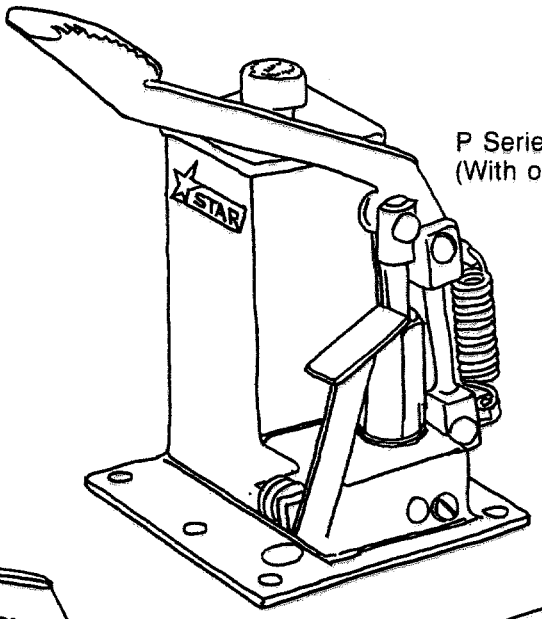
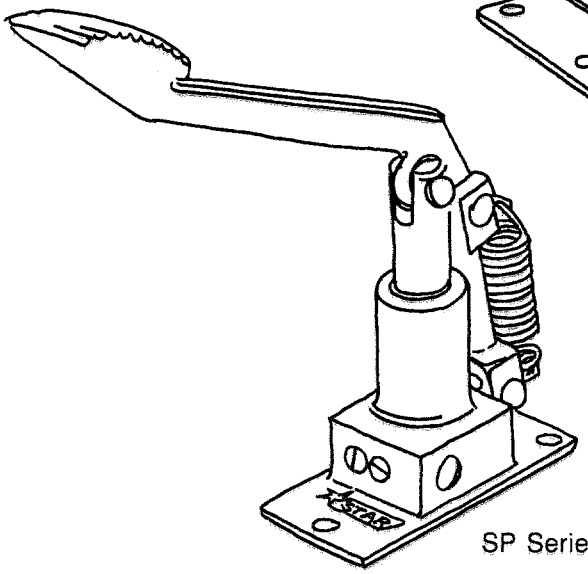
STAR SINGLE PISTON HYDRAULIC PUMPS

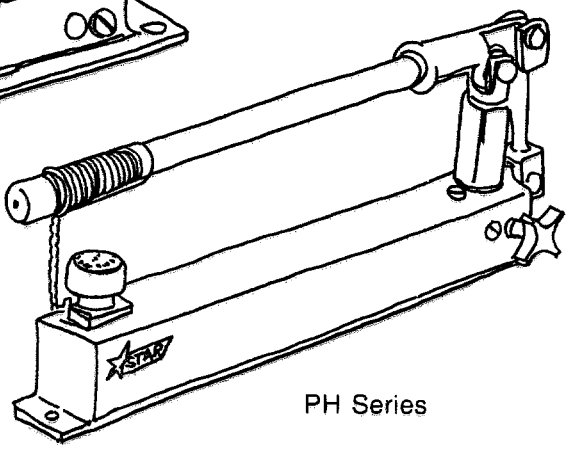
SERVICE MANUAL
(Hand or Foot Operated)



P Series
(With or without reservoir)



SP Series



PH Series

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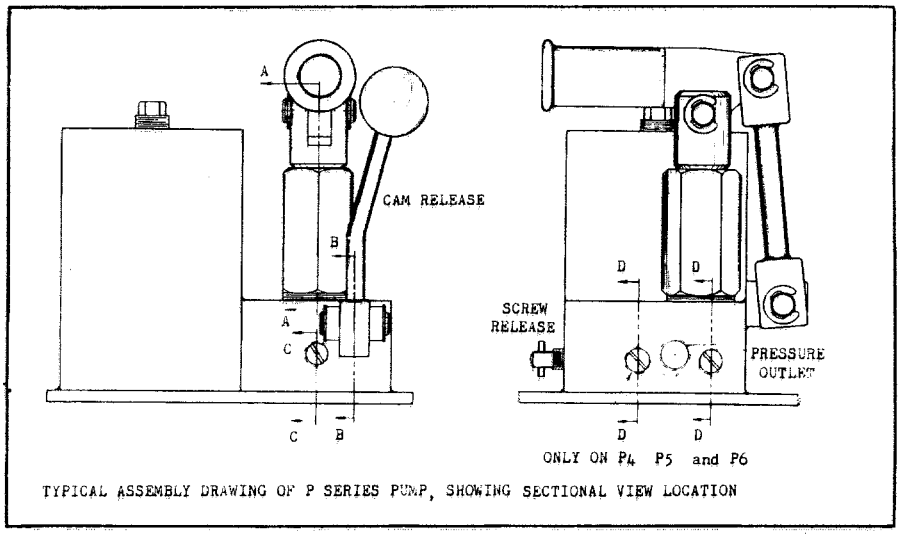
MAINTENANCE

In servicing hydraulic units, cleanliness is of the utmost importance. A clean work place and proper tools are necessary to insure efficient and effective repair. Special tools can be furnished on request.

NOTE: Please specify pump model number when ordering parts.



TYPICAL ASSEMBLY DRAWING OF P SERIES PUMP, SHOWING SECTIONAL VIEW LOCATION

TROUBLE	POSSIBLE CAUSE	CORRECTIVE REPAIR INSTRUCTIONS Refer to Pump Repair Section
Pump will not hold pressure	1 - Release valve ball not seating properly	Refer - "Release Valve"
	2 - Ball valves not seating properly	Refer - "Pump Valve"
	3 - Overload valve ball not seating properly	Refer - "Overload Valve"
Pump fails to supply pressure	1 - Lack of oil	Refer - "Oil"
	2 - Air bound pump	Refer - "Air Bleeding"
	3 - Release valve ball not seating properly	Refer - "Release Valve"
	4 - Small ball in ball valve circuit not seating properly	Refer - "Pump Valve"
	5 - Overload valve ball not seating properly	Refer - "Overload Valve"
Pump piston does not draw a full charge. (This is evident by a cushion effect at the top of the Pump stroke.)	1 - Air bound system	Refer - "Air Bleeding"
	2 - Lack of oil	Refer- "Oil"
Pump piston raises by itself under pressure.	Large ball in ball valve circuit not seating properly	Refer - "Pump Valve"
Pump functions properly but will generate only a given pressure below its normal pressure maximum.	Overload valve not set properly	Refer - "Overload Valve"

AIR BLEEDING

Air accumulation in a hydraulic system will cause erratic action. This may appear as pump failure to the inexperienced user. For this reason, it is adviseable to air bleed each pump before attempting to operate. To remove air from the pump, open release valve with the pump in an upright position. Operate the pump slowly through the full piston stroke about a dozen times. Close the release valve. Pump should be ready for use.

OIL

If the pump fails to operate, check the oil level before attempting any repairs.

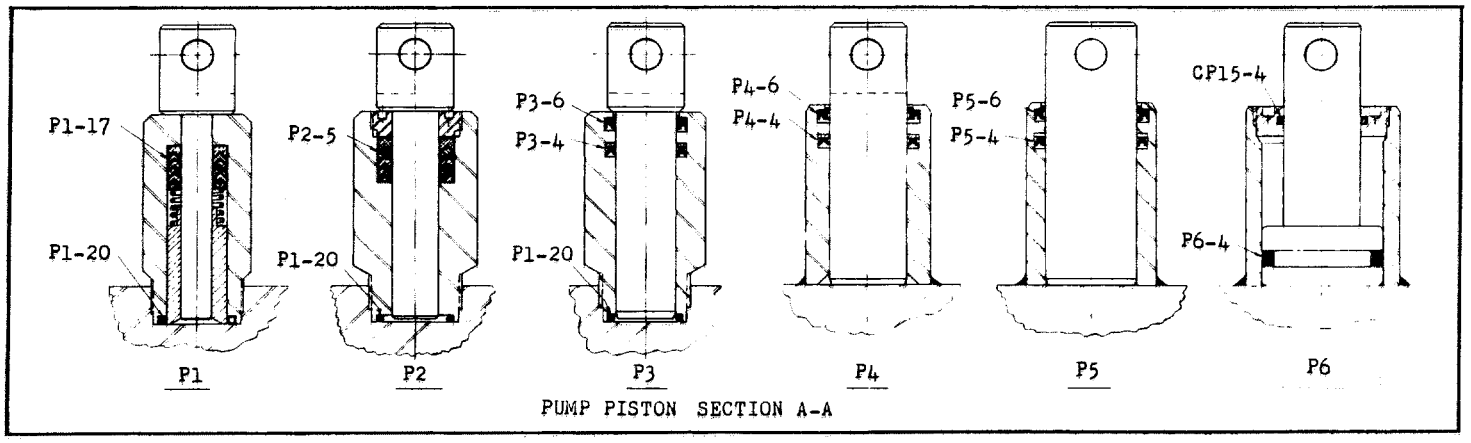
CAUTION: Use only Hydraulic Oil when refilling. NEVER USE BRAKE FLUID.

PUMP PISTON

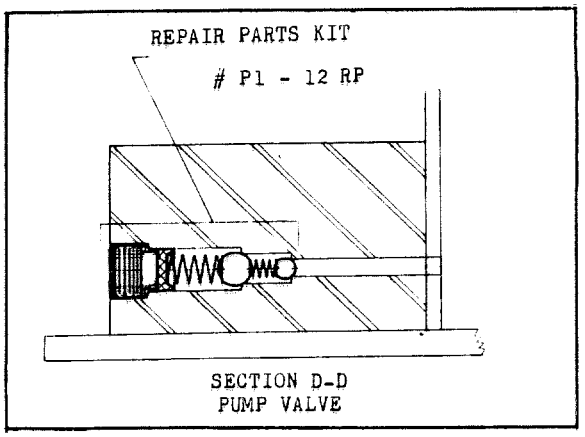
Leakage of oil around the pump piston indicates worn or damaged piston packings.

To replace packings:

a) Remove piston actuating linkage.
b) Remove piston. (See piston drawing.)
c) Remove all packings. (See piston drawing.)
d) Clean all parts and dry with compressed air.
e) Install new packings, wipers, and static seals making sure that packing seal lips are face down toward the pressure. (Dip each part into clean hydraulic oil before assembly.)
f) Open the release valve (to allow air to bleed from the piston barrel back to the reservoir) and insert the piston.
g) Replace piston linkage.
h) NOTE: With release valve open, stroke pump about a dozen times to bleed air completely from the pump.



PUMP PISTON SECTION A-A

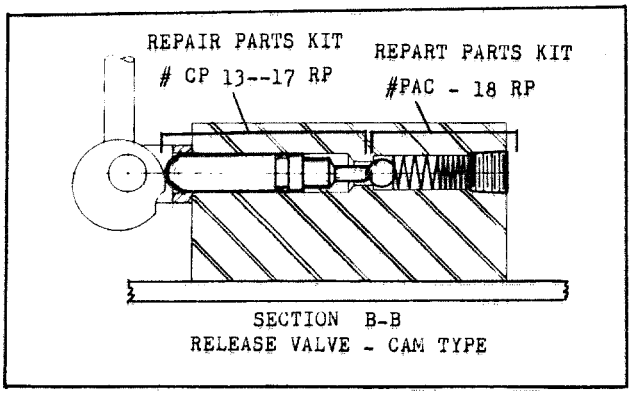


SECTION D-D
PUMP VALVE

PUMP VALVES

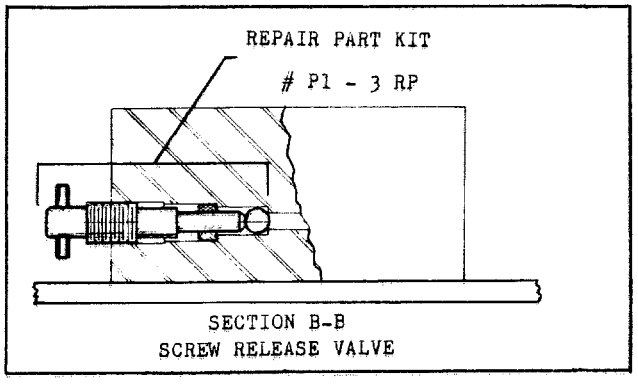
If the pump fails to supply pressure or if the pump piston is under pressure at all times, the pump valves may need a cleaning. Stand pump in upright position while removing valve plug and valve seal. Tilt pump to remove valve springs and balls. Allow oil to drain from the reservoir through these valve holes to wash foreign matter from hole. Lay pump on its side to clean and inspect valve chamber. Be careful not to mar or nick ball valve seats. Clean valve balls and spring in a solvent. Replace rusted or corroded balls. Do not stretch ball springs. To reassemble, insert in sequence, small ball, small spring, large ball, large spring into cleaned chamber. Using the valve seal inserting tool (CP13-44), assemble new valve seal. Finally, screw in valve seal plug.

This procedure should be carried out in all ball valve circuits. If the valves fail to operate properly after they have been cleaned, it may be necessary to reseat the valve balls. Remove the springs and tap each ball lightly in its respective seat using the 1/4" ball seating tool (CP13-42) for the small ball and the 3/8" ball seating tool (CP13-43) for the large ball. Remove balls to make sure they are not stuck to the seats. Reassemble pump valves as before.



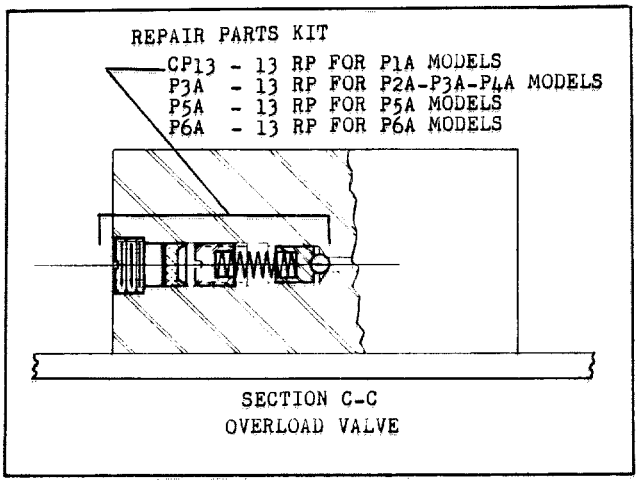
RELEASE VALVE - CAM TYPE

If the pump fails to lift or hold a load, the release valve may be dirty. From back of pump remove release valve plug, release ball spring and, release ball. From front, remove release lever pin, release lever, and release plunger. Clean release valve chamber and inspect ball seat. If necessary, re-seat release ball by tapping it lightly on the ball seat, using the 3/8" ball seating tool (CP13-43). Clean plunger and inspect plunger packing. Replace if necessary. To reassemble, insert ball, ball spring, and release valve plug. Dip release plunger packing in hydraulic oil and carefully insert into plunger chamber. Replace release lever and lever pin.



RELEASE VALVE - SCREW TYPE

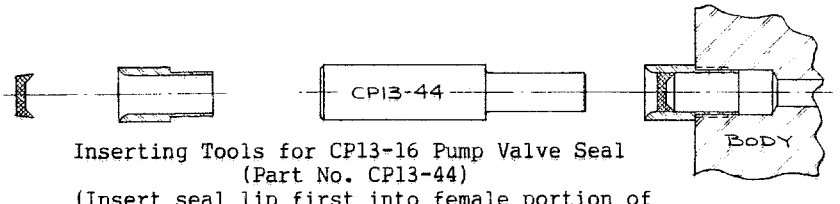
If the pump fails to lift or hold a load, the release valve may be dirty. Remove release screw, release valve seal and 9/32" release valve ball. Clean and inspect valve seat and screw. A slight depression in the end of the screw is not harmful. Screws with excessive deformation should be replaced. Re-seat the release ball using the 1/4" ball seating tool (CP13-42). Insert the release valve packing using the valve packing inserting tool (P1A-40). Reassemble release screw.



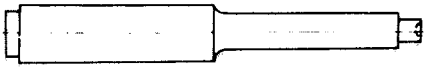
OVERLOAD VALVE

If the pump fails to lift or hold a load after the release valve and pump valves have been checked, the overload valve may be dirty. To clean valve, remove valve plug and valve plug seal. Using a screwdriver, remove the overload valve screw. Tip pump forward to remove valve spring, valve plunger, and steel ball. Clean and inspect valve hole. If the ball seat is marred, re-seat same by lightly tapping ball on seat using tool (CP13-45). Remove ball to prevent sticking. Reassemble ball, plunger, spring and valve screw. Connect a pressure gauge to the pressure outlet. Stroke pump to obtain maximum desired pressure. Turn valve screw clockwise to increase pressure reading and counter-clockwise to reduce maximum reading. After valve is set properly, replace valve seal and valve plug.

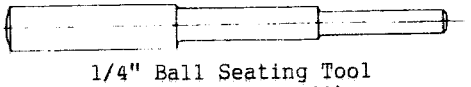
SPECIAL TOOLS AVAILABLE FOR REPAIRING STAR PUMPS ARE SHOWN BELOW.



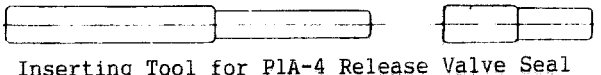
Inserting Tools for CP13-16 Pump Valve Seal
(Part No. CP13-44)
(Insert seal lip first into female portion of tool. Use male tool to push seal into pump.)



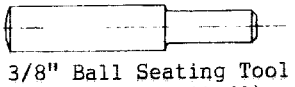
Overload Valve Ball Seating Tool
(Part No. CP13-45)



1/4" Ball Seating Tool
(Part No. CP13-42)



Inserting Tool for P1A-4 Release Valve Seal
(Part No. P1A-40)

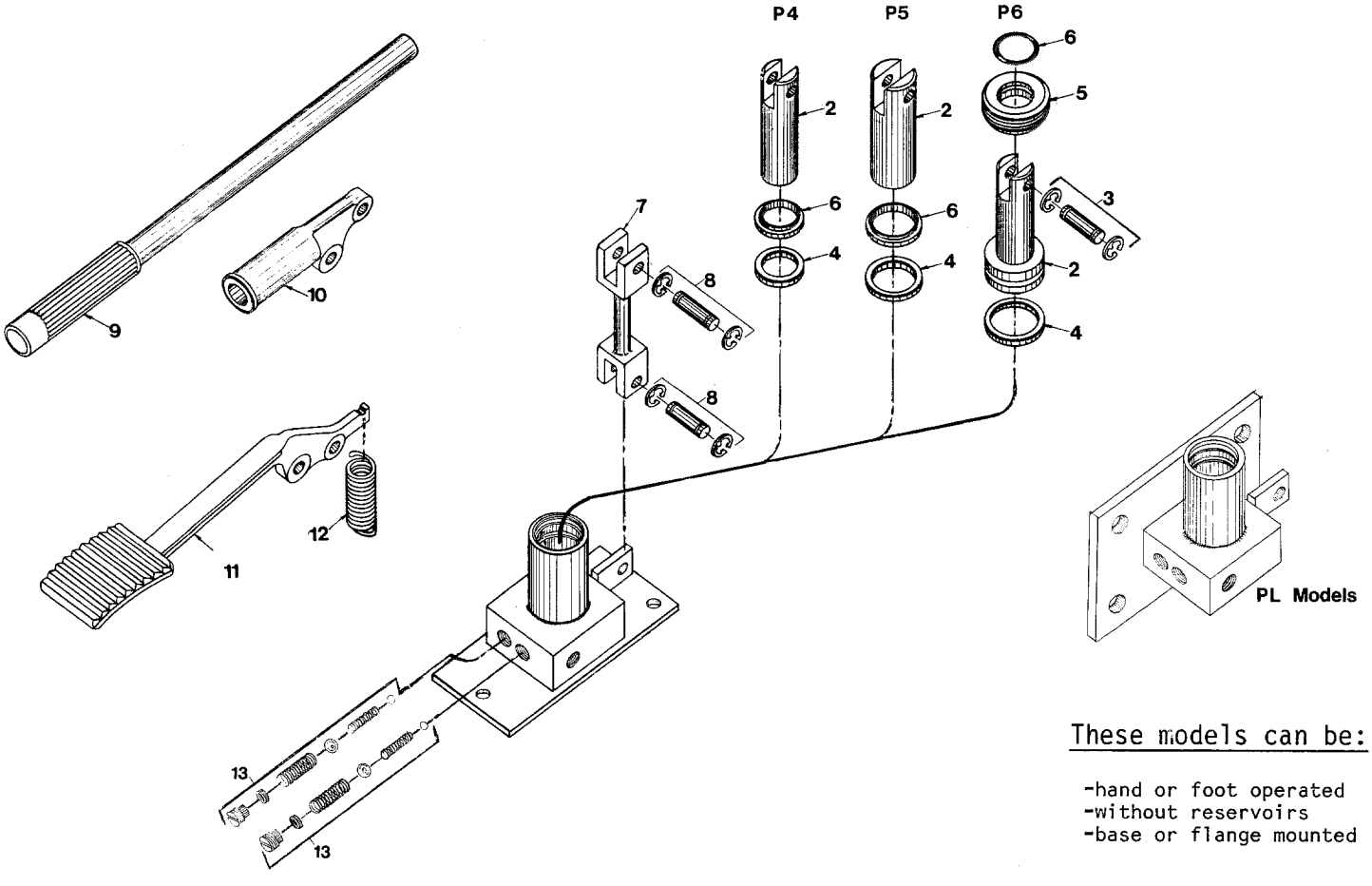


3/8" Ball Seating Tool
(Part No. CP13-43)

SP SERIES

STAR Single Piston Pumps

1¼" — 1½" — 2" Diameters



These models can be:

-hand or foot operated
-without reservoirs
-base or flange mounted

Item No.	Part Name	1-1/4" Piston MODELS: SP4A, SP4A-PL, FSP4A, FSP4A-PL, SP4A-SS ++ Part No.	1-1/2" Piston MODELS: SP5A, SP5A-PL, FSP5A, FSP5A-PL Part No.	2" Piston MODELS: SP6A, SP6A-PL, FSP6A, FSP6A-PL Part No.
	Repair Kit (incl parts with *)	SP4A-RK	SP5A-RK	SP6A-RK
2	Piston	P4-2	P5-2	CP15-2
3	Piston Pin (incl Rings)	CP13-10RP	CP13-10RP	CP13-10RP
4	Pump Piston Packing	* P4-4	* P5-4	* P6-4
5	Pump Packing Nut	---	---	CP15-7
6	Pump Piston Wiper	* P4-6	* P5-6	* CP15-4
7	Pump Link	CP13-12	CP13-12	CP13-12
8	Link Pin (incl Ring)	CP13-10RP	CP13-10RP	CP13-10RP
9	Lever Handle	CP13-23	CP13-23	CP13-23
10	Pump Socket	CP13-9	CP13-9	CP13-9
11	Foot Lever	FCP12-9	FCP12-9	FCP12-9
12	Foot Lever Return Spring	FCP13-23	FCP13-23	FCP13-23
13	Pump Valve (Complete- incl 2)	* P1-12RP	* P1-12RP	* P1-12RP
	Inserting Tool	* CP13-44	* CP13-44	* CP13-44

++ add "-SS" to Part No.

Please give the following information when ordering parts:

- Part Number
- Part Name
- Model No. of Pump

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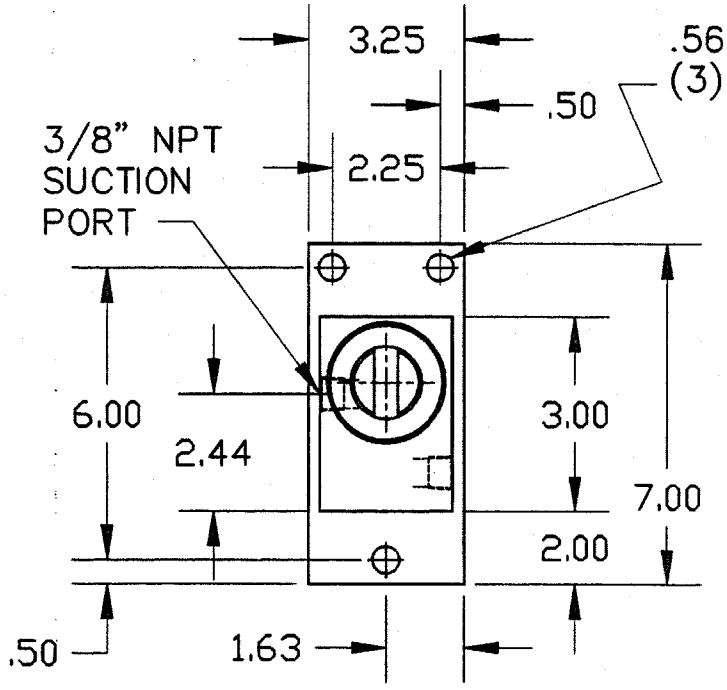
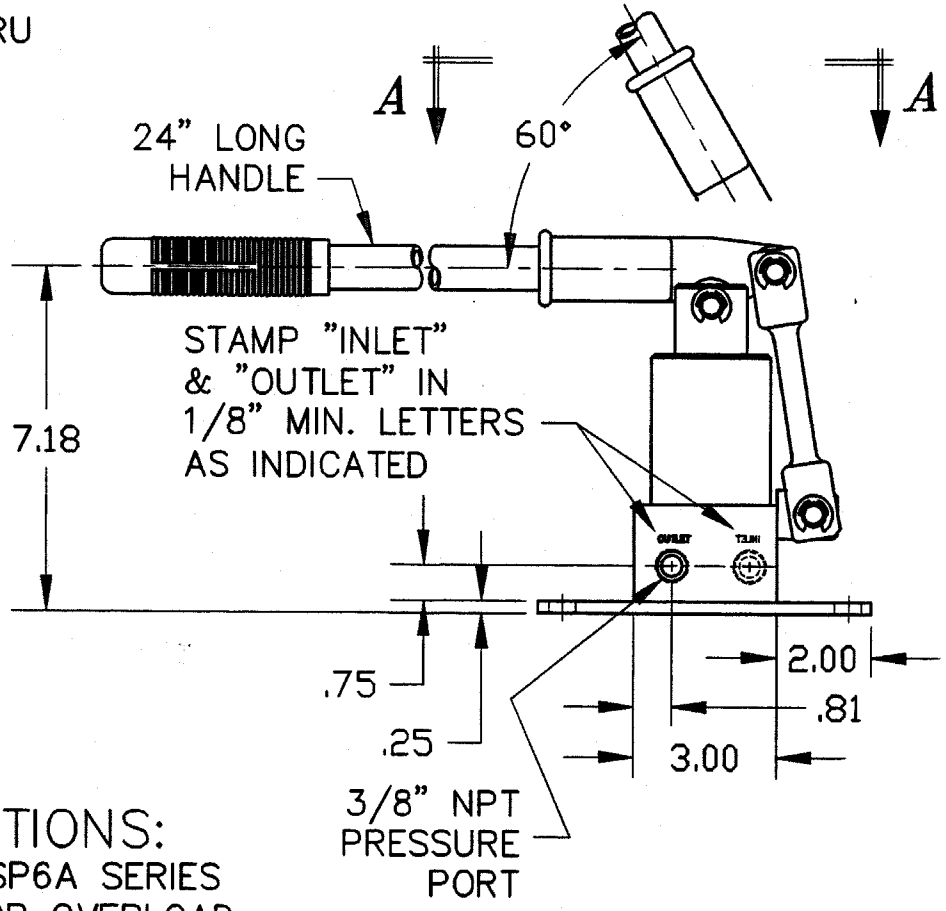


VIEW A–A
ROTATED 90° CCW



SPECIFICATIONS:

HAND PUMP, SP6A SERIES
NO RELEASE OR OVERLOAD
BASE PLATE MOUNTED
NET WEIGHT, 10 lb
500 PSI PRESSURE
4.71 CU" DISPLACEMENT
HANDLE FORCE 20 lb./100 PSI
→ VITON SEALS ←

APPROVED FOR PRODUCTION
COMPANY:
APPRVD. BY:
APPRVL. DATE:
PLEASE RETURN ONE COPY WITH SIGNATURE OF APPROVAL TO STAR HYDRAULICS, INC.

DESCRIPTION	REV.	MATERIAL:	SP1A – MODIFIED HAND PUMP	STAR HYDRAULICS, INC. RIVER GROVE, ILLINOIS 60171–1598	
		TOLERANCE .XX DEC: ±.010 .XXX DEC: ±.005 DEGREE: ±1°	DWG. CODE A/4	CONFIDENTIAL INFORMATION THIS DRAWING AND THE INFORMATION CONTAINED HEREIN, ARE THE EXCLUSIVE PROPERTY OF STAR HYDRAULICS, INC. DISCLOSURE OR DUPLICATION IS PROHIBITED	DRAWN: G.P.W. / CKD.:
					SCALE: QUARTER / DATE: 4–20–00
					PART No. MK2427

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