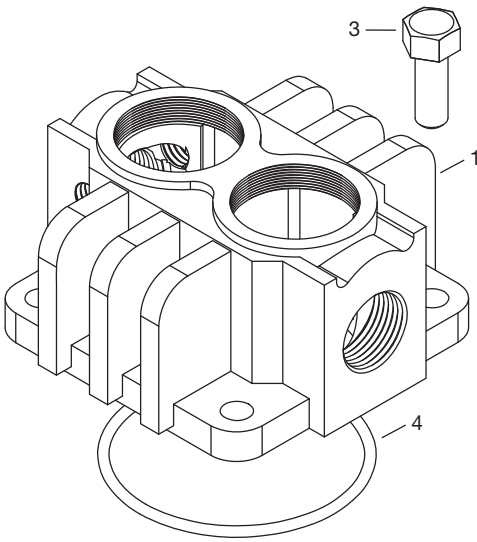
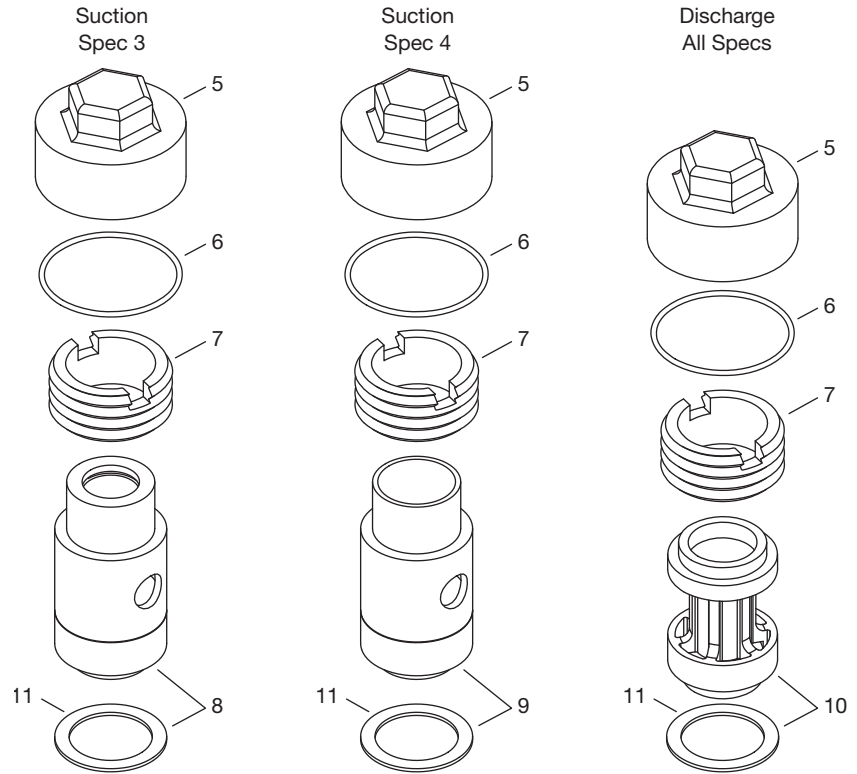


Appendix E—Parts Details for 91 and F91 Head and Valve Assembly

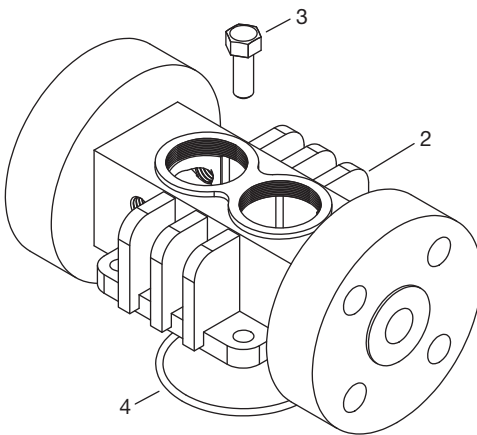
91 Head Assembly



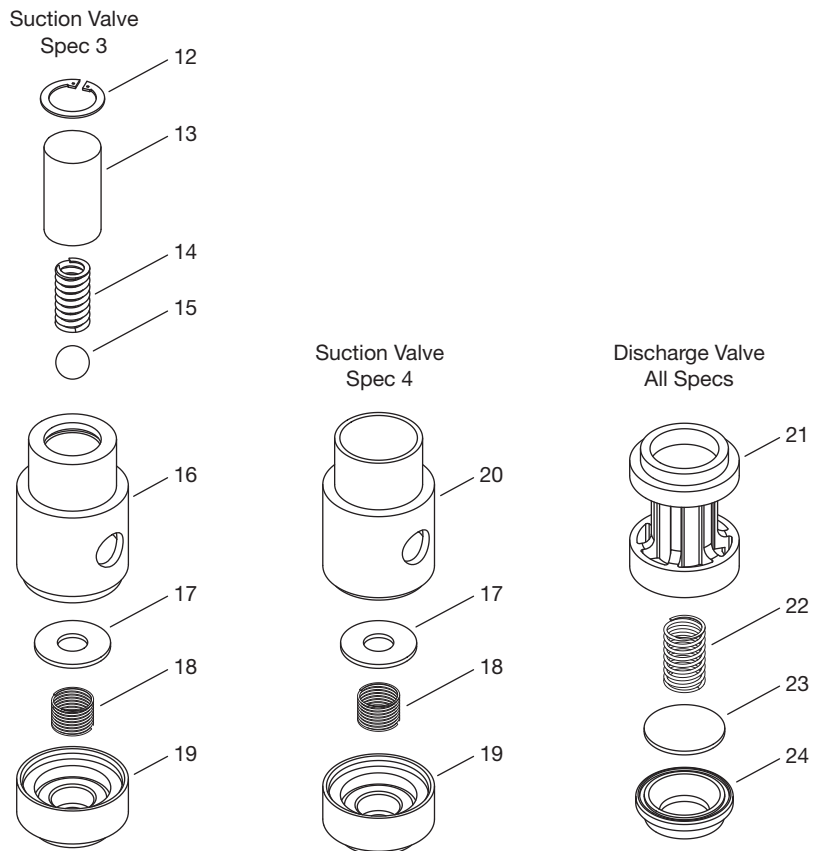
Valve Holddown Assemblies



F91 Head Assembly



Valve Assemblies



WARNING CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 91 and F91 Head and Valve Assembly

Head and Valve Bill of Materials

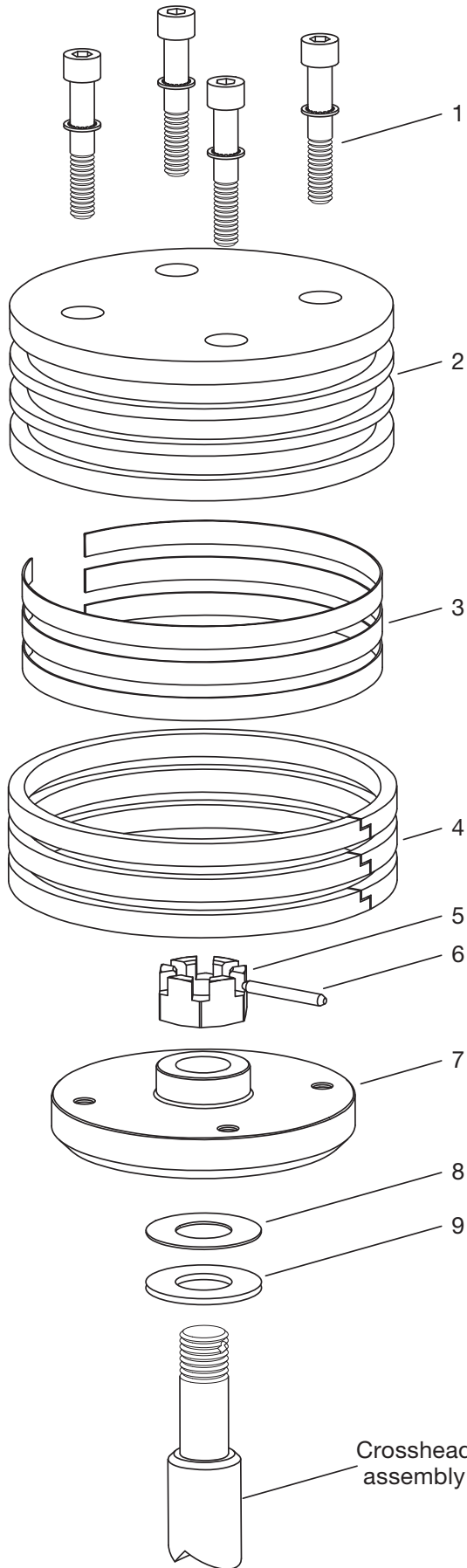
Ref No.	Part No.	Description	Qty.
1.	2374	Head (model 91)	1
	2374-X	Head assembly (model 91, spec 3)	1
	2374-X1	Head assembly (model 91, spec 4)	1
2.	4302	Head (model F91, Class 300 RF flange)	1
3.	7001-037NC100A	Bolt (hex head 3/8"-16 x 1-1/4")	4
4.	2-235_ ^a	O-ring	1
5.	2714-1	Valve cap	2
6.	2-031_ ^a	O-ring	2
7.	2715	Holddown screw	2
8.	3483-1X	Suction valve assembly (aluminum, spec 3)	1
9.	3483-X	Suction valve assembly (aluminum, spec 4)	1
10.	3485-X	Discharge valve assembly (aluminum, all specs)	1
11.	2717	Valve gasket (aluminum)	2
12.	5000-77	Retainer ring (spec 3)	1
13.	3977	Suction valve relief housing (spec 3)	1
14.	1411	Spring (spec 3)	1
15.	1410	Ball (spec 3)	1
16.	3483-1	Suction valve seat (spec 3)	1
17.	3972	Suction valve plate	1
18.	4009	Suction spring	1
19.	3484	Suction valve bumper	1
20.	3483	Suction valve seat (spec 4)	1
21.	3486	Discharge valve bumper	1
22.	4008	Discharge spring	1
23.	3973	Discharge valve plate	1
24.	3485	Discharge valve seat	1

^a _ denotes material code. See material code chart for details.

^b Registered trademark of the DuPont company.

Material Code	
A	Buna-N
B	Neoprene ^{®b}

Appendix E—Parts Details for 91 and F91 Head and Valve Assembly



Piston—Bill of Materials Piston Diameter 3" (7.62 cm)

Ref No.	Part No.	Description	Qty.
1.	7002-010TP100A	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)	As Req.
9.	1527	Thrust washer	1

Piston Clearance (Cold)^a

Model	Minimum (x)	Maximum (x)
91	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 E—Parts Details for 91 and F91 Packing Assembly

Packing—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	2242	Cylinder	1
2.	2-235 ^a	O-ring for cylinder	1
3.	5000-137	Retainer ring	1
4.	1012	Washer	1
5.	1628	Packing spring	1
6.	1714	Packing box washer	1
7.	1453-1	Male packing ring	1
8.	1454 ^b	Packing ring	8
9.	1452-1	Female packing ring	1
10.	2240	Crosshead guide	1
11.	1387-X	Adjusting screw assembly	1
12.	2526	Crankcase gasket	1
13.	1452-1X1	Packing set	1
14.	7001-037NC100A	Bolt (hex head 3/8"-16 x 1")	4
15.	7001-037NC125A	Bolt (hex head 3/8"-16 x 1-1/4")	4
16.	7206-037A	Lock washer (3/8")	4
17.	2243	Inspection plate	1
18.	2244	Inspection plate gasket	1
19.	7012-010NC025B	Screw (Pan HD phillip)	6
20.	1192	Lock device (not shown)	1

Assembly Number	Assembly Name
1132-X2	Crosshead—piston rod assembly

^a _ denotes material code. See material code chart for details.

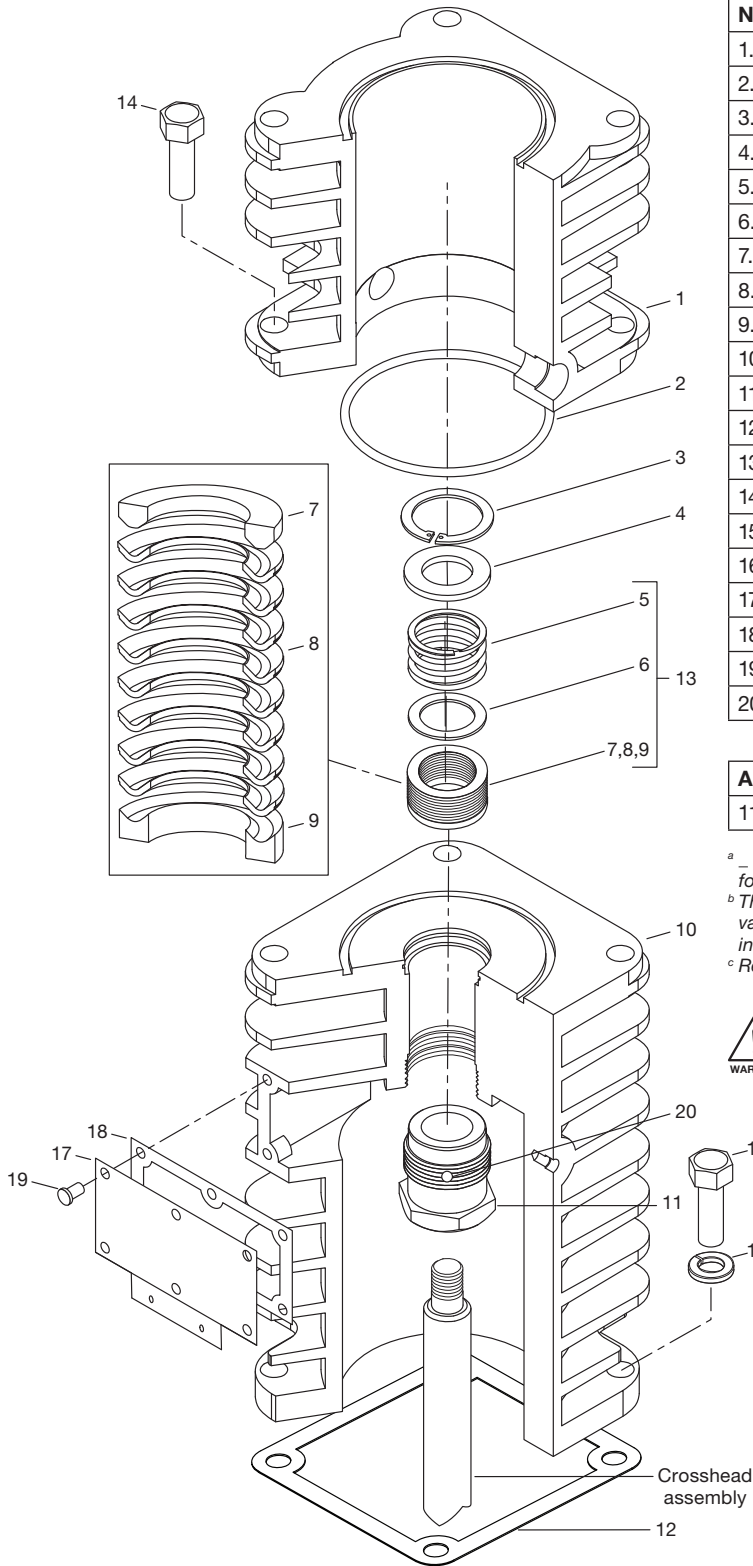
^b The quantity of 1454 packing rings required will vary due to tolerances. Use cone 4005 for installation of packing.

^c Registered trademark of the DuPont company.

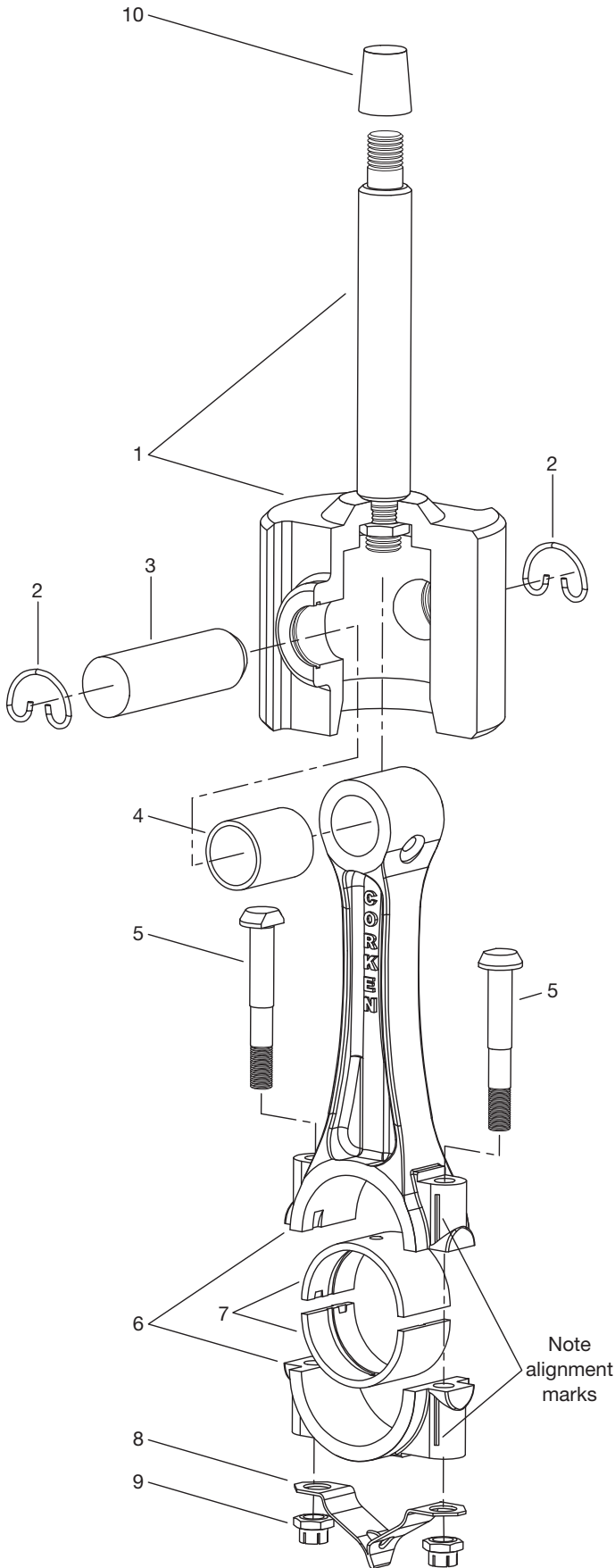
Material Code	
A	Buna-N
B	Neoprene ^{®c}



CAUTION: Always relieve pressure in the unit before attempting any repairs.



Appendix E—Parts Details for 91 and F91 Connecting Rod Assembly



Connecting Rod—Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	1132-X2	Crosshead assembly	1
2.	1498	Retainer ring	2
3.	2505	Wrist pin	1
4.	1846-X ^{a, b}	Wrist pin bushing	1
5.	1599 ^b	Bolt	2
6.	1889-1X	Connecting rod assembly	1
7.	1367 ^b	Connecting rod bearing (pair)	1
8.	2011 ^b	Dipper	1
9.	1600 ^{b, c}	Nut	2
10.	4005	Packing installation cone	1

^a After the wrist pin bushing has been pressed into the connecting rod, it must be honed to .8759/.8756. A hydraulic press and honing machine are recommended for this step.

^b Included with connecting rod assembly, not sold separately.

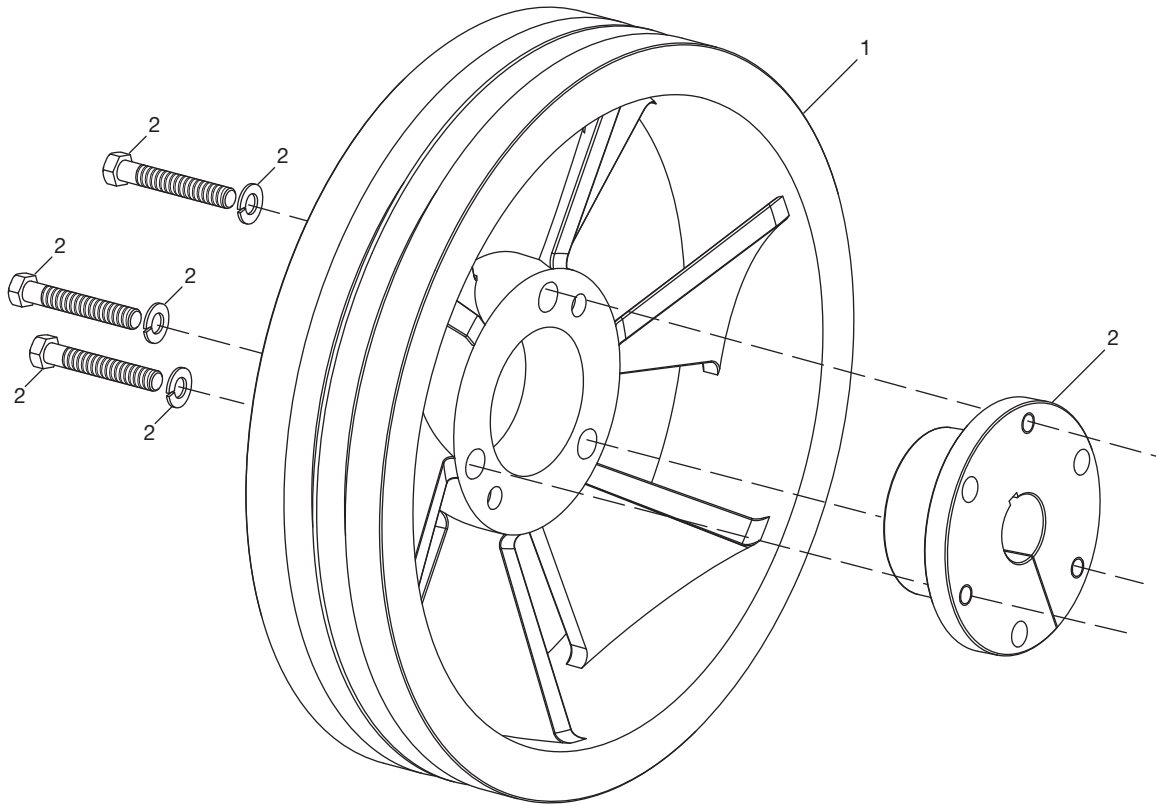
^c Torque connecting rod nut to 28 ft. lbs.

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

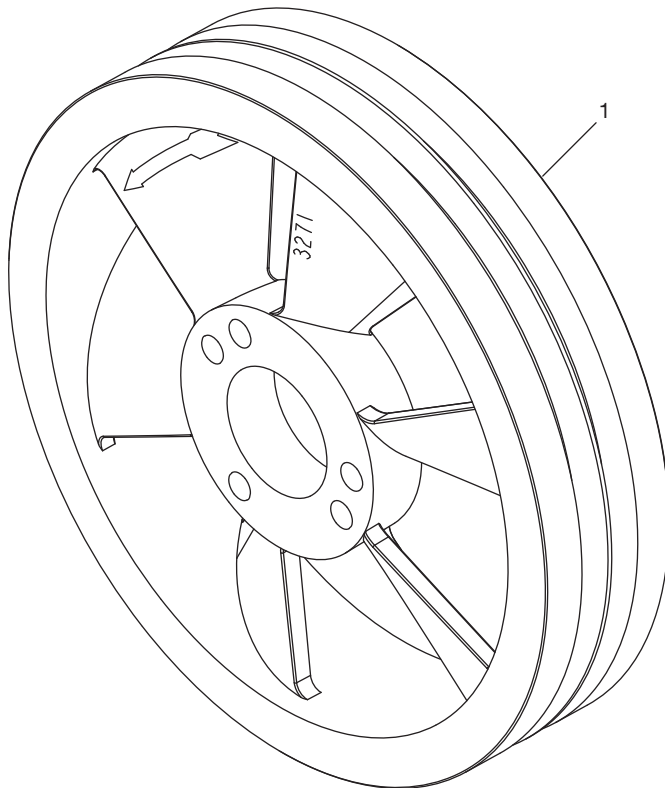


CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 91 and F91 Flywheel Assembly



Back Side



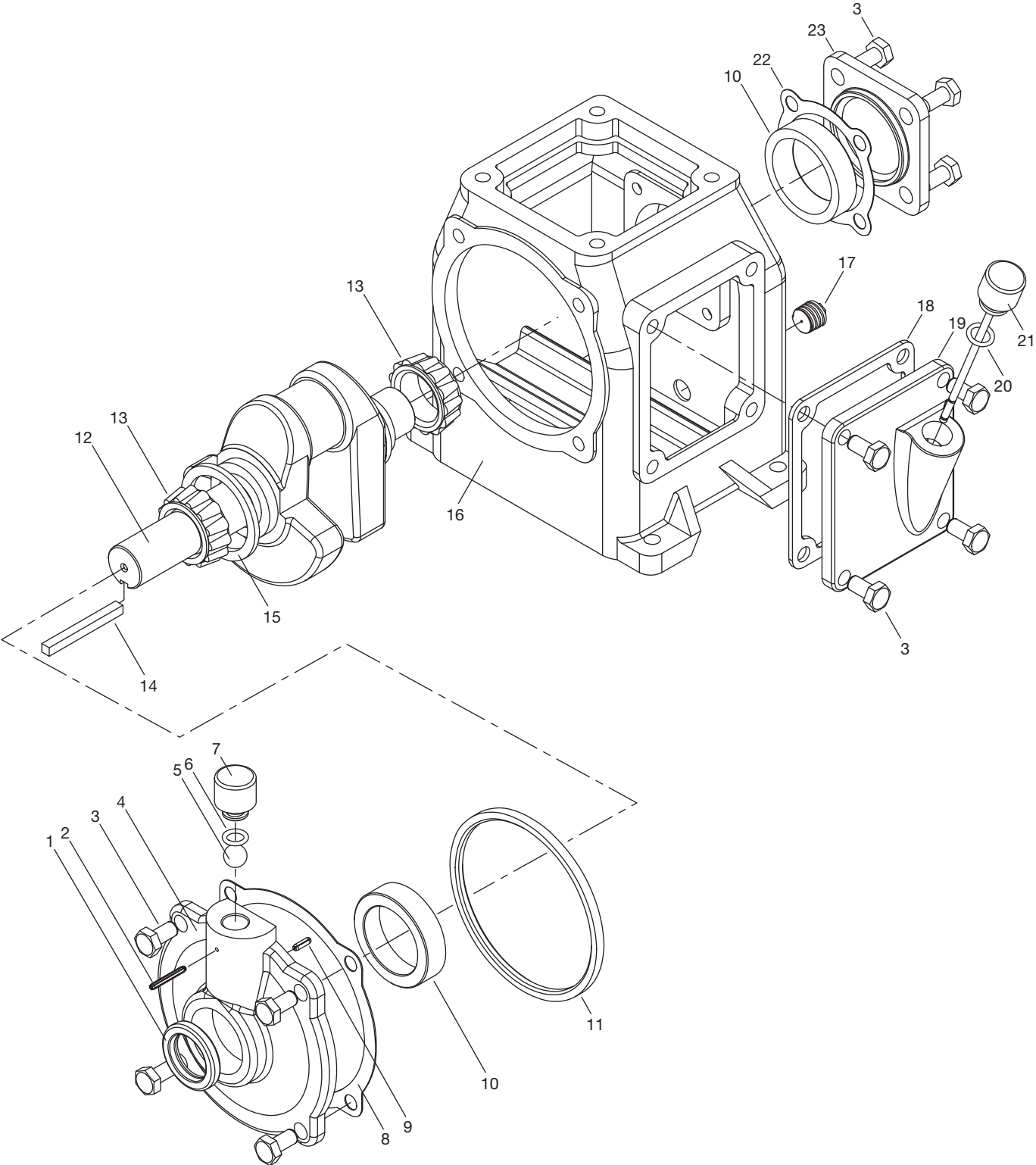
Front Side

Flywheel—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3271	Flywheel (14" O.D., 2 groove)	1
2.	H SF-1.125	Hub with three bolts and lockwashers	1

Assembly Number	Assembly Name
3271-X2	Flywheel assembly (flywheel, hub, and three bolts) standard

Appendix E—Parts Details for 91 and F91 Crankcase Assembly



Appendix E—Parts Details for 91 and F91 Crankcase Assembly

Packing—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3259	Oil seal	1
2.	1450	Groove pin (1/8" x 1")	1
3.	7001-037NC075A	Hex head (3/8"-16 x 3/4", grade 5)	12
4.	3260	Bearing carrier	1
5.	2796	Breather ball	1
6.	2-111A	O-ring (Buna-N)	1
7.	1279-X	Breather cap	1
8.	2725	Bearing carrier gasket	1
9.	1807	Roll pin (1/8" x 5/8")	1
10.	2718	Bearing cup	2
11.	2723	Oil circulating ring	1
12.	2476	Crankshaft	1
13.	2719	Bearing cone	2
14.	2289	Flywheel key	1
15.	2290	Oil ring retainer washer	1
16.	2554	Crankcase (capacity: 0.9 quarts, 0.8 liters)	1
17.	1661	Pipe plug (3/8" NPT square or hex head)	1
18.	2729	Inspection plate gasket	1
19.	2728	Crankcase inspection plate	1
20.	2-112A	O-ring (Buna-N)	1
21.	1368-X1	Oil bayonet assembly (with O-ring)	1
22.	2721	Bearing adjustment shim (0.005)	As needed
	2721-1	Bearing adjustment shim (0.007)	As needed
	2721-2	Bearing adjustment shim (0.020)	As needed
23.	2720	Bearing cap	1

Assembly Number	Assembly Name
2476-X	Crankshaft assembly with 2476, 2290 and 2719
2476-SX ^a	Extended crankshaft assembly with 2719 (2) and 2290
3260-X	Bearing carrier assembly with 3260, 2718, 3259, 1279-X, 2-111A, 1450, 2796 and 1807
3271-X2 ^a	Flywheel assembly 14" - 2 groove with H SF-1.125 and 3271

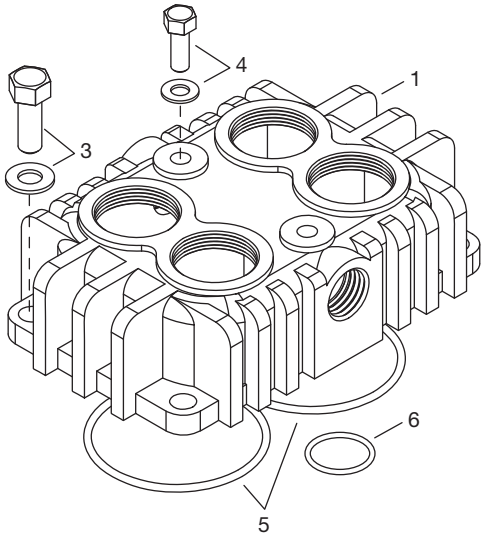
^a Optional equipment.



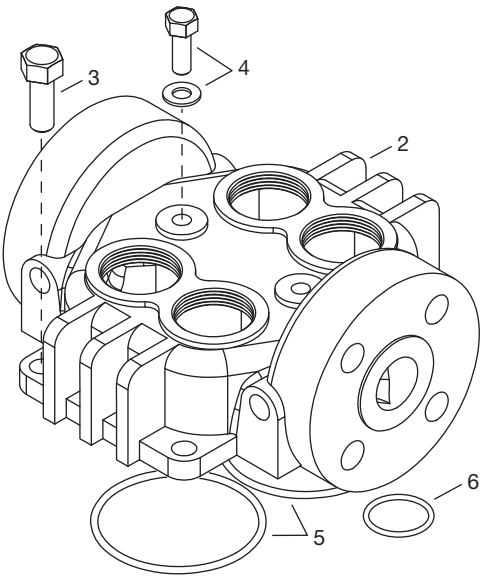
CAUTION: Always relieve pressure in the unit before attempting any repairs.


Appendix E—Parts Details for 291 and F291 Head and Valve Assembly

291 Head Assembly

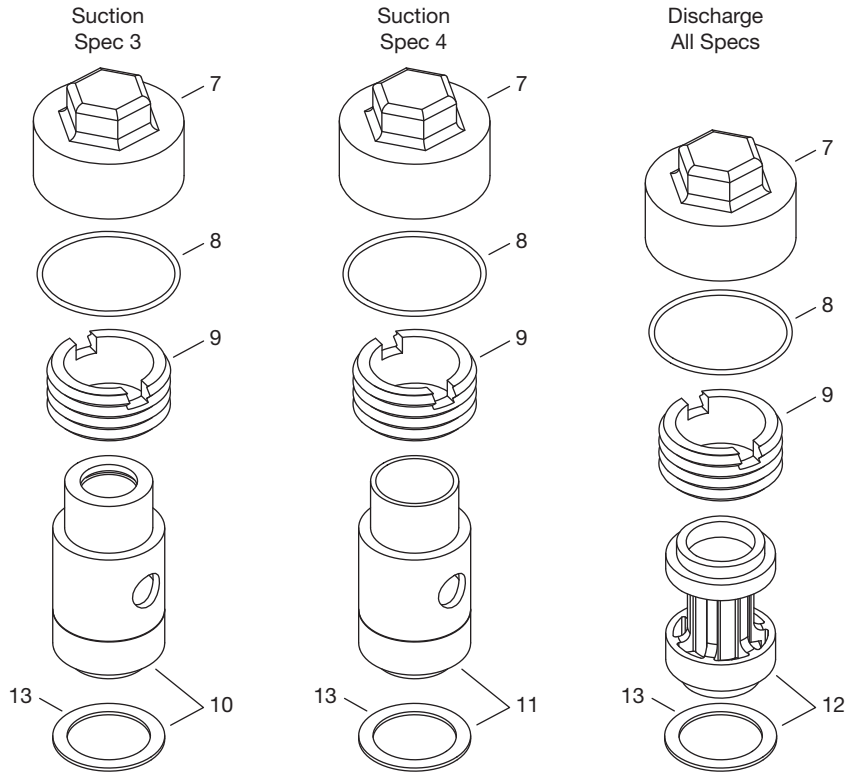


F291 Head Assembly

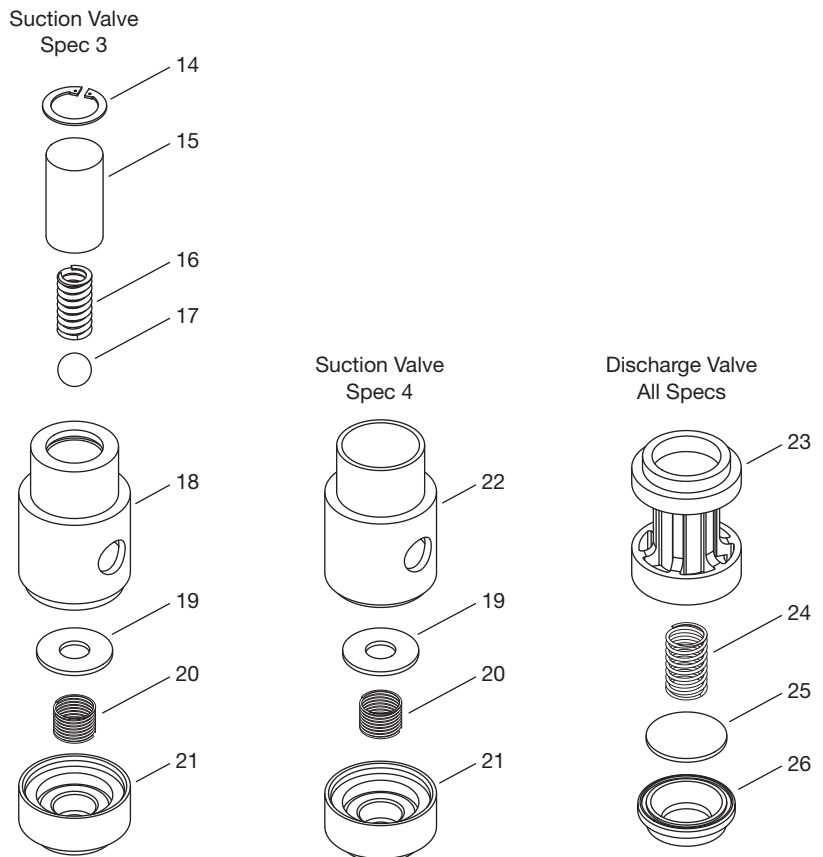


WARNING  *CAUTION: Always relieve pressure in the unit before attempting any repairs.*

Valve Holddown Assemblies



Valve Assemblies Details



Appendix E—Parts Details for 291 and F291 Head and Valve Assembly

Head and Valve Bill of Materials

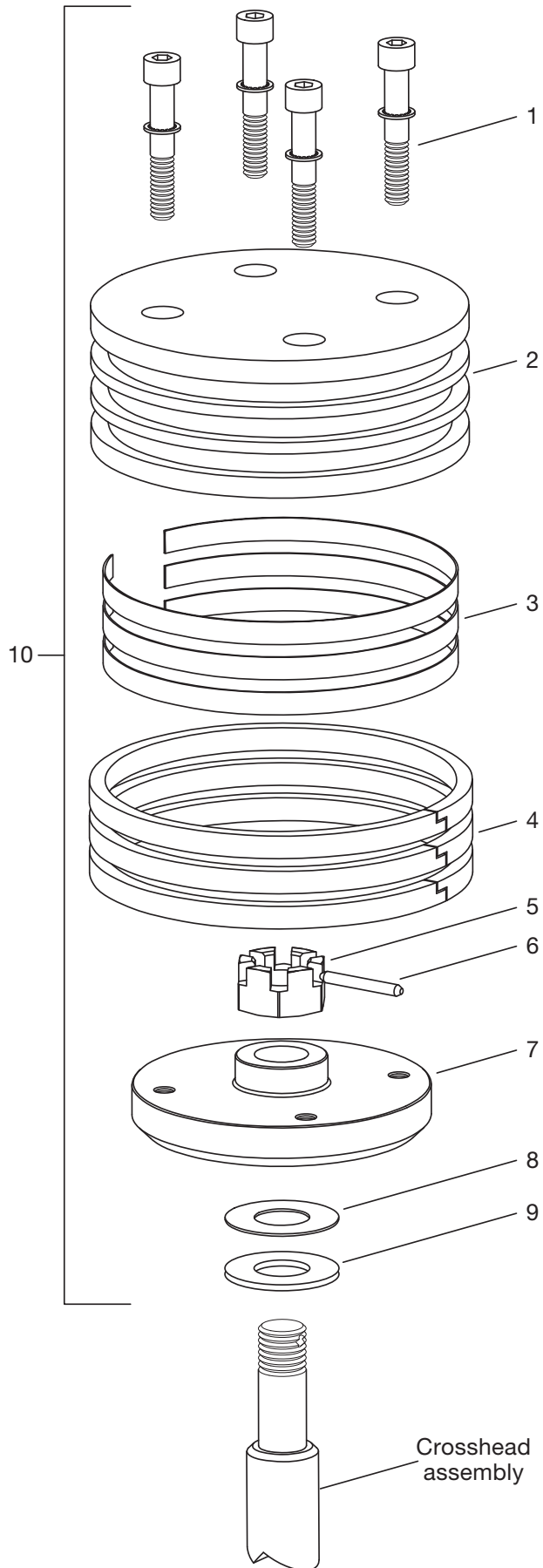
Ref No.	Part No.	Description	Qty.
1.	2912	Head (model 291)	1
	2912-X1	Head assembly (model 291, spec 3)	1
	2912-X2	Head assembly (model 291, spec 4)	1
2.	4300	Head (model F291, Class 300 RF flange)	1
3.	7001-037NC100A	Bolt (hex head, 3/8-16 x 1-1/4")	4
	7206-037A	Lock washer	4
4.	2731	Center headbolt	2
	2732	Gasket (center headbolt)	2
5.	2-235_ ^a	O-ring	2
6.	2-113_ ^a	O-ring	1
7.	2714-1	Valve cap	4
8.	2-031_ ^a	O-ring	4
9.	2715	Holddown screw	4
10.	3483-1X	Suction valve assembly (aluminum, spec 3)	2
11.	3483-X	Suction valve assembly (aluminum, spec 4)	2
12.	3485-X	Discharge valve assembly (aluminum, all specs)	2
13.	2717	Valve gasket (aluminum)	4
14.	5000-77	Retainer ring (spec 3)	2
15.	3977	Suction valve relief housing	2
16.	1411	Spring (spec 3)	2
17.	1410	Ball (spec 3)	2
18.	3483-1	Suction valve seat (spec 3)	2
19.	3972	Suction valve plate	2
20.	4009	Suction spring	2
21.	3484	Suction valve bumper	2
22.	3483	Suction valve seat (spec 4)	2
23.	3486	Discharge valve bumper	2
24.	4008	Discharge spring	2
25.	3973	Discharge valve plate	2
26.	3485	Discharge valve seat	2

^a _ denotes material code. See material code chart for details.

^b Registered trademark of the DuPont company.

Material Code	
A	Buna-N
B	Neoprene ^{®b}

Appendix E—Parts Details for 291 and F291 Piston Assembly



Piston—Bill of Materials Piston Diameter 3" (7.62 cm)

Ref No.	Part No.	Description	Qty.
1.	7002-010TP100A	Screw (socket head)	8
	7207-010A	Lock washer	8
2.	1983	Head (iron)	2
3.	1775	Ring expander	6
4.	1772	Piston ring	6
5.	1482	Locknut	2
6.	1483	Lock pin	2
7.	1984	Piston platform	2
8.	1528	Shim washer (thick)	As req.
	1528-1	Shim washer (thin)	
9.	1527	Thrust washer	2

Ref No.	Assembly Number	Assembly Name	Qty.
10.	1983-X	Piston assembly	2

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 E—Parts Details for 291 and F291 Packing Assembly

Packing—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	2913-1	Cylinder	1
2.	2-235_ ^a	O-ring (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	16
9.	1452-1	Female packing ring	2
10.	4398-X	Cartridge holddown screw	2
11.	4394	Packing box cartridge	2
12.	1387-X	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	Screw (1/4"-20 x 3/8" pan hd phillip)	10
20.	7001-037NC100A	Bolt (hex head 3/8"-16 x 1-1/4")	12
21.	7206-037A	Lock washer	12
22.	1192	Locking device (not shown)	1

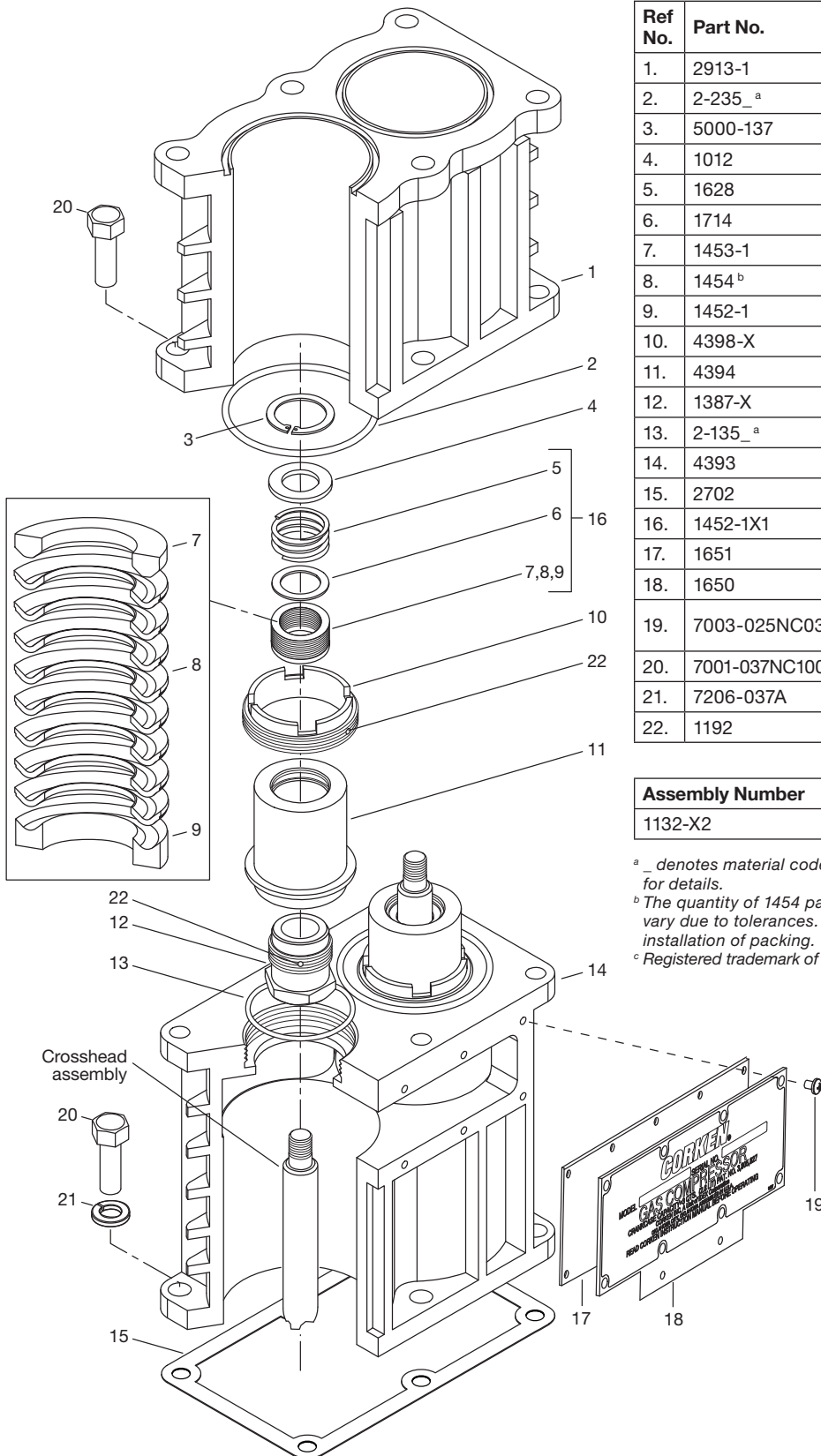
Assembly Number	Assembly Name
1132-X2	Crosshead—piston rod assembly

^a _ denotes material code. See material code chart 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.

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



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 291 and F291 Connecting Rod Assembly

Connecting Rod—Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	1132-X2	Crosshead assembly	2
2.	1498	Retainer ring	4
3.	2505	Wrist pin	2
4.	1846-X ^{a, b}	Wrist pin bushing	2
5.	1599 ^b	Bolt	4
6.	1889-X	Connecting rod assembly	2
7.	1367 ^b	Connecting rod bearing (pair)	2
8.	1600 ^{b, c}	Nut	4
9.	4005	Packing installation cone	1

^a After the wrist pin bushing has been pressed into the connecting rod, it must be honed to .8759/.8756. A hydraulic press and honing machine are recommended for this step.

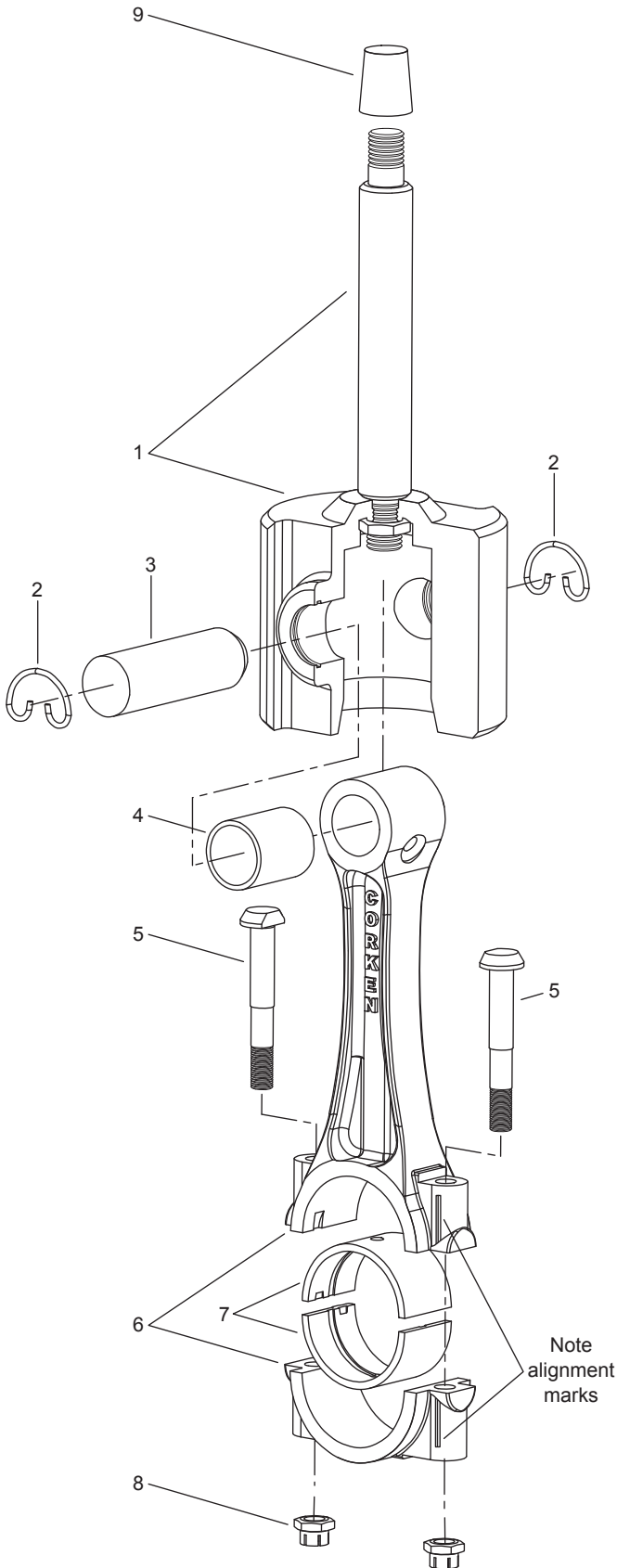
^b Included with connecting rod assembly.

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

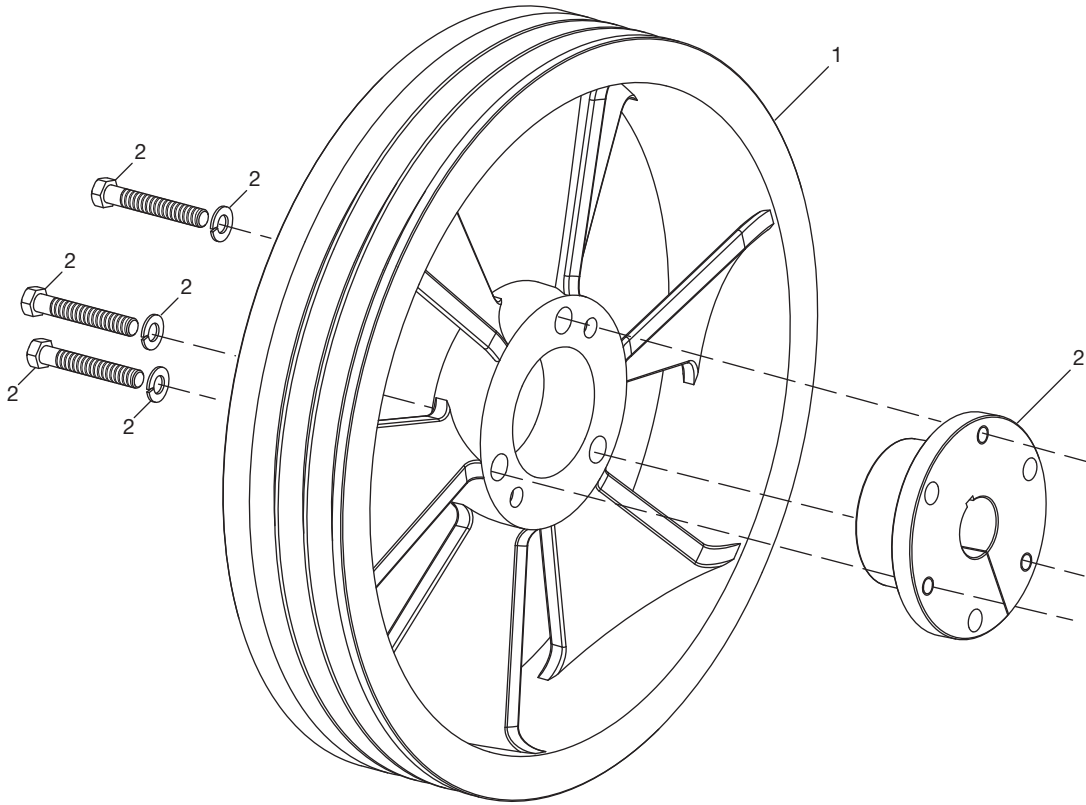
Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.



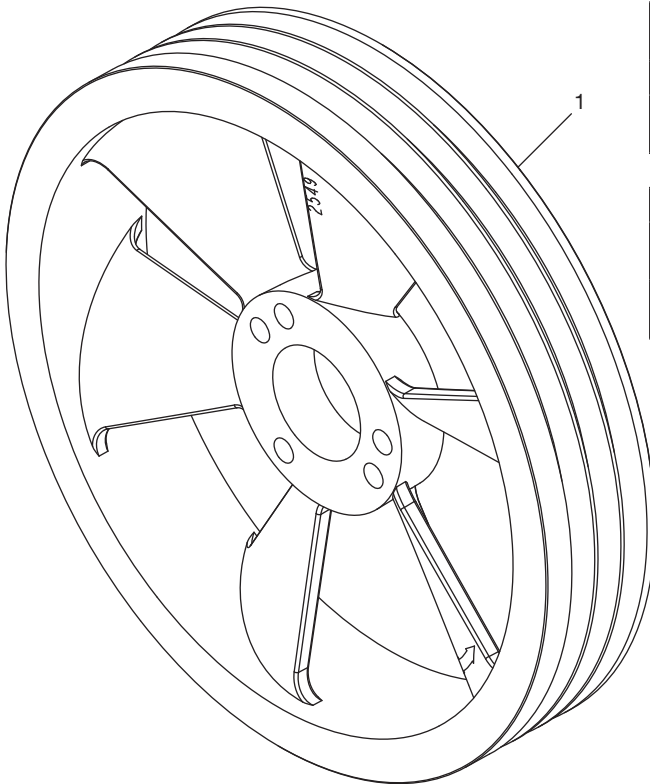
CAUTION: Always relieve pressure in the unit before attempting any repairs.



Appendix E—Parts Details for 291 and F291 Flywheel Assembly



Back Side



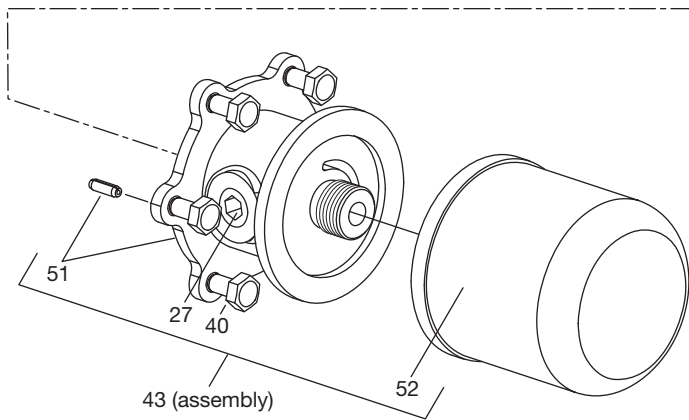
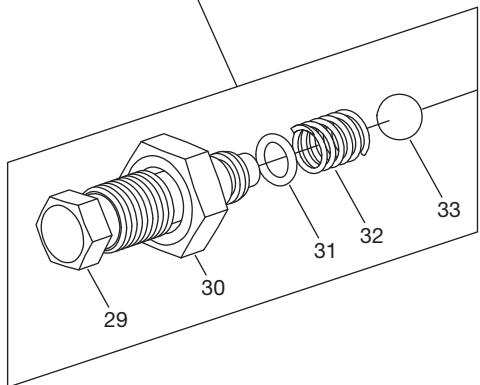
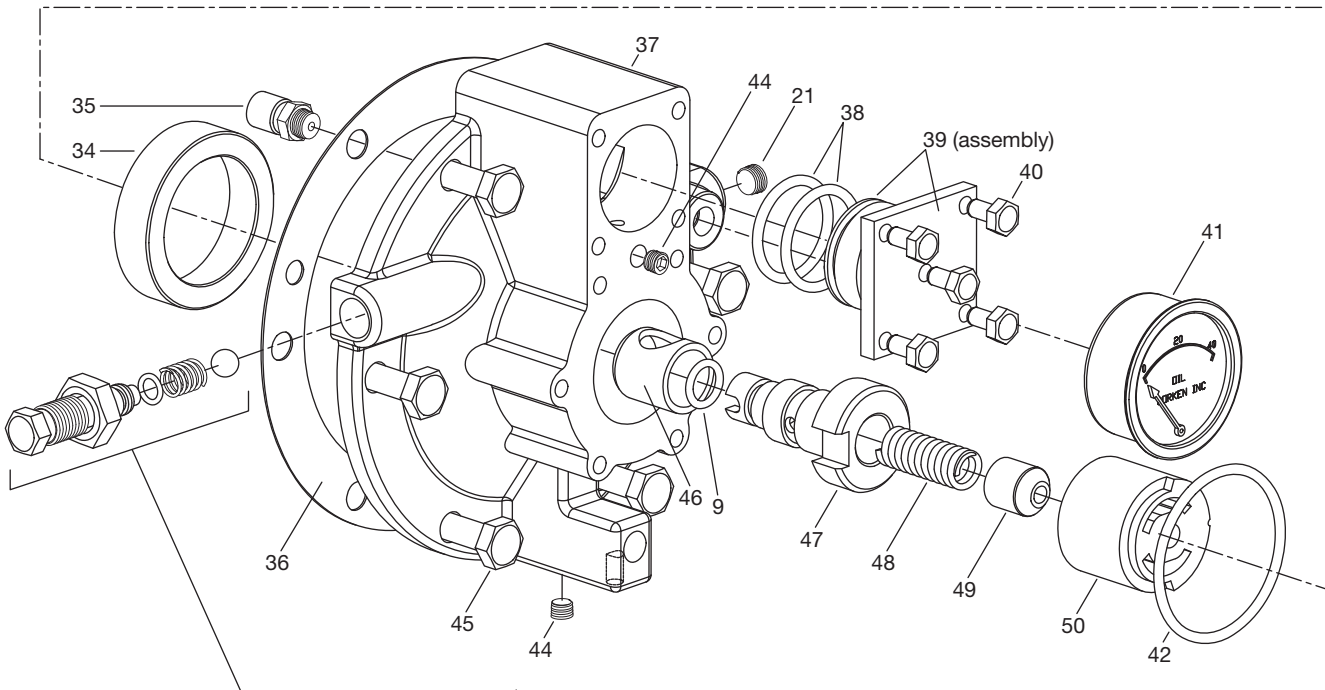
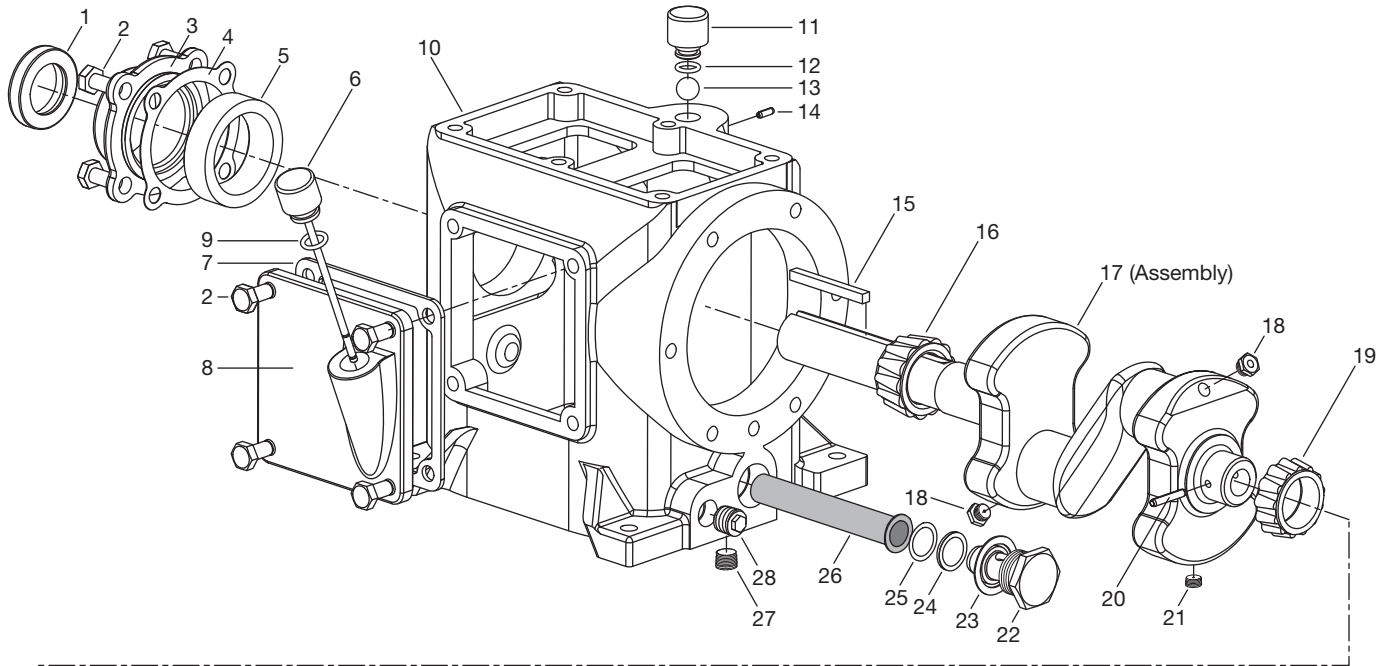
Front Side

Flywheel—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	2549	Flywheel (16" O.D., 3 groove)	1
2.	H SF-1.250	Hub with three bolts and lockwashers	1

Assembly Number	Assembly Name
2549-X1	Flywheel assembly (flywheel, hub, and three bolts)—standard
3271-X1	Flywheel assembly for extended crankshaft—optional

Appendix E—Parts Details for 291 and F291 Crankcase Assembly



Appendix E—Parts Details for 291 and F291 Crankcase Assembly

Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	1278	Oil seal	1
2.	7001-037NC075A	Bolt (hex head, 3/8"-16 x 3/4")	8
3.	2957	Bearing cover	1
4.	1273	Bearing adjustment shim (0.005")	As needed
	1273-1	Bearing adjustment shim (0.007")	As needed
	1273-2	Bearing adjustment shim (0.020")	As needed
5.	1500	Bearing cup	1
6.	1368-X	Oil bayonet	1
7.	2713	Crankcase inspection plate gasket	1
8.	2958	Crankcase inspection plate	1
9.	2-112A	O-ring (Buna-N)	2
10.	2955	Crankcase	1
11.	1279	Breather cap	1
12.	2-111A	O-ring (Buna-N)	1
13.	2796	Breather ball	1
14.	1450	Lock pin (1/8" x 1")	1
15.	1671	Flywheel key	1
16.	1501	Bearing cone	1
17.	1341-X1	Crankshaft assembly with 1284 (2), 1286, 1341, 1501, 2590, 2719	1
18.	1284	Crankshaft orifice	2
19.	2719	Bearing cone	1
20.	1286	Pump shaft drive pin	1
21.	2590	Pipe plug (1/8" NPT, flush seal)	2
22.	1280	Filter screen screw	1
23.	1281	Filter screen screw gasket	1
24.	2-116A	O-ring (Buna-N, filter screen)	1
25.	1276	Filter screen washer	1
26.	1275	Oil filter screen	1
27.	3289	Pipe plug (1/4" NPT, flush seal)	2
28.	1661	Pipe plug (3/8" NPT)	1
29.	1290	Relief valve adjusting screw	1
30.	1291	Adjusting screw locknut	1
31.	2-011A	O-ring (Buna-N, relieve valve adjustment screw)	1
32.	1292	Relief valve spring	1
33.	1293	Relief valve ball	1
34.	2718	Bearing cup	1
35.	2961-X	Air release valve assembly with 2961, 2962, 2963	1
36.	1285	Bearing carrier gasket	1
37.	2956	Bearing carrier	1
38.	2-218A	O-ring (Buna-N, closure body, 2 required)	2
39.	1515-X	Closure cap assembly including 2-218A (2)	1
40.	7001-025NC050A	Bolt (hex head, 1/4"-20 x 1/2")	10
41.	1302	Oil pressure gauge	1

Ref No.	Part No.	Description	Qty.
42.	2-228A	O-ring (Buna-N, pump cover)	1
43.	4222-X	Oil filter assembly	1
44.	1629	Pipe plug (1/16" NPT, flush seal)	2
45.	7001-037NC100A	Bolt (hex head, 3/8"-16 x 1")	6
46.	2805	Pump shaft bushing	1
47.	2850	Pump shaft adapter	1
48.	2852	Oil pump spring	1
49.	2851	Spring guide	1
50.	2849-X	Oil pump assembly (individual pump parts not available)	1
51.	2798	Pump cover pin with 4222	1
52.	4225	Filter	1

Assembly Number	Assembly Name
1279-X	Breather cap assembly with 1279, 2-111A
1342-X1 ^a	Extended crankshaft assembly with 1284 (2), 1286, 1342, 1501, 2590, 2719
1368-X1	Oil bayonet assembly with 1368-X, 2-112A
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, 2-011A, 2-112A, 2-228A.
2957-X	Bearing cover assembly with 2957 and 1278

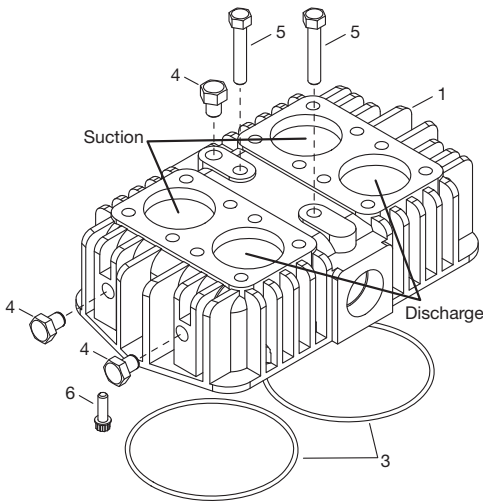
^a Optional equipment.



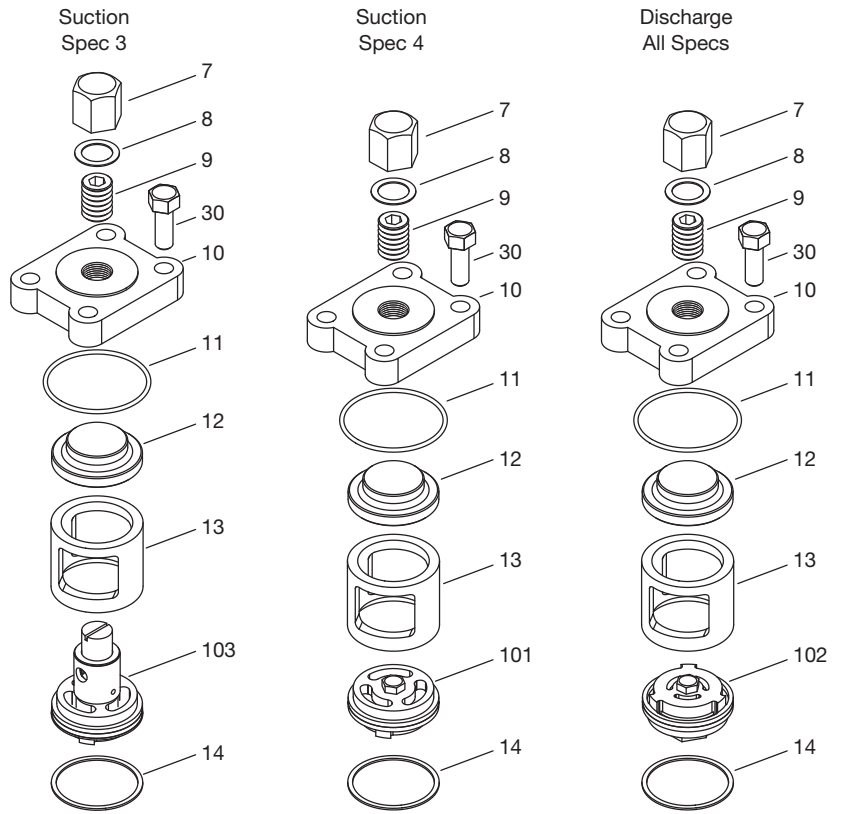
CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 491 and F491 Head and Valve Assembly

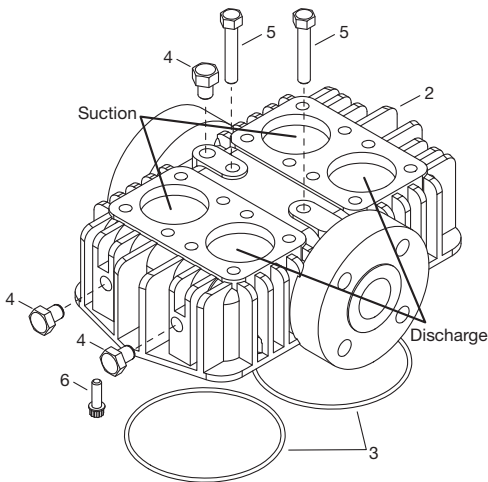
491 Head Assembly



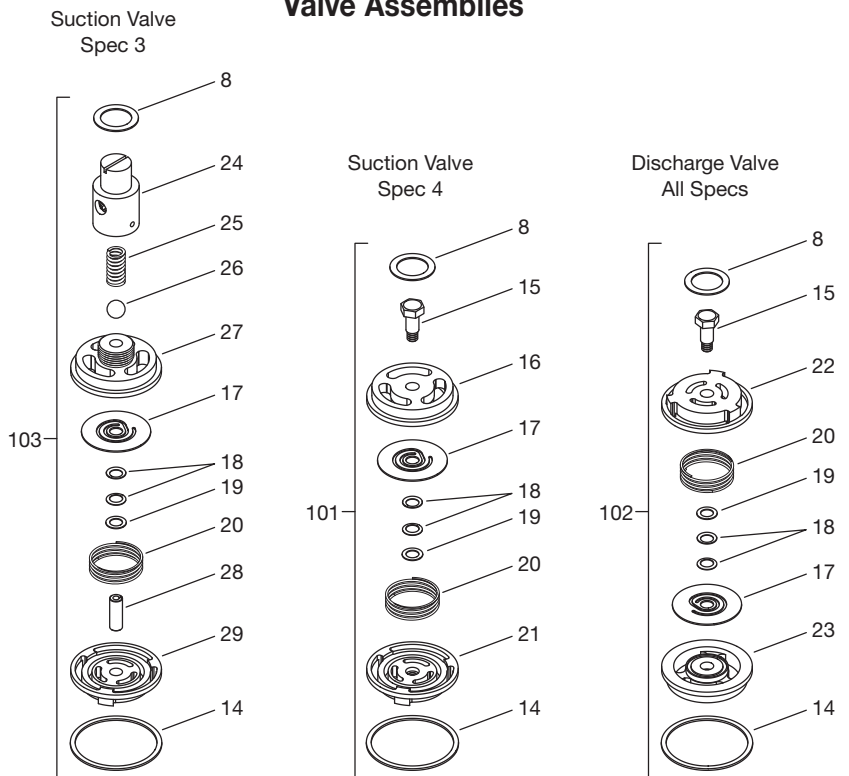
Valve Holddown Assemblies



F491 Head Assembly



Valve Assemblies



WARNING CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 491 and F491 Head and Valve Assembly

Head and Valve Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3712 ^a	Head (model 491, ductile iron)	1
2.	4297	Head (model F491, Class 300 RF flange)	1
3.	2-253_ ^{a, b, c}	O-ring (model 491)	2
4.	3442	Pipe plug (1/4" NPT)	3
5.	1479 ^b	Center head bolt	2
6.	7005-043NC125A ^b	Bolt (ferry head, 7/16"-14 x 1-1/4", 490 and 491 prior to serial #FZ44188)	12
	7005-043NC150A ^b	Bolt (ferry head, 7/16"-14 x 1-1/2", 491 serial # FZ44188 and later)	12
7.	1477	Valve screw nut	4
8.	1478	Gasket (steel)	4
9.	1476	Valve holddown screw	4
10.	1475	Valve cover plate	4
11.	2-143_ ^c	O-ring for cover plate	4
12.	1409 ^d	Valve spacer	4
13.	2448	Cage	4
14.	1418	Valve gasket (aluminum)	4
15.	2446	Bolt	2 or 4
16.	2438	Suction valve seat	2
17.	2442	Valve plate	4
18.	2445 ^d	Spacer (two per valve)	8
19.	3355	Washer	4
20.	1407	Valve spring	4
21.	2440	Suction valve bumper (spec 4)	2
22.	2441	Discharge valve bumper	2
23.	2439	Discharge valve seat	2
24.	2533-1	Adjusting screw	2
25.	1411	Relief ball spring	2
26.	1410	Relief ball	2
27.	2532-1	Suction valve seat	2
28.	2534-1	Suction valve post	2
29.	2447	Suction valve bumper (spec 3)	2
30.	7001-043NC125A	Bolt (hex head, 7/16"-14 x 1-1/4")	16

Ref No.	Valve Assembly No.	Assembly Name
101.	2438-X	Suction valve assembly—spec 4
102.	2439-X	Discharge valve assembly—all specs
103.	2532-1X	Suction valve assembly—spec 3

Head Assembly No.	Model	Valve Specification
3712-X1 ^a	491	3
3712-X2 ^a	491	4
4297-X1	F491 (Class 300 RF)	3
4297-X2	F491 (Class 300 RF)	4

^a S/N FZ44188 and later.

^b Not included in head assembly.

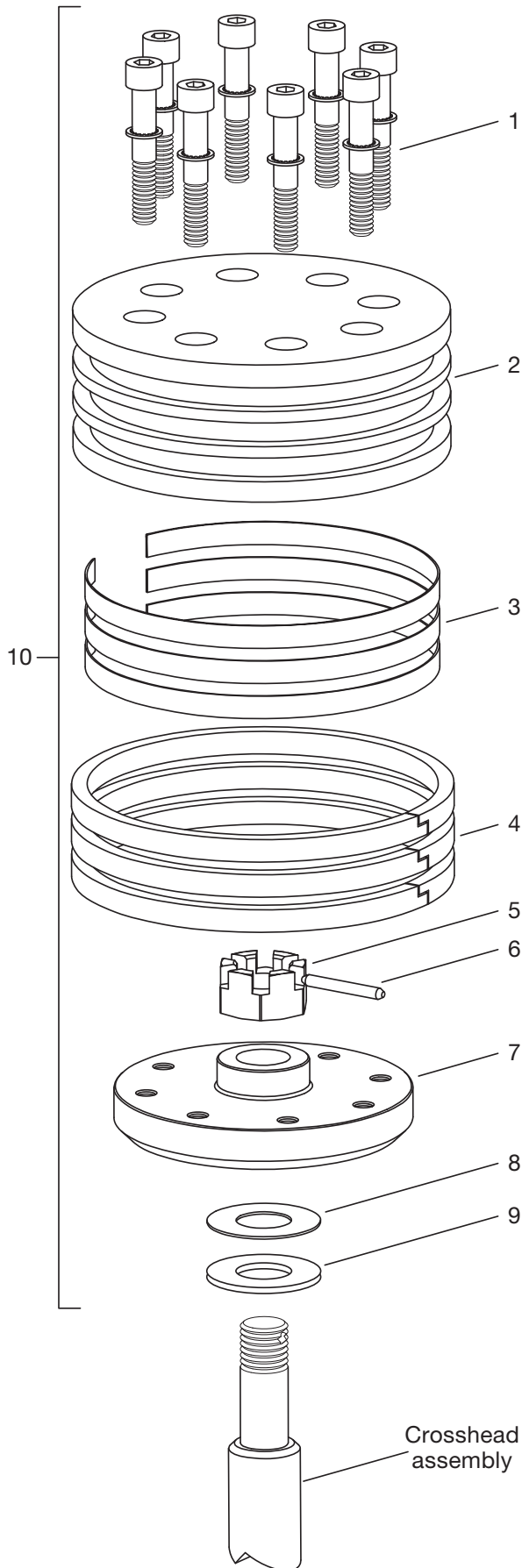
^c _ denotes material code. See material code chart for details.

^d Place spacers back to back as shown.

^e Registered trademark of the DuPont company.

Material Code	
A	Buna-N
B	Neoprene ^{®e}

Appendix E—Parts Details for 491 and F491 Piston Assembly



Piston—Bill of Materials Piston Diameter 4" (10.16 cm)

Ref No.	Part No.	Description	Qty.
1.	7002-025TP125A	Screw (socket head)	16
	7207-025A	Lock washer	16
2.	1985	Head (iron)	2
3.	1776	Ring expander	6
4.	1773	Piston ring	6
5.	1482	Locknut	2
6.	1483	Lock pin	2
7.	1986	Piston platform	2
8.	1528	Shim washer (thick)	As Req.
	1528-1	Shim washer (thin)	
9.	1527	Thrust washer	2

Ref No.	Assembly Number	Assembly Name	Qty.
10.	1985-X	Piston assembly	2

Piston Clearance (Cold)^a

Model	Minimum	Maximum
491 ^b	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.

^b For 491 compressor with head O-rings.

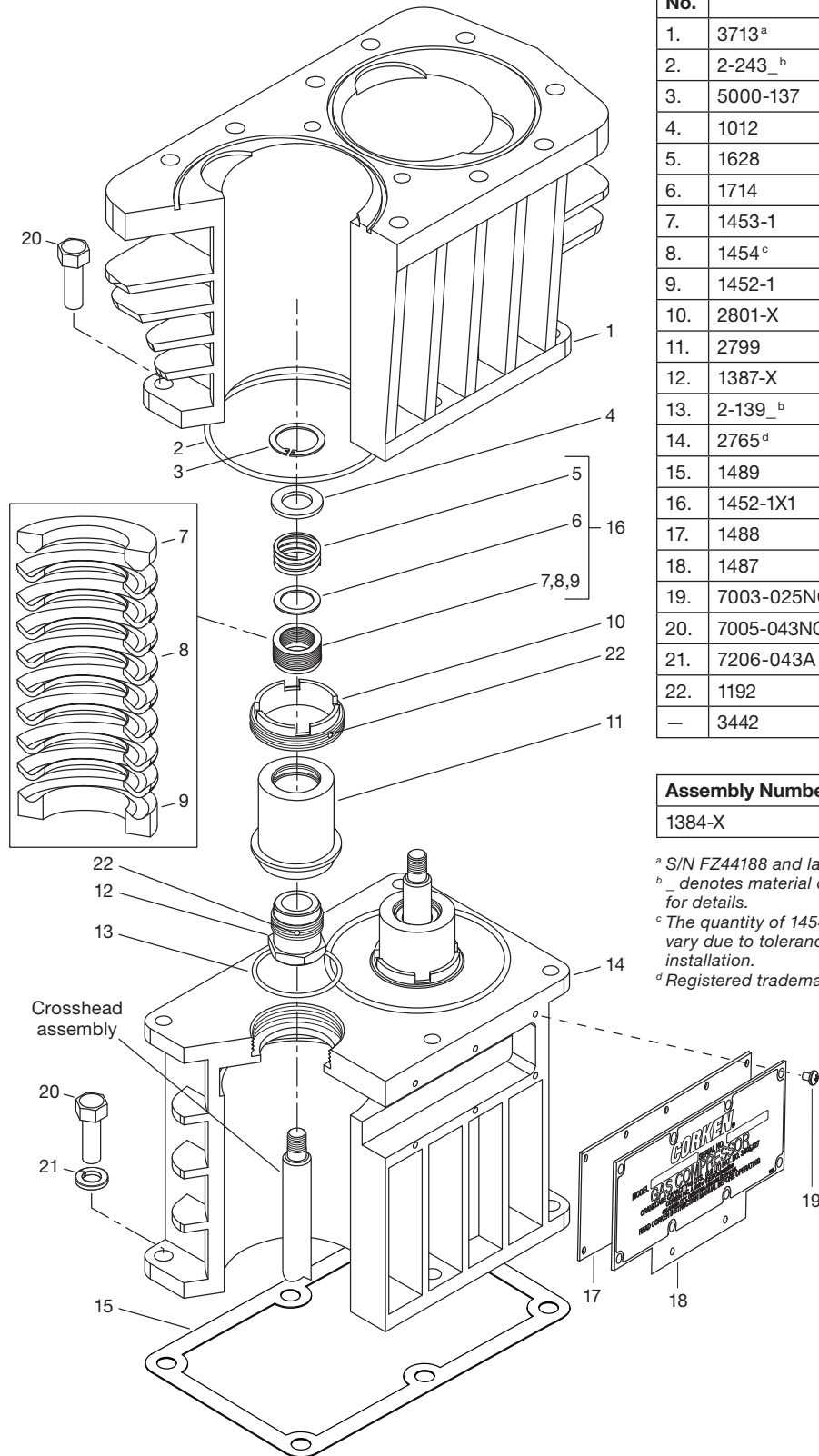


CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 491 and F491 Packing Assembly

Packing—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3713 ^a	Cylinder (491 with O-ring)	1
2.	2-243 ^b	O-ring (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 ^c	Packing ring	16
9.	1452-1	Female packing ring	2
10.	2801-X	Cartridge holddown screw	2
11.	2799	Packing box cartridge	2
12.	1387-X	Adjusting screw	2
13.	2-139 ^b	O-ring (packing cartridge)	2
14.	2765 ^d	Crosshead guide	1
15.	1489	Crankcase gasket	1
16.	1452-1X1	Packing set	2
17.	1488	Inspection plate gasket	1
18.	1487	Inspection plate	1
19.	7003-025NC037E	Screw (1/4"-20 x 3/8")	10
20.	7005-043NC125A	Bolt (ferry head, 7/16"-14 x 1-1/4")	12
21.	7206-043A	Lock washer (7/16")	6
22.	1192	Locking device (not shown)	1
—	3442	Pipe plug (1/4" NPT, not shown)	1



Assembly Number	Assembly Name
1384-X	Crosshead assembly

^a S/N FZ44188 and later.

^b _ denotes material code. See material code chart for details.

^c The quantity of 1454 packing rings required will vary due to tolerances. Use Cone 4005 for packing installation.

^d Registered trademark of the DuPont company.

Material Code	
A	Buna-N
B	Neoprene ^{®d}



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 491 and F491 Connecting Rod Assembly

Connecting Rod—Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	1384-X	Crosshead assembly	2
2.	1498	Retainer ring	4
3.	1496	Wrist pin	2
4.	1495-X ^{a, b}	Wrist pin bushing	2
5.	1492 ^b	Bolt	4
6.	1490-X	Connecting rod assembly	2
7.	1491 ^b	Connecting rod bearing (pair)	2
8.	1493 ^{b, c}	Nut	4
9.	4005	Packing installation cone	1

^a After the wrist pin bushing has been pressed into the connecting rod, it must be honed to .8759/.8756. A hydraulic press and honing machine are recommended for this step.

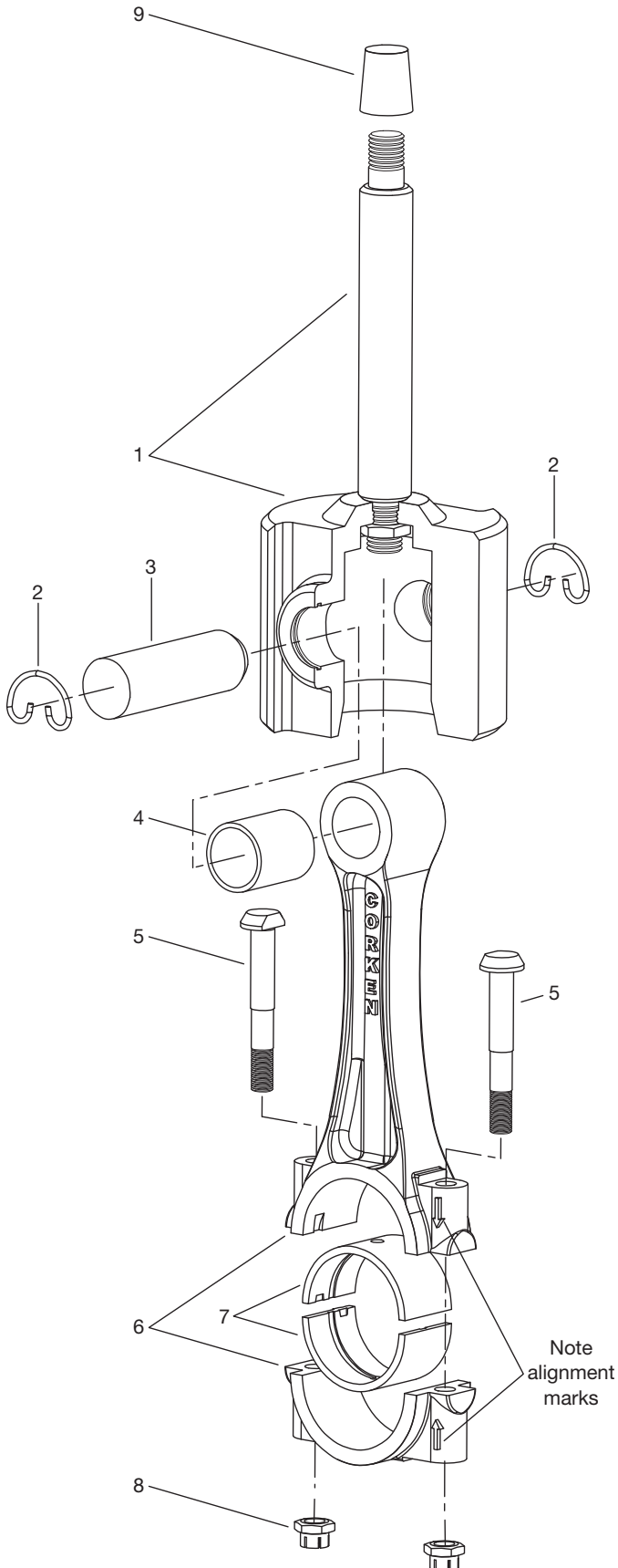
^b Included with connecting rod assembly.

^c Torque connecting rod nut to 30 ft. lbs.

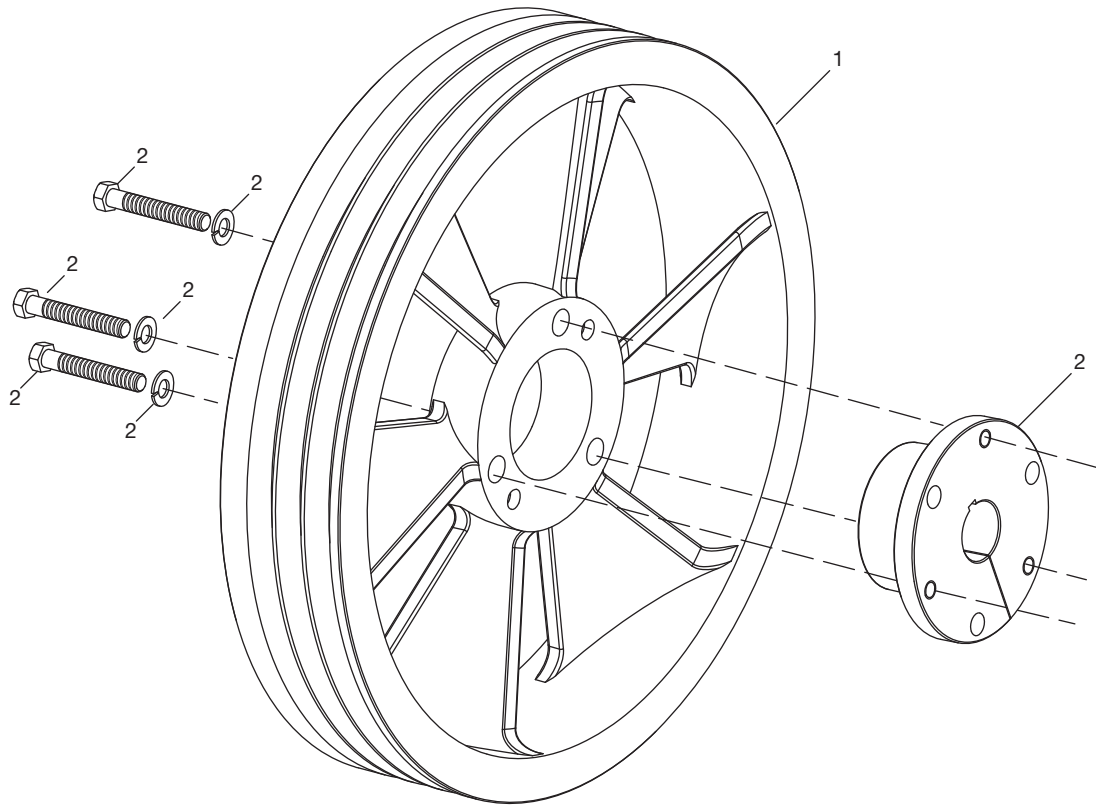
Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.



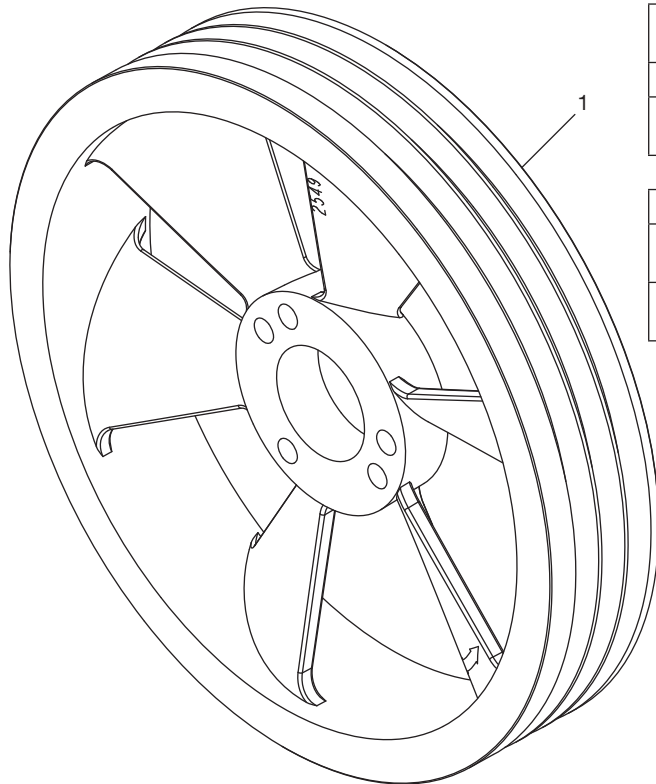
CAUTION: Always relieve pressure in the unit before attempting any repairs.



Appendix E—Parts Details for 491 and F491 Flywheel Assembly



Back Side



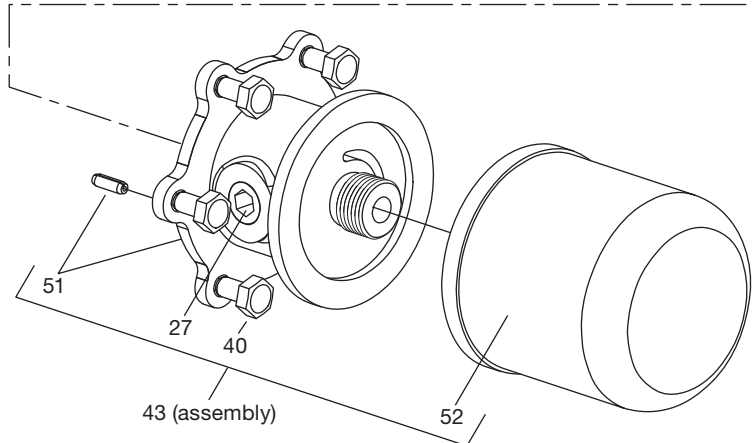
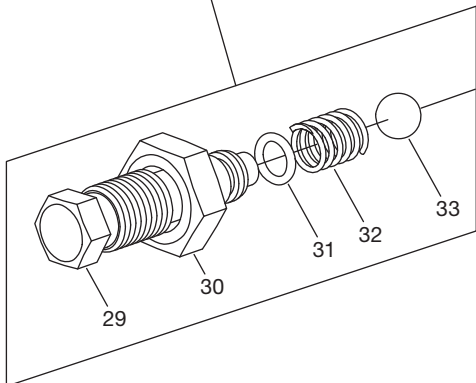
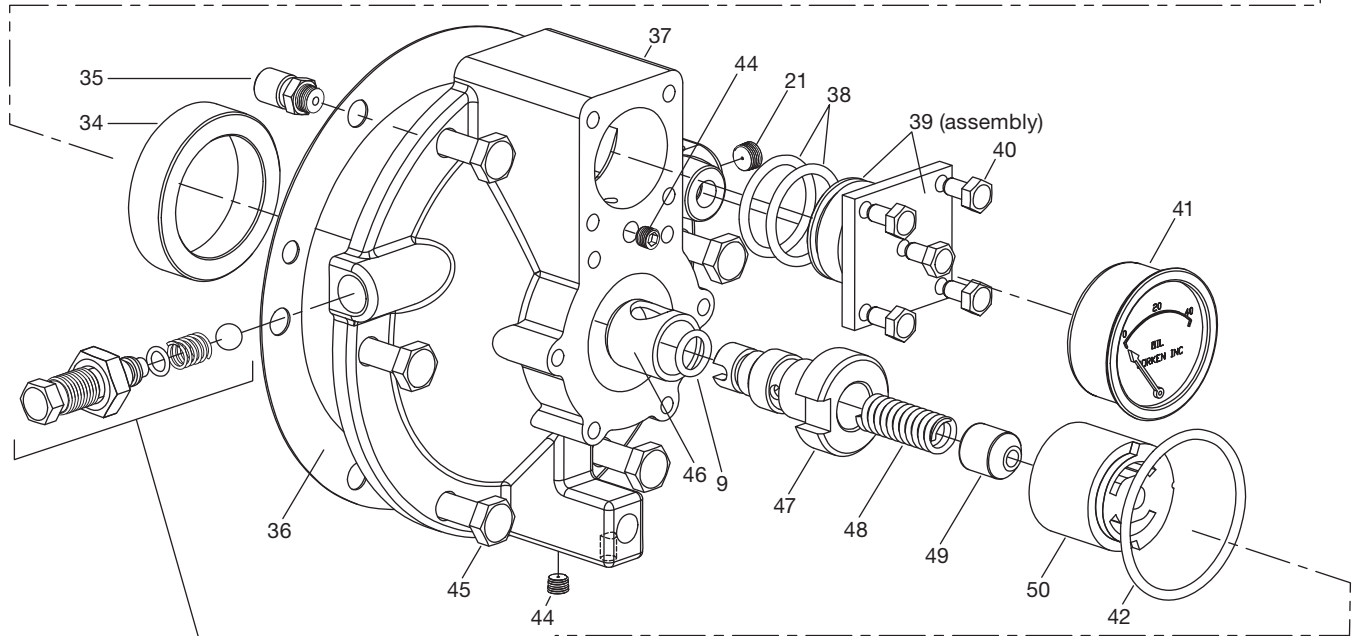
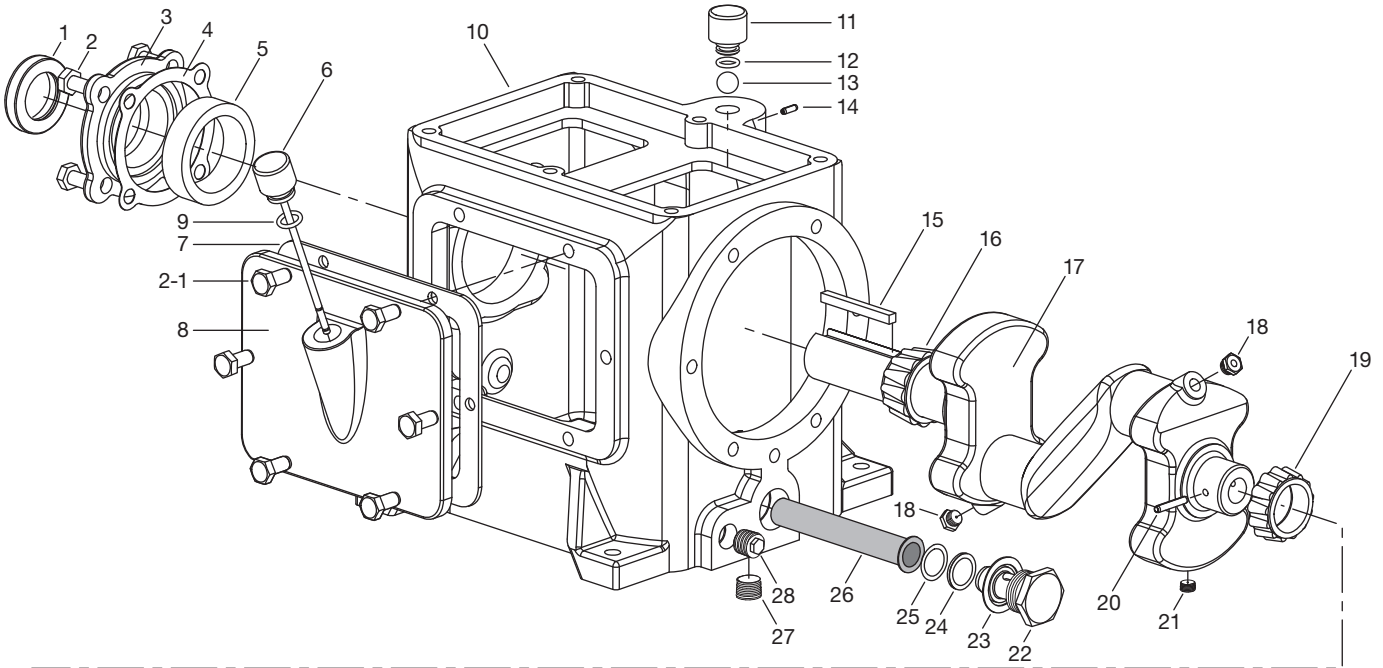
Front Side

Flywheel—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	2549	Flywheel (16" O.D., 3 groove)	1
2.	H SF-1.375	Hub with three bolts and lockwashers	1

Assembly Number	Assembly Name
2549-X	Flywheel assembly (flywheel, hub, and three bolts)—standard
3271-X1	Flywheel assembly for extended crankshaft—optional

Appendix E—Parts Details for 491 and F491 Crankcase Assembly



Appendix E—Parts Details for 491 and F491 Crankcase Assembly

Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	4438	Oil seal	1
2.	7001-037NC075A	Bolt (hex head, 3/8"-16 x 3/4")	4
2-1.	7001-031NC075A	Bolt (hex head, 5/16"-18 x 3/4")	6
3.	2847-1	Bearing cover	1
4.	1504	Bearing adjustment shim (0.005")	As needed
	1504-1	Bearing adjustment shim (0.007")	As needed
	1504-2	Bearing adjustment shim (0.020")	As needed
5.	1502	Bearing cup	1
6.	1508-X	Oil bayonet	1
7.	1511	Crankcase inspection plate gasket	1
8.	2853	Crankcase inspection plate	1
9.	2-112A	O-ring (Buna-N, oil bayonet and pump shaft)	2
10.	2803	Crankcase	1
11.	1279	Breather cap	1
12.	2-111A	O-ring (Buna-N, breather cap)	1
13.	2796	Breather ball	1
14.	1450	Lock pin	1
15.	1663	Flywheel key	1
16.	1503	Bearing cone	1
17.	1499-X	Crankshaft assembly with 1284 (2), 1286, 1499, 1501, 1503, 2590	1
18.	1284	Crankcase orifice (2)	2
19.	1501	Bearing cone	1
20.	1286	Pump shaft drive pin	1
21.	2590	Pipe plug	2
22.	1280	Filter screw	1
23.	1281	Filter screen screw gasket	1
24.	2-116A	O-ring (Buna-N, filter screen)	1
25.	1276	Filter screen washer	1
26.	1275	Oil filter screen	1
27.	3289	Pipe plug	2
28.	1661	Plug (3/8" NPT)	1
29.	1290	Relief valve adjusting screw	1
30.	1291	Adjusting screw locknut	1
31.	2-011A	O-ring (Buna-N, relief valve adjusting screw)	1
32.	1292	Relief valve spring	1
33.	1293	Relief valve ball	1
34.	1500	Bearing cup	1
35.	2961-X	Air release valve assembly with 2961, 2962, 2963	1
36.	1513	Bearing carrier gasket	1
37.	2804	Bearing carrier	1
38.	2-218A	O-ring (Buna-N, closure body, 2)	2
39.	1515-X	Closure cap assembly	1
40.	7001-025NC050A	Bolt (hex head, 1/4"-20 x 1/2")	11
41.	1302	Oil pressure gauge	1

Ref No.	Part No.	Description	Qty.
42.	2-228A	O-ring (Buna-N, pump cover)	1
43.	4222-X	Oil filter assembly (external)	1
44.	1629	Pipe plug (1/16" NPT, flush seal)	2
45.	7001-037NC100A	Bolt (hex head, 3/8"-16 x 1")	6
46.	2805-X	Pump shaft bushing	1
47.	2850	Pump shaft adapter	1
48.	2852	Oil pump spring	1
49.	2851	Spring guide	1
50.	2849-X	Oil pump assembly (individual pump parts not available)	1
51.	2798	Pump cover pin with 4222	1
52.	4225	Oil filter	1

Assembly Number	Assembly Name
1279-X	Breather cap assembly with 1279, 2-111A
1499-SX ^a	Extended crankshaft assembly with 1284 (2), 1286, 1499-S, 1501, 1503, 2590
1508-X1	Oil bayonet assembly with 1508-X, 2-112A
2804-X	Bearing carrier assembly with 1290, 1291, 1292, 1293, 1500, 1513, 1515-X, 1629 (2), 2590, 2804, 2849-X, 2850, 2851, 2852, 2961-X, 2-011A, 2-112A, 2-228A, 4222-X
2847-1X	Bearing cover assembly with 2847-1, 4438

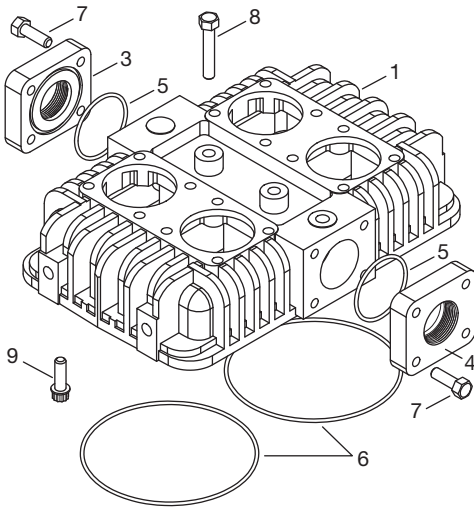
^a Optional equipment.



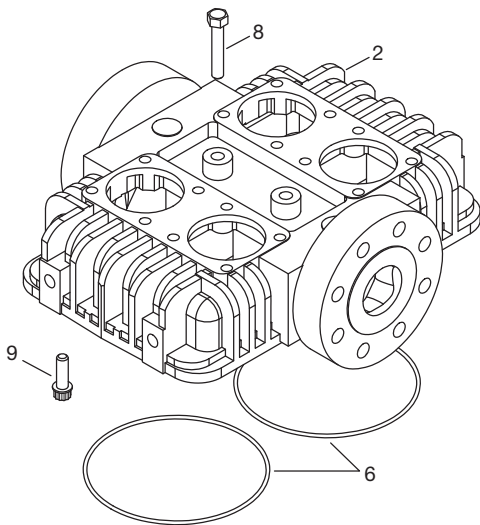
CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 691 and F691 Head and Valve Assembly

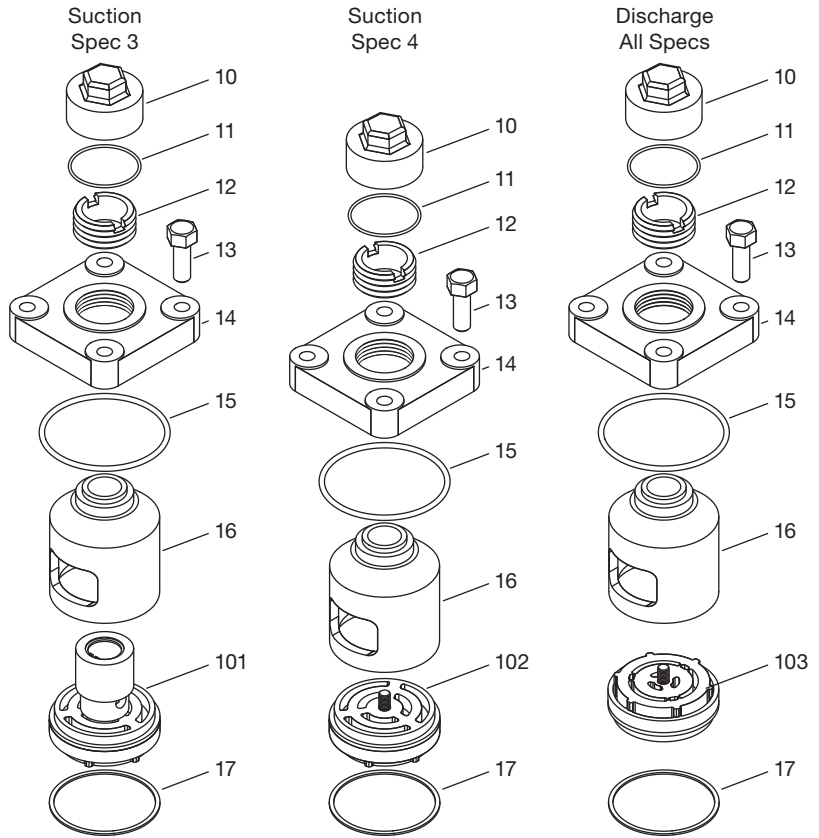
691 Head Assembly



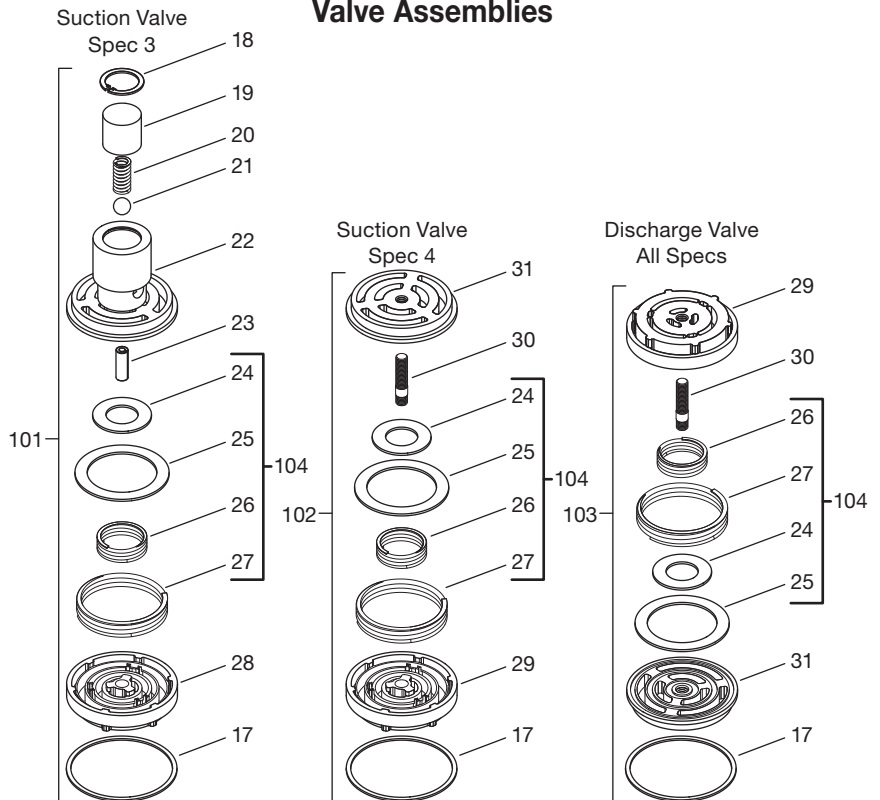
F691 Head Assembly



Valve Holddown Assemblies



Valve Assemblies



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 691 and F691 Head and Valve Assembly

Head and Valve Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3458 ^a	Head (model 691)	1
2.	4299	Head (model F691, Class 300 RF flange)	1
3.	2144-2	Flange (2" NPT, suction)	1
4.	2144-1.5	Flange (1-1/2" NPT, discharge)	1
5.	2-231_ ^b	O-ring	2
6.	2-261_ ^b	O-ring (model 691 head)	2
7.	7001-043NC150A	Bolt (hex head, 7/16"-14 x 1-1/2")	8
8.	2136	Center head bolt	2
9.	7005-050NC150A	Bolt (ferry head, 1/2"-13 x 1-1/2")	12
10.	2714	Valve cap	4
	2714-1	Valve cap (grooved for O-ring)	4
11.	2-031_ ^b	O-ring (valve cap)	4
12.	2715	Holddown screw	4
13.	7001-043NC137A	Bolt (hex head, 7/16"-14 x 1-3/8")	16
14.	1764	Valve cover plate	4
15.	2-235_ ^b	O-ring (cover plate)	4
16.	2797	Valve cage	4
17.	2114	Valve gasket (aluminum)	4
18.	5000-77	Retainer ring	2
19.	3977	Suction valve relief housing (spec 3)	2
20.	1411	Spring	2
21.	1410	Relief ball	2
22.	3948	Valve seat (spec 3)	2
23.	2534-1	Suction valve post (spec 3)	2
24.	4230	Inner valve plate	2
25.	4229	Outer valve plate	2
26.	3929	Inner valve spring	2
27.	3928	Outer valve spring	2
28.	3949-1	Valve bumper (spec 3)	2
29.	3857-1	Valve bumper (spec 3)	4
		Valve bumper (spec 4)	6
30.	3920	Valve stud	4
31.	3856	Valve seat	2

Ref No.	Valve Assembly No.	Assembly Name
101.	3948-2X	Suction valve assembly—spec 3
102.	3856-2X	Suction valve assembly—spec 4
103.	3857-2X	Discharge valve assembly—all specs
104.	3146-X2	Valve repair kit—all specs (suction and discharge)

Head Assembly No.	Model	Valve Specification
3458-X	691	3

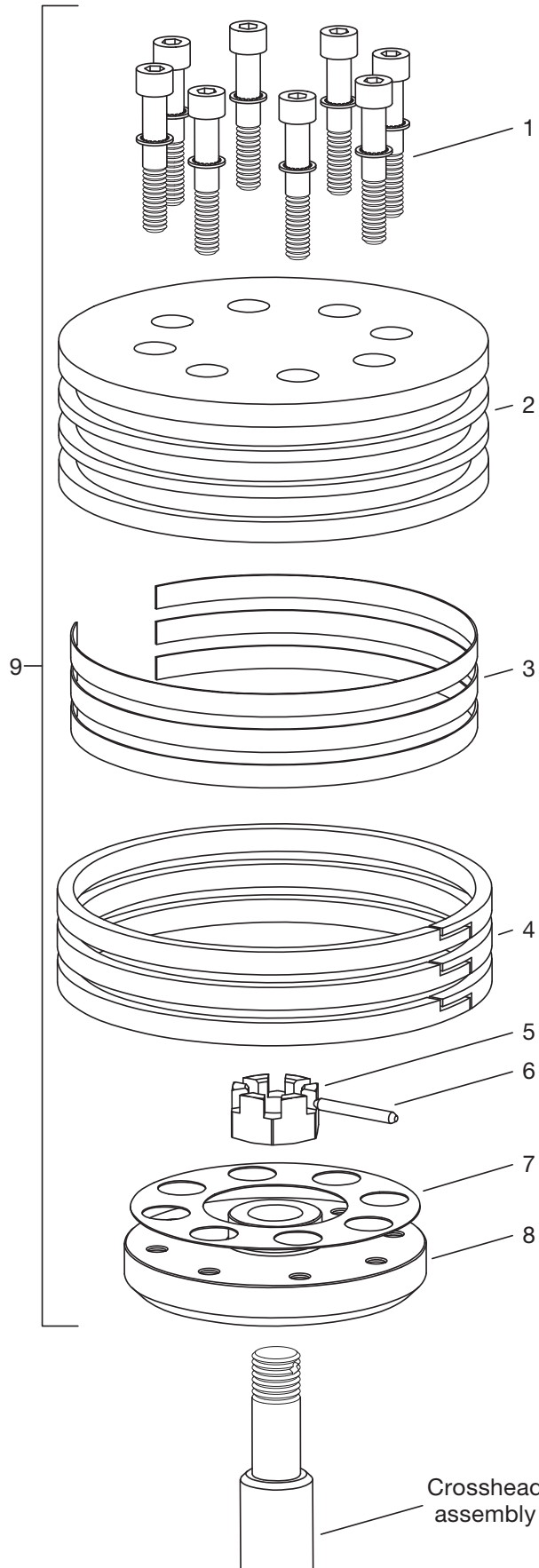
^a S/N NQ51455 and later. Earlier models use gasket #2177.

^b _ denotes material code. See material code chart for details.

^c Registered trademark of the DuPont company.

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

Appendix E—Parts Details for 691 and F691 Piston Assembly



Piston—Bill of Materials Piston Diameter 4.5" (11.43 cm)

Ref No.	Part No.	Description	Qty.
1.	7002-025TP125A	Screw (socket head)	16
	7207-025A	Lock washer	16
2.	1987	Head, iron	2
3.	1740	Ring expander	6
4.	1739	Piston ring	6
5.	1482	Locknut	2
6.	1483	Lock pin	2
7.	1735	Shim washer (thick)	As Req.
	1735-1	Shim washer (thin)	
8.	1986	Piston platform	2

Ref No.	Assembly Number	Assembly Name	Qty.
9.	1987-X1	Piston assembly	2

Piston Clearance (Cold)^a

Model	Minimum	Maximum
691	0.025" (0.64 mm)	0.040" (1.02 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 E—Parts Details for 691 and F691 Packing Assembly

Packing—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3457	Cylinder (model 691)	1
2.	2-247 ^a	O-ring (cylinder)	2
3.	1749-X	Cartridge holddown screw	2
4.	5000-175	Retainer ring	2
5.	1731	Packing spring	2
6.	1728	Packing washer	2
7.	1724	Male packing ring	2
8.	1725-2	Packing ring	8
9.	1723	Female packing ring	2
10.	2407	Packing box cartridge	2
11.	2-233 ^a	O-ring (packing cartridge)	2
12.	1748	Cartridge plate	2
13.	5000-350	Retainer ring	2
14.	2405	Crosshead guide	1
15.	1722-X	Adjusting screw	2
16.	1761	Crankcase gasket	1
17.	1725-2X	Packing set	2
18.	1760	Inspection plate gasket	1
19.	1721	Inspection plate	1
20.	7003-025NC037E	Screw (1/4"-20 x 3/8")	10
21.	1192	Locking device (for adjusting screw, not shown)	2
22.	2893	Locking device cartridge holddown screw (not shown)	2
23.	7005-050NC175A	Bolt	16
24.	7206-050A	Lock washer	16

Assembly Number	Assembly Name
2405-X	Crosshead guide assembly with 1748 (2), 2405, 5000-350 (2)
3544-X4	Crosshead assembly "M" style

^a _ denotes material code. See material code chart for details.

^c The quantity of 1454 packing rings required will vary due to tolerances. Use Cone 4005 for packing installation.

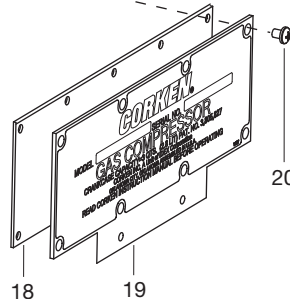
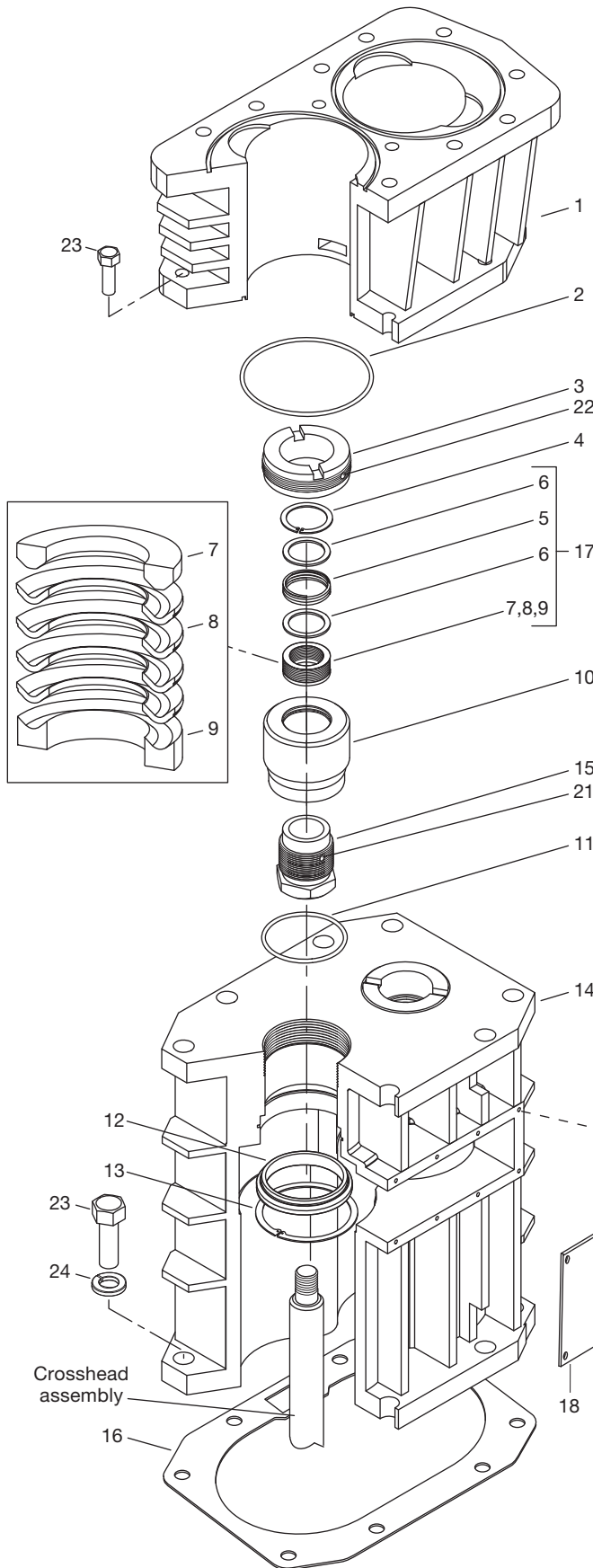
^d S/N XC30633 and later.

^e Registered trademark of the DuPont company.

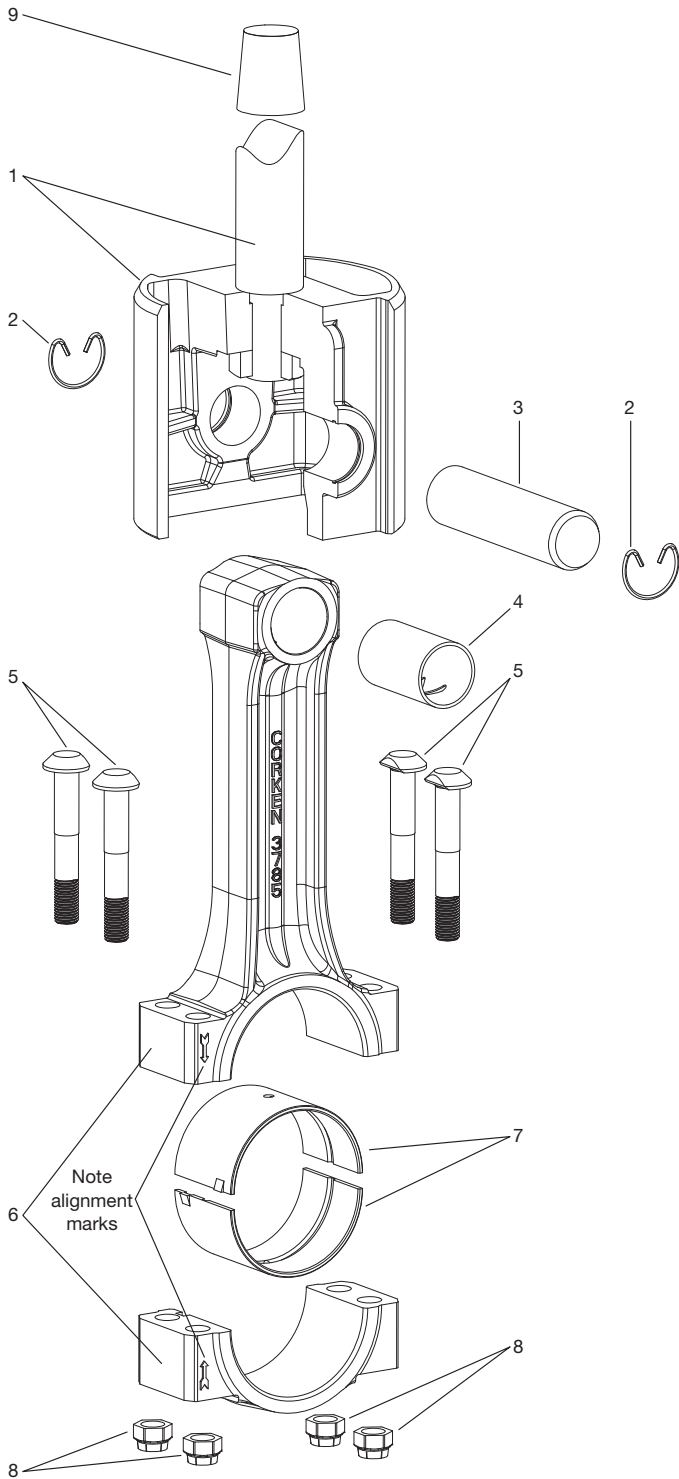
Material Code	
A	Buna-N
B	Neoprene ^{®d}



CAUTION: Always relieve pressure in the unit before attempting any repairs.



Appendix E—Parts Details for 691 and F691 Connecting Rod Assembly



Connecting Rod—Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
	Spec M Only		
1.	3544-X4	Crosshead assembly	2
2.	3590	Retainer ring	4
3.	3540	Wrist pin	2
4.	3541-X ^{a, c}	Wrist pin bushing	2
5.	1726 ^a	Bolt	8
6.	3785-X1	Connecting rod assembly	2
7.	3542 ^a	Connecting rod bearing (pair)	2
8.	1727 ^{a, b}	Nut	8
9.	4692	Packing installation cone	1

^a Included with connecting rod assembly

^b Torque connecting rod nut to 40 ft. lbs.

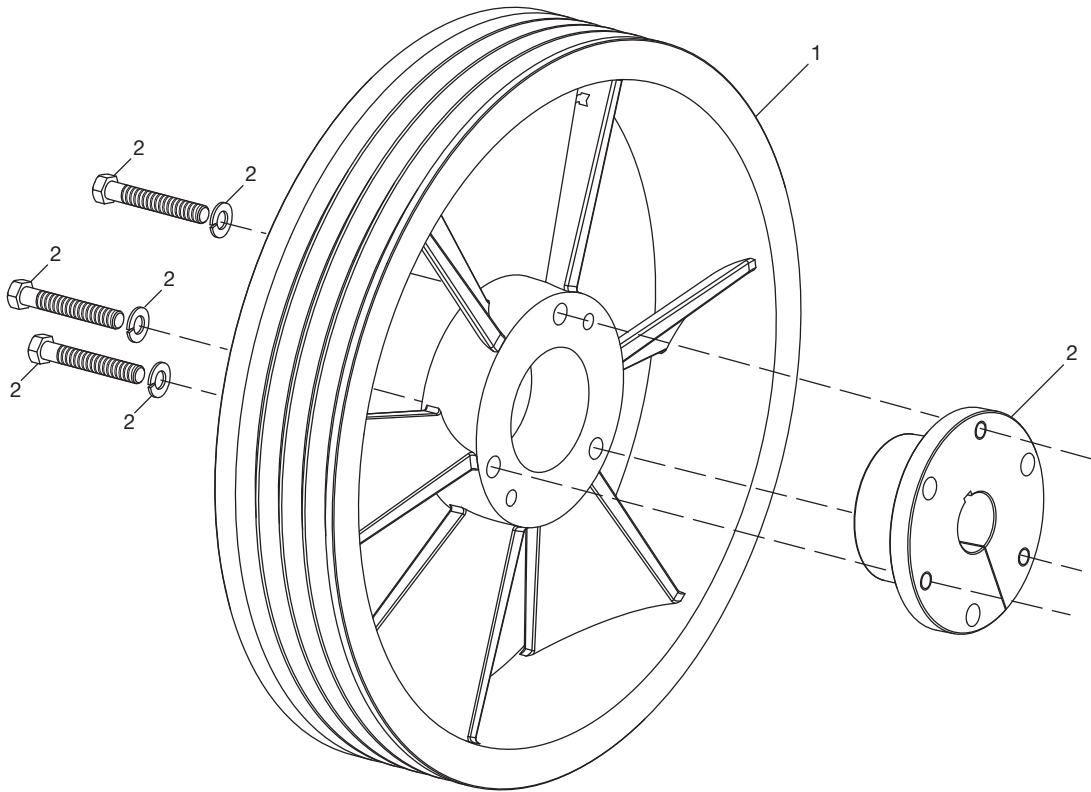
^c After the wrist pin bushing has been pressed into the connecting rod, it must be honed to 1.1263/1.1259 (Spec M ONLY). A hydraulic press and honing machine are recommended for this step.

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

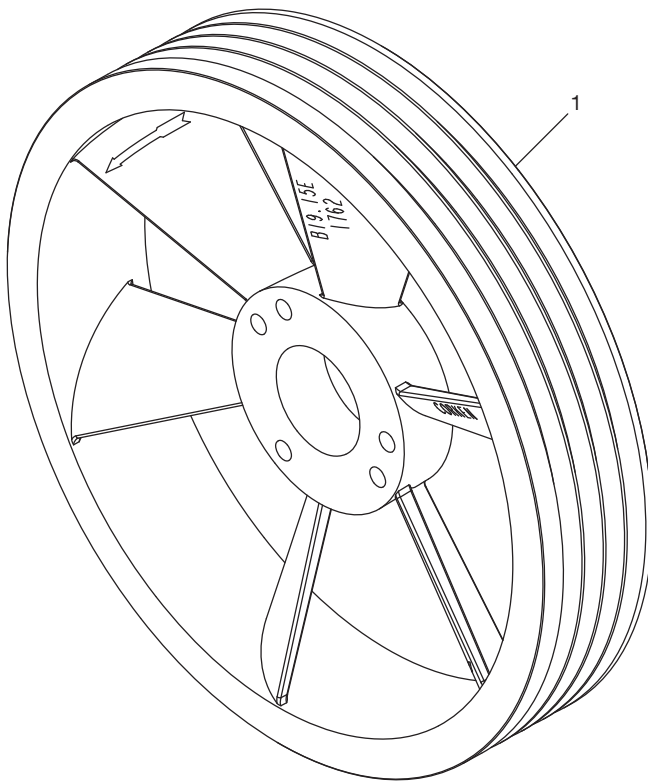


CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for 691 and F691 Flywheel Assembly



Back Side



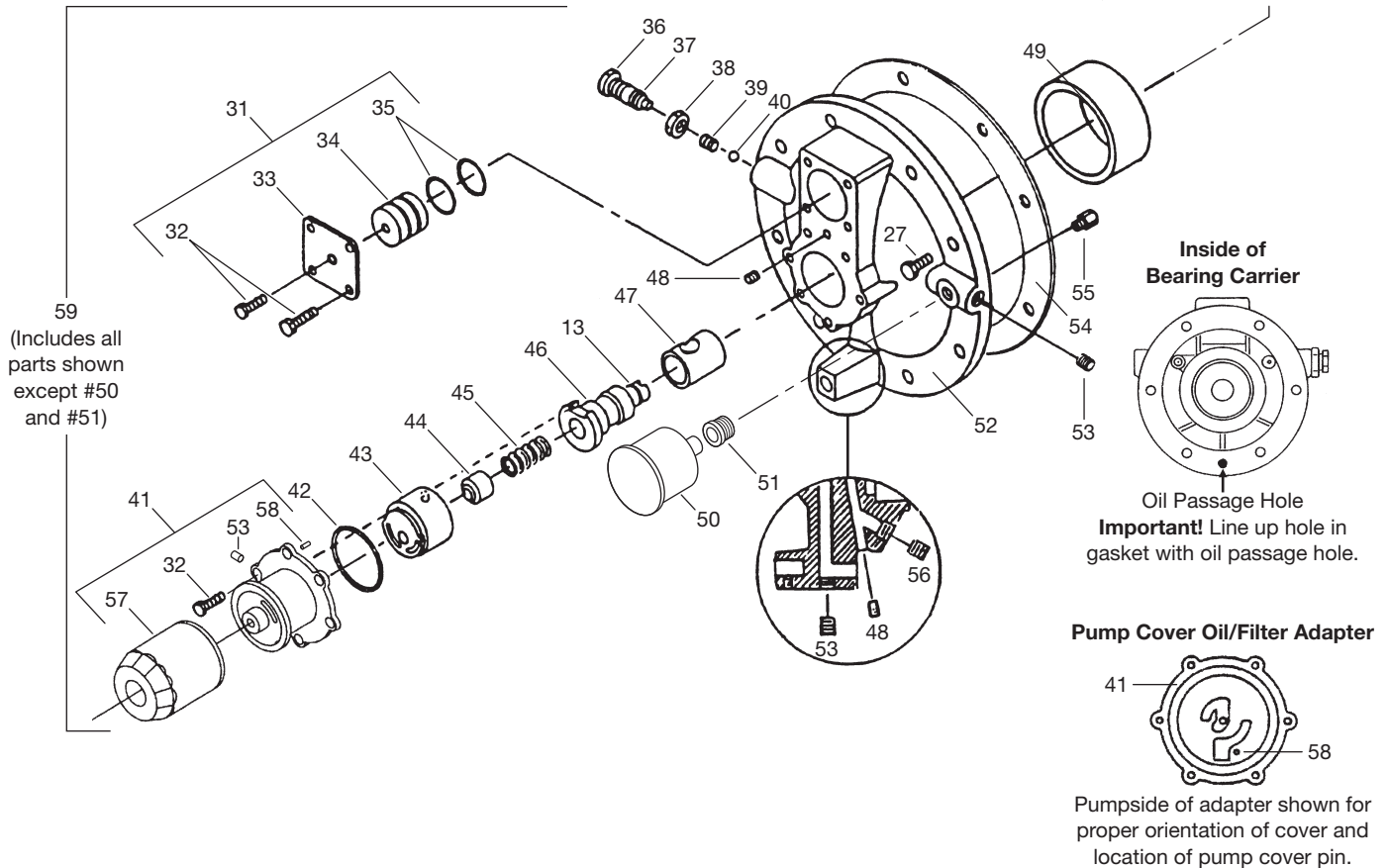
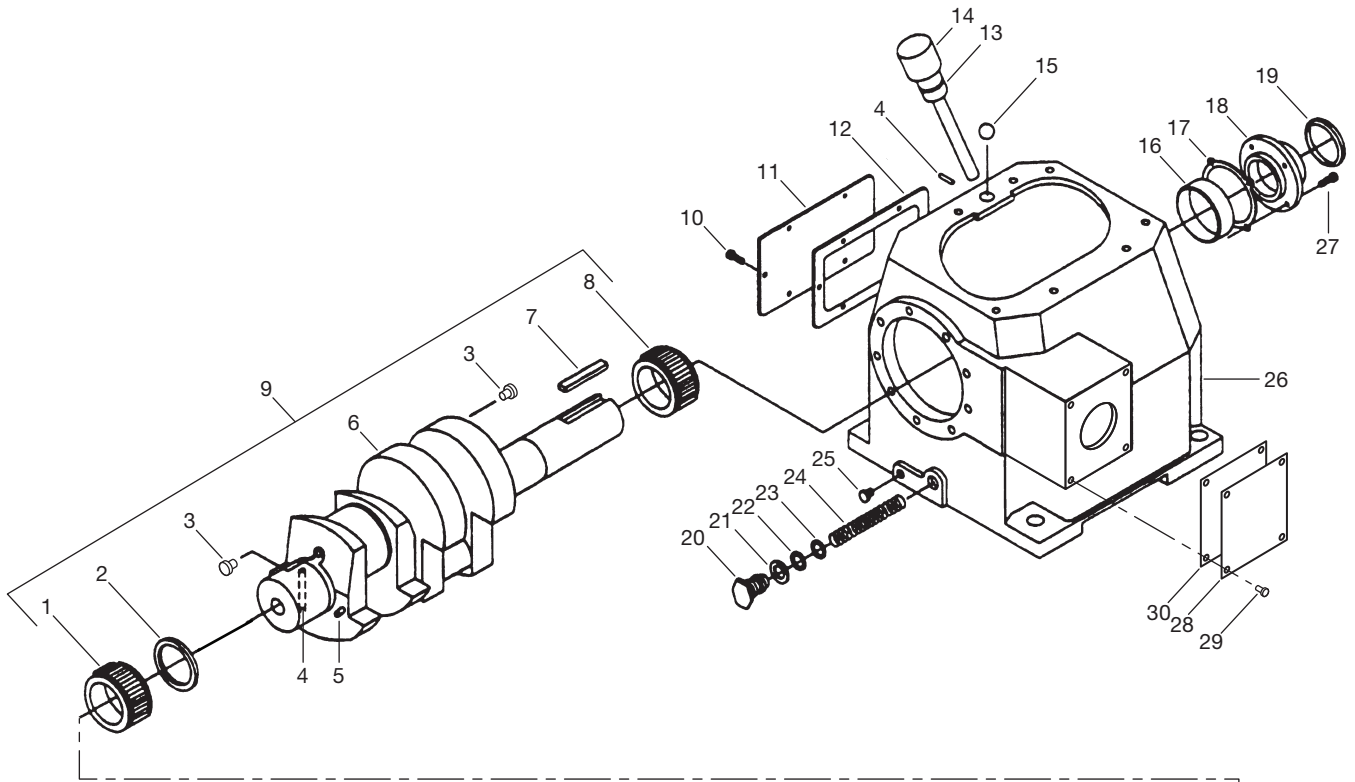
Front Side

Flywheel—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	1762	Flywheel (19.5" O.D., 4 groove)	1
2.	H E-2.125	Hub with three bolts and lockwashers	1

Assembly Number	Assembly Name
1762-X	Flywheel assembly (flywheel, hub, and three bolts)—standard

Appendix E—Parts Details for 691 and F691 Crankcase Assembly



Appendix E—Parts Details for 691 and F691 Crankcase Assembly

Packing—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	1737	Bearing cone	1
2.	3638-1	Spacer	1
3.	1284	Crankshaft orifice	2
4.	2197	Drive pin	1
5.	2933	Link pin	1
6.	3786	Crankshaft	1
7.	3503	Flywheel key	1
8.	3580	Bearing cone	1
9.	3786-X1	Crankshaft assembly	1
10.	7001-031NC075A	Bolt (hex head, 5/16"–18 x 3/4")	6
11.	2122	Inspection cover	1
12.	2123	Gasket (inspection cover)	1
13.	2-112A	O-ring, Buna-N	2
14.	3225-X1	Oil bayonet assembly (with O-ring)	1
15.	2126	Breather ball	1
16.	3579	Bearing cup	1
17.	3589	Bearing adjustment shim (.005")	As needed
	3589-1	Bearing adjustment shim (.007")	As needed
	3589-2	Bearing adjustment shim (.020")	As needed
18.	3539	Bearing cover	1
19.	3526	Oil seal	1
20.	1280	Filter screw	1
21.	1281	Gasket (filter)	1
22.	2-116A	O-ring (Buna-N)	1
23.	1276	Washer	1
24.	1275	Oil filter screen	1
25.	3443	Pipe plug (1/2" NPT, steel)	1
26.	3221	Crankcase	1
27.	7001-037NC100A	Bolt (hex head, 3/8"–16 x 1", grade 5)	12
28.	3875	Access cover	1
29.	7003-025NC037E	Screw (1/4"–20 x 3/8")	4
30.	3874	Gasket, access cover	1
31.	1515-X	Closure cap assembly	1
32.	7001-025NC050A	Bolt (hex head, 1/4"–20 x 1/2")	11
33.	1515	Closure cap	1
34.	1516	Closure body	1
35.	2-218A	O-ring (Buna-N)	2
36.	1290	Relief valve adjusting screw	1
37.	2-011A	O-ring (Buna-N)	1
38.	1291	Adjusting screw locknut	1
39.	1292	Relief valve spring	1
40.	1293	Relief valve ball	1
41.	4222-X ^a	Oil filter adapter assembly (with pin)	1
42.	2-228A	O-ring (Buna-N)	1
43.	2849-1X ^a	Oil pump assembly	1

Ref No.	Part No.	Description	Qty.
44.	2851	Spring guide	1
45.	2852	Oil pump spring	1
46.	3219	Pump shaft adapter	1
47.	2805-X ^b	Pump shaft bushing	1
48.	1629	Pipe plug (1/16" NPT, flush seal)	1
49.	1736	Bearing cup	1
50.	1302	Oil pressure gauge	1
51.	1044	Bushing (1/8" x 1/4" NPT)	1
52.	3220-2	Bearing carrier	1
53.	3289	Pipe plug (1/4" NPT, flush seal)	4
54.	2131	Bearing carrier gasket	1
55.	2961-X	Air release valve assembly	1
56.	2590	Pipe plug (1/8" NPT, flush seal)	1
57.	4225	Filter	1
58.	2798	Pump cover pin (included with 4222-X)	1
59.	3220-2X	Bearing carrier assembly M3 style	1

Assembly Number	Assembly Name
3221-X1	Crankcase assembly (M3, 4, 8, 9) without lubrication (not shown)

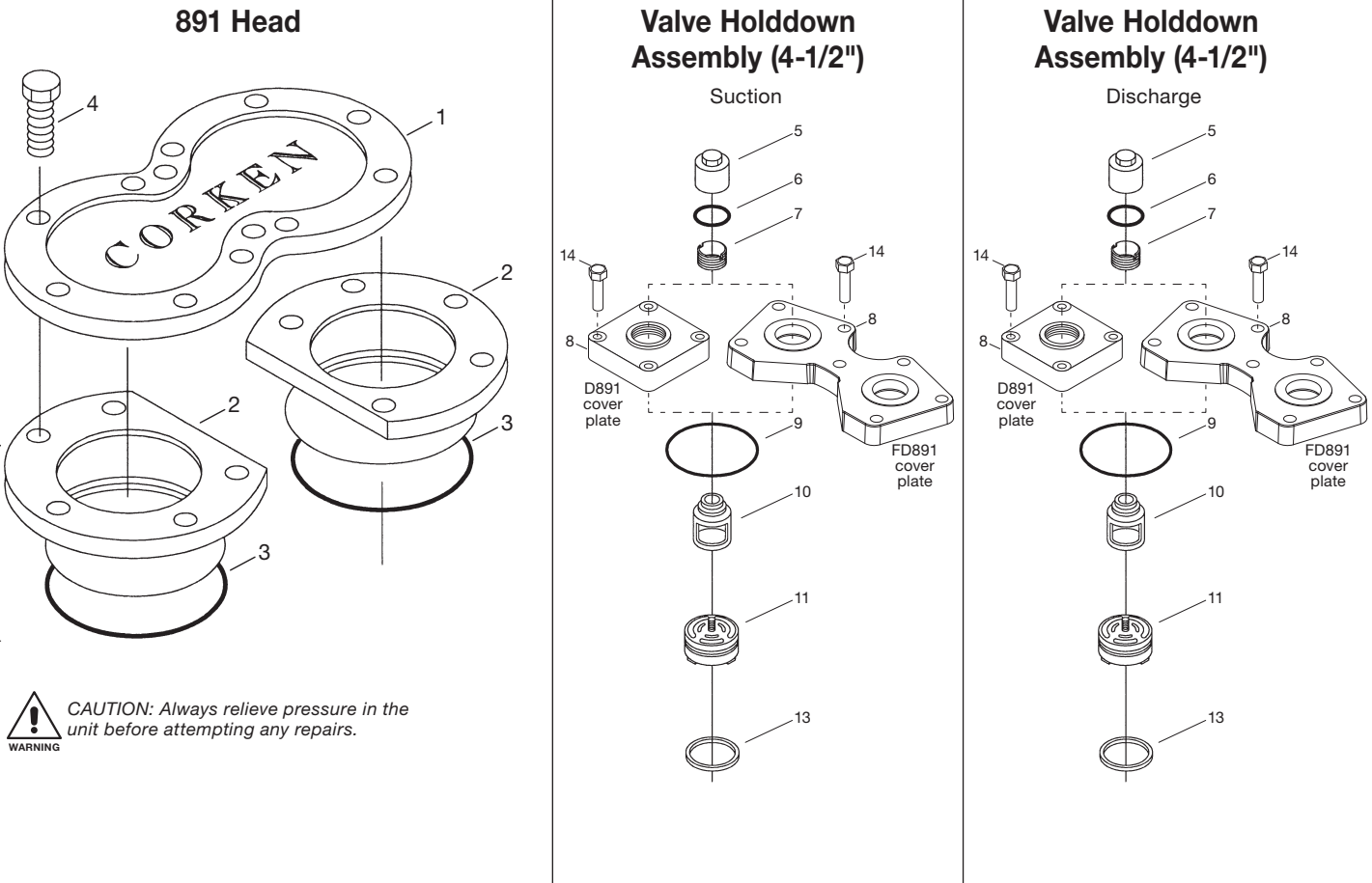
^a Caution: To avoid damage during assembly, refer to installation Instruction Manual IE400.

^b Must be rebored and honed after replacing (0.876"/0.875" diameter).



CAUTION: Always relieve pressure in the unit before attempting any repairs.

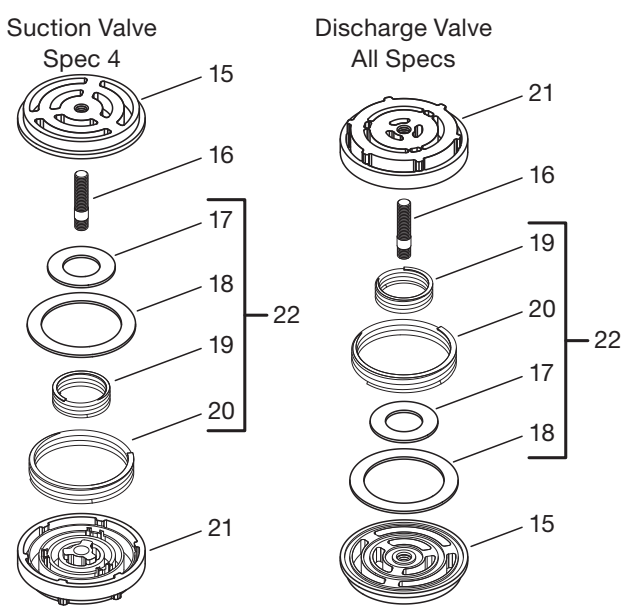
Appendix E—Parts Details for D891 and FD891 Head and Valve Assembly



Head and Valve Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3923	Cylinder cap	1
2.	3924	Cylinder head (4-1/2")	2
3.	2-246_a	O-ring	2
4.	7001-050 NC175A	Bolt (hex head, 1/2"-13 x 1-3/4", grade 5, torque to 65 ft•lbs)	12
5.	2714-1	Valve cap	8
6.	2-031_a	O-ring	8
7.	2715	Holddown screw	8
8.	1764	Valve cover plate (model D891)	8
	4854	Valve cover plate (model FD891)	4
9.	2-235_a	O-ring	8
10.	3570-1	Valve cage	8
11.	3856-2X	Valve assembly (4-1/2", suction)	4
12.	3857-2X	Valve assembly (4-1/2", discharge)	4
13.	2114 ^b	Valve gasket	8
14.	7001-043 NC150A	Bolt (hex head, 7/16"-14 x 1-1/2", torque to 37 ft•lbs)—model FD891	28
		Bolt (hex head, 7/16"-14 x 1-1/2", torque to 37 ft•lbs)—model D891	32
15.	3856	Valve seat (4-1/2")	8
16.	3920	Stud	8
17.	4230 ^c	Valve plate (inner)	8
18.	4229 ^c	Valve plate (outer)	8
19.	3929 ^c	Inner spring	2
20.	3928 ^c	Outer spring	2
21.	3857-1	Valve bumper (4-1/2")	8
22.	3146-X2	Valve repair kit	1

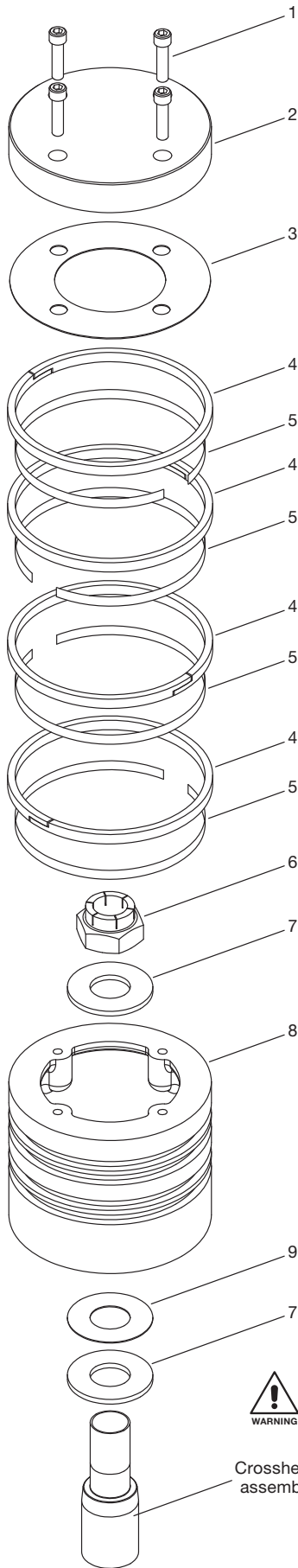
Valve Assemblies (4-1/2")



^a _ denotes material code. See material code chart for details.
^b Included with valve assembly.
^c Included with valve repair kit.
^d Registered trademark of the DuPont company.

Material Code	
A	Buna-N
B	Neoprene ^{®d}

Appendix E—Parts Details for D891 and FD891 Piston



Piston—Bill of Materials Piston Diameter 4.5" (11.43 cm)

Ref No.	Part No.	Description	Qty.
1.	7002-025TP100A	Screw (orlo, gr. 8, torque to 8 ft•lbs)	4
2.	3927	Piston cap	1
3.	2902	Shim washer (thick)	As req.
	2902-1	Shim washer (thin)	
4.	1739	Piston rings	4
5.	1740	Expander ring	4
6.	3604	Lock nut (torque to 150 ft•lbs)	1
7.	3730	Thrust washer	2
8.	3925	Piston (4-1/2" diameter)	1
9.	3603	Shim washer (thick)	As req.
	3603-1	Shim washer (thin)	
10.	3812	Loctite tube (620, not shown)	1

Ref No.	Assembly Number	Assembly Name
11.	3925-X1	Piston assembly

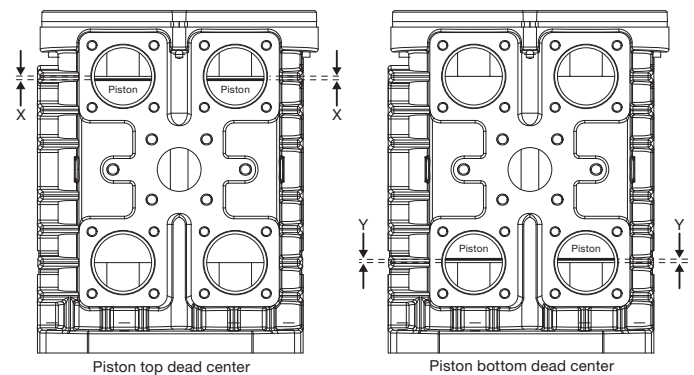
Piston Clearance (Cold)^a

Model	Top (X) Minimum ^a	Top (X) Maximum ^a	Bottom (Y) Minimum ^b	Bottom (Y) Maximum ^b
D891	0.084" (2.13 mm)	0.104" (2.64 mm)	0.010" (0.25 mm)	0.020" (0.51 mm)

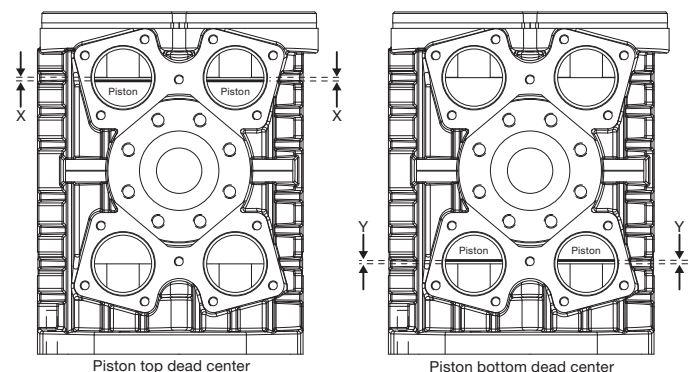
^a The distance from the bottom of the head to the top of the piston.


^b The distance from the bottom of the piston to the top of the packing barrel.

Model D891 Piston Clearance



Model FD891 Piston Clearance

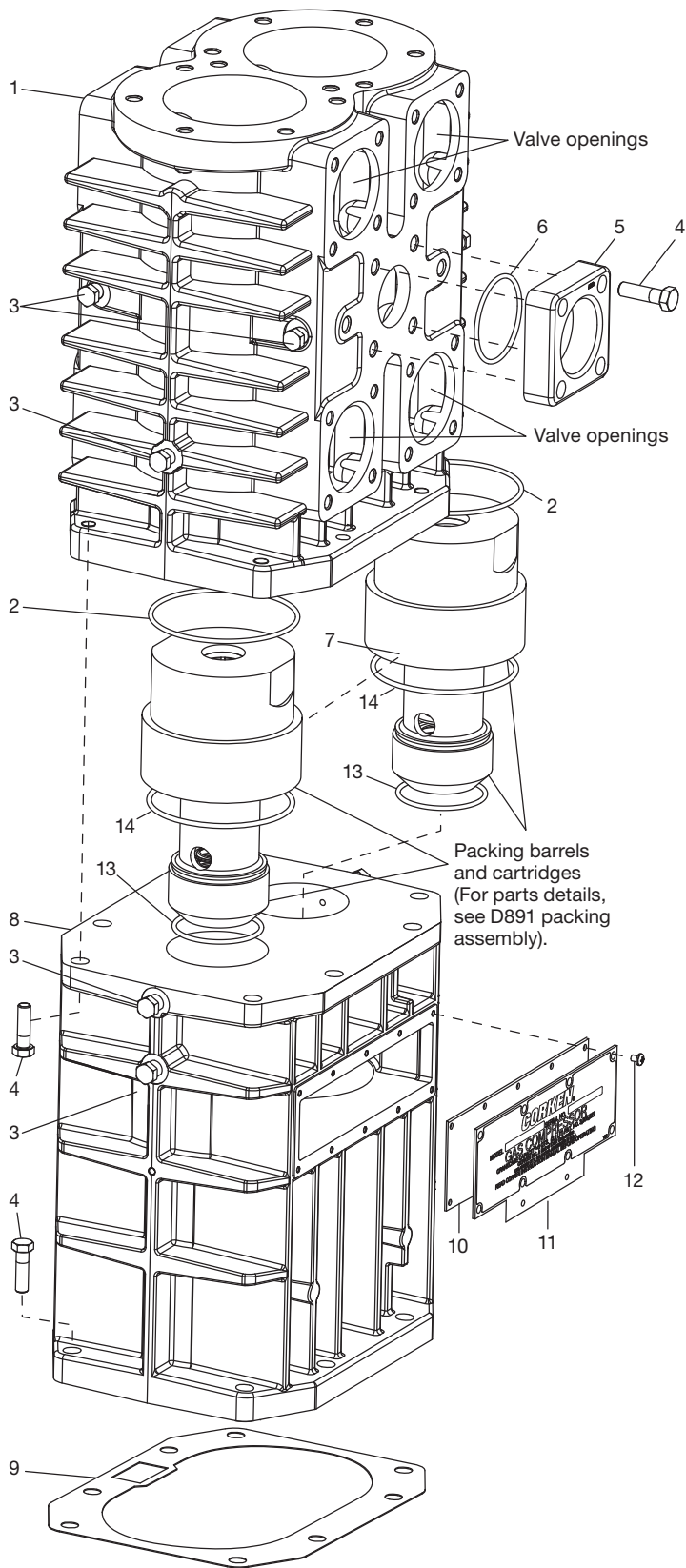


WARNING  **CAUTION:** Always relieve pressure in the unit before attempting any repairs.

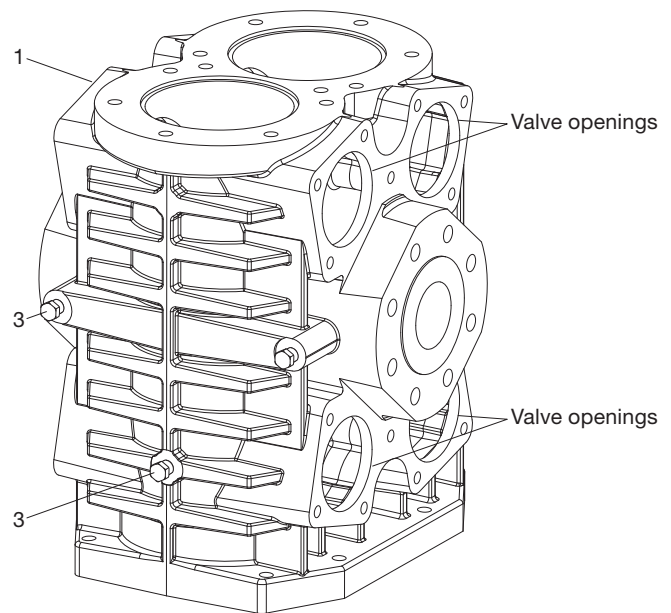
Crosshead assembly

Appendix E—Parts Details for D891 and FD891 Crosshead Guide

D891 Cylinder



FD891 Cylinder



Crosshead Guide—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3922	Cylinder (model D891)	1
	4851	Cylinder (model FD891, Class 300 RF flange)	1
2.	2-246_a	O-ring for cylinder	2
3.	3442	Pipe plug (1/4" NPT)	3
4.	7001-050NC175A	Bolt (hex head, 1/2"—13 x 1-3/4", grade 5, model D891)	18
		Bolt (hex head, 1/2"—13 x 1-3/4", grade 5, model FD891)	14
5.	3793-2S	Flange (inlet / outlet, model D891 only)	2
6.	2-231_a	O-ring (flange, model D891 only)	2
7.	3253	Roll pin	1
8.	2405-1	Crosshead guide	1
9.	1761	Gasket (crankcase)	1
10.	1760	Gasket (inspection cover)	1
11.	1721	Inspection cover	1
12.	7012-010NC025B	Bolt (phillip head, 10"—24 x 1/4")	10
13.	2-231_a	O-ring	2
14.	2-238_a	O-ring	2

^a _ denotes material code. See material code chart for details.

^b Registered trademark of the DuPont company.

Material Code

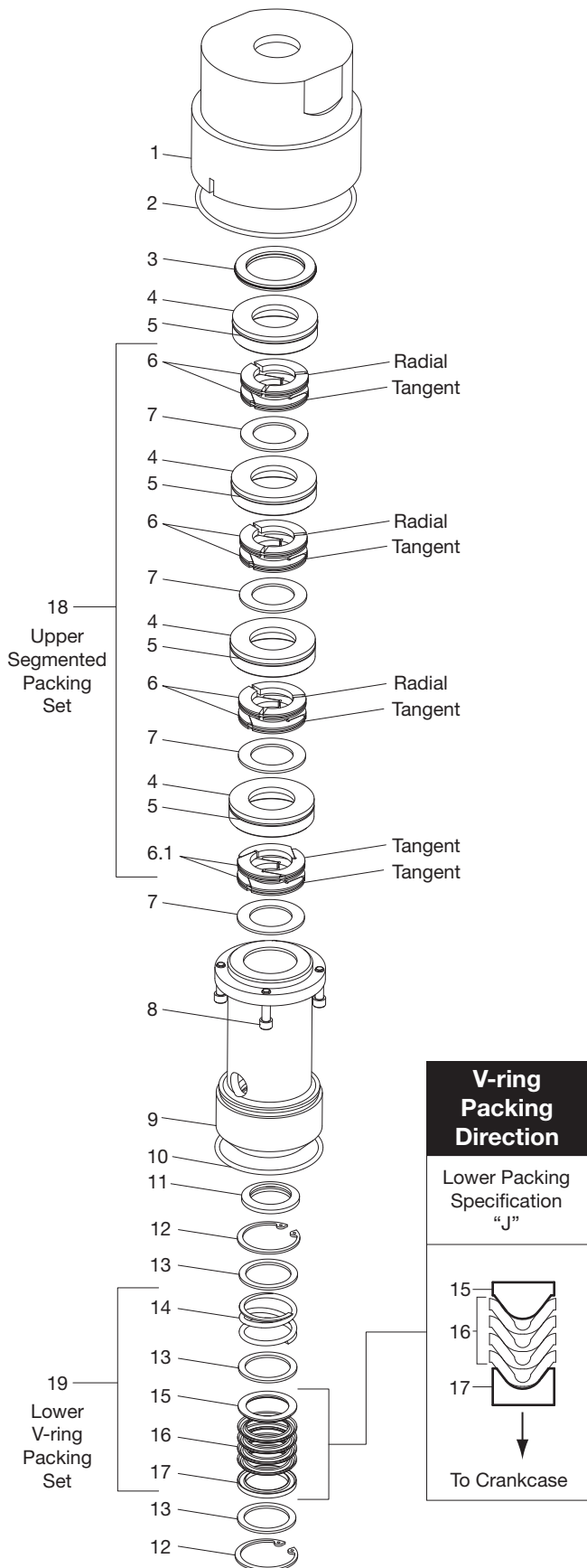
A	Buna-N
B	Neoprene ^{®b}



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for D891 and FD891 Packing

Specification "J"



Packing—Bill of Materials

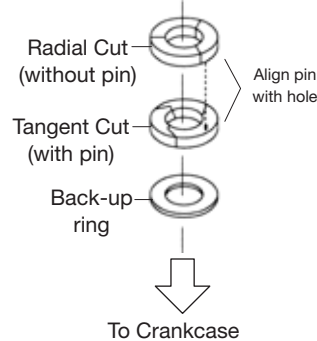
Ref No.	Part No.	Description	Qty.
1.	3926	Packing barrel (4-1/2")	2
2.	2-238 ^{a, c}	O-ring	2
3.	3906	Crush gasket	2
4.	3817	Packing cup (Not included in 3810-X1 packing set)	8
5.	2-036 ^{a, d}	O-ring (cup)	8
6.	3810	Segmented packing (radial—tangent) pair	6
6.1.	3814	Segmented packing (tangent—tangent) pair	2
7.	3811	Back-up ring	8
8.	7002-025TP100A	Screw (socket head, 1/4"—20 x 1")	8
9.	3885	Cartridge	2
10.	2-231 ^a	O-ring	4
11.	1732 ^b	Oil deflector ring	2
12.	5000-175	Retainer ring	4
13.	1728	Washer	6
14.	1731	Spring	2
15.	1724	Packing ring (male)	2
16.	1725-2	V-ring packing	8
17.	1723	Packing ring (female)	2
18.	3810-X1 ^e	Packing set (segmented)	2
19.	1725-2X	Packing set (V-ring)	2

Identification of Packing Specification

Example: Model Number FD891 **J** M4PFBANSNN
 Packing Spec _____

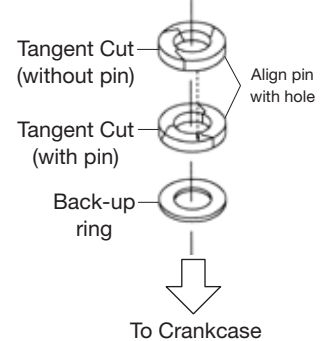
Segmented Packing for Specification "J"

Piston (Pressure) Side



Segmented packing for Specification "J"

Piston (Pressure) Side



IMPORTANT: Identify and line up the rings before installing. Be sure they face the way shown here and that the pin and hole are aligned when assembled.

^a _ denotes material code. See material code chart for details.

^b Deflector ring is loose within the packing cartridge until fitted on the piston rod. Must be put in from the bottom of the cartridge.

^c Insert O-ring into the groove in the bottom of the barrel.

^d Starting with S.N. NN51397.

^e Packing cup O-ring not included in packing set.

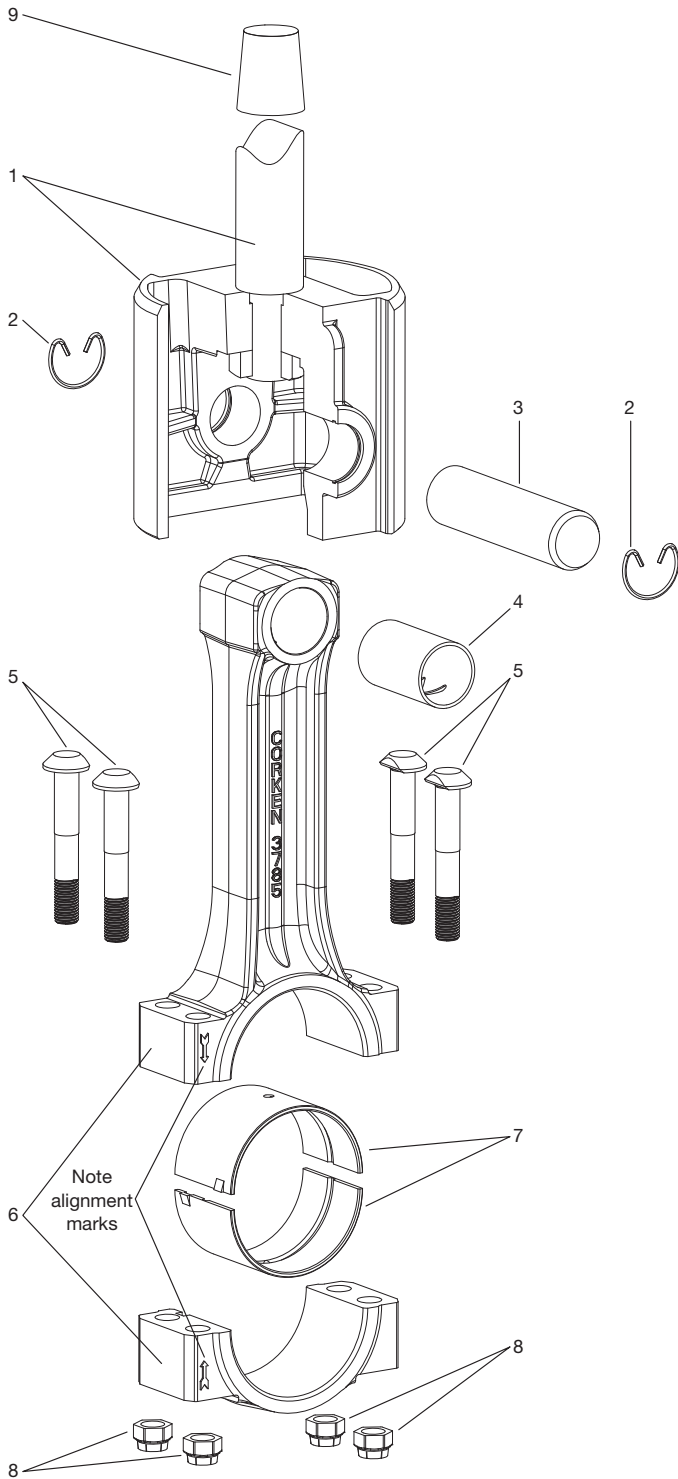
^f Registered trademark of the DuPont company.

Material Code	
A	Buna-N
B	Neoprene ^{®f}



CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for D891 and FD891 Connecting Rod Assembly



Connecting Rod—Bill of Materials

Ref No.	Part No.	Description	Qty. per Compressor
1.	3544-X3	Crosshead assembly	2
2.	3590	Retainer ring	4
3.	3540	Wrist pin	2
4.	3541-X ^{a, c}	Wrist pin bushing	2
5.	1726 ^a	Bolt	8
6.	3785-X1 ^a	Connecting rod assembly	2
7.	3542 ^a	Connecting rod bearing (pair)	2
8.	1727 ^{a, b}	Nut	8
9.	3905	Packing installation cone	1

^a Included with connecting rod assembly

^b Torque connecting rod nut to 40 ft. lbs.

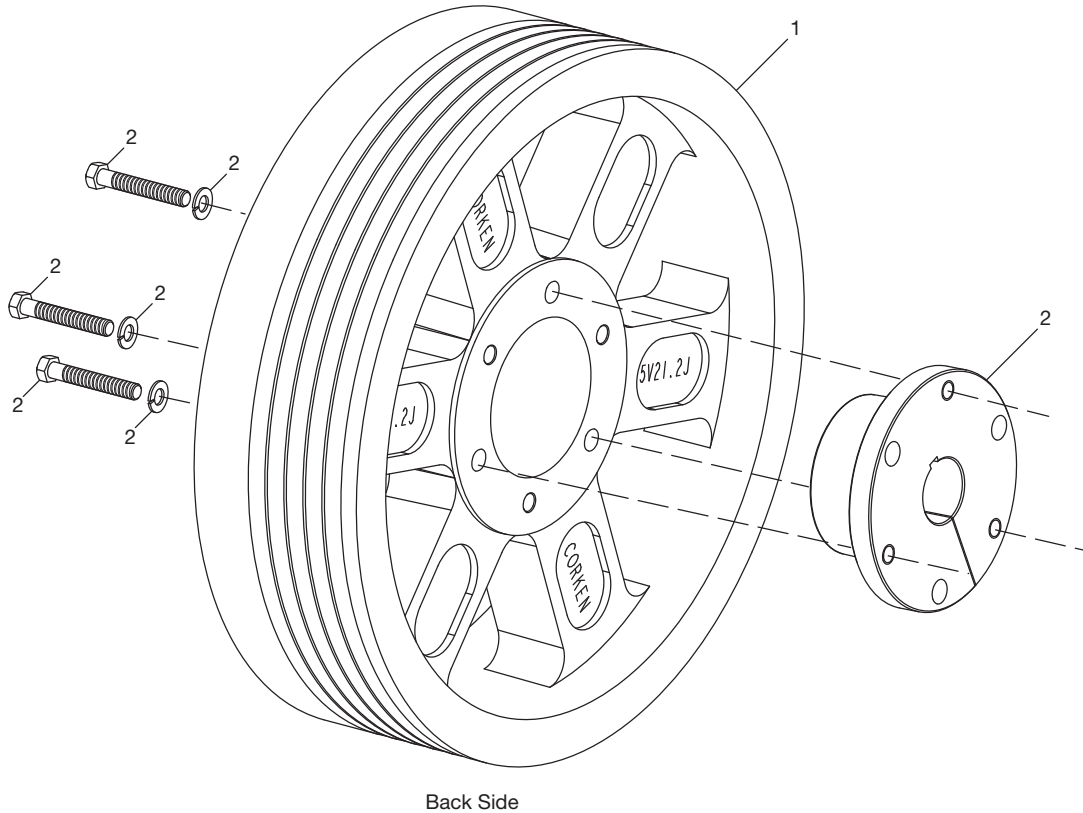
^c After the wrist pin bushing has been pressed into the connecting rod, it must be honed to 1.1263/1.1259. A hydraulic press and honing machine are recommended for this step.

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

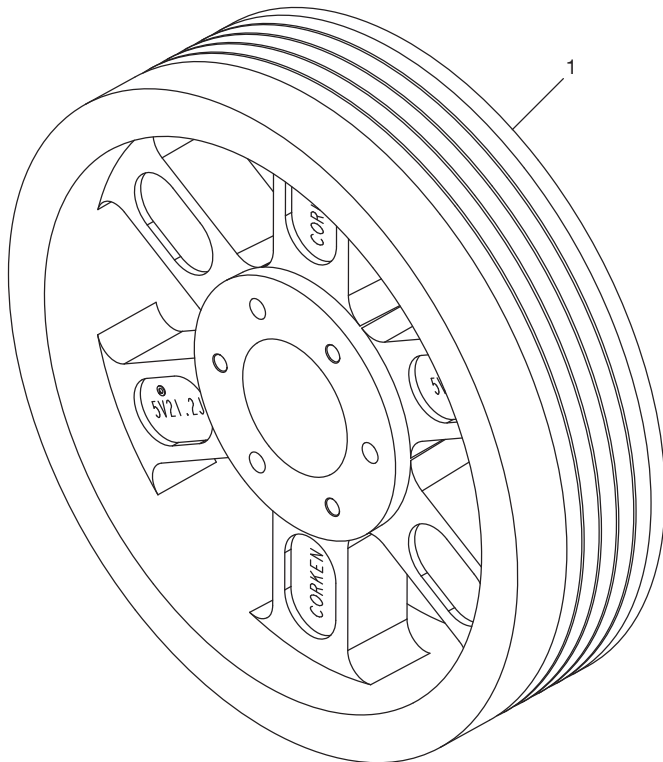


CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Parts Details for D891 and FD891 Flywheel Assembly



Back Side



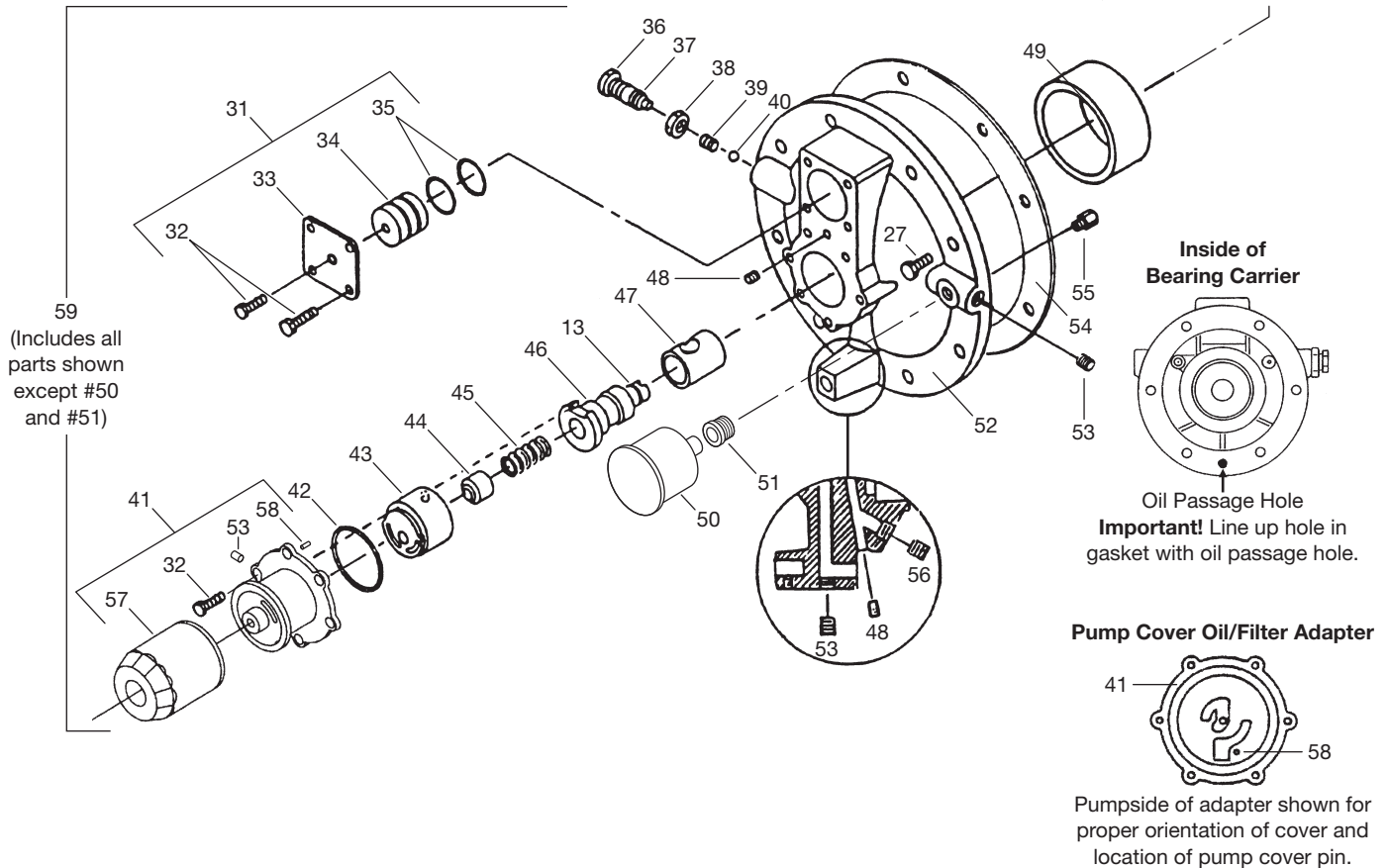
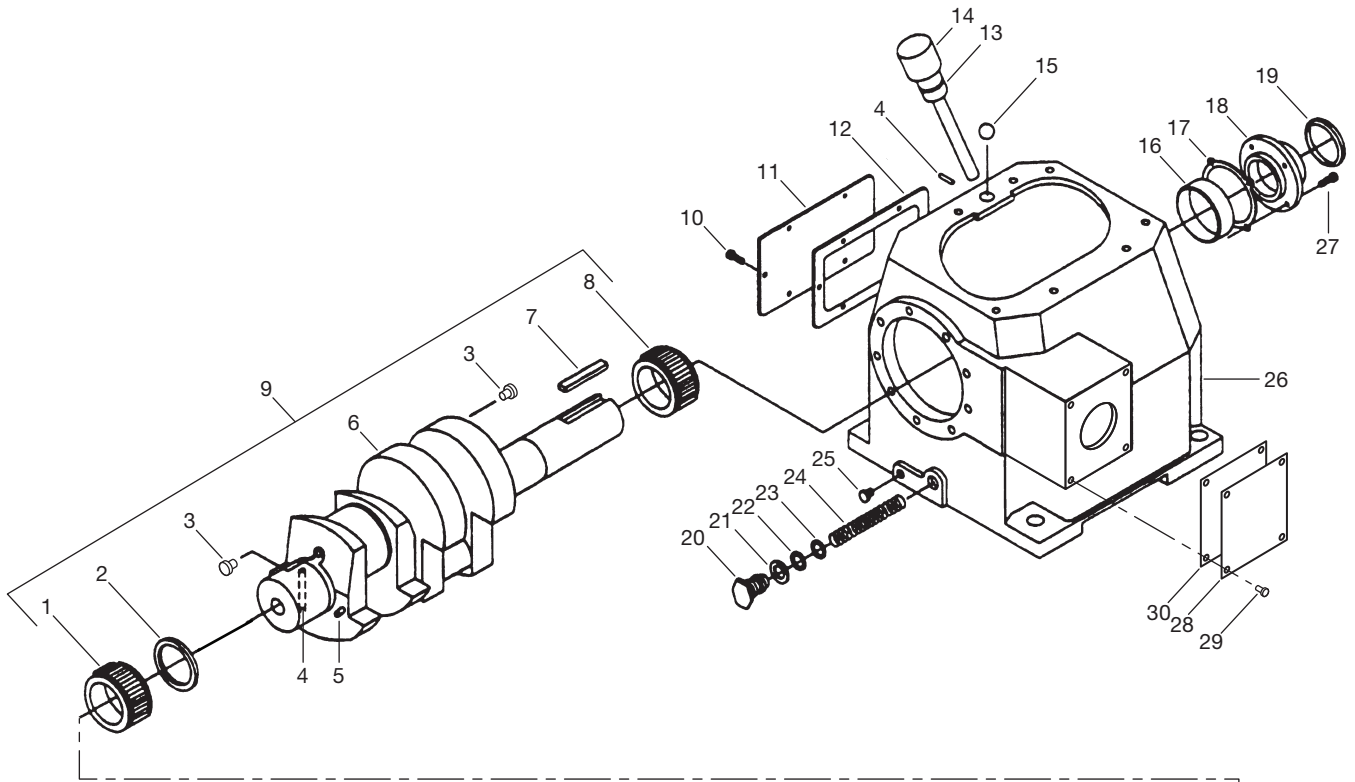
Front Side

Flywheel—Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3852	Flywheel (21.2" O.D., 5 groove)	1
2.	H J-2.125	Hub with three bolts and lockwashers	1

Assembly Number	Assembly Name
3852-X	Flywheel assembly (flywheel, hub, and three bolts)

Appendix E—Parts Details for D891 and FD891 Crankcase Assembly



Appendix E—Parts Details for D891 and FD891 Crankcase Assembly

Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	1737	Bearing cone	1
2.	3638-1	Spacer	1
3.	1284	Crankshaft orifice	2
4.	2197	Drive pin	1
5.	2933	Link pin	1
6.	3786	Crankshaft	1
7.	3503	Flywheel key	1
8.	3580	Bearing cone	1
9.	3786-X1	Crankshaft assembly	1
10.	7001-031NC075A	Bolt (hex head, 5/16"–18 x 3/4")	6
11.	2122	Inspection cover	1
12.	2123	Gasket (inspection cover)	1
13.	2-112A	O-ring (Buna-N)	2
14.	3225-X1	Oil bayonet assembly (with O-ring)	1
15.	2126	Breather ball	1
16.	3579	Bearing cup	1
17.	3589	Bearing adjustment shim (.005")	As needed
	3589-1	Bearing adjustment shim (.007")	As needed
	3589-2	Bearing adjustment shim (.020")	As needed
18.	3539	Bearing cover	1
19.	3526	Oil seal	1
20.	1280	Filter screw	1
21.	1281	Gasket (filter)	1
22.	2-116A	O-ring (Buna-N)	1
23.	1276	Washer	1
24.	1275	Oil filter screen	1
25.	3443	Pipe plug (1/2" NPT, steel)	1
26.	3221	Crankcase	1
27.	7001-037NC100A	Bolt (hex head, 3/8"–16 x 1", grade 5)	12
28.	3875	Access cover	1
29.	7003-025NC037E	Screw (1/4"–20 x 3/8")	4
30.	3874	Gasket (access cover)	1
31.	1515-X	Closure cap assembly	1
32.	7001-025NC050A	Bolt (hex head, 1/4"–20 x 1/2")	11
33.	1515	Closure cap	1
34.	1516	Closure body	1
35.	2-218A	O-ring (Buna-N)	2
36.	1290	Relief valve adjusting screw	1
37.	2-011A	O-ring (Buna-N)	1
38.	1291	Adjusting screw locknut	1
39.	1292	Relief valve spring	1
40.	1293	Relief valve ball	1
41.	4222-X ^a	Oil filter adapter assembly (with pin)	1
42.	2-228A	O-ring (Buna-N)	1
43.	2849-1X ^a	Oil pump assembly	1

Ref No.	Part No.	Description	Qty.
44.	2851	Spring guide	1
45.	2852	Oil pump spring	1
46.	3219	Pump shaft adapter	1
47.	2805 ^b	Pump shaft bushing	1
48.	1629	Pipe plug (1/16" NPT, flush seal)	1
49.	1736	Bearing cup	1
50.	1302	Oil pressure gauge	1
51.	1044	Bushing (1/8" x 1/4" NPT)	1
52.	3220-2	Bearing carrier	1
53.	3289	Pipe plug (1/4" NPT, flush seal)	4
54.	2131	Bearing carrier gasket	1
55.	2961-X	Air release valve assembly	1
56.	2590	Pipe plug (1/8" NPT, flush seal)	1
57.	4225	Filter	1
58.	2798	Pump cover pin (included with 4222-X)	1
59.	3220-2X	Bearing carrier assembly M3 style	1

Assembly Number	Assembly Name
3221-X1	Crankcase assembly (M3, 4, 8, 9) without lubrication (not shown)

^a Caution: To avoid damage during assembly, refer to installation Instruction Manual IE400.

^b Must be rebored and honed after replacing (0.876"/0.875" diameter).



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