(1) Dip roller in clean lube oil and install onto cam parallel to camshaft.

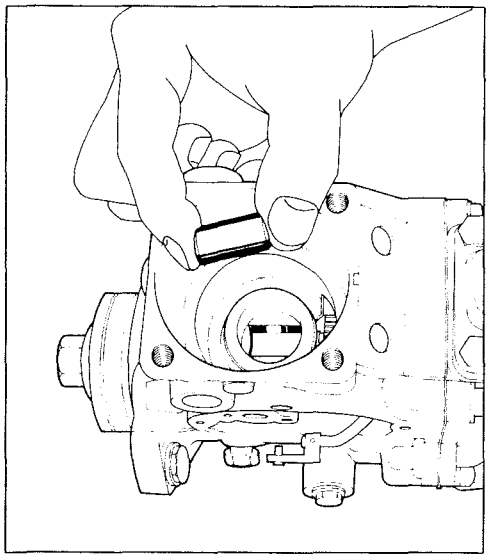

FIGURE 1-57
INSTALLING TAPPET ROLLER

(2) Insert tappet guide assembly making certain that guide pin in pump housing mates with slot in the tappet guide assembly.

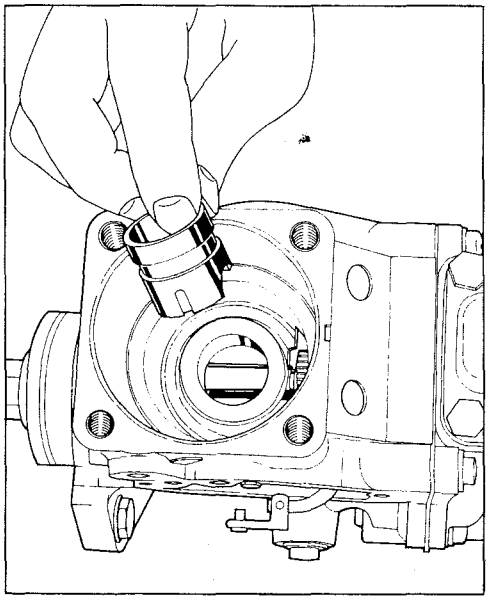

FIGURE 1-58
INSTALLING TAPPET GUIDE ASSEMBLY

(3) Check the clearance between the tappet and roller as follows:

(a) Position the Intravance camshaft so that the keyway is exactly at the 12 o'clock position and in full retard position.

(b) Position service tool TSE 76227 into pump housing as shown in Fig. 1-59 so that small inner pin of tool is inserted in hole in tappet. Make certain that the larger, outer shaft of the tool is resting firmly against the upper tappet guide pad area.

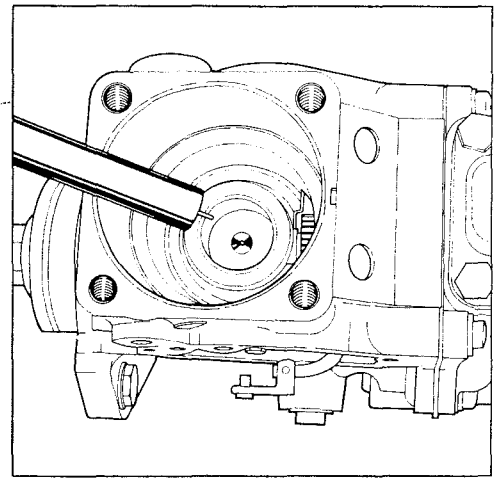

FIGURE 1-59
INSERTING TOOL TSE 76227
INTO TAPPET

(c) Push down on the smaller, inner pin of the tool with a small piece of drill rod to make certain that the tappet roller is contacting the cam lobe.

(d) Measure the distance from the top of the larger, outer shaft to the top of the smaller, inner shaft of the tool with a depth micrometer and record the dimension.

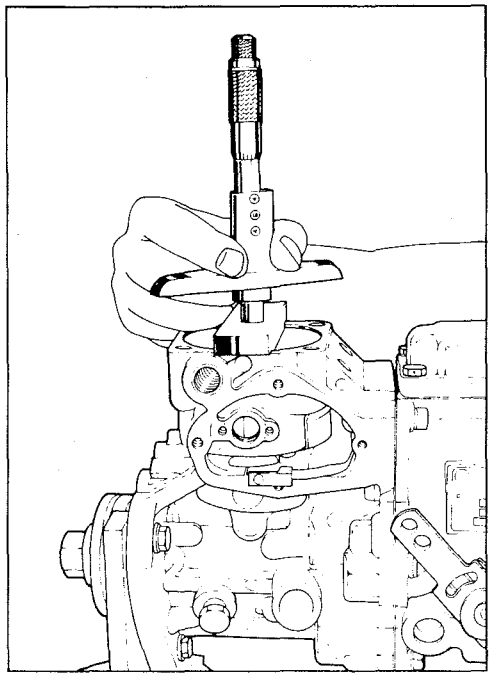

FIGURE 1-60
MEASURING TAPPET —
ROLLER CLEARANCE

(e) While holding the tool downward to secure the tappet, rotate the camshaft until the tappet guide moves upward to maximum height. Then repeat step (d) above.

E. Installation Of Hydraulic Head

(f) The difference between the two dimensions is the clearance between the tappet and the tappet roller. Refer to applicable customer specification for tappet clearance requirement.

Note: A clearance of .004"-.013" is specified for most applications. International Harvester California pump applications require a tappet roller clearance of .004"-.007" (.102-.178MM).

(g) If necessary, replace the tappet guide and/or tappet roller to obtain the required clearance.

Three Tappet Guides are available in the sizes indicated on the following table.

TABLE 1. TAPPET GUIDES

PART NUMBER	ROLLER BUSHING TO TAPPET LOWER SURFACE	COLOR IDENTIFICATION
GU859	.3070-.3080 (7.798-7.823 mm)	None
GU859-1	.3045-.3055 (7.734-7.760 mm)	Yellow Dot
GU859-2	.3015-.3025 (7.658-7.683 mm)	Green Dot

Identification marked on undercut near tappet pad.

(4) If pump is equipped with indexing plate for the hydraulic head and plate was removed, reinstall it at this time. Assemble thin (.030") copper gasket, indexing plate and thick (0.070") copper gasket over head indexing screw — thick gasket will be between housing and plate after assembly.

(5) Assemble indexing plate screw with plate and copper gaskets to pump housing.

(6) Position tongue of indexing plate on top face of pump housing, then center plate by aligning top edge of plate parallel to edge of pump housing. Refer to Fig. 1-61.

(7) Tighten the indexing plate screw to the required torque value.

(8) Apply a film of grease to the lower hydraulic head gasket and then insert gasket into hydraulic head bore in pump housing. Make certain that gasket is centered in housing bore.

(9) Position the camshaft in full retard with the keyway at exactly 12 o'clock position.

(10) Align the locating slot in the flange of the hydraulic head with the tongue of the indexing plate, if so equipped. Otherwise, align the slot in the head flange with the machined slot in the pump housing. Then, rotate the hydraulic head face gear until the line mark on the face gear is aligned with the raised mark in the pump housing timing window.

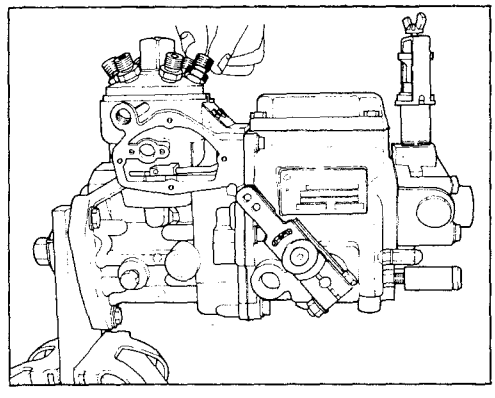

FIGURE 1-61
HYDRAULIC HEAD INSTALLED

(11) Insert the hydraulic head assembly carefully into the pump housing.

(12) Assemble the four head retaining clamps, screws and eight washers according to Fig. 1-62. They **must** be assembled as shown with the convex surface on WA 8520 mating with the concave surface on WA 8521. Install the head retaining hardware and tighten the screws down finger tight.

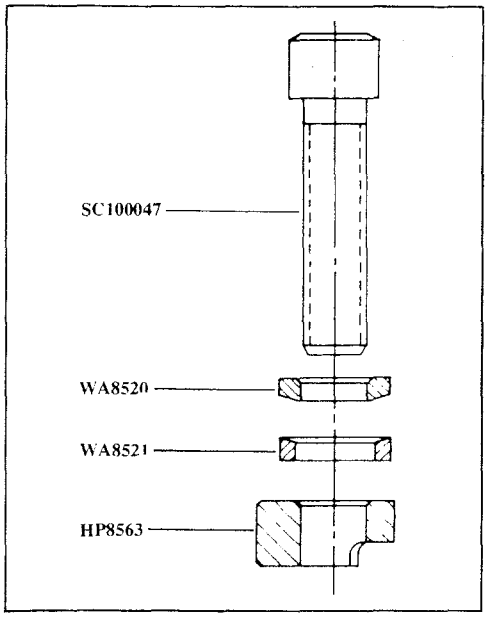

FIGURE 1-62
HYDRAULIC HEAD RETAINING SCREW, WASHERS AND CLAMP

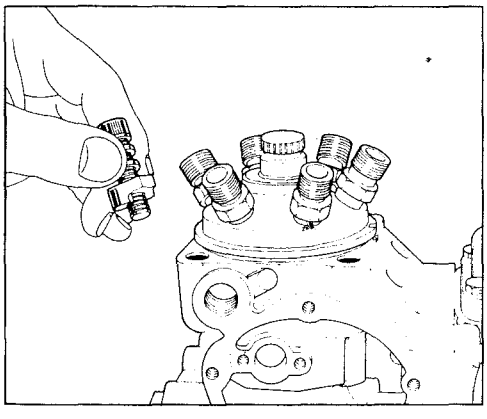

FIGURE 1-63
INSTALLING HEAD RETAINING HARDWARE

Note: Slight radial repositioning of the hydraulic head may be necessary to permit the heads of the retaining screws to clear the high pressure discharge fittings.

(13) With the slot in the head aligned with the tongue of the locating plate (or the machined slot in pump housing) and line mark on face gear aligned with raised bead in timing window, tighten the head retaining screws evenly to the required torque value.

Caution: When tightening the retaining screws, rotate the camshaft **slightly** in each direction to make certain that the face gear teeth and governor drive gear teeth are engaging properly. The line mark on face gear should move roughly the same amount to either side of raised bead in pump housing timing window before meeting resistance.

(14) After assembly, make certain that the scribed line on the face gear aligns with the raised bead in the timing window when the camshaft keyway is exactly at the 12 o'clock position in full retard.

Note: To help prevent corrosion from engine cleaning agents that may leak into head bore of pump housing, the head locating slot can be filled with a silicone rubber adhesive sealant, RTV or equivalent.

(15) Apply a film of grease to the control unit "O" ring and install "O" ring in groove in control unit assembly.

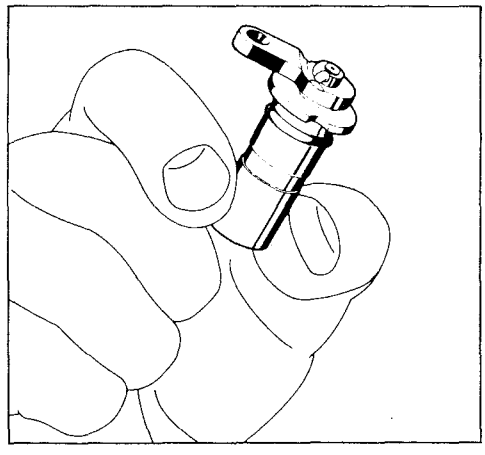

FIGURE 1-64
"O" RING INSTALLED ON CONTROL UNIT ASSEMBLY

(16) Insert the plunger sleeve pin into the control unit assembly.

(17) Make certain that the plunger sleeve is in its lowest position.

(18) Position control unit arm so that plunger sleeve pin is at the 6 o'clock position. The plunger sleeve pin must be positioned so that flats are horizontal and face with dot is up.

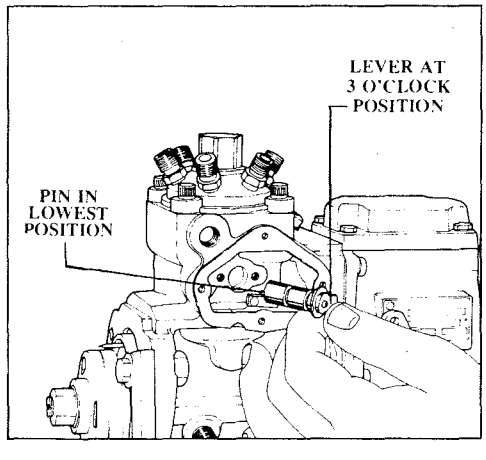

FIGURE 1-65
INSTALLING CONTROL UNIT ASSEMBLY

(19) With the two scallops in the control unit bushing horizontal, insert the control unit assembly into the bore in pump housing.

Caution: If plunger sleeve pin is not properly engaged in plunger sleeve slot, there will be lack of governor control.

(20) Align the two scallops on the control unit assembly with the control unit retaining plate screw holes in the pump housing.

(21) Insert the control rod pin into the control unit arm.

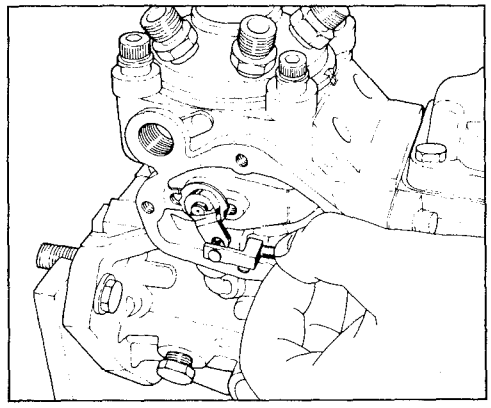

FIGURE 1-66
ENGAGING CONTROL ROD PIN

(22) Insert the screws into the two holes of the retaining plate. Slide the two spacers onto the retaining plate screws and install the assembly over the control unit.

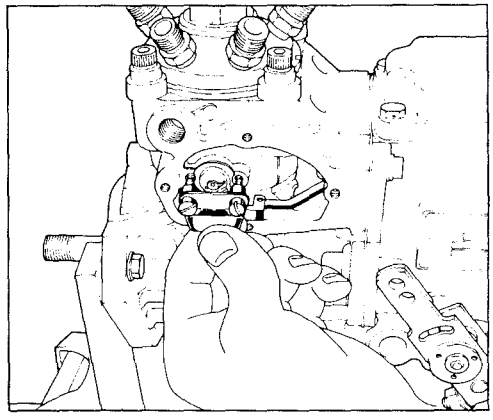

FIGURE 1-67
INSTALLING RETAINING PLATE

(23) Tighten the retaining plate screws **evenly** to the required torque value (reference Torque Chart, Section X1).

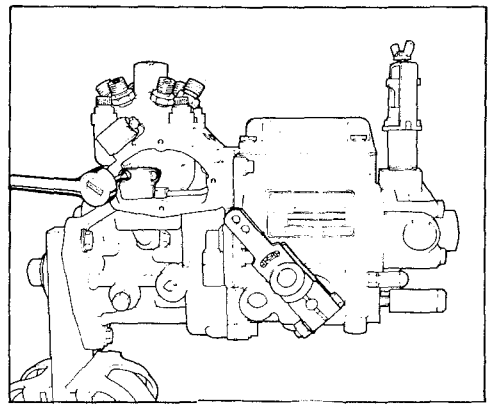

FIGURE 1-68
TIGHTENING RETAINING PLATE SCREWS

(24) Hold the control unit shaft against the control unit retaining plate by applying force with a screwdriver behind the control unit lever arm. Then, measure the clearance between the control rod link and the control unit retaining plate. (Refer to Fig. 1-69). Also, refer to Fig. 1-70 for standard control unit arrangement and Fig. 1-71 for electric shut-off control unit feature.

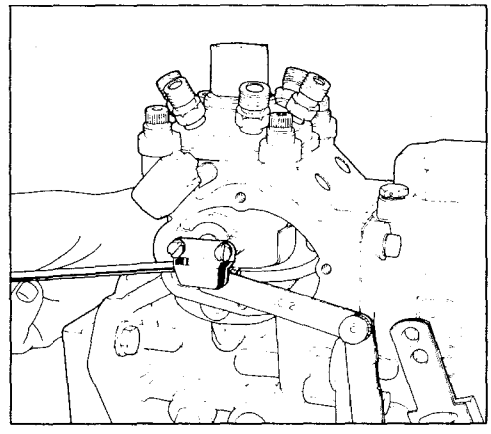

FIGURE 1-69
MEASURING CONTROL UNIT — RETAINER PLATE CLEARANCE

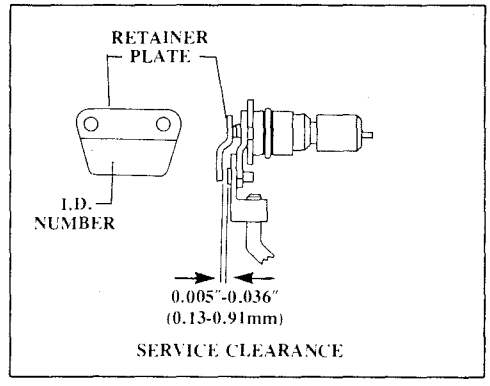

FIGURE 1-70
STANDARD CONTROL UNIT — RETAINER PLATE CLEARANCE

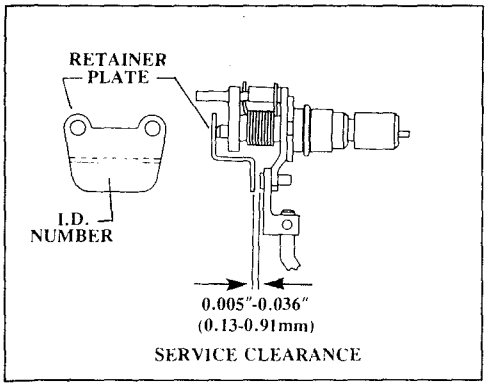

FIGURE 1-71
ELECTRIC SHUT-OFF CONTROL UNIT — RETAINER PLATE CLEARANCE

(25) The required control unit — retainer plate clearance is .005"-.036" (0.13-0.91 mm).

(26) If the clearance is not per specification, install a retainer plate with a smaller identification number (such as 1) or a larger identification number (such as 3) which yields the required clearance.

(27) Make certain there is no binding in the control unit, control rod or fulcrum lever assembly.

(28) Refer to Internal Timing and Testing Section VI for setting or checking lift-to-port closing and delivery valve opening pressure requirements per customer spec.

(29) Lockwire the two control unit retainer plate screws together as shown in Fig. 1-72 and Fig. 1-73 for units with electric shut-off.

Caution: Lockwire should not be wound around screw heads above horizontal centerline since interference with solenoid plunger may occur.

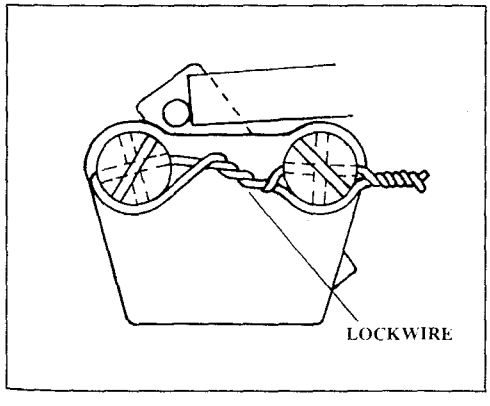

FIGURE 1-72
RETAINER PLATE SCREW LOCKWIRING FOR LEFT HAND PUMPS WITH ELECTRIC SHUT-OFF

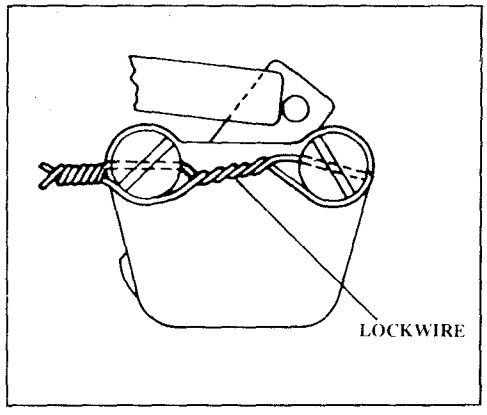

FIGURE 1-73
RETAINER PLATE SCREW LOCKWIRING FOR RIGHT HAND PUMPS WITH ELECTRIC SHUT-OFF

(30) For pumps equipped with Bowden Wire shut-off or Single-Lever Control, install lockwire according to Fig. 1-74. In each case, the final tying braid should always be made in line with the hole in the screw to prevent any sharp bends or breaks in the wire.

Note: The above lockwire should be installed after flow timing the injection pump if lift-to-port closing must be verified or adjusted.

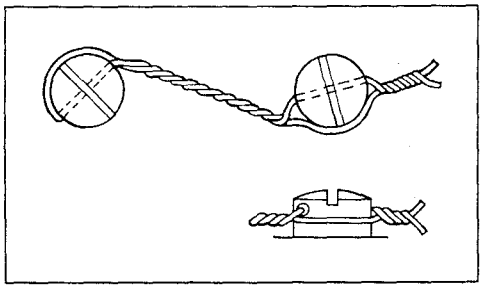

FIGURE 1-74
RETAINER PLATE SCREW LOCKWIRING FOR PUMPS WITH BOWDEN WIRE SHUT-OFF OR SINGLE-LEVER CONTROL

(31) Assemble overflow fitting (or valve) as required and also install inlet fitting to the pump housing. Refer to Fig. 1-75.

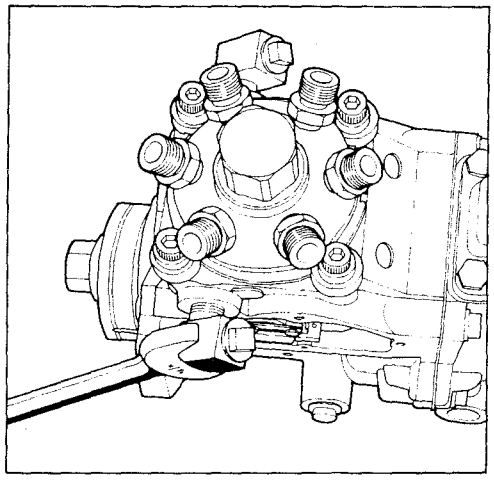

FIGURE 1-75
INSTALLING INLET AND OUTLET FITTING (OR VALVE)

Note: Refer to specific customer pump parts list for proper location of inlet and outlet (overflow valve) fittings.

(32) Assemble control unit cover gasket, control unit cover, screws and lockwashers.

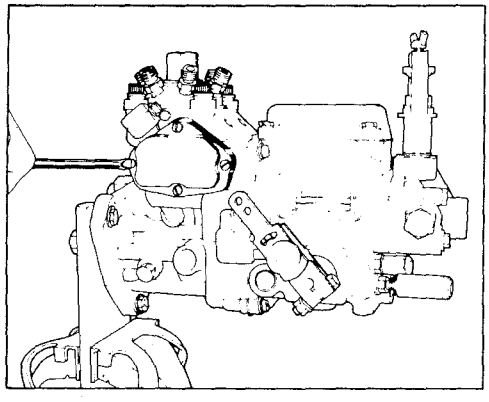

FIGURE 1-76
INSTALLING CONTROL UNIT COVER AND GASKET

(33) Tighten control unit cover screws to required torque per Torque Chart (Section XI) after flow timing the pump.

(34) After flow timing and calibrating the pump, install external sealwiring, if required. Refer to Section VIII.