TECH BULLETIN

Published regarding engineering changes and improvements

TECH BULLETIN INDEX

continued on back

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No.	Subject	Models
040	Manifold and Valve Part	3527 and 3537
041	Oil Gauge and Crankcase	3520 and 3535
042	Four Screw Crankcase Cover	623, 820, 1010
043	LPS and HPS Servicing	All Plunger Models
044	Tapered Seat	7001 - 7023
045	One-Piece S.S. Plunger Retainer w/Stud	5PFR, 7PFR, 15PFR
046	Valve Plug with Coil Spring	317, 347, 357, 1057
047	Blind Bearing Shaft Cover	Gearbox Plunger Pumps
048	Extended Valve Plug	7PFR and 15PFR
049	Stainless Steel Hardware	3PFR7, 5PFR7, 15PFR7
050	Spacer with Coil Springs	3520, 3527, 3535, 3537
051	M10 Manifold and Crankcase	7PFR and OEM
052	Plunger Rod and Stud	3PFR, 5PFR, 15PFR, 35PFR, 60PFR
053	Liquid Gasket	All Plunger NAB-S.S. Models
054	2 Piece Seal Retainer	5PFR and 7PFR
055	Removing Pumps from Gas Engine or Electric Motor	2SF, 2SFX, 2DX, 4SF, 5DX, 6DX
056	OBSOLETE	
057	Set Screw and Hardened Key	4SF
058	Forged Manifold and Extended Valve Plugs	56, 57, 59, 60
059	OBSOLETE	
060	Baffle Assembly	34170
061	Installation and Adjustment Procedure	8100
062	Manifold and Seal Case	650 and 651
063	Hi-Temp, Cooled Inlet Renamed	2520C
064	By-Pass Hose Sizing	All Unloaders/Regulators
065	Higher Performance Ratings	2SF and 4SF
066	Single V-Packing	4HP35G1 and 4HP40G1
067	S.S. Plunger Retainer	3PFR, 5PFR, 7PFR
068	S.S. V-Packing Spacer and O-Rings	3507
069	Forged Extended Manifolds	35PFR
070	Maximum Performance	2SF and 4SF
071	Plunger Rod and Retainer	4HP and 5DX
072	Manifold Head and V-Packing	1050, 1051, 1057
073	Hi-Temp HPS	3PFR, 5PFR, 2SF
074	Torque Chart	Piston and Plunger Pumps
075	Sleeved Plunger Rod	4SF“S”
076	Valve Seat and O-Ring	2530 and 2537
077	Oil Drain Kit	All Models (except 2SF/4SF)
078	Field Retrofit Mounting	5CP
079	Manifold Head and Port Location	317, 347, 357
080	Extended Discharge Manifold	3507 and 3517
081	Seal Case and Wick	2530 and 2537
082	Press-in Valve Plug	6761
083	Winterizing a Pump	All Models
084	Eye-Bolt Relocation	60FR, 60PFR, 68PFR
085	M8 Keyway	25FR, 25PFR, 28PFR
086	Ceramic Plunger	2DX
087	Female Adapters	15PFR, 35PFR, 60PFR
088	6 Bolt S.S. Manifold	3CP and 5CP

TECH BULLETIN 001
03/75

Published regarding engineering changes and improvements

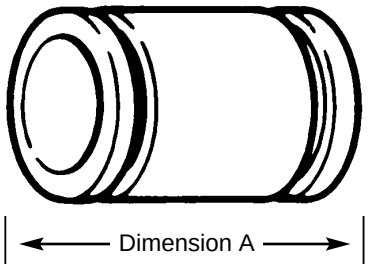
SUBJECT: Long to Short Cylinders Change - Piston Pumps

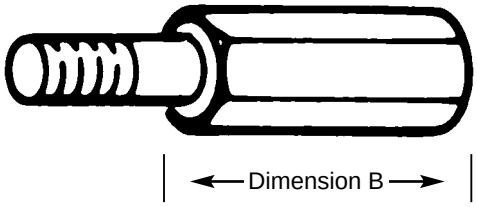
Early production **10 Frame** pumps were produced with long cylinders. Production was then changed to the short cylinders. The long cylinders required a long cylinder bolt. The short cylinders require a short cylinder bolt. **The long and short cylinders and bolts cannot be interchanged and must be replaced as a set.**

As the long cylinders and bolts are no longer available, it is necessary to convert to the shorter cylinders and bolts.

Model 623 and 1010 pumps prior to 5740101 had the long cylinders. Model 820 pumps prior to 0740101 had long cylinders.

The following are the part numbers and dimensions for the various cylinder replacements.





	OLD		NEW	
Dimension A	**Long Cylinder** 2.164" (55 mm) Chrome Plated		**Short Cylinder** 1.69" (50 mm)	
	Pump Model	Part No.	Chrome Part No.	Unchromed Part No.
	520	—	28763	29045
	623	27349	28342	28776
	820	27423	28340	28778
	1010	27416	28341	28780
Dimension B	**Long Cylinder Bolt** 3.05" (77.5 mm)		**Short Cylinder Bolt** 2.75" (69.9 mm)	
	Pump Model	Part No.	Part No.	
	All models	27351	43047	

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TECH BULLETIN 002 12/76

Published regarding engineering changes and improvements

SUBJECT: Inlet Pressure VS Liquid Temperature

As the temperature of the pumped liquid increases, the likelihood of vaporization and cavitation increases. Several aspects of the system should be considered with elevated temperatures to achieve optimum performance.

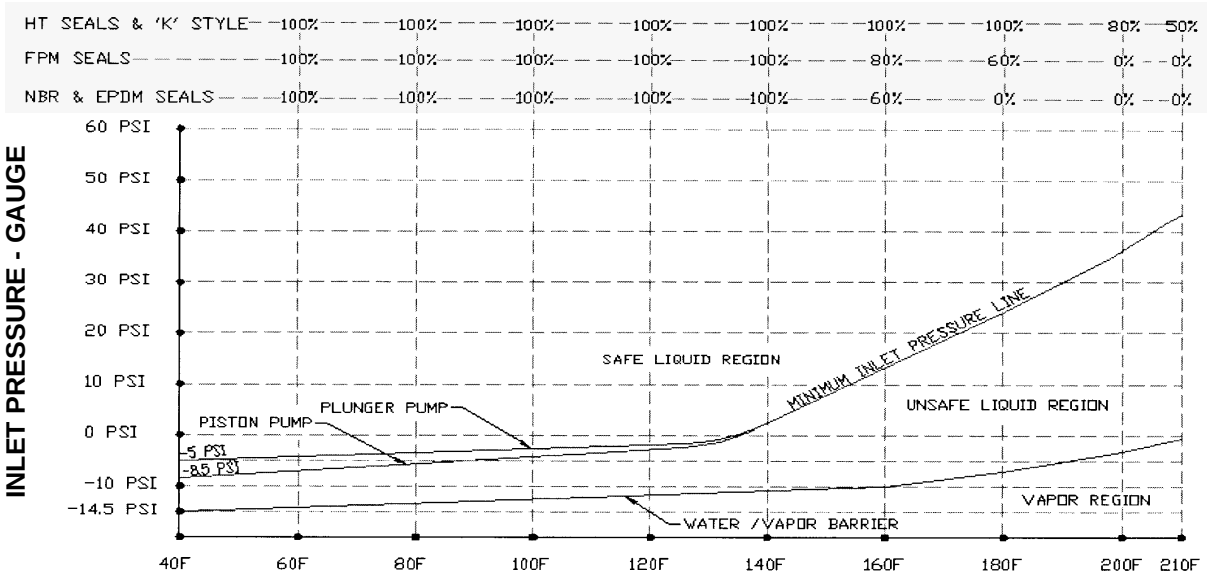
- pressurize inlet above 130 F
- reduce pump RPM
- install C.A.T. in inlet line
- increase inlet line size to the pump
- properly sized and baffled supply tank

PRESSURIZED INLET

With ambient liquids the **piston pumps** can handle a negative suction of up to 8.5 PSI [20 feet of water] and the **plunger pumps** can handle a negative suction up to 5 PSI [11.5 feet of water]. As the temperature of the liquid increases, the vapor pressure also increases. By increasing the inlet pressure to the pump, you can minimize the increased risk of cavitation.

To achieve the recommended inlet pressures with elevated temperatures, it is often necessary to use a booster pump. The booster pump should be approximately twice the system capacity to assure adequate flow into the pump. See chart below.

MAXIMUM PUMP SPEED VS WATER TEMPERATURE



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C.A.T.

The optimum installation for ambient temperature liquids is with a properly sized supply tank. It should be enclosed and 6-10 times the system capacity with at least two baffles. If more than 5-6 feet from the pump or long feed lines or a booster pump or high temperature liquids are present, the C.A.T. [captive acceleration tube] should be installed to stabilize inlet pressure. [Note the C.A.T. will not function with a negative suction inlet].

REDUCTION IN RPM

In addition to increasing the inlet pressure to the pump as temperature increases, reducing the pump RPM will also offer added protection. Reducing the RPM reduces the acceleration of the liquid and the vaporization of the liquid. See chart below for recommended RPM.

INCREASED LINE SIZE

It is always important to have the inlet supply line sized to match or be one size larger than the pump inlet port for optimum performance, but it is most critical when the pumped liquid is at elevated temperatures. Under sizing the line will only compound the problems of high temperature vaporization. See individual Pump Data Sheet.

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TECH BULLETIN 003

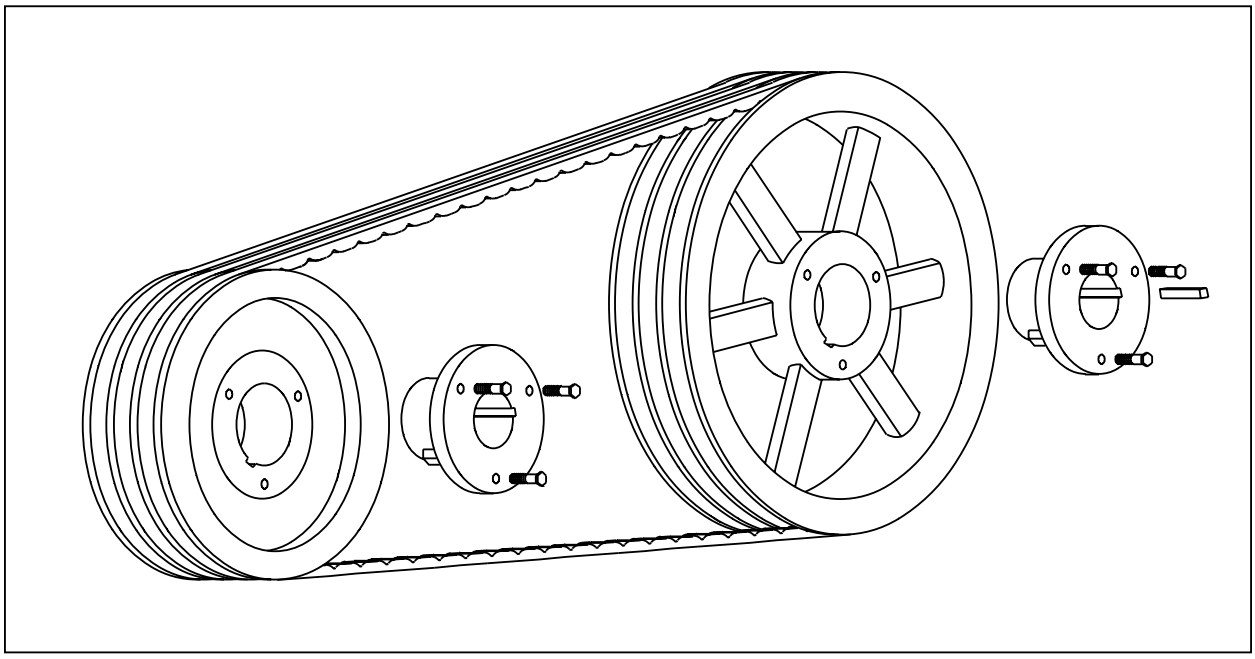
03/77

Published regarding engineering changes and improvements

SUBJECT: Drive Packages - Power Units

With the development of the Power Units, we now have a very extensive selection of Drive Packages available for the 3 PFR - 68 PFR pumps for **electric and gas** drives. Each pump has several selections to match specific HP, GPM and PSI combinations.

A complete Drive Package includes pump pulley and hub, motor pulley and hub, key and belt(s). We use quality BK and B5V pulleys with BX or 5VX belts. These packages can be used with standard U.S. 1725 RPM, 60 HZ electric motors or 1450 RPM, 50 HZ requirements. Pulley center distance ranges are provided for each plunger or piston frame size.



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ELECTRIC DRIVES

3 - 7 PFR PLUNGER PUMPS
Center Distance 11.5" to 13.5"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 270, 3CP				
4.0	UP TO 2200 PSI	7.5	997110	—
	UP TO 1850 PSI	5	997108	—
3.5	UP TO 2200 PSI	5	997109	—
2.3	UP TO 2200 PSI	5	997108	—
1.5	UP TO 2200 PSI	5	997111	—
Models 310, 5CP2120W				
5.0	UP TO 2000 PSI	7.5	997104	—
	UP TO 1500 PSI	5	997106	—
4.0	UP TO 2500 PSI	7.5	997103	—
	UP TO 2000 PSI	5.5	997101	—
	UP TO 1800 PSI	5	997000	—
3.5	UP TO 2200 PSI	5	991005	—
	UP TO 1200 PSI	5	997107	—
2.0	UP TO 2000 PSI	3	997105	—
Models 45, 5CP3120				
4.5	3250 - 3500 PSI	15	997026	—
	2500 - 3250 PSI	10	997025	—
	1625 - 2500 PSI	7.5	997023	—
4.0	2750 - 3500 PSI	10	997006	—
	1850 - 2750 PSI	7.5	997024	—
Models 53, 530				
5.0	2200 - 2500 PSI	10	997014	—
	1500 - 2200 PSI	7.5	997015	—
	UP TO 1500 PSI	5	997021	—
Models 55, 550, 5CP5120				
5.0	2200 - 3000 PSI	10	997005	—
	1500 - 2200 PSI	7.5	997005	—
	UP TO 1450 PSI	5	997016	—
4.5	2450 - 3000 PSI	10	997008	—
	1650 - 2450 PSI	7.5	997009	—
	UP TO 1650 PSI	5	997017	—
4.0	2750 - 3000 PSI	10	997018	997005
	1850 - 2750 PSI	7.5	997019	997005
	UP TO 1850 PSI	5	997020	997016
3.0	UP TO 2400 PSI	5	997100	—
Models 5CP6120, 5CP6121				
6.0	1200 - 1600 PSI	7.5	997028	—
	1200 - 1450 PSI	6	997028	—
	UP TO 1200 PSI	5	997029	—
5.0	1450 - 1600 PSI	6	997030	—
	UP TO 1450 PSI	5	997031	—
4.0	UP TO 1600 PSI	5	997032	—
Model 56				
8.0	1825 - 2500 PSI	15	997001	—
	1370 - 1825 PSI	10	997002	—
6.0	2400 - 3000 PSI	15	997007	—
	1825 - 2400 PSI	10	997008	—
	1215 - 1825 PSI	7.5	997009	—
	UP TO 1215 PSI	5	997017	—
5.5	2700 - 3500 PSI	15	997010	—
	2000 - 2700 PSI	10	997011	—
	UP TO 2000 PSI	7.5	997012	—
5.0	3000 - 3500 PSI	15	997013	997007
	2200 - 3000 PSI	10	997014	997008
	1500 - 2200 PSI	7.5	997015	997009
	UP TO 1500 PSI	5	997021	997017
Model 70				
4.5	3500 - 5000 PSI	15	997001	—
	2500 - 3500 PSI	10	997002	—
4.0	4000 - 5000 PSI	15	997003	—
	UP TO 4000 PSI	15	997022	—
	2750 - 3700 PSI	10	997004	—

— Indicates Drive Accessory not activated to date.

15-25 PFR PLUNGER PUMPS
Center Distance 13.7" to 15.7"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Model 7CP6170				
11.0	1350 - 2000 PSI	15	996999	—
	1000 - 1350 PSI	10	996998	—
Models 650, 651				
7.0	2100 - 3000 PSI	15	991510	—
	1550 - 2100 PSI	10	991511	—
	UP TO 1550 PSI	7.5	991512	—
6.5	2250 - 3000 PSI	15	991516	—
	1680 - 2250 PSI	10	991517	—
	UP TO 1680 PSI	7.5	991518	—
6.1	2400- 3000 PSI	15	991519	991510
	1800 - 2400 PSI	10	991520	991511
	UP TO 1800 PSI	7.5	991521	991512
5.5	2650 - 3000 PSI	15	991531	991516
	2000 - 2650 PSI	10	991532	991517
	UP TO 2000 PSI	7.5	991533	991518
5.0	2150 TO 3000 PSI	10	991546	991520
	UP TO 2150 PSI	7.5	991547	991521
Models 660, 661				
10.0	2300 - 3000 PSI	20	991556	—
	UP TO 3000 PSI	15	991555	—
Models 1050, 1051, 1057, 1851, 1851K				
12.0	1225 - 1800 PSI	15	991501	—
	900 - 1225 PSI	10	991502	—
	UP TO 900 PSI	7.5	991503	—
11.3	1300 - 1800 PSI	15	991504	—
	970 - 1300 PSI	10	991505	—
	UP TO 970 PSI	7.5	991506	—
10.5	1390 - 1800 PSI	15	991507	—
	1000 - 1390 PSI	10	991508	—
	UP TO 1000 PSI	7.5	991509	—
10.1	1450 - 2200 PSI	15	991513	991501
	1100 - 1450 PSI	10	991514	991502
	UP TO 1100 PSI	7.5	991515	991503
9.1	1600 - 2200 PSI	15	991519	991504
	1200 - 1600 PSI	10	991520	991505
	UP TO 1200 PSI	7.5	991521	991506
8.0	1800 - 2200 PSI	15	991537	—
	1350 - 1800 PSI	10	991538	—
	UP TO 1350 PSI	7.5	991539	—
7.1	1550 - 2200 PSI	10	991548	—
	UP TO 1550 PSI	7.5	991549	—
	UP TO 1050 PSI	5	—	991553
Models 2530*, 2531, 2537, 2831, 2831K				
25.0*	UP TO 1000 PSI	20	991561	—
21.0	1000 - 1200 PSI	20	991558	—
	700 - 1000 PSI	15	991558	—
20.1	725 - 1200 PSI	15	991522	—
	550 - 725 PSI	10	991523	—
	UP TO 550 PSI	7.5	991524	—
18.8	800 - 1200 PSI	15	991525	—
	600 - 800 PSI	10	991526	—
	UP TO 600 PSI	7.5	991527	—
18.1	800 - 1200 PSI	15	991528	991555
	600 - 800 PSI	10	991529	—
	UP TO 600 PSI	7.5	991530	—
17.5	830 - 1200 PSI	15	991534	991522
	625 - 830 PSI	10	991535	991523
	UP TO 625 PSI	7.5	991536	991524
16.9	870 - 1200 PSI	15	991540	—
	650 - 870 PSI	10	991541	—
	UP TO 650 PSI	7.5	991542	—
16.2	900 - 1200 PSI	15	991543	—
	675 - 900 PSI	10	991544	991526
	UP TO 675 PSI	7.5	991545	991527
15.0	1000 - 1200 PSI	15	991559	991528
	730 - 1000 PSI	10	991550	991529
	UP TO 730 PSI	7.5	991551	991530
12.0	UP TO 1200 PSI	10	991554	—

ELECTRIC DRIVES

35 - 38 PFR PLUNGER PUMPS
Center Distance 17.0" to 19.0"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 3507, 3801, 3801K				
9.0	4000 - 5000 PSI	40	993501	993538
	4000 - 5000 PSI	30	993502	993537
	3250 - 4000 PSI	25	993502	993537
	UP TO 3250 PSI	20	993503	993536
8.8	4150 - 5000 PSI	40	993504	—
	4150 - 5000 PSI	30	993505	—
	3300 - 4150 PSI	25	993505	—
	UP TO 3300 PSI	20	993506	—
8.5	4300 - 5000 PSI	40	993507	—
	4300 - 5000 PSI	30	993508	—
	3400 - 4300 PSI	25	993508	—
	UP TO 3400 PSI	20	993509	—
8.2	4450 - 5000 PSI	40	993510	—
	4450 - 5000 PSI	30	993511	—
	3350 - 4450 PSI	25	993511	—
	UP TO 3350 PSI	20	993512	—
7.9	4650 - 5000 PSI	30	993513	993535
	3700 - 4650 PSI	25	993513	993535
	UP TO 3700 PSI	20	993514	—
7.6	4500 - 5000 PSI	25	993515	993502
	3850 - 4500 PSI	25	993516	993502
	3000 - 3850 PSI	20	993517	993503
	UP TO 3000 PSI	15	993518	993503
7.35	4500 - 5000 PSI	25	993519	993505
	3850 - 4500 PSI	25	993520	993505
	3000 - 3850 PSI	20	993521	993506
	UP TO 3000 PSI	15	993522	993506
7.0	4200 - 5000 PSI	25	993523	993508
	3200 - 4200 PSI	20	993524	993509
	UP TO 3200 PSI	15	993525	993509
6.75	4200 - 5000 PSI	25	993526	993511
	3200 - 4200 PSI	20	993527	993512
	UP TO 3200 PSI	15	993528	992512
6.0	4500 - 5000 PSI	20	993529	993521
	3200 - 4500 PSI	20	993530	993521
	UP TO 3200 PSI	15	993531	993522
5.5	4500 - 5000 PSI	20	993532	993527
	3200 - 4500 PSI	20	993533	993527
	UP TO 3200 PSI	15	993534	993528
Models 3517, 3811, 3811K				
14.0	2600 - 3000 PSI	40	993501	993538
	2600 - 3000 PSI	30	993502	993537
	2100 - 2600 PSI	25	993502	993537
	UP TO 2100 PSI	20	993503	993536
13.7	2650 - 3000 PSI	40	993504	—
	2650 - 3000 PSI	30	993505	—
	2130 - 2650 PSI	25	993505	—
	UP TO 2130 PSI	20	993506	—
13.2	2750 - 3000 PSI	40	993507	—
	2750 - 3000 PSI	30	993508	—
	2200 - 2750 PSI	25	993508	—
	UP TO 2200 PSI	20	993509	—
12.75	2860 - 3000 PSI	40	993510	—
	2860 - 3000 PSI	30	993511	—
	2300 - 2860 PSI	25	993511	—
	UP TO 2300 PSI	20	993512	—
12.3	2400 - 3000 PSI	30	993513	993535
	2400 - 3000 PSI	25	993513	993535
	UP TO 2400 PSI	20	993514	—
11.9	2800 - 3000 PSI	25	993515	993502
	2450 - 2800 PSI	25	993516	993502
	2200 - 2450 PSI	20	993517	993503
	UP TO 2200 PSI	15	993518	993503
11.4	2800 - 3000 PSI	25	993519	993505
	2450 - 2800 PSI	25	993520	993505
	2200 - 2450 PSI	20	993521	993506
	UP TO 2200 PSI	15	993522	993506

35 - 38 PFR PLUNGER PUMPS
Center Distance 17.0" to 19.0"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 3517, 3811, 3811K Continued				
10.9	2600 - 3000 PSI	25	993523	993508
	2200 - 2600 PSI	20	993524	993509
	UP TO 2200 PSI	15	993525	993509
10.5	2600 - 3000 PSI	25	993526	993511
	2200 - 2600 PSI	20	993527	993512
	UP TO 2200 PSI	15	993528	993512
9.3	2750 - 3000 PSI	20	993529	993521
	2200 - 2750 PSI	20	993530	993521
	UP TO 2200 PSI	15	993531	993522
8.5	2600 - 3000 PSI	20	993532	993527
	2200 - 2600 PSI	20	993533	993527
	UP TO 2200 PSI	15	993534	993528
Models 3520, 3821, 3821K				
23.0	1580 - 2000 PSI	40	993501	993538
	1580 - 2000 PSI	30	993502	993537
	1250 - 1580 PSI	25	993502	993537
	UP TO 1250 PSI	20	993503	993536
22.4	1630 - 2000 PSI	40	993504	—
	1630 - 2000 PSI	30	993505	—
	1300 - 1630 PSI	25	993505	—
	UP TO 1300 PSI	20	993506	—
21.7	1680 - 2000 PSI	40	993507	—
	1680 - 2000 PSI	30	993508	—
	1350 - 1680 PSI	25	993508	—
	UP TO 1350 PSI	20	993509	—
21.0	1740 - 2000 PSI	40	993510	—
	1740 - 2000 PSI	30	993511	—
	1400 - 1740 PSI	25	993511	—
	UP TO 1400 PSI	20	993512	—
20.1	1800 - 2000 PSI	30	993513	993535
	1450 - 1800 PSI	25	993513	993535
	UP TO 1450 PSI	20	993514	—
19.5	1875 - 2000 PSI	25	993515	993502
	1500 - 1875 PSI	25	993516	993502
	1250 - 1500 PSI	20	993517	993503
	UP TO 1250 PSI	15	993518	993503
18.8	1875 - 2000 PSI	25	993519	993505
	1500 - 1875 PSI	25	993520	993505
	1250 - 1500 PSI	20	993521	993506
	UP TO 1250 PSI	15	993522	993506
18.0	1650 - 2000 PSI	25	993523	993508
	1250 - 1650 PSI	20	993524	993509
	UP TO 1250 PSI	15	993525	993509
17.25	1650 - 2000 PSI	25	993526	993511
	1250 - 1650 PSI	20	993527	993512
	UP TO 1250 PSI	15	993528	993512
15.3	1800 - 2000 PSI	20	993529	993521
	1250 - 1800 PSI	20	993530	993521
	UP TO 1250 PSI	15	993531	993522
Models 3535, 3831, 3831K				
36.0	1000 - 1200 PSI	40	993501	993538
	1000 - 1200 PSI	30	993502	993537
	800 - 1000 PSI	25	993502	993537
	UP TO 800 PSI	20	993503	993536
35.1	1000 - 1200 PSI	40	993504	—
	1000 - 1200 PSI	30	993505	—
	800 - 1000 PSI	25	993505	—
	UP TO 800 PSI	20	993506	—
33.9	1100 - 1200 PSI	40	993507	—
	1100 - 1200 PSI	30	993508	—
	850 - 1100 PSI	25	993508	—
	UP TO 850 PSI	20	993509	—
32.8	1100 - 1200 PSI	40	993510	—
	1100 - 1200 PSI	30	993511	—
	850 - 1100 PSI	25	993511	—
	UP TO 850 PSI	20	993512	—

ELECTRIC DRIVES

35 - 38 PFR PLUNGER PUMPS
Center Distance 17.0" to 19.0"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 3535, 3831, 3831K Continued				
31.6	1150 -1200 PSI	30	993513	993535
	925 - 1150 PSI	25	993513	993535
	UP TO 925 PSI	20	993514	—
30.5	1100 - 1200 PSI	25	993515	993502
	950 - 1100 PSI	25	993516	993502
	750 - 950 PSI	20	993517	993503
	UP TO 750 PSI	15	993518	993503
29.4	1100 -1200 PSI	25	993519	993505
	1000 - 1100 PSI	25	993520	993505
	800 - 1000 PSI	20	993521	993506
	UP TO 800 PSI	15	993522	993506
28.1	1000 - 1200 PSI	25	993523	993508
	750 - 1000 PSI	20	993524	993509
	UP TO 750 PSI	15	993525	993509
27.0	1000 - 1200 PSI	25	993526	993511
	750 - 1000 PSI	20	993527	993512
	UP TO 750 PSI	15	993528	993512
24.0	1100 - 1200 PSI	20	993529	993521
	750 - 1100 PSI	20	993530	993521
	UP TO 750 PSI	15	993531	993522
22.0	1000 - 1200 PSI	20	993532	993527
	750 - 1000 PSI	20	993533	993527
	UP TO 750 PSI	15	993534	993528
Models 3541, 3545, 3841, 3841K				
45	UP TO 1000 PSI	40	993501	993538
	UP TO 900 PSI	30	993502	993537
40	UP TO 1000 PSI	30	993513	993535
35	UP TO 1000 PSI	25	993523	993508

68PFR PLUNGER PUMPS
Center Distance 25.5" to 27.5"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Model 6811, 6811K ★ *Dump Gun Required*				
15.0	★ 6000 - 7000 PSI	75	996001	—
	★ 5000 - 6000 PSI	60	996002	—
	4000 - 5000 PSI	50	996003	996027
	3000 - 4000 PSI	40	996003	996027
	2500 - 3000 PSI	30	996004	—
	UP TO 2500 PSI	25	996004	—
14.1	★ 6300 - 7000 PSI	75	996005	—
	5250 - 6300 PSI	60	996005	—
	4200 - 5250 PSI	50	996006	—
	3150 - 4200 PSI	40	996006	—
	2650 - 3150 PSI	30	996007	—
	UP TO 2650 PSI	25	996007	—
13.1	★ 5600 - 7000 PSI	60	996008	—
	4500 - 5600 PSI	50	996009	—
	3400 -4500 PSI	40	996009	—
	2800 - 3400 PSI	30	996010	—
	UP TO 2800 PSI	25	996010	—
12.5	★ 5900 - 7000 PSI	60	996023	996002
	4700 - 5900 PSI	50	996011	996003
	3500 - 4700 PSI	40	996012	996003
	2950 - 3500 PSI	30	996013	996004
	UP TO 2950 PSI	25	996013	996004
11.7	★ 6250 - 7000 PSI	60	996024	996005
	5000 - 6250 PSI	50	996014	996006
	3750 - 5000 PSI	40	996018	996006
	3150 - 3750 PSI	30	996015	996007
	UP TO 3150 PSI	25	996015	996007
11.0	★ 5400 - 7000 PSI	50	996016	996009
	4000 - 5400 PSI	40	996016	996009
	3350 - 4000 PSI	30	996017	996010
	UP TO 3350 PSI	25	996017	996010

68 PFR PLUNGER PUMPS
Center Distance 25.5" to 27.5"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Model 6811, 681K Continued				
10.3	★ 5700 - 7000 PSI	50	996019	996012
	4300 - 5700 PSI	40	996019	996012
	3600 - 4300 PSI	30	996020	996013
	UP TO 3600 PSI	25	996020	996013
9.9	★ 6000 - 7000 PSI	50	996021	996018
	4500 - 6000 PSI	40	996021	996018
	3700 - 4500 PSI	30	996022	996015
	UP TO 3700 PSI	25	996022	996015
Model 6821, 6821K				
25.0	2350 - 3000 PSI	50	996003	996027
	1800 - 2350 PSI	40	996003	996027
	1500 - 1800 PSI	30	996004	—
	UP TO 1500 PSI	25	996004	—
22.6	2600 - 3000 PSI	50	996006	—
	1950 - 2600 PSI	40	996006	—
	1625 - 1950 PSI	30	996007	—
	UP TO 1625 PSI	25	996007	—
20.9	2800 - 3000 PSI	50	996009	—
	2100 - 2800 PSI	40	996009	—
	1750 - 2100 PSI	30	996010	—
	UP TO 1750 PSI	25	996010	—
20.0	2200 - 3000 PSI	40	996012	996003
	1850 - 2200 PSI	30	996013	996004
	UP TO 1850 PSI	25	996013	996004
18.7	2350 - 3000 PSI	40	996018	996006
	2000 - 2350 PSI	30	996015	996007
	UP TO 2000 PSI	25	996015	996007
17.6	2500 - 3000 PSI	40	996016	996009
	2100 - 2500 PSI	30	996017	996010
	UP TO 2100 PSI	25	996017	996010
16.4	2700 - 3000 PSI	40	996019	996012
	2250 - 2700 PSI	30	996020	996013
	UP TO 2250 PSI	25	996020	996013
15.8	2800 - 3000 PSI	40	996021	996018
	2350 - 2800 PSI	30	996022	996015
	UP TO 2350 PSI	25	996022	996015
Model 6831, 6831K				
40.0	UP TO 2300 PSI	70	996033	—
31.0	UP TO 2300 PSI	50	996031	—
Model 6841, 6841K				
48.0	1850 - 2000 PSI	75	996001	—
	1550 - 1850 PSI	60	996002	—
	1250 - 1550 PSI	50	996003	996027
	1200 - 1500 PSI	50	996032	—
	950 - 1250 PSI	40	996003	996027
	800 - 950 PSI	30	996004	—
	UP TO 800 PSI	25	996004	—
44.0	1700 - 2000 PSI	60	996005	—
	1350 - 1700 PSI	50	996006	—
	1000 - 1350 PSI	40	996006	—
	830 - 1000 PSI	30	996007	—
	UP TO 830 PSI	25	996007	—
41.0	1800 - 2000 PSI	60	996008	—
	1450 - 1800 PSI	50	996009	—
	1100 - 1450 PSI	40	996009	—
	900 - 1100 PSI	30	996010	—
	UP TO 900 PSI	25	996010	—
39.0	1500 - 2000 PSI	50	996011	996003
	1150 - 1500 PSI	40	996012	996003
	950 - 1150 PSI	30	996013	996004
	UP TO 950 PSI	25	996013	996004
36.4	1650 - 2000 PSI	50	996014	996006
	1200 - 1650 PSI	40	996018	996006
	1000 - 1200 PSI	30	996015	996007
	UP TO 1000 PSI	25	996015	996007

ELECTRIC DRIVES

68 PFR PLUNGER PUMPS
Center Distance 25.5" to 27.5"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Model 6841, 6841K Continued				
34.3	1750 - 2000 PSI	50	996016	996009
	1300 - 1750 PSI	40	996016	996009
	1100 - 1300 PSI	30	996017	996010
	UP TO 1100 PSI	25	996017	996010
32.0	1850 - 2000 PSI	50	996019	996012
	1500 - 1850 PSI	40	996019	996012
	1150 - 1500 PSI	30	996020	996013
	UP TO 1150 PSI	25	996020	996013
30.8	1450 - 2000 PSI	40	996021	996018
	1200 - 1450 PSI	30	996022	996015
	UP TO 1200 PSI	25	996022	996015
Models 6861, 6861K, 6760, 6767, 6761				
70.0	830 - 1000 PSI	50	996003	996027
	625 - 830 PSI	40	996003	996027
	520 - 625 PSI	30	996004	—
	UP TO 520 PSI	25	996004	—
64.2	900 - 1000 PSI	50	996006	—
	680 - 900 PSI	40	996006	—
	570 - 680 PSI	30	996007	—
	UP TO 570 PSI	25	996007	—
60.0	975 - 1200 PSI	50	996009	—
	735 - 975 PSI	40	996009	—
	600 - 735 PSI	30	996010	—
	UP TO 600 PSI	25	996010	—
56.0	1040 - 1200 PSI	50	996011	996003
	780 - 1040 PSI	40	996012	996003
	650 - 780 PSI	30	996013	996004
	UP TO 650 PSI	25	996013	996004
53.0	1100 - 1200 PSI	50	996014	996006
	825 - 1100 PSI	40	996018	996006
	700 - 825 PSI	30	996015	996007
	UP TO 700 PSI	25	996015	996007
50.0	875 - 1200 PSI	40	996016	996009
	750 - 875 PSI	30	996017	996010
	UP TO 750 PSI	25	996017	996010
47.0	930 - 1200 PSI	40	996019	996012
	800 - 930 PSI	30	996020	996013
	UP TO 800 PSI	25	996020	996013
45.0	975 - 1200 PSI	40	996021	996018
	825 - 975 PSI	30	996022	996015
	UP TO 825 PSI	25	996022	996015

10 FR PISTON PUMPS
Center Distance 11.5" to 13.5"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 621, 623				
6.3	UP TO 1200 PSI	5	991005	—
5.6	UP TO 1200 PSI	5	991007	—
5.2	UP TO 1200 PSI	5	991010	991005
Models 820, 821				
10.2	750 - 1000 PSI	7.5	991002	991001
	UP TO 750 PSI	5	991003	—
9.6	800 - 1000 PSI	7.5	991004	—
	UP TO 800 PSI	5	991005	—
8.1	925 - 1000 PSI	7.5	991008	991002
	UP TO 925 PSI	5	991009	991003
7.2	UP TO 1000 PSI	5	991011	—
Models 1010, 1011				
12.0	600 - 700 PSI	7.5	991004	—
	UP TO 600 PSI	5	991005	—
10.9	UP TO 700 PSI	5	991006	—
10.2	UP TO 700 PSI	5	991009	991003
9.0	UP TO 700 PSI	5	991011	991006

25 FR PISTON PUMPS
Center Distance 13.7" to 15.7"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 1520, 1521				
15.0	750 - 1000 PSI	10	991526	—
	UP TO 750 PSI	7.5	991527	—
14.4	775 - 1000 PSI	10	991529	—
	UP TO 775 PSI	7.5	991530	—
13.8	800 - 1000 PSI	10	991535	991523
	UP TO 800 PSI	7.5	991536	991524
13.3	850 - 1000 PSI	10	991541	—
	UP TO 850 PSI	7.5	991542	—
12.8	875 - 1000 PSI	10	991544	991526
	UP TO 875 PSI	7.5	991545	991527
11.8	930 - 1000 PSI	10	991550	991529
	UP TO 930 PSI	7.5	991551	991530
Models 2520, 2521				
25.6	600 - 800 PSI	15	991528	991555
	450 - 600 PSI	10	991529	—
	UP TO 450 PSI	7.5	991530	—
24.6	600 - 800 PSI	15	991534	991522
	450 - 600 PSI	10	991535	991523
	UP TO 450 PSI	7.5	991536	991524
23.75	625 - 800 PSI	15	991540	—
	475 - 625 PSI	10	991541	—
	UP TO 475 PSI	7.5	991542	—
22.8	650 - 800 PSI	15	991543	—
	500 - 650 PSI	10	991544	991526
	UP TO 500 PSI	7.5	991545	991527
21.0	700 - 800 PSI	15	991552	991528
	550 - 700 PSI	10	991550	991529
	UP TO 550 PSI	7.5	991551	991530

60 FR PISTON PUMPS
Center Distance 25.5" to 27.5"

GPM	Pressure Range	Motor Hp	Drive 60 HZ	Drive 50 HZ
Models 6020, 6021				
60.0	750 - 1000 PSI	40	996012	996003
	600 - 750 PSI	30	996013	996004
	UP TO 600 PSI	25	996013	996004
56.0	800 - 1000 PSI	40	996018	996006
	650 - 800 PSI	30	996015	996007
	UP TO 650 PSI	25	996015	996007
52.8	850 - 1000 PSI	40	996016	996009
	700 - 850 PSI	30	996017	996010
	UP TO 700 PSI	25	996017	996010
49.3	900 - 1000 PSI	40	996019	996012
	750 - 900 PSI	30	996020	996013
	UP TO 750 PSI	25	996020	996013
45.0	800 - 1000 PSI	30	996022	996015
	UP TO 800 PSI	25	996022	996015
Models 6040, 6041				
40.0	1100 - 1500 PSI	40	996012	996003
	900 - 1100 PSI	30	996013	996004
	UP TO 900 PSI	25	996013	996004
37.4	1200 - 1500 PSI	40	996018	996006
	1000 - 1200 PSI	30	996015	996007
	UP TO 1000 PSI	25	996015	996007
35.2	1250 - 1500 PSI	40	996016	996009
	1050 - 1250 PSI	30	996017	996010
	UP TO 1050 PSI	25	996017	996010
32.9	1350 - 1500 PSI	40	996019	996012
	1150 - 1350 PSI	30	996020	996013
	UP TO 1150 PSI	25	996020	996013
31.6	1150 - 1500 PSI	30	996022	996015
	UP TO 1150 PSI	25	996022	996015

GAS DRIVES

5 - 7 PFR PLUNGER PUMPS
Center Distance 11.5" to 13.5"

GPM	Pressure Range	Engine Hp	Drive No.
Models 310, 5CP2120W			
4.0	UP TO 2000 PSI	5.5	997102
Models 45, 5CP3120			
4.5	2875 - 3500 PSI	14	991821
	2500 - 2875 PSI	12.5	991821
4.0	3250 - 3500 PSI	14	991822
	2875 - 3250 PSI	12.5	991822
	2800 - 3250 PSI	14	991809
Models 53, 530			
5.0	2350 - 2500 PSI	12.5	991813
	2000 - 2350 PSI	11	991813
4.5	2350 - 2500 PSI	11	991813
Models 55, 550, 5CP5120			
5.0	2600 - 3000 PSI	14	991810
	2250 - 2600 PSI	12.5	991810
	2000 - 2250 PSI	11	991810
4.5	2750 - 3000 PSI	14	991811
Model 56			
8.0	2000 - 2500 PSI	18	991815
	1500 - 2000 PSI	14	991809
	1200 - 1500 PSI	12.5	991809
6.0	2150 - 2500 PSI	14	991811
	1800 - 2150 PSI	12.5	991811
5.5	2800 - 3500 PSI	18	991818
	2400 - 2800 PSI	14	991812
	2000 - 2400 PSI	12.5	991812
	1500 - 2000 PSI	11	991812
Model 57			
4.5	3500 - 4000 PSI	18	991817
	2900 - 3500 PSI	14	991811
	2500 - 2900 PSI	12.5	991811
4.0	3800 - 4000 PSI	18	991818
	3200 - 3800 PSI	14	991812
Model 70			
4.5	4200 - 5000 PSI	20	991815
	3250 - 4200 PSI	18	991815
	2800 - 3250 PSI	14	991809
4.0	4700 - 5000 PSI	20	991815
	3600 - 4700 PSI	18	991815

15 PFR Plunger Pumps
Center Distance 13.7" to 15.7"

GPM	Pressure Range	Engine Hp	Drive No.
Model 650			
7.0	2700 - 3000 PSI	20	991806
	2250 - 2700 PSI	18	991806
	1800 - 2250 PSI	14	991802
6.0	2500 - 3000 PSI	18	991807
	2100 - 2500 PSI	14	991803
Model 1050			
12.0	1625 - 1800 PSI	20	991805
	1375 - 1625 PSI	18	991805
	1150 - 1375 PSI	14	991801
	1000 - 1150 PSI	12.5	991801
	750 - 1000 PSI	11	991801
10.0	2100 - 2200 PSI	25	991806
	1850 - 2100 PSI	20	991806
	1600 - 1850 PSI	18	991806
	1300 - 1600 PSI	14	991802
	1125 - 1300 PSI	12.5	991802
	950 - 1125 PSI	11	991802

TECH BULLETIN 004 06/77

Published regarding engineering changes and improvements

SUBJECT: Changes to Models 1024 & 1044

The original pumps had 3 V-Packings per cylinder and a sleeve-type piston with a counterbore for the retainer. Continuing development found that 2 V-Packings per cylinder was superior because both V-Packings received optimum lubrication. The 2 V-Packing design is shorter. This allows the sleeve-type piston to be shorter and eliminated the need to have the piston retainer ride in the sleeve counterbore.

Model 1024 and 1044 pumps with serial numbers beginning with 6760101 have 2 V-Packings and non-counterbore sleeve-type pistons. Following are the part numbers of the various items changed per this modification, the parts that must be changed to convert the pump from a 3 V-Packing to a 2 V-Packing design and the parts to change to a non-counterbore sleeve-type piston design.

Model 1024

Description	PN Before Modification	PN After Modification
Piston (Sleeve-type)	28677	29634
Piston Retainer	28679	29588
Female Adapter	28670	29586
V-Packing	27047 (3 per cyl.)	27047 (2 per cyl.)
Male Adapter	28671	29587
Adapter Washer	28672 (1 per cyl.)	29635 (2 per cyl.)
Cylinder Adapter	28668	No change in PN
Spring	27045	No change in PN

To change pump with 3 V-Packings per cylinder to 2 V-Packings per cylinder requires:

Quantity per Cylinder	Description	Part Number
1	Female Adapter	29586
2	V-Packing	27047
1	Male Adapter	29587
2	Adapter Washer	29635

To change pump with counterbore in piston for retainer to a flat surface hard chrome piston requires:

Quantity	Description	Part Number
1	Piston (Sleeve-type)	29634
1	Piston Retainer	29588

continued on back

Rev. 01/96

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Model 1044

Description	PN Before Modification	PN After Modification
Piston (Sleeve-type)	29084	29633
Piston Retainer	29085	43377
Female Adapter	29075	29523
V-Packing	29076 (3 per cyl.)	29076 (2 per cyl.)
Male Adapter	29077	29525
Adapter Washer	29078 (1 per cyl.)	29632 (3 per cyl.)
Cylinder Adapter	29074	No change P.N.
Spring	29079	No change P.N.

To change pump with 3 V-Packings per cylinder to 2 V-Packings per cylinder requires:

Quantity per Cylinder	Description	Part Number
1	Female Adapter	29523
2	V-Packing	29076
1	Male Adapter	29525
2	Adapter Washer	29632

To change pump with counterbore in piston for retainer to a flat surface hard chrome piston requires:

Quantity	Description	Part Number
1	Piston (Sleeve-type)	29633
1	Piston Retainer	43377

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TECH BULLETIN 005

08/77

Published regarding engineering changes and improvements

SUBJECT: "B" Manifold and Stepped Valve Seat

Beginning with May 1977, a back-up ring was added to the Valve Seat on all 10 Frame pumps. A thicker "stepped" Valve Seat was necessary to hold the added back-up ring and o-ring. A new manifold marked with a "B" with a deeper valve chamber was also necessary for this change.

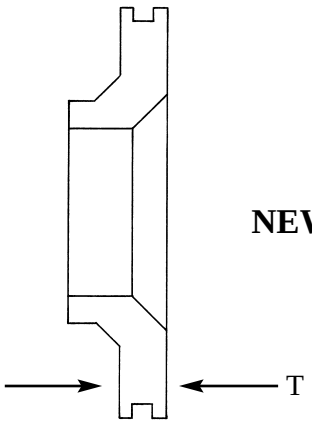
	524-624		10 Frame	
Item Description	Flat Valve O-Ring Only	Stepped Valve O-Ring and Back-up Ring	Flat Valve O-Ring Only	Stepped Valve O-Ring and Back-up Ring
Valve Seat	28680	43061 "B"	27350	43063 "B"
Discharge Manifold	28925	43060 "B"	37352	43046 "B"
Cylinder Bolts	85364	85364	28343	43047
Back-up Ring	—	43059	—	43062
Valve Kit	—	30643	30225	30449

It is important that parts are not interchanged from one design to another. However, with the use of PN 30452 spacer, the old Valve Seat with o-ring only may be used in the new style manifold-B.

The stainless steel discharge manifold (PN 30248) has a deep enough counterbore to permit either valve design.

The stepped Valve Seat back-up ring began with the following serial numbers:

Model	Serial No.
623.....	4770951
820.....	5770221
1010.....	5770421
524.....	8770101
624.....	6770201



OLD Valve Seat
T = .157" (4.0 mm)
PN 27350

NEW Stepped Valve Seat
T = .197" (5.0 mm)
PN 43046

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Technical Services Department

Rev. 11/99

TECH BULLETIN 008

01/78

Published regarding engineering changes and improvements

SUBJECT: Motor Pulley Selection Chart

Frequently questions arise concerning the selection of the proper motor pulley to get the required pump performance.

Here are charts which show the available motor pulley sizes with the respective pump RPM that each motor pulley will deliver as well as the total pump output in G.P.M.

Because of the many pulley selections available for the 25 Frame thru 68 Frame pumps, they are not included here. Please see Tech Bulletin 003 for a complete selection of Drive Accessory Packages available for 7 FR, 10 FR, 15 FR, 25 FR, 35 FR, and 60 FR which include drive hub and pulley, pump hub and pulley, key and belts. These Drive Accessory Packages are used in our complete Power Units and are available as individual accessories to simplify your assembly.

Plunger Pump Motor Pulley Selection Chart

Motor Pulley Size	**270-277** 5" Pulley		**310-311-317** 8" Pulley		**530** 9.75" Pulley		**56** 9.75" Pulley		**650-651** 9.75" Pulley		**1050-51-57** 9.75" Pulley	
	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM
3.3	1217	3.0	713	3.0	583	2.6	583	2.6	583	4.1	583	6.0
4.1	1420	3.5	884	3.7	725	3.3	725	3.3	725	5.1	725	7.6
4.4			950	4.0	778	3.5	778	3.5	778	5.4	778	8.1
4.7	1625	4.0	1013	4.2	832	3.8	832	3.8	832	4.8	832	8.7
4.9			1056	4.4	858	3.9	858	3.9	858	6.0	867	9.0
5.0			1078	4.5	880	4.0	880	4.0	880	6.2	884	9.2
5.1			1099	4.6	900	4.1	900	4.1	900	6.3	903	9.4
5.5			1190	5.0	973	4.4	973	4.4	973	6.8	973	10.2
5.6					990	4.5	990	4.5	990	6.9	990	10.3
5.7					1008	4.6	1000	4.5	1000	7.0	1008	10.5
6.3					1100	5.0	1110	5.0			1100	11.6
6.5										1150	1150	12.0
7.5							1320	6.0				

Piston Pump Charts on reverse side

Rev. 02/96

Piston Pump Motor Pulley Selection Chart

Motor Pulley Size	Model 280				Model 333				Model 430			
	5" Pulley		8" Pulley		5" Pulley		8" Pulley		5" Pulley		8" Pulley	
	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM
1.00	345	.7	215	.4	345	1.2	215	.8	345	1.6	215	1.0
1.25	430	.9	265	.5	430	1.6	265	.9	430	2.0	265	1.2
1.50	515	1.1	320	.7	515	1.9	320	1.1	515	2.4	320	1.5
1.75	600	1.3	375	.8	600	2.2	375	1.4	600	2.8	375	1.8
2.00	690	1.5	430	.9	690	2.5	430	1.6	690	3.3	430	2.0
2.25	775	1.7	485	1.0	775	2.8	485	1.8	775	3.7	485	2.3
2.50	860	1.9	535	1.2	860	3.2	535	2.0	860	4.1	535	2.5
2.75	945	2.1	590	1.3	945	3.5	590	2.2	945	4.5	590	2.8
3.00	1035	2.3	645	1.4	1035	3.8	645	2.4	1035	4.9	645	3.1
3.25	1120	2.5	700	1.5	1120	4.1	700	2.6	1120	5.3	700	3.3
3.50	1205	2.7	750	1.6			750	2.8			750	3.6
3.75	1290	2.9	803	1.8			803	3.0			803	3.8
4.00	1380	3.1	860	1.9			860	3.2			860	4.1
4.25			915	2.0			915	3.4			915	4.3
4.50			970	2.1			970	3.6			970	4.6
4.75			1020	2.3			1020	3.8			1020	4.9
5.00			1075	2.4			1075	4.0			1070	5.1
5.25			1130	2.5								
5.50			1185	2.6								
5.75			1235	2.7								
6.00			1290	2.9								
6.25			1345	3.0								

Motor Pulley Size	Model 623		Model 820		Model 1010		Model 1020		Model 1520		Model 2020		Model 2520	
	9.75" Pulley		9.75" Pulley		9.75" Pulley		9.75" Pulley		9.75" Pulley		9.75" Pulley		9.75" Pulley	
	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM	RPM	GPM
3.35	550	3.8	550	5.8	550	7.3	550	7.5	550	10.0	550	12.7	550	17.8
3.55	585	4.1	585	6.2	585	7.8	585	8.0	585	10.6	585	13.5	585	18.9
3.75	620	4.3	620	6.5	620	8.2	620	8.4	620	11.2	620	14.3	620	20.0
3.95	660	4.5	660	7.0	660	8.8	660	9.0	660	12.0	660	15.2	660	21.3
4.25	709	5.0	709	7.6	709	9.5	709	9.7	709	13.0	709	16.5	709	23.1
4.45	750	5.2	750	7.9	750	10.0	750	10.2	750	13.6	750	17.3	750	24.2
4.75	805	5.6	805	8.5	805	10.7			805	14.6	805	18.5	805	26.0
4.95	840	5.9	840	8.9	840	11.2			840	15.2	840	19.4		
5.25	900	6.3	900	9.5	900	12.0					900	20.7		
5.45			935	9.9										

NOTE: All figures based on 1725 RPM motor speed. Pulley sizes are expressed in outside diameters. Pulleys are all double grooved "B" section.

NOTE: The above ratings show total pump output (GPM), including any by-pass flow. Since many regulating devices and systems require a minimum by-pass flow, be sure your selection takes this into account.

Maximum Ratings:	280	333	430	623	820	1010	1020	1520	2020	2520
RPM	1330	1070	1040	850	940	900	720	830	870	772
GPM	3.0	4.0	5.0	6.0	10.0	12.0	10.0	15.1	20.0	25.0
PSI	1000	1200	1000	1200	1000	700	1200	1000	800	800
HP	2.1	3.3	3.4	4.9	6.9	5.8	8.2	10.3	11.0	13.7

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Technical Services Department

TECH BULLETIN 009 02/78

Published regarding engineering changes and improvements

SUBJECT: 25 Frame Piston Pump Piston Rod and Seal Change

The 25 Frame pump have undergone two design changes. The first change was to increase the size of the piston rod threads from 7 mm to 8 mm. The second change was to increase the wall thickness of the piston rod sleeve thereby increasing the O.D. from 14 mm to 16 mm.

Be sure to check sizes of piston rod threads and sleeves before ordering any parts from the chart below. Measure the O.D. of the threads. - 7 mm is equal to .275 inches and 8 mm equals .315 inches.

The following is a cross reference list showing the old M7 and new M8 parts and kits. These changes are effective with the following serial numbers: 1020-N800101, 1520-5800123, 2020-5800101, 2520-7760101.

Description	7 mm	8 mm	Model
Piston Rod	27780	29229	All
Piston Spacer	27796	29391	All
Inlet Valve	27819	29242	1020
Inlet Valve	26541	29232	1520
Inlet Valve	27944	29234	2020
Inlet Valve	27839	29249	2520
Piston Retainer	27822	29241	1020
Piston Retainer	27816	29233	1520
Piston Retainer	27947	29235	2020
Piston Retainer	27842	29239	2525
Conical Washer	26994	27871	All
Slotted Nut	26546	27510	All
Cotterpin	14158	29589	All
Piston Kit	30249, 30808	30838	1020
Piston Kit	30250, 30809	30839	1520
Piston Kit	30251, 30810	30840	2020
Piston Kit	30811	30252	2520

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Rev. 02/96

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The following is a cross reference list showing the old M14 and new M16 parts and kits. These changes are effective with the following serial numbers: 1020-D770106, 1520-2780105, 2020-D7700101, 2520-7700101.

Description	14 mm	16 mm	Model
Sleeve	27787	43122	All
Seal	26538	43124	All
Oil Wick	27789	43126	All
Seal Kit	30258	30482	All
Sleeve & Seal Kit	30259	30483	All
Cup Kit	30253	30253	1020
Cup Kit	30254	30254	1520
Cup Kit	30255	30255	2020
Cup Kit	30256	30256	2520

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TECH BULLETIN 011
10/79

Published regarding engineering changes and improvements

SUBJECT: Discharge Manifold Model 1024 and 1044

To extend the service life of these pumps, a back-up ring was added to reinforce the o-ring on the Valve Seat. To accommodate this change a new stepped Valve Seat was necessary and a new manifold with a deeper counterbore.

The following are the old and new parts for this change. These parts are effective with serial numbers [1024] 8770101 and [1044] 7770101.

Description	Old Parts	New Parts
Valve Seat	28680	43061
O-Ring	28820	28820
Back-up Ring	—	43059
Discharge Manifold	28683	43058
Valve Kit	30617	30643

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Rev. 02/96

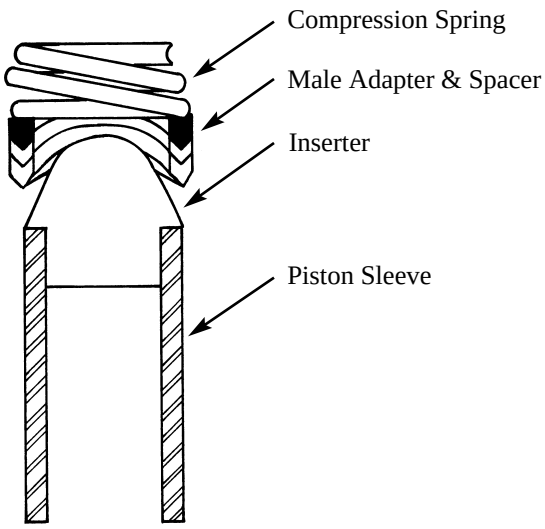
TECH BULLETIN 012
09/79

Published regarding engineering changes and improvements

SUBJECT: V-Packing Inserters, Sleeve-Type Pump

The V-Packings have a tight fit on the sleeve-type piston. This is necessary to withstand the high pressures of these pumps. A cup inserter is available to help install the V-Packing over the sleeve-type piston.

To install the V-Packing, lubricate both the V-Packing and the sleeve-type piston. With the inserter in position on the discharge end of the sleeve-type piston, slide the V-Packing over the inserter and onto the piston. To apply even pressure on the V-Packing, use the male adapter plus spacer and compression spring and push against spring with the heel of your hand.



Following are the part numbers for the inserter for the various sleeve-type pumps:

Model	P/N Inserter
284	27975
524	43292
624	28930
1024	43293
1044	43294
6024	43296
6044	43298

As a reminder, the following are the part numbers for the cup inserters for our standard cup and piston assemblies.

Model	Bore Size	P/N Inserter
280, 430	20 mm	22130
820, 1020	25 mm	43189
1010, 1520	28.5 mm	15770
2020	32 mm	27964
2520	38 mm	27853

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TECH BULLETIN 013
03/79

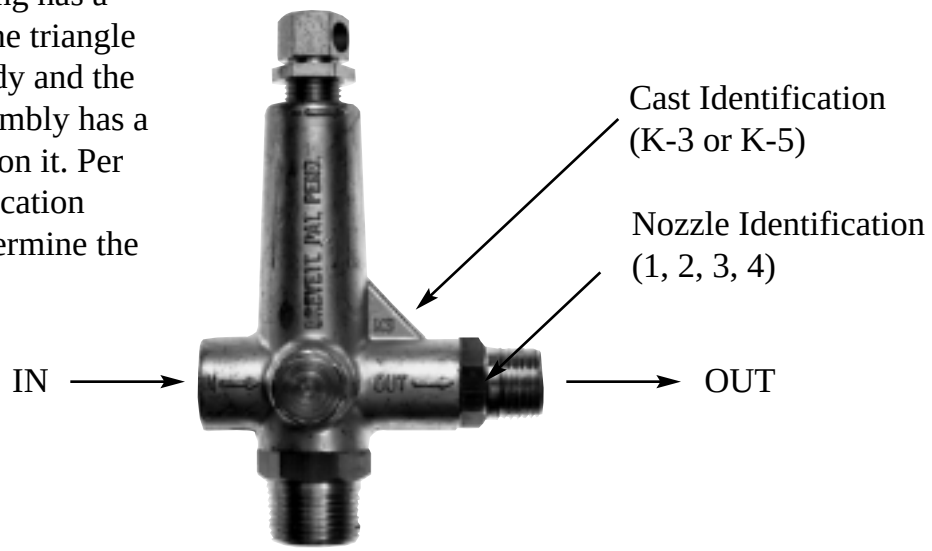
Published regarding engineering changes and improvements

SUBJECT: Unloader Identification Chart

The 7538-46 series Regulating Unloaders can be identified as follows:

P/N	Unloader Valve Body Identification	Nozzle Barb Assembly	Nozzle Identification
7538	K-3	33130	1
7539	K-3	33125	2
7540	K-3	33126	3
7541	K-3	33124	4
7544	K-5	33130	1
7545	K-5	33125	2
7546	K-5	33126	3

The unloader valve body housing has a cast identification number on the triangle webbing between the upper body and the inlet port. The nozzle/barb assembly has a stamped identification number on it. Per the photo at right, these identification numbers will easily let you determine the model of the unloader.



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TECH BULLETIN 016
03/80

Published regarding engineering changes and improvements

SUBJECT: Bac-cup Assembly for Models 290, 323, 333, 430, 623

The 3FR, 4FR, 5FR and 10FR-623 pumps have an optional piston cup assembly called the Bac-cup. For intermittent duty at high pressure and used with the standard chromed cylinders, this is an economical optional cup alternative. A reinforced teflon back-up ring is used as a compliment to the standard piston cup. This teflon ring serves two functions.

1. The diameter of the ring is larger than the diameter of the piston. When a cup wears in a standard piston cup assembly, the metal portion (the piston) is forced against the cylinder wall and scores the cylinder. With the Bac-cup design, the teflon ring prevents immediate contact of the metal portion of the piston and the cylinder wall and helps reduce scoring.

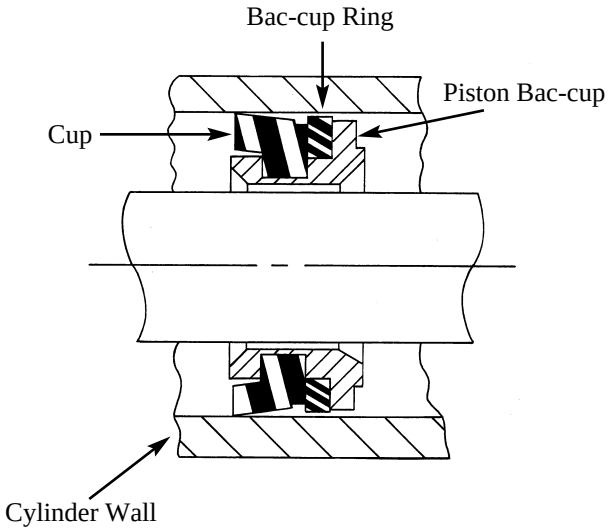
2. To handle the stresses of higher temperatures or higher pressures, the special material blends of the V-Hot Cup or Machined Piston Assembly are harder. The softer elastomer of the standard cup cannot withstand the higher temperatures or pressures because it does not have adequate support. The added back-up ring in the Bac-cup assembly provides this support.

In the Bac-cup assembly, the diameter of the teflon ring can be fitted closer to the diameter of the cylinder without the concern of damaging the cylinder wall. The closer fit provides better support for the cup and provides longer life to applications up to 1500 PSI. NOTE: For temperatures above 140°F and continuous duty operation, the Machined Piston Assembly or the V-Hot Cup is recommended.

The Bac-cup assembly is available in the 18 mm, 20 mm, and 22 mm for the following models:

ITEM	MODELS			
Description	*290 20 mm	623 20 mm	333 18 mm	323 22 mm
Standard Cup	43172	43172	43717	43789
Piston	30543	30543	43784	43787
Bac-cup Ring	30544	30544	43719	43788
Kit	30023	30822	30841	30858

*290 pump is standard with Bac-cup assembly. All other models are optional.



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TECH BULLETIN 017
05/80

Published regarding engineering changes and improvements

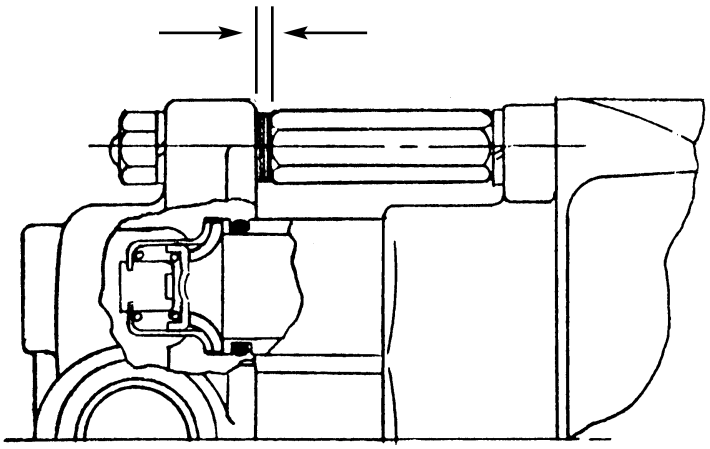
SUBJECT: Shimming of Discharge Manifolds

The shims on the cylinder bolts are used in some models to compensate for the manufacturing tolerances of the various parts. When the discharge manifold is tightened against the shims, the cylinders, discharge valves and spring retainers are held tight against the counterbore in the manifold. If there are too many shims, there will be movement of the cylinder and internal leakage by the discharge valve seat and cylinder causing pulsation and lower output. If there are too few shims, there is the possibility of distorting the manifold. Once the proper shims have been determined, the manifold can be removed to work on valves or pistons and replaced without re-shimming. **Once the discharge manifold is replaced, it is necessary to recheck the shims, to compensate for the manufacturing tolerances of the new manifold.** To re-shim, use the following procedure:

1. Remove all shims from the cylinder bolts.
2. With all the pump components assembled, slip the discharge manifold complete with discharge valve assembly onto the cylinder bolts. Thread the cylinder bolt/nuts on finger tight.
3. With a caliper, measure the gap between the discharge manifold and the shoulder of the cylinder bolt. (See sketch) If a caliper is not available, make up a shim pack of various sizes to measure the gap.
4. Select the shims that will be [.005 to .010 inches] [.15 to .25 mm] less than the measured gap. Shims come in .039, .019, and .012 inch [1.0, 0.5 and0.3 mm] thickness. **Make certain that thickness of the retainer washer is counted in the total shim package.** Remove the discharge manifold, install the shim package onto the cylinder bolts and replace the manifold. Install the lockwashers and nuts and torque to the following specs:

TORQUE CHART

Model	in/lbs.	ft./lbs.	Nm
280, 333, 430	115	9.4	13
10 Frame	220	18.1	25
25 Frame	350	28.9	40



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Rev. 02/96

TECH BULLETIN 020

09/80

Published regarding engineering changes and improvements

SUBJECT: Quiet Discharge Valve Kits - Models 280, 333, 430, 623, 820, 1010

Standard construction of the CAT PUMP models 280, 333, 430, 623, 820 and 1010 includes the quiet discharge valve assemblies. With the quiet valve design, a 5 to 8 decibel noise level reduction occurs.

The complete Quiet Valve Kit, PN 30686 and 30687, is interchangeable with a complete flat valve kit PN 30024 and 30449. However, the individual parts for the quiet valve (valve, valve seat, valve spring retainer and valve spring) **cannot be interchanged** with the standard flat valve design.

Please review the part numbers for the different designs to assure the correct parts are ordered for your pump.

	Model 280, 333, 430		Model 623, 820, 1010	
Effective Date	**SN 0800101**		**SN 9800101**	
Valve Kit PN	30024(Flat)	**30686(QV)**	30449(Flat)	**30687(QV)**
Discharge Valve	22842	**43723**	20262	**43721**
Discharge Valve Seat	29487	**43434**	43063	**43428**
Valve Spring Retainer	22841	**43442**	43135	**43429**
Valve Spring	22031	**43360**	20265	**43751**

CAT PUMPS
Technical Services Department

Rev. 11/90

TECH BULLETIN 021
09/80

Published regarding engineering changes and improvements

SUBJECT: Piston Rod, Sleeve and Seal Changes - Model 1020, 1520 & 2020

The piston rod thread size on the 25 Frame piston pump models was changed from M7 to M8. The seals were also changed from M14 to M16. Both old and new parts are available. Effective dates for both individual parts and kits are shown below:

Modified Parts on 25 Frame Pump

Old PN	New PN	Qty	Description	Models Used On				Modification
27780	29229	3	Piston Rod	2520	2020	1520	1020	M7 to M8
27839	29240	3	Inlet Valve	x				M7 to M8
27944	29234	3	Inlet Valve		x			M7 to M8
26541	29232	3	Inlet Valve			x		M7 to M8
27819	29242	3	Inlet Valve				x	M7 to M8
27796	29231	3	Piston Spacer	x	x	x	x	M7 to M8
27842	29239	3	Piston Retainer	x				M7 to M8
27949	29235	3	Piston Retainer		x			M7 to M8
27816	29233	3	Piston Retainer			x		M7 to M8
27822	29241	3	Piston Retainer				x	M7 to M8
26994	27871	3	Conical Washer SS	x	x	x	x	M7 to M8
26546	27510	3	Slotted Nut SS	x	x	x	x	M7 to M8
14158	29589	3	Cotterpin	x	x	x	x	2x15 to 1.6x12
27787	43122	3	Sleeve	x	x	x	x	M14 to M16
26538	43124	3	Seal	x	x	x	x	M14 to M16
27789	43126	3	Wick	x	x	x	x	M14 to M16
30249	30838	1	Piston Kit				x	M7 to M8
30251	30840	1	Piston Kit		x			M7 to M8
30800	30839	1	Piston Kit			x		M7 to M8
30841	30252	1	Piston Kit	x				M7 to M8
30258		1	Seal Kit	x	x	x	x	M14 to M7
30435		1	Seal Kit	x	x	x	x	M14 to M8
—	30482	1	Seal Kit	x	x	x	x	M16 to M8
30817		1	Sleeve & Seal Kit	x	x	x	x	M14 to M7
—	30819	1	Sleeve & Seal Kit	x	x	x	x	M16 to M8
—	30253	1	Cup Kit				x	M8
—	30254	1	Cup Kit			x		M8
—	30255	1	Cup Kit		x			M8
—	30256	1	Cup Kit	x				M8

Effective Dates:

Model 2520-Beginning with SN 7760101 (M8 piston rod). Beginning with SN 770101 (M16 piston sleeves and seals)

Model 1520-Beginning with SN 5800123 **Model 2020**-Beginning with SN 5800101 **Model 1020**-Beginning with SN N800101

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Technical Services Department

Rev. 02/96

TECH BULLETIN 022
09/80

Published regarding engineering changes and improvements

SUBJECT: O-Ring Repair Kit - 7001 - 7032 Regulators

CPC Regulators have been made in both round and hex body shapes. Additionally, the hex design has design changes which have improved the performance and life of the valve. These changes cannot be identified externally.

To accommodate the various design changes, the O-ring kits include O-rings to service all variations within either the hex or round. Consequently, not all O-rings are required to repair a regulator.

To determine which style O-ring to use in the kit, compare the O-rings in the kit with the O-rings from the worn regulator. If the old O-ring is lost or too damaged to identify, start with the larger of the two similar O-rings. If the larger O-ring leaves a gap when installed on the piston, remove it and use the smaller size O-rings.

O-RING KIT NUMBERS

Regulator PN	GPM	PSI	OLD STYLE Round	CURRENT STYLE Hex
7001	0.5 - 5	100 - 1000	30770	**30771**
7002	0.5 - 5	500 - 2000	30772	**30771**
7003	0.5 - 5	1500 - 3000	30774	**30775**
7011	1.0 - 10	100 - 1000	30776	**30777**
7012	1.0 - 10	500 - 2000	30778	**30777**
7013	1.0 - 10	1500 - 3000	30780	**30781**
7014	2.0 - 1.0	1500 - 4000	—	**30796**
7021	2.5 - 25	100 - 1000	30782	**30783**
7022	2.5 - 25	500 - 2000	30784	**30793**
7023	2.5 - 25	1500 - 3000	30786	**30787**
7028	3.5 - 35	250 - 800	—	**30783**
7031	3.5 - 35	700 - 1000	—	**30783**
7032	3.5 - 35	1000 - 2000	—	**30783**

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Rev. 11/90
Rev. 03/96

TECH BULLETIN 023
05/89

Published regarding engineering changes and improvements

SUBJECT: By-Pass Port - Model 7538, 7539, 7541, 7544, 7545, 7546

The by-pass port on these Unloaders has a 1/2" NPT female straight thread and a **3/4" NPT male tapered thread.** The 1/2" male thread is used to assemble the internal body of the unloaders and **was not meant to be a connection for the by-pass hose.** If the 3/4" male thread is too large, it is permissable to use the 1/2" female thread if caution is used and a 1/2" male straight fitting is used. **DO NOT USE A 1/2" TAPERED THREAD FITTING** as the resulting force expanding the straight thread housing is sufficient to crack it.

CAT PUMPS
Technical Services Department

Rev. 05/89

TECH BULLETIN 024 3/81

Published regarding engineering changes and improvements

SUBJECT: Lubrication of the Lo-Pressure Seals

Most CAT PUMPS are equipped with lubricating holes at the top front of the crankcase or inlet manifold for lubricating the seals (wicks when needed). If a rigid maintenance cycle is maintained, it may not be necessary to lubricate the seals. If oilers are not installed, the dust caps on each new pump can remain in these oil holes for added dust protection.

Piston Pumps:

The 3 FR, 4 FR and 10 FR piston pumps come standard with the prelubed Prrrrrm-a-lube Seals and lubrication is not required in standard water applications. If detergents, high temperatures or other chemicals are used, the seals should be changed to the Blue Dot Seal and wick combination and periodic lubrication will assure maximum seal life. Saturate the wicks thoroughly before installation. The 25 FR and 60 FR pumps come standard with the seal and wick combination and periodic lubrication will provide maximum seal life.

Plunger Pumps:

Plunger pumps come standard with prelubed Lo-Pressure Seals and lubrication is not required in standard water applications. In other applications where the pumped fluid may wash out the lubricant, saturated wicks may be added and additional lubrication will assure maximum seal life.

In most applications, only a small amount of lubrication is necessary to assure a smooth running surface on the plunger or piston rod. Typically, 2-3 drops per hole per week (up to 15 FR models) and 4-6 drops per hole per week (25 to 60 FR models) is adequate, even in continuous duty applications.

The type of lubricant will be determined by the application and such things as the compatibility with other system components, concern for contamination of the pumped fluid or pumped solutions which may be slightly abrasive or at the extremes of the pH range of 5-9.

In **car wash** and **pressure wash applications**, standard crankcase oil can be used.

In **industrial applications** with varying solutions and temperatures, standard crankcase oil, standard glycerine, food grade glycerine or polyglycol-41 may be used.

In **Reverse Osmosis applications**, the lubricant is determined by the sensitivity of the membrane and whether the membrane can be cleaned. Some membranes are not affected by small amounts of oil, while others are destroyed. Consult the membrane supplier for more details.

CAT PUMPS
Technical Services Department

Rev. 11/99

TECH BULLETIN 025
09/82

Published regarding engineering changes and improvements

SUBJECT: New Crankcase Model 333 & 430

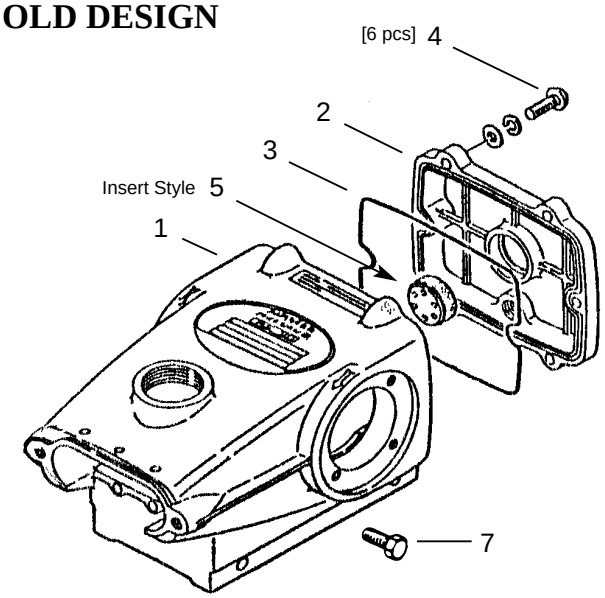
Starting with serial number 6810101, the models 333 and 430 pumps have a four bolt rear cover instead of six bolts. This change was made to standardize tooling when the plunger pumps were added to the pump line.

When ordering the revised design crankcase, it is necessary to order all the new design related items: rear cover, oil gauge, screws and cover o-ring.

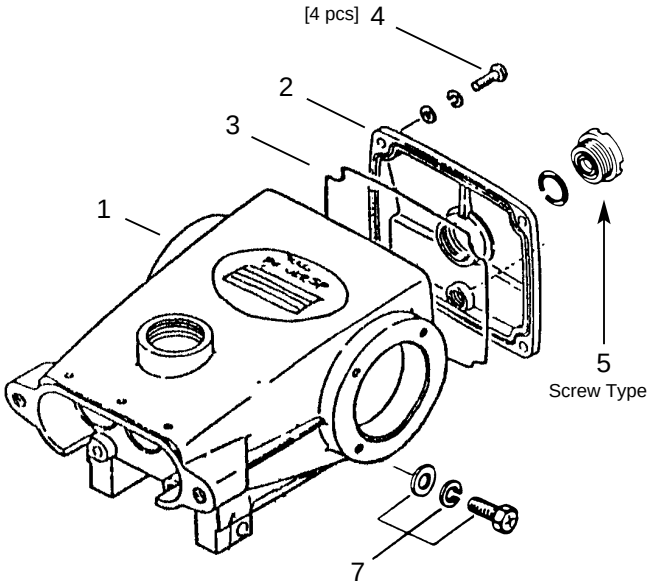
CAT PUMPS will stock parts for both designs, with the exception of the PN 27978 crankcase. This old part number will automatically be substituted with all the new replacement parts.

At the same time, the crankcase cover screws are changing to a combination head style. The new screw will allow use of either a hex socket or phillips head tool.

OLD DESIGN



NEW DESIGN



Part Numbers

Item #	Description	Old Design 6 Screw	New Design 4 Screw
1	Crankcase	27978	43735
2	Rear Cover	27980	43339
3	O-Ring, Rear Cover	27705	43340
4	Screw, Rear Cover	19200	92520
5	Oil Gauge, Bubble	22289	43987
6	O-Ring, Oil Gauge	Not Used	44428
7	Screw, Bearing Case	25811	92519

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Technical Services Department

Rev. 04/96

TECH BULLETIN 026 01/83

Published regarding engineering changes and improvements

SUBJECT: Crankcase Cover and Threaded Style Oil Gauge

The models 280, 290, 333, 430 and 10 Frame have all changed from the old pressed-in-style to the new threaded-in oil gauge.

When replacing the old style crankcase cover with the new threaded hole style, it is necessary to use the new threaded oil gauge and o-ring.

The threaded oil gauge PN 43214 has been superseded by a new bubble threaded style PN 43987.

A new oil gauge removal tool PN 44050 is available for use with the new bubble threaded oil gauge.

Please refer to the models and S/N below for the correct part to use on your pump.

MODEL	Pressed Style Crankcase Cover	*Threaded Style Crankcase Cover
280, 290	(26105)	43845
333, 430	27980	43339
10 Frame	(27328)	43847

MODEL	Pressed Style Oil Gauge	*Threaded Style Oil Gauge & O-Ring	**Bubble Threaded Oil Gauge & Gasket
280, 290	(22289)	(43214) 20285	43987 44428
333, 430	(22289)	(43214) 20285	43987 44428
10 Frame	(22289)	(43214) 20285	43987 44428

( ) Indicates item is obsolete and no longer available.
* Effective with SN 282-0554 (280,290); SN 681-0101 (333, 430); SN 182-1393 (623); SN 282-1101 (820); SN 682-1101 (1010).
** Effective with SN 183-0101 (All Models).

CAT PUMPS
Technical Services Department

Rev. 03/96

TECH BULLETIN 027
11/82

Published regarding engineering changes and improvements

SUBJECT: Valve Assemblies for the Plunger Pumps

For optimum performance, the material used for the valve retainers has changed. Originally, they were all nylon or stainless steel. Currently, all models are using the economical and extremely durable PVDF.

Model	Nylon	S.S.	Effective Date	PVDF	Effective Date
310, 340, 350	(43728)	(43837)	4820101	44565	4850101
530, 53, 58G1	(43726)	(43836)	3820151	44564	4850101
550, 55, 51G1, 60	(43726)	(43836)	3820151	44564	5850101
59G1, 60G1					
56, 57, 59, 60	—	—	—	44564	—
650	(43726)	(43836)	5820101	44564	5850101
1050, 1057	—	(43836)	—	44564	5850101

( ) Indicates obsolete - no longer available.

All styles of retainers are interchangeable, however, only the PVDF will be stocked.

The new forged dimpled style valve plugs are used on all plunger pumps and are completely interchangeable with the old flat style.

Model	OLD	NEW
310, 340, 350	43727	43849
530, 550, 56, 57, 59, 60 53, 55, 59G1, 60G1	43724	43851
650, 1050	43253	43851

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Rev. 04/96

TECH BULLETIN 030

06/83

Published regarding engineering changes and improvements

SUBJECT: New Flanged Nut

Effective with March 1, 1983 manufacturer dates, all Models 280, 323, 333, 390, 430 pumps come standard with the part number 101804 flanged nut (M8) used in fastening the discharge manifold.

This change was made to standardize parts with the Model 290 and to simplify the servicing of these pumps by eliminating the lockwasher.

Please update your records with this change.

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Rev. 10/90

TECH BULLETIN 032
05/84

Published regarding engineering changes and improvements

SUBJECT: Shaft Extension on Models 310, 317, 323
Manifold Port Changes on Models 310, 317, 323, 530, 550

Inlet Manifold Port:	**Change**	**Effective Date**
Model 310, 317	Both inlet ports changed from 3/8" NPT to **1/2" NPT**.	N830101
Model 323	Special 1/4" NPT injection port added to inlet manifold.	3820101

Discharge Manifold Port:	**Change**	**Effective Date**
Model 310	Discharge ports moved **3/4" FORWARD**.	6830101
Model 530	Discharge ports moved **1" FORWARD**.	5831075
Model 550	Discharge ports moved **1" FORWARD**.	1840101

Shaft Extension:	**Change**	**Effective Date**
Model 310, 317	Both shafts extended by **5 mm**.	N830101
Model 323	Both shafts extended by **5 mm**.	D830101

All Model 310 and 323 pumps AFTER the above dates must use **PN 109692** (long) shaft protector. The complete mounting kit **PN 30659** will have the new **long** shaft protector included. PN 43364 **(short)** is no longer available, but the long shaft protector is interchangable with the short on all models prior to above dates.

Please mark your stock accordingly and update your catalogs with this specification data.

See back side of page for dimensional drawings on above pumps.

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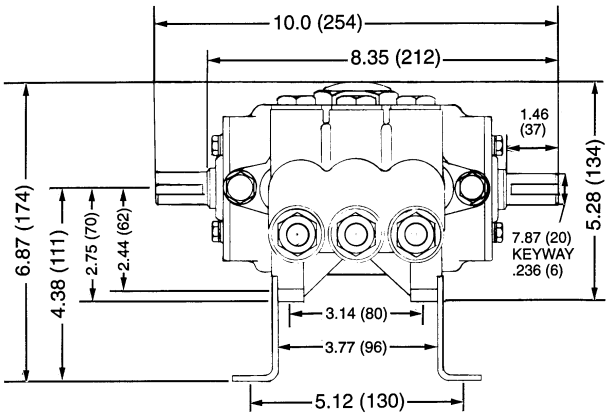
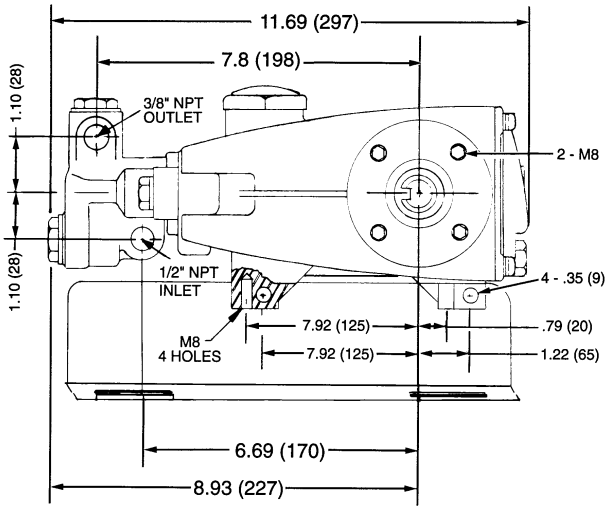
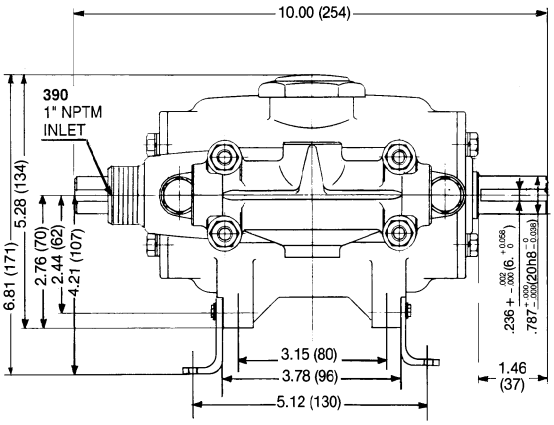
Rev. 04/96

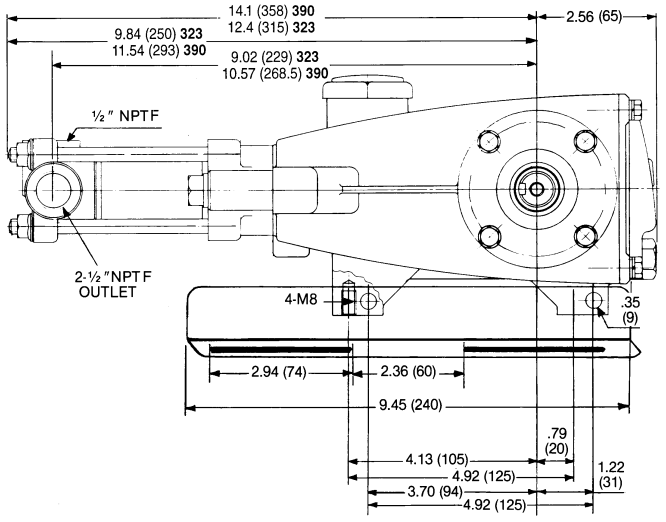
Model 310, 317



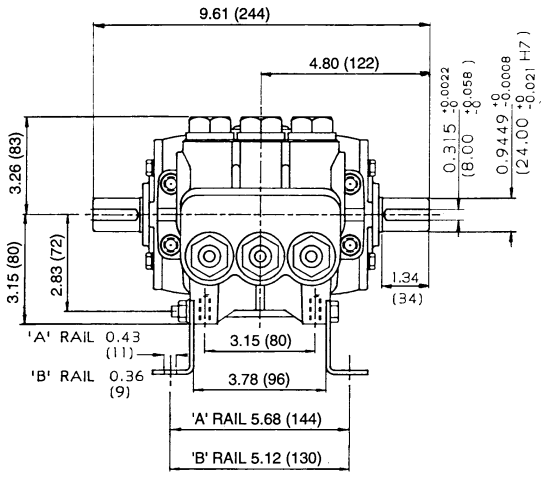


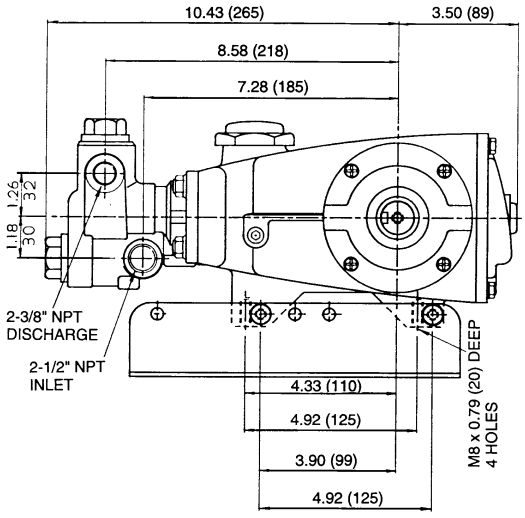
Model 323





Model 530, 550





TECH BULLETIN 033
05/84

Published regarding engineering changes and improvements

SUBJECT: Crankcase and Rear Cover Change for Models 270, 279, 280, 290

The following is a summary of the crankcase changes which have occurred in the 3 Frame pumps. Due to popular demand, the large oil filler cap has been incorporated back into these pumps. Note the Serial Number of the pump you are servicing to assure the proper parts are ordered.

MODEL 270 & 279	**Before SN 2840101**	**After SN 2840101**	**After SN 7850101**
Crankcase	43939	44276	44657
Crankcase Cover	43453	43339	43339
Oil Filler Cap	43211	44374	43211
O-Ring, Crankcase Cover	26087	43340	43340
O-Ring, Oil Cap	14177	44377	14177
Bubble Oil Gauge	43987	43987	43987
O-Ring, Bubble Oil Gauge	20285	44428	44428
Dimension Change Overall Length	260 MM (10.2")	261 MM (10.3")	**261 MM** (10.3")
Additional Changes which are effective with SN 2840101:			
Inlet Manifold Socket Head Bolt (M10x35)	87927	87931	—
O-Ring, Inlet Adapter	14181	17547	—

MODEL 280 & 290	**Before SN 3840101**	**After SN 3840101**	**After SN 6850101**
Crankcase	28766	44274	44658
Crankcase Cover	43845	43339	43339
Oil Filler Cap	43211	44374	43211
O-Ring Crankcase Cover	26087	43340	43340
O-Ring, Oil Cap	14177	44377	14177
Bubble Oil Gauge	43987	43987	43987
O-Ring, Bubble Oil Gauge	20285	44428	44428
Dimension Change Overall Length	268 MM (10.55")	269 MM (10.59")	**269 MM** (10.59")

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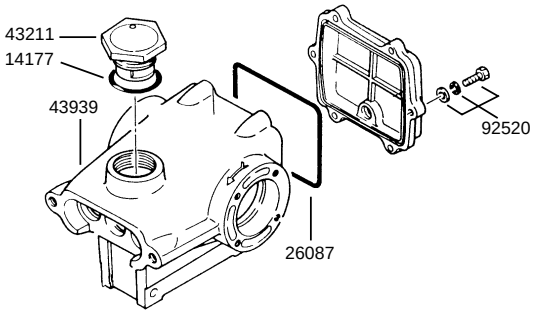
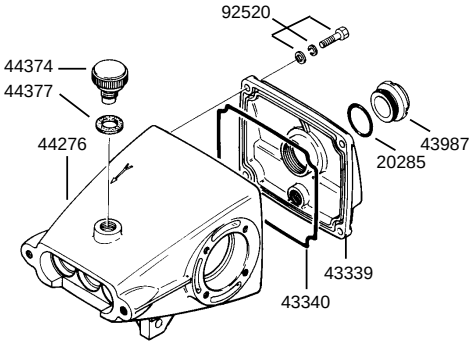
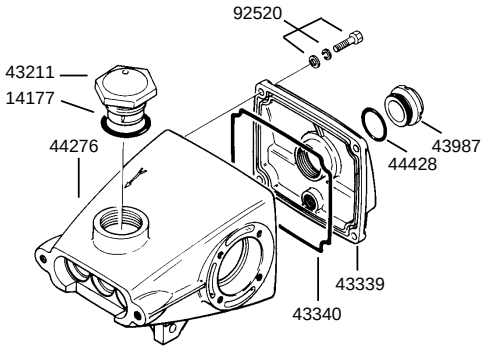
Rev. 11/90

Models 270 & 279

Before SN 2840101 **Intermediate** **After S/N 7850101**

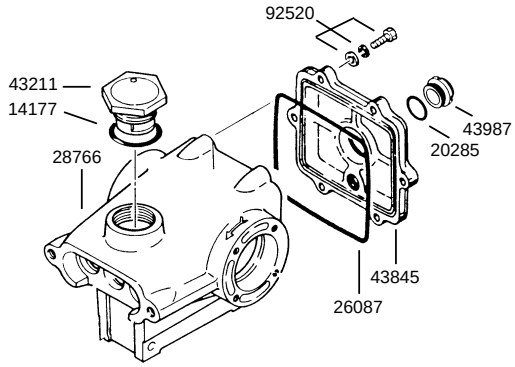


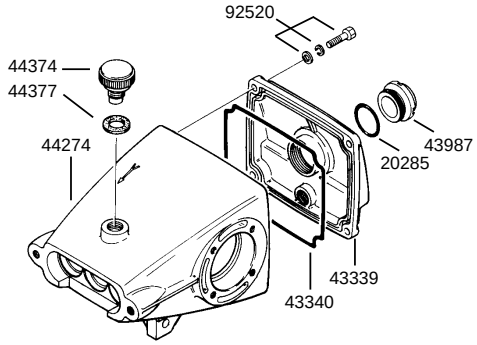


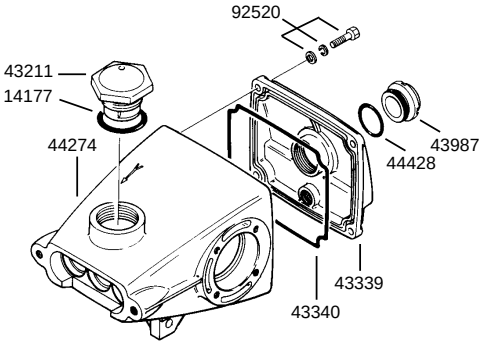


Models 280 & 290

Before SN 3840101 **Intermediate** **After S/N 6850101**







TECH BULLETIN 034
08/84

Published regarding engineering changes and improvements

SUBJECT: Servicing the Crankcase Section: 3FR, 4FR, 10FR, 25FR Piston Pumps

With proper installation and periodic maintenance, crankcase servicing is seldom necessary. CRANKCASE SERVICING SHOULD BE PERFORMED ONLY BY TRAINED SERVICE TECHNICIANS.

After removing the wet-end follow these steps to disassemble and service the drive end of your pump.

DISASSEMBLY

1. Drain all oil from the pump crankcase before servicing.
2. Remove Discharge and Inlet manifolds as described in standard service manual.
3. Remove the Crankcase Cover and both Bearing Cases.
4. Remove the rear half of the Connecting Rods.
   NOTE: Front and rear halves of Connecting Rods are a matched set. **DO NOT MIX.**
5. Pull all three Piston Rods completely forward toward the wet-end.
6. Turn the crankshaft and check for clearance of the front half of the Connecting Rods.
7. Place the bearing block tool on the work surface. Slip the shaft into the female side of the bearing block and tap the opposite side of the crankshaft. Bearing will press into the bearing block.
   NOTE: When removing the crankshaft, one bearing will remain in the pump and the other will stay on the shaft.
   NOTE: The crankshaft can only be removed from one side on the 10 and 25 frame pumps. An arrow inside the rear of the crankcase indicates the direction.
8. Press bearing off the crankshaft. Using a soft mallet, tap other bearing from crankcase.
9. Pull the Piston Rods with front half of connecting rod from rear of crankcase.
10. Using a screwdriver handle or the crosshead of the piston rod, drive out the crankcase Seals from the back [inside the crankcase]. The seal washer will come out with the seal.

continued on back

Rev. 04/96

REASSEMBLY

1. Examine the crankcase Seals for deterioration, cuts or scale build up and replace if worn.
2. Insert seal washer to rest on lip of each crankcase seal chamber.
3. Install the new Seals from the wet-end of crankcase with the garter spring toward the crankcase of the pump.
4. Next examine the Piston Rod for wear, straightness and snug wrist Pin fit and replace if worn.
5. Examine Connecting Rods for scoring or stripped thread appearance and replace if worn.
6. Insert Piston Rods from rear of crankcase through crankcase seals and push completely forward.
   NOTE: Be certain the identification numbers on the front half of the connecting rods are up so they can be easily matched to the back half.
   NOTE: Exercise caution not to cut the crankcase Seals with the threaded end of the piston rod.
7. Examine crankshaft journals and replace if scored or grooved.
8. Insert Crankshaft into crankcase.
9. Examine bearings and replace if worn.
10. Place bearing block over one of the shaft extensions and turn pump on its side on work surface.
11. Slip bearing and bearing driver tool over shaft and drive bearing onto shaft until completely seated.
12. Rotate pump to horizontal position, place bearing block and collar over opposite shaft.
13. Slip bearing over shaft and drive second bearing into position until completely seated.
    NOTE: Be certain shaft is centered.
14. Replace back half of the connecting rods, matching the identification numbers with the front half and torque per chart.
15. Rotate shaft by hand to be certain shaft is free moving.
16. Examine crankshaft oil seals, bearing case o-rings and crankcase cover o-ring and replace if cut or worn.
17. Replace new crankshaft seals in Bearing Cases and mount on crankshaft. Torque per chart.
18. Place new o-ring on Crankcase Cover and fasten to rear of crankcase. Torque per chart.

TORQUE CHART

Pump Model	Thread	Tool Size	Torque
Connecting Rod Screw			
280, 290, 320, 333, 430	M7 x 1.0	10mm Hex	9 Nm, 80 in. lbs.
623, 820, 1010, 1020, 1520, 2020, 2520	M8 x 1.0	13mm Hex	12 Nm, 110 in. lbs.
Bearing Case Screw			
280, 290, 320, 333, 430, 623, 820, 1010	M6 x 1.0	10mm Hex	4.5 Nm, 40 in. lbs.
1020, 1520, 2020, 2520	M8 x 1.25	13mm Hex	10 Nm, 90 in. lbs.
Crankcase Rear Cover Screw			
280, 290, 320, 333, 623, 820	M6 x 1.0	Cross-Recessed Head	4.5 Nm, 40 in. lbs.
1020, 1520, 2020, 2520	M8 x 1.25	Cross-Recessed Head	10 Nm, 90 in. lbs.

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Technical Services Department

TECH BULLETIN 035
09/84

Published regarding engineering changes and improvements

SUBJECT: Servicing the Crankcase Section of Your 7PFR-60PFR Plunger Pump

With proper installation and periodic maintenance, crankcase servicing is seldom necessary. CRANKCASE SERVICING SHOULD BE DONE ONLY BY TRAINED SERVICE TECHNICIANS.

The 3PFR and 5PFR plunger models such as the 270 and 310 contain the same type ball bearing as used in the piston pumps and can be serviced by following the instructions on Tech Bulletin 034. The remaining plunger models have tapered roller bearings and are serviced differently.

After removing the pump wet-end, follow these steps to disassemble and service the drive-end of your 7PFR, 15PFR, 25PFR, 35PFR and 60PFR plunger models.

Disassembly:

1. Drain pump of all oil in crankcase before servicing.
2. Remove the rear cover and one bearing cover.
3. The bearing race and crankshaft oil seal will remain with the bearing cover. The bearings will remain on the crankshaft.
4. Remove the rear half of the connecting rods.
5. Pull all three plunger rods completely forward.
6. Turn the crankshaft and check for clearance of the front half of the connecting rods.
7. Pull the crankshaft from the pump.
8. Remove the other bearing cover with crankshaft seal and race.

   Note: on 60PFR the race will remain with the inner bearing cover.
9. Drive or press bearings off shaft.
10. Pound bearing cover on a flat surface to loosen the race. Remove the bearing with an extractor tool.
11. Pull plunger rods with front half of connecting rod from rear of crankcase.
12. Use the handle of a screwdriver or the crosshead end of the plunger rod, to drive out the crankcase seals from the **wet-end** side of the crankcase.

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Rev. 07/99

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Reassembly:

1. Examine crankcase oil seals for deterioration, cuts or scale build-up and replace if worn.
2. Check for seal washer then install new crankcase oil seals from wet-end side of crankcase with the **garter spring toward the crankcase** of the pump.
3. Install one bearing cover with race, o-ring, and crankshaft oil seal.
4. Next, examine the plunger rods for scoring in oil seal area, and ensure there is a snug fit in the rist pin area, replace if worn.
5. Examine connecting rods for scoring or stripped threads and replace if worn.
6. Lubricate and insert plunger rods from rear of crankcase through crankcase oil seals. Gently push completely forward.

   Note: Be certain the identification numbers on the front half of the connecting rods are UP so they can be easily matched to the back half.

   Note: Exercise caution not to cut or roll the crankcase seals with the end of the plunger rod.
7. Examine crankshaft oil seals, bearing cover o-rings and crankcase cover o-ring and replace if cut or worn.
8. Examine crankshaft journals and replace if scored or grooved. Examine bearing for contamination or wear and replace as needed.
9. Press small diameter tapered end of new race into bearing cover until completely seated. Note: Inner bearing cover on 60PFR.
10. Mount the tapered roller bearing onto crankshaft with large O.D. toward crankshaft center and press onto the shoulder of crankshaft until completely seated.
11. Insert crankshaft into the crankcase and center.
12. Mount bearing cover onto crankshaft ends and press snug into crankcase. Torque per chart.
13. Rotate crankshaft by hand to be certain crankshaft is free moving. If side play is evidenced, remove one bearing cover shim. If extremely tight turning, add shims as needed to achieve free movement.
14. Line up back half of the connecting rods, matching the identification numbers with the front half. Replace the washer on hex screws, apply Locktite to threads and torque per chart.
15. Rotate shaft again by hand to be certain connecting rods are free moving.
16. Mount crankcase cover on rear of pump and torque per chart.

Note: On 25PFR, 35PFR and 60PFR pumps, a special locking washer is used. This must be replaced when servicing the connecting rods. Place washer over back side of connecting rod, insert screw and torque per chart. Bend one tab out over screw, the other tab in toward crankshaft flush against connecting rods. Proceed with the reassembly of the pump as outlined in our standard service manual.

TORQUE CHART

Pump Model	Thread	Tool Size	in. lbs.	ft. lbs.	Nm
Connecting Rod Screws					
310	M7	M10 Hex	95	7.96	11
530, 550, 650, 1050, 2530	M8	M13 Hex	130	10.8	15
35 Frame	M10	M17 Hex	395	32.5	45
60 Frame	M10	M17 Hex	390	32.5	44
Bearing Cover Screws					
310, 650, 1050	M6	M10 Hex	50	4.0	6.0
530, 550	M6	M10 Hex	115	9.4	13
2530, 35 Frame	M8	M13 Hex	115	9.4	13
60 Frame	M10	M17 Hex	220	18.1	25
Rear Cover Screws					
310, 650, 1050	M6	M10 Hex	50	4.0	6.0
530, 550	M6	M10 Hex	115	9.4	13
2530, 35 Frame	M8	M13 Hex	115	9.4	13
60 Frame	M10	M17 Hex	220	18.1	25

TECH BULLETIN 036 03/94

Published regarding engineering changes and improvements

SUBJECT: Cylinder & Plunger Reference Chart

The serial number which is clearly stamped into the lower side of the crankcase above the mounting flange is not intended for pump identification when selecting service parts. These serial numbers can assist you in determining “Effective Dates” for changes in pump construction, performance, or design which are highlighted in the Technical Bulletins. The best way to identify a pump that does not have a model decal, is with the dimensions outlined below.

CYLINDER REFERENCE CHART

MODEL	P.N.	LENGTH INCHES	LENGTH MM	I.D. INCHES	I.D. MM	O.D. INCHES	O.D. MM
280	26112	1.181	30	.787	20	1.024	26
290	101802	1.378	35	.787	20	1.024	26
323	43768	1.575	40	.866	22	1.142	29
333	25660	1.575	40	.709	18	1.024	26
390	44288	2.205	56	1.260	32	1.398	35.5
430	24285	1.575	40	.787	20	1.024	26
623	28342	1.969	50	.787	20	1.417	36
820	28340	1.969	50	.984	25	1.417	36
1010	28341	1.969	50	1.122	28.5	1.417	36
1020	27823	2.559	65	.984	25	1.850	47
1520	27817	2.559	65	1.122	28.5	1.850	47
2020	28533	2.559	65	1.260	32	1.850	47
2520	27844	2.559	65	1.496	38	1.850	47
6020	29466	4.409	112	2.205	56	2.559	65
6040	43204	4.409	112	1.811	46	2.559	65
6024	43118	6.496	165	1.500	38	2.756	70
6044	43119	6.496	165	1.850	47	2.756	70

4FR:	Model 430:	Cylinder has no groove; two piece piston assembly.
	Model 333	Cylinder has one groove on outside diameter at discharge one piece, machined piston.
10FR:	Model 623:	Cylinder has one groove on outside diameter at discharge end; either one piece machined piston assembly or three piece bac-cup assembly.
	Model 1010:	Cylinder has no groove; two piece piston assembly.

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Rev. 4/00

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CERAMIC PLUNGER REFERENCE CHART

MODEL	P.N.	LENGTH INCHES	LENGTH MM	O.D. INCHES	O.D. MM
2DX	542403	1.063	27	.630	16
5DX	46727	1.850	47	.630	16
2SF, 2SFX	544697	.709	18	.709	18
2SF10-30	45847	.551	14	.709	18
2SF29ELS	45429	.630	16	.709	18
4SF	45848	.945	24	.787	20
230, 240, 270, 231, 241, 271, 237, 247 277	43901	1.693	43	.709	18
3CP1120, 1130, 1140, 3CP1221, 1231, 1241	46976	1.693	43	.709	18
310, 340, 350, 311, 341, 351, 317, 347, 357	43367	2.835	72	.787	20
5CP2120W, 5CP2140WCS, 5CP2150W, 5CP6120	46841	1.969	50	.787	20
5CP3120, 5CP3120G1	46884	1.969	50	.630	16
5CP5120, 5CP5150G1	46893	1.969	50	.709	18
45	45783	2.835	72	.630	16
550, 51, 55	43311	3.031	77	.630	16
530, 53, 56, 57, 58, 59, 60	43232	3.031	77	.709	18
650, 651, 660, 661, 681	43300	3.031	77	.787	20
70, 781	45890	2.835	72	.551	14
7CP6170	48559	2.087	53	.866	22
1050, 1051, 1057, 1851	43552	3.031	77	.945	24
2510	48535	3.937	100	.984	25
2530, 2531, 2537, 2831	45749	3.661	93	1.260	32
3507, 3510, 3801	43945	5.709	145	.787	20
3515, 3517, 3811	43866	5.709	145	.984	25
3520, 3521, 3527, 3821	43957	5.709	145	1.260	32
3531, 3535, 3537, 3831	43921	5.709	145	1.575	40
3541, 3545, 3841	46806	5.709	145	1.772	45
6760, 6761, 6767, 6861	44749	7.283	185	2.165	55
6811	43866	5.709	145	.984	25
6821	43957	5.709	145	1.260	32
6831	43921	5.709	145	1.575	40
6841	45672	7.283	185	1.772	45

NON-PRODUCTION MODELS REFERENCE CHART

MODEL	P.N.	LENGTH INCHES	LENGTH MM	I.D. INCHES	I.D. MM	O.D. INCHES	O.D. MM
260	24285	1.575	40	.787	20	1.063	27
284	27877	1.319	33.5	.787	20	1.024	26
300	25660	1.575	40	.709	18	1.024	26
*42HS	45783	2.835	72	—	—	.630	16
*43HS	45890	2.835	72	—	—	.551	14
400	22161	2.047	52	.787	20	1.024	26
410	24285	1.575	40	.787	20	1.024	26
420	24285	1.575	40	.787	20	1.024	26
500	21984	2.047	52	.787	20	1.024	26
520	28763	1.969	50	.709	18	1.417	36
524	43131	2.579	65.5	1.020	25.9	1.496	38
624	43264	3.071	78	.945	24	1.260	32
*654	43232	3.031	77	—	—	.709	18
1000	20253	2.559	65	1.122	28.5	1.260	32
1024	28673	2.598	66	1.102	28	1.772	45
1044	29080	2.677	68	1.339	34	1.772	45
2500	13632	3.346	85	1.500	38.1	1.677	42.6

*Plunger Pump

OTHER HANDY IDENTIFYING FEATURES ARE: Mfg. date stamped on underside of crankcase near mounts (DX, SF marked with sticker). Pump stroke stamped in crankshaft end.

Model 260:	“T” in serial number
Model 400, 410, 420:	“A” in serial number
Model 1000:	“B” in serial number
Model 500:	“C” in serial number
Model 2500:	“D” in serial number

CAT PUMPS
Technical Services Department

TECH BULLETIN 037
09/84

Published regarding engineering changes and improvements

SUBJECT: Piston Assembly for Model 323, 333, 623

Both the Bac-Cup Piston Assembly and the Machined Piston Assembly perform equally well in most applications. However, in those situations where the inlet conditions are negative, and/or hi-temperature, the Machined Piston Assembly provides a smoother fluid suction.

To assure optimum performance in all applications, the Machined Piston Assembly will become a standard in all model 323, 333, and 623 pumps effective with serial numbers shown below.

Service kits and individual replacement parts will continue to be available for both Bac-Cups and Machined Piston Assemblies to handle your individual needs.

BAC-CUP

Model	Piston Kit	Cup Kit	Bac-Cup	Bac-Cup Ring	Bac-Cup Piston
323	30857	30858	43792	43788	43787
333	30842	30841	43719	43784	43717
623	30843	30822	43172	30543	30544

MACHINED

Model	Piston Kit	Cup Kit	Machined Piston Assembly	Effective Date
323	30992	30993	103741	4840101
333	30240	30239	28955	6840101
623	30219	30220	30340	7841101

CAT PUMPS
Technical Services Department

Rev. 04/96

TECH BULLETIN 038
03/85

Published regarding engineering changes and improvements

SUBJECT: Blue-dot Seal and Wicks for Model 323

Many equipment manufacturers have standardized on using Blue-dot seals and wicks for applications using soaps, chemicals or higher temperatures. This wick and seal combination provides optimum service in applications where hot water and detergents might prematurely flush the grease from Prrrrrm-a-lube seals. The model 323 pump is standardly equipped with Blue-dot seals and wicks, and requires no modification. The models 333, 430, 623, 1010 must be modified when Blue-dot seals are required. Please specify Model 333.0300, 430.0300, 630.0300 or 1010.0300.

	PUMP MODELS		
ITEM DESCRIPTION	**323**	**333, 430**	**623, 820, 1010**
BLUE-DOT OPTION	STANDARD	OPTIONAL	OPTIONAL
Blue-Dot Seal (Buna-N)	25153	25153	25153
Wick	43532	27711	27910
Oil Pan	43355	27712	27911
Blue-Dot Seal Kit	34011	30229	30226

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Technical Services Department

Rev. 03/96

TECH BULLETIN 039
03/85

Published regarding engineering changes and improvements

SUBJECT: Flat Valves for Model 390

Beginning with serial number 2850101, the flat valve assembly became standard in the Model 390 pumps.

The Flat Valve parts are not interchangable with the Quiet Valve parts and must be replaced as a set.

	OPTIONAL [Quiet Valve]	STANDARD [Flat Valve]
Valve	43721	104302
Seat	43779	103956
Retainer	43780	103957
Spring	43751	43751
O-Ring, D.V.S.	43793	43793
Valve Kit	30859	34010

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03/96

TECH BULLETIN 040 05/85

Published regarding engineering changes and improvements

SUBJECT: Manifold and Valve Part Changes - Model 3527 and 3537

Old Version

Intermediate Version

Current Version

Description	Old Version	Intermediate Version SN 2850101	Current Version SN 3850101
Discharge Manifold	44105	44613 - Valve ports machined for stepped valve seat	46335 89981
Valve Plug	44198	44643 - Used with 70KG Spring	44643
Spring Retainer	44615 - Must be used only with flat seat (Black or Grey)	44645 - (ALBZ) Must be used with stepped valve seat. May also be used with flat valve seat.	44728 - (PVDF) Used only with stepped seat and 44729 Washer.
Coil Spring	N.A.	44644 - Used with 100 KG machined valve plug 28 mm L, 25 mm W	44644
Valve Seat	44107 - Flat	44612- Stepped	44612
O-Ring, Valve Seat	17639	26142	26142
Back-up ring, Valve Seat	N.A.	44614	44614
Discharge Manifold Socket Head Screw	89572 - Now replaced by 89628	89628 - Stainless Steel (M12x65)	89628
Valve Kit	31036	34017	34017 - Now includes new PVDF retainers & washers.

Also see Tech Bulletin 069.

continued on back

Rev. 07/96

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NEW version and **OLD** version parts are **NOT** interchangeable. Please check the serial number of the pump you are servicing to assure the proper parts are ordered. Both new and old version parts will be available for servicing.

Simplified removal of the spring retainer and valve seat are added features of the new Aluminum Bronze retainers. By threading a M10 x 1.5 bolt into the top of the retainer, you can easily lift out the complete valve assembly. By threading the bolt completely into the valve, you can separate the valve seat from the spring retainer.

Individual Components for Old and New Version Kits.

Description	**Quantity**	**OLD** Valve Kit 31036	**NEW** Valve Kit 34017
O-Ring, Valve Seat	3	17639	26142
Valve Seat	3	44107 (Flat)	44612 (Stepped)
Valve	3	44108	44108
Spring	3	44109	44109
Spring Retainer	3	44615	44728 (PVDF White)
O-Ring, Valve Plug	3	89827	89827
Back-up Ring, Valve Plug	3	20388	20388
Back-up Ring, Valve Seat	3	N.A.	44614
Washer	3	N.A.	44729

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Technical Services Department

TECH BULLETIN

041
05/85

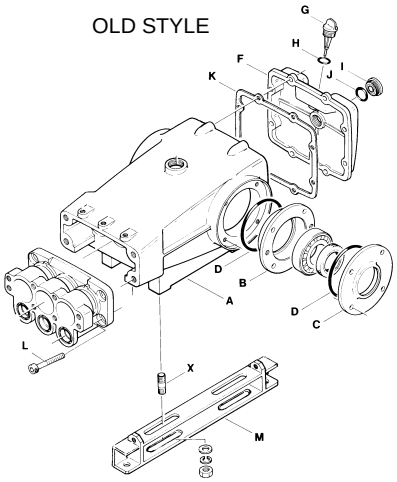
Published regarding engineering changes and improvements

SUBJECT: 35 Frame Crankcase Change - Models 3520, 3535

The new crankcase changes will simplify the disassembly and reassembly of the crankcase section. **Note the change from fine thread to coarse thread** on both the **inlet manifold screws and mounting studs** and the "new style" bubble oil gauge.

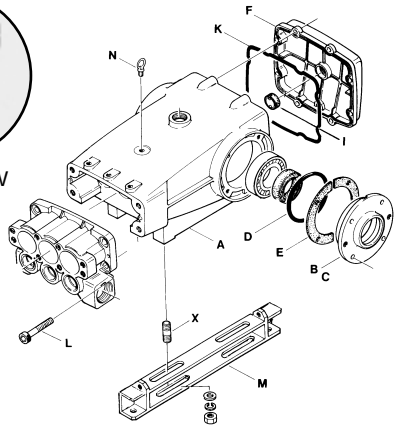
NEW version and OLD version parts are NOT INTERCHANGEABLE. Please check the serial number of the pump you are servicing to assure the proper parts are ordered. See individual operators manuals for parts exclusive to Corrosion Resistant and Stainless Steel models.

OLD STYLE

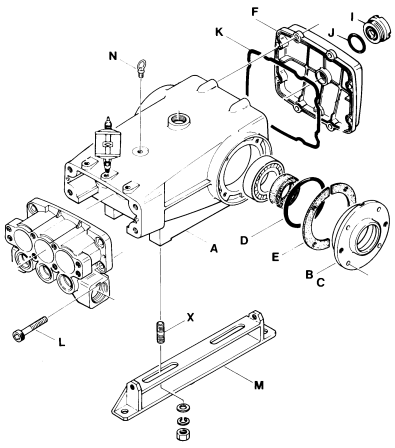


I.M. SCREW

INTERMEDIATE STYLE



NEW STYLE



ITEM	DESCRIPTION	OLD STYLE	INTERMEDIATE STYLE SN 2850101	NEW STYLE SN 8900101
A	Crankcase	43854	44559	44559
B	Bearing Cover	2-29327 (Inner)	44542	44542
C	Bearing Cover	2-43857 (Outer)	44542	44542
D	O-Ring	4-12398	2-12398	2-12398
E	Shim, Split (2 pc)	N/A	4-44543	4-44543
F	Crankcase Cover	43856	45936	45936
G	Dip Stick	27769	Discontinued	Discontinued
H	O-Ring	11338	Discontinued	Discontinued
I	Oil Gauge	43987 (Threaded)	22289 (Press)	43987 (Threaded)
J	O-Ring, Oil Gauge	20285	Discontinued	44428 Flat Flex Gasket
K	O-Ring, Rear Cover	29324	16612 (O-Ring)	16612 (O-Ring)
L	Inlet Manifold Hex Socket Head Screw	44207 (14x40) (Fine)	44585 SS (Coarse) (14x40) V-groove around head	44585 SS (Coarse) (14x40) V-groove around head
M	Box Rail Assembly	44197	92674 (43888 Rail, 34018 Stud Kit)	92674 (43888 Rail, 34018 Stud Kit)
N	Eye Bolt	N/A	44319	44319
X	Stud Mounting Kit	31041 (Fine)	34018 (Coarse) 34039 SS	34018 (Coarse) 34039 SS

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TECH BULLETIN 042
10/85

Published regarding engineering changes and improvements

SUBJECT: Crankcase Part Changes on 623, 820, 1010

The following new crankcase part number changes are effective with SN 4850101. These changes have been incorporated to streamline the body and extend the simplicity of servicing and the commonality of the parts between the piston and plunger pump models.

Description	Old Style	New Style
Crankcase	27325 (6 screw)	44641 (4 screw)
Crankcase Cover	43847 (6 screw)	43491 (5 screw)
O-Ring, Crankcase Cover	27418 (6 screw)	43492 (4 screw)
Crankcase Cover Screws (M6x20)	19200 (Phillips)	92520 (Hex Head)
Seal Case Screws (M6x16)	25811 (Phillips)	92519 (Hex Head)

Both old and new parts will be available from stock.

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TECH BULLETIN 043
10/85

Published regarding engineering changes and improvements

SUBJECT: Plunger Pump Lo-Pressure and Hi-Pressure Seal Servicing

For complete servicing information, refer to the **Diagnosis and Maintenance** section of the **Plunger Pump Service Manual.**

To obtain optimum performance from your CAT PUMP, regularly scheduled maintenance of both seals and valves are necessary. This schedule should be determined on an individual pump basis as each installation varies in performance hours and application conditions.

The first signs of seals wearing is a loss in pressure followed by eventual leaking, if left unattended. Water leaking from the underside of the manifold between the manifold and the crankcase can be caused by any of the following conditions:

- worn Lo-Pressure Seals
- worn Hi-Pressure Seals
- excessive inlet pressure
- prolonged cavitation
- running dry
- excessive heat

When servicing the pump packings, it is recommended that both the Lo-Pressure and Hi-Pressure Seals be replaced as a matched set. Generally, the leaking from the Lo-Pressure Seal area is an indication the Hi-Pressure Seals need replacement. Failure to replace both Lo-Pressure and Hi-Pressure Seals may result in premature wear of other related fluid-end parts or possible water in the crankcase.

Careful examination of the male and female adapters [when used] for any notable wear should also be done whenever the seals are replaced. Good male and female adapters will assure proper support and maximum life for the seals.

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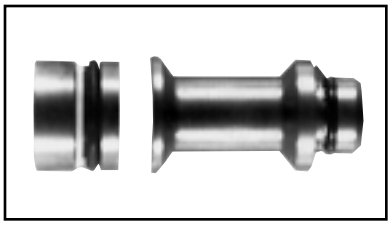
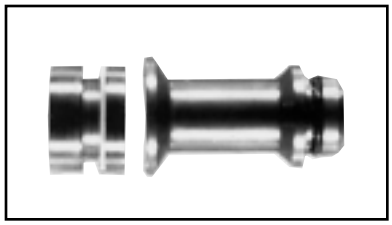
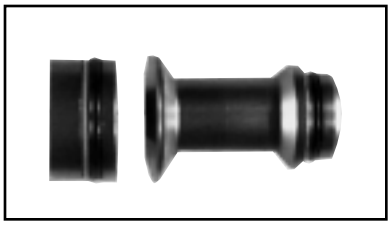
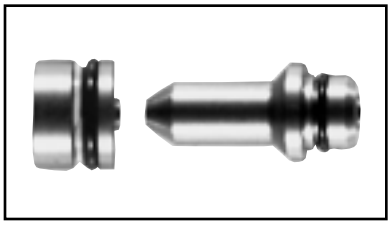
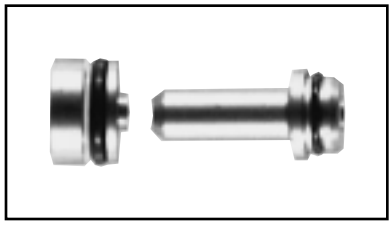
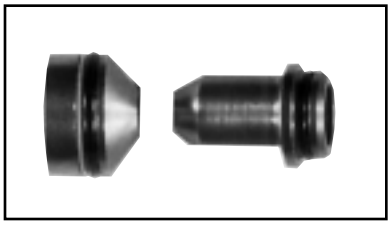
TECH BULLETIN 044
10/85

Published regarding engineering changes and improvements

SUBJECT: 7001-7023 CPC Regulator Design Change

To improve the performance of the CPC Regulator over the full range of specifications, a change was made to the piston and seat.

7001-7023	**7011-7013**	**7021-1023**
		
Old Style	Old Style	Old Style
		
New Style	New Style	New Style

The change was from a flat seating surface to a tapered or cone-shaped surface. The old and new style parts cannot be interchanged.

Following are effective dates for the three sizes of regulators. If your regulator is stamped with a manufacture date prior to these dates, both the piston and seat should be replaced when the regulator is serviced.

7001-7003	7011-7013	7021-7023
5 GPM sizes August 1982	10 GPM sizes August 1983	25 GPM sizes April 1984

The **old part numbers** have been reassigned to the new tapered piston and seat. Only the **new style** parts will be available and must be replaced as a set. It is also recommended to replace the o-rings when installing a new piston and seat.

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Rev. 01/94

TECH BULLETIN 045
08/86

Published regarding engineering changes and improvements

SUBJECT: One-Piece Stainless Steel Plunger Retainer with Stud

For added durability and greater serviceability, the old style plunger retainer (43234) and stud (43236) have been replaced with the new **one-piece stainless steel** plunger retainer with stud (PN 104360).

The two-piece is totally interchangeable with the new one-piece and requires no additional modification.

The following are the effective Serial Numbers for each of the pump models making this change.

Model	Effective Serial Number
310	0850101
340	9850101
350	9850101
530	9850101
550	9850101
650	9850101
1050	N850101

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Rev. 07/94

TECH BULLETIN 046
08/86

Published regarding engineering changes and improvements

SUBJECT: 317, 347, 357, and 1057 Valve Plug

Effective June 1986 production, the above pumps will have the valve plug design with coil spring. This modification provides greater seating concentricity and prolonged valve life under continuous duty and harsh conditions.

Please update your parts books for the following part numbers. All other parts in the valve assembly remain the same.

Model Used	Old P.N.	New P.N.	Effective S/N
317, 347, 357	44308	44833 Valve Plug 44832 Coil Spring	6860101
1057	44261	44831 Valve Plug 44832 Coil Spring	6880101

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Rev. 02/90

TECH BULLETIN 047
10/86

Published regarding engineering changes and improvements

SUBJECT: Blind Bearing-Shaft Cover

A new design bearing cover is being used on all pump models with the single extended shaft. On these new production models, the one-piece blind bearing-shaft cover design will be used in place of the individual bearing case and seal.

This change results in several advantages:

- eliminates the need for a shaft protector
- provides protection for the rotating shaft end
- prevents dust etc. from possibly entering through the shaft seal area
- holds the pump dimensions to a minimum
- maintains a clean, uniform pump body appearance

Following are the part numbers and effective dates for this design change:

	OLD PART NUMBER					NEW PART NUMBER		
Frame	**Standard Models**	**Shaft Protector**	**Crankshaft**	**Oil Seal**	**Bearing Cover**	**Crankshaft**	**Blind Cover**	**Effective Date Box Marking**
3	279	25130	44924 Single Long	24159	27950	44973 Single Short	44972	HH 7860101
5	340 347 349.1 349.118	109692	43388 Single Long	43222	43344	44945 Single Short	44949	HH 7860101
7	510 *570 *590 519.1 519.118	43256	44701 Single Long	43222	43223	*44947 Single Short	*44948 Blind	HH D860101
7	589.1 589.118	43256	44670	43222	43223	44946 Single Short	44948 Blind	HH D860101

* These models were limited production and replaced by 57 and 59 pumps and 59G1, 60G1 and 70G1 gearbox pump models with Blind Bearing Cover.

Continued on back

Rev. 07/99

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OLD PART NUMBER					NEW PART NUMBER		
OEM Models	**Shaft Protector**	**Crankshaft**	**Oil Seal**	**Bearing Cover**	**Crankshaft**	**Blind Cover**	**Effective Date Box Marking**
30	–	–	–	–	44923	44944	D910101
31	109692	44279	43465	43745	45911	44944	HH 7860101
34	109692	44945	43465	43745	44945	44944	HH 7860101
34.G1	109692	44945	43465	43745	44945	44944	HH D860101
35	109692	44270	43465	43745	44270	44944	HH 7860101
51.G1	43256	44949	43465	43466	44947	44967	HH 7860101
51.G118	43256	44947	43465	43466	44947	44967	HH D860101
53	43256	43219	43465	43466	44233	44967	HH 7860101
55	43256	43219	43465	43466	44233	44967	HH D860101
58.G1	43256	44946	43465	43466	44946	44967	HH D860101
58.G118	43256	44946	43465	43466	44946	44967	HH D860101

The new blind cover is not directly interchangeable with the old crankshaft. Please check your pump serial number before ordering new parts. All orders for the old crankshaft part number will automatically be substituted with the new shorter extension crankshaft **and** blind cover.

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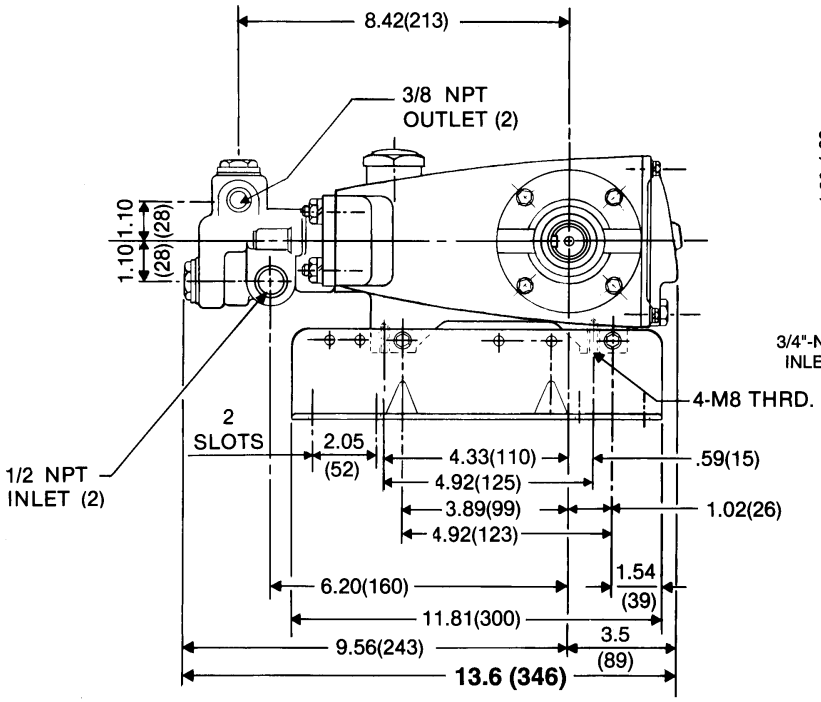
TECH BULLETIN 048
06/87

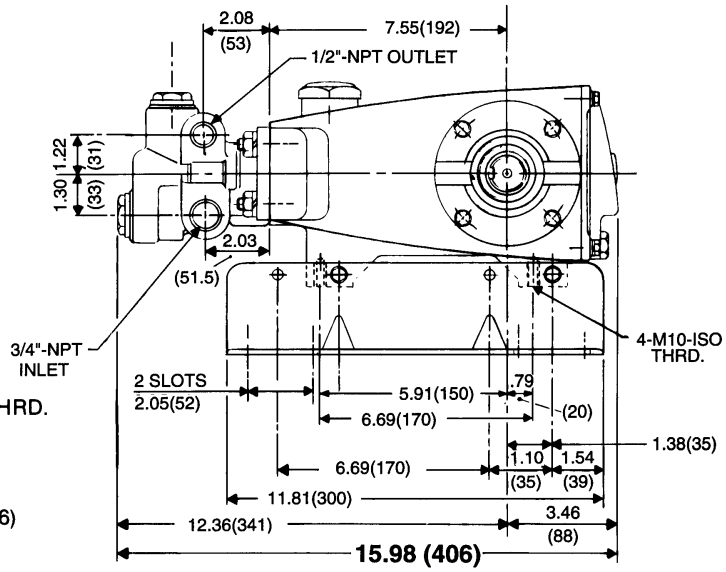
Published regarding engineering changes and improvements

SUBJECT: Valve Plug Dimension Change

For added ease in servicing the valves on the 10FR and 15FR plunger pumps, we have extended the hex head of the plug by **4mm**. We will continue to use the same part numbers **43851** for chromed and **43850** for unchromed. The longer head will start with 5860101 manufacture date. Please update your catalogs with this data.



Models 510, 530, 550, 580



Models 650, 654, 1050

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TECH BULLETIN 049

7/87

Published regarding engineering changes and improvements

SUBJECT: Stainless Steel Hardware for Corrosion Resistant 3FR, 5FR, and 15FR Pump

Certain stainless steel parts will become a standard feature on all corrosion resistant pump models. These stainless steel items provide added tolerance and reduced maintenance where corrosion is a concern.

Model	**237, 247, 277**		**317, 347, 357**	
Description	**Old Part No.**	**New Part No. Effective S/N: 2870101**	**Old Part No.**	**New Part No. Effective S/N: 4870101**
Inlet Plug	22179c	44563 ALBZ	22179c	44563 ALBZ
Screw (M6 x 20)	92520	89053 19933 15849	92520	89053 19933 15849
Screw (M x 16)	92519	89618 19933 15849	92519	89618 19933 15849
Socket Head Bolt (M10 x 35)	87931	87950	87931	87950
Split Lock Washer (M10)	12503	15847	12503	15847
Socket Head Bolt (M10 x 55)	87933	87952	—	—
Stud Bolt (M10 x 45)	—	—	—	—
Hex Nut (M10)	—	—	—	—
Plunger Retainer	44031	44031	44305	44031
Gasket, Plunger Retainer	44041	44041	30866	44041

Chart continued on next page.

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STAINLESS STEEL SELECTION CHART (Continued)

Model	**1057**		**651, 1051**	
Description	**Old Part No.**	**New Part No. Effective S/N: 6870101**	**Old Part No.**	**New Part No. Effective S/N: 690101**
Inlet Plug	44562	44562 ALBZ	44382	44382
Screw (M6 x 20)	92520	89053 19933 15849	92520	89053 19933 15849
Screw (M x 16)	92519	89618 19933 15849	92519	89618 19933 15849
Socket Head Bolt (M10 x 35)	—	—	—	—
Split Lock Washer (M10)	12503	15847	12503	15847
Socket Head Bolt (M10 x 55)	—	—	—	—
Stud Bolt (M10 x 55)	14050	44005	14050	44005
Hex Nut (M10)	81048	81258	81048	81258
Plunger Retainer	44305	44031	44031	44031
Gasket, Plunger Retainer	30866	44041	44041	44041

TECH BULLETIN 050 12/93

Published regarding engineering changes and improvements

SUBJECT: 35 Frame Spacer with Coil Springs: Models 3520, 3527, 3535, 3537

For extended packing life and optimum performance, the above models will be built using the Spacer with Coil Springs. The Coil Springs keep the packing secure under normal operation and provide additional tension support as the V-Packing begins to wear. The overall effect is extended V-Packing life and more up-time.

To allow for additional Spacer length, the Inlet Manifold ports have been machined deeper. **WHEN SERVICING, ALL DATED PARTS MUST BE USED AS A SET.** The new Inlet Manifolds will be stamped with an "S" for easy identification. The old parts will gradually be phased out.

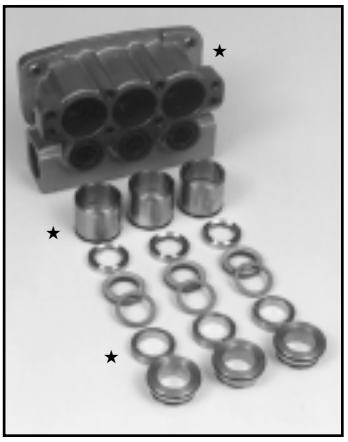
These changes will become effective with the serial numbers shown below. **This spacer with Coil Springs has been standard in all Stainless Steel models since initial production.** All models use PN 45113 individual Coil Spring.

Old Part Number		Intermediate Part Number		Current Part Number
Model 3520		**Effective D930101**		**Effective 5940101**
—	—	46349	Spacer w/Coil Springs–BB	46349
[44530]	Inlet Manifold–BB	[46346]	Inlet Manifold–BB	46392 ●
44110	V.P. Cylinder (40mm)–NAB	46348	V.P. Cylinder (50mm)–BB	46348
43966	V.P. Spacer–BB	43966	V.P. Spacer–BB	43966
Model 3527		**Effective 9880101**		**No Change**
—	—	45566	Spacer w/Coil Springs–SS	45566
44206	Inlet Manifold–NAB	45124	Inlet Manifold–NAB	45124 ●
44110	V.P. Cylinder (40mm)–NAB	45563	V.P. Cylinder (50mm)–SS	45563
Model 3535		**Effective D930101**		**Effective 5940101**
—	—	46352	Spacer w/Coil Springs–BB	46352
[44530]	Inlet Manifold–BB	46346	Inlet Manifold–BB	46392 ●
43929	V.P. Spacer–BB	43929	V.P. Spacer–BB	45369
Model 3537		**Effective 0870101**		**No Change**
—	—	45382	Spacer w/Coil Spring–SS	45382
44206	Inlet Manifold–NAB	45124	Inlet Manifold–NAB	45124 ●
[44118]	V.P. Spacer–NAB	45369	V.P. Spacer–SS	45369

BB=Brass NAB=Nickel Aluminum Bronze SS=316 Stainless Steel

● Review Tech Bulletin 069 for additional information on 35 PFR Extended Manifolds.

[ ] Individual Parts no longer available.



Models 3520, 3527

Models 3535, 3537

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TECH BULLETIN

051
04/88

Published regarding engineering changes and improvements

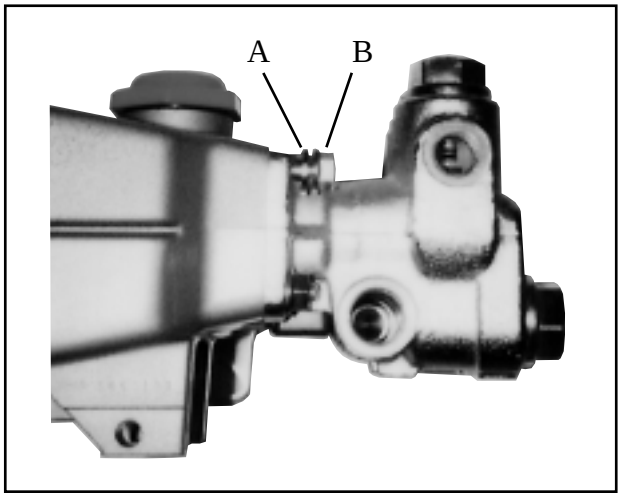
SUBJECT: Manifold and Crankcase Changes
530, 550, 560, 519.1, 519.118, 589.1, 589.118
OEM 51, 53, 55, 51G1, 51G118, 58G1, 58G118

To standardize production and extend our parts commonality between models, the 5FR and 7FR plunger pumps have been modified to use the M10 manifold mounting hardware. This modification requires a new part number for both the crankcase and manifold head.

The old M8 manifolds will no longer be available, however, to service a pump, four (4) spacers will be supplied with each replacement M10 manifold which are required to properly mount and align the new M10 manifold onto an old M8 crankcase stud.

The correct procedure for installing a new M10 manifold onto the old M8 crankcase starts with sliding the manifold onto the ceramic plungers and snugging it up to the crankcase. Next, insert the smaller O.D. of each spacer (A) over the end of each exposed stud and into the manifold tapped holes. Thread on the old flanged nuts (B) and torque to 125 in/lbs.

See reverse side for cross reference chart.



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Part Number Cross Reference Charts

Standard Models

Description	Model	M8	M10C	M10F
Manifold	530	43241	—	45417
	550	43314	45142	45547
	560	—	45058	45937
Spacers	530, 550	—	45386	45386
Stud/Bolts/Nuts	530, 550	85631 & 101804	87935 & 12503	85694 & 45550
	560	44556	87935 & 12503	85694 & 45550
Crankcase	530, 550, 560	43209	45056	45056

O.E.M. Models

Description	Model	M8	M10C	M10F
Manifold	53, 58G1, 58G118	44048	—	45419
	55, 51, 51G1, 51G118	44265	45140	45549
	56, 57	—	45047	45937
Spacers	53, 58G1, 58G118, 55, 51G1, 51G118	—	45386	45386
Stud/Nut/Screw	53, 58G1, 58G118, 55, 51, 51G118	85631 & 101804	87935 & 12503	85694 & 45550
	56, 57	44556	87935 & 12503	85694 & 45550
Crankcase	53, 58G1, 58G118, 55, 51G1, 51G118	44231	44555	44555
	56, 57	—	—	44555

TECH BULLETIN 052
11/88

Published regarding engineering changes and improvements

SUBJECT: Plunger Rod and Stud Change

For added corrosion resistance and extended life, the material of the plunger rod has been changed. The area in front of the crosshead that holds the Plunger Retainer Stud is now 316SSL. On the 5 and 15 Frame plunger models, this change also incorporates a shortened Plunger Rod and lengthened Retaining Stud. On these models, the Plunger Rod and Stud **must be changed as a set**.

Part Number Cross Reference Chart

MODEL	DESCRIPTION	OLD P/N	NEW P/N (316SSL)	EFFECTIVE DATE
3 Frame				
237	Plunger Rod	43898	45114	D870101
247	Stud	84690 (M6x40)	89652 (M6x43)	N870101
277	Plunger Retainer	43234	44031 (M6)	7870101
	Gasket	43645	44041	
5 Frame				
317	Plunger Rod	43365	45256	5880176
347	Stud	43236 (M6x16)	89653 (M6x58)	5880176
357	Plunger Retainer	44031	44031 (M6)	D870101
	Gasket	44041	44041	
15 Frame				
1057	Plunger Rod	43501	45258	3880101
	Stud	43236 (M6x16)	89651 (M6x70)	
	Plunger Retainer	44031	44031 (M6)	
	Gasket	44041	44041	
35 Frame				
3737	Plunger Rod	43861	45116	0871101
3527	Stud	88627 (M10x122)	89778 (M10x122)	1881101
3517	Plunger Retainer	43867	44084 (M7)	1881101
	Gasket	44085	44085	
35 Frame				
3507	Plunger Rod	43943	45118	0871101
	Stud	89581 (M10x123)	89779 (M7x123)	
	Plunger Retainer	44068	44068 (M7)	
	Gasket	44069	44069	
60 Frame				
6767	Plunger Rod	106137	45384	2880101
	Stud	44748 (M14x147)	44748 (M14x147)	
	Plunger Retainer	44750	44750 (M14)	
	Gasket	44751	44751	

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Rev. 07/99

TECH BULLETIN

053
11/88

Published regarding engineering changes and improvements

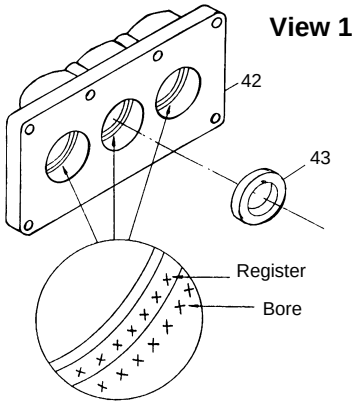
SUBJECT: Liquid Gasket - Plunger Pump Models

For aggressive liquid applications such as car wash, reverse osmosis, leachate, and saltwater re-injection.

To enhance the life of pumps used with aggressive liquids, Liquid Gasket should be applied to certain mating surfaces during maintenance. The application of the Liquid Gasket in o-ring and seal crevices and metal mating surfaces provides an environment in which the part can flex without inducing an erosion-corrosion cycle on the adjacent metal. By filling the gaps between mating surfaces, there is no stagnant fluid that can cause crevice corrosion. Filled gaps are also less prone to harbor bacteria.

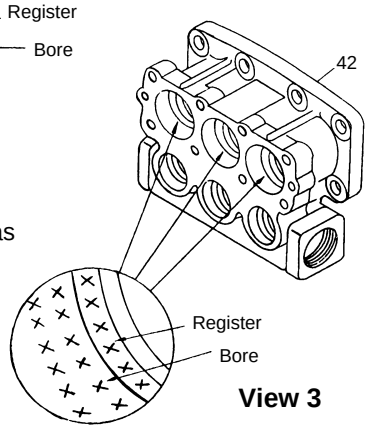
The following instructions cover the procedures for applying Liquid Gasket to specific parts and surfaces when servicing. All surfaces should be wiped clean before applying any Liquid Gasket. On mating surfaces **only a thin film is required.** Avoid using excess material. Around o-rings and seals liquid gasket should be applied in sufficient quantity to ensure that the crevices are filled on the side exposed to the pumped fluid. Please read **Material Safety Data** information before application.

Excess Liquid Gasket should be wiped away as assembly proceeds. NOTE: **Flush pump and drain approximately 5 minutes prior to connecting to operating system**. Refer to individual pump service manuals for proper assembly procedure and torque requirements. Please order PN 6104 Liquid Gasket in addition to seal and valve kits for servicing.



View 2

Apply Liquid Gasket as indicated by x or ↑



View 3

LO-PRESSURE SEAL (View 1)

Before fitting Lo-pressure seal into inlet manifold, apply Liquid Gasket in the manifold bores where the seals will make contact with the manifold chamber walls. Remove EXCESS Liquid Gasket.

HI-PRESSURE SEAL (View 2)

Apply Liquid Gasket in the manifold chamber walls where the Hi-pressure seal will make contact when installed. See individual pump service manual for correct seal installation procedure. Remove EXCESS Liquid Gasket.

MALE AND FEMALE ADAPTERS (View 3)

Apply Liquid Gasket to the 'V' of the Female Adapter and to the manifold chamber or V-Packing Cylinder where the V-Packings will make contact. Apply Liquid Gasket to the 'V' of the Male Adapter and to the manifold chamber walls where the male adapter comes in contact.
Remove EXCESS Liquid Gasket.

Continued on other side...

Rev. 07/99

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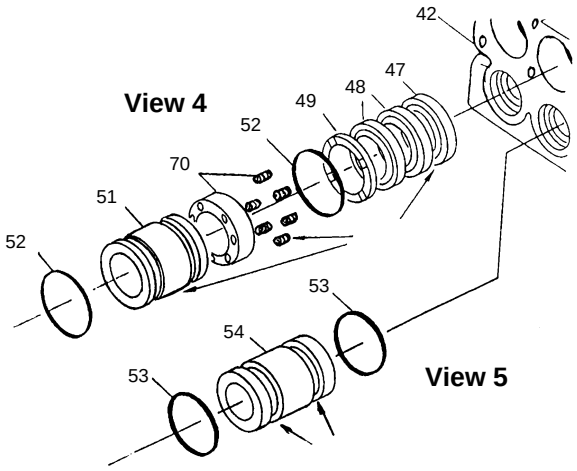
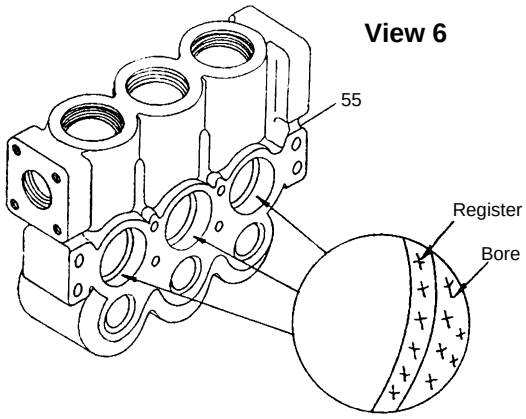
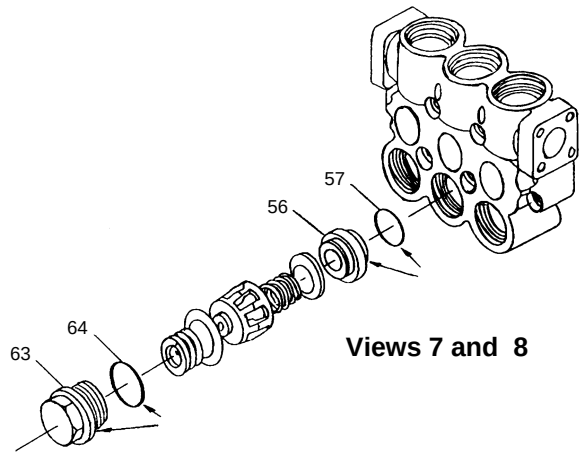


Apply Liquid Gasket as indicated ↑



Apply Liquid Gasket as indicated by x or ↑



Apply Liquid Gasket as indicated by ↑

V-PACKING CYLINDER AND SPACER W/COIL SPRINGS (View 4)

Fill the spring cavities of the 35FR and 60FR models (3x6-35FR) (3x8-60FR) with Liquid Gasket. Apply Liquid Gasket to back of Spacer. Remove EXCESS Liquid Gasket.
Fit o-rings onto V-Packing Cylinder grooves and generously fill crevices with Liquid Gasket. Remove EXCESS Liquid Gasket.

INLET SPACER (View 5)

(Exclusive to Model 6767) Fit o-rings onto Spacer and fill crevices with Liquid Gasket. Apply Liquid Gasket to the Inlet Manifold chamber walls and install the Spacers.
(Other Models) Apply Liquid Gasket to o-ring groove of Inlet Manifold and insert o-ring. Remove EXCESS Liquid Gasket.

DISCHARGE MANIFOLD (View 6)

Apply Liquid Gasket to the manifold chambers before installing V-Packing Cylinders in the manifold or Discharge Valve Spacers (25FR) in manifold over Spacers.
Remove EXCESS Liquid Gasket.

VALVE SEATS (View 7)

Assemble the valve assemblies and then fit o-rings and back-up rings onto valve seats. Fill the crevices with Liquid Gasket. Apply Liquid Gasket to the discharge manifold chambers where the valve seat rests. Remove EXCESS Liquid Gasket.

VALVE PLUGS (View 8)

Fit o-rings into valve plugs and fill o-ring crevices with Liquid Gasket. Remove EXCESS Liquid Gasket.

MATERIAL SAFETY DATA

7/27/99

Hazardous Ingredients	Silica Amorphous 10-20%, Polyester Polyol 80-90%
Boiling Point	Not Available
Vapor Pressure	Not Available
Vapor Density.....	Not Available
Solubility in Water.....	Insoluble
Appearance and Odor.....	Blue gel, mild odor
Specific Gravity	1.18
Evaporation Rate.....	Not Available
Flash Point	400°F
Extinguishing Media	Foam Carbon Dioxide Dry Chemical Water Spray
Health Hazard	
Eye	YES Severe eye irritation
Inhalation.....	YES (Solvent) Dizziness and shortness of breath
Skin	POSSIBLE (Solvent) Redness and prolonged contact may cause irritation
Ingestion.....	POSSIBLE Residual putty not believed to be toxic
Reactivity.....	Stable, hazardous polymerization will not occur, incompatible with strong oxidizers or acids

Emergency & First Aid Procedures:
EYES: Flush with water for at least 15 minutes, seek medical aid.
SKIN: Wash with warm soapy water. Remove contaminated clothing.
INHALATION: Rest and fresh air, seek medical aid.
INGESTION: Do not induce vomiting, seek medical aid.

This information highlights the proper use in handling of this product under normal conditions. Normal caution should be exercised when using.

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Technical Services Department

TECH BULLETIN 054 10/95

Published regarding engineering changes and improvements

SUBJECT: 2 Piece Seal Retainer - Plunger Pump

To simplify servicing and to assure proper seating of the Lo-Pressure Seals in the **5PFR-7PFR** Pumps, a 2 piece Seal Retainer eliminates the old style snap-ring. This 2 piece Seal Retainer will continue to hold the wick, which should be replaced at the time of seal servicing. **Note:** New seal cases will not have a machined groove to hold the snap-ring and the 2 piece Seal Retainer must be installed to secure the Lo-Pressure Seal.

When servicing the snap-ring style pumps, **remove the existing Seal Retainer with wick and snap-ring and discard. Note:** All 45344, 44434, and 101793 snap-rings will be discontinued and automatically replaced with new 2 piece Seal Retainer 45681 and 45682.

With the new 2 piece Seal Retainer, insert the wick into the large diameter recess of Seal Retainer. Then snap the Adapter onto the Rear Seal Retainer. Be sure to line up slots. Then, insert retainer assembly over plunger with wick extension down and small O.D. out (wick forward). Proceed with seal replacement as described in Service Manual or Plunger Pump Service Video Section I.
DO NOT INSTALL NEW SNAP-RING on 5FR or 7FR PUMPS.

Frame	Model	Item	Old P/N	New P/N Effective 05890101
5FR	31, 34, 35, 310, 340, 350	Seal Case (Brass)	43304	45679, 45681, 45682
	317, 347, 357	Seal Case (S.S.)	45075	45680, 45681, 45682
	311, 341, 351	Seal Case	45075	45680, 45681, 45682
	All 5FR	Seal Retainer	43352	45681, 45682
	All 5FR	Wick	43302	43302
7FR	53, 530, 58G1	Seal Case	43242	45683, 45686, 45687
	55, 550, 51G1	Seal Case	43315	45684, 45686, 45687
	56, 57, 59, 60	Seal Case	44547	45685, 45686, 45687
	All 7FR	Seal Retainer	43238	45686, 45687
	53, 530, 540, 55, 550, 51G1	Wick	43239	43239

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Rev. 11/99

TECH BULLETIN 055 04/89

Published regarding engineering changes and improvements

SUBJECT: Removing your Pump from your Gas Engine or Electric Motor
2SF, 2SFX, 2X, 2DX, 4SF, 4HP, 5DX

The following steps will assist you in removing your pump from your gas engine or electric motor.

1. To start the process, spray a few drops of penetrating oil onto the top groove or two small rectangular slots on the sides of the pump flange.
2. Remove the mounting bolts and washers securing the pump to the drive.
3. Loosen set screw 2-3 turns (4SF, 4HP, 5DX).
4. Insert a flat head screwdriver into the two opposing slots on the mounting flange and pry pump from gas engine or electric motor. *Apply only reasonable pressure. Do not force separation.*
5. If pump resists the separation, insert two [PN 80228] full threaded screws (M8x1.25x80) into the two special holes in the pump mounting flange. Thread in deep enough to make contact with the gas adapter plate or electric motor face. Then continue to thread in the bolts in an alternating pattern to separate the pump from the drive. *Apply only reasonable torque. Do not force separation.*
6. A strong bond may develop in any direct drive installation and may increase with heavy duty operation and time. It may be necessary to repeat one or more of these steps.

2SF, 2SFX, 4SF, 5DX models

1. If pump continues to resist, back out bolts so they are no longer making contact with the gas adapter flange or electric motor face.
2. Remove oil gauge so end of crankshaft can be seen (2SF, 4SF).
3. Line up a brass rod with crankshaft end and hit several times with an iron hammer to provide a shock to the shaft.
4. Tighten bolts again in an alternating pattern to back off pump. *Apply only reasonable torque. Do not force separation.*

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Rev. 3/00

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TECH BULLETIN 057
04/91

Published regarding engineering changes and improvements

SUBJECT: 4SF Set Screw and Hardened Key

The 4SF pumps have been designed to accommodate a set screw to provide additional security for the key on the shaft.

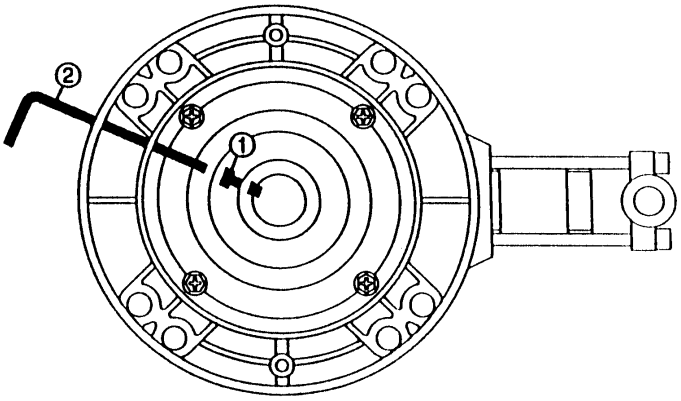
All direct drive assemblies are prone to some frettering corrosion with the metal to metal contacts. The set screw has been added to the 4SF design to lock the key in place. This will minimize movement and prevent excessive wear.

The crankshaft will have the set screw hole tapped into the keyway area and there will be an access hole in the pump mounting flange to enable the insertion of a hex allen wrench for tightening the set screw.

Should a replacement crankshaft be needed for units prior to this production date, the new tapped crankshaft will interchange, however, the crankcase will need to be drilled out for access to the set screw. Contact the factory for further information. The current part numbers for the crankshaft and crankcase will be used for these new parts.

The following steps should assist in properly installing this set screw.

1. Apply Loctite 242 to the threads of the set screw and thread 2-3 turns into the crankshaft.
2. Install the key into the motor or gas engine keyway. On gas engine shaft, key (PN 44455) may be installed either direction in the keyway. On electric motor shaft, key (PN 46076) must be installed with special tapered end **down and towards motor**.
3. Rotate pump crankshaft by hand to line up set screw with access hole in pump flange. Insert allen wrench for guide.
4. Apply antiseize lubricant (PN 6109) to engine or motor shaft.
5. Line up pump shaft with engine or motor shaft. Before mounting pump onto shaft. Rotate engine or motor shaft to match pump keyway position. With a hand recoil start gas engine, you may mount the pump first then line up set screw. Rotate the engine shaft to line up the **etched line** in the pump crankshaft end (visible through the bubble oil gauge) with the **access hole** at the **top right** of the pump mounting flange.
6. Carefully slide pump onto engine or motor shaft until pump flange is flush with drive face.
7. Secure pump to gas engine or electric motor with hex head screws and lockwashers and torque to 110 in/lbs. (125 Kg/cm).
8. Then insert any standard M4 x M90 allen wrench into the access hole and torque set screw to 60-70 in/lbs. (70-80 Kg/cm).
9. Rotate engine or motor shaft to assure free movement and commence operation.



Effective with manufacturing dates:

4SF35GH1	5910001
4SF40GH1	D900221
4SF45GH1	2910001
4SF40EL	2910201
4SF45EL	1910801
4SF50EL	2910241

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TECH BULLETIN 058 4/91

Published regarding engineering changes and improvements

SUBJECT: Forged Manifold and Extended Valve Plugs
O.E.M. 56, 57, 59, 60 Plunger Pumps

Due to the high pressures and the sometimes extended service demanded of these pump models, we have gone to the Forged Brass Manifold Heads. With this change we also added extended valve plugs with both an o-ring and back-up ring at the end of the valve plug. Because of the extension and the fine threads used on the new valve plugs, they cannot be used in the old style manifolds.

The old part numbers for the models 560, 570, 590 , and the 56, 57, 59, 60 O.E.M. pumps will automatically be replaced with the new series parts.

	Old Part Numbers		New Part Numbers **Effective 0890101**	
560, 570, 590	45058	Manifold (ALBZ)	45937	Manifold (Forged Brass)
	43851	Valve Plug	45939	Valve Plug - Extended
	17617	O-Ring, Valve Plug	14179	O-Ring, Valve Plug
	N/A		20213	Back-up Ring, Valve Plug
56, 57, 59, 60	45047	Manifold	45937	Manifold (Forged Brass)
	43580	Valve Plug	45939	Valve Plug
	17617	O-Ring, Valve Plug	14179	O-Ring, Valve Plug
	N/A		20213	Back-up Ring, Valve Plug
All Models	30820	Valve Kit	33820	Valve Kit

Please also note that the 560, 570, 590 pumps are no longer available and will be substituted with the O.E.M. versions 56, 57, and 59.

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Rev. 10/95

TECH BULLETIN

060
04/91

Published regarding engineering changes and improvements

SUBJECT: Baffle Assembly

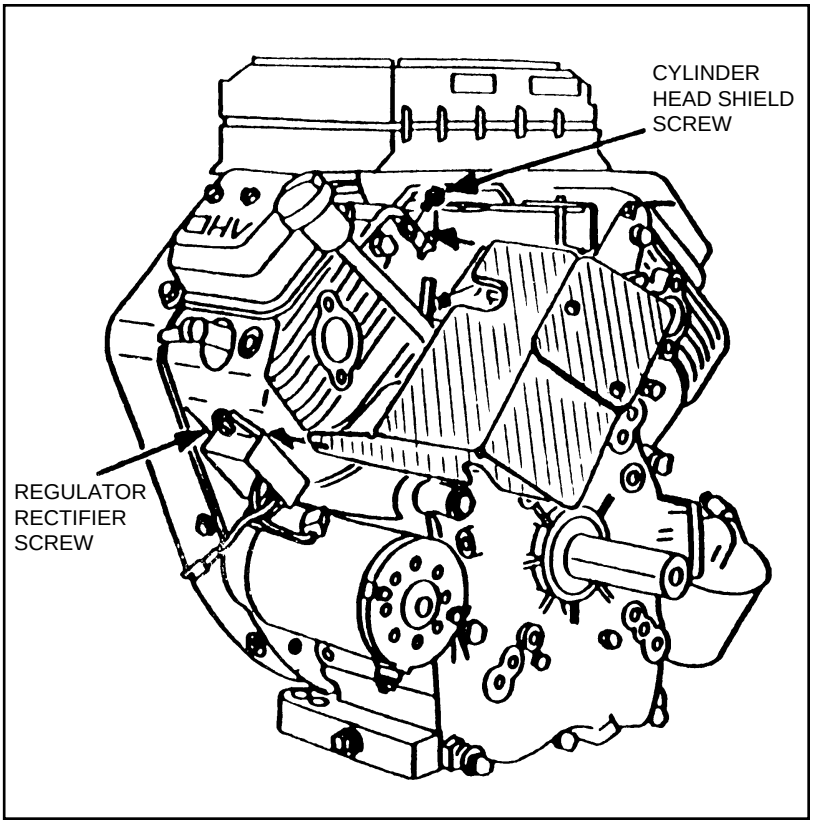
A number of field comments have been received concerning the overheating of pumps from, what appears to be, an insufficient air flow from the engine for cooling.

To assist the situation, Cat Pumps has developed a Baffle Assembly which attaches to the Cylinder Head Shield and the Regulator Rectifier of Vanguard 16 H.P. engines. This Baffle redirects the cooling exhaust across the pump to maintain normal operating temperatures.

The Baffle Assembly comes with the main baffle and a deflector plate for LOW MOUNT EXHAUST models. Remove the two self threading screws and deflector plate to adapt to the HIGH MOUNT EXHAUST models.

Attach the Baffle Assembly to the engine by unthreading the cylinder head shield and the regulator rectifier screws 3-4 turns. Slide the lower baffle tab between the rectifier box and engine shroud and push completely into engine. Retighten the engine screws.

The Baffle Assembly [PN 34170] is a very simple installation which will avoid unnecessary overheating or premature pump failure by redirecting the air flow from the cylinder head across the pump.



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TECH BULLETIN

061
09/91

Published regarding engineering changes and improvements

SUBJECT: Proper installation and adjustment of the Throttle Controller

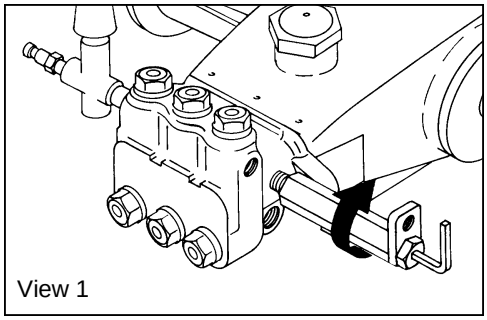
1. Install the Throttle Controller in the discharge line between the pump manifold and unloader valve. Where multiple discharge ports are available, it is not necessary to "T" in between the unloader and pump discharge. Simply use auxiliary discharge port (view 1).

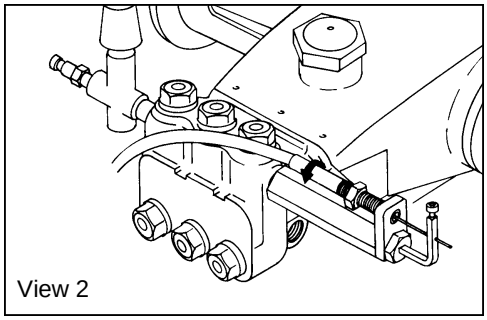
2. Connect the throttle Controller **cable** by turning the threaded cable end (view 2) into the **cable retainer**. Thread hand tight until **Locking Nut and Housing** are flush with the cable retainer. Then secure lock nut with wrench. Torque to 100 in/lb.

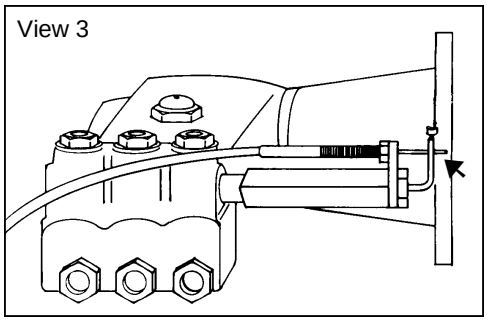
3. Slide cable wire through the hole in the **"L" connecting rod** (view 3). Apply a small amount of Locktite 242 to the I.D. of the **socket head screw**. Only partially thread onto "L" connecting rod until remaining connection is made.

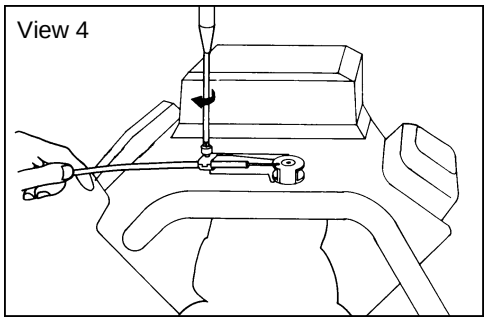
4. Slide "Z" end of cable through the housing clamp (view 4). Then insert "Z" end into cable inert on the engine throttle rack. Only partially tighten screw on housing clamp now to allow later fine tuning of the throttle cable.

continued on back


View 1


View 2


View 3


View 4

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5. With the engine in idle position, tighten the socket head screw on the “L” connecting rod. Torque to 8-10 in/lb. (view 5).

6. Start engine and make the necessary pressure adjustment to your unit to obtain full operating pressure at rated RPM. Check this pressure with the trigger gun open.

7. Leave gun open and adjust the engine to full RPM by sliding the cable housing back and forth to obtain a minimum of 5/1000ths of a gap at the stop on the engine throttle rack. (view 6).

CAUTION

The engine throttle should not be allowed to hammer against the throttle rack stop. Be certain to leave a small air gap between the throttle and the stop to prevent stress on the cable, the throttle stop and the “L” connecting rod (view 7).

8. When proper engine gap is reached tighten screw on cable housing clamp. Torque to 10 in/lb. (view 8).

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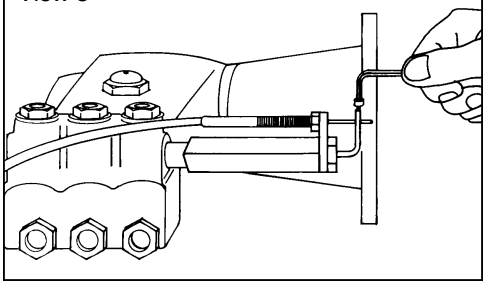
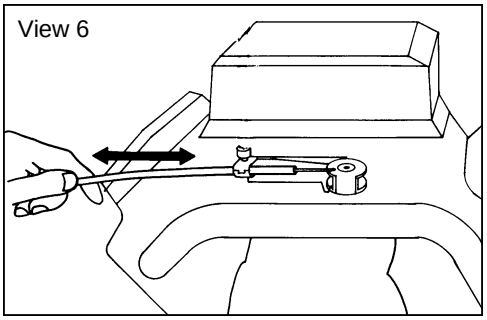
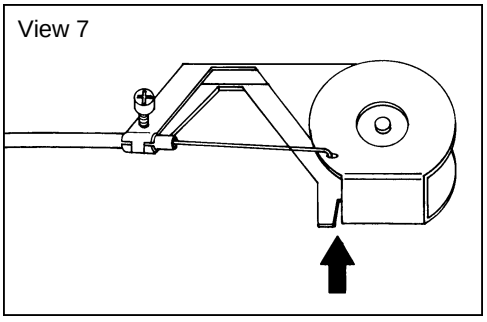
View 5



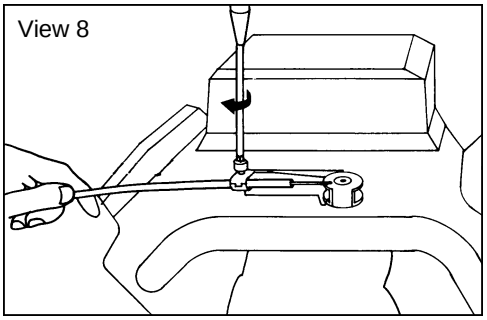
View 6



View 7



View 8



TECH BULLETIN 062
05/92

Published regarding engineering changes and improvements

SUBJECT: Manifold and Seal Case Changes on 650-651

For simplicity in servicing, the collar was eliminated from the Model 650. Because of the higher 3000 PSI performance of this pump, we also changed from a Brass to a Nickel Aluminum Bronze Head.

650	Old Part Number	New Part Number
Manifold Head	43511 *BB*	43971 *A*
Collar	43518 *BB*	45050
Back-up Ring	43519 *T*	43519
O-Ring	13984 *B*	14762
Seal Case	43512 *BB*	45050 *BB*
Spacer, Plunger	43505 *BB*	43505 *BB*

To further improve the serviceability of this model and eliminate the possibility of cutting the o-ring on the seal case during installation, the o-ring and back-up ring were eliminated.

650	Old Part Number	New Part Number 07910101
Manifold Head	43971 *N*	45975 *A*
O-Ring	13984 *B*	—
Back-up Ring	43519 *T*	—
Seal Case	45050 *BB*	46065 *BB*
Spacer, Plunger	43505 *BB*	43505 *BB*

651	Old Part Number	New Part Number 08900101
Manifold Head	44379 *SS*	45976 *SS*
O-Ring	14333 *V*	—
Back-up Ring	43519 *T*	—
Seal Case	44380 *SS*	45977 *SS*
Spacer, Plunger	45880 *SS*	45880 *SS*

Material Codes: B=Buna-N BB=Brass N=Nickel Aluminum Bronze SS=Stainless Steel V=Viton T=Teflon

Formerly the Aluminum Bronze manifold head was marked "AL" on the face of the head. Effective with the elimination of the collar, both the S.S. and ALBZ heads are stamped with a “B” on the face.

The old style seal cases, collars, o-rings, and back-up rings will continue to be available until further notice, however, the old style manifold head will be discontinued. It is necessary to replace all components when replacing the old manifold head with the new manifold head.

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Rev. 05/96

TECH BULLETIN

063
11/92

Published regarding engineering changes and improvements

SUBJECT: Model 2520C Hi-Temp, Cooled Inlet Pump

To avoid confusion with the corrosion resistant series pumps, this special Hi-Temp pump Model 2527 has been renumbered as a Model 2520C.

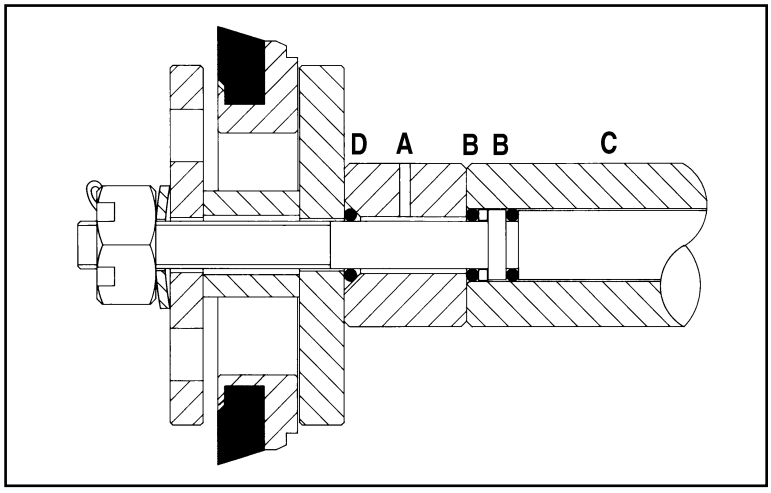
This pump has specially designed dual inlet seals and a specially ported inlet manifold to circulate cool fluid between the two inlet seals to enhance the life of the seals when working with liquid temperatures up to 210°F.

To further enhance the life of this pump, the special inlet spacer has been redesigned with a front taper to accommodate an o-ring. This o-ring offers an internal pressure and fluid seal to prevent fluid from weeping under the spacer and causing loss of performance.

When servicing this pump, you will need to upgrade to the new spacer and o-ring. The old spacer is no longer available.

	Old PN	New PN	Effective Date
Spacer	43273	46148	9/92
O-Ring (Viton®)	—	14198	9/92

For servicing these high temp pumps, (A) Following the installation of the Piston rod O-Rings (B) and sleeve (C), slip this vented spacer onto the rod with the **tapered end forward**. Then install the O-Ring (D) in the tapered groove and proceed with standard piston assembly. See Piston Service Manual for complete pump servicing.



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TECH BULLETIN

064
04/93

Published regarding engineering changes and improvements

SUBJECT: By-Pass Line Sizing

Restricting the by-pass line of your regulating device can result in unnecessary system problems. Damaging turbulence in the supply tank, back pressure to the regulating valve or excessive pressure to the pump inlet are typical problems which can be avoided by properly sizing the by-pass line.

Normally one size larger than the by-pass port of the regulating device is adequate diameter, however, this can vary with the length of line.

The following chart and formula are provided to assist in the proper selection of the low pressure by-pass hose. Remember to use a quality flexible, reinforced hose and follow these steps:

a. Determine the **number and type of fittings** used with your by-pass hose
b. Select the **fitting size** from the top of the chart
c. Determine the desired **hose length**
d. Calculate the formula and locate where the **Equivalent Feet** and your **system flow** intersect
e. If the Equivalent Feet and flow do not intersect within the hose diameter size you are using, either increase the diameter or decrease the length, recalculate and verify against the chart again.

See chart and example on reverse side.

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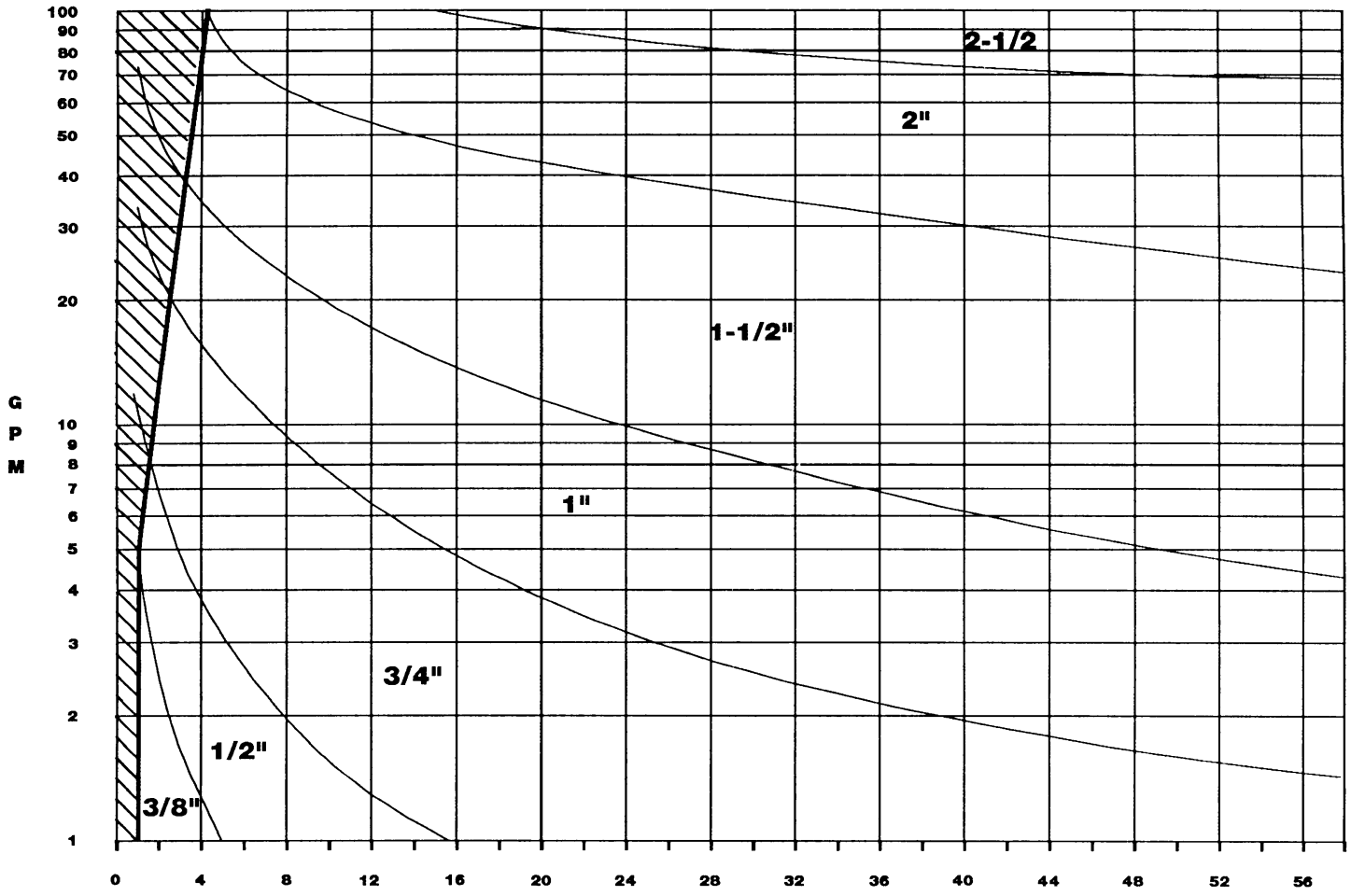

EQUIVALENT FEET

EQUIVALENT FEET = Length of by-pass hose (ft.) + Equivalent feet for fittings in by-pass circuit

TYPE OF FITTING	EQUIVALENT FT. FOR FITTING SIZE					
————	3/8	1/2	3/4	1	1-1/2	2
Coupling	0.8	1.0	1.4	1.7	2.8	3.5
90° Elbow	2.7	3.5	4.5	5.7	9.0	11.0
45° Elbow	0.6	0.75	1.0	1.2	2.0	2.5
Tee	2.7	3.5	4.5	5.7	9.0	11.0

EXAMPLE: What size by-pass hose must I use for a system with 6.0 GPM flow using two 90° elbows with a desired hose length of 3 feet?

For 1/2" hose Equivalent ft. length = 3' + 2 x 3.5 = 3 + 7 = 10 ft.
This does not fall in the 1/2" area.

For 3/4" hose Equivalent ft. length = 3' + 2 x 4.5 = 3 + 9 = 12 ft.
This falls in the 3/4" area.

TECH BULLETIN 065 01/93

Published regarding engineering changes and improvements

SUBJECT: Higher Performance - SF Pumps

Following extensive testing both in the field and in our engineering lab, the SF pumps have proven themselves with outstanding performance under their new specifications.

The 2SF Plunger Pumps are now rated to **2000 PSI** performance on the Gas Models, **2SF22GS** [2.2 GPM], **2SF30GS** [3.0 GPM] and **2SF35GS** [3.5 GPM]. Please note the **"S"** has been used to denote the **2000 PSI** rating.

All of the 4SF models have been upgraded to **3000 PSI** and two new 5 GPM models [4SF50ELH electric] and [4SF50GH1 gas] have been added to the line. Please note that the **"H"** has been used to denote the **3000 PSI** rating. [See Tech Bulletin 075 for futher updates to this model].

All 2SF and 4SF pumps have also been upgraded to the stainless steel inlet valves. For the 2SF P/N 44873 nylon has been replaced with **45854 S.S.** For the 4SF P/N 45185 nylon has been replaced by P/N **45845 S.S.** [The nylon inlet valves will only be used in "HT" units. The new P/N is 33873].

This change to stainless steel inlet valves was also done to the 2SF Inlet Valve Kit P/N 34668.

Following is the production date these valves became effective for each model:

Old P/N		New P/N
2SF22E	6920341	2SF22ES
2SF22EL	1920001	2SF22ELS
2SF29EL	4920071	2SF29ELS
2SF30E	1920246	2SF30ES
2SF35E	2920261	2SF35ES
4SF40ELH	4920101	4SF40ELS
4SF45ELH	4920101	4SF45ELS
4SF50ELH	4920101	4SF50ELS

Old P/N		New P/N
2SF22G	3930101	2SF22GS
2SF22GH	3930101	2SF22GS
2SF30G	4920315	2SF30GS
2SF30GH	2920311	2SF30GS
2SF35G	2920371	2SF35GS
2SF35GH	3930101	2SF35GS
4SF35GH1	0920101	4SF35GS1
4SF40GH1	0920101	4SF40GS1
4SF45GH1	0920101	4SF45GS1
4SF50GH1	3930101	4SF50GS1

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Technical Services Department

Rev. 11/99

TECH BULLETIN 066
10/94

Published regarding engineering changes and improvements

SUBJECT: V-Packing change - HP Pumps

The original production run of 4HP35G1 and 4HP40G1 pumps were built with two V-Packings and a thin Male Adapter.

For added strength under pressure and to keep service time and costs to a minimum, this pump was modified to a single V-Packing and a thicker Male Adapter.

These new parts are available in the seal kit 34062 and will replace the old items during servicing. Discard the old Male Adapter and two V-Packings and use only the new kit parts.

34062 Seal Kit

3—48222 Lo-Pressure Seal–Buna-N

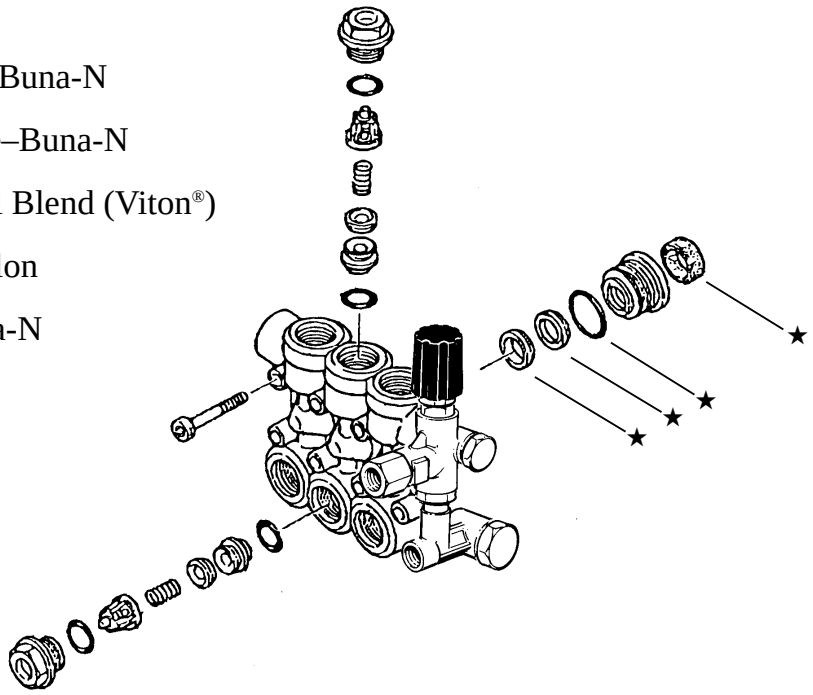
3—13980 O-Ring, Seal Case–Buna-N

3—46617 V-Packing-Special Blend (Viton®)

3—46618 Male Adapter–Nylon

3—46730 Seal Washer–Buna-N

★ Included in Kit



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TECH BULLETIN 067
10/94

Published regarding engineering changes and improvements

SUBJECT: Plunger Retainer Change

For added strength and corrosion resistance, the Plunger Retainer on the 3FR, 5FR and 7FR pumps has been changed from brass to 303 Stainless Steel. This change is effective with June 1994 production on the following pump models:

Frame Size	Model	Old Part Number Brass	New Part Number S.S.
3FR	230, 240, 270, 279	43234	46504
5FR	30, 31, 34, 35, 34G1, 35G1 42HS, 43HS, 45, 45G1	43234	46504
7FR	51, 53, 55, 58, 51G1, 51G118, 58G1 58G118 56, 57, 59, 60, 70, 56G1, 59G1, 60G1	43234	46504

CAT PUMPS
Technical Services Department

TECH BULLETIN 068

8/94

Published regarding engineering changes and improvements

SUBJECT: V-Packing Spacer and O-Ring Change for Model 3507

For added corrosion resistance, we have changed the V-Packing Spacer from Nickel Aluminum Bronze to 316 Stainless Steel.

Additionally, we have changed the o-rings on the V-Packing Spacer and the Valve Seat from 70 durometer to 85 durometer.

The Valve Kit 34151 and Seal Kit 31037 will also be updated to include these changes.

Description	Old P/N	Intermediate P/N (1/94)	New P/N (6/94)
V-Packing Spacer	44078 NAB	45597 SS	46668 SS
O-Ring, Seat	23172 NBR-70D	26089 NBR-85D	26089 NBR-85D
O-Ring, Spacer	14200 NBR-70D	17622 NBR-85D	17622 NBR-85D

NAB=Nickel Aluminum Bronze NBR=Medium Nitrile (Buna-N) SS=316 Stainless Steel

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TECH BULLETIN 069
8/94

Published regarding engineering changes and improvements

SUBJECT: Forged Extended Manifolds

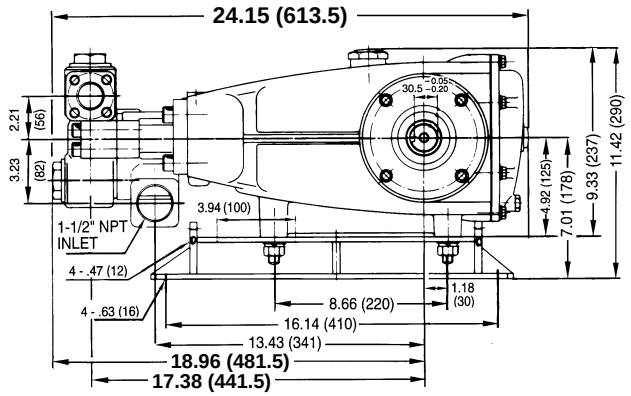
To provide added strength enhance quality control and provide better appearance, the 3520 and 3535 pump Inlet Discharge Manifolds will now be a forged extended design.

Additionally, the 3521, 3527, 3531, 3537, 3507, 3517 pumps will have a new extended cast manifold.

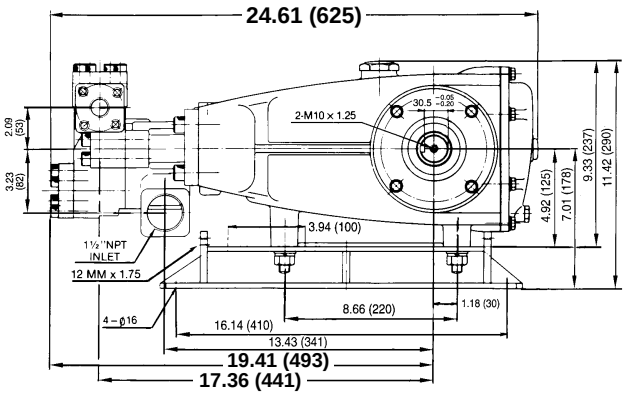
To properly mount these new extended manifolds onto the pump, longer Socket Head Screws are necessary. The old Discharge Manifolds will be phased out and must be replaced with the new Discharge Manifold plus screws.

See the revised Dimensional Drawing for the new overall pump length. See reverse side for new part numbers and effective dates for this change.

Models
3520, 3521, 3527
3535, 3531, 3537



Models
3507, 3517



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Model	Old Part Number		Current Part Number		Qty Req.	Date
3507	44079	Discharge Manifold	46478	Discharge Manifold	1	994
	89626	M12x65 Screw	89981	M12x70 Screw	8	
3517	44094	Discharge Manifold	46479	Discharge Manifold	1	395
	89628	M12x65 Screw	89981	M12x70 Screw	8	
	45206	Inlet Manifold	● 45124	Inlet Manifold	1	D93
3527	44613	Discharge Manifold	46335	Discharge Manifold	1	494
	44206	Inlet Manifold	● 45124	Inlet Manifold	1	594
3537	44613	Discharge Manifold	46335	Discharge Manifold	1	D93
	89628	M12x65 Screw	89981	M12x70 Screw	8	
	44206	Inlet Manifold	● 45124	Inlet Manifold	1	D93
3521	45371	Discharge Manifold	46326	Discharge Manifold	1	D93
	89678	M12x65 Screw	89981	M12x70 Screw	8	
	45365	Inlet Manifold	45365	Inlet Manifold	1	194
3531	45371	Discharge Manifold	46326	Discharge Manifold	1	194
	89628	M12x65 Screw	89981	M12x70 Screw	8	
	45365	Inlet Manifold	45365	Inlet Manifold	1	

Model	Old Part Number		Old Extended Part Number		Date	New Forged Extended Part Number		Qty Req.	Date
3520	44725	Dschg Mfld	46340	Dschg Mfld	194	46394	Dschg Mfld	1	594
	89573	M12x65 Screw	89980	M12x70 Screw		89980	M12x70 Screw	8	
	44530	Inlet Mfld	[46346]	Inlet Mfld	194	● 46392	Inlet Mfld	1	594
3535	44725	Dschg Mfld	46340	Dschg Mfld	194	46394	Dschg Mfld	1	494
	89573	M12x65 Screw	89980	M12x70 Screw		89980	M12x70 Screw	8	
	44530	Inlet Mfld	[46346]	Inlet Mfld	194	● 46392	Inlet Mfld	1	494
	44738	Plug	44738	Plug		⁎ 46444	Valve Plug	6	

⁎ Old style plugs may be used in new style manifold.

● Review Tech Bulletin 50 for additional information on spacer with coil spring.

[ ] Individual parts no longer available.

TECH BULLETIN 070

3/95

Published regarding engineering changes and improvements

SUBJECT: Maximum Performance - SF Pumps

RPM: It is important to operate the system within the pump RATED RPM. The 2SF pumps are rated at 1725 RPM (Electric) or 3450 RPM (Electric or Gas) and the 4SF pumps are rated at 1725 RPM (Electric) and 3200 RPM (Gas). Most engines have a 3600 RPM rating. Running beyond these rated pump RPMs can result in added stress to the drive-end and premature failure of an item which normally would provide years of service.

DISCHARGE PRESSURE: It is important to ***operate the system within the pump RATED MAXIMUM DISCHARGE PRESSURE.*** The standard 2SF is 1200 PSI, the "H" version is 1500 PSI, the "S" version is 2000 PSI and the "Z" version is 2500 PSI. The 4SF "H" was 2500-3000 PSI and the "S" version is 3000-3500 PSI.

PRESSURE GAUGE: It is important to mount your pressure gauge on or very close to the discharge manifold of the pump to receive the most accurate pressure reading. Mounted downstream of the chemical injector or near the gun or nozzle will give an inflated rating and after prolonged operation, could result in undue stress to the pump. Incorrect pressure readings from an improperly placed pressure gauge can result in excessive pressure loads to either the manifold or the drive-end of the pump.

PRESSURE UNLOADER/REGULATOR: Both the 2SF and 4SF have specially designed unloaders to operate within the pump specifications and maximize pump life. Use of other unloaders should be carefully reviewed before installation and use. Some regulating devices have high pressure spikes when in the by-pass mode. To assure proper operation of the unloader/regulating valve, be certain to include the 5-10% by-pass for the regulating device in the nozzle calculation. This by-pass is essential in minimizing pressure spikes.

CHEMICAL INJECTORS: The standard chemical injector for the 2SF is 7123 and for the 4SF is 7124. The orifices in these chemical injectors are designed to be used with a standard 30-50 ft. high pressure hose. As the hose length increases, additional back pressure can be created and the chemical orifice must change accordingly, to enable chemical draw. With a longer 100 ft. hose, it may be necessary to change to the 7122 on the 2SF pump. Be aware of the increased pressure drop across the injector with this change and include this in your high pressure nozzle calculation. See data sheet for more details.

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Technical Services Department

Rev. 11/99

TECH BULLETIN 071

4/95

Published regarding engineering changes and improvements

SUBJECT: Plunger Rod Changes - HP Pumps

To improve the production capabilities and maintain quality control, the plunger rod and stud for the 4HP pump models have changed effective with ***January 1, 1995*** production. The pump model numbers will change from HP to DX.

Item	Old Part No.		New Part No.	
4HP35GI, 4HP40G1			**5DX35G1, 5DX40G1**	
Plunger Rod	46525		 46728	
O-Ring, Plunger Retainer	17399		..... N/A	
Keyhole Washer	45697		..... N/A	
Ceramic Plunger	46524		 46727	
Gasket, Plunger Retainer	45891		..... N/A	
Seal Washer	N/A		 46730	
Barrier Slinger	43900		 46732	
Plunger Retainer w/Stud	104360		 48201	

The current Ceramic Plunger and Plunger Retainer will remain available for servicing older pump models, however, ***if the Plunger Rod wears, it will automatically be replaced with all of the above items as a set.*** If only ***one Plunger Rod*** needs replacement, it is acceptable to use one new style and two old style.

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Technical Services Department

Rev. 11/99

TECH BULLETIN 072

5/95

Published regarding engineering changes and improvements

SUBJECT: Manifold Head and V-Packing Change - 15FR

The CAT PUMP V-Packing alternate for FPM and EPDM on the Model 1050 is 103692 V-Packing (PTFE). This special blend V-Packing is more compatible with a wider variety of fluids and temperatures. Because of the extended life and greater compatibility of this V-Packing, we have made the 103692 common to 1057 and 1051 pumps and all models when FPM and EPDM are required.

Tighter tolerances are required with this 103692 V-Packing. Because of ISO requirements, it is necessary to assign new part numbers for this change. The following are the part numbers for the Manifold Head and Seat Kits including the 103692 V-Packing.

The old manifold part numbers will gradually be phased out.

PUMP MODEL	OLD MANIFOLD HEAD	CURRENT MANIFOLD HEAD	CURRENT SEAL KITS		
			NBR	FPM	EPDM
1050	43511 BB	46704 BB	30913	30986	33913
1057	43971 NAB	46706 NAB	33916	30986	33913
1051	44379 SS	46705 SS	33916	30986	33913

BB=Brass EPDM=Ethylene Propylene Diene Monamer FPM=Fluorocarbon (Viton®)
NAB=Nickel Aluminum Bronze NBR=Medium Nitrile (Buna-N) SS=316SS

CAT PUMPS
Technical Services Department

Rev. 11/99

TECH BULLETIN 073 10/95

Published regarding engineering changes and improvements

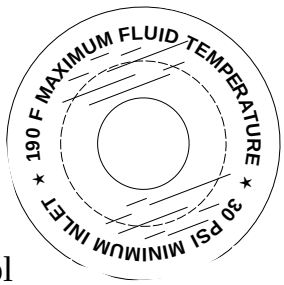
SUBJECT: Hi-Temp Pumps

Recently CAT PUMPS introduced a number of Hi-Temp Pump Models. Each of these models uses a specially formulated Hi-Pressure Seal referred to as STG. These seals are a two part construction with a stainless steel backing for added strength and support at high temperatures.

During servicing of these seals, the two pieces can separate. It is important to watch for this during removal to be certain the stainless steel support is removed from the manifold before the new seal assembly is installed. If accidentally left in the manifold, it will create an added load and result in premature wear to the seals or damage to other components. Note: this two piece construction is also used on the standard 2SF Hi-Pressure Seal and the same caution is recommended. Also on the 2SF Hi-Temp pumps, the Inlet Valve changes from the standard stainless steel to the Hi-Temp nylon when the Hi-Temp Hi-Pressure Seals are changed.

The following are the special "Hi-Temp" Hi-Pressure Seals and the complete Seal Kit for each model:

		Hi-Temp Seal	Hi-Temp Seal Kit
3 Frame	233.3000, 231.3000 243.3000, 241.3000 273.3000, 271.3000	46652	33915
5 Frame	313.3000, 311.3000 343.3000, 341.3000 353.3000, 351.3000	46667	33623
2SF	all models [add 3 at end of standard P.N.]	46652 33873	33953



Each Hi-Temp unit is tagged with a special Hi-Temp label to caution the operator that a minimum of **30 PSI inlet pressure** is essential with high temperatures and maximum temperature of the pumped fluid of is **190°F.**

If using a holding tank, it must be sized to 10 times the system flow and be equipped with at least two baffles. There should also be a temperature control valve in the system to shut down the pump at the maximum temperature of 190°F.

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TECH BULLETIN 074

7/95

Published regarding engineering changes and improvements

SUBJECT: Piston and Plunger Pump Torque Chart

PISTON PUMPS

ITEM	THREAD SIZE	TOOL SIZE	TOOL PART NO.	TORQUE in. lbs.	TORQUE ft. lbs.	TORQUE Nm
Piston Rod Nut						
284	M4	M8 Hex	25052	25	2.0	3
280, 290, 323, 333, 390, 430, 10 FR	M6	M10 Hex	25082	55	4.4	6
1020, 1520, 2020	M7	M10 Hex	25082	115	9.4	13
25 FR	M8	M13 Hex	25324	115	9.4	13
6020, 6040	M14	M24 Hex	44046	390	32.5	44
6024, 6044	M10	M17 Hex	25083	220	18.1	25
Manifold Stud / Nut & Cylinder Bolts						
280, 284, 290, 323, 333, 390, 430	M8	M12 Hex	—	115	9.4	13
10 FR	M10	M17 Hex	25083	220	18.1	25
25 FR	M12	M19 Hex	—	350	28.9	39
6020, 6024, 6040, 6044	M16	M24 Hex	44046	565	47.0	64
Bubble Oil Gauge						
All Models	M28	Oil Gauge Tool	44050	45	3.6	5
Mounting Screws						
280, 290, 333, 430	M8	M13 Hex	25324	100-115	8.3-9.5	12-13
520, 623, 820, 1010	M10	M17 Hex	25083	205	17.1	24
25 FR	M12	M19 Hex	—	285-345	23.7-28.8	34-40

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PLUNGER PUMPS

ITEM		THREAD SIZE	TOOL SIZE	TOOL PART NO.	TORQUE in. lbs.	TORQUE ft. lbs.	TORQUE Nm
Plunger Retainer - 303 S.S./Brass							
3 FR		M5	M11 Hex	44044	55	4.4	6
Plunger Retainer - 316 S.S.							
3 FR		M5	M12 Hex	—	55	4.4	6
3CP, 5CP		M6	M10 Hex	25082	55	4.4	6
Plunger Retainer							
O.E.M.	31, 34, 35, 42HS, 43HS, 45 56, 57, 58, 59, 60, 70	M5	M11 Hex	44044	55	4.4	6
5 FR, 7 FR, 15 FR		M5	M12 Hex	—	55	4.4	6
5CP		M6	M10 Hex	25082	44	4.4	6
25 FR	2530, 2537	M7	M14 Hex	25053	90	7.2	10
35 FR	3507, 3510	M7	M14 Hex	25053	90	7.2	10
35 FR	3515, 3517, 3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M10	M21 Hex	—	220	18.1	25
38 FR	3801, 3811	M7	M14 Hex	25053	90	7.2	10
38 FR	3821, 3831	M10	M21 Hex	—	220	18.1	25
60 FR	6767	M14	M30 Hex	—	520	43.4	59
68 FR	6811, 6821, 6831	M10	M21 Hex	—	220	18.1	25
68 FR	6841, 6861	M14	M30 Hex	—	520	43.4	59
Manifold Head Bolts							
3CP	1120, 1130, 1140	M8	M6 Allen	30941	115	9.4	13
5 FR	31, 34, 35, 310, 340, 350 311, 341, 351, 317, 347, 357	M10	M8 Hex	25052	220	18.1	25
5CP	2120W, 2140W, 2150W 3120, 5120, 5150, 6120	M8	M6 Allen	30941	115	9.4	13
5 FR	42HS, 43HS, 45	M10	M8 Allen	33046	220	18.1	25
7 FR	510, 530, 550, 56, 57, 58, 59, 60, 70	M10	M14 Hex	25053	220	18.1	25
15 FR	650, 651, 1050, 1051, 1057	M10	M17 Hex	25083	220	18.1	25
Inlet Manifold Screws							
3 FR	All Models	M10	M8 Allen	33046	220	18.1	25
3CP	1121, 1131, 1141	M8	M6 Allen	30941	115	9.4	13
5CP	6121, 6141, 6151	M12	M10 Allen	33047	115	9.4	13
25 FR	2530, 2537	M12	M10 Allen	33047	350	28.9	39
35 FR	3507, 3517, 3510, 3515, 3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M14	M12 Allen	33048	480	39.8	54
38 FR	3801, 3811, 3821, 3831	M14	M12 Allen	33048	500	41.6	56
60 FR	6767	M16	M24 Hex	44046	565	47.0	64
68 FR	6811, 6821, 6831, 6841, 6861	M16	M14 Allen	33049	620	51.6	70
Discharge Manifold Screws							
3 FR	All Models	M10	M8 Allen	33046	220	18.1	25
3CP	1121, 1131, 1141	M10	M8 Allen	33046	140	12	16
5CP	6121, 6141, 6151	M12	M10 Allen	33047	260	22	30
25 FR	2530, 2537	M12	M10 Allen	33047	350	28.9	40
35 FR	3507, 3517, 3510, 3515, 3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M12	M10 Allen	33047	350	28.9	40
38 FR	3801, 3811, 3821, 3831	M12	M10 Allen	33047	355	29.6	40
60 FR	6767	M16	M14 Allen	33049	565	47.0	64
68 FR	6811, 6821, 6831 (Upper) 6841, 6861	M16	M14 Allen	33049	660	55.0	75
68 FR	6811, 6821, 6831 (Lower)	M12	M10 Allen	33047	355	29.6	40

PLUNGER PUMPS

ITEM		THREAD SIZE	TOOL SIZE	TOOL PART NO.	TORQUE in. lbs.	TORQUE ft. lbs.	TORQUE Nm
Valve Plugs							
3CP, 5CP, 5 FR, 42HS		M22	M24 Hex	44046	870	72.3	98
5 FR	43HS, 45	M25	M24 Hex	44046	520	43.4	59
7 FR	51, 55, 56, 57, 58, 59 ,60, 70, 530, 550	3/4" SPT	M27 Hex	44045	870	72.3	98
15 FR	650, 651, 1050, 1051, 1057	3/4" SPT	M27 Hex	44045	870	72.3	98
35 FR	3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M45	M41 Hex	—	1305	108.5	147
60 FR	6767	M70	M41 Hex	—	1390	115.7	157
Valve Plug / Plate Screws							
35 FR	3507, 3517, 3510, 3515	M10	M8 Allen	33046	220	18.1	25
38 FR	3801, 3811, 3821, 3831	M10	M8 Allen	33046	250	21.0	28
68 FR	6811, 6821, 6831	M10	M8 Allen	33046	250	21.0	28
Valve Block Screws							
68 FR	6841, 6861	M16	M14 Allen	33049	660	55.0	75
Crankcase Cover / Bearing Cover Screws							
3CP, 3 FR - All Models		M6	M10 Hex/Phil.	25082	50	4.0	6
5 FR	31, 34, 35, 310, 340, 350, 317, 347, 357, 311, 341, 351	M6	M10 Hex/Phil.	25082	50	4.0	6
5 FR	42HS, 43HS, 45	M6	M10 Hex/Phil.	25082	50	4.0	6
		M8	M13 Hex	25324	115	9.4	13
5CP	Crankcase Cover - All Models	M6	M10 Hex/Phil.	25082	50	4.0	6
	Bearing Cover - All Models	M8	M13 Hex	25324	115	9.4	13
7 FR	51, 53, 55, 56, 57, 59, 60, 70	M6	M10 Hex	25324	115	9.4	13
15 FR	650, 1050	M6	M10 Hex	25082	50	4.0	5.7
25 FR	2530, 2537	M8	M13 Hex	25324	115	9.4	13
35 FR	3507, 3517, 3510, 3515, 3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M8	M13 Hex	25324	115	9.4	13
38 FR	3801, 3811, 3821, 3831	M8	M13 Hex	25324	115	9.4	13
60 FR	6767	M10	M17 Hex	25083	220	18.1	25
68 FR	6811, 6821, 6831, 6841, 6861	M10	M17 Hex	25083	220	18.1	25
Connecting Rod Screws							
3CP, 3 FR, 4 FR, 5CP, 5 FR		M7	M10 Hex	25082	95	7.96	11
7 FR, 10 FR, 15 FR, 25 FR		M8	M13 Hex	25324	130	10.8	15
35 FR	3507, 3517, 3510, 3515, 3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M10	M17 Hex	25083	395	32.5	45
38 FR	3801, 3811, 3821, 3831	M10	M17 Hex	25083	390	32.5	44
60 FR	6767	M10	M17 Hex	25083	390	32.5	44
68 FR	6811, 6821, 6831, 6841, 6861	M10x1.25	M17 Hex	25083	390	32.5	44
Bubble Oil Gauge							
All Models		M28	Oil Gauge Tool	44050	45	3.6	5
Mounting Bolts							
3CP, 3 FR, 5CP - All Models		M8	M13 Hex	25324	115	9.4	13
5 FR, 7 FR		M8	M13 Hex	25324	115	9.4	13
15 FR		M10	M17 Hex	25083	240	19.7	29
25 FR	2530, 2537	M12	M19 Hex	—	350	28.9	39
35 FR	3507, 3517, 3510, 3535, 3520, 3521, 3527, 3535, 3531, 3537, 3545, 3541	M14	M22	—	570	47.4	68
38 FR	3801, 3811, 3821, 3831	M14	M22	—	570	47.4	68

2DX, 2SF, 2X, 4SF, 5DX, 4HP PUMPS

ITEM	THREAD SIZE	TOOL SIZE	TOOL PART NO.	TORQUE in. lbs.	TORQUE ft. lbs.	TORQUE Nm
Plunger Rod Nut						
2SF, 4SF	M6	M10 Hex	25082	55	4.4	6
Plunger Retainer						
2DX30GS, 5DX, 4HP	M6	M10 Hex	25082	55	4.4	6
Manifold Screw						
2SF, 4SF, 5DX, 4HP	M8	M6 Allen	30941	115	9.4	13
2DX, 2X	M6	M10 Hex/Phil.	25082	55	4.4	6
Outer Bearing Case Screw						
2SF, 4SF	M6	M10 Hex/Phil.	25082	50	4.0	6
Inner Bearing Case Screw						
2SF, 4SF	M6	M10 Hex/Phil.	25082	50	4.0	6
Valve Plugs						
2DX, 2X	M22	M22 Hex	—	520	43.4	59
5DX, 4HP	M22	M24 Hex	44046	870	72.3	100
Bearing Case Screws						
2DX, 2SF, 2X, 4SF	M6	M10 Hex/Phil.	25082	50	4.0	6
5DX, 4HP	M8	M13 Hex M5 Hex/Phil.	25324	115	9.4	13
Crankcase Cover						
5DX, 4HP	M6	M10 Hex	25082	50	4.0	6
Bubble Oil Gauge						
All Models	M28	Oil Gauge Tool	44050	45	3.6	5

TECH BULLETIN 075
10/95

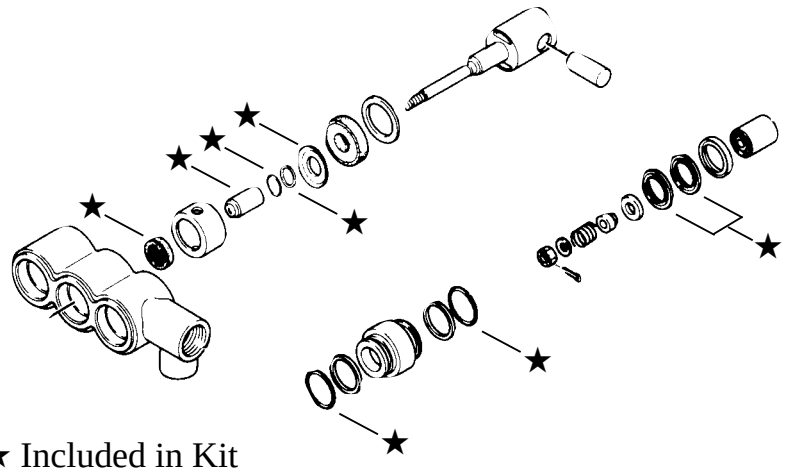
Published regarding engineering changes and improvements

SUBJECT: Sleeve Change - 4SF Pumps

The 4SF pumps have proven to be exceptionally long lasting performers in the portable pressure washer market. To offer even greater performance life and simplify servicing, the 4SF pump models have been upgraded to a new “Sleeved Piston Rod”.

The following are the new items needed to service these “S” sleeved style pumps.
The “S” models started with production date October 1995.

46644	Piston Rod - Sleeved
46646	Sleeve
43568	Barrier Slinger
25392	O-Ring, Sleeve
29003	Back-up Ring, Sleeve
34063	Sleeve and Seal Kit



★ Included in Kit

The standard “H” models will gradually be phased out and replaced with this new sleeved “S” version. The standard “H” piston rod will also be phased out. When replacing the “H” non-sleeved piston rod with the “S” sleeved piston rod, it is recommended that all three rods be done as a set. This will assure a uniform performance and provide easier servicing in the future.

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Rev. 11/99

TECH BULLETIN 076
1/96

Published regarding engineering changes and improvements

SUBJECT: Valve Seat Change 2530 and 2537 Pumps

Recently the valve seat and o-ring design was changed to enhance performance life of this pump, particularly in harsh conditions.

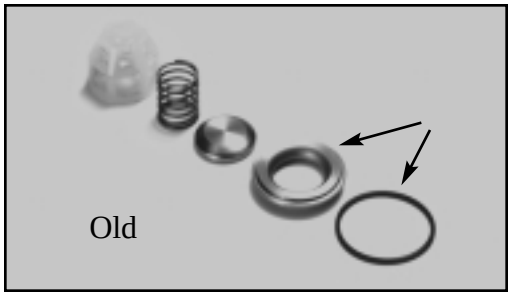
The original design called for the o-ring to be installed onto the lip of the seat, after the valve seat was installed. This position periodically allowed the o-ring to extrude and contribute to possible erosion in the manifold chamber.

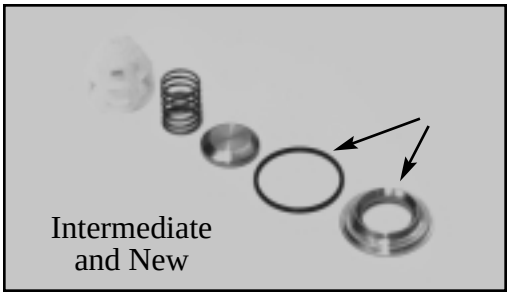
Effective with 695 mfg date, the o-ring was moved to the back side of the valve seat with the o-ring installed first, onto the lip in the manifold chamber, then the valve seat with the **machined o-ring groove down.**

Effective with 1195 mfg date, the valve seat was modified to a new thicker style, still with the o-ring installed first, onto the lip in the manifold chamber, then the valve seat with the **machined o-ring groove down.**

Kit 33951 will service all pumps prior to 1195 mfg date, while kit 33952 will service all pumps after 1195 mfg date. If the 33952 is used to service an old style pump, all 6 valve seats must be upgraded to the new 46857.

	⋆ **Old Parts** [Prior to 695]	⋆ **Intermediate Parts** [After 695]	**New Parts** [After 1195]
Valve Seat	45754 304SS 45841 316SS	— 46828 316SS	— 46857 316SS
Valve Kit	30951	33951	33952





⋆ Both old and intermediate parts are no longer available. Upgrade to new thicker valve seat requires all six valve seats or two kits.

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TECH BULLETIN 077

7/97

Published regarding engineering changes and improvements

SUBJECT: Oil Drain Kit

To facilitate the draining of the crankcase oil from a CAT PUMP, we now offer an Oil Drain Kit. This will be listed as an “optional” accessory on the pump data sheets.

Simply remove the oil drain plug from the rear crankcase cover and thread in the adapter with o-ring. Then thread in the oil drain hose with barb. The opposite end can be mounted to your equipment enclosure panel with the panel mount adapter or to the L-bracket and then fastened to the mounting base of your unit. Secure the panel mount adapter and thread in the square head plug. Remove the plug when ready to drain the oil. Remember to use teflon tape on all threaded connections.

34334 Oil Drain Kit

1—34368	Hose (24" x 3/8")
1—25144	Adapter, Drain Plug
1—23170	O-Ring, Adapter
1—34329	Square Head Plug
1—34369	Barb (3/8" x 1/4")
1—34338	Panel Mount Nut
1—34347	L-Bracket
2—990776	Screws (1/4-20) Self Tap.
1—34333	Instruction Sheet

CAT PUMPS
Technical Services Department

TECH BULLETIN 078

8/97

Published regarding engineering changes and improvements

SUBJECT: Field Retrofit Mounting

For those in need of replacing a failed General Pump, we now offer a field retrofit mounting kit which will place a CAT PUMP directly into the footprint of a General.

Just specify the 30637 Angle Mounting Kit with your next CAT PUMP order. It contains the necessary right and left rails and hardware to simplify the changeover.

This retrofit mounting will allow the CAT PUMP Model 5CP to replace the following General models: T1011, TS1011, T1511, TS1511, T2011, TS2011, TS2021.

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Technical Services Department

TECH BULLETIN 079
3/99

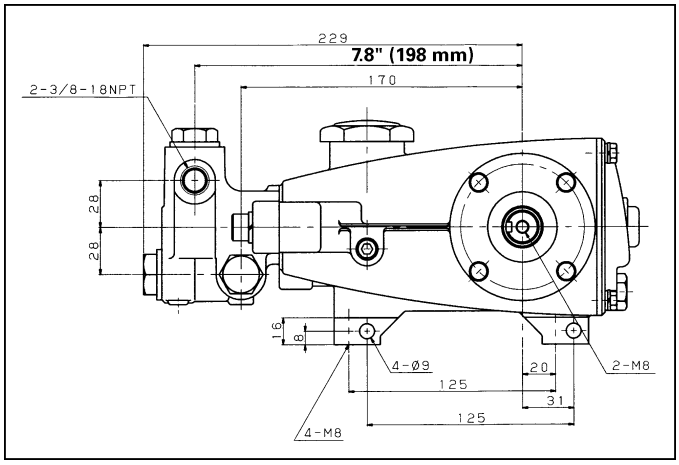
Published regarding engineering changes and improvements

SUBJECT: Manifold Head Change - 5PFR

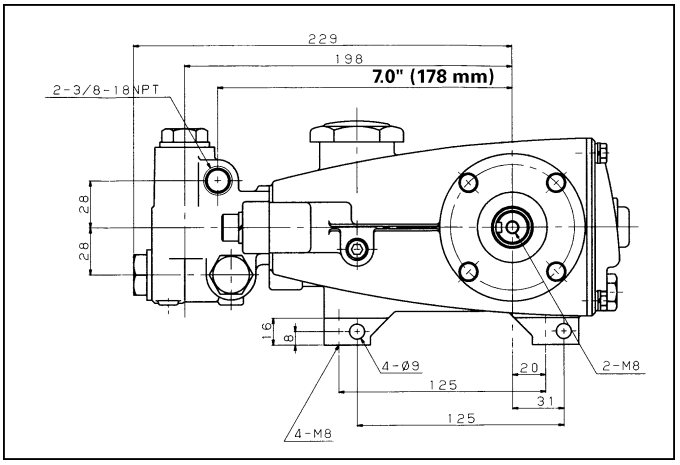
The tooling for the Nickel Aluminiun Bronze manifold head has expired. In creating a new tool, the head is slightly modified and results in a relocation of the discharge port on the 317, 347, 357 pumps.

The center distance from discharge port to crankshaft is now 7.0" (178 mm) on all pumps from the March 1999 production forward. The Part Number (44124) for the manifold head will remain the same.

Prior to 399
Old Models



After 399
New Models



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Rev. 11/99

TECH BULLETIN 080

10/99

Published regarding engineering changes and improvements

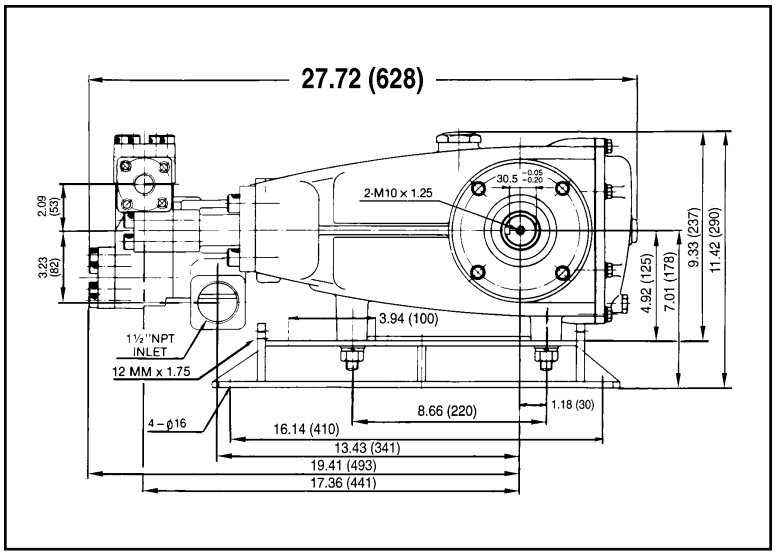
SUBJECT: Discharge Manifold Change 3507-3517

To provide added strength, enhance quality control and provide better appearance, the 3507 and 3517 discharge manifolds have been extended. This change will increase the overall length of the pump by 3mm.

The same bolts are used to mount these new discharge manifolds onto the pump. The old discharge manifold will automatically be updated with this new version.

Below is the revised dimensional drawing and a chart showing the part number changes that are effective with D98 production.

Model	Item	Old PN	New PN	Description
3507	185	46478	46561	Discharge Manifold
	188	89981	89981	Screw (M12x70)
	299	814562	816755	Complete Head
3517	185	46479	46565	Discharge Manifold
	188	89981	89981	Screw (M12x70)
	299	—	816750	Complete Head



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TECH BULLETIN

081
11/00

Published regarding engineering changes and improvements

SUBJECT: Seal Case and Wick Change - 2530, 2537

With the significant number of continuous-duty, industrial installations using the 25 Frame pumps, they have been upgraded to include a wick and oil pan. This feature offers the opportunity for added lubrication in heavy use and low lubricity liquid applications.

This change becomes effective with October 1997 production. The Model 2531 was originally released with this new feature.

Item	Old Part Number	New Part Number	
Wick	110667	110796	
Seal Retainer	110672	110672	Front
Seal Retainer	—	111116	Back
Oil Pan	—	27790	
Hex Screw	—	92519	

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TECH BULLETIN 082
01/00

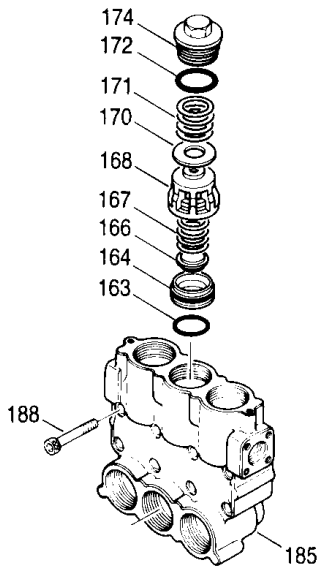
Published regarding engineering changes and improvements

SUBJECT: Discharge Manifold 6761

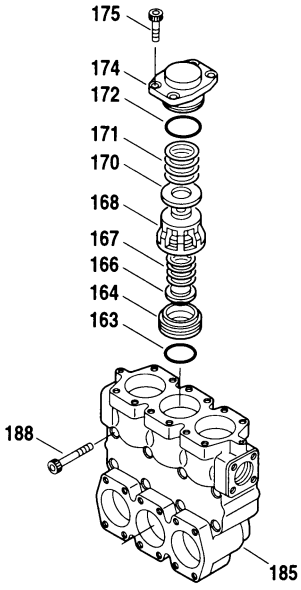
For added strength and ease in servicing, the current M70 threaded valve plug has been replaced with a press-in style Valve Plug and four M16 screws to secure it to the manifold. The new valve plug design requires a new Discharge Manifold. The old discharge manifold will be discontinued and replaced with the new style. The plugs will temporarily remain available for servicing older models. This change is effective with January 2000 production.

Item	Description	Current PN	MATL	New PN	MATL	Qty
174	Plug, Valve	48428	SS	48572	SS	6
175	Screw M16x35	N/A		48573	S	24
185	Manifold, Discharge	45774	SSL	48489	SSL	1

Old Style



New Style



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TECH BULLETIN

083
11/99

Published regarding engineering changes and improvements

SUBJECT: Winterizing a Pump

Standard Shut Down

- Flush pump and chemical injector with fresh water.
- Turn off power supply.
- Squeeze trigger gun to relieve line pressure.
- Disconnect Inlet and Discharge Plumbing.

System Flush

- Connect a short 4 foot hose to the pump inlet and place the other end of the hose in a container with 50% water and 50% antifreeze.
- Start the unit and run until the antifreeze flows out the discharge of the pump.
- Shut the unit off and disconnect the hose from the pump inlet.
- Store unit (do not install plugs in the inlet and discharge port).
- Cover to protect from severe elements.

Restarting System

- Turn regulator/unloader setting to lowest pressure point.
- Check crankcase oil level and purity.
- Reconnect the liquid supply line, discharge line and allow liquid to flow through pump for 2-3 minutes.
- Check for leaks at all plumbing connections.
- Turn crankshaft by hand initially. If free moving, start power.
- Gradually reset regulator/unloader in small increments to desired system pressure and resume operation.
- Follow your established maintenance cycle or the standard Preventative Maintenance Check List in the pump service manual.

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TECH BULLETIN

084
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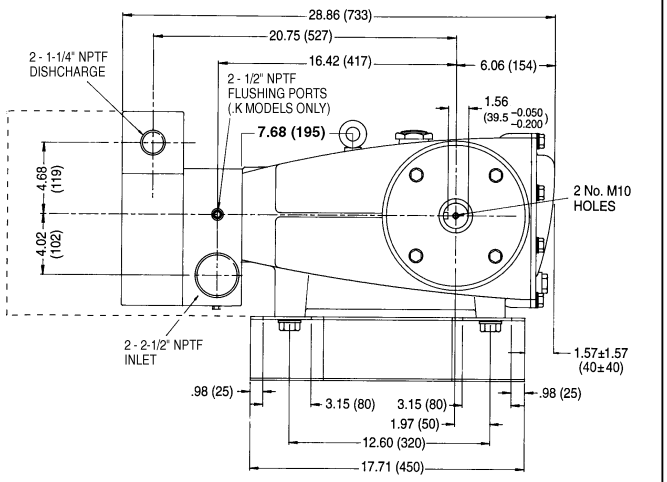
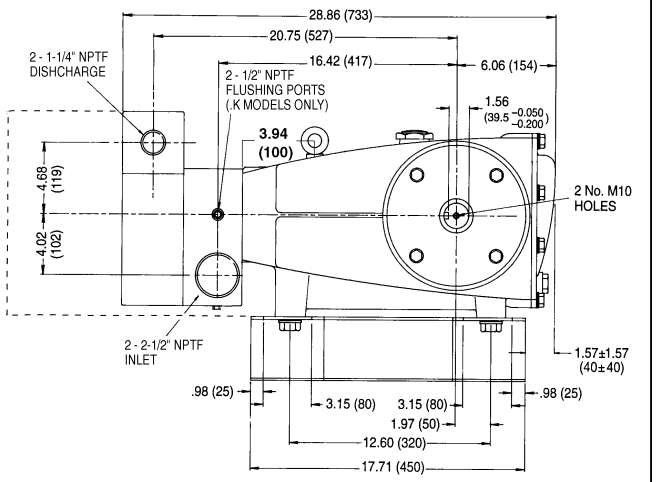
SUBJECT: Crankcase Change - 60 Frame

The 60 Frame Crankcase lifting eye bolt has been relocated to a more forward position. This has been done to provide better balance with the increase popularity of the block-style heads.
This change will take place approximately January 2000 and the crankcase PN 43284 will continue to be used. A recess has also been added at the top of the crankcase for the label.

Old Dimensional



New Dimensional



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TECH BULLETIN

085
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SUBJECT: Crankshaft Change - 25 Frame

The keyway in the 25 Frame Crankshaft has been changed to be compliant with the industry standard for M30 hubs. The new M8 Key and Crankshaft will be effective with March 2000 production. The new M8 pumps will be phased in as the old M7 stock exhausts.

The old Crankshaft with M7 keyway will automatically be replaced with the new Crankshaft with M8 keyway. The 50146 key will remain active, as it is used with other models.

This change affects the following pump models:

Piston - 1020, 2020, 1520, 1521, 2520, 2521, 2525, 2525C
Plunger - 2510, 2511, 2530, 2531, 2537
Plunger Block-Style - 2831, 2831K

OLD ITEMS		NEW ITEMS	
50146	Key (M7x7x40)	990036	Key (M8x7x40)
27770	Crankshaft (w/M7 keyway)	48704	Crankshaft (w/M8 keyway)
30207	Hub “H” 30 mm (Keyway M7)	30059	Hub “H” 30 mm (Keyway M8)

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TECH BULLETIN 086 02/00

Published regarding engineering changes and improvements

SUBJECT: Plunger Rod Change - 2DX

The Models 2DX20EN and 2DX30GNS with the nickel plated plunger rods have been eliminated. These models are now replaced by the ceramic plunger models 2DX20ES and 2DX30GS.

A kit is available for servicing and upgrading the older style pumps to the new ceramic plungers. The old plunger rods are no longer available.

OLD ITEMS			NEW ITEMS		
46628	BBNP	Plunger Rod	542402	BBCP	Plunger Rod
—	—	—	542403	CC	Plunger
—	—	—	542405	S	Retainer w/Stud
—	—	—	46730	NBR	Seal Washer
47215	NBR	Oil Seal	47215	NBR	Oil Seal
			31864	—	Plunger Rod Conversion Kit (Includes 3 each of 542402, 542403, 542405, 46730, 47215)

BBCP=Brass/Chrome Plated BBNP=Brass/Nickel Plated CC=Ceramic
NBR=Medium Nitrile (Buna-N) S=304SS

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TECH BULLETIN

087
11/00

Published regarding engineering changes and improvements

SUBJECT: Female Adapters - Plunger Pumps

When scheduled, preventative maintenance is not done on a regular cycle and the pump is permitted to operate after the V-Packings are worn, unnecessary damage can result to the ceramic plunger.

To provide extended pump life and minimize the possible damage to the ceramic plunger, on some plunger pump models, the Female Adapter has changed from Brass, Nickel Aluminum Bronze or Stainless Steel to **Delrin**®. This Delrin® is an extremely durable material and offers a cushion when the V-Packing begins to wear that prevents excessive damage to the ceramic plunger.

This is not a remedy for inadequate maintenance, but has proven successful in minimizing the need for replacing the ceramic plunger.

The metal Female Adapters are still used in the higher pressure and Block-Style pumps.

Female Adapter Cross Reference

Model	Old P/N (Metal)	New P/N (Delrin®)
651,661	44164	48388
1051, 1057	45073	48389
3521,3527	45564	48390
3531,3537	45367	48391
3541	—	48383
6761,6767	45771	48392

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TECH BULLETIN

088
11/00

Published regarding engineering changes and improvements

SUBJECT: SS Manifold Changes - 3CP and 5CP

The manifold design of the 3CP and 5CP pumps has changed from a 4-bold design to a 6-bolt design offering added strength and performance life in harsh applications.

The numbering of the pumps has changed to assure the correct manifold part numbers are used when servicing the new 6-bolt style. All internal seal and valve parts and kits remain common between the old and new models.

Pump Old Model	Inlet Manifold Old P/N	Discharge Manifold Old P/N	Pump New Model	Inlet Manifold New P/N	Discharge Manifold New P/N
3CP1121	46997	46998	3CP1221	48556	48558
3CP1131	46997	46998	3CP1231	48556	48558
3CP1141	46997	46998	3CP1241	48556	48558
5CP6121	48210	48214	5CP6221	48852	48554
5CP6141	48210	48214	5CP6241CS	48852	48554
5CP6151	48210	48214	5CP6251	48852	48554

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