


# VOLVO POWER STEERING



QUICK TEST, TROUBLESHOOTING, ADJUSTMENTS, REBUILD



Produced By:

## **Volvo of America Corporation**

### **NATIONAL SERVICE SCHOOL**

Power Industrial Park  
Rockleigh, N.J. 07647

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## MAINTENANCE & QUICK TESTS

Before rebuilding either power steering component, you should always do the following:

### A. Normal maintenance.

1. **Check fluid level** in reservoir. Fluid should be  $\frac{1}{4}$  inch above full mark when engine has been brought to normal operating temperature and then shut off.  
**NOTE:** Only use Type A or Dexron automatic transmission fluid.
2. **Check belt tension** with Kent-Moore Belt tension gauge. New belt 100 lbs.; Used belt 75 lbs. Center deflection should be 5mm ( $\frac{3}{16}$  inch).

### B. Quick Test for Proper Operation

1. **Road Test car.**
  - a. Is power assist present?
  - b. Is power assist smooth, not erratic?
  - c. Is power steering free from noise?
2. **Visual inspection for leaks:**
  - a. Check hoses and connections.
  - b. Check components.
3. **Check front end** components for damage and alignment.
4. **Check tires, rims** and other related items.
5. **Pressure test for proper operation.** See pages IV and V in this book. Also refer to 140 series Service Manual, 1973 Section 6, Page 32.

**Special Note:** There are occasions where customers blame power steering when in fact the front-end is out or bent or, tires are soft, or rims are damaged. Don't be fooled!

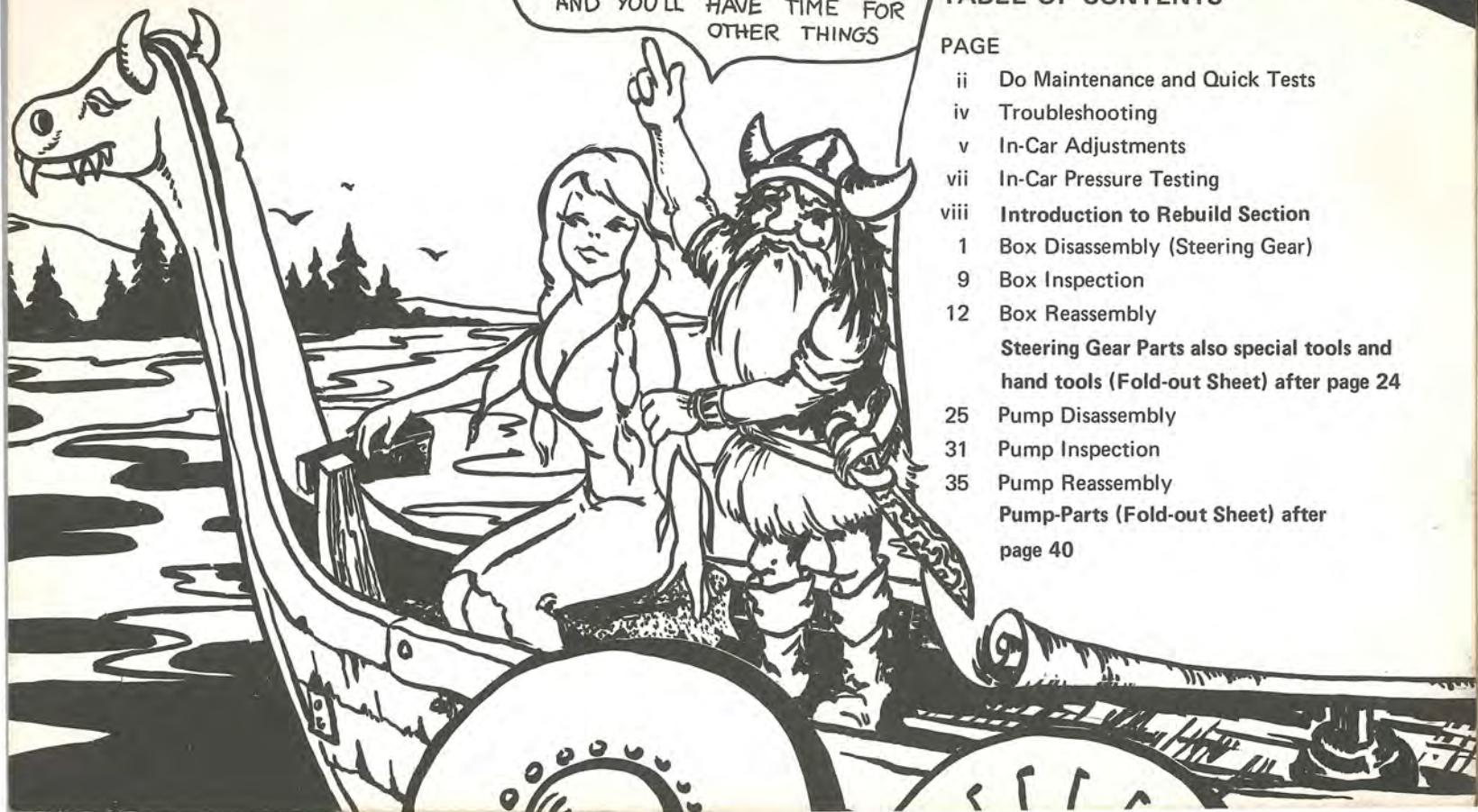
ii

DO THE QUICK TEST ABOVE  
AND YOU'LL HAVE TIME FOR  
OTHER THINGS

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## TROUBLESHOOTING STEERING PROBLEMS

numbers in ( ) refer to fold-out parts drawings

### CAR WANDERS

1. Check all steering components in QUICK TESTS.
2. Check oil level and bleed. (Number 4 and 5 in IN-CAR ADJUSTMENTS.)

### PULLS TO ONE SIDE

1. Check front-end, tires, rims, brakes and frame.
2. Check all steering components in QUICK TESTS.

### STEERING STIFF RIGHT AND LEFT

1. Caster out, ball joints jammed, check front end.
2. Check oil level and bleed. (Number 4 and 5 in IN-CAR ADJUSTMENTS.)
3. Check filter and clean channel of reservoir.
4. Check pump. (Number 8 in IN-CAR ADJUSTMENTS.)  
Check and clean control valve (27). (Number 8c in IN-CAR ADJUSTMENTS.)
5. Rebuild or replace steering box.

### STEERING HEAVY ONE DIRECTION ONLY

Rebuild or replace steering gear (the steering box).

### HEAVY WITH RAPID STEERING WHEEL TURNS

1. Check power steering belt.
2. Check oil, then bleed. (Number 4 and 5 in IN-CAR ADJUSTMENTS.)
3. Check Pump. (Number 8 in IN-CAR ADJUSTMENTS.) Check

and clean control valve (27).

4. Rebuild or replace pump.

### ENGINE STALLS AT IDLE IN LOCK POSITION

check pump and steering box. (Number 8 and 9 in IN-CAR ADJUSTMENTS.)

### FRONT WHEEL SHIMMY

1. Check all steering components as in quick tests. Also check wheel bearings.
2. Check oil level, then bleed. (Number 4 and 5 in IN-CAR ADJUSTMENTS.)

### SHOCKS AND JARRING IN STEERING WHEEL

1. Check oil level, then bleed. (Number 4 and 5 in IN-CAR ADJUSTMENTS.)
2. Adjust sector shaft pressure point. (Number 6 in IN-CAR ADJUSTMENTS.)
3. Replace or rebuild steering box.

### STEERING CONTINUES TO TURN WITHOUT ASSISTANCE.

Steering valve needs adjustment (9). Rebuild or replace steering box.

### NOISE FROM PUMP

Check oil level and bleed. (Number 4 and 5 in IN-CAR ADJUSTMENTS.)

iv



## IN-CAR ADJUSTMENTS

numbers in ( ) refer to fold-out parts drawings

These are the only adjustments and repairs that can be done with the unit in car. Any other corrective measures must be performed after removing components from vehicle.

1. TIGHTEN ALL BOLTS ON STEERING COMPONENTS.
2. CHECK HOSES AND REPLACE IF NECESSARY.
3. CHECK FLUID LEVEL AND BELT TENSION.
4. CHECK OIL LEVEL, SHOULD BE 5-10mm (¼") ABOVE LEVEL MARK.
5. BLEED SYSTEM.
  - a. Jack up front end. Check oil reservoir level. Should be 5-10mm (¼") ABOVE level mark.
  - b. Start engine. Oil level should go to level mark. Add oil if it goes below mark.
  - c. Turn wheel, with engine running, lock to lock as long as air bubbles appear in the reservoir. Add oil to keep at mark.
  - d. Stop engine. Oil level should rise 5-10mm (¼"). If car is still stiff or heavy rapid turns, check pump number below.

6. ADJUST SECTOR SHAFT PRESSURE POINT. (shown in photo 2).
  - a. Jack up front end of car.
  - b. Remove pitman arm lock nut.
  - c. Using 9992849, remove pitman arm.
  - d. Place steering box in middle position by counting number of turns lock to lock.
  - e. Using 17mm wrench, loosen adjusting screw lock nut.
  - f. Using 5mm allen wrench, turn adjusting screw clockwise until slight resistance is felt when turning steering wheel left or right of center.
  - g. Tighten lock nut.
  - h. Check adjustment by turning steering wheel several times from lock to lock. Slight resistance should be felt when passing center position.
  - i. Set front wheels straight forward and steering wheel in center position. Fit pitman arm and tighten nut to 17-20 kmp or 125-145 ft. lbs.
  - j. Make sure alignment of pitman arm is correct.

v



**7. REPLACEMENT OF CONTROL SPINDLE SEAT (54) ON STEERING BOX.** (shown in 1973 Service Manual 140 series page 6:33 fig. 6-71, 6-72).

- Dismantle steering shaft flange by removing two nuts and bolts. Move steering shaft to one side.
- Mark location of flange on spindle, remove clamping bolt and remove flange.
- Remove rubber cover and circlip from shaft.
- Carefully apply tool 9992860 to sealing ring. Tighten screw and remove sealing ring. If ring sticks in circlip groove, carefully turn tool backwards and forwards.
- Fill space in new seal ring lips with multipurpose grease. Fit ring on to tool 9992863 with help of loose guide. Remove Guide and fit ring into box.
- Fit circlip and cover.
- Refit flange according to marks. Distance between housing and lower flange, 5-7mm or .20"-.28".
- Assemble steering shaft.
- Check oil level and bleed, number (4) above.

**8. PUMP TEST — check belt condition and tension first.**

- Hook up pressure gauge SVO 2864 as shown below.
- At engine idle, engine warm, close operating lever on pressure gauge briefly (10 seconds max). Pressure should read 67 Kp/Cm<sup>2</sup> (953 psi) for all models.

- If pressure low, remove pump control valve and clean. See steps 76, 77, 96, 97, 98, 99, 115, 116 in this booklet.
- Pressure still low? Rebuild or replace pump.

**9. STEERING BOX TEST FOR 140 SERIES ONLY.**

- With pressure gauge hooked up, do the pump test, number 5 above, a, b.
- Put a 6mm (0.240") shim on each stop bolt limiting the full steering lock. Leave gauge operating valve open. Turn steering wheel to lock with force of about 100N (22 lb) and keep force on for 5 seconds while reading gauge. Do other direction. If same pressures as pump test, steering gear is OK.
- If pressure lower than pump test, check for external leaks. Do b. above again with 1mm (0.040") shims. No power steering should be present.
- Adjust unloading valve (6) which should cancel power steering about 3° before normal lock. Check this by test b and c above. Only the left turn position can be adjusted. Release lock nut (5) at front of steering gear housing. Screw out valve delays (6) the cancel of PS in makes cancel earlier.
- Rebuild or replace box.

**10. STEERING BOX TEST FOR 164 SERIES.** Turn to lock for 5 seconds and read off pressure. If lower than pump, rebuild or replace steering gear.

vi

**In-car Pressure Testing**  
(see items 8 and 9 on page vi)

**140**

**test at pump**  
**2865-2866 (5007)**

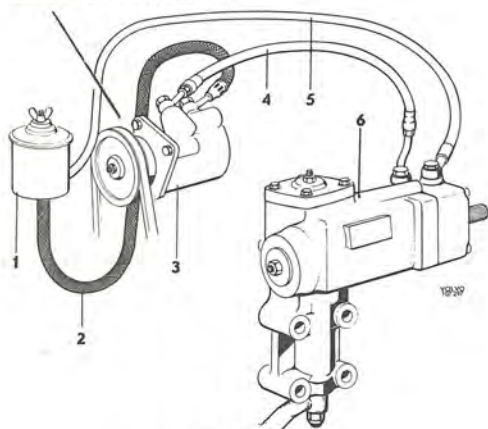
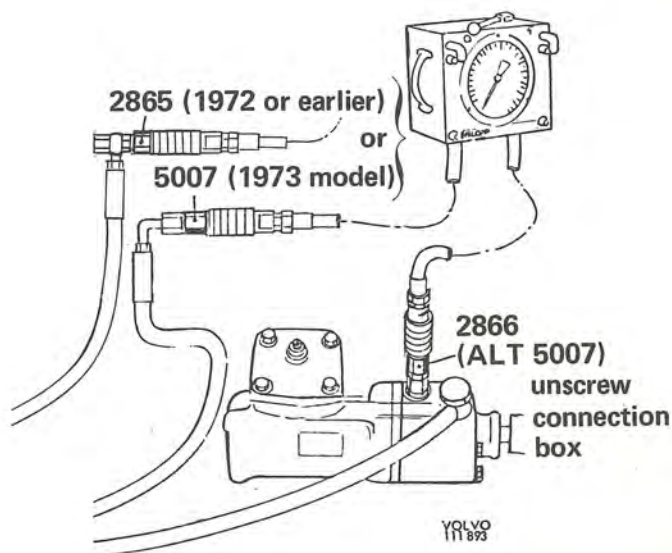


Fig. 6-43. Power steering

- Oil reservoir with filter
- Pump suction line
- Power pump
- Delivery oil line
- Return oil line
- Steering gear

**164**



YOLVO  
111 893

vii



Install seal ring in valve housing, sealing lip facing in. Use tool SVO 2863.



Install seal

(54)

Refers to fold-out parts picture

57 Photo number



Jack up car. Remove drain plug. Remove cover from reservoir. Start and run engine for 10 sec. Stop engine, turn wheels lock to lock until all oil has run out. Wash component before removal.

## DISASSEMBLY OF P.S. BOX.

Drain system  
(6)

1

Remove unit from vehicle and place in vise. Hold adjusting screw with 5 mm allen wrench. Remove locknut using 17 mm box wrench.



Put box in vise and remove nut  
(17)

2

Remove four bolts from top cover using 1/2" socket.

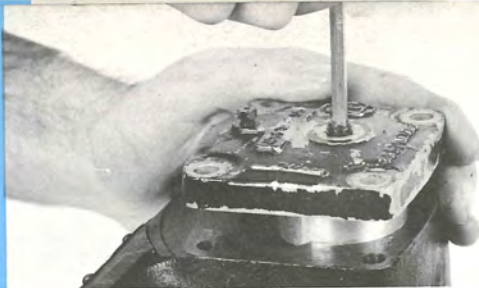


Remove bolts  
(19)

3



Turn adjusting screw clockwise with 5 mm allen wrench. This will force top cover up and off. Do not turn top cover since that will damage sealing surface.

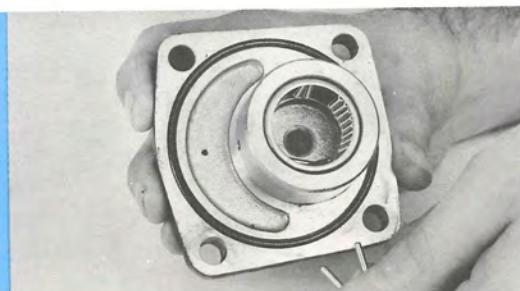


Remove cover by turning screw (16)

2

4

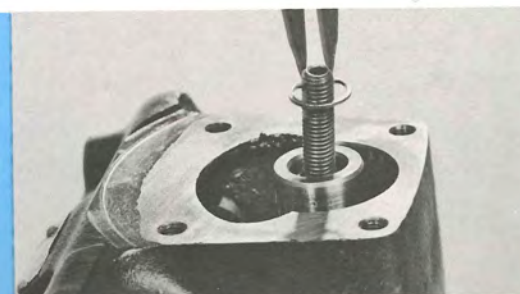
Remove needle bearings from top cover. Also, remove large o-ring.



Remove bearings and o-ring.

5

Using circlip pliers, remove circlip from tension adjusting screw. Remove screw and washer.

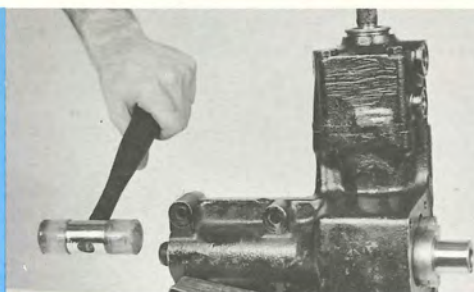


Remove circlip, screw and washer. (11, 12, 13)

6



Align sector shaft teeth in center of opening. Using fiber hammer remove sector shaft from housing by lightly tapping end.



Remove shaft (10)

7

Use magnet on 6" handle to remove upper and lower sector shaft needle bearings.



Remove bearings (3, 7)

8

Remove rubber cover from input shaft. With 1/2" box wrench remove four bolts from valve housing.



Remove rubber cover and bolts (50, 51, 52)

9

3



Carefully remove valve housing. Be certain to leave cover (30) in place as it is a ball bearing retainer.



Remove housing  
(56)

4

10

Pull out valve assembly with cover and piston. Do not screw assembly out.



Pull out piston and  
worm.  
(22, 30, 68)

11

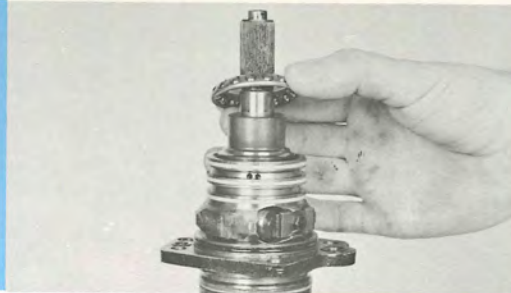
Turn housing over. Remove seal retaining circlip with circlip pliers. Remove seal using tool SVO 2996. Take care not to damage sealing surface.



Remove seal  
(54)

12

Place piston and valve assembly in vise, splines up. Be sure to use copper jaws. Remove caged ball bearing.



Remove bearing.  
Note: copper jaws  
(59)

13

Using two medium screw drivers carefully pry up sleeve. Do not score steering spindle or damage roller bearing assembly under collar.



Remove sleeve  
(60)

14

Remove caged needle bearings from control spindle.



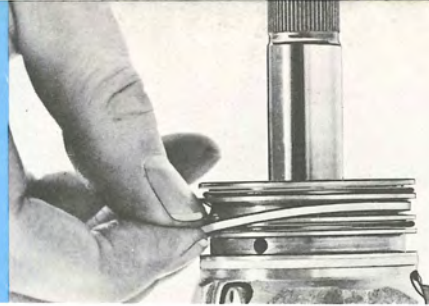
Remove bearings  
(61)

15

5



Remove three plastic seals and three o-rings from valve assembly.



Remove seals and o-rings.  
(62-67)

6

16

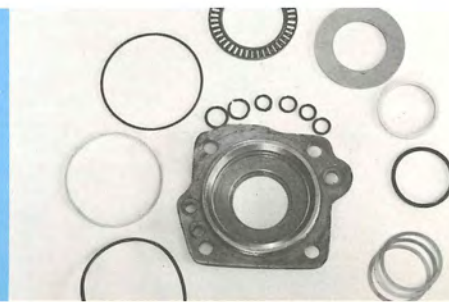
Screw out valve assembly. Hold cover in place until worm gear is removed. Caution: **Do not remove torsion shaft or valves. Complete assembly replaced if defective.**



Screw out valve assembly  
(68)

17

Remove all seal rings and o-rings from cover. Remove axial needle bearings, thrust washer, and shims.



Disassemble cover  
(32-36)

18

Using o-ring tool remove seal and o-ring from piston.



Remove o-ring and seal  
(25, 26)

19

Remove piston from vise and pour out ball bearings. **Do not lose or damage any of the 23 bearings.**



Remove ball bearings

20

Drive out punch set in lock nut using **punch** and **4 mm chisel**. Keyway must be totally clear.



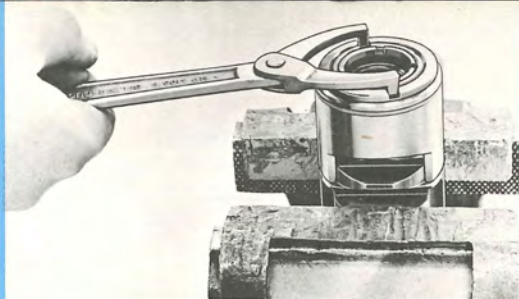
Clear keyway  
(27)

21

7



Using 2" spanner wrench, remove lock nut from power piston assembly.



Remove nut  
(27)

8

22

Slide off brass collar.



Remove collar  
(24)

23

Pull out tube seal. Remove split tube by pushing with finger from inside and prying with screwdriver.



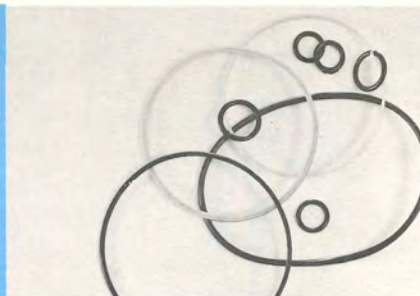
Remove seal and  
tube  
(41, 42)

24



Wash all components in solvent. All seal rings and O-ring should be replaced. If you must re-use, wash in water soluble solution. Solvent will damage seals.

Should Be Replaced!

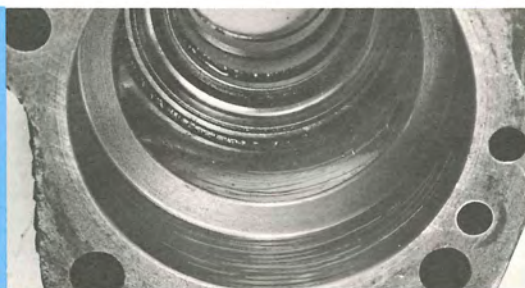


INSPECTION.

Wash parts, replace  
all seals

25

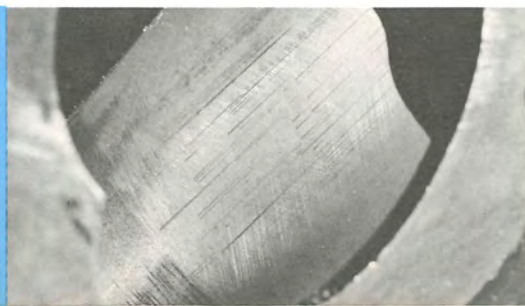
Inspect valve housing for indication of wear: burrs, grooves, or severe scoring.



Inspect valve housing  
(56)

26

Inspect gear housing for indication of wear: burrs, grooves, or severe scoring.



Inspect housing  
(4)

27

9



Power piston brass cover must slide freely and easily in housing bore and must be free of severe scoring.

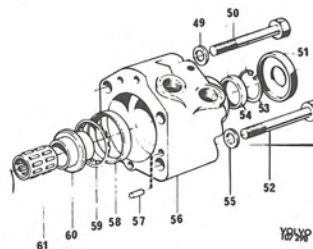


Check piston fit  
(24)

10

28

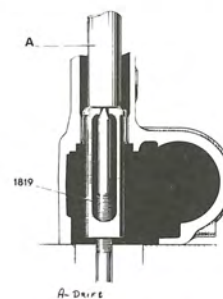
Check all sealing surfaces and threads for pressure and return lines.



Check hose  
connections  
(56)

29

Check needle bearings. Replace if damaged. If bearings are replaced, races must also be replaced. Remove races using tool SVO 1819. Install using tools SVO 2995 and SVO 1801.



Check needle bearings

30

Check piston, worm gear and sector shaft for evenness, severe scoring, sealing surface damage or spline damage.

Check parts for  
damage  
(22, 68, 10)

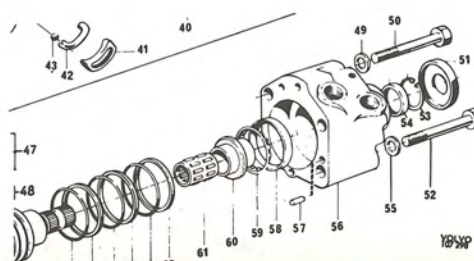
31

Check threads and connections for damage on gear housing, valve housing, and adjusting screw.

Check all threads  
(11, 6, 4)

32

Check: caged ball bearing, caged needle bearing, axial needle bearing, ball bearings and sleeve.



Check all bearings  
(58, 60, 43, 59)

33

11



34

Make certain all parts are absolutely clean.  
Lightly coat parts with ATF, type A or dexron.  
Replace all seals and gaskets.

## ASSEMBLY OF STEERING BOX.

Clean and oil parts;  
replace seals

35

Install caged needle bearing and sleeve on control spindle. **No clearance should be noted, but sleeve should turn easily.** Bearings available in four sizes to adjust clearance.



Install bearing and collar  
(60, 61)

36

Put valve housing in vise large opening up. Place caged ball bearing inside, seated on bearing race.



Install bearing  
(59)

37

Assemble three o-rings and 3 plastic seals on valve assembly. Install assembly in housing, splined shaft first.



Assemble seals and install worm gear  
(68)

38

Put axial needle bearing and thrust washer on worm.



Install bearing and washer  
(35, 36)

39



Put cover on worm gear.

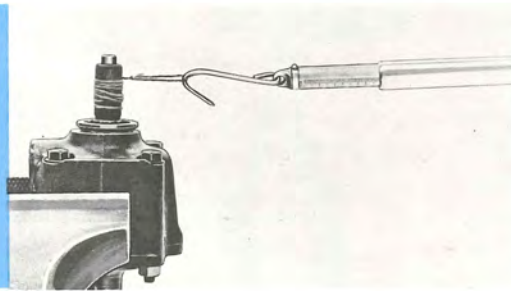


Install cover  
(30)

14

40

Use appropriate bolts to hold cover to housing. Tighten bolts to **25 ft. lb.** Adjust preload by selecting proper thrust washer — 6 sizes are available. .075-.094 inch. (1.9-2.4 mm) **Preload 3.7 to 6.4 lbs.** using spring gauge.



Bolt cover to housing.  
Check torque

41

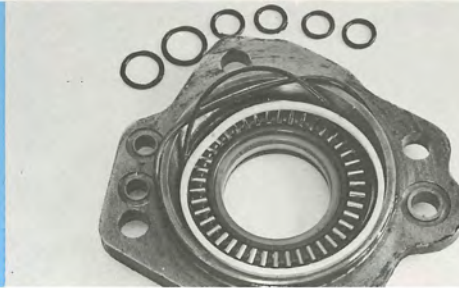
When proper preload is established, disassemble housing and cover.



Remove cover and  
housing  
(30, 56)

42

Assemble cover (30): 6 small o-rings; 2 large o-rings; 1 medium o-ring; 2 small plastic seals; 1 large plastic seal; shims; thrust washer; axial needle bearing.



Assemble cover  
(28-38)

43

Coat mating surface of cover which contacts worm gear. With marking paint.



Coat with marking  
paint  
(30, 68)

44

Place worm gear and cover together. Check for proper mating of surfaces by rotating with slight pressure. If contact is poor replace seal with larger size .071" (1.8 mm) disassemble and clean.



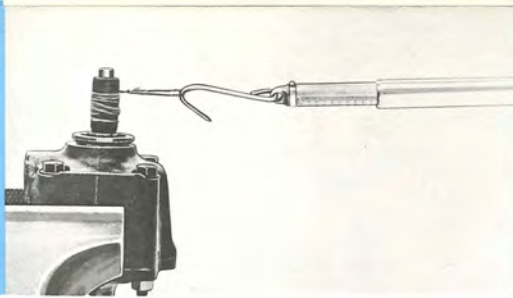
Check contact, if  
poor replace seal.

45

15



Assemble cover with thrust washer determined by photo 41. Coat cover gasket with ATF. Put cover on worm gear and bolt to valve housing with **25 ft. lbs.** torque. Using **spring gauge** check **pre load 10-15 lbs.** Adjust by installing additional shims. Disassemble.



Reassemble cover and gear. Check torque. (30, 56, 68)

16

46

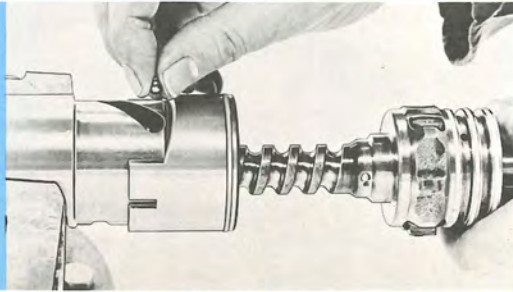
Put power piston in vise; bore to the side; ball bearing feed hole facing up. Partially install brass sleeve. **Use copper jaws.**



Put piston in vise; copper jaws. (22, 24)

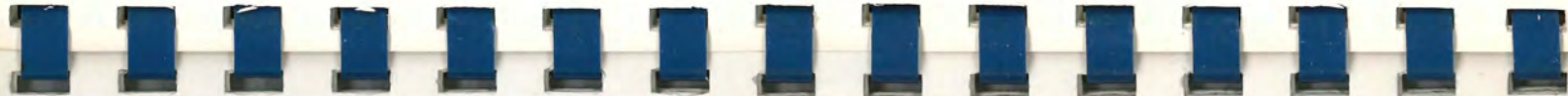
47

Insert worm gear in power piston until gear appears in middle of first feed hole. Feed **16 balls** while rotating shaft counter clockwise. Balls should appear in second hole. Do not cock worm.



Insert ball bearings

48



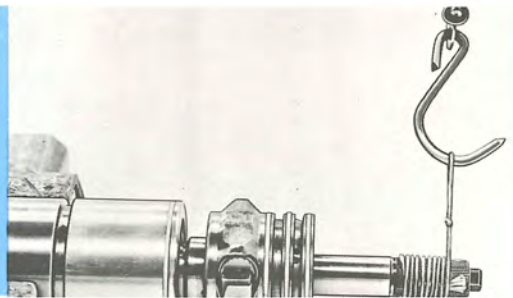
Put remaining **7 ball** bearings in split tube using vaseline. Put two halves of tube together and place in gear.



Install ball bearings. Put tube in gear (22, 42)

49

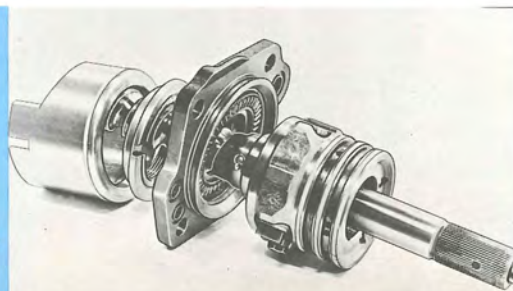
Check torque required to turn worm gear in piston. **5-10 lbs. using spring gauge.** If reading is incorrect replace all 23 balls. 5 sizes are available. When reading is correct carefully disassemble and store balls.



Check torque

50

Place o-ring and plastic seal on brass sleeve. Put preassembled cover, locknut, and sleeve on worm gear.



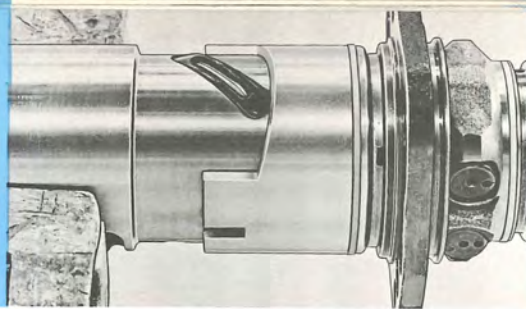
Assemble gear, cover, nut and sleeve with seal. (68, 30, 27, 24)

51

17



Put worm gear in piston and insert **23 ball bearings** according to previous method. Install seal for split tube. Seat brass sleeve. Make sure all teeth are exposed on gear.



Assemble gear and power piston with ball bearings.  
(68, 30, 27, 24, 22)

18

52

Do not screw out worm gear as bearings will fall into piston. Distance from bottom of gear to bottom of cover should **not exceed 6 inches**.

## WARNING

Do not screw out worm gear

53

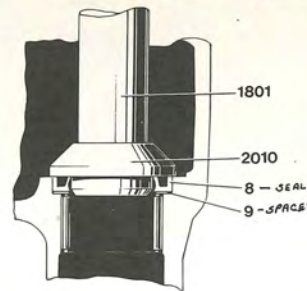
Secure locknut by setting with punch.



Tighten lock nut  
(27)

54

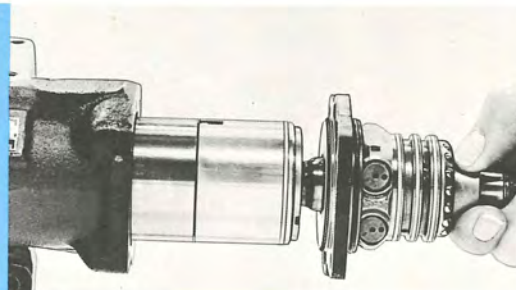
Put steering box in vise, positioned as it would be in car. Install spacer on top of needle bearing race. Using tools **SVO 2010** and **SVO 1801**. Install seal with lip up.



Install seal in P.S. housing.  
(8, 9)

55

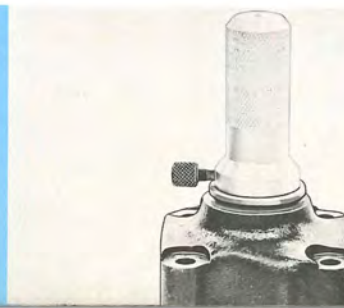
Install complete power piston, cover, and valve assembly in P.S. housing. Teeth should be exposed in top opening.



Install piston in housing.  
(4, 22, 30, 68)

56

Install seal ring in valve housing, sealing lip facing in. Use tool **SVO 2863**.



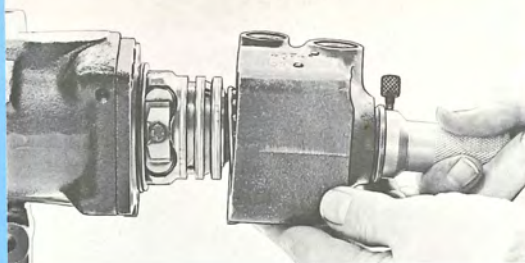
Install seal  
(54)

57

19



Using tool **SVO 2863** install valve housing over control spindle taking care not to damage splines. Install 4 bolts and tighten to 25 ft. lbs.



Install valve housing  
(56)

(20)

58

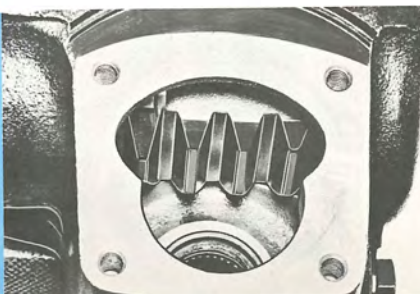
Using circlip pliers install seal retaining circlip.



Install circlip  
(53)

59

Align teeth of power piston in sector shaft opening. The space between the second and third teeth should be in center of opening.

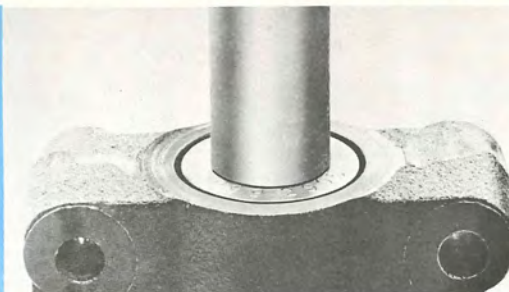


Align teeth

60



Install lower seal ring using tools **SVO 1801** and **SVO 2995**.



Install seal  
(2)

61

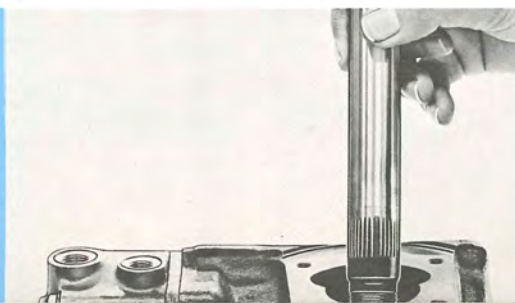
Using vaseline, install needle bearings for sector shaft.



Install needle bearings  
(3, 7)

62

Put tape on splines of sector shaft to prevent damage to seal. Carefully install sector shaft. It maybe necessary to turn input shaft back and forth slightly in order to fully seat shaft. **Do not turn too far or misalignment may occur.**



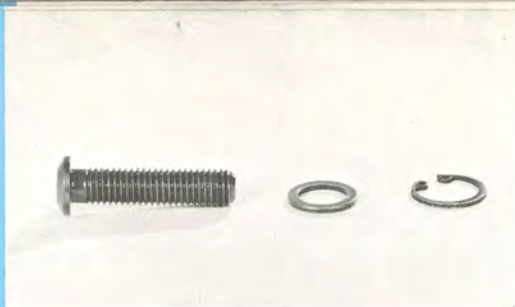
Tape splines and  
install shaft.  
(10)

63

(21)



Assemble tension adjuster screw with washer and circlip. Washer is available in different thicknesses to adjust clearance. There should be no play when installed but should still turn freely.



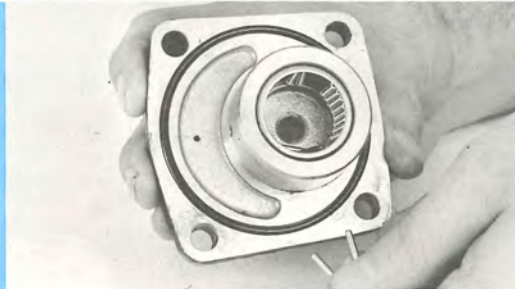
Assemble adjuster screw  
(11, 12, 13)

22

64

Install needle bearings and o-ring in sector shaft cover.

**CAUTION:** Only sector shaft bearings can be used. Do not exchange with other needle bearings.



Install bearings and o-ring.  
(14, 15, 16)

65

Install sector shaft cover by turning adjusting screw counter clockwise using 5 mm allen wrench. Do not turn cover because sealing surfaces will be damaged and bearings may fall into unit.

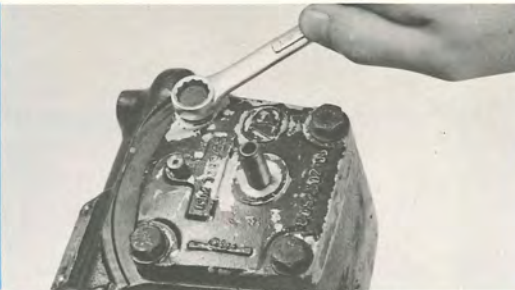


Install cover  
(16)

66



Install 4 bolts with washers in sector shaft cover. Tighten to 22 ft. lbs.



Bolt down cover  
(19, 20)

67

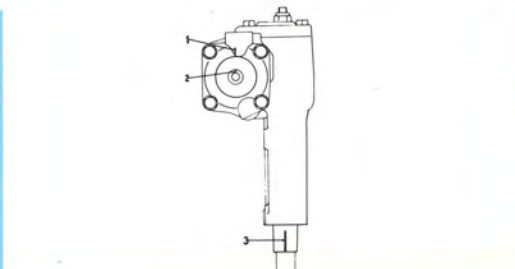
Install rubber cover over control spindle splines on valve housing.



Install rubber cover  
(51)

68

Remove tape from sector shaft splines. Turn input shaft lock to lock to determine if 1/2 turn of sector shaft is available either side of center. Align marks according to figure. If neither of the above is possible, realign gears.



Remove tape and align marks.

69

23



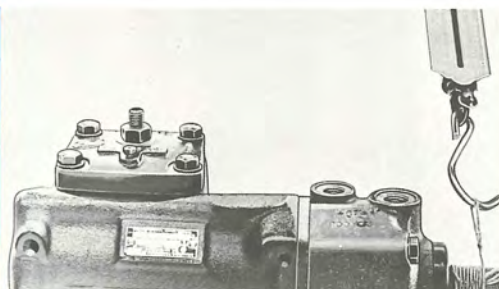
Using 5 mm allen wrench turn adjusting screw clockwise until pressure is felt. Tighten adjusting screw locknut to 18 ft. lbs.



Adjust pressure point, and lock (24)

70

Using spring gauge check torque required to turn input shaft. Torque when shaft is in center should be 9-13 lbs. more than at either end of sector shaft travel. Maximum torque – 40 lbs.



Check torque

71

After installing unit in car check function according to instructions in factory service manual section 6 page 32.

Test unit

72

## POWER STEERING SPECIAL TOOLS



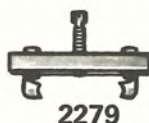
1801



1819



2010



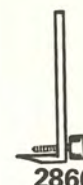
2279



2481



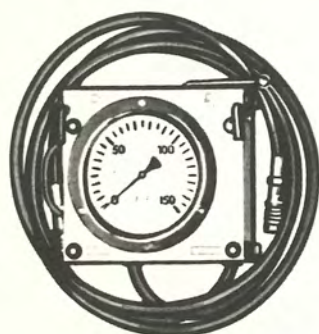
2013



2860



2863



2864



2865



2866



2990



2995



2996



2997



4028

When ordering, add 999 before numbers shown here (SVO=999)



See over for illustration and list of  
special tools and hand tools.

# LIST OF SPECIAL TOOLS AND LIST OF HAND TOOLS

## SPECIAL TOOLS SVO=999

1801 & 2010-Inner Sector Shaft  
Seal Installer  
1801 & 2995-Outer Sector Shaft  
Bearing Race Puller  
1821-Inner Sector Shaft Bearing  
Race Puller  
2060-"In Car" Power Steering  
Box Seal Puller-Recommend  
Dealer Purchase  
2279-Power Steering Pump  
Pulley Remover  
2303-Drift For Removal Of  
Power Steering Pump Plates  
2481-Sleeve Installer  
2863-Steering Box Input Shaft  
Seal Installer, Recommend  
For Dealer Purchase  
2864-Pressure Gauge  
2865 & 2866-Gauge Adapting  
Nipples (5007 For 164, 1973)  
2996-Pump Housing Bearing And  
Seal Installer And Remover  
4028-Outer Sector Shaft Seal  
Installer

## HAND TOOLS

5mm Allen  
O-Ring Tool  
2 Medium Screwdrivers  
"4mm" Chisel (specially made)  
Spring Gauge  
Magnet On 6" Handle  
Teflon Tape  
Marking Paint  
Vaseline  
1/2" Open  
7/8" Open  
1 1/16" Open  
17mm Open  
Long Nose Pliers  
Channel Lock  
Circlip Pliers  
Slip Joint Pliers  
Copper Jaws  
Automatic Trans Fluid A or Dextron  
1 Vise Brass Jaws  
1/2" Socket-3/8" Drive  
Spanner  
Punch  
Foot Pound Torque Wrench



# POWER STEERING SPECIAL TOOLS



1801



1819



2010



2279



2481



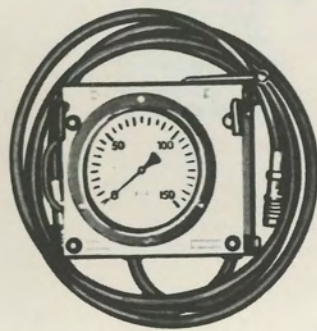
2013



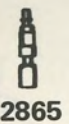
2860



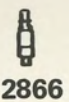
2863



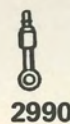
2864



2865



2866



2990



2995



2996



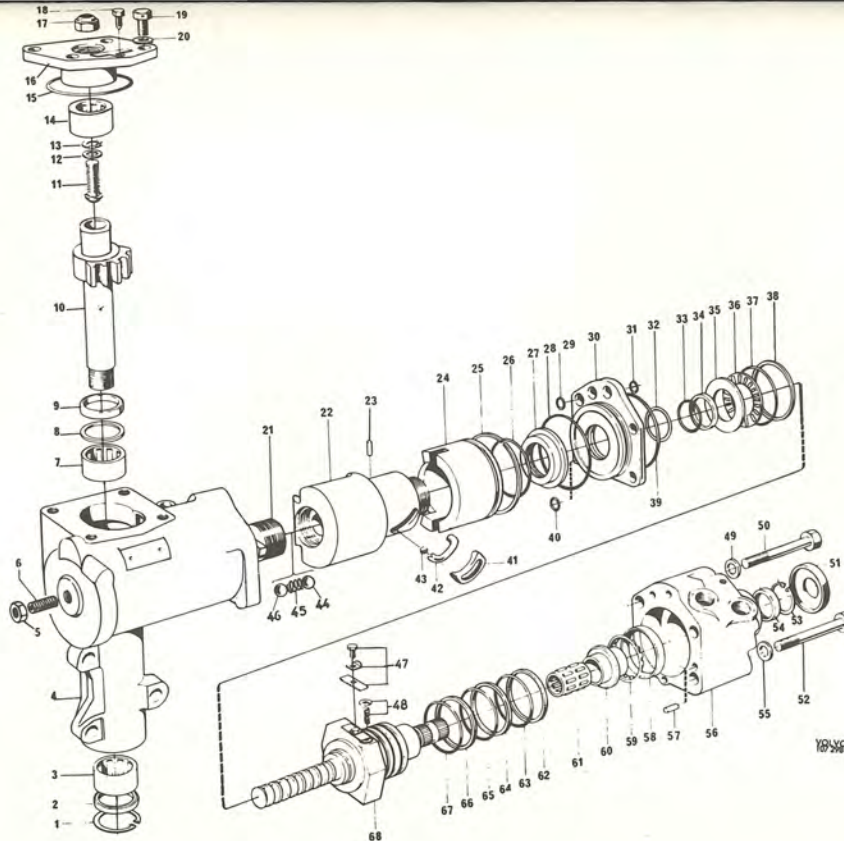
2997



4028

When ordering, add 999 before numbers shown here (SVO=999)



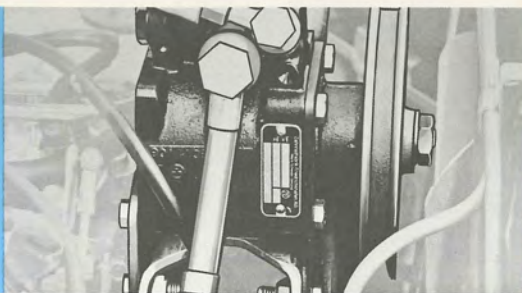


**Illustration A. Steering gear disassembled**

- |                       |                   |                    |                   |                                  |
|-----------------------|-------------------|--------------------|-------------------|----------------------------------|
| 1. Circlip            | 15. O-ring        | 29. O-ring         | 43. Ball          | 57. Guide pin (only early prod.) |
| 2. Lower sealing ring | 16. Cover         | 30. Cover          | 44. Bolt          | 58. Bearing ring                 |
| 3. Needle bearing     | 17. Locknut       | 31. O-ring         | 45. Lock washer   | 59. Ball bearing                 |
| 4. Housing            | 18. Bleeder screw | 32. Shims          | 46. Retainer      | 60. Bearing sleeve               |
| 5. Packing            | 19. Bolt          | 33. O-ring         | 47. Washer        | 61. Needle bearing               |
| 6. Plug               | 20. Washer        | 34. Packing        | 48. Spring        | 62. Packing                      |
| 7. Needle bearing     | 21. Plug          | 35. Bearing washer | 49. Washer        | 63. O-ring                       |
| 8. Washer             | 22. Piston        | 36. Needle bearing | 50. Bolt          | 64. Packing                      |
| 9. Upper sealing ring | 23. Pin           | 37. O-ring         | 51. Rubber cover  | 65. O-ring                       |
| 10. Steering shaft    | 24. Sleeve        | 38. Packing        | 52. Bolt          | 66. Packing                      |
| 11. Adjuster screw    | 25. Piston ring   | 39. O-ring         | 53. Circlip       | 67. O-ring                       |
| 12. Adjuster washer   | 26. O-ring        | 40. O-ring         | 54. Sealing ring  | 68. Worm                         |
| 13. Circlip           | 27. Ring nut      | 41. Packing        | 55. Washer        |                                  |
| 14. Needle bearing    | 28. O-ring        | 42. Pipe halves    | 56. Valve housing |                                  |



Follow draining procedure and remove unit from car. See service manual, section 6 page 31.

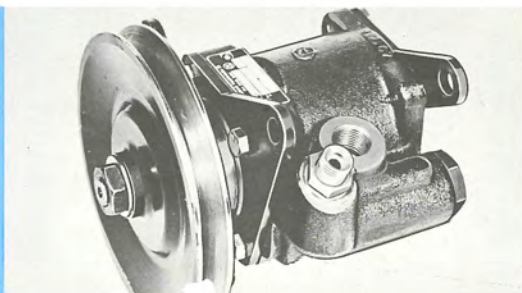


## DISASSEMBLY OF P.S. PUMP.

Drain and remove system

73

Remove bracket and pulley from P.S. pump. Be careful not to lose woodruff key. Use  $\frac{7}{8}$ " box wrench & puller SVO 2279.



Remove bracket & pulley

74

Remove shaft bearing retaining circlip using circlip pliers.



Remove circlip (No. 5)

75



Using  $1\frac{1}{16}$ " open end wrench remove plug for pressure regulator valve.



Remove plug  
(23)

(26)

76

Using long nose pliers remove spring and pressure regulator valve.



Remove spring &  
valve  
(26, 27)

77

Using pliers remove large circlip for rear cover.



Remove circlip  
(20)

78

Remove large rear cover by holding pump with cover facing down and tapping with fiber hammer. Remove small spring.



Remove cover  
(19)

79

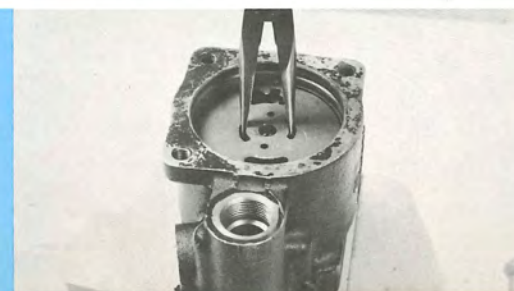
Using o-ring tool remove first o-ring.



Remove o-ring  
(21)

80

Using long nose pliers remove first plate. Slight force is necessary since plate is sealed by second o-ring.



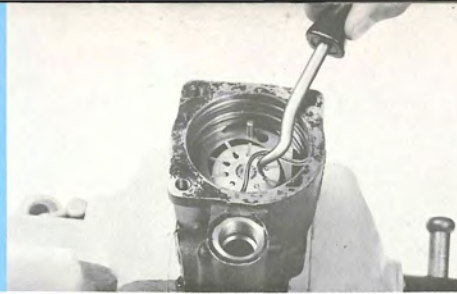
Remove plate  
(18)

81

(27)



Using o-ring tool remove second o-ring.

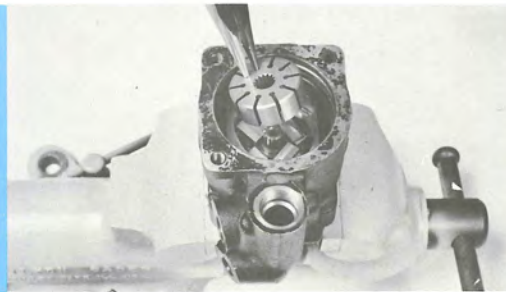


Remove o-ring  
(17)

28

82

Using long nose pliers carefully lift rotor from pump.



Remove rotor  
(25)

83

After removing rotor some blades may remain in housing. Be certain to remove all 10.



Remove blades  
(15)

84



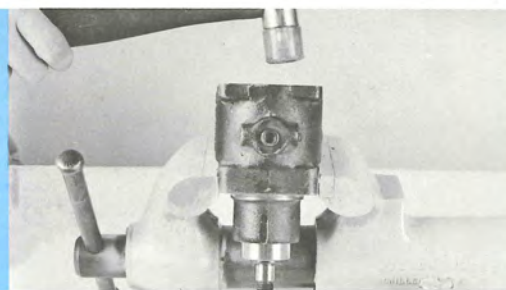
Remove intermediate piece by pulling and using slight rocking motion.



Remove plate  
(16)

85

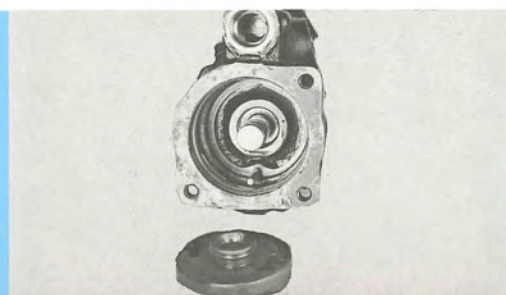
Using fiber hammer carefully tap shaft and bearing out of housing from inside.



Remove shaft  
(4, 6)

86

Remove pump from vise; place on bench, large opening down. Using tool SVO 2303 carefully tap third plate down. Tool will fit thru hole in bearing but not in plate.



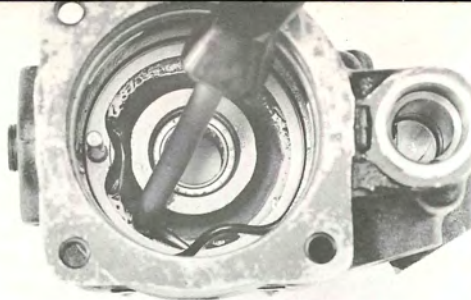
Remove plate  
(14)

87

29



Remove 2 o-rings using o-ring tool; 1 large o-ring from housing; 1 small o-ring from bottom plate.

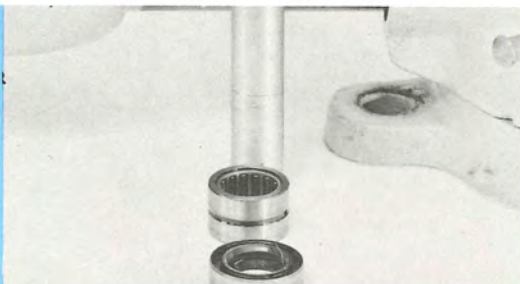


Remove 2 o-rings  
(12, 13)

30

88

Using tool SVO 2996 tap needle bearing and seal out of housing from outside.



Remove bearing and  
seal.  
(8, 9)

89

Check that there are no scratches on shaft from needle bearings. Check threads and splines for damages.



INSPECTION OF COMPONENTS  
P.S. PUMP.

Check shaft  
(4)

90

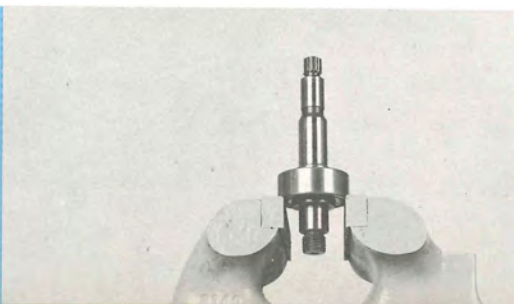
If sealed ball bearing is damaged, it can be replaced. First remove circlip.



Replace bearing only  
if bad.  
(6)

91

Place shaft in vise. Do not tighten vise. Then tap shaft out of bearing. Replace with new bearing.



Remove bearing  
(6)

92

31



Check needle bearing and seal. Replace if necessary.



Check bearing and seal  
(8, 9)

32

93

Inspect plates for wear and scoring.



Check plates  
(14, 18)

94

Check rotor assembly for evidence of damage: rotor, blades, and intermediate piece. Blades should slide freely in rotor. **Pieces are replaced as a complete set.**



Check rotor, plate and blades  
(15, 16, 25)

95



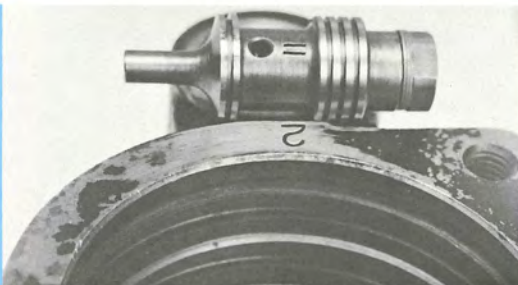
Check that pressure regulator valve slides freely in its bore.



Check valve  
(27)

96

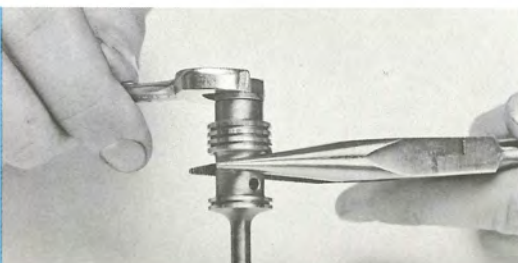
Check that valve has the same tolerance code as housing. Number stamped on lip of housing (1 or 2) agrees with marking stamped into side of valve (1 or 2 or //).



Compare markings

97

If you suspect there is a problem with valve, then disassemble it. Hold valve by side drilling. **Do not mar machined surfaces.** Clean, and replace any damaged part.



Take apart valve  
if necessary.  
(27)

98

33



Assemble valve immediately. Number of washers regulates spring pressure and, therefore, max. pump output.



Assemble valve  
(27)

34

99

Thoroughly clean all parts. Replace all seals.

Clean parts

100

Make sure all parts are well cleaned and lightly coated with ATF. All sealing components should be replaced.

ASSEMBLY OF P.S. PUMP.

Coat parts with ATF

101

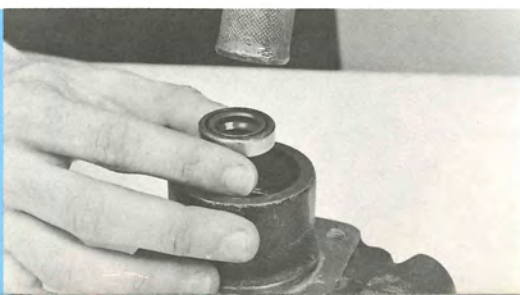
Press bearing into housing. Use tool SVO 2996. Be certain bearing is fully seated. Brg. should be 37 mm or 1.45" from end of housing.



Install bearing.  
(9)

102

Apply grease to seal and install in housing using tool SVO 2997.



Install seal.  
(8)

103

35



Install bottom o-ring in groove in housing.



Install o-ring  
(12)

36

104

Install shaft with previously fitted bearing into housing by tapping with **fiber hammer**. Be certain bearing is fully seated. Next install brg. retaining circlip.



Install shaft & bearing  
(4, 6)

105

Place small o-ring in groove on inner plate.

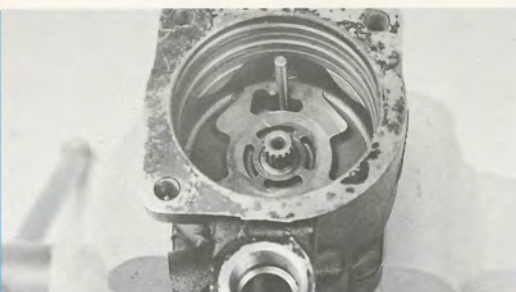


Install o-ring  
(13, 14)

106



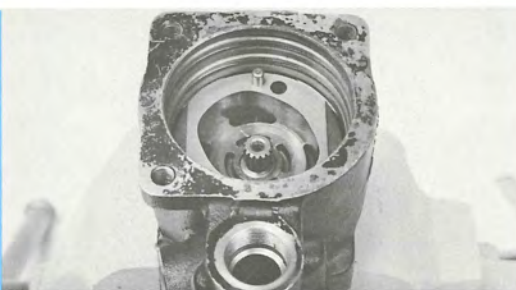
Install plate over shaft in housing. Locating pin should go in deeper indentation in plate. O-ring faces down. Be sure plate is fully seated by tapping with **fiber hammer**.



Install plate  
(14)

107

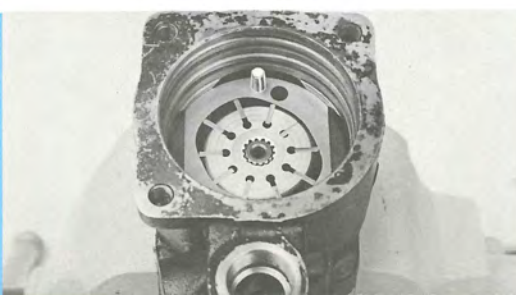
Install intermediate piece with locating pin in small hole and arrow up.



Install plate  
(16)

108

Install rotor with splines up and fine polishing down. Insert 10 blades into rotor rounded edges out.



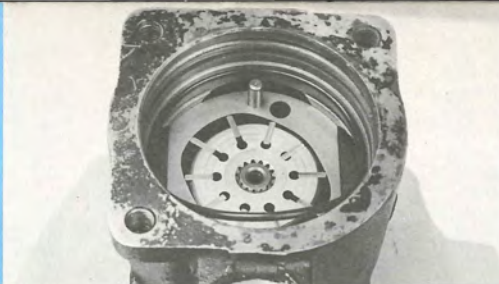
Install rotor and  
blades  
(15, 25)

109

37



Install second o-ring in groove in housing.



Install o-ring  
(17)

38

110

Install last plate in housing, flange down centering pin in larger indentation. Be certain plate is fully seated and not cocked.



Install plate  
(18)

111

Install top o-ring in groove in housing.



Install o-ring  
(21)

112



Install small spring and fit cover to housing.



Install spring and  
cover.  
(19, 22)

113

Install large circlip by holding cover down with c-clamp or handle of hammer.



Install circlip  
(20)

114

Install pressure regulator valve using care not to damage machined surfaces.



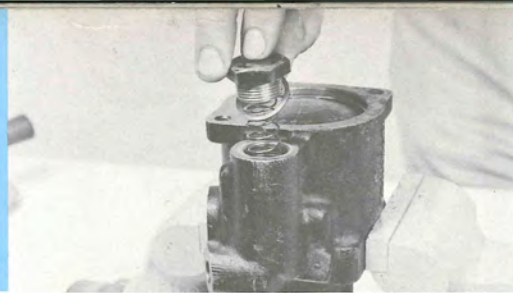
Install valve  
(27)

115

39



Install spring, gasket and plug. Use  $1\frac{1}{16}$ " open end wrench.

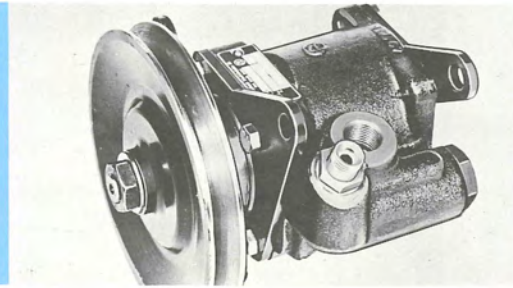


Install spring, gasket and plug.  
(23, 24, 26)

40

116

Install hose adaptor nipple, mounting bracket, woodruff key and pulley.

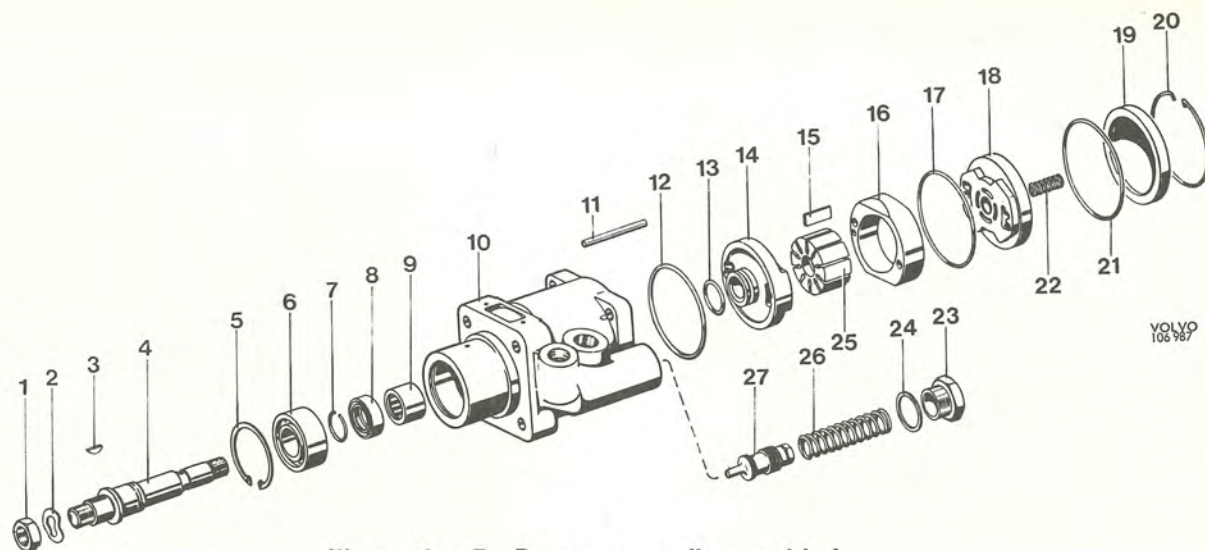


Install nipple, bracket, and pulley.

117







**Illustration B. Power pump disassembled**

- |            |                   |                        |                   |
|------------|-------------------|------------------------|-------------------|
| 1. Nut     | 8. Sealing ring   | 15. Blade              | 22. Spring        |
| 2. Washer  | 9. Needle bearing | 16. Intermediate piece | 23. Plug          |
| 3. Key     | 10. Housing       | 17. O-ring             | 24. Packing       |
| 4. Shaft   | 11. Pin           | 18. Outer plate        | 25. Rotor         |
| 5. Circlip | 12. O-ring        | 19. Cover              | 26. Spring        |
| 6. Bearing | 13. O-ring        | 20. Circlip            | 27. Control valve |
| 7. Circlip | 14. Inner plate   | 21. O-ring             |                   |



Please send in this card when you complete a Power Steering Job.

Date done: \_\_\_\_\_

Check sections you used:

- |  |   |
|--|---|
| <input type="checkbox"/> Quick Tests             | <input type="checkbox"/> Box Inspection   |
| <input type="checkbox"/> Troubleshooting         | <input type="checkbox"/> Box Reassembly   |
| <input type="checkbox"/> In-Car Adjustments      | <input type="checkbox"/> Pump Disassembly |
| <input type="checkbox"/> In-Car Pressure Testing | <input type="checkbox"/> Pump Inspection  |
| <input type="checkbox"/> Box Disassembly         | <input type="checkbox"/> Pump Reassembly  |

Circle any section above that gave you trouble or had errors.

May we contact you? ☐ Yes ☐ No

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Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

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Do you want more books like this one?

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|-------|-----------------------------|
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| _____ | Overdrive                   |
| _____ | Power steering              |
| _____ | York A/C compressor rebuild |

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Company \_\_\_\_\_

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City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

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