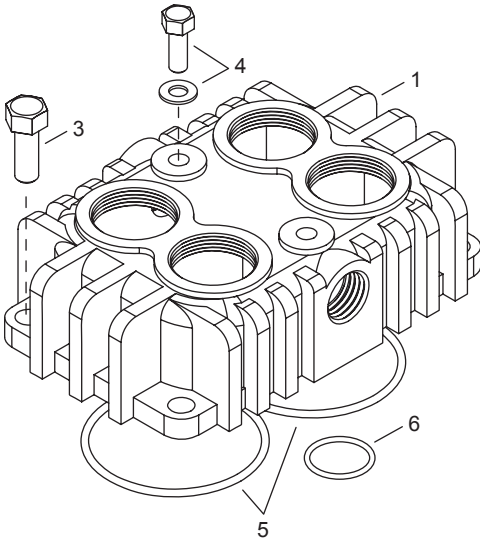
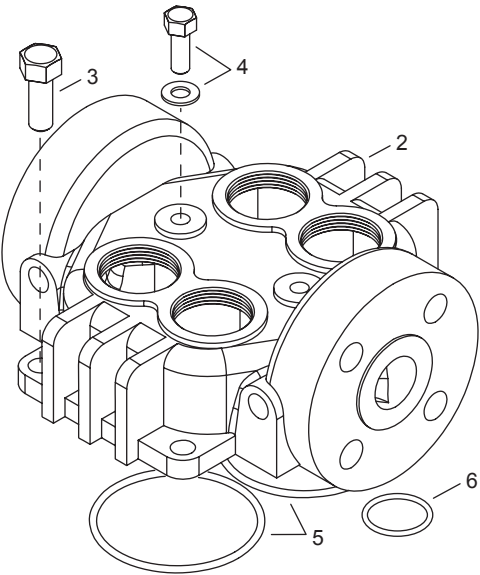


Appendix H—291 and F291 Head and Valve Assembly Details

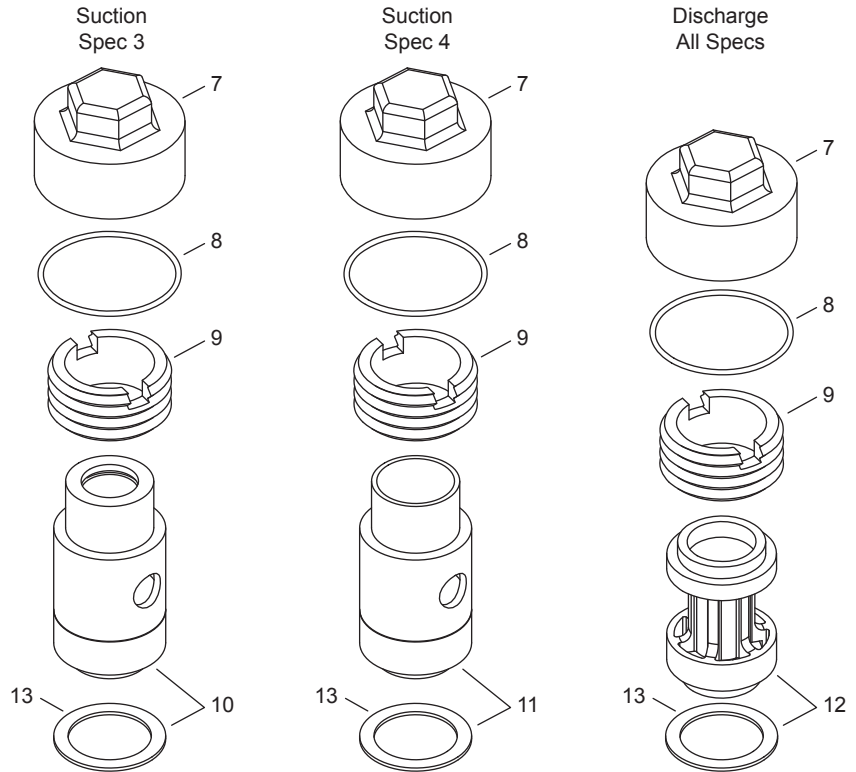
291 Head Assembly



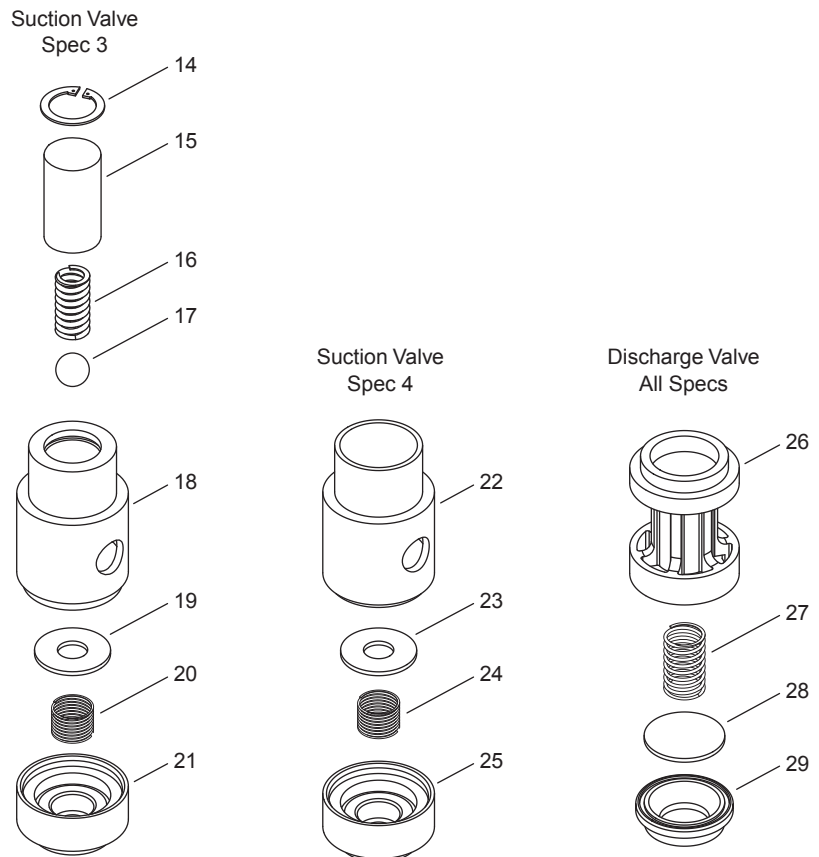
F291 Head Assembly



Valve Holddown Assemblies



Valve Assemblies Details



Appendix H—291 and F291 Head and Valve Assembly Details

Head and Valve Bill of Materials

Ref No.	Part No.	Description
1.	2912	Head model 291
	2912-X1	Head assy. for model 291 (spec 3)
	2912-X2	Head assy. for model 291 (spec 4)
2.	4300	Head model F291 (ANSI flange)
3.	7001-037 NC100A	Bolt, 3/8-16 x 1" Gr.5 hex head
4.	2731	Center headbolt
	2732	Gasket for center headbolt
5.	2-235 _b	O-ring
6.	2-113 _b	O-ring
7.	2714-1	Valve cap
8.	2-031 _b	O-ring
9.	2715	Holddown screw
10.	3483-1X	Suction valve assy. (spec 3)
	3483-1X1 ^a	Same as above but with copper gaskets
	3483-1X2 ^a	Same as above but with iron-lead gaskets
11.	3483-X	Suction valve assy. (spec 4)
	3483-X1 ^a	Same as above but with copper gaskets
	3483-X2 ^a	Same as above but with iron-lead gaskets
12.	3485-X	Discharge valve assy. (all specs)
	3485-X1 ^a	Same as above but with copper gaskets
	3485-X2 ^a	Same as above but with iron-lead gaskets
13.	2717	Valve gasket (aluminum)
	2717-1 ^a	Valve gasket (copper)
	2717-2 ^a	Valve gasket (iron-lead)
14.	5000-77	Retainer ring (spec 3)
15.	3977	Suction valve relief housing
16.	1411	Spring (spec 3)
17.	1410	Ball (spec 3)
18.	3483-1	Suction valve seat (spec 3)
19.	3972	Suction valve plate (spec 3)
20.	4009	Suction spring (spec 3)
21.	3484	Suction valve bumper (spec 3)
22.	3483	Suction valve seat (spec 4)
23.	3972	Suction valve plate (spec 4)
24.	4009	Suction spring (spec 4)
25.	3484	Suction valve bumper (spec 4)
26.	3486	Discharge valve bumper
27.	4008	Discharge spring
28.	3973	Discharge valve plate
29.	3485	Discharge valve seat

O-ring Code	
A	Buna-N
B	Neoprene ^{®c}

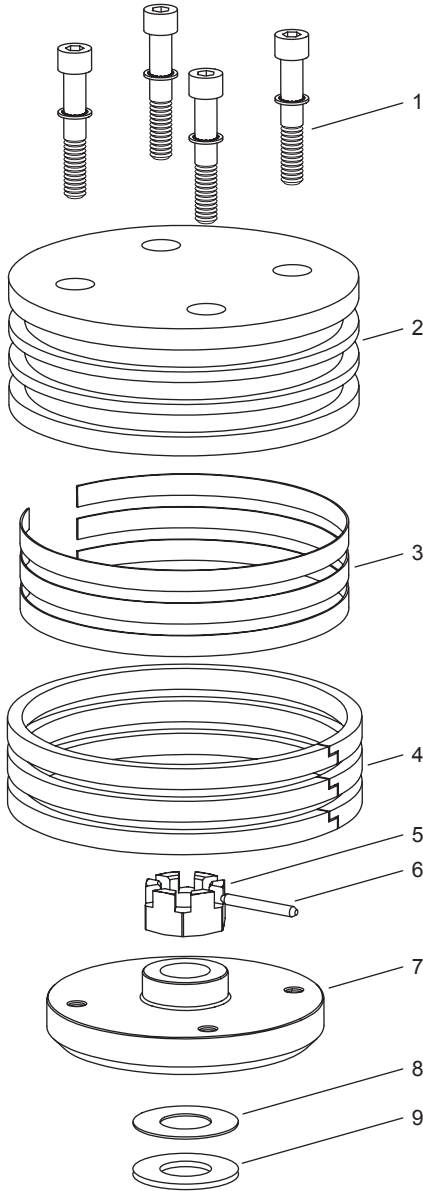
^a Optional

^b _ denotes O-ring code. See O-ring chart to the left for details.

^c Registered trademark of the DuPont company.

CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

Appendix H—291 and F291 Piston Assembly Details



**Piston Assembly Number 1983-X Bill of Materials
Piston Diameter 3" (7.62 cm)**

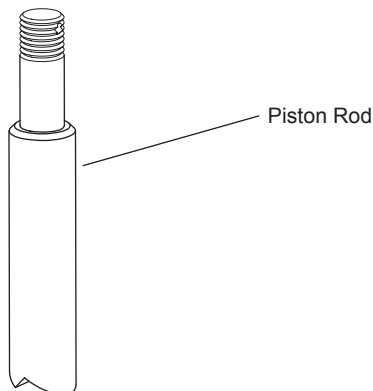
Ref No.	Part No.	Description	Qty
1.	7002-0100C100A	Screw, socket head	4
	7207-010A	Lock washer	4
2.	1983	Head, iron	1
3.	1775	Ring expander	3
4.	1772	Piston ring	3
5.	1482	Locknut	1
6.	1483	Lock pin	1
7.	1984	Piston platform	1
8.	1528	Shim washer, thick	As Req.
	1528-1	Shim washer, thin	
9.	1527	Thrust washer	1

Piston Clearance (Cold)^a

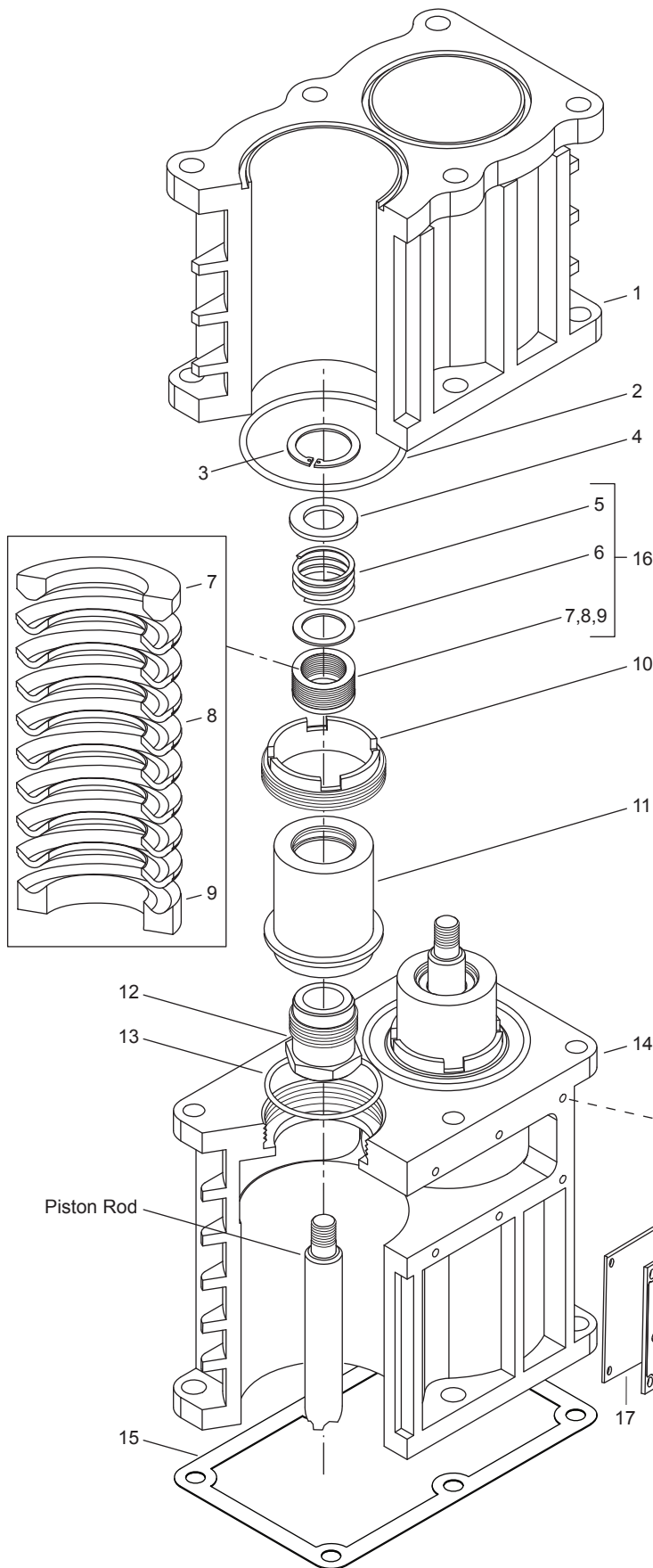
Model	Minimum	Maximum
291	0.020" (0.51 mm)	0.044" (1.12 mm)

^a The distance from the bottom of the head to the top of the piston.

CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.



Appendix H—291 and F291 Packing Assembly Details



Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty
1.	2913-1	Cylinder	1
2.	2-235_a	O-ring for cylinder	2
3.	5000-137	Retainer ring	2
4.	1012	Washer	2
5.	1628	Packing spring	2
6.	1714	Packing box washer	2
7.	1453-1	Male packing ring	2
8.	1454 ^b	Packing	6
9.	1452-1	Female packing ring	2
10.	4398	Cartridge holddown screw	2
11.	4394	Packing box cartridge	2
12.	1387	Adjusting screw	2
13.	2-135_a	O-ring (packing cartridge)	2
14.	4393	Crosshead guide	1
15.	2702	Crankcase gasket	1
16.	1452-1X1	Packing set	2
17.	1651	Inspection plate gasket	1
18.	1650	Inspection plate	1
19.	7003-025NC037E	1/4-20x3/8"	4
not shown	1192	Locking device	4

Other Assemblies

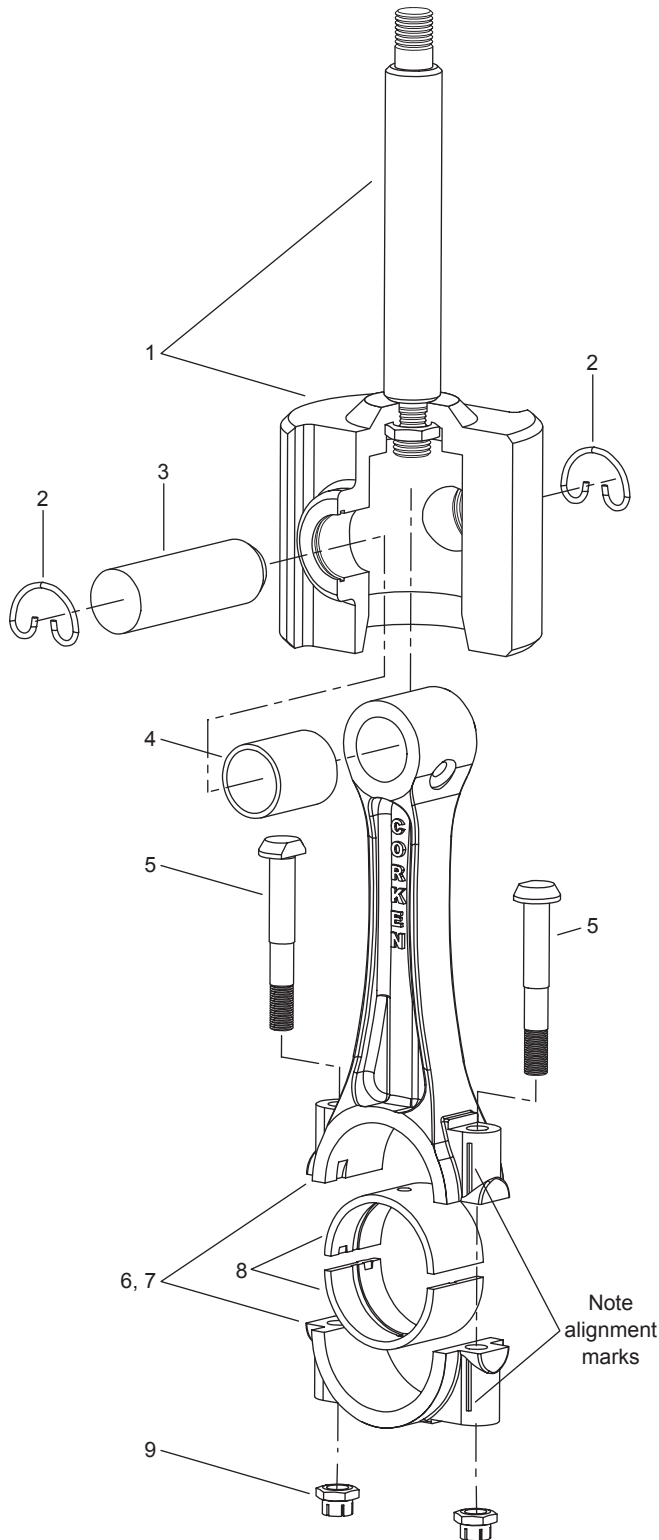
Assembly Number	Assembly Name	Qty
1132-X2	Crosshead assembly	2
1452-1X1	Packing set with 1452-1, 1453-1, 1454 (8), 1628, 1714	2

O-ring Code	
A	Buna-N
B	Neoprene ^{®c}

- ^a _ denotes O-ring code. See O-ring chart above for details.
- ^b The quantity of 1454 packing rings required will vary due to tolerances. Use Cone 4005 for installation of packing.
- ^c Registered trademark of the DuPont company.

CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

Appendix H—291 and F291 Connecting Rod Assembly Details



Connecting Rod Assembly Bill of Materials

Ref No.	Part No.	Description
1.	1132-X2 ^a	Crosshead assembly
2.	1498	Retainer ring
3.	2505	Wrist pin
4.	1846-X ^{a,b}	Wrist pin bushing
5.	1599 ^b	Bolt
6.	1889-X	Connecting rod assembly
7.	1889 ^b	Connecting rod
8.	1367 ^b	Connecting rod bearing
9.	1600 ^{b,c}	Nut

^a Must be rebored after replacing (0.8754/0.8751 dia.)

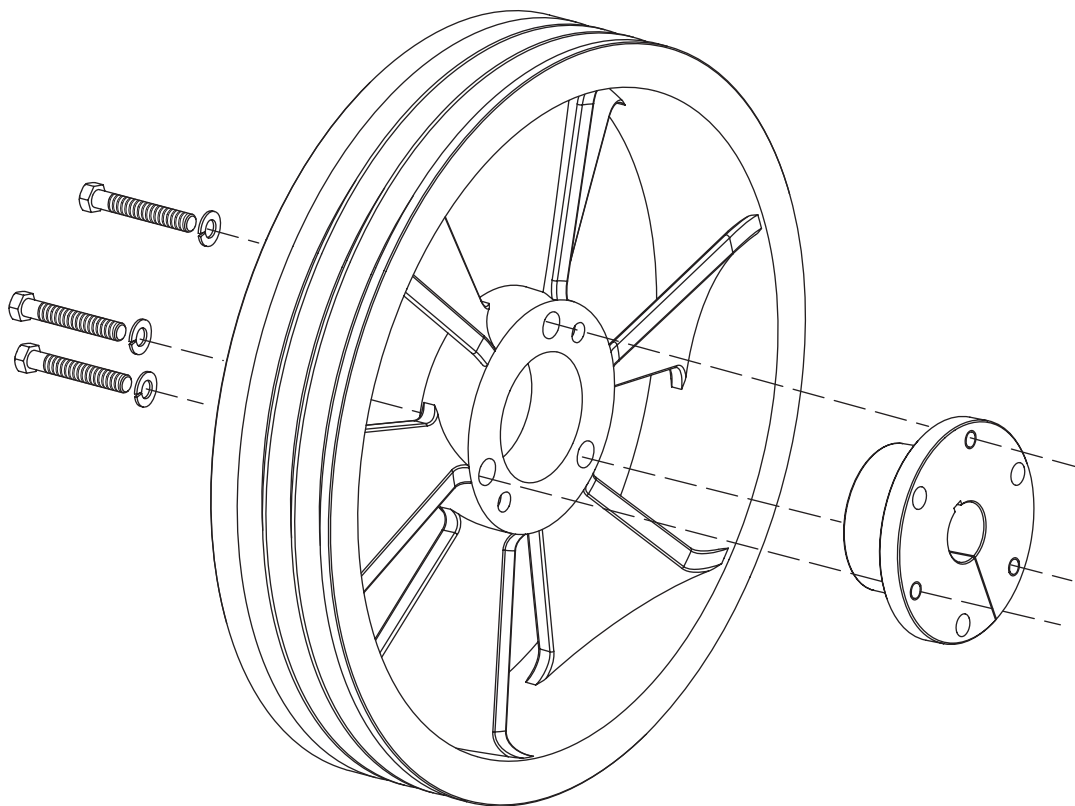
^b Included with connecting rod assembly

^c Torque connecting rod nut to 28 ft. lbs.

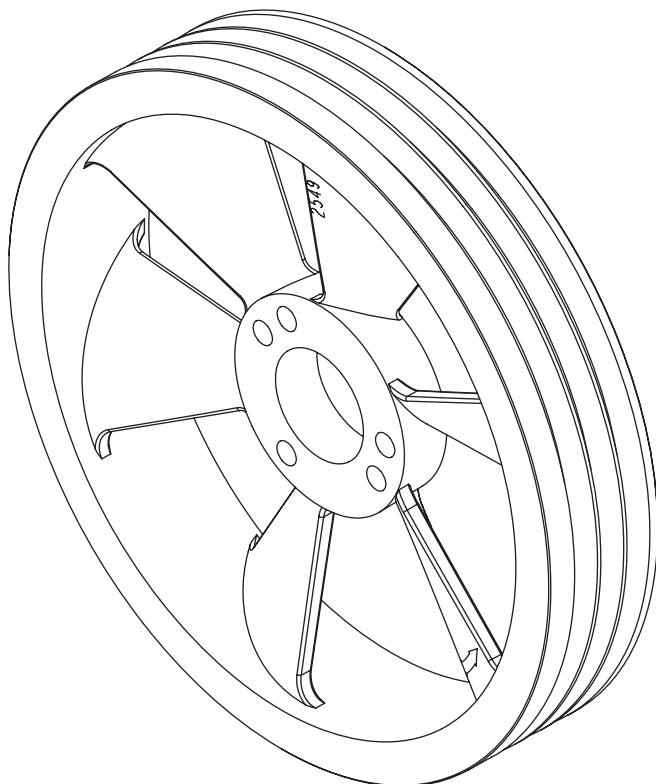
Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.

CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

Appendix H—291 and F291 Flywheel Assembly Details



Back Side

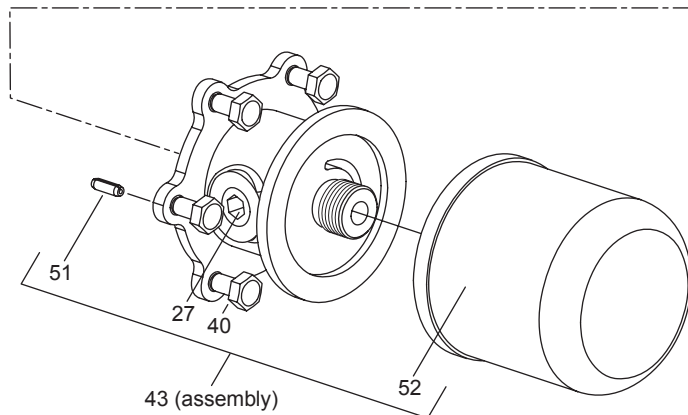
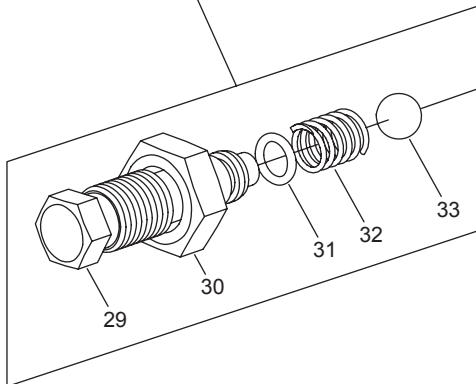
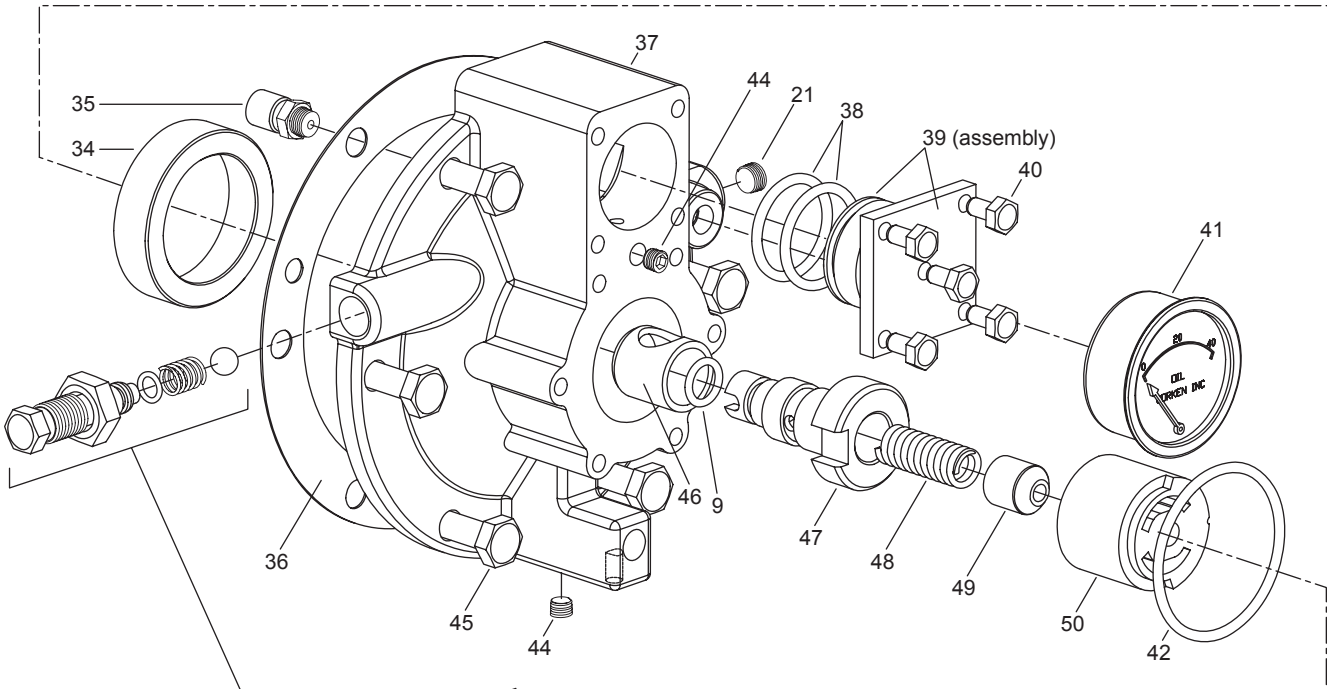
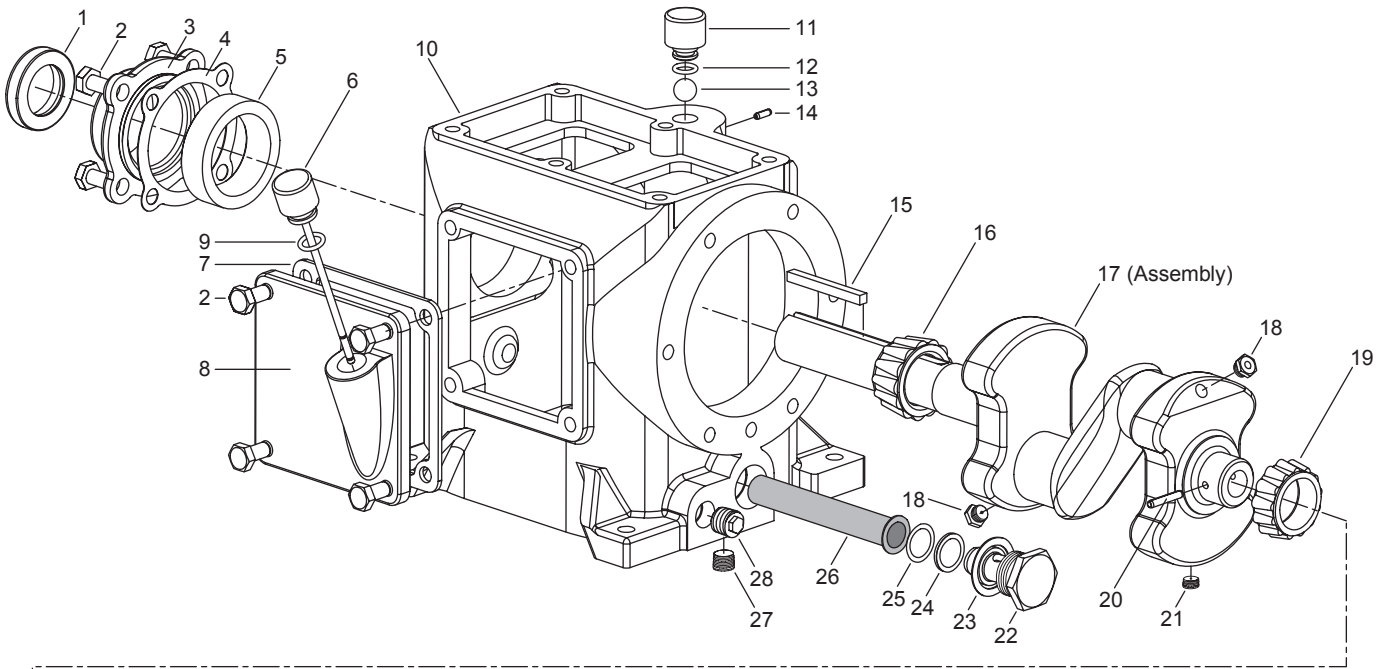


Front Side

Flywheel Assembly Bill of Materials

Assembly Number	Assembly Name
2549-X1	Flywheel assembly (flywheel, hub, and three bolts)
2549	Flywheel: 16" O.D., 3 groove
H SF-1.250	Hub with three bolts and lockwashers

Appendix H—291 and F291 Crankcase Assembly Details



Appendix H—291 and F291 Crankcase Assembly Details

Crankcase Assembly Bill of Materials

Ref No.	Part No.	Description
1.	1278	Oil seal
2.	7001-037NC075A	Bolt, 3/8-16 x 3/4, hex head
3.	2957	Bearing cover
4.	1273	Bearing adjustment shim (0.005")
	1273-1	Bearing adjustment shim (0.007")
	1273-2	Bearing adjustment shim (0.020")
5.	1500	Bearing cup
6.	1368-X	Oil bayonet
7.	2713	Crankcase inspection plate gasket
8.	2958	Crankcase inspection plate
9.	2-112 ^c	O-ring
10.	2955 ^{a,b}	Crankcase
11.	1279	Breather cap
12.	2-111 ^c	O-ring (breather cap)
13.	2796	Breather ball
14.	1483	Lock pin - 1/8 x 1"
15.	1671	Flywheel key
16.	1501	Bearing cone
17.	1341-X1	Crankshaft assembly with 1284 (2), 1286, 1341, 1501, 2590, 2719
18.	1284	Crankshaft orifice (2)
19.	2719	Bearing cone
20.	1286	Pump shaft drive pin
21.	2590	Pipe plug - 1/8 NPT, flush seal
22.	1280	Filter screen screw
23.	1281	Filter screen screw gasket
24.	2-116 ^c	O-ring (filter screen)
25.	1276	Filter screen washer
26.	1275	Oil filter screen
27.	3289	Pipe plug - 1/4 NPT, flush seal
28.	1661	Pipe plug - 3/8 NPT
29.	1290	Relief valve adjusting screw
30.	1291	Adjusting screw locknut
31.	2-011 ^c	O-ring (relieve valve adjustment screw)
32.	1292	Relief valve spring
33.	1293	Relief valve ball
34.	2718	Bearing cup
35.	2961-X	Air release valve assembly with 2961, 2962, 2963
36.	1285	Bearing carrier gasket
37.	2956	Bearing carrier
38.	2-218 ^c	O-ring (closure body) (2 required) (Spec 3, 4, 8, 9 only)
39.	1515-X	Closure cap assembly including 2-218A(2) (Spec 3, 4, 8, 9 only)
40.	7001-025NC050A	Bolt, 1/4-20 x 1/2, hex head
41.	1302	Oil pressure gauge
42.	2-228 ^c	O-ring (pump cover)
43.	4222-X	Oil filter assembly
44.	1629	Pipe plug - 1/16 NPT, flush seal
45.	7001-037NC100A	Bolt, 3/8-16 x 1, hex head
46.	2805	Pump shaft bushing
47.	2850	Pump shaft adapter
48.	2852	Oil pump spring
49.	2851	Spring guide
50.	2849-X	Oil pump assembly (individual pump parts not available)
51.	2798	Pump cover pin with 2848-X
	2848-X	Pump cover (includes pin)
52.	4225	Filter

Other Assemblies

Assembly Number	Assembly Name
1279-X	Breather cap assembly with 1279, 2-111A
1341-X1	Crankshaft assembly with 1284 (2), 1286, 1341, 1501, 2590, 2719
1342-X1 ^a	Extended crankshaft assembly with 1284 (2), 1286, 1342, 1501, 2590, 2719
1368-X1	Oil bayonet assembly with 1368-X, 2-112A
1515-X	Closure cap assembly including 2-218A (2) (Spec 3, 4, 8, 9 only)
2956-X	Bearing carrier assembly with 1285, 1290, 1291, 1292, 1293, 1515-X, 2718, 2805, 2806 (2), 2848-X, 2849-X, 2850, 2851, 2852, 2956, 2961-X, 2011-A, 2-112A, 2-228A.
2957-X	Bearing cover assembly with 2957 and 1278
2961-X	Air release valve assembly with 2961, 2962, 2963
3271-X1 ^a	Flywheel assembly, 14" O.D. 2 groove with 3218 and 3271 (not part of crankcase assembly) (not shown)

O-ring Code

A	Buna-N
B	Neoprene ^{®d}

^a Optional equipment

^b Crankcase capacity: 1.5 quarts (1.4 liters)

^c _ denotes O-ring code. See O-ring chart above for details.

^d Registered trademark of the DuPont company.

CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.