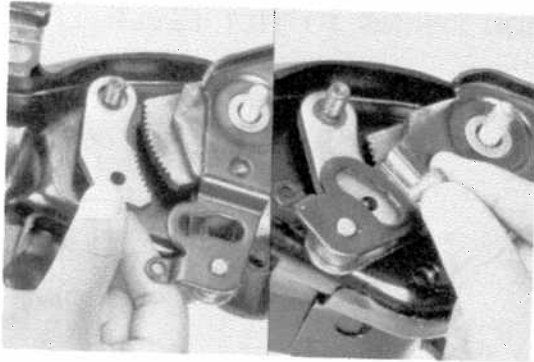
- (b) Select a collar No.2 which will eliminate all play between the support and collar, and install it.

Part No.	Outer diameter	mm (in.)
45814-22010	17.982–18.000	(0.7080–0.7087)
45814-22020	18.000–18.018	(0.7087–0.7094)

- (c) Drive in the serration bolt to the support.

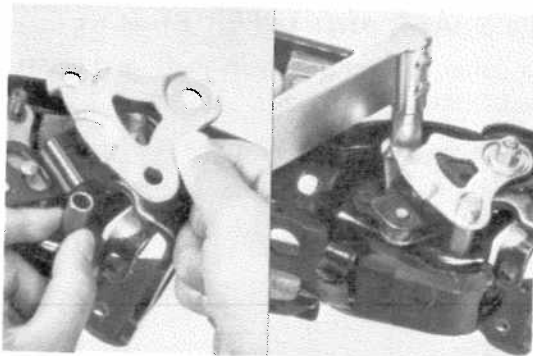


- (d) Install the tilt steering pawl and the reclining release pin.



- (e) Assemble the collar and tilt lever retainer.

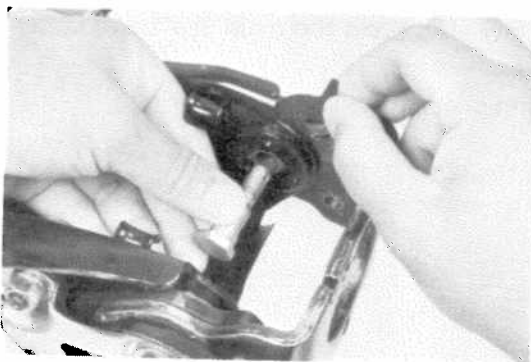
Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

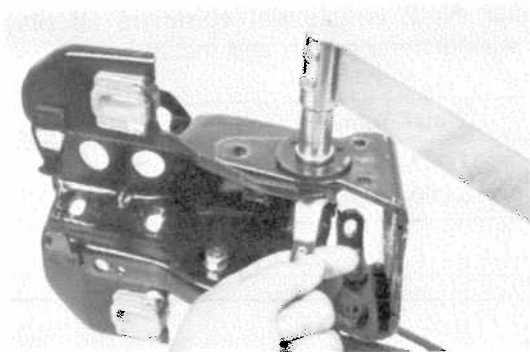


4. INSTALL SHIM, BOLT AND NUT

- (a) Select a shim which fits snugly when pressed in by hand.

Part No.	Thickness	mm (in.)
45815-22010	0.2	(0.008)
45815-22020	0.5	(0.020)
45815-22030	0.8	(0.031)
45815-22040	1.4	(0.055)
45815-22050	1.8	(0.071)





(b) Install the shim, bolt, washer and a nut.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

(c) Install a cotter pin.



5. INSTALL TILT STEERING SUPPORT STOPPER BOLT

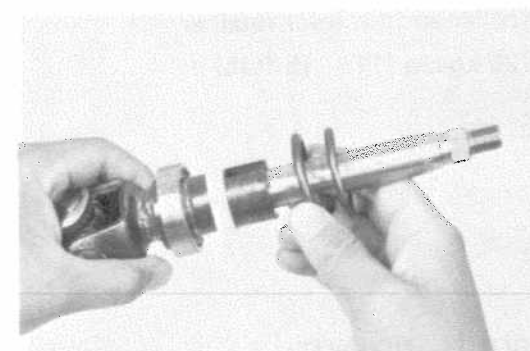
(a) Install the stopper bolt and bracket.

(b) Tighten the nut so the bracket is parallel with the tilt steering support.

Torque: 80 – 120 kg-cm (70 – 104 in.-lb)

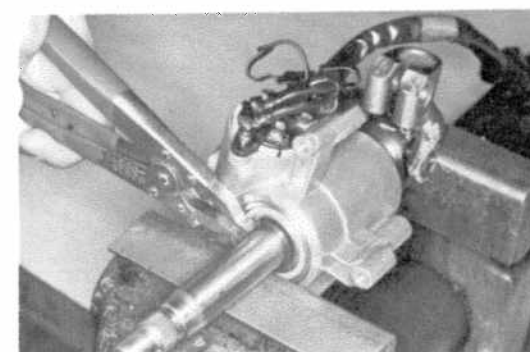


6. INSTALL TENSION SPRING TO TILT LEVER



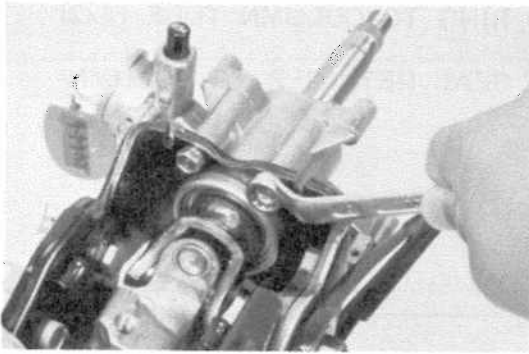
7. ASSEMBLE MAIN SHAFT AND UPPER BRACKET

(a) Assemble the collar, spring and main shaft, and insert them into the bracket.



(b) Using a soft jaw vise, press the main shaft and upper bearing.

(c) Using snap ring pliers, install a new snap ring.



8. INSTALL UPPER BRACKET WITH MAIN SHAFT TO COLUMN BRACKET

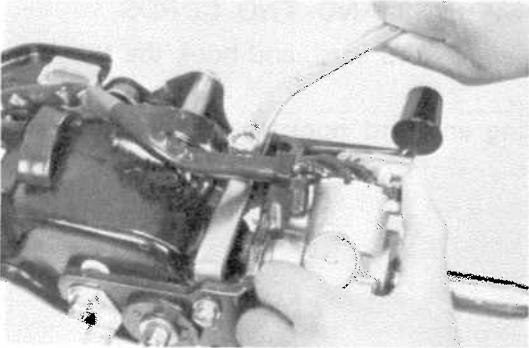
- (a) Apply anaerobic adhesive and sealant [THREE BOND 1324 (Part No. 08833-00070) or equivalent] to 1 or 2 threads of the bolt end.

NOTE: This adhesive will not harden while exposed to air. It will act as a sealer or binding agent only when applied between clearances of thread, etc. and air is cut off.

- (b) Install the two bolts; one with a wiring clamp.

Torque: 60 – 90 kg-cm (53 – 78 in.-lb)

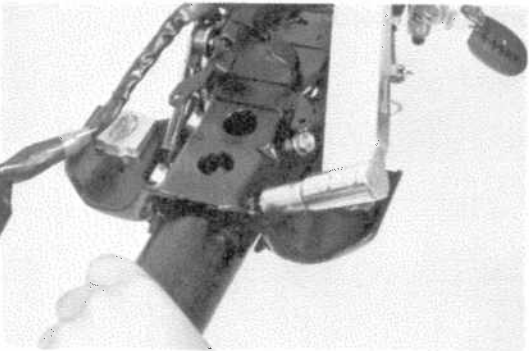
9. INSTALL SUPPORT BRACKET



10. INSTALL COLUMN HOLE COVER TO COLUMN TUBE

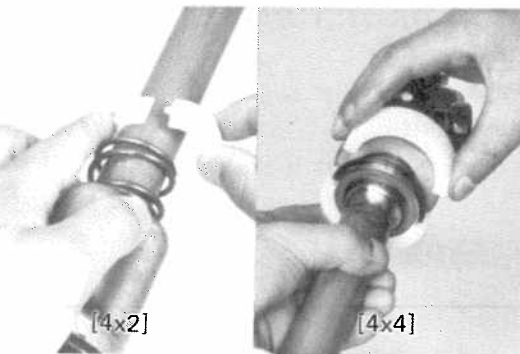
11. ASSEMBLE BREAKAWAY BRACKET TO COLUMN TUBE

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)



12. INSTALL SPRING AND SPRING RETAINER TO MAIN SHAFT (4x2)

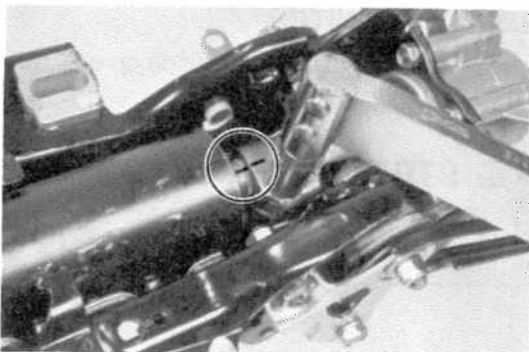
INSTALL O-RING AND BEARING SUPPORTS ON LOWER BEARING (4x4)

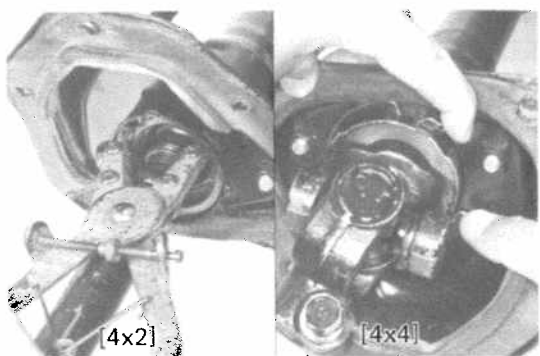


13. CONNECT MAIN SHAFT AND INTERMEDIATE SHAFT

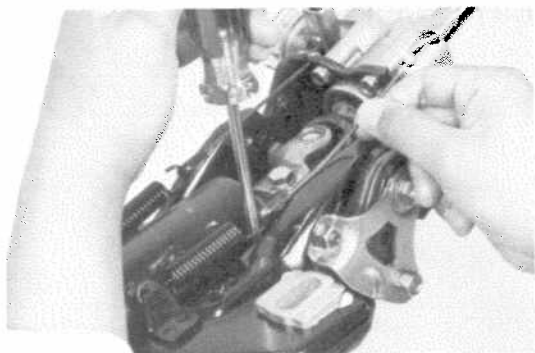
Align the matchmarks on the joint and intermediate shaft and tighten the bolt.

Torque: 200 – 300 kg-cm (15 – 21 ft-lb)

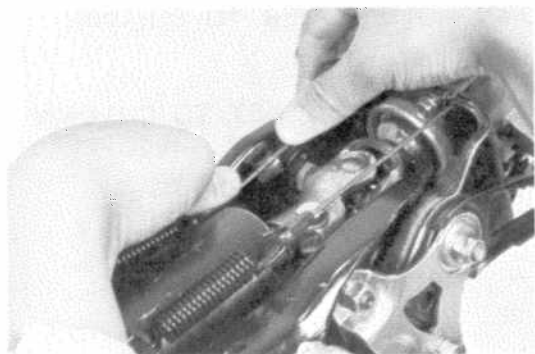


**14. INSTALL SNAP RING TO COLUMN TUBE (4x2)**

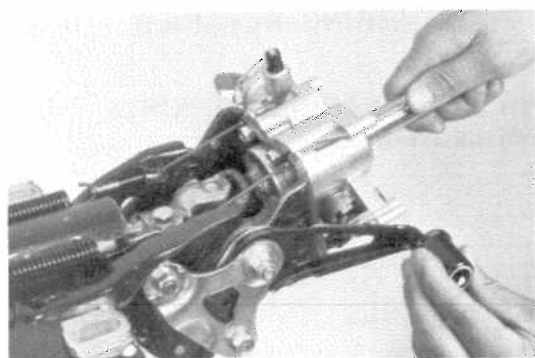
INSTALL DUST SEAL RETAINER TO COLUMN TUBE (4x4)

**15. INSTALL TWO SPRINGS AND TWO CORDS**

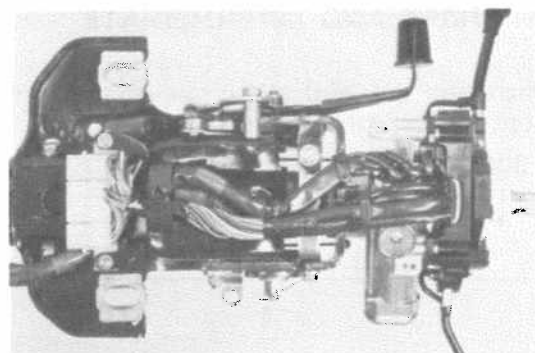
- (a) Connect the spring and cord, and hook the spring to the hanger.
- (b) Pry the spring end and hook the cord end to the support.



- (c) Hook the cords to the cord guides.

**16. CHECK OPERATION OF TILT STEERING LEVER AND SUPPORT**

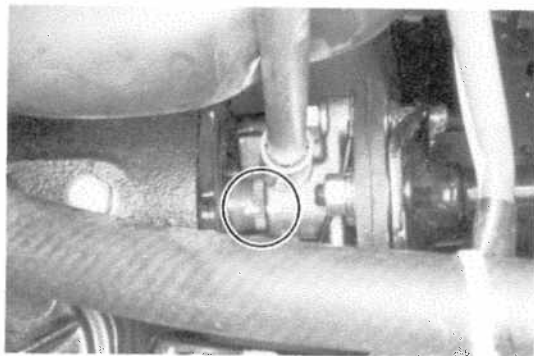
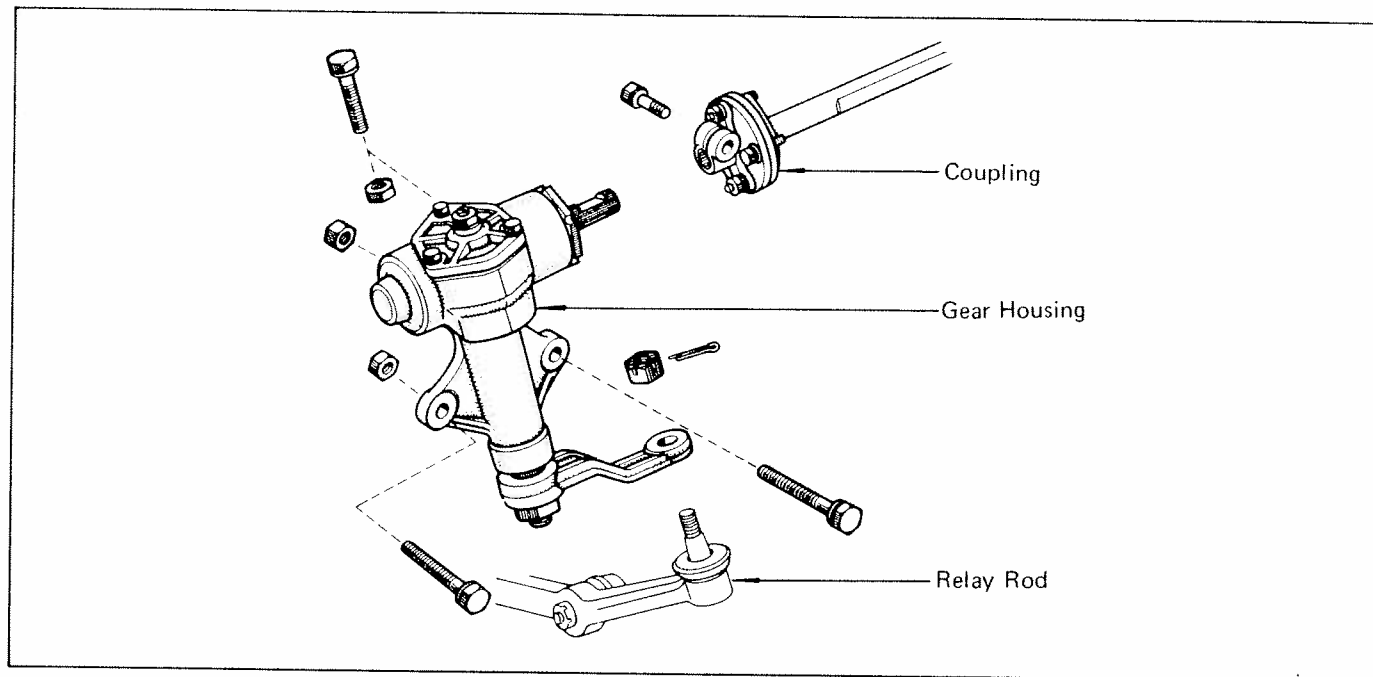
- (a) Check that there is no axial or horizontal play at the end of the main shaft.
- (b) Check that the main shaft locks securely in all six positions.

**17. INSTALL COMBINATION SWITCH**

- (a) Install the combination switch and wiring connector.
- (b) Clamp the wire.

INSTALLATION OF STEERING MAIN SHAFT
(See page 16-11 or 16-22)

STEERING GEAR HOUSING (4x2)

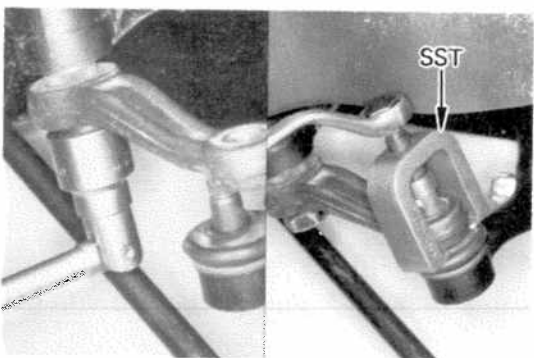


REMOVAL OF STEERING GEAR HOUSING

1. MARK COUPLING AND WORM SHAFT

Place an alignment mark on the coupling and worm shaft to ensure correct reassembly.

2. REMOVE COUPLING BOLT



3. DISCONNECT RELAY ROD FROM PITMAN ARM

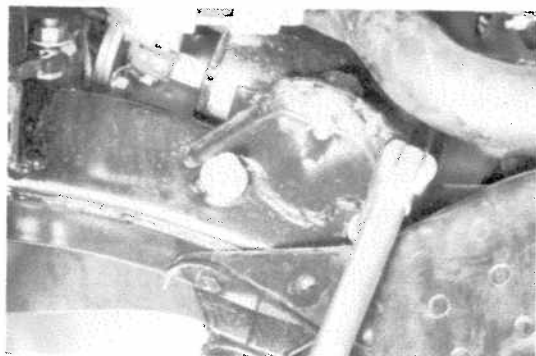
(a) Loosen the pitman arm set nut.

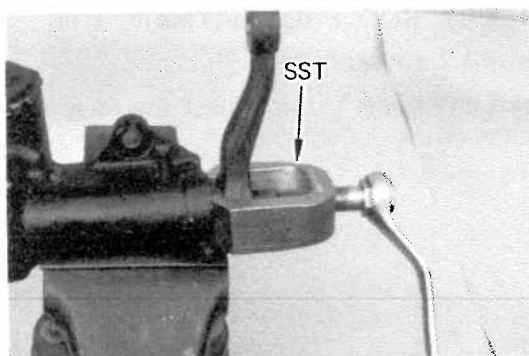
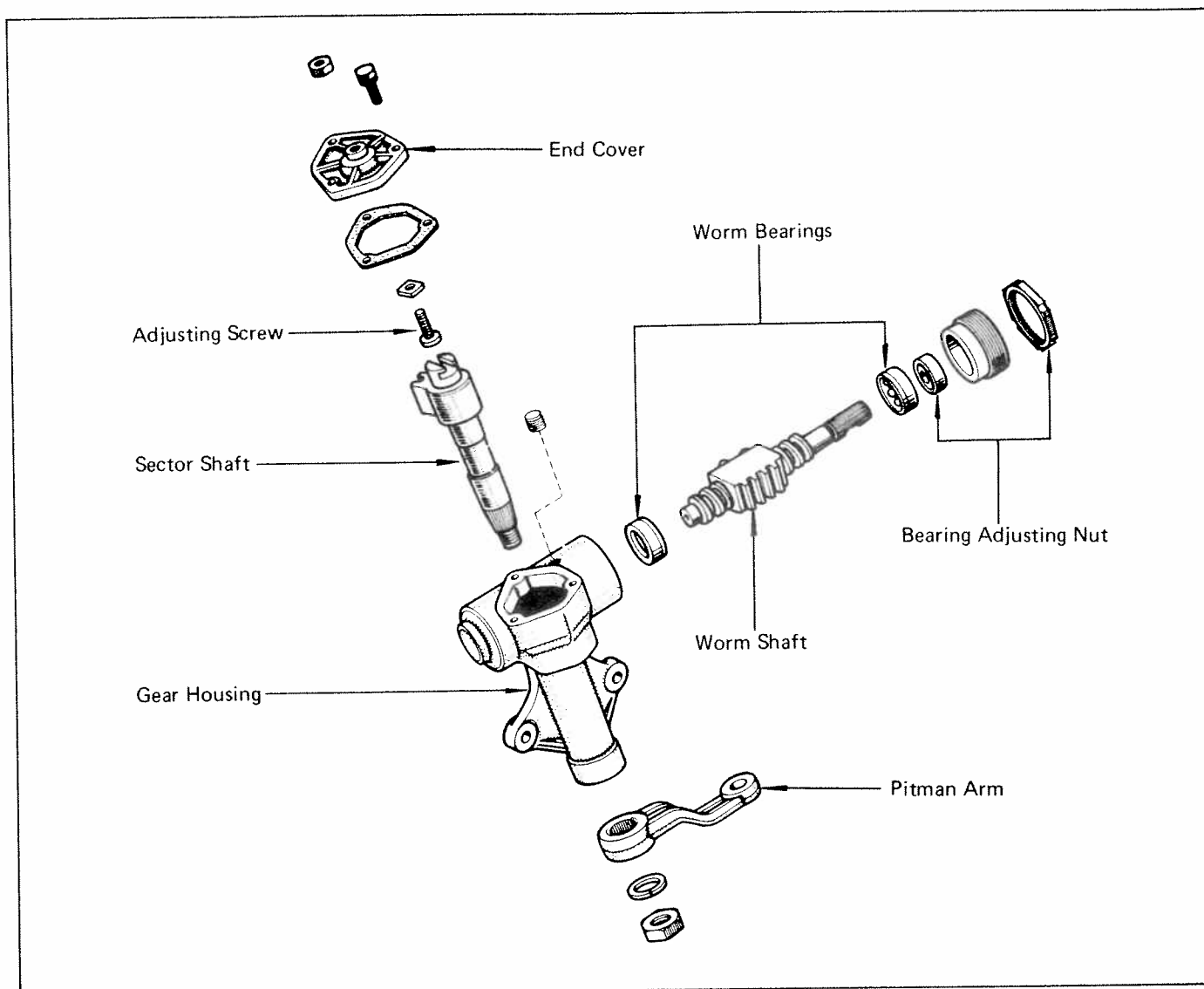
(b) Using a tie rod end puller*, disconnect the relay rod from the pitman arm.

*SST 09611-20014

4. REMOVE GEAR HOUSING

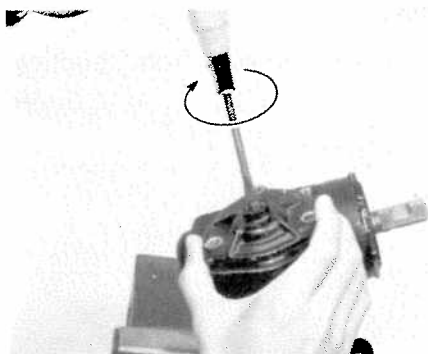
Remove three bolts and pull gear housing from coupling.

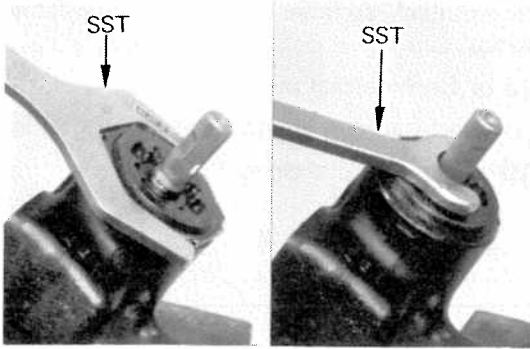




DISASSEMBLY OF STEERING GEAR HOUSING

1. REMOVE OIL FILLER PLUG AND DRAIN GEAR HOUSING OIL
 2. REMOVE PITMAN ARM
 - (a) Remove the pitman arm set nut.
 - (b) Using a pitman arm puller*, pull the pitman arm off the sector shaft.
- *SST 09610-55012
3. REMOVE END COVER AND SECTOR SHAFT
 - (a) Remove the adjusting screw lock nut and three bolts.
 - (b) Remove the end cover by tightening the adjusting screw.
 - (c) Pull the sector shaft from the housing.



**4. REMOVE LOCK NUT**

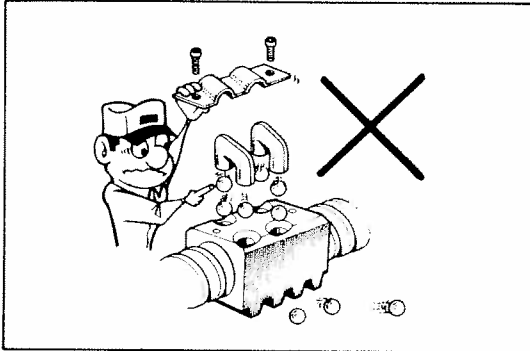
Using a lock nut wrench*, remove the lock nut.

*SST 09617-30040 or Commercial wrench

5. REMOVE BEARING ADJUSTING SCREW

Using a bearing adjusting screw wrench*, remove the adjusting screw.

*SST 09616-22010 or Commercial wrench

**6. REMOVE WORM SHAFT**

Pull the worm shaft out of the gear housing.

CAUTION: Do not disassemble the ball nut from the steering worm shaft.

INSPECTION AND REPAIR OF STEERING GEAR HOUSING

1. INSPECT WORM AND BALL NUT

(a) Check worm and ball nut for wear or damage.

(b) Check that the nut rotates smoothly down the shaft by its own weight.

CAUTION: Do not allow the ball nut to hit the end of the worm shaft.

If a problem is found, repair or replace the worm.

2. INSPECT WORM BEARINGS AND RACES

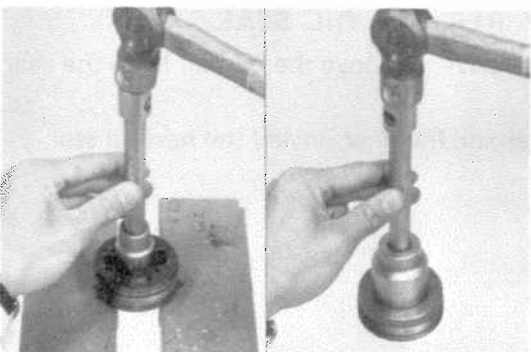
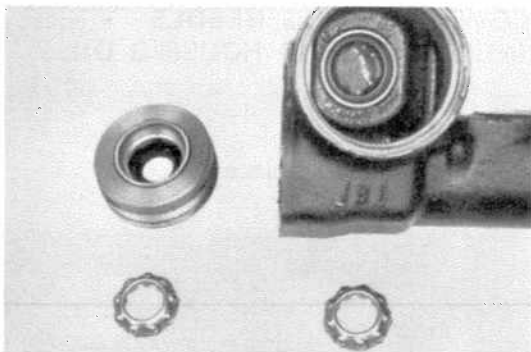
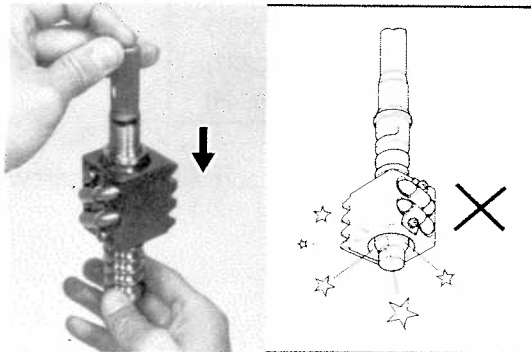
Check for wear or damage.

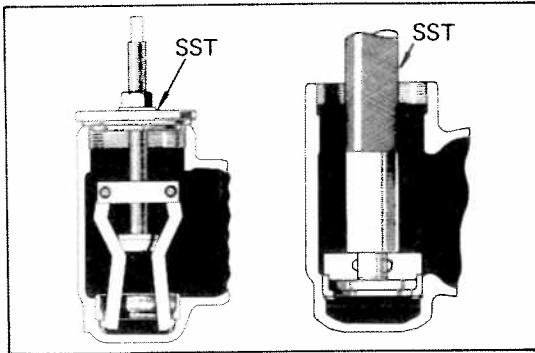
If a problem is found, replace the bearings, bearing races and oil seal.

3. IF NECESSARY REPLACE BEARING RACES AND OIL SEAL

(a) Using a punch and hammer, remove the bearing race and oil seal from the adjusting nut.

(b) Using a driver and hammer, carefully install a new bearing race and oil seal.



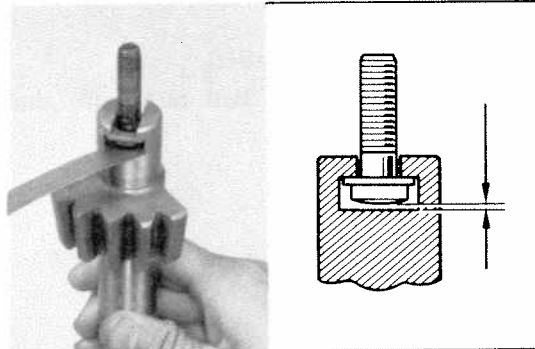


(c) Using a bearing puller*, remove the bearing race from the gear housing.

*SST 09612-30013 or Commercial puller

(d) Using a driver* and hammer, install the bearing race.

*SST 09620-30010 or Commercial driver



4. INSPECT SECTOR SHAFT

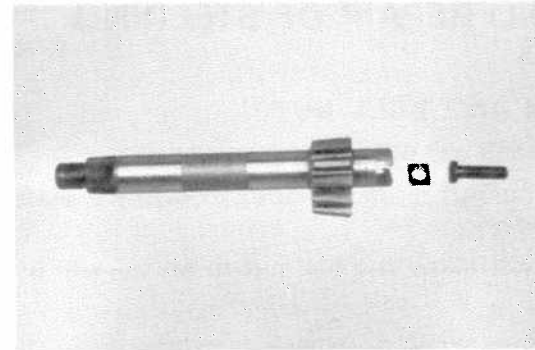
(a) Measure shaft thrust clearance with a feeler gauge.

Maximum clearance: 0.05 mm (0.0020 in.)

If necessary, install a new thrust washer to provide the minimum clearance between the sector shaft and the adjusting screw.

Thrust washer thickness

Part No.	Thickness	mm (in.)
45353-20010	1.95	(0.0768)
45352-20010	2.00	(0.0787)
45354-20010	2.05	(0.0807)
45355-20010	2.10	(0.0827)
45356-20010	2.15	(0.0846)

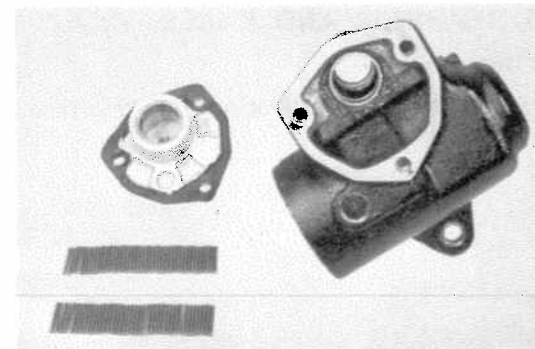


(b) Check the shaft, thrust washer, and adjusting screw for wear or damage.

5. INSPECT END COVER BUSHING, NEEDLE ROLLER BEARINGS AND GEAR HOUSING OIL SEAL

Check parts for wear or damage.

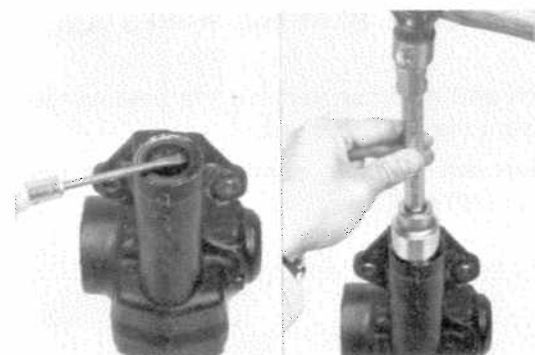
If the oil seal is worn or damaged, replace it.



6. IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver, remove the oil seal from the gear housing.

(b) Using a driver and hammer, install the new oil seal.



ASSEMBLY OF STEERING GEAR HOUSING (See illustration on page 16-34)

1. APPLY MULTIPURPOSE GREASE TO BUSHING, NEEDLE ROLLER BEARINGS AND OIL SEALS

2. INSERT WORM SHAFT INTO GEAR HOUSING

Place worm bearings on the shaft and insert the shaft into the housing.

3. INSTALL AND ADJUST BEARING ADJUSTING SCREW

- (a) Using an adjusting screw wrench*, gradually tighten the adjusting screw until snug.

*SST 09616-22010 or Commercial wrench

- (b) Using a torque wrench and socket*, measure the bearing preload in BOTH directions. Turn the adjusting screw until the preload is correct.

Preload (starting): 3.0 – 5.0 kg-cm (2.6 – 4.3 in.-lb)

*SST 09616-00010 or 00002-00800

- (c) Hold the adjusting screw in position with an adjusting screw wrench* and tighten the lock nut with a lock nut wrench*.

Torque: 2,300 – 2,600 kg-cm (167 – 188 ft-lb)

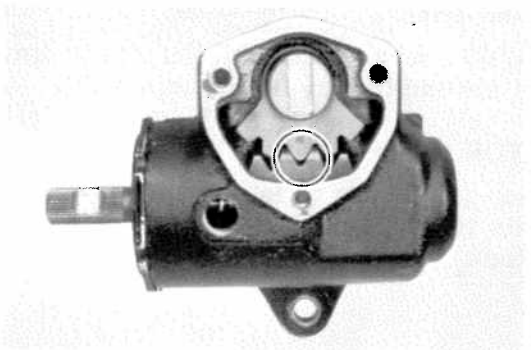
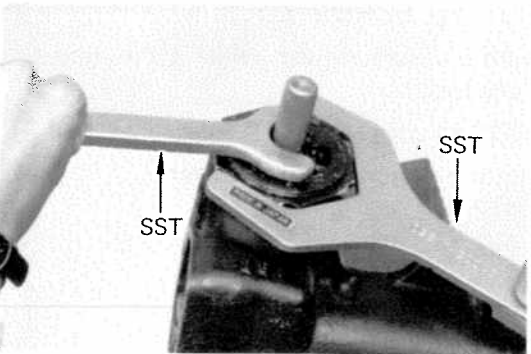
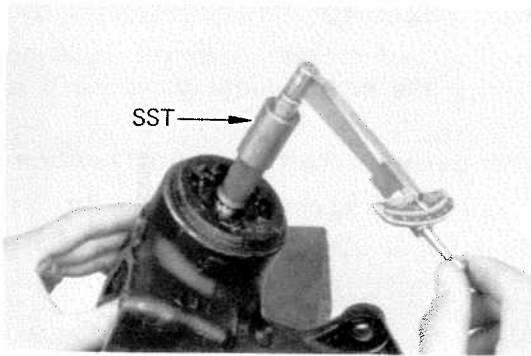
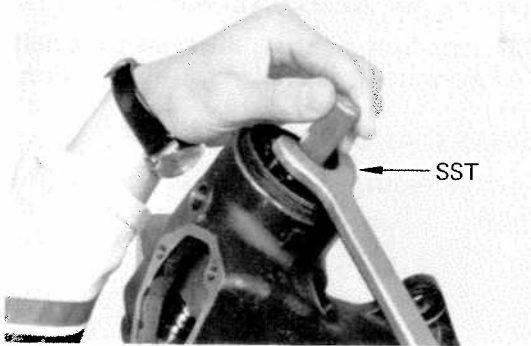
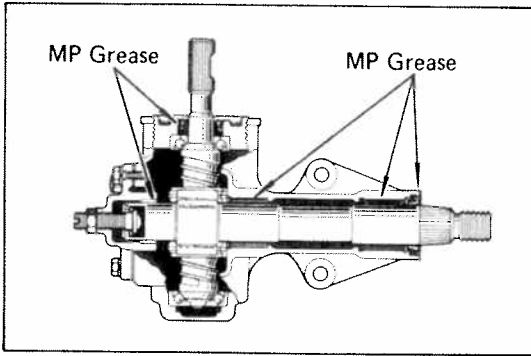
*SST 09616-22010 and 09617-30040

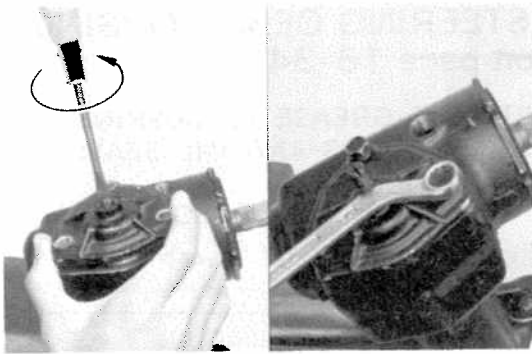
or Commercial wrenches

NOTE: Check that the bearing preload is still correct.

4. INSTALL SECTOR SHAFT

Set the ball nut at the center of the worm shaft. Insert the sector shaft into the gear housing so that the center teeth mesh together.

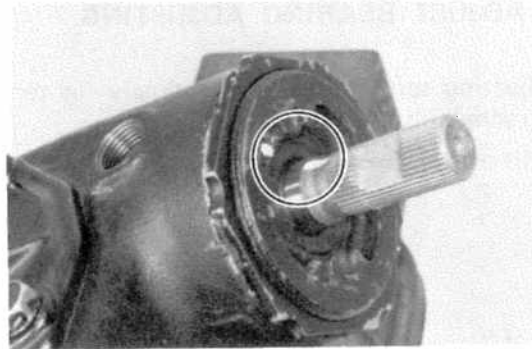




5. INSTALL ADJUSTING SCREW, THRUST WASHER AND END COVER

- (a) Install three end cover bolts, finger tight.
- (b) Loosen the adjusting screw as far as possible.
- (c) Torque three cover bolts.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

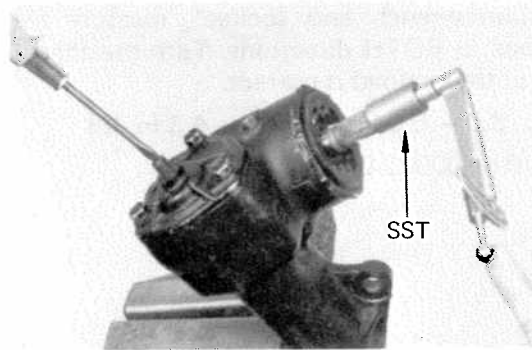


6. PLACE WORM SHAFT IN NEUTRAL POSITION

Count the total shaft rotations and turn the shaft back half of that number. The worm shaft is now in neutral position.

7. MARK WORM SHAFT AND HOUSING

Place an alignment mark on the worm shaft and housing to show neutral position.



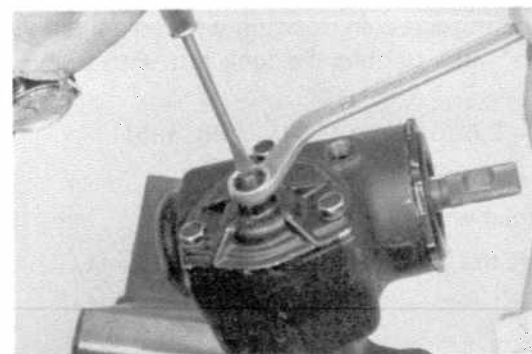
8. ADJUST OVERALL PRELOAD

Using a torque wrench and socket*, turn the adjusting screw while measuring the preload until the preload is correct.

NOTE: Be sure that the worm shaft is in neutral position.

Preload (starting): 8.0 – 10.5 kg-cm (6.9 – 9.1 in.-lb)

*SST 09616-00010 or 00002-00800

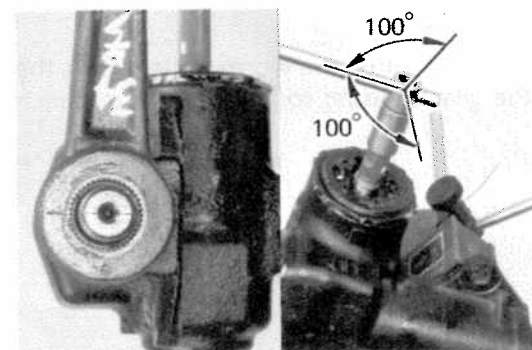


9. TIGHTEN ADJUSTING SCREW LOCK NUT

Hold the screw with a screwdriver while tightening the lock nut. Torque the lock nut.

Torque: 190 – 310 kg-cm (14 – 22 ft-lb)

NOTE: Check that the preload is still correct.

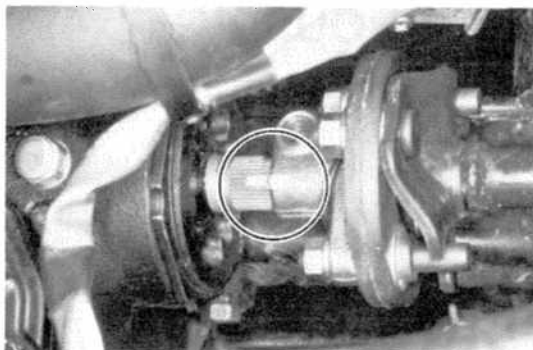


10. INSTALL PITMAN ARM

Align the marks on the sector shaft with the pitman arm. Install the pitman arm and tighten the nut finger tight.

11. MEASURE SECTOR SHAFT BACKLASH

Install the backlash gauge. Check that the sector shaft has no backlash within 100 degrees of the left and right sides from neutral position.

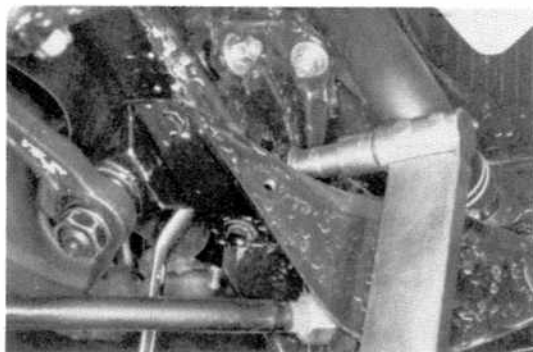


INSTALLATION OF STEERING GEAR HOUSING

(See illustration on page 16-33)

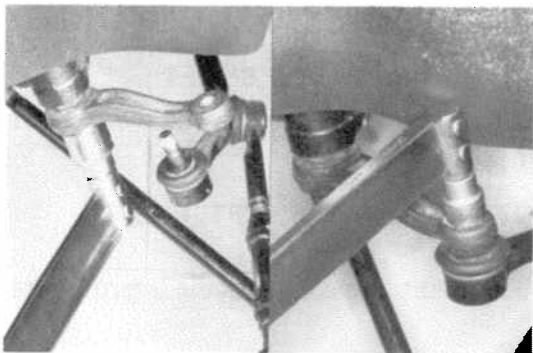
1. INSTALL GEAR HOUSING

(a) Align the marks on the worm shaft with the coupling.



(b) Install the housing with three bolts. Torque the bolts.

Torque: 500 – 600 kg-cm (37 – 43 ft-lb)



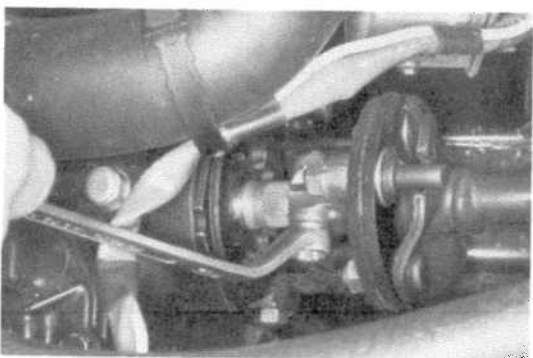
2. TORQUE PITMAN ARM SET NUT

Torque: 1,100 – 1,250 kg-cm (80 – 90 ft-lb)

3. CONNECT PITMAN ARM TO STEERING LINKAGE

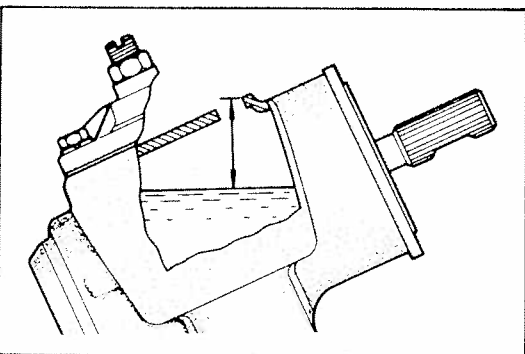
Connect the arm to the linkage and torque the nut.
Install a new cotter pin.

Torque: 750 – 1,100 kg-cm (55 – 79 ft-lb)



4. INSTALL AND TORQUE COUPLING SET BOLT

Torque: 200 – 300 kg-cm (15 – 21 ft-lb)

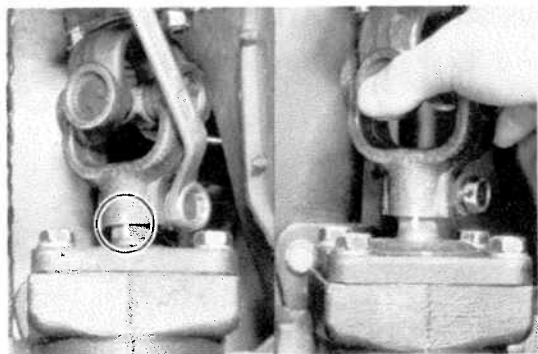
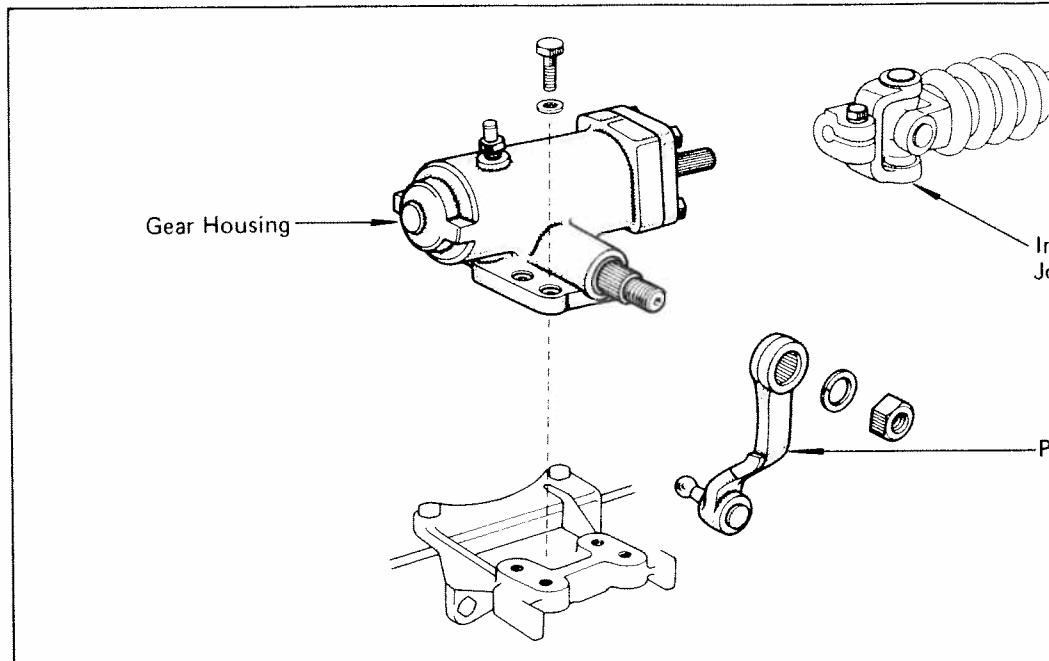


5. FILL GEAR HOUSING WITH GEAR OIL

Oil level: 18 – 28 mm (0.71 – 1.10 in.) from top

Capacity: 380 – 400 cc (23.2 – 24.4 cu in.)

STEERING GEAR HOUSING



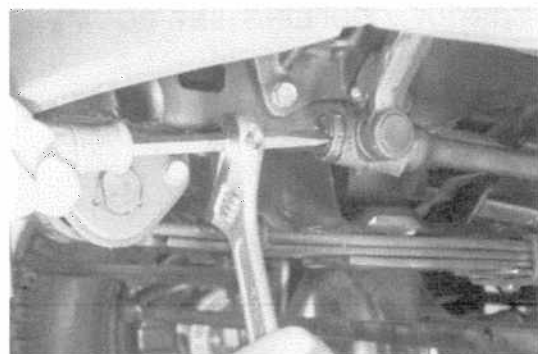
REMOVAL OF STEERING GEAR HOUSING

1. MARK JOINT YOKE AND WORM SHAFT

Place an alignment mark on the joint yoke and worm shaft to ensure correct reassembly.

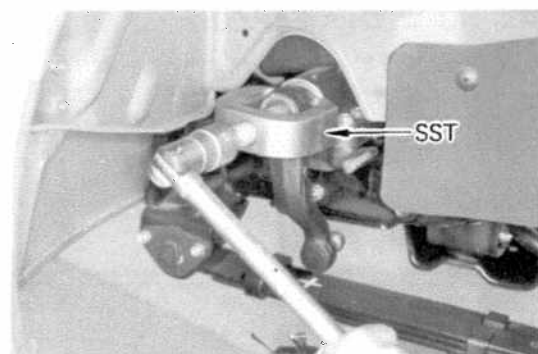
2. DISCONNECT INTERMEDIATE WORM SHAFT

Loosen the joint yoke bolt and nut, and disconnect the intermediate worm shaft.



3. DISCONNECT DRAG LINK FROM PITMAN ARM

- Remove the cotter pin and nut.
- Disconnect the drag link from the pitman arm.

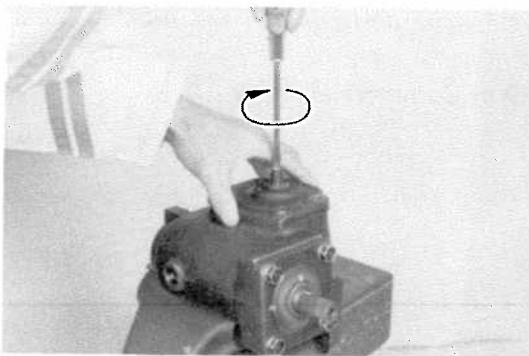
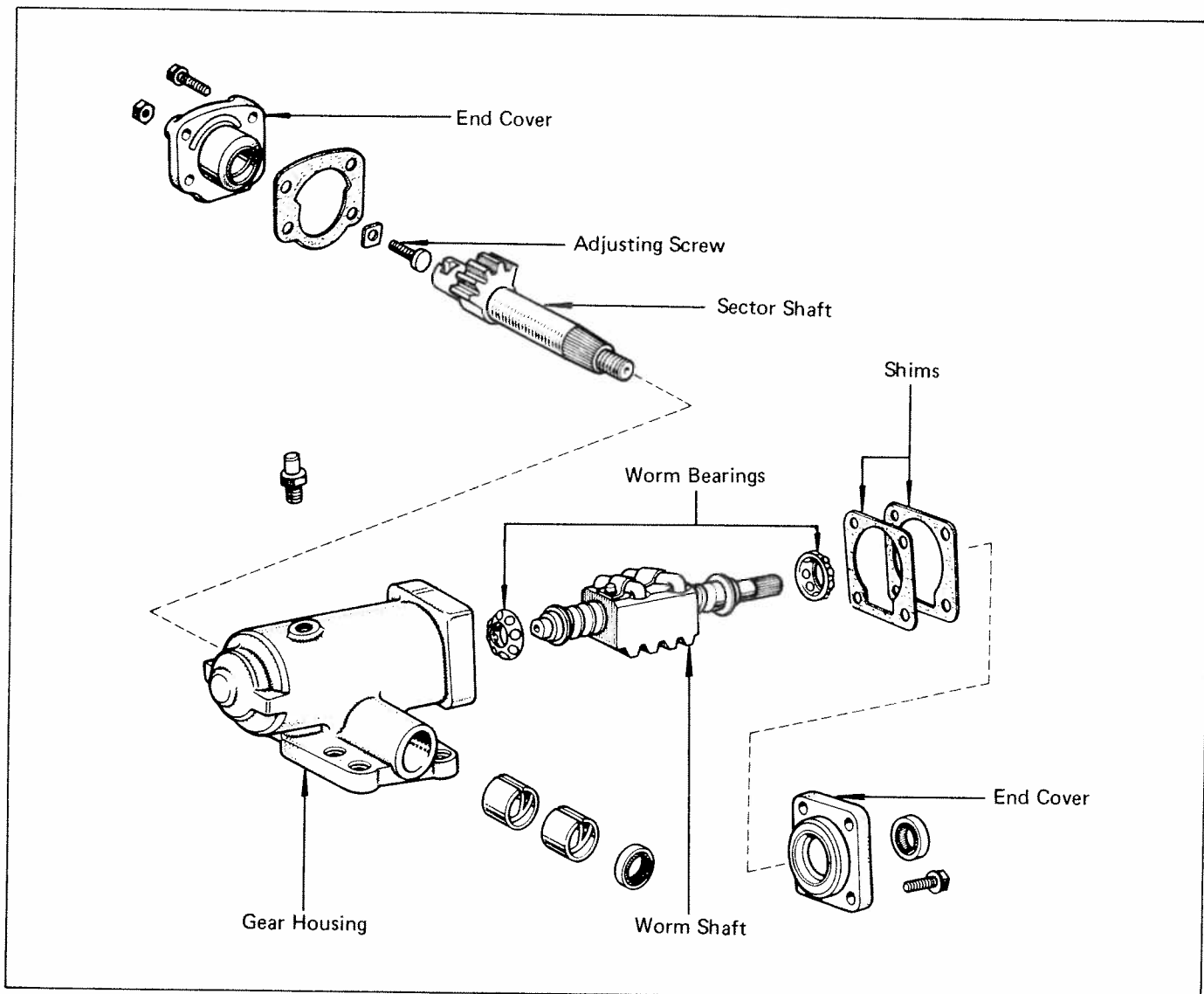


4. REMOVE PITMAN ARM FROM HOUSING

Remove the pitman arm set screw*, disconnect the pitman arm from the housing.
*SST 09610-55012

5. REMOVE GEAR HOUSING

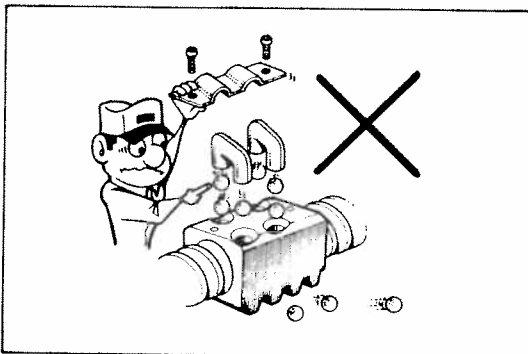
Remove four bolts and take the gear housing out from the engine compartment side.

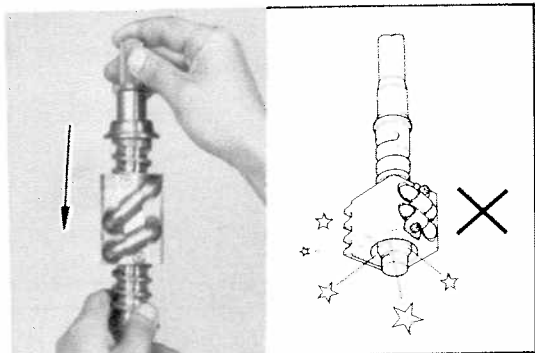


DISASSEMBLY OF STEERING GEAR HOUSING

1. REMOVE OIL FILLER PLUG AND DRAIN GEAR HOUSING OIL
2. REMOVE END COVER AND SECTOR SHAFT
 - (a) Remove the adjusting screw lock nut and four bolts.
 - (b) Remove the end cover by tightening the adjusting screw.
 - (c) Pull the sector shaft from the housing.
3. REMOVE END COVER AND WORM SHAFT
 - (a) Remove the end cover and shims.
 - (b) Remove the worm shaft and the two bearings.

CAUTION: Do not disassemble the ball nut from the steering worm shaft.





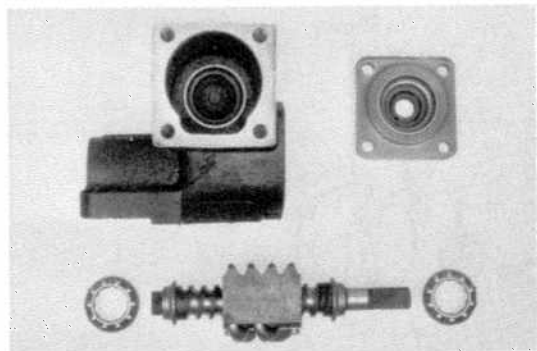
INSPECTION AND REPAIR OF STEERING GEAR HOUSING

1. INSPECT WORM AND BALL NUT

- (a) Check worm and ball nut for wear or damage.
- (b) Check that the nut rotates smoothly down the shaft by its own weight.

CAUTION: Do not allow the ball nut to hit the end of the worm shaft.

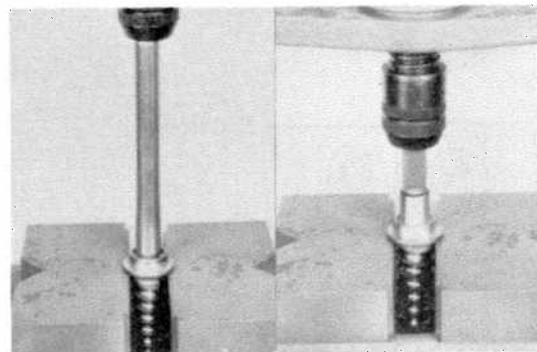
If a problem is found, repair or replace the worm.



2. INSPECT WORM BEARINGS AND RACES

Check for wear or damage.

If a problem is found, replace the bearings, bearing races and oil seal.

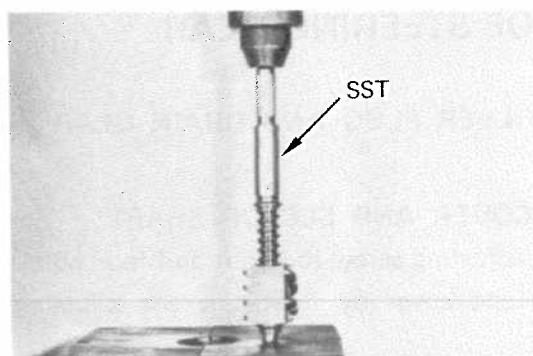


3. IF NECESSARY REPLACE BEARING RACES AND OIL SEAL

- (a) Using a press, remove the bearing inner races from the worm shaft.

- (b) Using a driver* and press, install the bearing inner races.

*SST 09620-30010 or Commercial driver

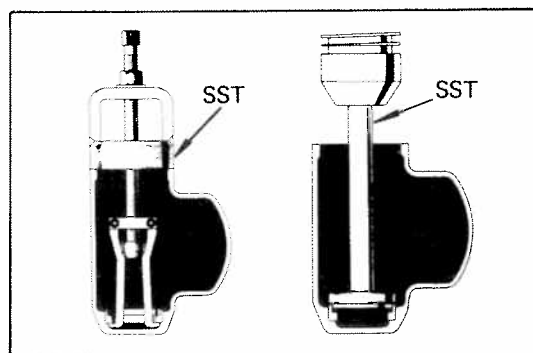


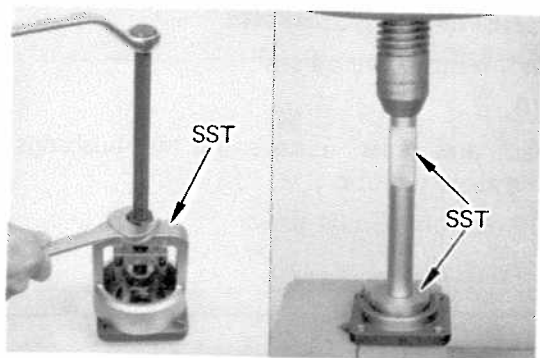
- (c) Using a bearing puller*, remove the bearing outer race from the gear housing.

*SST 09612-65013 or Commercial puller

- (d) Using a driver* and press, install the bearing outer race.

*SST 09608-35013 or Commercial driver



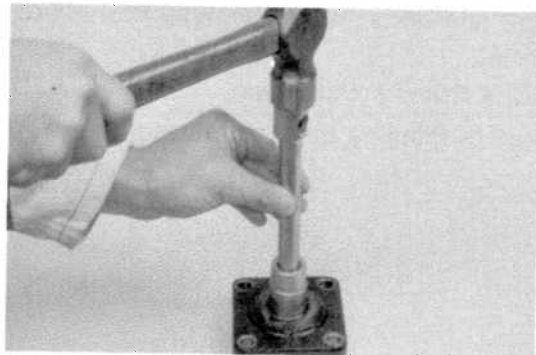


- (e) Using a bearing puller*, remove the bearing outer race from the end cover.

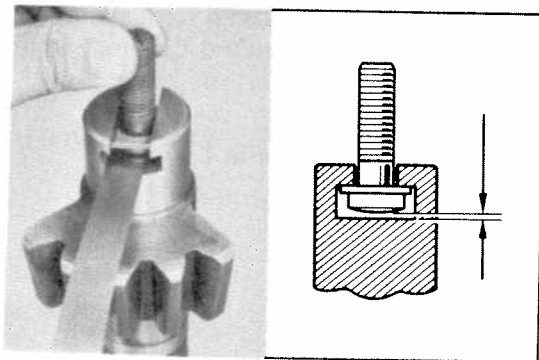
*SST 09612-65013 or Commercial puller

- (f) Using a driver* and press, install bearing outer race.

*SST 09608-35013 or Commercial driver



- (g) Using a driver and hammer, replace the oil seal with a new one.



4. INSPECT SECTOR SHAFT

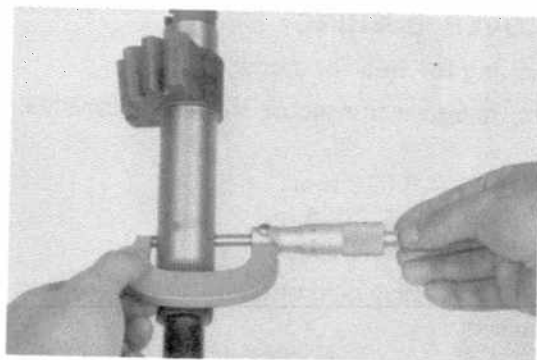
- (a) Measure that thrust clearance with a feeler gauge.

Maximum clearance: 0.05 mm (0.0020 in.)

If necessary, install a new thrust washer to provide the minimum clearance between the sector shaft and the adjusting screw.

Thrust washer thickness mm (in.)

Part No.	Thickness	Part No.	Thickness
45352-36010	2.00 (0.0787)	45355-36010	2.15 (0.0846)
45353-36010	2.05 (0.0807)	45356-36010	2.20 (0.0866)
45354-36010	2.10 (0.0827)		



- (b) Check the shaft, thrust washer and adjusting screw for wear or damage.

- (c) Measure the shaft outer diameter.

Outer diameter:

STD 31.970 – 31.992 mm
(1.2587 – 1.2595 in.)

Limit 31.95 mm (1.2579 in.)

5. INSPECT GEAR HOUSING BUSHINGS

- (a) Check the bushings for wear or damage.

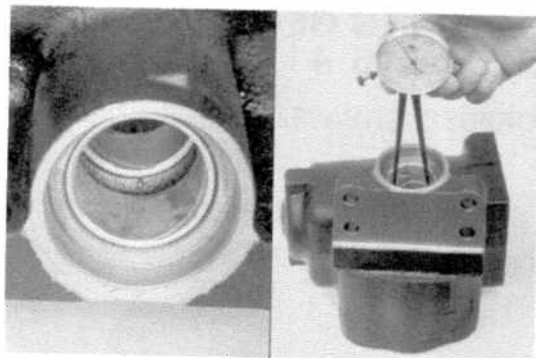
- (b) Using calipers, measure the sector shaft oil clearance.

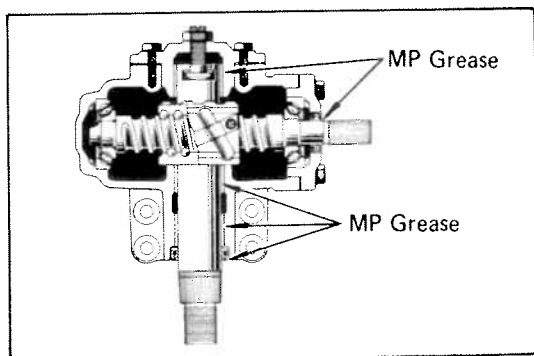
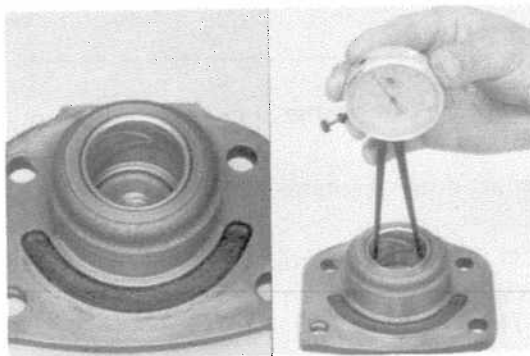
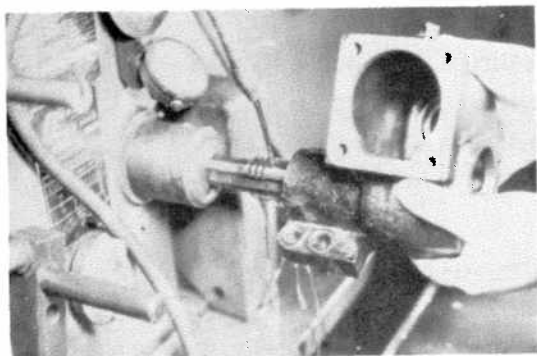
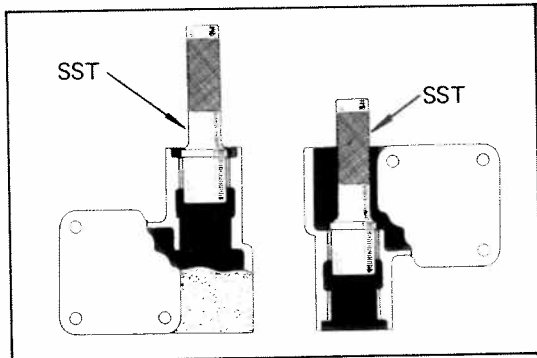
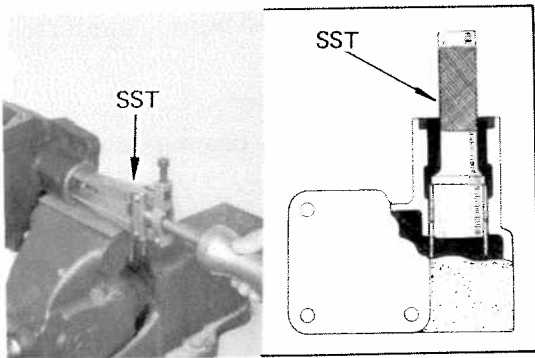
Oil clearance:

STD 0.01 – 0.06 mm
(0.0004 – 0.0024 in.)

Limit 0.1 mm (0.004 in.)

If necessary, replace the bushings.





6. IF NECESSARY, REPLACE BUSHINGS

(a) Using a puller*, remove the oil seal.

*SST 09308-00010

(b) Using a driver* and press, remove the two bushings together in the same direction.

*SST 09307-12010 or Commercial driver

(c) Using a driver* and press, install the outer bushing to the gear housing.

*SST 09307-12010 or Commercial driver

(d) Install the inner bushing by the same procedure.

(e) Hone the inner surface of the bushings until standard oil clearance is obtained between the bushings and sector shaft.

Standard oil clearance:

0.01 – 0.06 mm (0.0004 – 0.0024 in.)

(f) Install the new oil seal to the gear housing.

7. INSPECT END COVER BUSHING

(a) Check the bushing for wear or damage.

(b) Using calipers, measure the sector shaft oil clearance.

Oil clearance:

**STD 0.009 – 0.060 mm
(0.0004 – 0.0024 in.)**

Limit 0.10 mm (0.0039 in.)

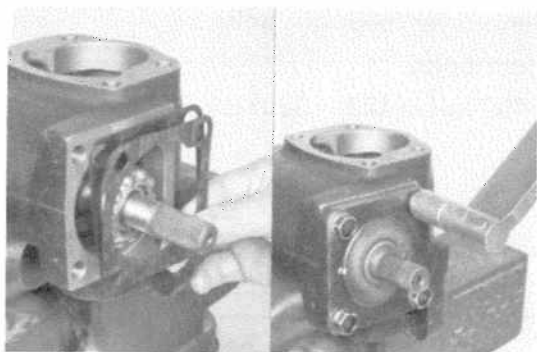
If the oil clearance is excessive or damage is found, the end cover must be replaced.

ASSEMBLY OF STEERING GEAR HOUSING (See illustration on page 16-41)

1. APPLY MULTIPURPOSE GREASE TO BUSHINGS AND OIL SEAL

2. INSERT WORM SHAFT INTO GEAR HOUSING

Place worm bearings on the shaft and insert the shaft into the housing.



3. INSTALL SHIMS AND END COVER, AND ADJUST WORM BEARING PRELOAD

- (a) Install the same amount of shim as there was before disassembly.
- (b) Install the end cover and torque the four bolts.

Torque: 300 – 450 kg-cm (22 – 32 ft-lb)

NOTE: While tightening the bolts, check the worm shaft to see that it turns properly.

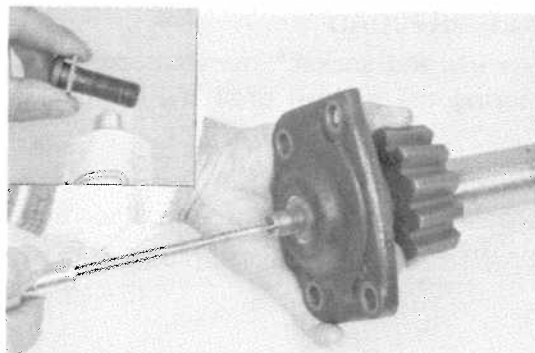
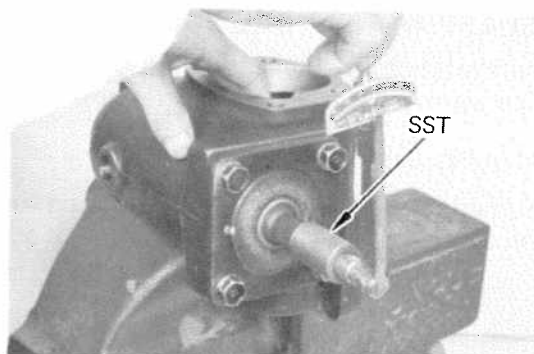
- (c) Using a torque wrench and socket*, measure the bearing preload in BOTH directions.

*SST 09616-00010 or 00002-00800

Preload (starting): 3.5 – 6.5 kg-cm (3.0 – 5.6 in.-lb)

If the preload is not within limit, correct by selecting shims of proper thickness.

Shim thickness		mm (in.)	
Part No.	Thickness	Part No.	Thickness
45323-36010	0.05 (0.0020)	45323-36080	0.09 (0.0035)
45323-36070	0.06 (0.0024)	45323-36040	0.10 (0.0039)
45323-36020	0.07 (0.0028)	45323-36050	0.20 (0.0079)
45323-36030	0.08 (0.0031)	45323-36060	0.50 (0.0197)

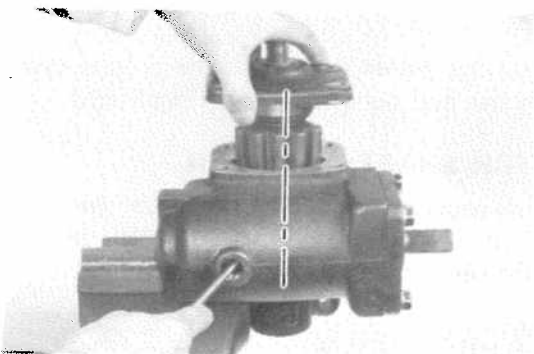
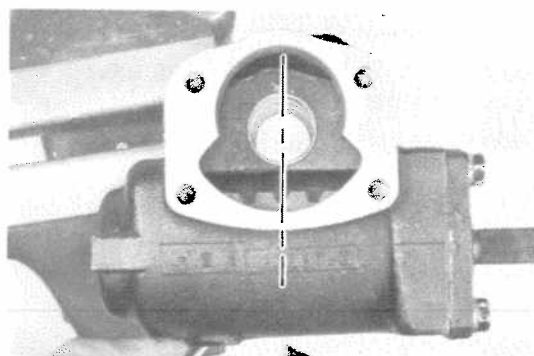


4. INSTALL SECTOR SHAFT AND END COVER

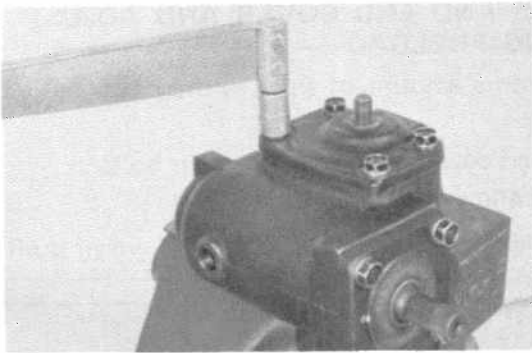
- (a) Apply liquid sealer to the adjusting screw thread and insert it in the thrust washer.
- (b) Assemble the sector shaft and adjusting screw to the end cover.

NOTE: Fully loosen the adjusting screw.

- (c) Apply liquid sealer to the gear housing.
- (d) Set and support the ball nut at the center of the gear housing by inserting a screwdriver into the breather plug hole.



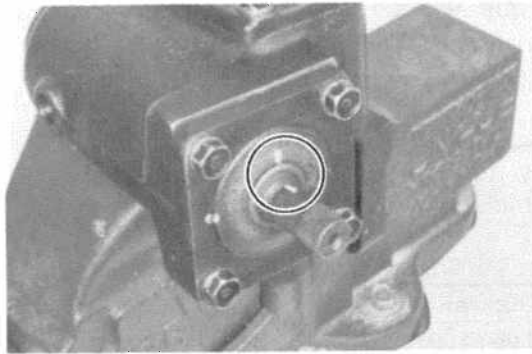
- (e) Insert the sector shaft into the gear housing so that the center teeth mesh together.



(f) Tighten the end cover mounting bolts.

Torque the four bolts.

Torque: 300 – 450 kg-cm (22 – 32 ft-lb)

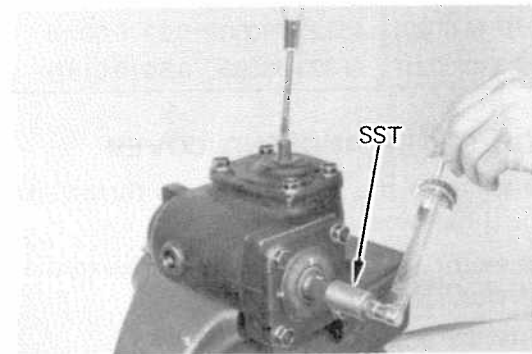


5. PLACE WORM SHAFT IN NEUTRAL POSITION

Count the total shaft rotations and turn the shaft back half of that number. The worm shaft is now in neutral position.

6. MARK WORM SHAFT AND HOUSING

Place an alignment mark on the worm shaft and housing to show neutral position.



7. ADJUST OVERALL PRELOAD

Using a torque wrench and socket*, turn the adjusting screw while measuring the preload until the preload is correct.

*SST 09616-00010 or 00002-00800

NOTE: Be sure that the worm shaft is in neutral position.

Preload (starting): Worm bearing preload plus 4.5 kg-cm (3.9 in.-lb)

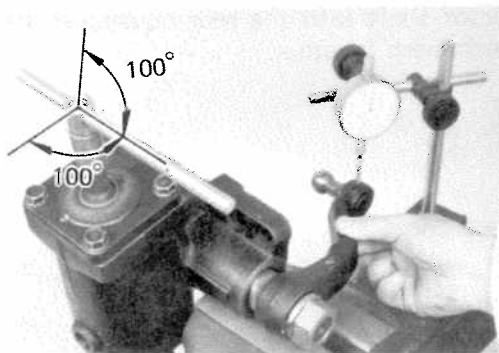


8. TIGHTEN ADJUSTING SCREW LOCK NUT

Hold the screw with a screwdriver while tightening the lock nut. Torque the lock nut.

Torque: 350 – 500 kg-cm (26 – 36 ft-lb)

NOTE: Check that the preload is still correct.

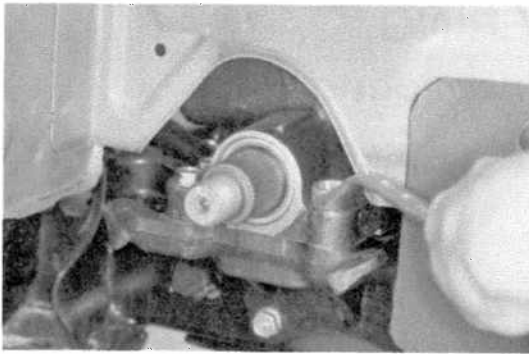


9. INSTALL PITMAN ARM

Align the marks on the sector shaft with the pitman arm. Install the pitman arm and tighten the nut finger tight.

10. MEASURE SECTOR SHAFT BACKLASH

Install the backlash gauge. Check that the sector shaft has backlash 0 – 0.27 mm (0 – 0.0106 in.) within 100 degrees of the left and right sides from neutral position.



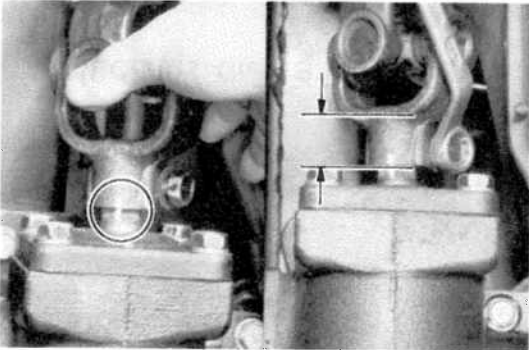
INSTALLATION OF STEERING GEAR HOUSING

(See illustration on page 16-40)

1. INSTALL GEAR HOUSING

Install the housing with four bolts. Torque the bolts.

Torque: 500 – 650 kg-cm (37 – 47 ft-lb)



2. CONNECT INTERMEDIATE SHAFT TO WORM SHAFT

(a) Align the matching marks on the joint yoke and worm shaft.

(b) Compress and install the intermediate shaft onto the worm shaft.

Depth: Manual steering 27 mm (1.06 in.)

Power steering 34 mm (1.34 in.)

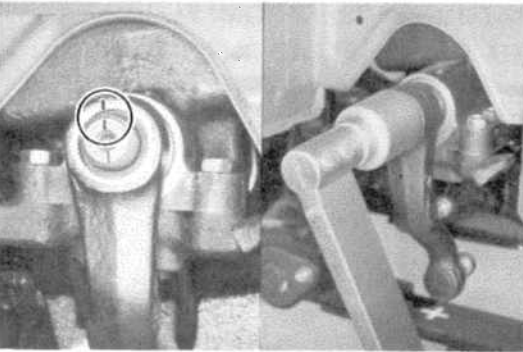
(c) Tighten the joint yoke bolt.

Torque: 300 – 450 kg-cm (22 – 32 ft-lb)

3. INSTALL PITMAN ARM

Align the matching marks on the sector shaft. Torque the nut.

Torque: 1,600 – 1,900 kg-cm (116 – 137 ft-lb)

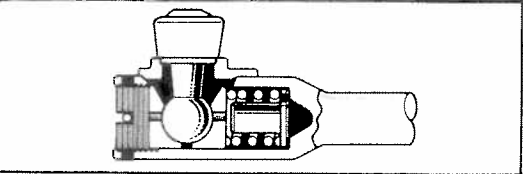


4. CONNECT DRAG LINK

(a) Insert the pitman arm in the drag link.

(b) Tighten the plug completely and then loosen 1-1/3 turns.

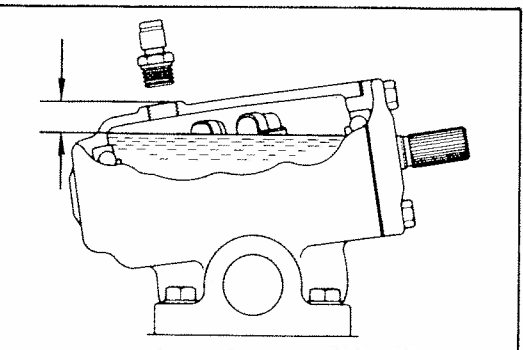
(c) Secure the plug by inserting a cotter pin.



5. FILL GEAR HOUSING WITH GEAR OIL

Oil level: 12 – 17 mm (0.47 – 0.67 in.) from top

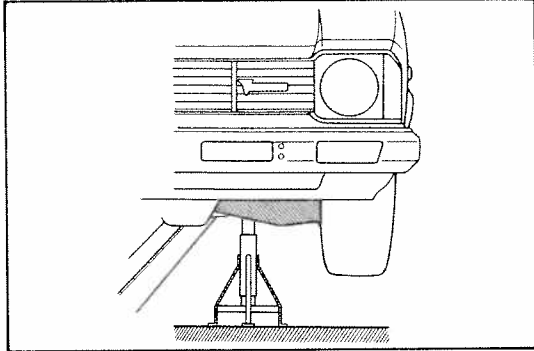
Capacity: 580 cc (35.4 cu in.)



POWER STEERING

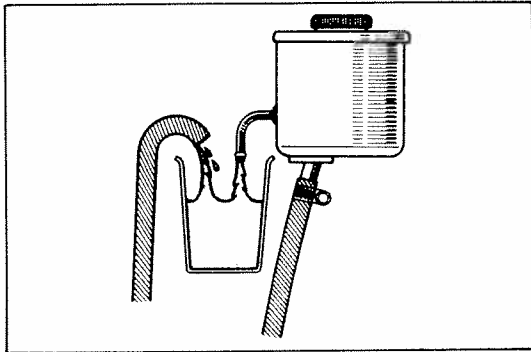
On-Vehicle Inspection

CHECK OF POWER STEERING FLUID

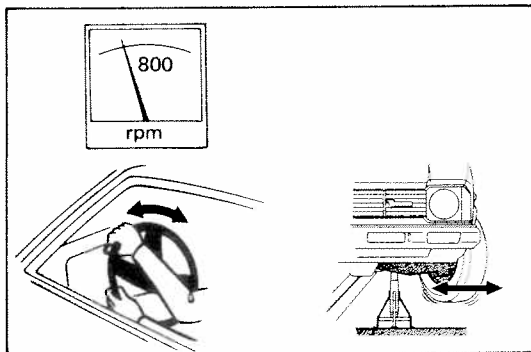


FLUID REPLACEMENT

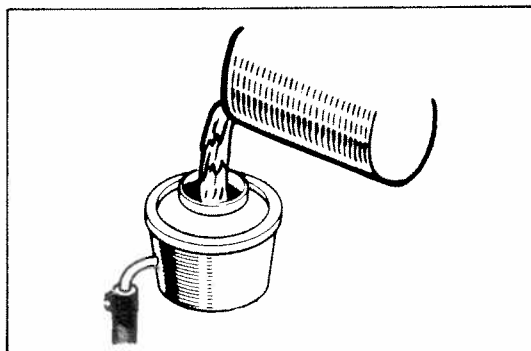
1. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS



2. DISCONNECT RETURN HOSE FROM FLUID RESERVOIR AND DRAIN FLUID INTO A CONTAINER



3. WITH ENGINE IDLING, TURN STEERING WHEEL FROM FULL LEFT TO FULL RIGHT WHILE DRAINING FLUID



4. CONNECT HOSE TO FLUID RESERVOIR
5. FILL RESERVOIR WITH FRESH FLUID ATF TYPE DEXRON
6. BLEED POWER STEERING SYSTEM

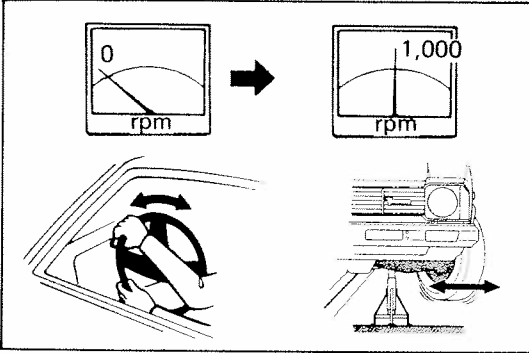


BLEEDING OF POWER STEERING SYSTEM

1. CHECK FLUID LEVEL IN RESERVOIR

Add fluid if low.

Fluid: ATF type Dexron or Dexron II



2. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS

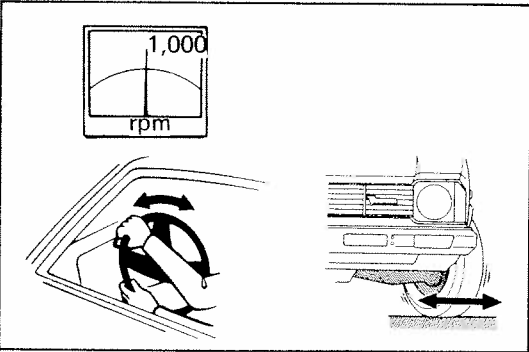
3. TURN STEERING WHEEL FULLY IN BOTH DIRECTIONS TWO OR THREE TIMES

4. RECHECK FLUID LEVEL IN RESERVOIR

Add fluid if low.

5. START ENGINE AND TURN STEERING WHEEL FULLY IN BOTH DIRECTIONS TWO OR THREE TIMES

Run the engine at 1,000 rpm or less.



6. LOWER FRONT OF VEHICLE

Remove the jack stand and lower the vehicle completely.

7. WITH ENGINE AT 1,000 RPM OR LESS, TURN STEERING WHEEL FULLY IN BOTH DIRECTIONS TWO OR THREE TIMES

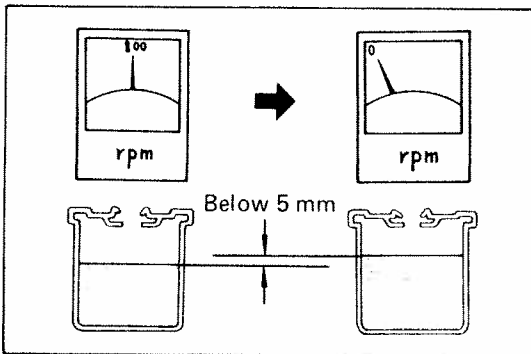
Return the steering wheel to center position.

8. CHECK THAT FLUID IN RESERVOIR IS NOT FOAMY OR CLOUDY AND DOES NOT RISE OVER MAXIMUM WHEN ENGINE IS STOPPED

Measure fluid level with the engine running. Stop the engine and measure the fluid level.

Maximum rise: 5 mm (0.20 in.)

If a problem is found, repeat steps 7 and 8. Repair the vane pump if the problem continues.



POWER STEERING PRESSURE CHECK

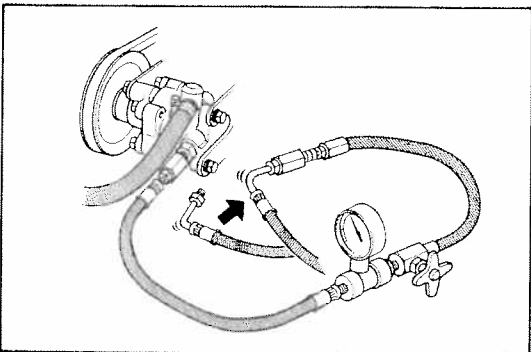
1. CONNECT PRESSURE GAUGE

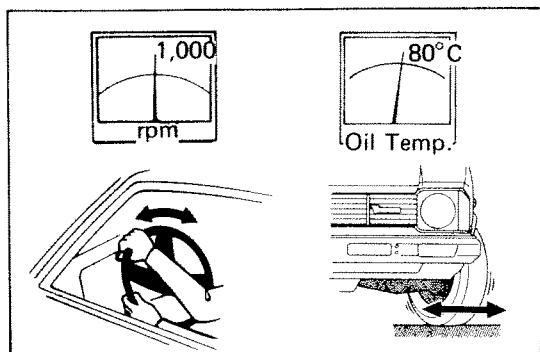
(a) Using a flarenut wrench*, remove the pressure line from the vane pump.

*SST 09631-22020 or Commercial wrench

(b) Connect the gauge side of the pressure gauge to the vane pump and the valve side to the pressure line.

(c) Bleed the system and check that the fluid level is correct.





2. CHECK THAT FLUID TEMPERATURE IS AT LEAST 80°C (176°F)

Turn the wheel fully in both directions a few times to increase the fluid temperature if required.

3. START ENGINE AND RUN AT IDLE

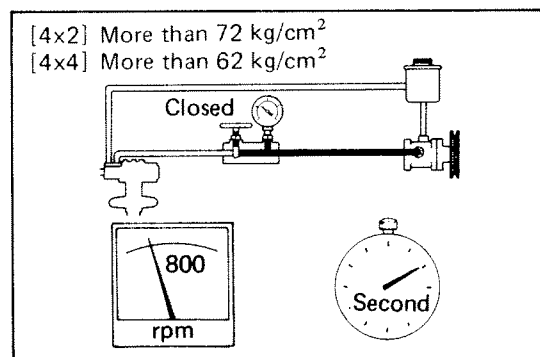
4. CHECK FLUID PRESSURE READING WITH VALVE CLOSED

Close the pressure gauge valve and observe the reading on the gauge.

Minimum pressure: 4x2 72 kg/cm² (1,024 psi)
4x4 62 kg/cm² (882 psi)

NOTE: Do not keep the valve closed for more than 10 seconds.

If pressure is low, repair or replace the vane pump.



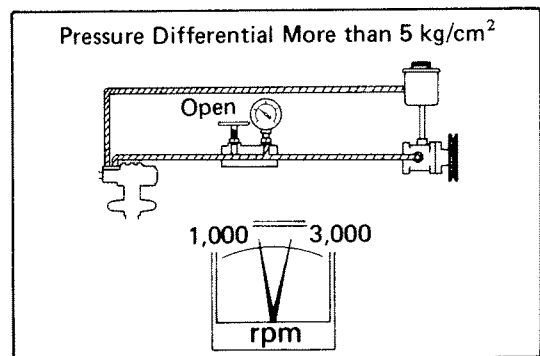
5. OPEN VALVE FULLY

6. CHECK AND RECORD PRESSURE READING AT 1,000 RPM

7. CHECK AND RECORD PRESSURE READING AT 3,000 RPM

Check that there is less than 5 kg/cm² (71 psi) difference in pressure between the 1,000 and 3,000 rpm checks.

If the difference is greater, repair or replace the vane pump flow control valve.

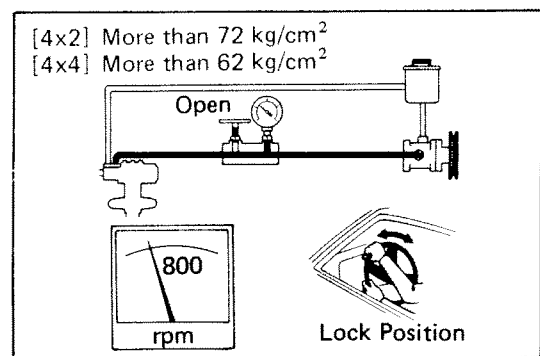


8. CHECK PRESSURE READING WITH STEERING WHEEL TURNED TO FULL LOCK

Be sure the pressure gauge valve is fully open and the engine is idling.

Minimum pressure: 4x2 72 kg/cm² (1,024 psi)
4x4 62 kg/cm² (882 psi)

If pressure is low, the gear box has an internal leak and must be repaired or replaced.



9. MEASURE STEERING EFFORT

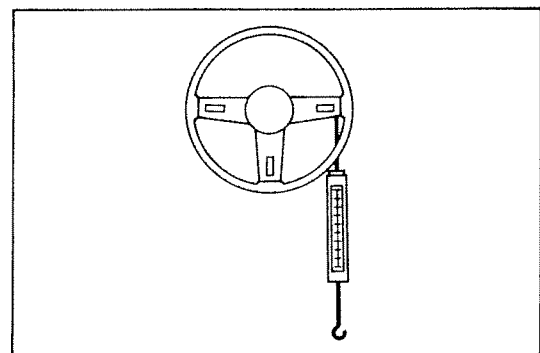
Center the steering wheel and run the engine at idle.

Using a scale, measure steering effort to full lock in both directions.

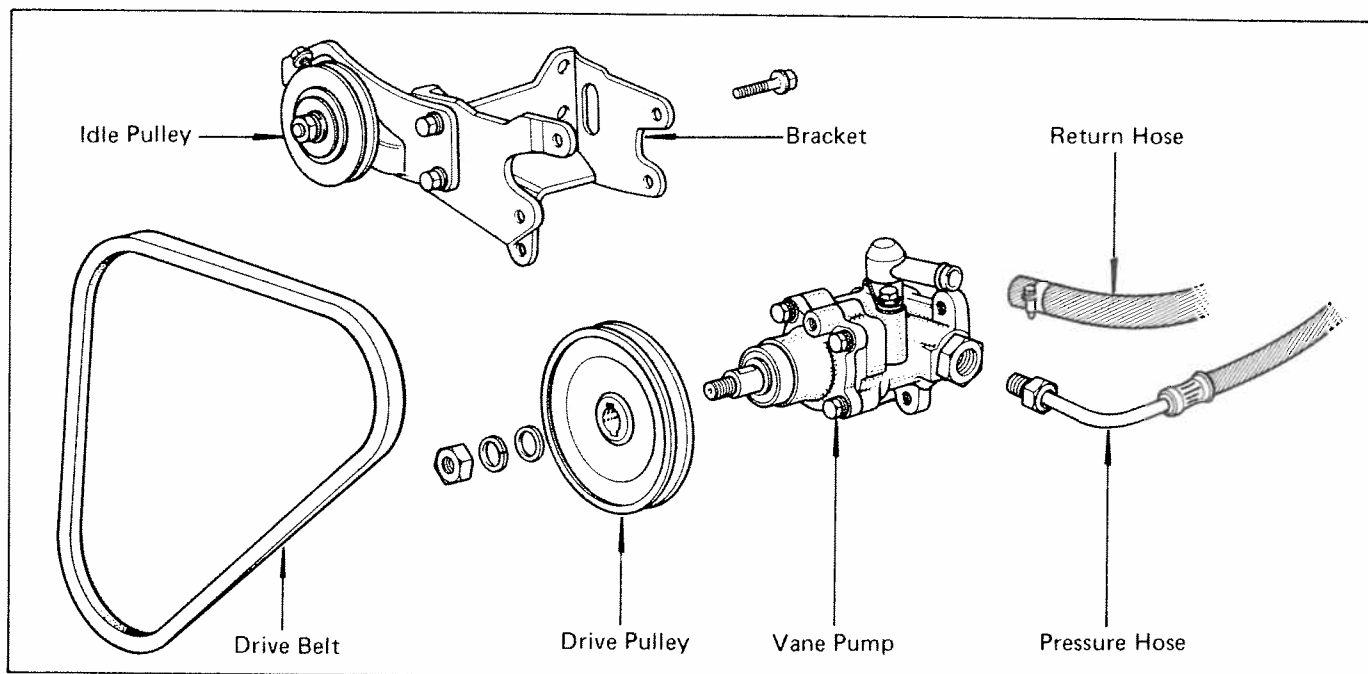
Maximum steering effort: 3.5 kg (7.7 lb)

If steering effort is excessive, repair the power steering unit.

NOTE: Be sure to consider tire type, pressure, and contact surface before making your diagnosis.



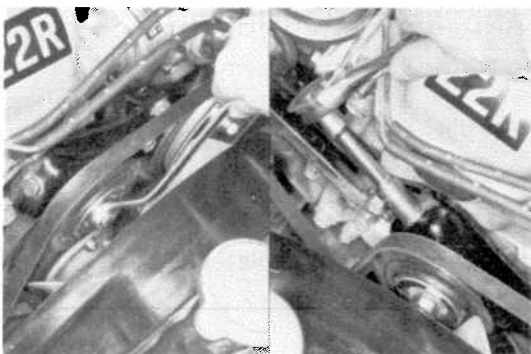
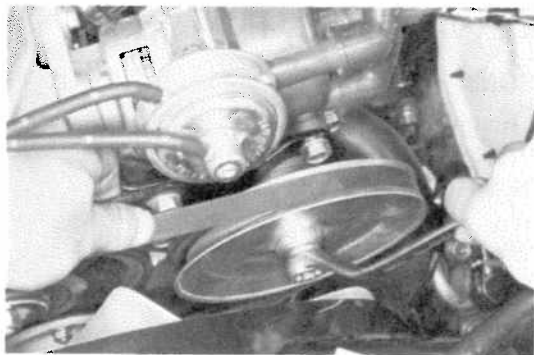
Vane Pump



REMOVAL OF VANE PUMP

1. REMOVE DRIVE BELT AND PULLEY

- (a) Push on the drive belt to hold the pulley in place and loosen the pulley nut.
- (b) Loosen the idler pulley nut.
- (c) Loosen the adjusting bolt and remove the drive belt.
- (d) Remove the drive pulley.



2. DISCONNECT PRESSURE LINE

Using a flare nut wrench*, loosen and disconnect the pressure line.

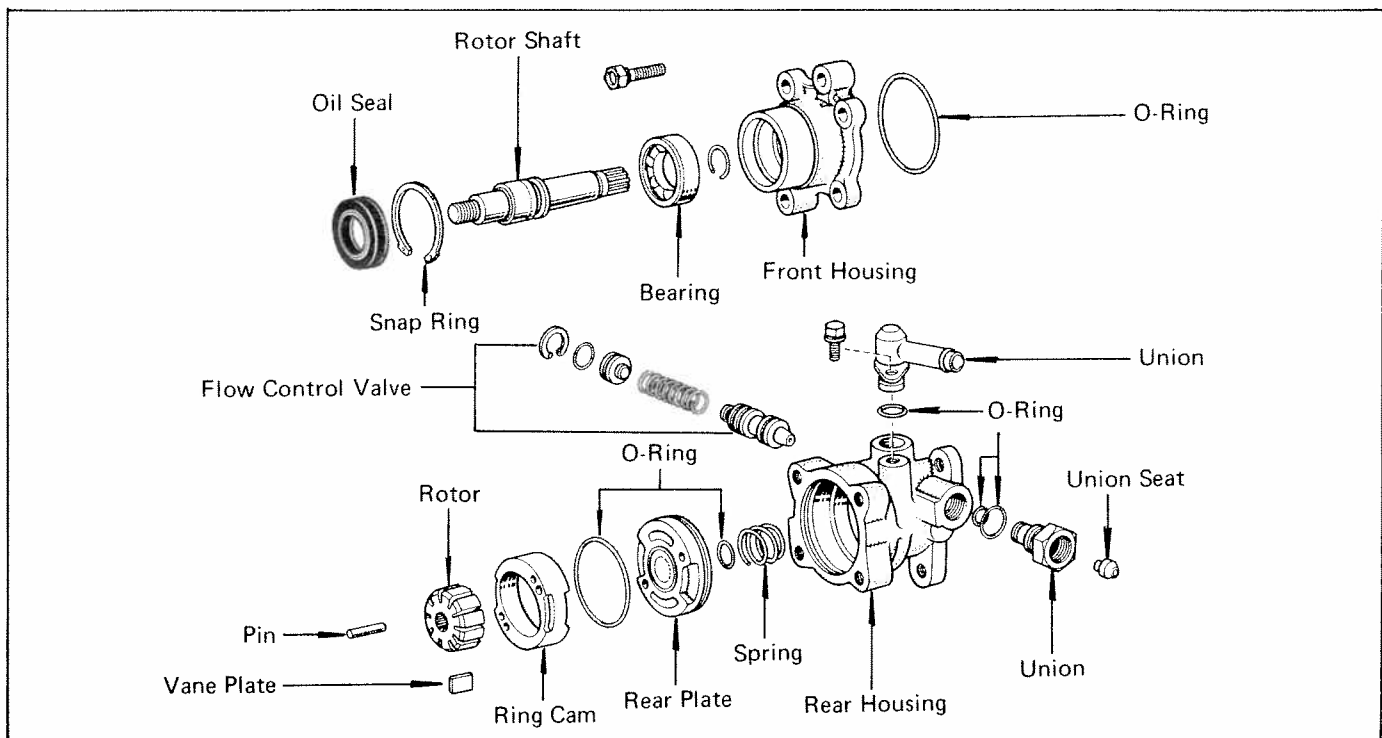
*SST 09631-22020 or Commercial wrench

3. DISCONNECT RETURN LINE HOSE

Loosen hose clamp and pull off the hose.

4. REMOVE VANE PUMP





DISASSEMBLY OF VANE PUMP

1. CLAMP VANE PUMP IN VISE

CAUTION: Do not tighten vise too tight.

2. REMOVE UNION FROM REAR HOUSING

3. MARK FRONT AND REAR HOUSINGS

Mark these parts to ensure correct reassembly.

4. REMOVE FRONT HOUSING

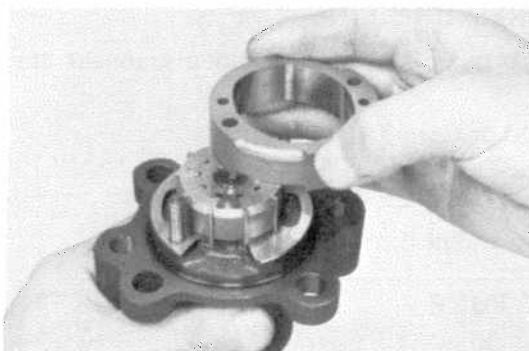
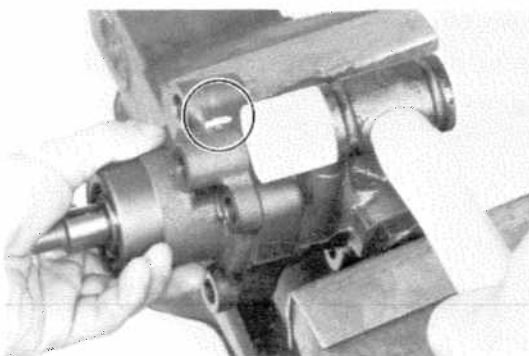
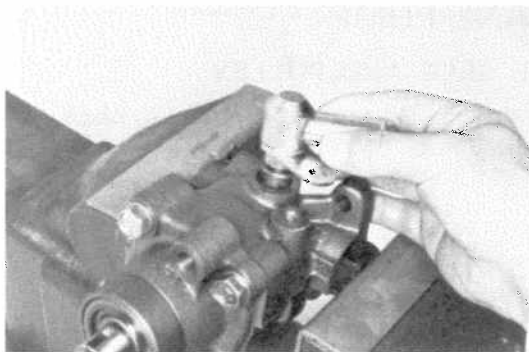
(a) Remove four front housing bolts.

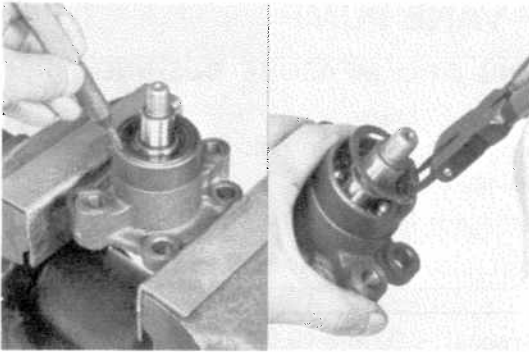
(b) Using a plastic hammer, tap off the front housing.

CAUTION: Be careful that the vane plates, rotor and cam ring do not fall out.

5. REMOVE RING CAM, ROTOR AND VANE PLATES

CAUTION: Be careful not to scratch the ring cam, rotor or vane plates.





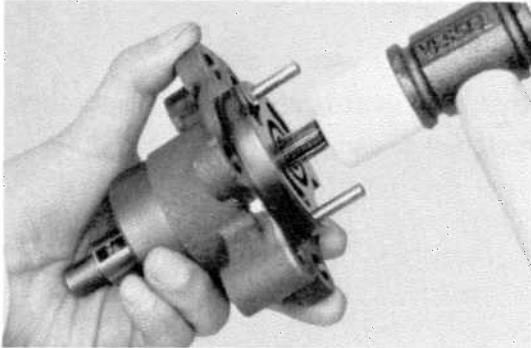
6. REMOVE ROTOR SHAFT

(a) Clamp the front housing in a vise.

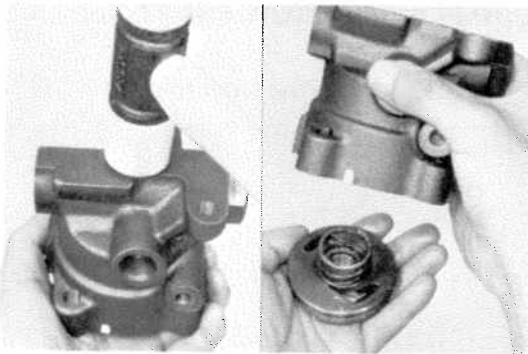
CAUTION: Do not tighten the vise too tight.

(b) Using a chisel and hammer, pry off the oil seal.

(c) Using snap ring pliers, remove the snap ring.



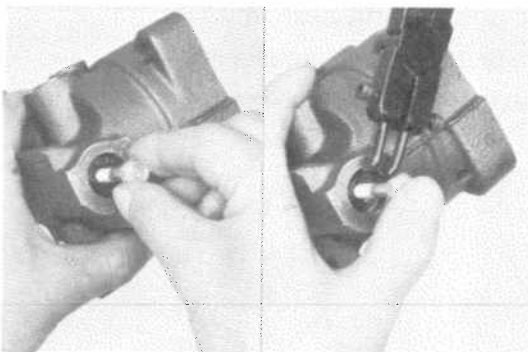
(d) Using a plastic hammer, lightly tap the rotor shaft out of the front housing.



7. REMOVE REAR PLATE AND SPRING

Using a plastic hammer, tap the bottom end of the rear housing, and remove the rear plate and spring.

CAUTION: Avoid gripping the rear plate with pliers as this could mar it.

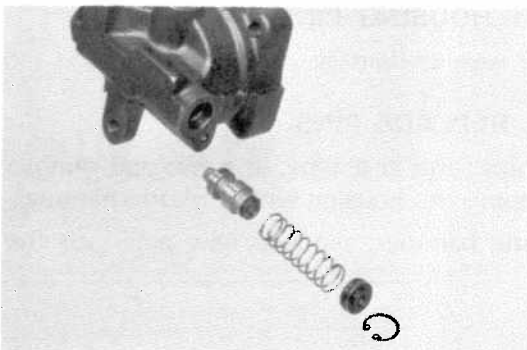


8. REMOVE FLOW CONTROL VALVE

(a) Temporarily install a bolt to the plug.

(b) Push the bolt and remove the snap ring with snap ring pliers.

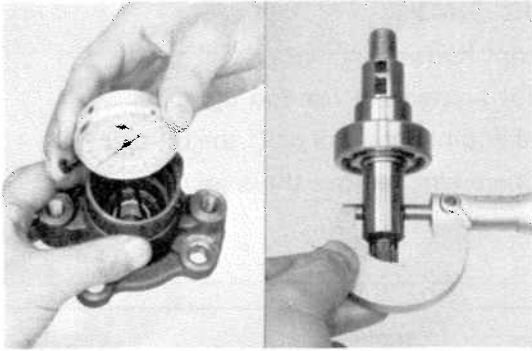
(c) Pull out the bolt and remove the plug.



(d) Remove the spring and flow control valve by hand.

CAUTION: Use care not to drop, scratch or nick this valve.

INSPECTION OF VANE PUMP



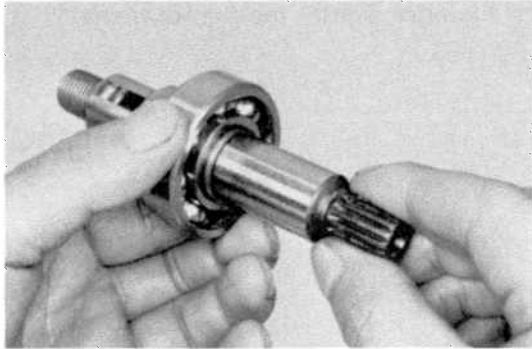
1. INSPECT BUSHING AND MEASURE BUSHING OIL CLEARANCE

- (a) Check bushing for wear or damage. The bushing cannot be replaced separately.

If wear or damage is found, replace entire housing.

- (b) Check the oil clearance between the bushing and rotor shaft.

Maximum oil clearance: 0.07mm (0.0028 in.)

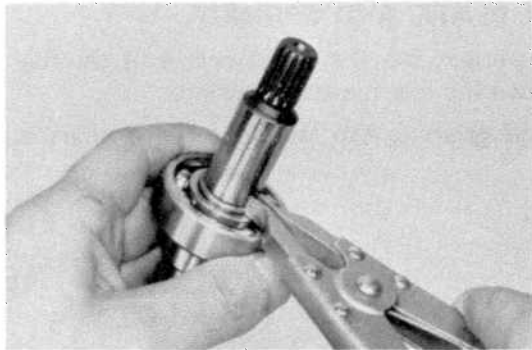


2. INSPECT ROTOR SHAFT

- (a) Check the rotor shaft for wear or damage.

- (b) Check that the rotor shaft bearing rotates smoothly.

If the bearing is scratched or damaged, replace it.



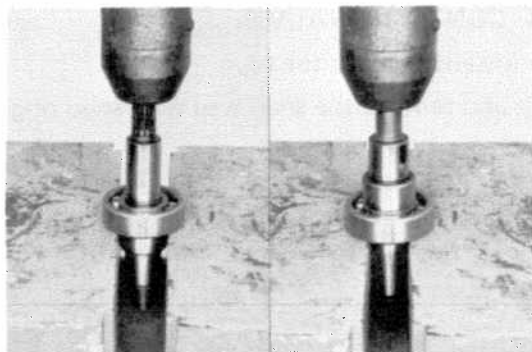
3. IF NECESSARY, REPLACE ROTOR SHAFT BEARING

- (a) Using snap ring pliers, remove the snap ring.

- (b) Using a press, press out the bearing.

- (c) Using a press, press in the bearing.

- (d) Using snap ring pliers, install the snap ring.



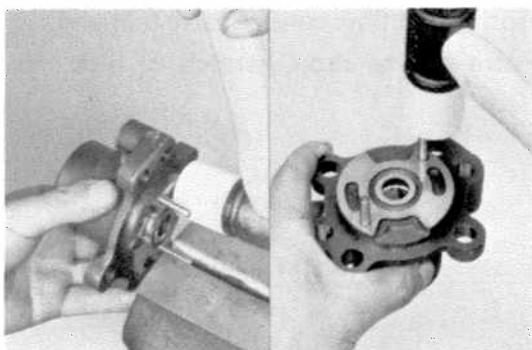
4. INSPECT FRONT HOUSING PINS

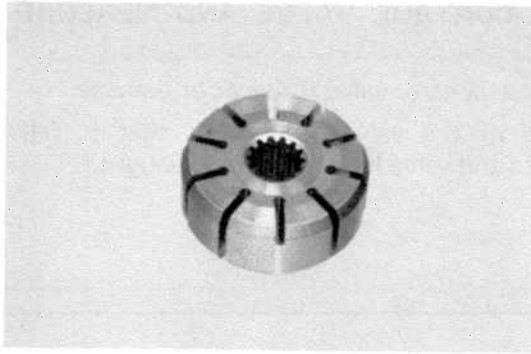
Check the pins for wear or damage.

5. IF NECESSARY, REPLACE PINS

- (a) Clamp the pins, one at a time, in a vise and remove them by tapping the housing with a plastic hammer.

- (b) Using a plastic hammer, tap two new pins into the housing.

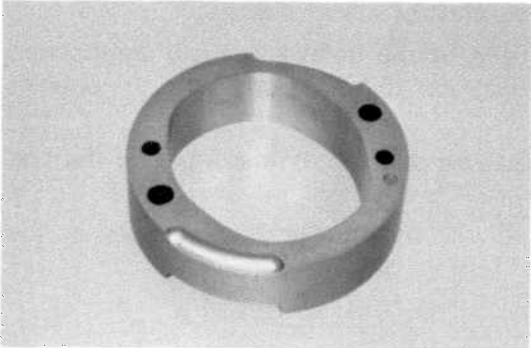




6. INSPECT AND MEASURE ROTOR

- (a) Check the rotor surface for wear, scratches or scoring.
- (b) Measure the thickness of the rotor and record it.

If a problem is found, replace the rotor.

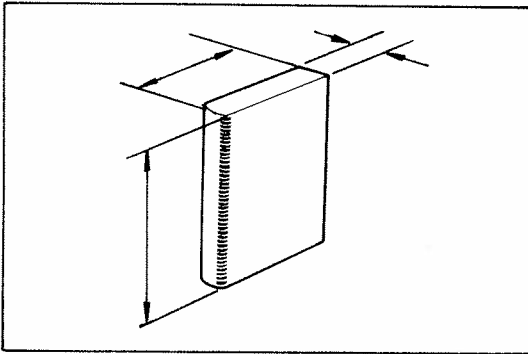


7. INSPECT AND MEASURE CAM RING

- (a) Check the inner surface for wear, scratches or scoring.
If a problem is found, replace the cam ring.
- (b) Measure the thickness of the cam ring. Check that the difference between the rotor and cam ring measurement is less than maximum.

Maximum difference: 0.06 mm (0.0024 in.)

If difference is excessive, replace the cam.



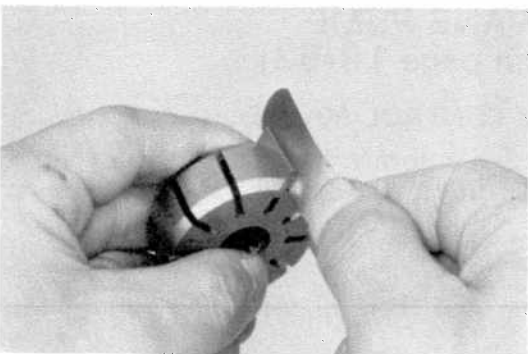
8. INSPECT AND MEASURE VANE PLATES

- (a) Check the vane plates for wear or scratches.
- (b) Measure the length, height and width of the vane plates.

Minimum length: 14.97 mm (0.5894 in.)

Minimum height: 7.8 mm (0.307 in.)

Minimum width: 1.7 mm (0.067 in.)

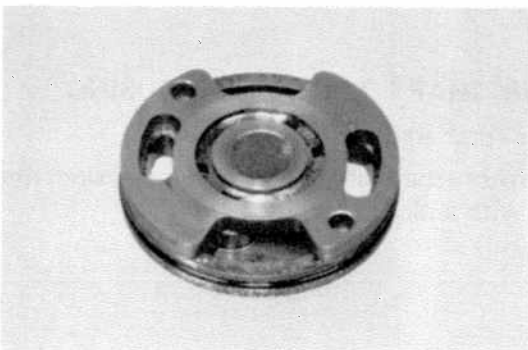


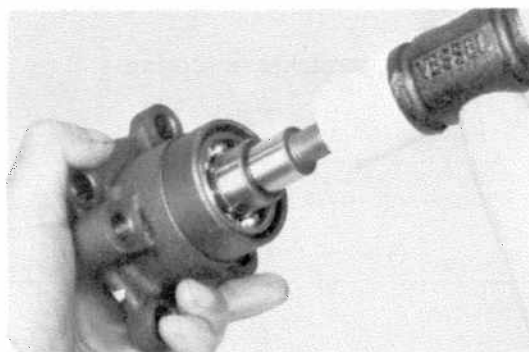
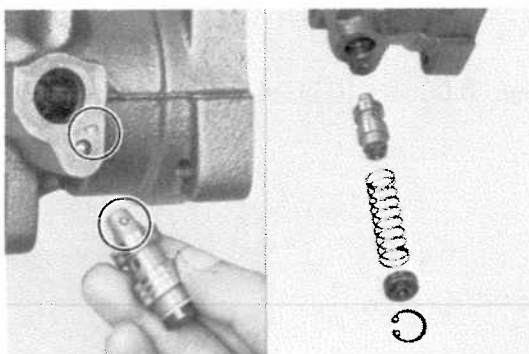
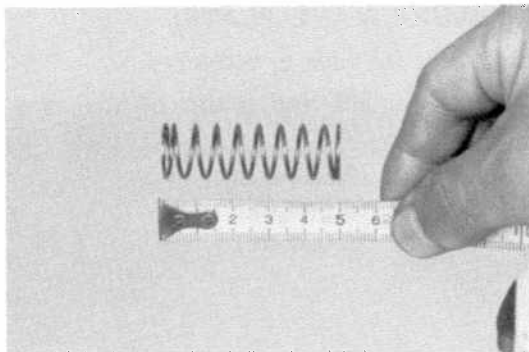
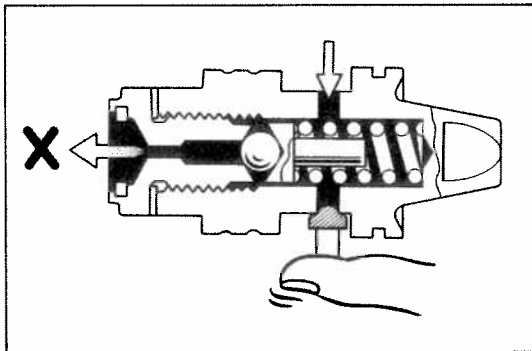
- (c) Measure the clearance between the vane plate and rotor groove.

Maximum clearance: 0.06 mm (0.0024 in.)

9. INSPECT REAR PLATE

Check the rear plate for wear, scratches or scoring.





10. INSPECT FLOW CONTROL VALVE AND MEASURE SPRING

- (a) Check the flow control valve for wear or damage.
- (b) Apply fluid to the valve and check that it falls smoothly into the valve hole by its own weight.

- (c) Check the flow control valve for leakage.
 - Close the one of the holes and apply compressed air [4 or 5 kg/cm² (57 or 71 psi)] into the opposite side.
 - Confirm that air does not come out from the end hole.

Replace as required with the same letter as stamped on the rear housing.

- (d) Check that the spring is within specification.

Spring length: 47 – 50 mm (1.85 – 1.97 in.)

If the spring is not within specification, replace the spring.

ASSEMBLY OF VANE PUMP (See illustration on page 16-52)

1. INSTALL FLOW CONTROL VALVE

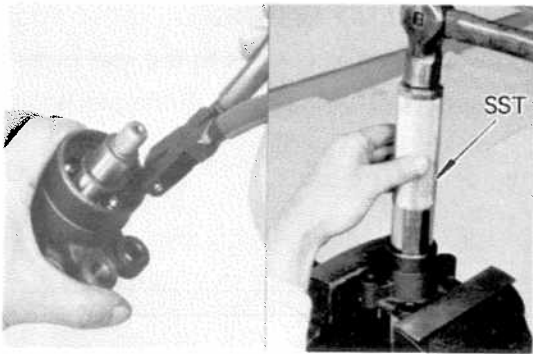
NOTE: Be sure the letter inscribed on the flow control valve matches the letter stamped on the rear of the pump body.

Inscribed mark: A–E

- (a) Lubricate the flow control valve and spring with ATF.
- (b) Install the flow control valve, spring, plug and snap ring.

2. INSTALL ROTOR SHAFT TO FRONT HOUSING

- (a) Lubricate the rotor shaft with ATF.
- (b) Install the rotor shaft into the front housing by tapping it in with a plastic hammer.



3. INSTALL SNAP RING

Using snap ring pliers, install the snap ring to the front housing.

4. INSTALL OIL SEAL

(a) Apply a light coat of multipurpose grease to the oil seal lip.

(b) Using a driver* and hammer, install the oil seal.

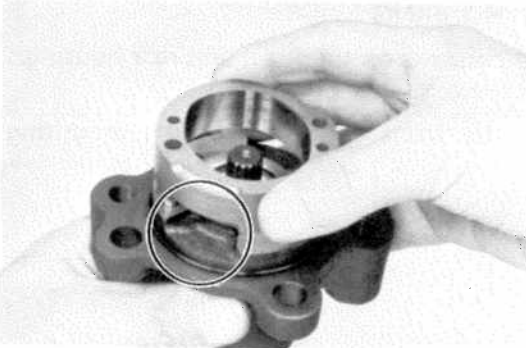
*SST 09608-30011 or Commercial driver

5. INSTALL O-RING

Lubricate and install the O-ring onto the front housing.

6. INSTALL RING CAM

Align the fluid passages of the ring cam and front housing, and install the ring cam.



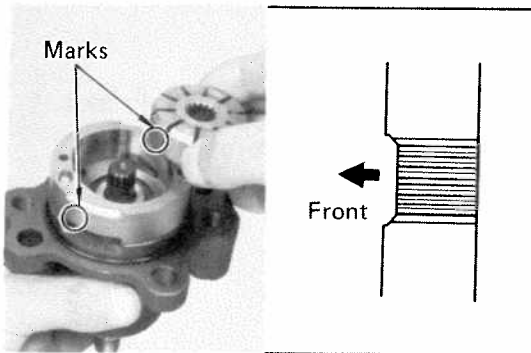
7. INSTALL ROTOR

(a) Lubricate the rotor with ATF.

(b) Install the rotor with the cut spline side facing toward the front housing.

NOTE: Be sure the letters inscribed on the ring cam and rotor are matching.

Inscribed mark: 1 – 4 or None



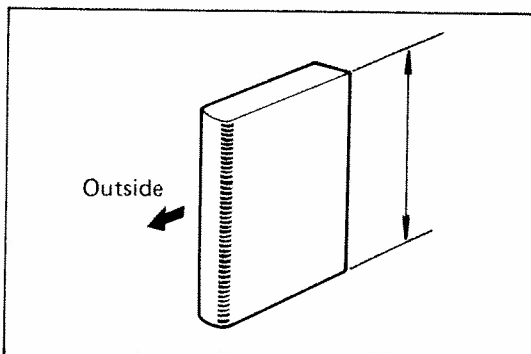
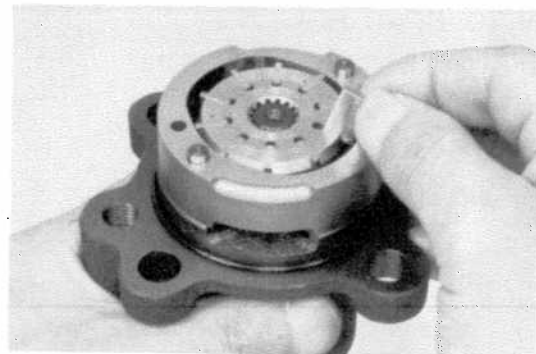
8. INSTALL VANE PLATES

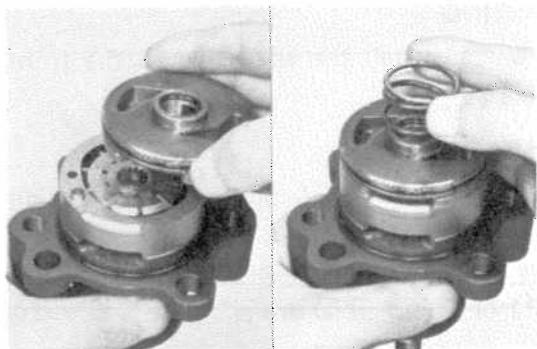
(a) Lubricate the vane plates with ATF.

(b) Install the vane plates with the round end facing outward.

NOTE: There are five vane lengths with the following rotor and cam ring marks:

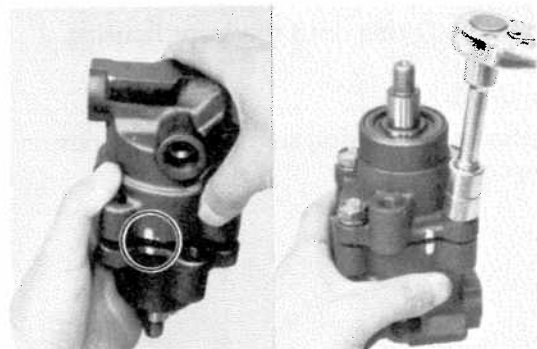
Rotor and cam ring mark	Vane Part No.	Vane length mm (in.)
None	44345-12010	14.996-14.998 (0.5904-0.5905)
1	44345-12020	14.994-14.996 (0.5903-0.5904)
2	44345-12030	14.992-14.994 (0.5902-0.5903)
3	44345-12040	14.990-14.992 (0.5902-0.5902)
4	44345-12050	14.988-14.990 (0.5901-0.5902)





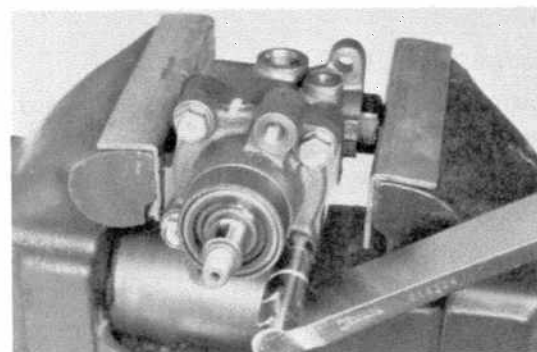
9. INSTALL REAR PLATE AND SPRING

- (a) Lubricate and install the two O-rings to the rear plate.
- (b) Place the rear plate on the ring cam with the pin holes aligned with the pins.
- (c) Place the spring on the rear plate.



10. INSTALL REAR HOUSING

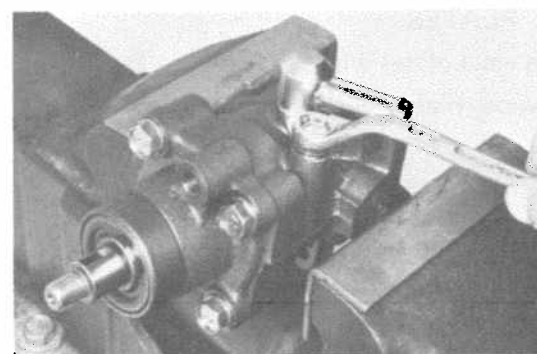
- (a) Align the matchmarks on the front and rear housings, and assemble them.
- (b) Half tighten the front and rear housing mounting bolts.



11. TIGHTEN FOUR HOUSING BOLTS

- (a) Clamp the rear housing in a vise.
- (b) Tighten the four housing bolts evenly 3 or 4 times.

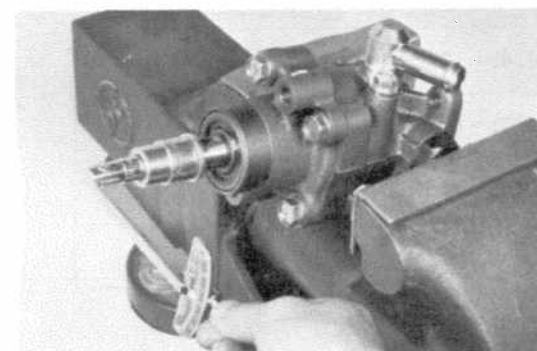
Torque: 400 – 550 kg-cm (29 – 39 ft-lb)



12. INSTALL UNION TO REAR HOUSING

- (a) Lubricate and install the O-ring to the union.
- (b) Insert and tighten the union

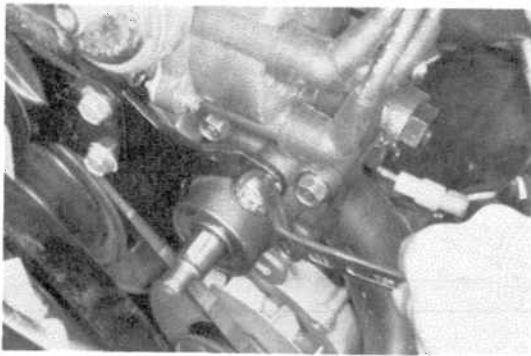
Torque: 100 – 160 kg-cm (8 – 11 ft-lb)



13. CHECK ROTOR SHAFT ROTATION CONDITION

- (a) Check that the rotor shaft rotates smoothly without abnormal noise.
- (b) Provisionally install the pulley nut and check the rotating torque.

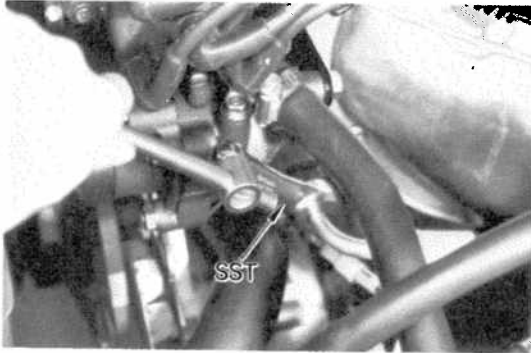
Rotating torque: Less than 2.75 kg-cm (239 in.-lb)



INSTALLATION OF VANE PUMP (See illustration on page 16-51)

1. INSTALL VANE PUMP

Place the vane pump in position and install mounting bolts.



2. CONNECT RETURN LINE HOSE

Push the hose on the fitting and tighten the clamp.

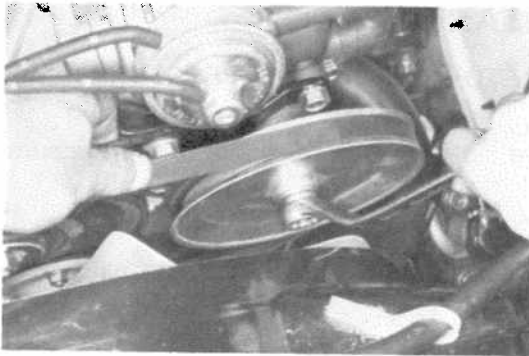
3. CONNECT PRESSURE LINE

Carefully connect the pressure line. Using a flare nut wrench*, tighten the connection.

Torque: 400 – 500 kg-cm (29 – 36 ft-lb)

NOTE: Check that there is sufficient clearance between the hose and exhaust manifold.

*SST 09631-22020 or Commercial wrench

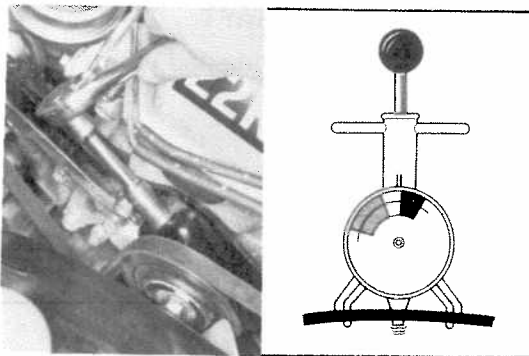


4. INSTALL DRIVE PULLEY AND BELT

(a) Install the key in the propeller shaft and push on the pulley.

(b) Push down on the drive belt to hold the pulley in place and torque the pulley set nut.

Torque: 450 – 550 kg-cm (33 – 39 ft-lb)



5. ADJUST DRIVE BELT TENSION

(a) Turn the adjusting bolt until the belt tension is at specified value.

(b) Tighten the idler pulley nut and adjusting bolt.

Drive belt tension:

New belt 125 ± 25 lb

Used belt 80 ± 20 lb

(w/ Borroughs drive belt tension gauge No.BT-33-73F)

6. FILL RESERVOIR WITH FLUID

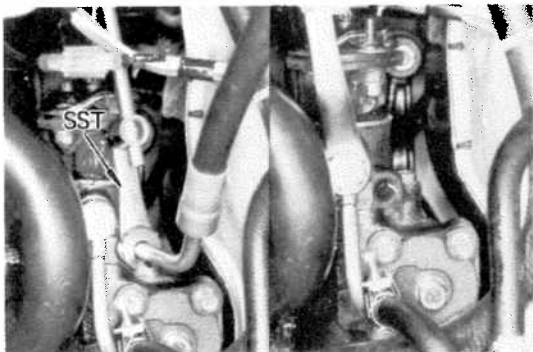
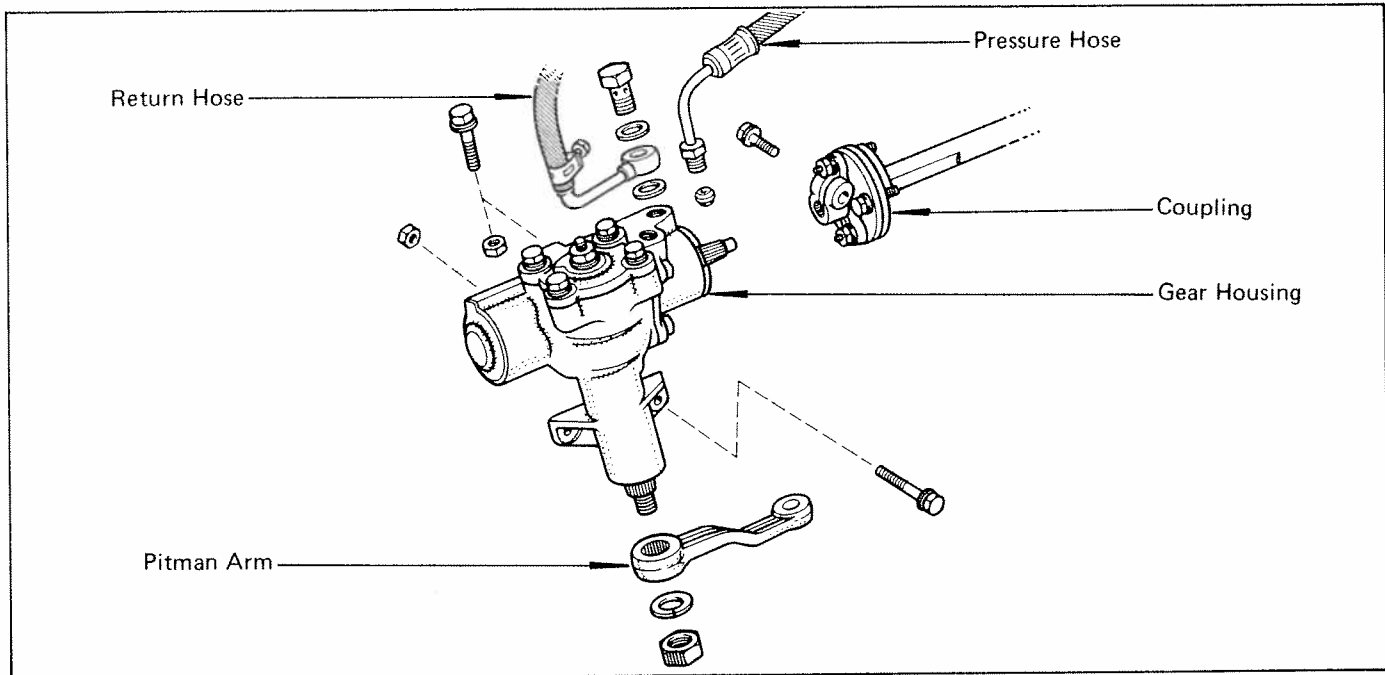
Fluid: ATF type Dexron or Dexron II

7. BLEED POWER STEERING (See page 16-49)

8. CHECK FOR FLUID LEAKS



Gear Housing (4x2)



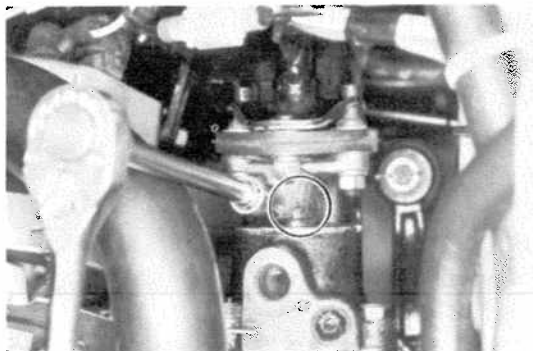
REMOVAL OF GEAR HOUSING

1. DISCONNECT RETURN LINE AND PRESSURE LINE

- (a) Using a flare nut wrench*, disconnect the pressure line.

*SST 09631-22020 or Commercial wrench

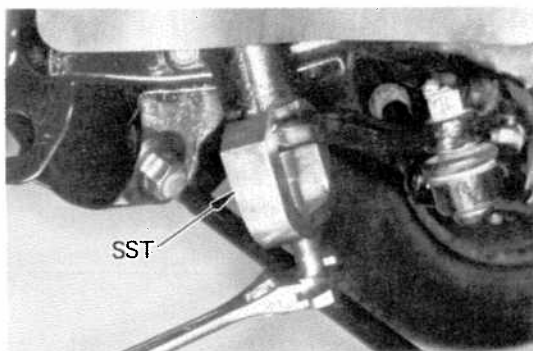
- (b) Remove the union bolt and disconnect the return line.



2. MARK COUPLING AND WORM SHAFT

Place an alignment mark on the coupling and worm shaft to ensure correct reassembly.

3. REMOVE COUPLING BOLT



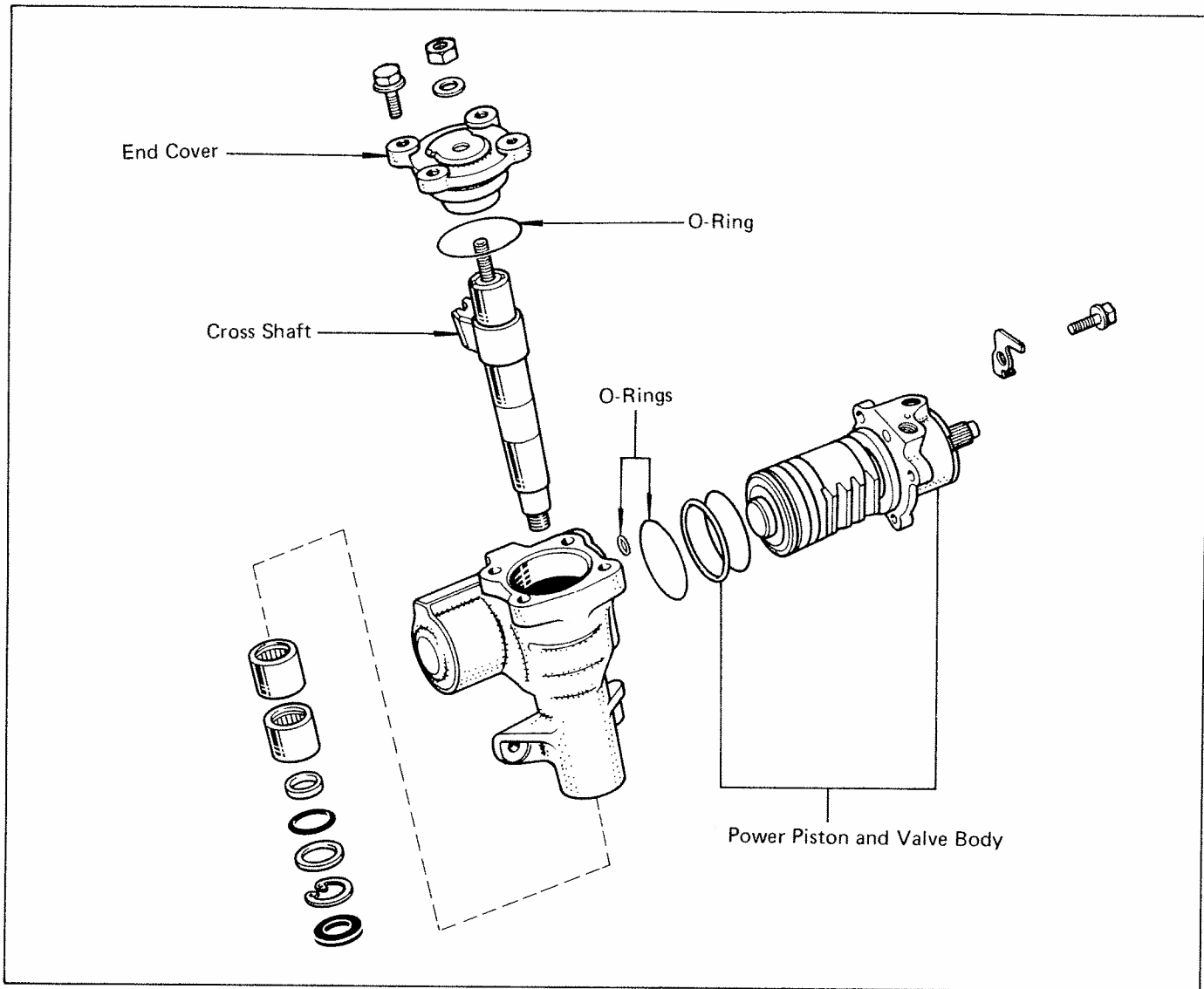
4. DISCONNECT PITMAN ARM FROM GEAR HOUSING

Remove the pitman arm set nut. Using a pitman arm puller*, disconnect the pitman arm from the gear housing.

*SST 09610-55012

5. REMOVE GEAR HOUSING

Remove three bolts and pull gear housing from the coupling.

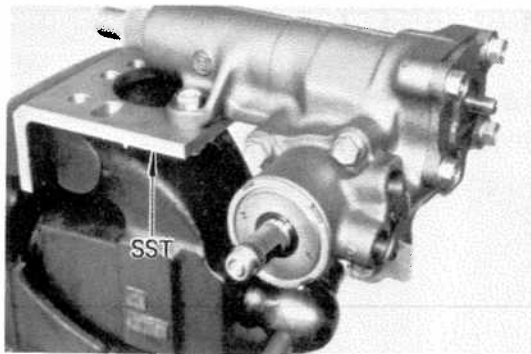


DISASSEMBLY OF GEAR HOUSING

1. MOUNT HOUSING ON STAND

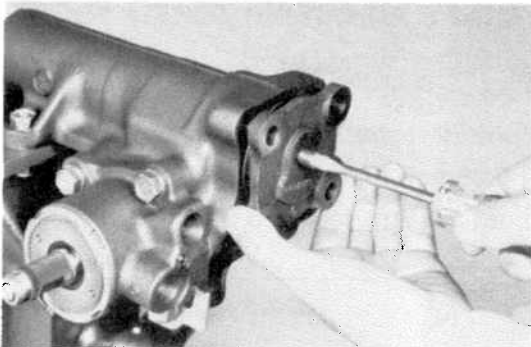
Mount the gear housing on a stand* and clamp the stand in a vise.

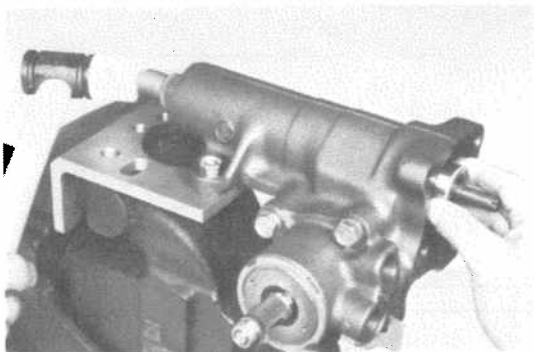
*SST 09630-00010



2. REMOVE CROSS SHAFT END COVER

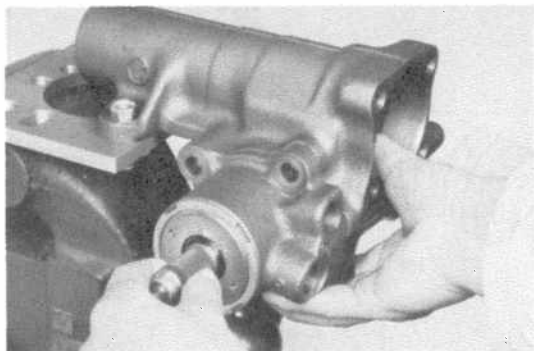
- Remove the adjusting screw lock nut and washer.
- Remove four end cover mounting bolts.
- Turn the adjusting screw clockwise until the cover is removed.





3. TAP OUT CROSS SHAFT

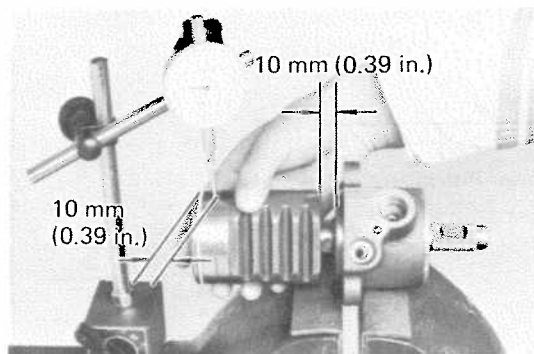
Using a plastic hammer, tap on the pitman arm end of the cross shaft and pull out the shaft.



4. REMOVE WORM GEAR VALVE BODY ASSEMBLY

- (a) Remove four valve body mounting bolts.
- (b) Hold the power piston with your finger and turn the worm shaft clockwise until the valve body O-ring is separated from the housing.
- (c) Pull out the worm gear valve body assembly.

CAUTION: Do not allow the worm gear to spin off the shaft.



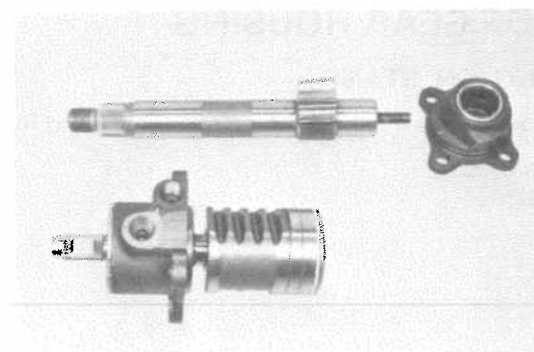
INSPECTION OF GEAR HOUSING

1. CHECK BALL CLEARANCE

- (a) Mount the valve body in a vise.
- (b) Using a dial indicator, check the ball clearance. Move the worm gear up and down.

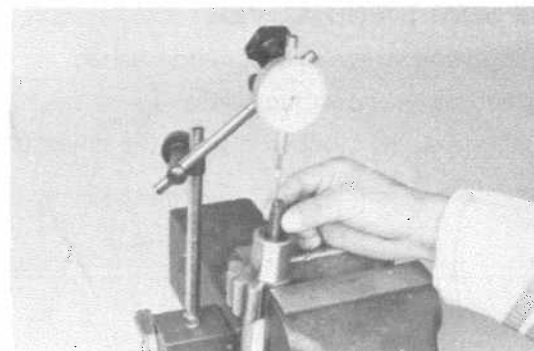
Maximum ball clearance: 0.15 mm (0.0059 in.)

If clearance is excessive, the power control valve assembly must be replaced.



2. INSPECT WORM GEAR, SECTOR GEAR, AND END COVER

- (a) Inspect both gears for wear or damage.
- (b) Inspect bearings for pitmarks or cracks.
- (c) Inspect O-ring groove for damage.

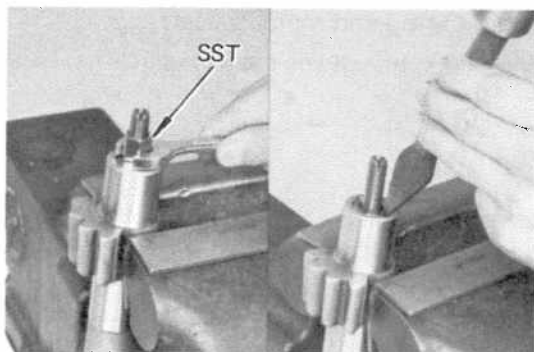


3. CHECK CROSS SHAFT ADJUSTING SCREW END PLAY

- (a) Clamp the cross shaft in a vise.
- (b) Using a dial indicator, check the end play.

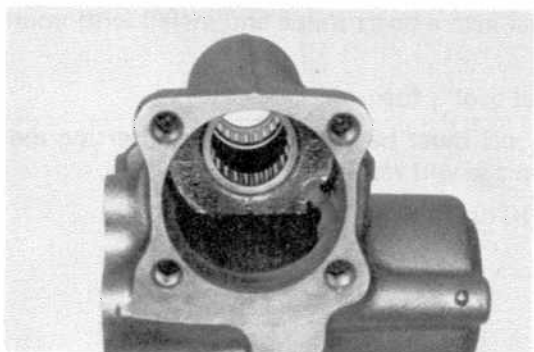
End play: 0.03 – 0.05 mm (0.0012 – 0.0020 in.)

If end play is not correct, see step 4 for adjustment procedure.



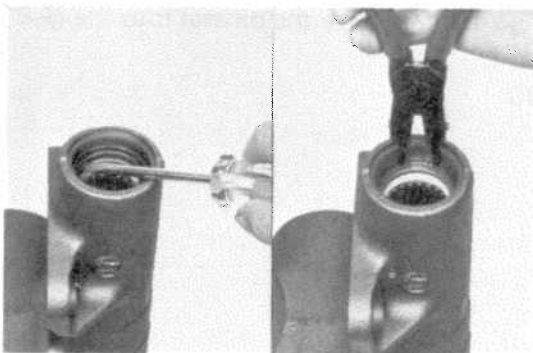
4. IF NECESSARY, ADJUST END PLAY

- (a) Using a chisel and hammer, remove the lock nut stake.
 - (b) Using a lock nut tool*, loosen the lock nut.
- *SST 09630-00010 or 00002-00800 No.5
- (c) Adjust the adjusting screw for correct end play and tighten the lock nut.
 - (d) Apply caulking to the lock nut.



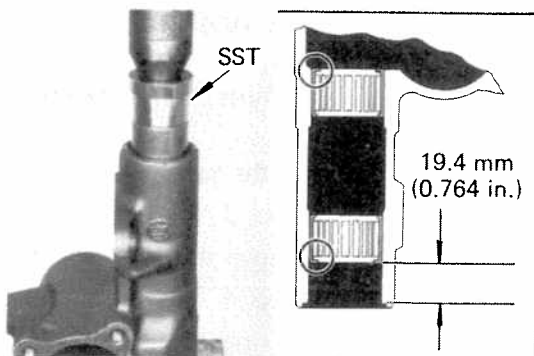
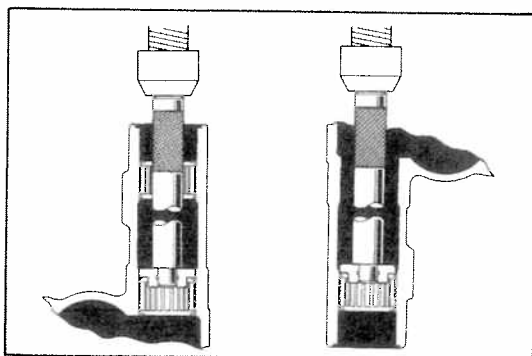
5. INSPECT GEAR HOUSING

- (a) Check the needle roller bearings for pitmarks or damage.
 - (b) Check the teflon ring and O-ring for damage.
- Replace bearings as required.



6. REPLACE TEFLON RING AND NEEDLE ROLLER BEARINGS

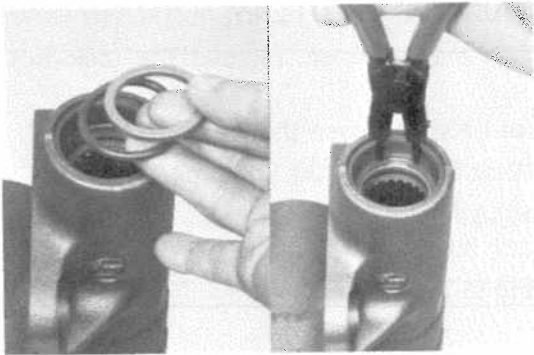
- (a) Pry out the oil seal from the pitman arm end of the housing.
 - (b) Using snap ring pliers, remove the snap ring.
 - (c) Remove the metal spacer, teflon seal and O-ring.
 - (d) Insert the bearing driver collar* between the two bearings and then the driver handle.*
- *SST 09630-00010 or 00002-00800 No. 6 and 7
- (e) Press out the bearing.
 - (f) Change sides and press out the other bearing.



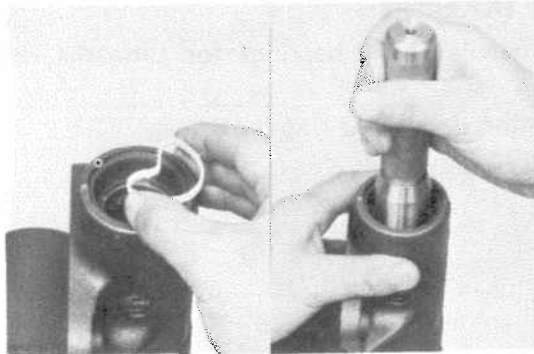
- (g) Using the bearing driver*, install the top bearing with the long flange out. Drive the bearing in flush with the inside casting surface.

*SST 09630-00010 or 00002-00800 No. 9

- (h) Using the same SST, install the lower bearing with the long flange out. The SST will bottom and correctly position the bearing.



- (i) Install the rubber O-ring and metal spacer.
- (j) Using snap ring pliers, install the snap ring.

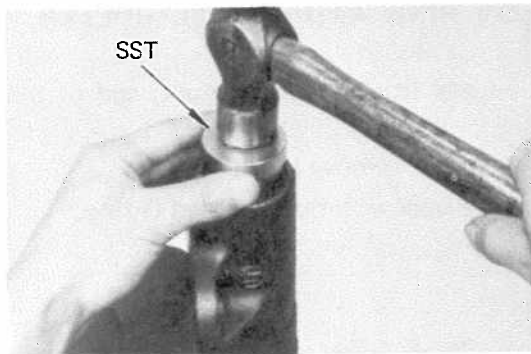


- (k) Form the seal into a heart shape and install with your finger.

- (l) Using the seal tool*, form the seal.

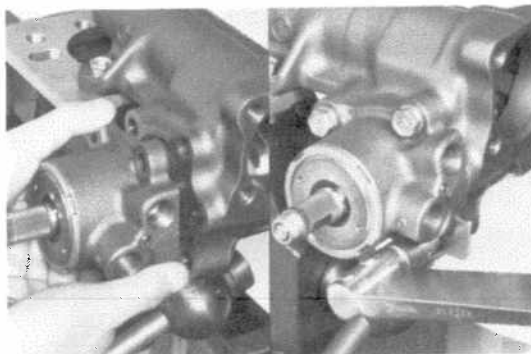
CAUTION: The seal must be formed before inserting the sector shaft or damage will result.

*SST 09630-00010 or 00002-00800



- (m) Using a bearing driver*, drive the oil seal into the gear housing.

*SST 09631-60010



ASSEMBLY OF GEAR HOUSING (See illustration on page 16-61)

1. INSTALL WORM GEAR VALVE BODY

- (a) Install two new O-rings.
- (b) Insert the valve body into the housing.
- (c) Tighten the valve body mounting bolts in a diagonal pattern.

Torque: 400 – 550 kg-cm (29 – 39 ft-lb)

2. INSPECT WORM SHAFT BEARING AND REPLACE OIL SEAL

NOTE: If a new worm gear valve body is being installed, skip this procedure.

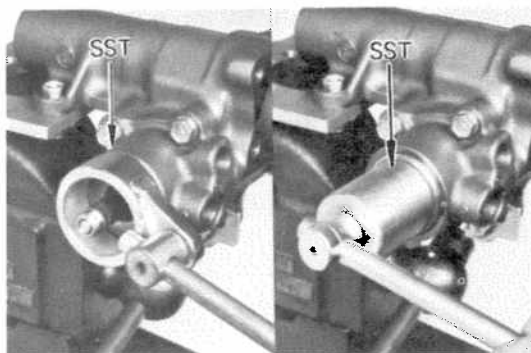
- (a) Using the lock nut tool*, remove the lock nut.

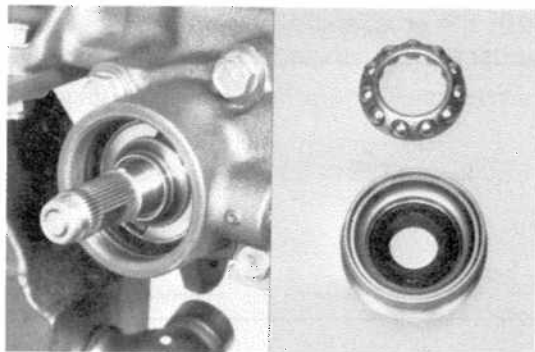
*SST 09630-00010 or 00002-00800 No. 3

- (b) Using the bearing cap tool*, remove the bearing cap.

*SST 09630-00010 or 00002-00800 No. 4

- (c) Remove the worm bearing and O-ring.





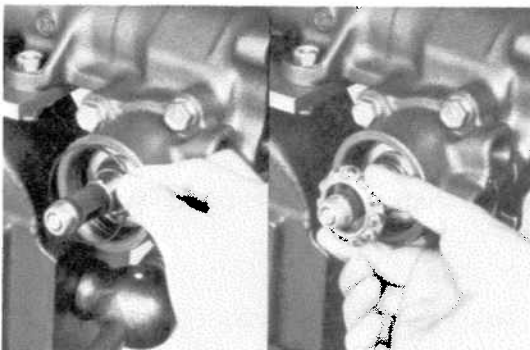
- (d) Inspect the bearing and races for pitmarks, cracks or damage.

Replace bearing or cap as required.

- (e) Remove old oil seal.

- (f) Using the seal driver*, drive in a new oil seal.

*SST 09630-00010 or 00002-00800 No. 8



- (g) Install a new O-ring bearing and bearing cap.

3. ADJUST WORM BEARING PRELOAD

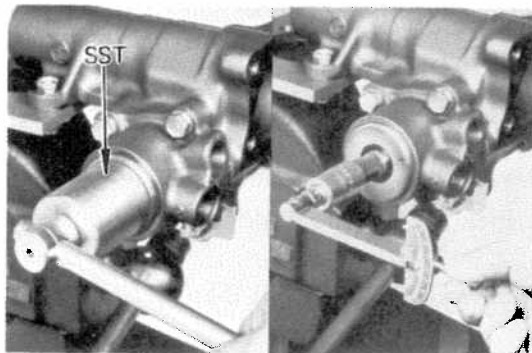
- (a) Using the bearing cap tool*, tighten the bearing cap until the preload is correct.

*SST 09630-00010 or 00002-00800 No. 4

- (b) Using the worm shaft tool* and torque wrench, check the preload of the bearing.

Preload: 4.0 — 6.5 kg-cm (3.5 — 5.6 in.-lb)

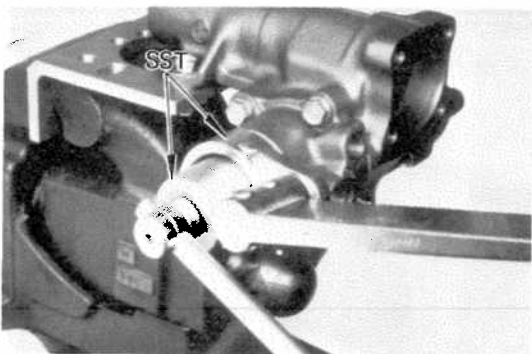
*SST 09616-00010



- (c) Using the lock nut tool*, tighten the lock nut while holding the bearing cap with the bearing cap tool*.

Torque: 450 — 550 kg-cm (33 — 39 ft.-lb)

*SST 09630-00010 or SST 00002-00800 No. 3 and No. 4



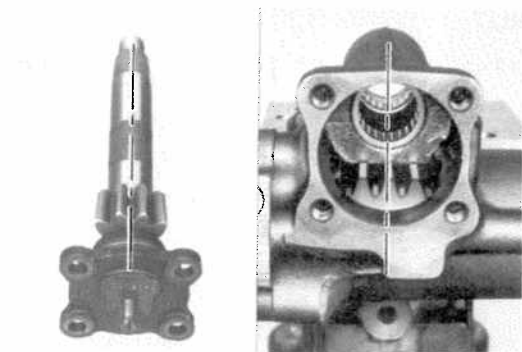
4. INSTALL CROSS SHAFT AND END COVER

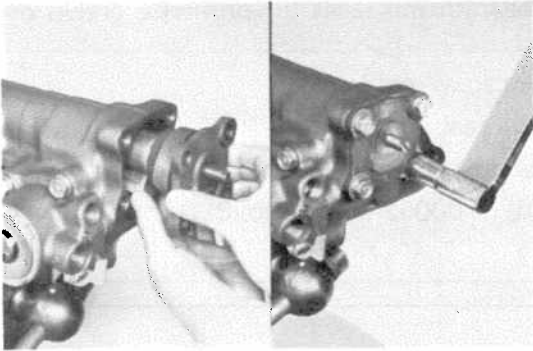
- (a) Install a new O-ring on the end cover.

- (b) Assemble the cross shaft to the end cover.

NOTE: Fully loosen the adjusting screw.

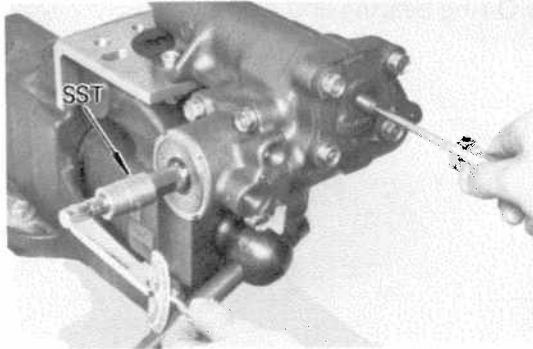
- (c) Set the worm gear at the center of the gear housing.





- (d) Insert and push the cross shaft into the gear housing so that the center teeth mesh together.
- (e) Tighten the end cover mounting bolts in a diagonal pattern.

Torque: 400 – 550 kg-cm (29 – 39 ft-lb)



5. DETERMINE CENTER POSITION OF GEAR BOX

Turn the worm shaft full lock in both directions and determine the exact center.

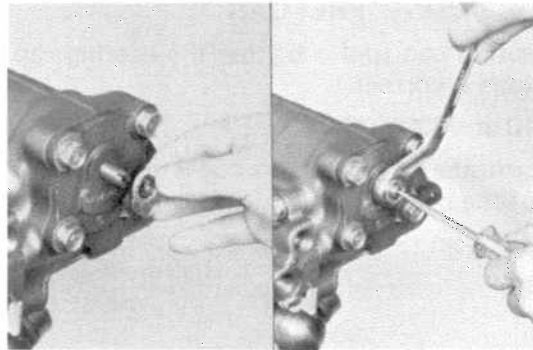
6. ADJUST TOTAL PRELOAD

- (a) Install the worm shaft tool* with torque wrench on centered worm shaft.

*SST 09616-00010

- (b) Turn the adjusting screw while measuring the preload until the preload is correct.

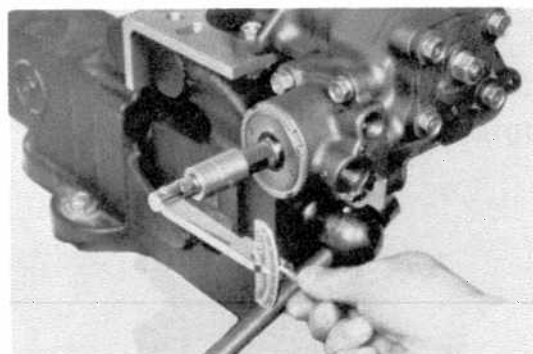
**Total preload: Worm shaft preload plugs
2.0 – 3.0 kg-cm (1.7 – 2.6 in.-lb)**



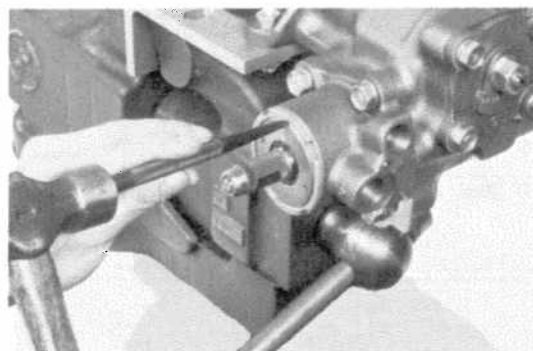
7. INSTALL A NEW WASHER AND TIGHTEN LOCK NUT

- (a) Install a new washer on the adjusting screw.
- (b) Tighten the lock nut while holding the adjusting screw.

Torque: 400 – 550 kg-cm (29 – 39 ft-lb)



8. RECHECK TOTAL PRELOAD



9. STAKE LOCK NUT

Using a punch and hammer, stake the lock nut at three places.

INSTALLATION OF GEAR HOUSING (See illustration on page 16-60)

1. INSTALL GEAR HOUSING

- (a) Align marks on worm shaft and coupling.
- (b) Tighten the gear housing mounting bolts.

Torque: 500 – 600 kg-cm (37 – 43 ft-lb)

2. CONNECT PITMAN ARM

- (a) Align marks on the pitman arm and cross shaft.
- (b) Tighten the pitman arm nut.

Torque: 1,100 – 1,250 kg-cm (80 – 90 ft-lb)

3. TIGHTEN COUPLING BOLT

Torque the coupling bolt.

Torque: 200 – 300 kg-cm (15 – 21 ft-lb)

4. INSTALL PRESSURE AND RETURN LINES

- (a) Connect the return line and tighten the union bolt.

Return line torque: 450 – 550 kg-cm (32 – 39 ft-lb)

- (b) Using a flare nut wrench*, connect the pressure line.

*SST 09631-22020 or Commercial wrench

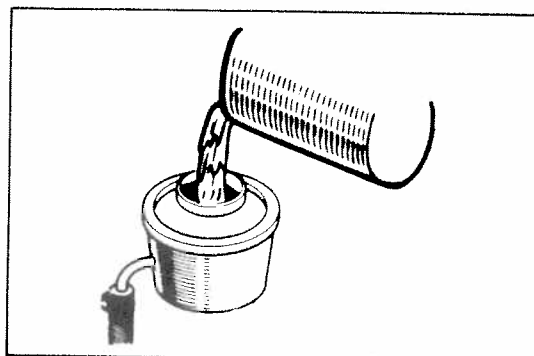
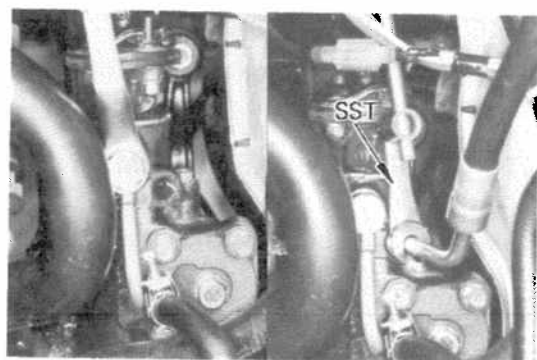
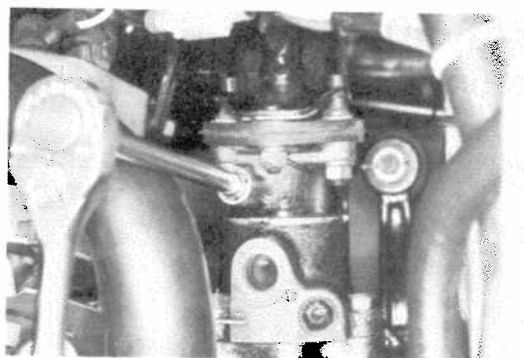
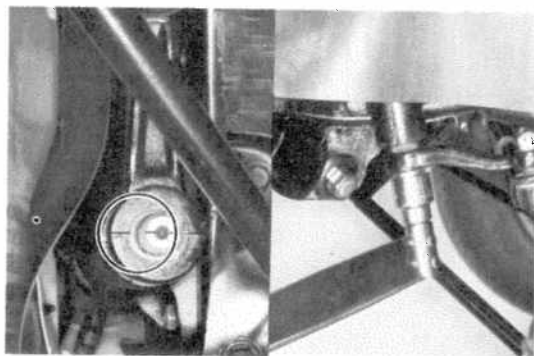
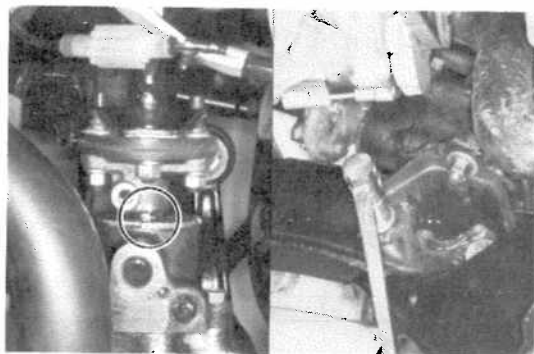
Pressure line torque: 400 – 500 kg-cm (29 – 36 ft-lb)

NOTE: Be sure the hose is not touching the fender.

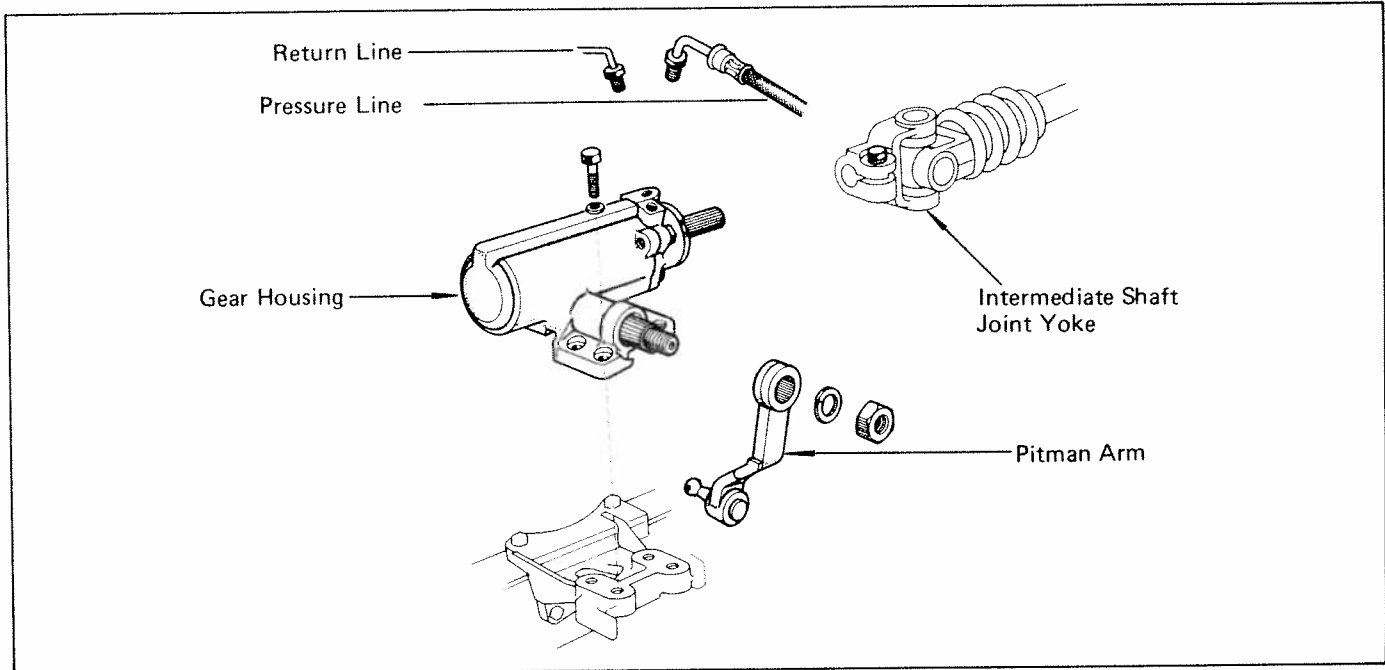
5. FILL RESERVOIR WITH FLUID

Fluid: ATF type Dexron or Dexron II

6. BLEED SYSTEM AND PERFORM PRESSURE CHECK (See page 16-49)



Gear Housing (4x4)

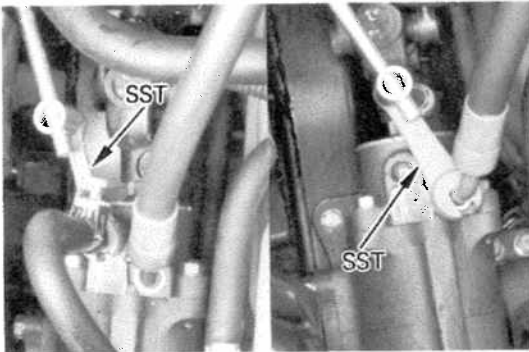


REMOVAL OF GEAR HOUSING

1. DISCONNECT RETURN LINE AND PRESSURE LINE

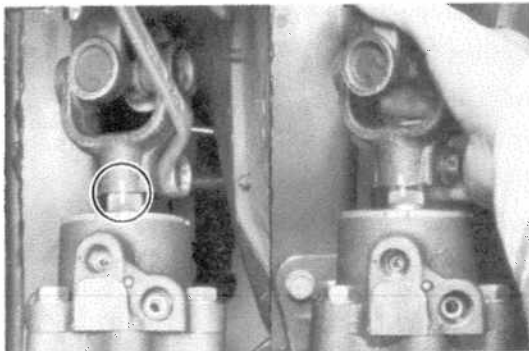
Using a flare nut wrench*, disconnect return and pressure lines.

*SST 09631-22020 or Commercial wrench



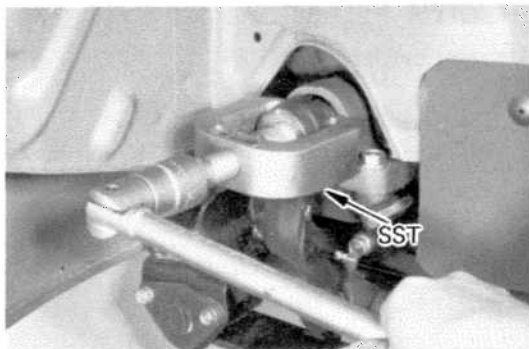
2. MARK JOINT YOKE AND WORM SHAFT

Place an alignment mark on the joint yoke and worm shaft to ensure correct reassembly.



3. DISCONNECT INTERMEDIATE SHAFT FROM WORM SHAFT

Loosen the joint yoke bolt and compress the intermediate shaft.



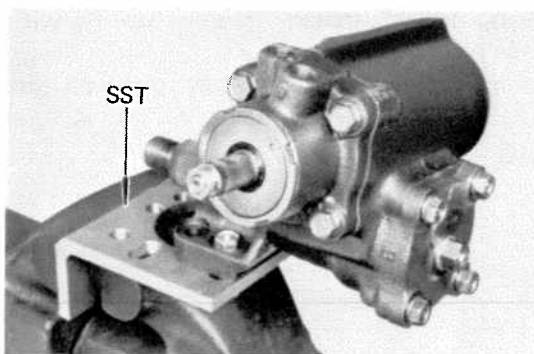
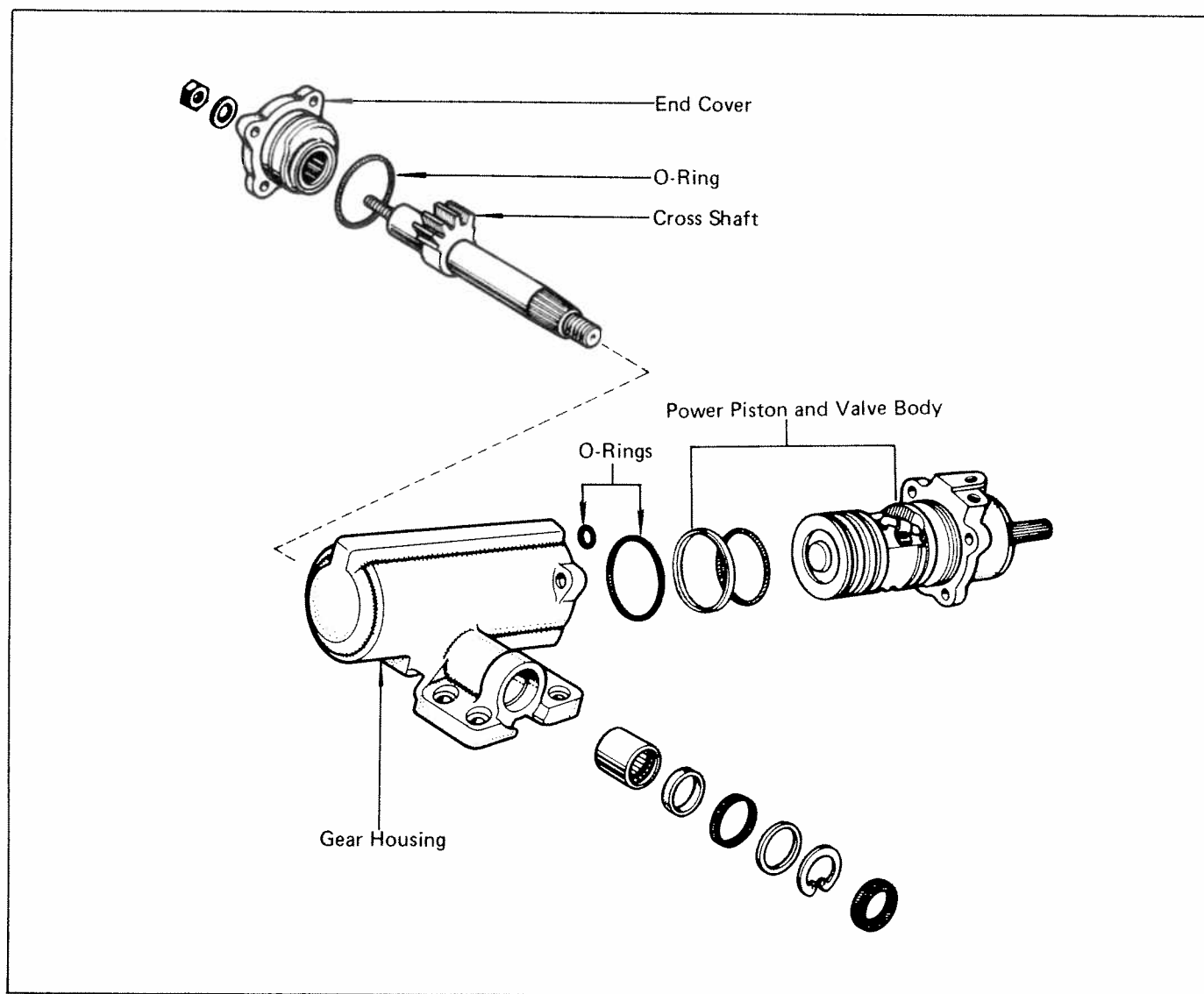
4. DISCONNECT PITMAN ARM FROM GEAR HOUSING

Remove the pitman arm set nut. Using a pitman arm puller*, disconnect the pitman arm from the gear housing.

*SST 09610-55012

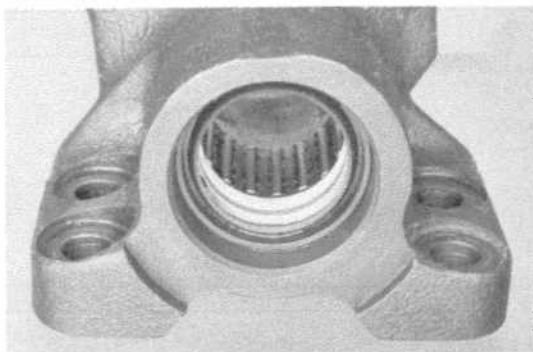
5. REMOVE GEAR HOUSING

Remove four bolts and take out the gear housing out of the engine compartment side.



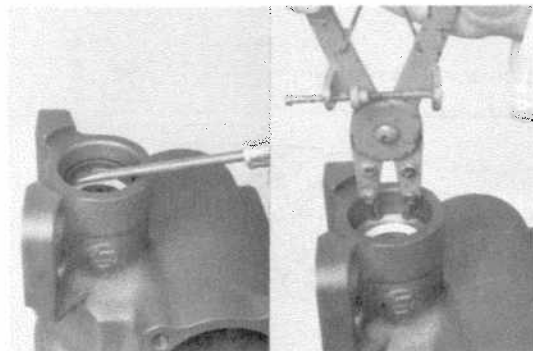
DISASSEMBLY OF GEAR HOUSING

NOTE: Disassembly procedure is same as for 4x2. Refer to DISASSEMBLY OF GEAR HOUSING 4x2 on page 16-61.



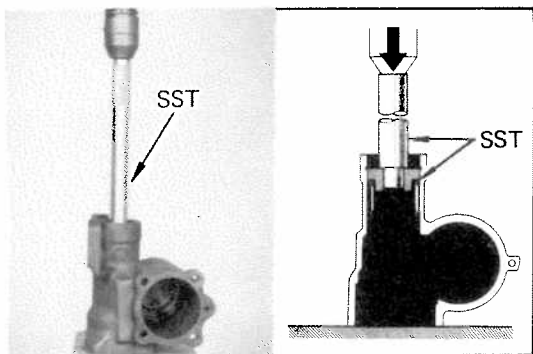
INSPECTION OF GEAR HOUSING

NOTE: Inspection procedure is same as for 4x2 except REPLACEMENT OF TEFLON RING AND NEEDLE ROLLER BEARING. Refer to INSPECTION OF GEAR HOUSING 4x2 on page 16-62.



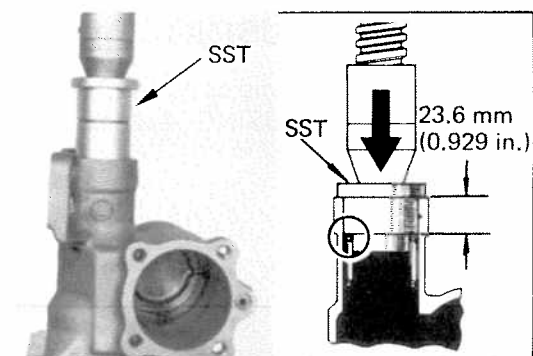
REPLACE TEFLON RING AND NEEDLE ROLLER BEARING

- (a) Pry out the oil seal from the pitman arm end of the housing.
- (b) Using snap ring pliers, remove the snap ring.
- (c) Remove the metal spacer, teflon seal and O-ring.



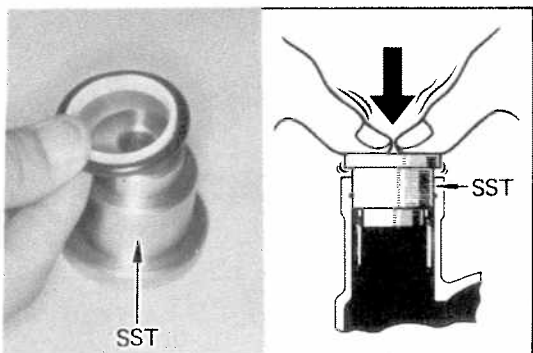
- (d) Using a bearing driver*, drive out the bearing.

*SST 09630-00010



- (e) Using a bearing driver*, install the new bearing with the long flange nut. The SST will bottom and correctly position the bearing.

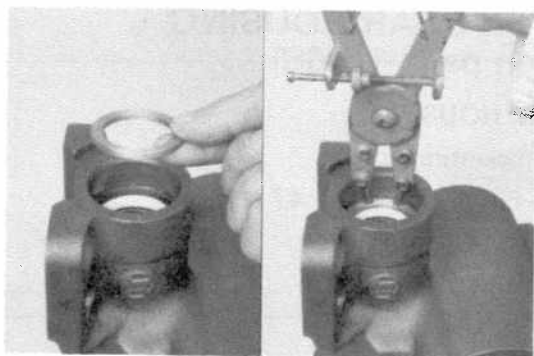
*SST 09631-60010



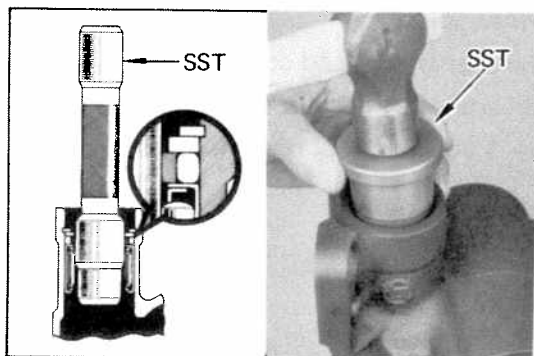
- (f) Install the new teflon ring together with the new O-ring to SST*.

*SST 09631-60010

- (g) Install the teflon ring and O-ring to the gear housing with the SST.



- (h) Install the metal spacer.
- (i) Using snap ring pliers, install the snap ring.



- (j) Using the seal tool*, form the seal.

CAUTION: The seal must be formed before inserting the sector shaft or damage will result.

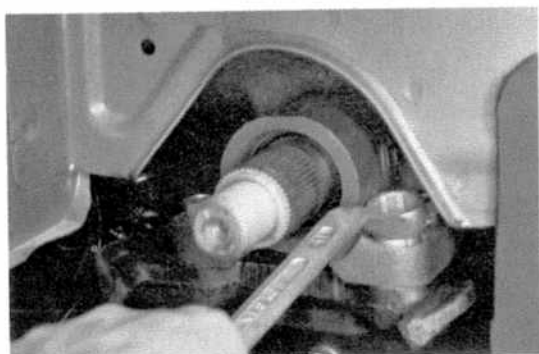
*SST 09630-00010 or 00002-00800

- (k) Using a bearing driver*, drive the oil seal into the gear housing.

*SST 09631-60010

ASSEMBLY OF GEAR HOUSING (See illustration on page 16-69)

NOTE: Assembly procedure is same as for 4x2. Refer to ASSEMBLY OF GEAR HOUSING 4x2 on page 16-64.

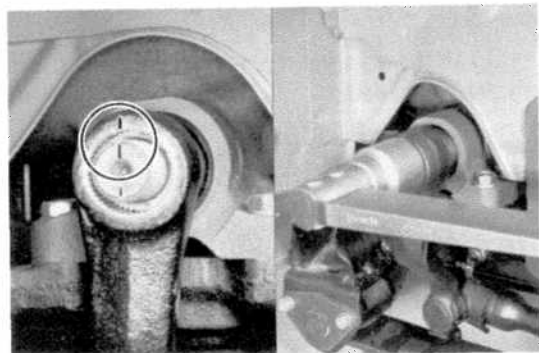


INSTALLATION OF GEAR HOUSING (See illustration on page 16-68)

1. INSTALL GEAR HOUSING

Torque the four mounting bolts.

Torque: 500 – 650 kg-cm (37 – 47 ft-lb)

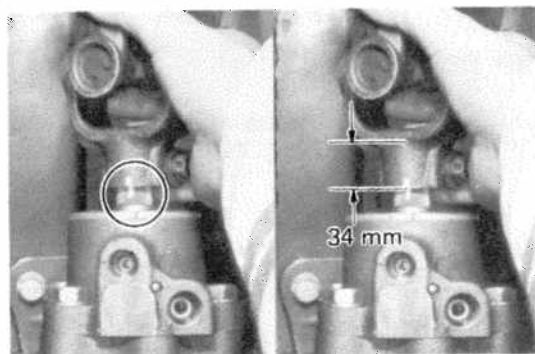


2. CONNECT PITMAN ARM

Align marks on the pitman arm and cross shaft.

Torque the pitman arm nut.

Torque: 1,600 – 1,900 kg-cm (116 – 137 ft-lb)



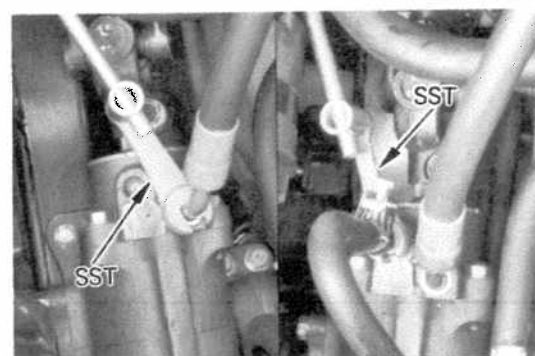
3. CONNECT INTERMEDIATE SHAFT TO WORM SHAFT

(a) Align the alignment marks on the joint yoke and worm shaft.

(b) Compress and install the intermediate shaft onto the worm shaft to a depth of 34 mm (1.34 in.).

(c) Tighten the joint yoke bolt.

Torque: 300 – 450 kg-cm (22 – 32 ft-lb)



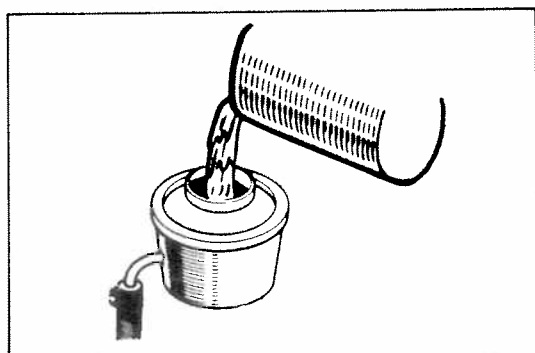
4. INSTALL PRESSURE AND RETURN LINES

Using a flare nut wrench*, install and tighten the union nuts.

*SST 09631-22020 or Commercial wrench

Torque: 400 – 500 kg-cm (29 – 36 ft-lb)

NOTE: Be sure the hose is not touching the fender.

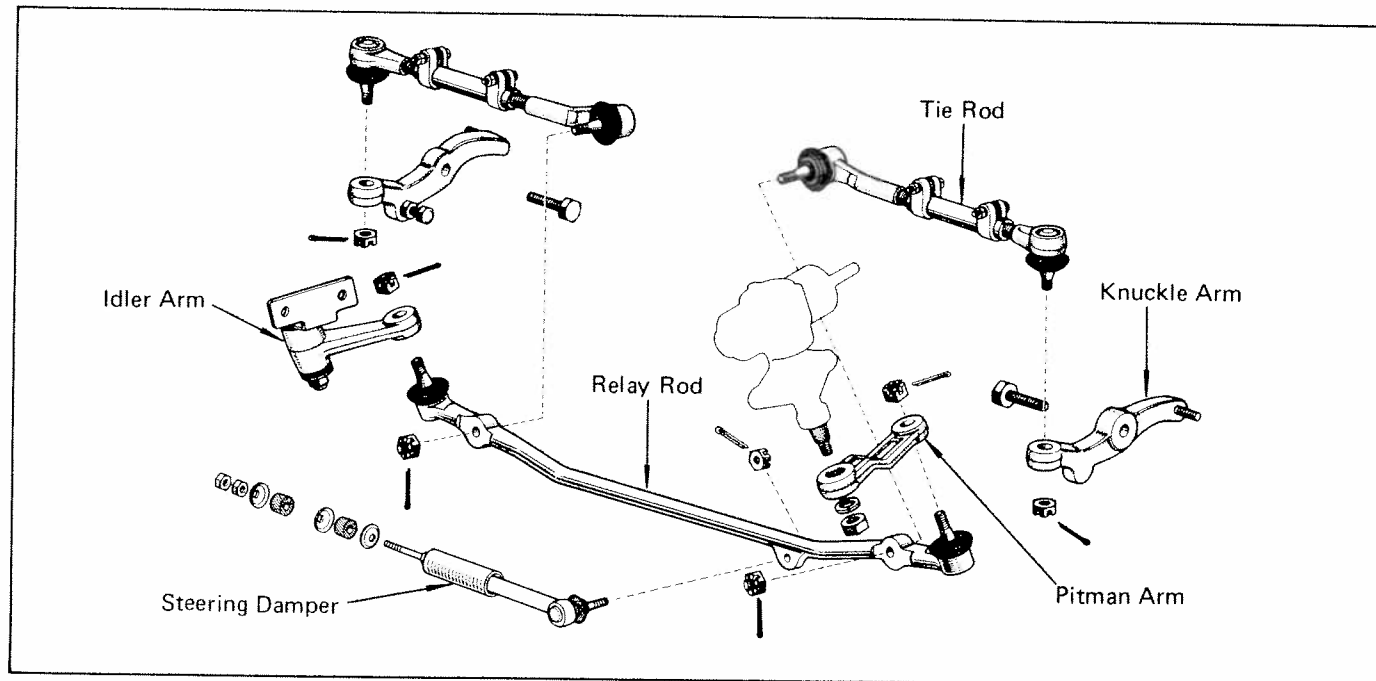


5. FILL RESERVOIR WITH FLUID

Fluid: ATF type Dexron or Dexron II

6. BLEED SYSTEM AND PERFORM PRESSURE CHECK (See page 16-49)

STEERING LINKAGE (4x2)



NOTE: After installing any of the steering linkage components, check the front wheel alignment and side slip. (See page 13-3)

Pitman Arm

REMOVAL AND INSPECTION OF PITMAN ARM

1. DISCONNECT PITMAN ARM FROM SECTOR SHAFT

Using pitman arm puller*, disconnect the pitman arm from the sector shaft.

*SST 09610-55012

2. DISCONNECT PITMAN ARM FROM TIE ROD

Using tie rod end puller*, disconnect the pitman arm from the relay rod.

*SST 09611-20014

3. INSPECT ARM FOR WEAR, DAMAGE OR CRACKS

Check for cracks with flaw detecting penetrant.

INSTALLATION OF PITMAN ARM

CONNECT PITMAN ARM TO TIE ROD AND SECTOR SHAFT

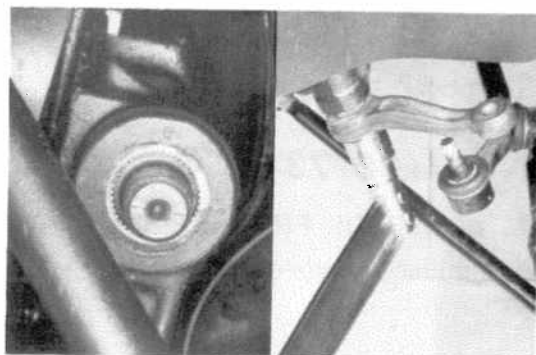
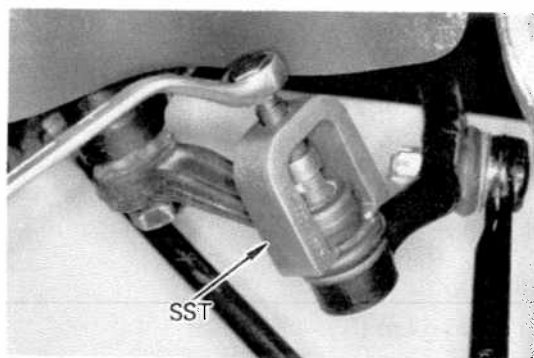
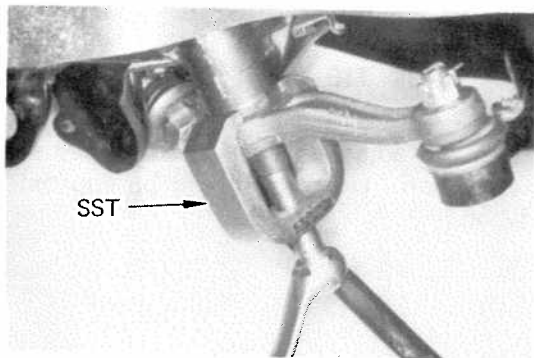
(a) Align marks on the pitman arm and the sector shaft.

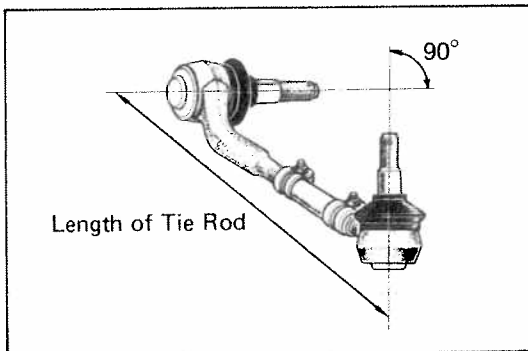
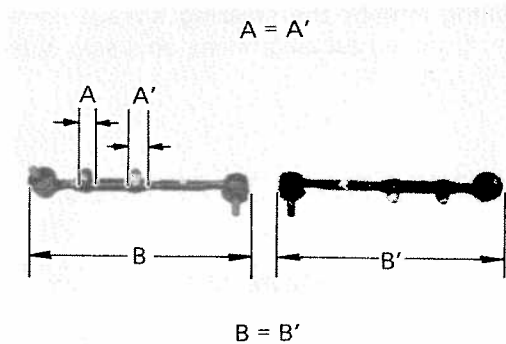
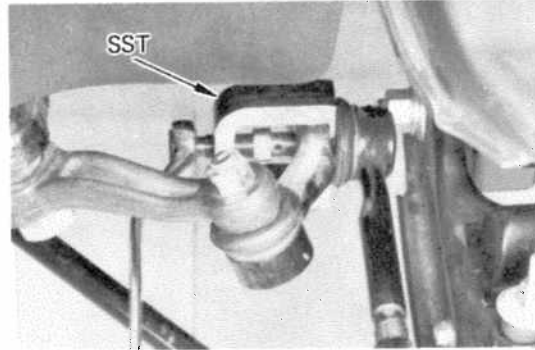
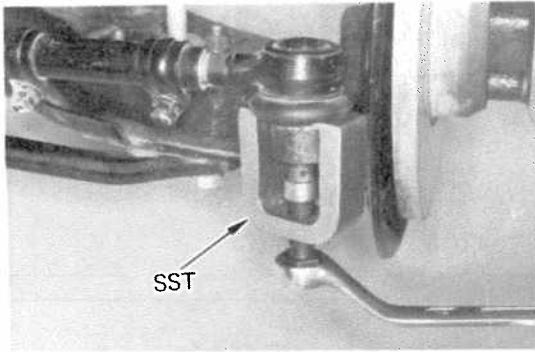
(b) Torque the pitman arm nut.

Torque: 1,100 — 1,250 kg-cm (80 — 90 ft-lb)

(c) Torque the relay rod nut.

Torque: 750 — 1,100 kg-cm (55 — 79 ft-lb)





Tie Rod

REMOVAL AND INSPECTION OF TIE ROD (See illustration on page 16-73)

1. DISCONNECT TIE ROD FROM RELAY ROD AND KNUCKLE ARM

Using tie rod end puller*, disconnect the tie rod.

*SST 09611-22011

2. INSPECT TIE ROD FOR WEAR, DAMAGE OR CRACKS

Check for cracks with flaw detecting penetrant.

INSTALLATION OF TIE ROD

1. ASSEMBLE AND ADJUST TIE RODS TO SAME LENGTH

Turn the tie rods in the adjusting clamp until measurements are equal as shown. Tie rods should be approximately 314 mm (12.36 in.).

2. ADJUST TIE ROD END ANGLE

(a) Turn tie rods so they cross at about 90 degrees.

(b) Tighten the adjusting tube clamps to lock the tie rods in position.

Torque: 200 — 300 kg-cm (15 — 21 ft-lb)

3. CONNECT TIE ROD

Torque the mounting bolts.

Torque: 750 — 1,100 kg-cm (55 — 79 ft-lb)

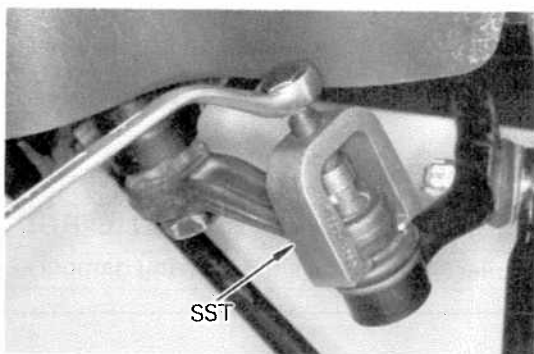
Relay Rod

REMOVAL AND INSPECTION OF RELAY ROD (See illustration on page 16-73)

1. DISCONNECT TIE ROD ENDS FROM RELAY ROD

Using the tie rod end puller*, disconnect the tie rod ends from the relay rod.

*SST 09611-22011



2. DISCONNECT RELAY ROD FROM PITMAN ARM AND IDLER ARM

Using puller*, disconnect and remove the relay rod.

*SST 09611-20014

3. INSPECT RELAY ROD FOR WEAR, DAMAGE OR CRACKS

Check for cracks with flaw detecting penetrant.



INSTALLATION OF RELAY ROD

CONNECT RELAY ROD TO FOLLOWING PARTS

- (a) Idler arm
- (b) Pitman arm
- (c) Tie rods

Torque four nuts.

Torque: Idler arm side	500 — 700 kg-cm (37 — 50 ft-lb)
Pitman arm side	750 — 1,100 kg-cm (55 — 79 ft-lb)

Knuckle Arm

REMOVAL AND INSPECTION OF KNUCKLE ARM

(See illustration on page 16-73)

1. DISCONNECT TIE ROD FROM KNUCKLE ARM

Using the rod end puller*, disconnect the tie rod from the knuckle arm.

*SST 09611-22011

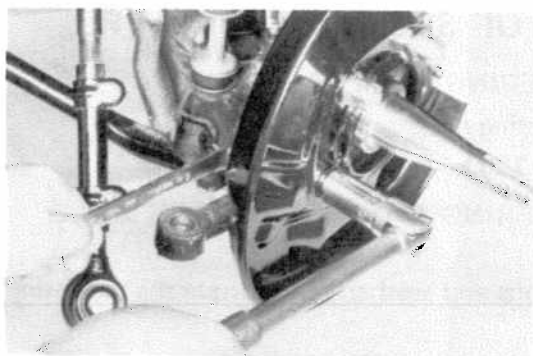
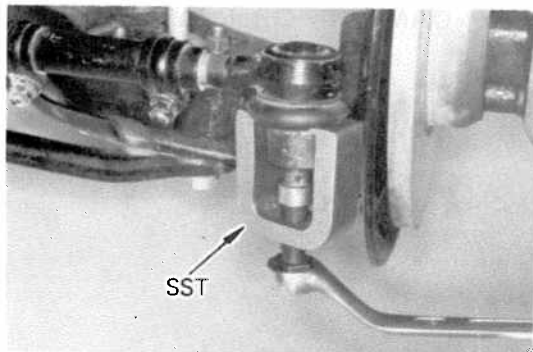
2. REMOVE FRONT AXLE HUB

(See page 13-7)

3. REMOVE KNUCKLE ARM

4. INSPECT KNUCKLE ARM FOR WEAR, DAMAGE OR CRACKS

Check for cracks with flaw detecting penetrant.



INSTALLATION OF KNUCKLE ARM

1. INSTALL KNUCKLE ARM TO STEERING KNUCKLE

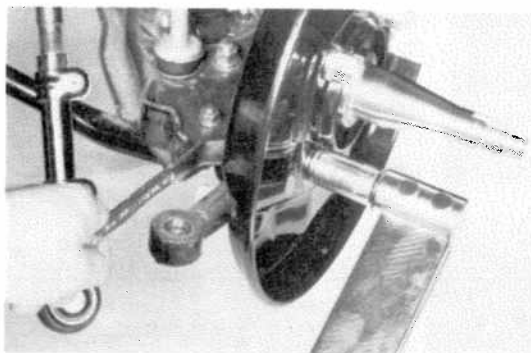
Torque: 900 — 1,300 kg-cm (66 — 94 ft-lb)

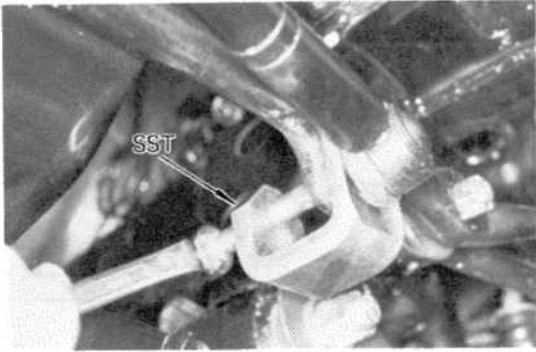
2. INSTALL FRONT AXLE HUB (See page 13-8)

3. CONNECT TIE ROD TO KNUCKLE ARM

Torque the bolt.

Torque: 750 — 1,100 kg-cm (55 — 79 ft-lb)





Steering Damper

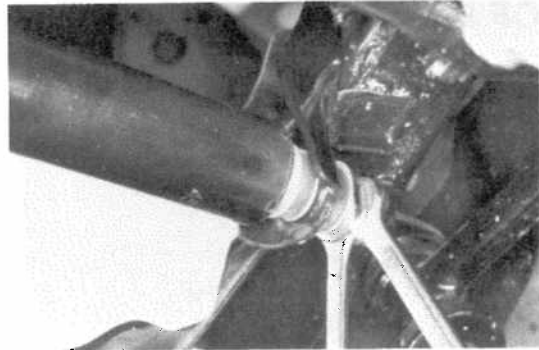
REMOVAL AND INSPECTION OF STEERING DAMPER

(See illustration on page 16-73)

1. DISCONNECT STEERING DAMPER FROM TIE ROD

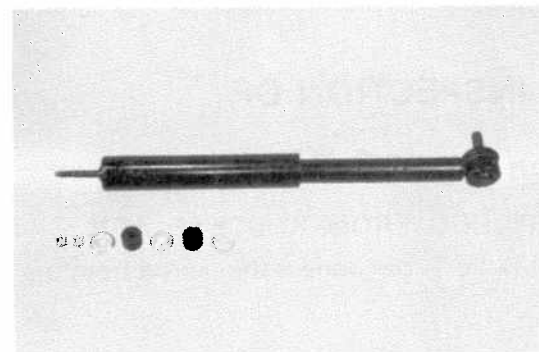
Using tie rod end puller*, disconnect the steering damper.

*SST 09611-12010

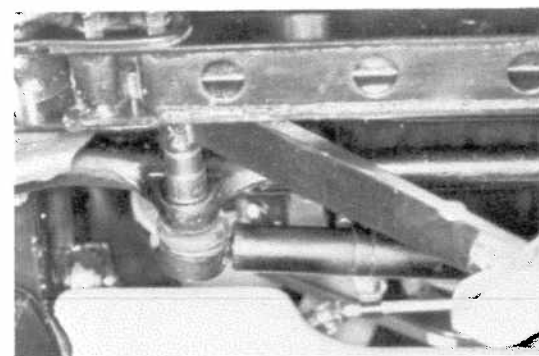


2. DISCONNECT STEERING DAMPER FROM FRONT AXLE HOUSING

Using two wrenches, remove the lock nut and mounting nut.



3. INSPECT STEERING DAMPER FOR DAMAGE AND OIL LEAKAGE



INSTALLATION OF STEERING DAMPER

1. CONNECT STEERING DAMPER TO TIE ROD

Torque the mounting nut.

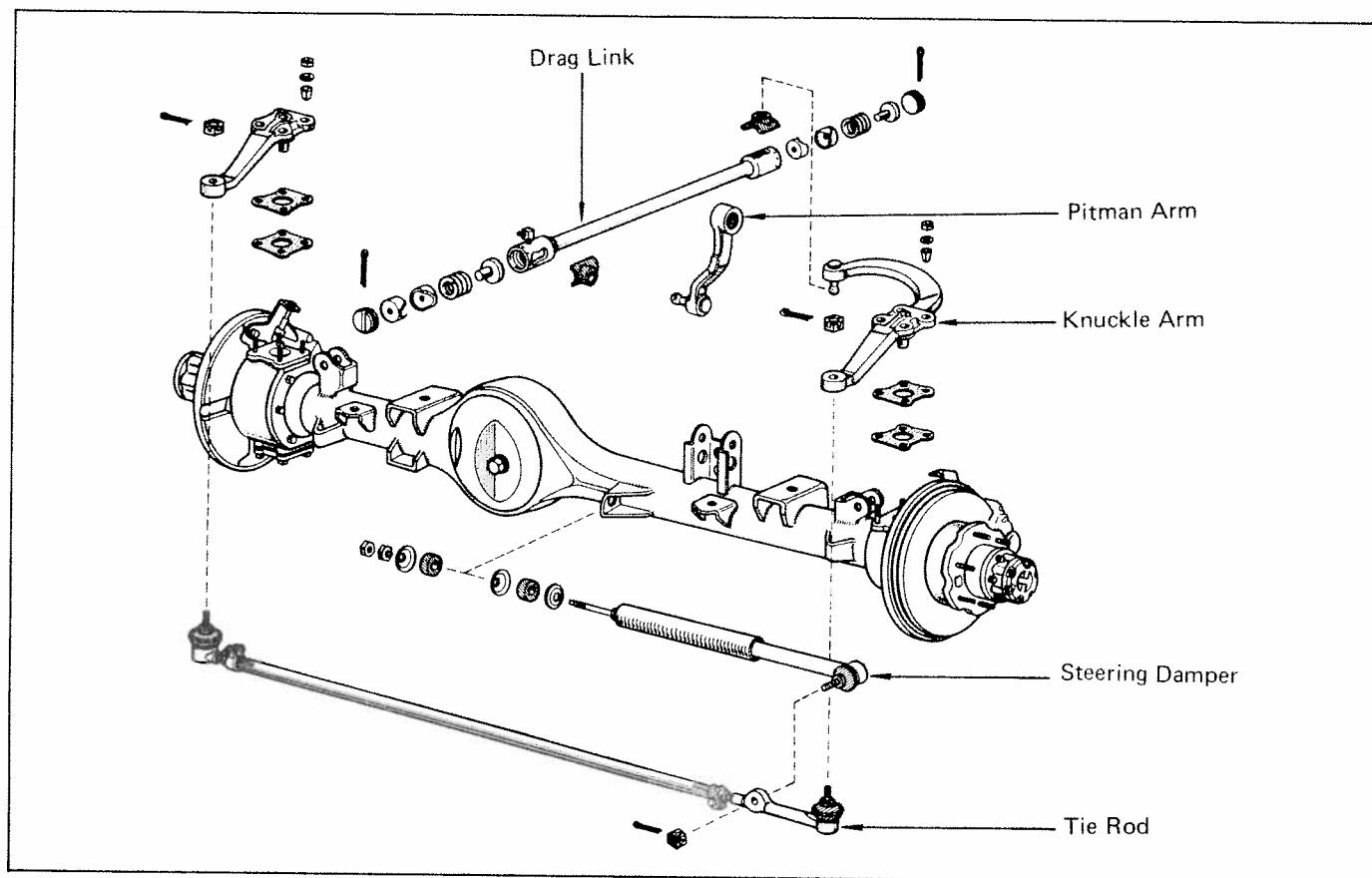
Torque: 500 – 700 kg-cm (37 – 50 ft-lb)

2. CONNECT STEERING DAMPER TO FRON AXLE HOUSING

Install the cushions and washers, and torque the mounting nut and lock nut.

Torque: 100 – 160 kg-cm (8 – 11 ft-lb)

STEERING LINKAGE (4x4)



Pitman Arm

REMOVAL AND INSPECTION OF PITMAN ARM

1. DISCONNECT PITMAN ARM FROM DRAG LINK
(See page 16-79)

2. DISCONNECT PITMAN ARM FROM SECTOR SHAFT

Using pitman arm puller*, disconnect the pitman arm from the sector shaft.

*SST 09610-55012

3. INSPECT ARM FOR WEAR, DAMAGE OR CRACKS
Check for cracks with flaw detecting penetrant.

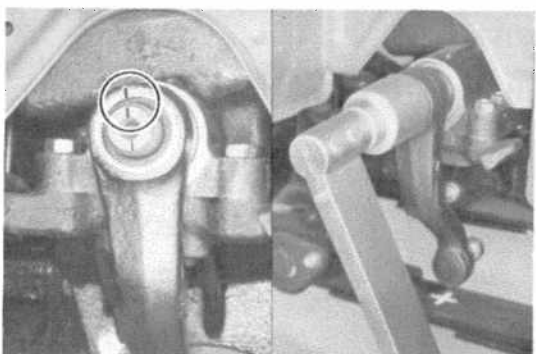
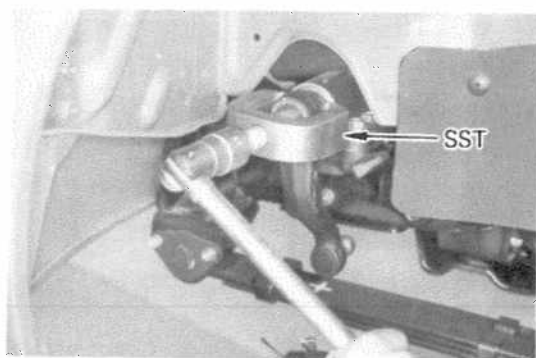
INSTALLATION OF PITMAN ARM

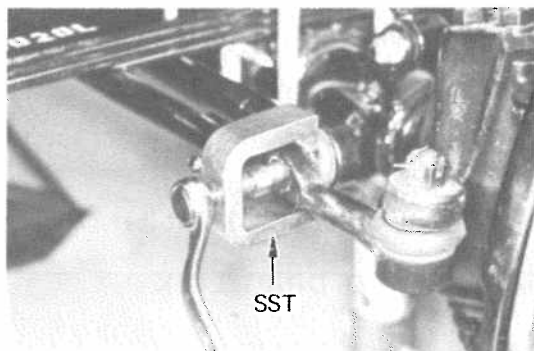
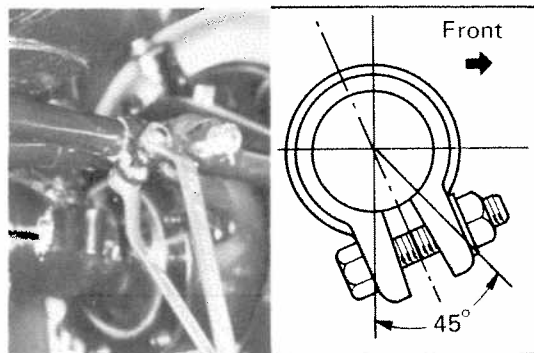
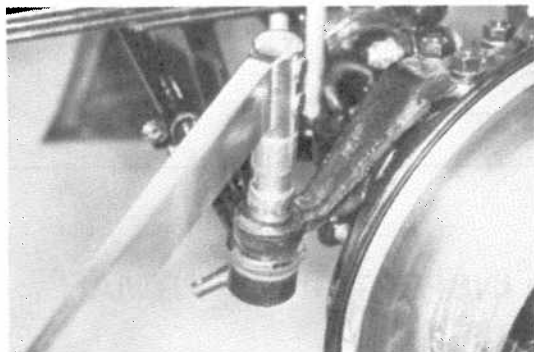
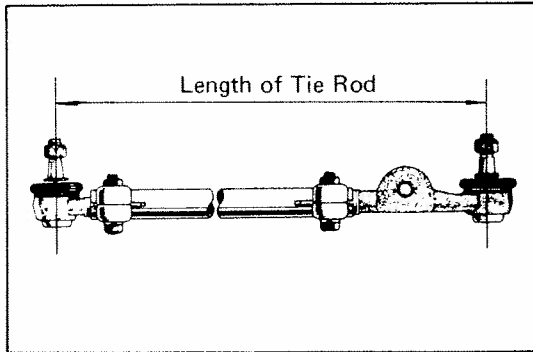
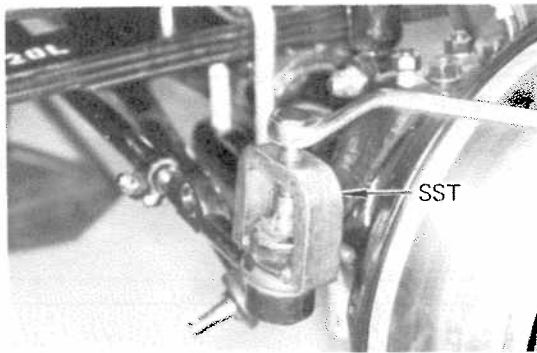
1. CONNECT PITMAN ARM TO SECTOR SHAFT

- (a) Align marks on the pitman arm and the sector shaft.
- (b) Torque the pitman arm bolt.

Torque: 1,600 – 1,900 kg-cm (116 – 137 ft-lb)

2. CONNECT PITMAN ARM TO DRAG LINK
(See page 16-79)





Tie Rod

REMOVAL AND INSPECTION OF TIE ROD (See illustration on page 16-77)

1. **DISCONNECT STEERING DAMPER FROM TIE ROD**
(See page 16-78)
2. **DISCONNECT TIE ROD FROM KNUCKLE ARM**
Using tie rod end puller*, disconnect the tie rod.
*SST 09611-22011
3. **INSPECT TIE ROD FOR WEAR, DAMAGE OR CRACKS**
Check for cracks with flaw detecting penetrant.

INSTALLATION OF TIE ROD

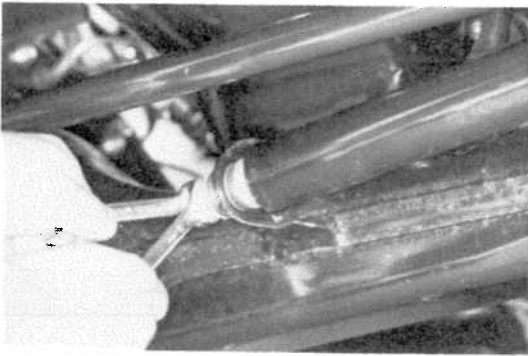
1. **ASSEMBLE AND ADJUST TIE ROD TO SPECIFIED LENGTH**
Turn the tie rod ends equal amounts into the tie rod tube.
Tie rods should be approximately 120 cm (47.24 in.).
2. **CONNECT TIE ROD**
Torque the mounting bolts.
Torque: 750 – 1,100 kg-cm (55 – 79 ft-lb)
3. **CONNECT STEERING DAMPER**
(See page 16-79)
4. **ADJUST TOE-IN** (See page 13-29)
5. **TIGHTEN CLAMP BOLTS**
Torque the clamp bolts.
Torque: 200 – 300 kg-cm (15 – 21 ft-lb)
NOTE: The steering damper side clamp opening must be positioned at the front of the tie rod and face within 45° from straight down as shown in the figure.

Steering Damper

REMOVAL AND INSPECTION OF STEERING DAMPER

(See illustration on page 16-77)

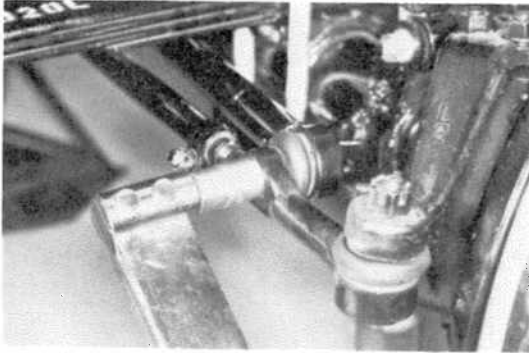
1. **DISCONNECT STEERING DAMPER FROM TIE ROD**
Using tie rod end puller*, disconnect the steering damper.
*SST 09611-22011



2. DISCONNECT STEERING DAMPER FROM FRONT AXLE HOUSING

Using two wrenches, remove the lock nut and mounting nut.

3. INSPECT STEERING DAMPER FOR DAMAGE AND OIL LEAKAGE



INSTALLATION OF STEERING DAMPER

1. CONNECT STEERING DAMPER TO TIE ROD

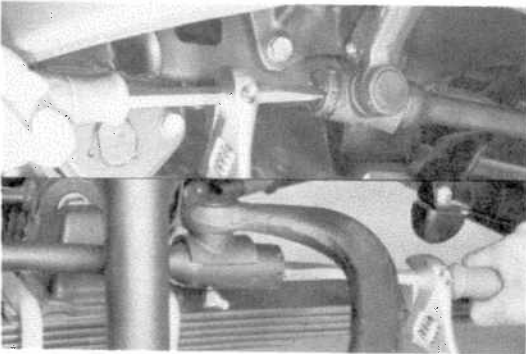
Torque the mounting nut.

Torque: 500 – 700 kg-cm (37 – 50 ft-lb)

2. CONNECT STEERING DAMPER TO FRONT AXLE HOUSING

Install the cushions and washers, and torque the mounting nut and lock nut.

Torque: 100 – 160 kg-cm (8 – 11 ft-lb)



Drag Link

REMOVAL AND INSPECTION OF DRAG LINK

(See illustration on page 16-77)

1. DISCONNECT DRAG LINK FROM PITMAN ARM AND KNUCKLE ARM

(a) Remove two cotter pins and plugs with a screwdriver on both sides.

(b) Remove the drag link.

2. INSPECT PARTS FOR WEAR OR DAMAGE

INSTALLATION OF DRAG LINK

1. CONNECT DRAG LINK TO PITMAN ARM

(a) Install the pitman arm side as shown in the figure.

(b) Tighten the plug completely and then loosen 1-1/3 turns.

2. CONNECT DRAG LINK TO KNUCKLE ARM

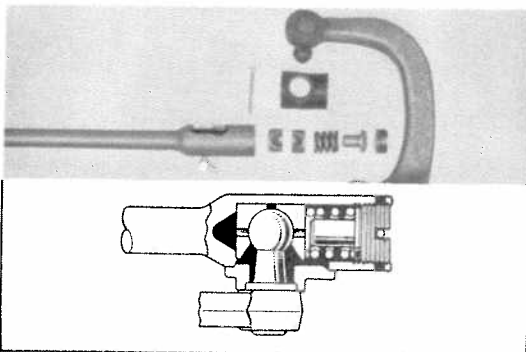
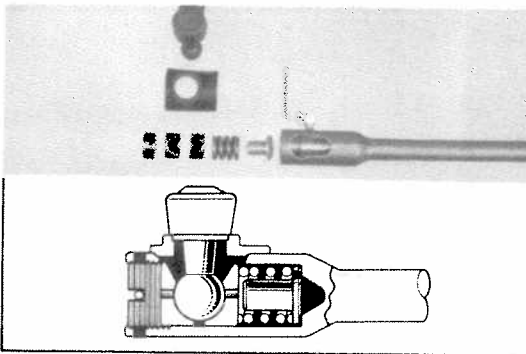
(a) Install the knuckle arm side as shown in the figure.

(b) Tighten the plug completely and then loosen 1-1/3 turns.

3. APPLY CHASSIS GREASE TO BOTH NIPPLES

Knuckle Arm

(See page 13-40)



— MEMO —
