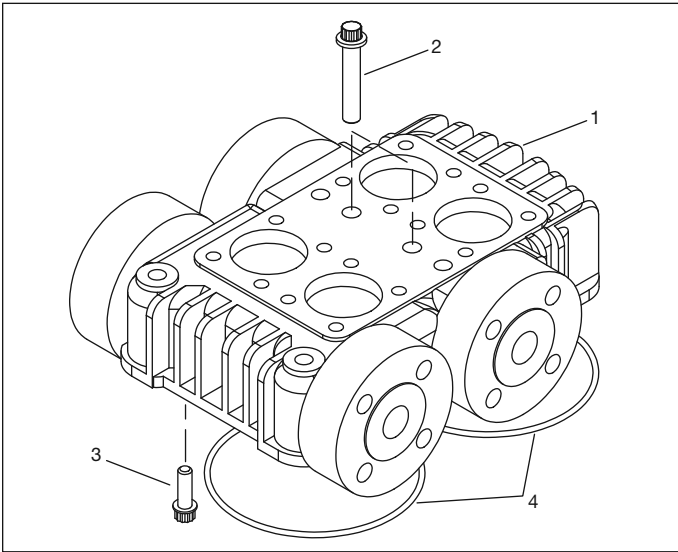
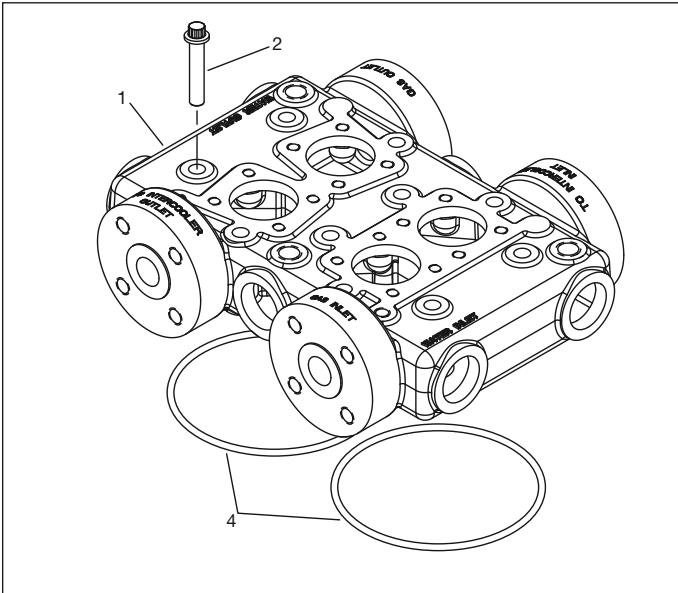


# Appendix E—Head and Valve Assembly Details—All D-Style Models 351

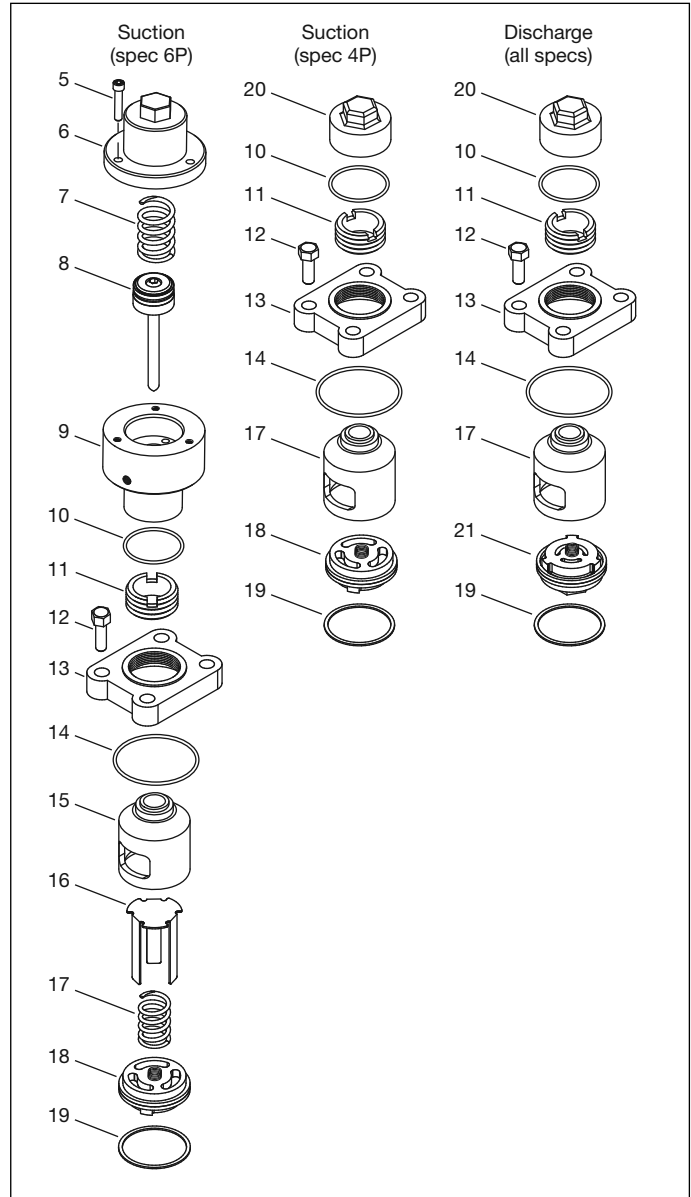
## FD Head



## WFD Head

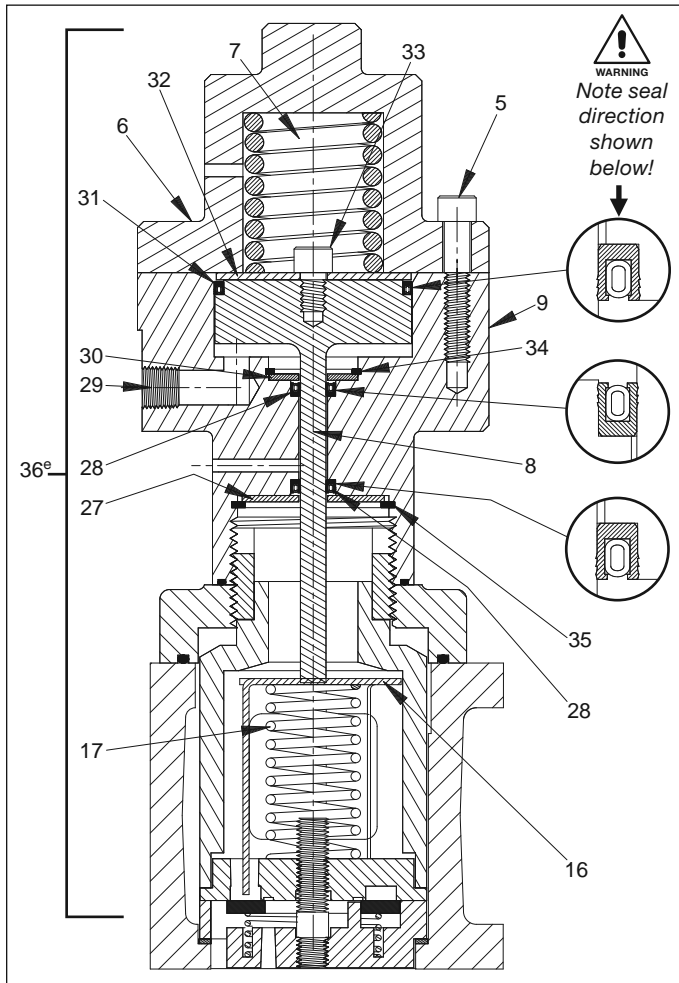


## Valve Holddown Assemblies

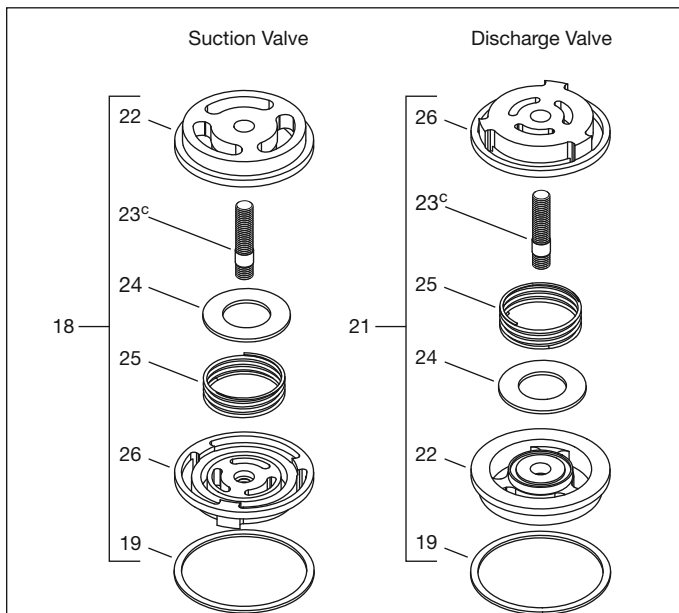


# Appendix E—Head and Valve Assembly Details—All D-Style Models 351

## Unloader Assembly (5320-X1<sup>e</sup>)



## Valve Assemblies



NOTE: A small amount of Loctite #263 should be applied around the complete circumference of the valve stud (part number 3920) before final assembly.

## Head and Valve Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1	4366	Head—FD351	1
	4372-3	Head—WFD351	1
2	1647	Center head bolt—FD351 only	2
		Head bolt—WFD351 only	10
3	7005-043NC150A	Head bolt—FD351 only	12
4	2-253 <sub>a</sub>	O-ring—1st stage & 2nd stage (FD351 only)	2
	2-253 <sub>a</sub>	O-ring—2nd stage (WFD351 only)	1
	2-256 <sub>a</sub>	O-ring—1st stage (WFD351 only)	1
5.	7002-025TP125A <sup>f</sup>	Socket head 1/4"-20 x 1-1/4"	6
6.	5275 <sup>f</sup>	Unloader body cap (spec 6P)	2
7.	5277 <sup>f</sup>	Unloader spring (spec 6P)	2
8.	5273	Unloader piston (spec 6P)	2
9.	5345 <sup>f</sup>	Unloader body (spec 6P)	2
10.	2-031 <sub>a</sub>	O-ring	4
11.	2715	Valve hold-down screw	4
12.	7001-043NC125A	Hex head 7/16-14 x 1-1/4"	16
13.	2205	Cover plate (3-1/4)	4
14.	2-143 <sub>a</sub>	O-ring	4
15.	5319	Valve cage	4
16.	5320 <sup>f</sup>	Unloader actuator (spec 6P)	2
17.	5277 <sup>f</sup>	Unloader spring (spec 6P)	2
18.	5311-3X <sub>d</sub>	Suction valve assembly	2
	1418-2	Valve gasket (iron-lead standard)	4
	1418-1	Valve gasket (copper optional)	4
	1418	Valve gasket (aluminum optional)	4
20.	2714-1	Valve cap (spec 4P and discharge)	4
21.	5318-3X <sub>d</sub>	Discharge valve assembly	2
22.	5311	Valve seat	4
23.	3920 <sup>c</sup>	Valve stud	4
24.	5312	Valve plate	4
25.	5313	Valve spring	4
26.	5318-3	Valve bumper	4
27.	5281 <sup>f</sup>	Unloader washer	1
28.	5278-X <sup>f</sup>	Piston seal assembly	2
29.	2590 <sup>f</sup>	Pipe plug 1/8" NPT flush	1
30.	5280 <sup>f</sup>	Unloader washer	1
31.	5279-X <sup>f</sup>	Piston seal assembly	1
32.	5272 <sup>f</sup>	Unloader piston cap	1
33.	7002-025NC037A <sup>f</sup>	Bolt 1/4-20 soc. button hd	1
34.	5000-87SS <sup>f</sup>	Retainer ring	1
35.	5000-150SS <sup>f</sup>	Retainer ring	1
36.	5320-X1 <sup>e</sup>	Unloader assembly	1

O-ring Code	
A	Buna-N
B	Neoprene <sup>®b</sup>
D	Viton <sup>®b</sup>
E	PTFE
K	Kalrez <sup>®b</sup>

Gasket Material Code	
	Aluminum
1	Copper
2	Iron-lead

<sup>a</sup> denotes O-ring code. See O-ring chart for details.

<sup>b</sup>Registered trademark of the DuPont company.

<sup>c</sup>Apply Loctite #263 before final assembly.

<sup>d</sup> denotes gasket material.

<sup>e</sup>Only the numbered items are included in the assembly.

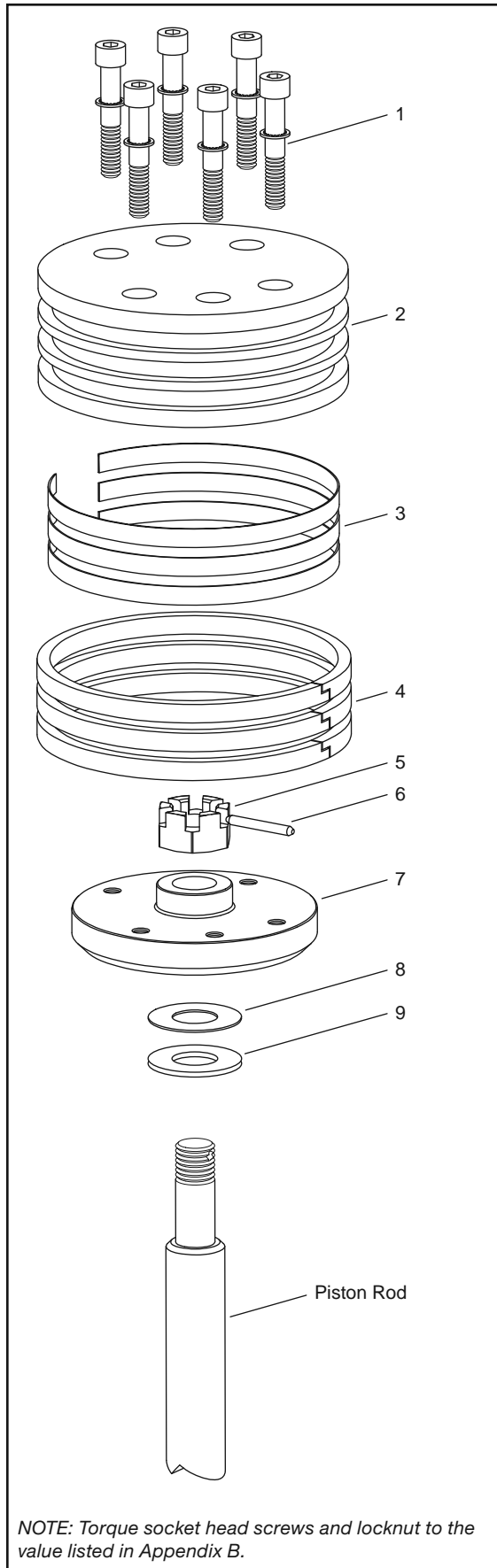
<sup>f</sup>Included with unloader assembly #5320-X1.



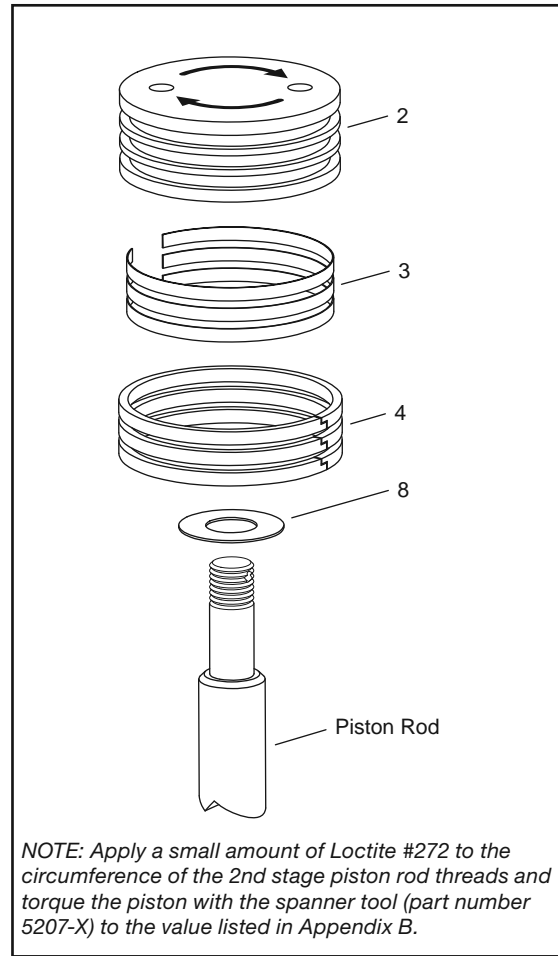
CAUTION: Always relieve pressure in the unit before attempting any repairs.

# Appendix E—Piston Assembly Details—All D-Style Models 351

## 1st Stage



## 2nd Stage

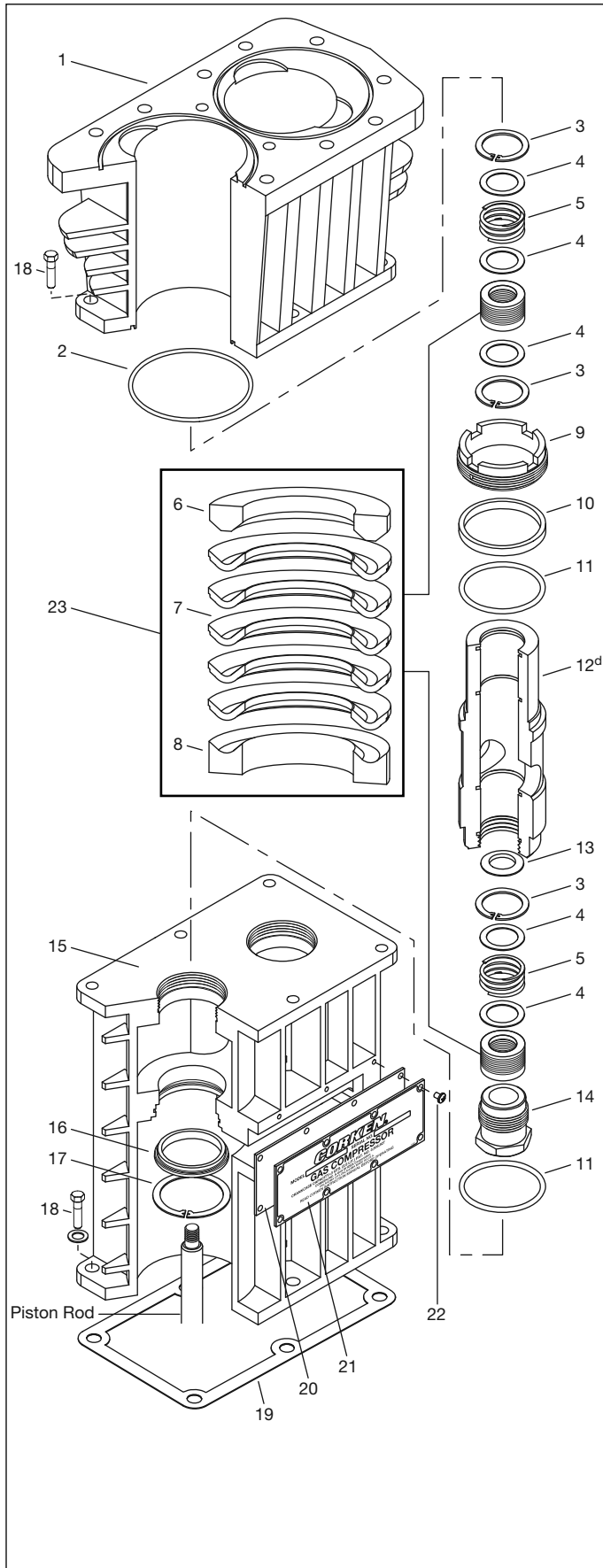


## Piston Assembly Bill of Materials

Piston Assembly No.		1st Stage		2nd Stage	
		5305-X		5307-X	
Piston Diameter		2-3/4" (6.98 cm)		1-3/4" (4.45 cm)	
Ref. No.	Part Name	Part No.	Qty.	Part No.	Qty.
1.	Screw, sockethead	7002-008 NC125A	6	Does not apply	
	Lock washer	7207-008A	6		
2.	Piston head	5305	1	5307	1
3.	Ring expander	1774	3	2015	3
4.	Piston ring	5315—PTFE (standard)	3	1770—PTFE (standard)	3
		5315-2—Alloy 50 (optional)	3	1770-3—PEEK (optional)	3
5.	Locknut	1482	1	Does not apply	
6.	Lock pin	1483	1	Does not apply	
7.	Piston platform	5306	1	Does not apply	
8.	Shim washer, thick	1528	As req.	1378	As req.
	Shim washer, thin	1528-1			
9.	Thrust washer	1527	1	Does not apply	

# Appendix E—Packing Assembly Details—All D-Style Models 351 and 391

## Packing Spec. A



## Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	5334	Cylinder—FD351	1
	5259	Cylinder—WFD351	1
	4160	Cylinder—D391, FD391	1
	3744	Cylinder—WD391, WFD391	1
2.	2-231 <sup>a</sup>	O-ring—2nd stage (all models)	1
	2-247 <sup>a</sup>	O-ring—1st stage (all models)	1
3.	5000-125	Retainer ring	6
4.	1714	Packing box washer	10
5.	1628	Packing spring	4
6.	1453-1	Male packing ring	4
7.	1454	Packing ring	20
8.	1452-1	Female packing ring	4
9.	2801	Cartridge holddown screw	2
10.	2778	Spacer	2
11.	2-227 <sup>a</sup>	O-ring	4
12.	2776 <sup>d</sup>	Packing cartridge	2
13.	1677-1	Oil deflector ring	2
14.	1387-X	Adjustment screw assembly (includes part number 1192)	2
	1192	Locking device TFE 1/8" dia. x 1/4" long	2
15.	2773-X	Crosshead guide assembly	1
16.	2777 <sup>c</sup>	Cartridge plate	2
17.	5000-262 <sup>c</sup>	Retainer ring	2
18.	7005-043NC125A	Ferry head bolt	12
	7206-043A	Lock washer	6
19.	1489	Crankcase gasket	1
20.	1488	Inspection plate gasket	1
21.	1487	Inspection plate	1
22.	7003-025NC037E	1/4-20x3/8"	8
23.	1452-1X3	Packing set (PTFE standard) includes 1452-1, 1453-1, 1454 (5), 1628, 1714	4
	1452-2X3	Packing set (Alloy 50 optional) includes 1452-1, 1453-1, 1454 (5), 1628, 1714	4

O-ring Code	
A	Buna-N
B	Neoprene <sup>®b</sup>
D	Viton <sup>®b</sup>
E	PTFE
K	Kalrez <sup>®b</sup>

<sup>a</sup> \_ denotes O-ring code. See O-ring chart for details.

<sup>b</sup>Registered trademark of the DuPont company.

<sup>c</sup>Included with crosshead guide assembly 2773-X.

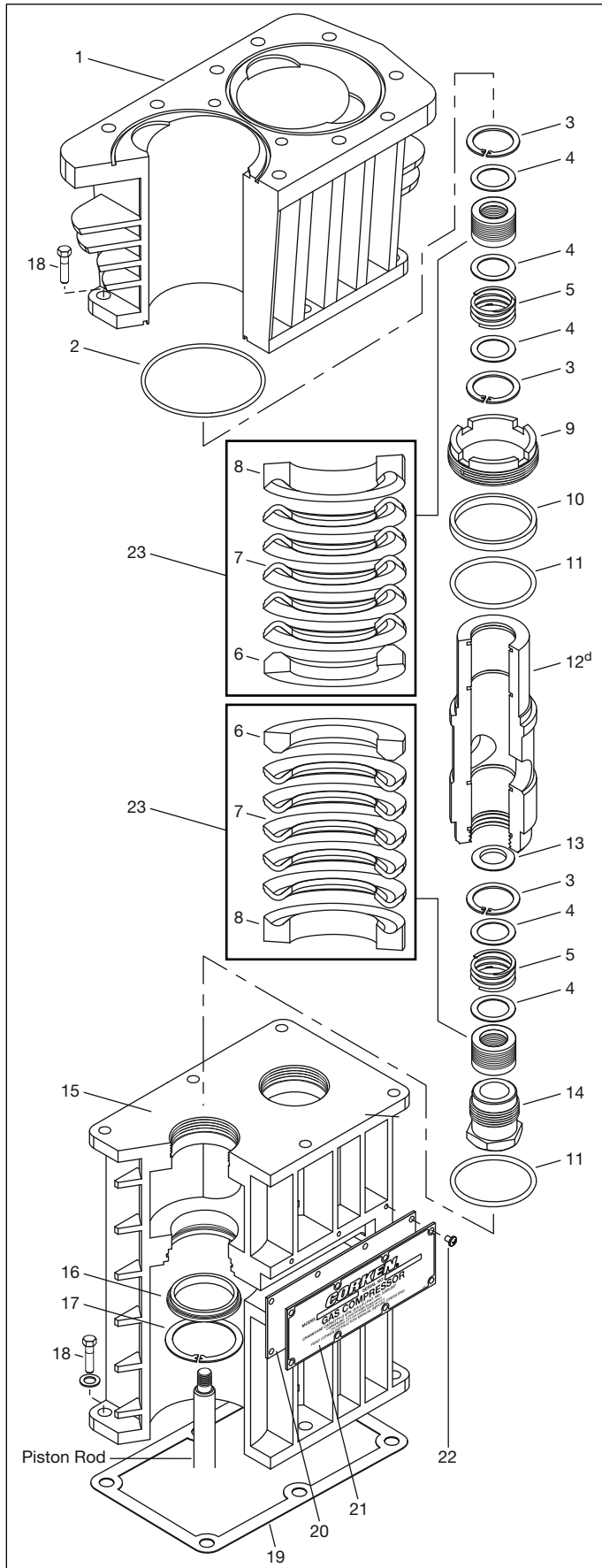
<sup>d</sup>Before installing the packing cartridge and packing on the piston rod, use packing cone (part number 4005) on the 1st stage of model 351 and both stages of model 391. Use packing cone (part number 5268) on the 2nd stage of model 351 only. See crosshead and connecting rod assembly details for more information.



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

# Appendix E—Packing Assembly Details—All D-Style Models 351 and 391

## Packing Spec. B



## Packing Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	5334	Cylinder—FD351	1
	5259	Cylinder—WFD351	1
	4160	Cylinder—D391, FD391	1
	3744	Cylinder—WD391, WFD391	1
2.	2-231 <sup>a</sup>	O-ring—2nd stage (all models)	1
	2-247 <sup>a</sup>	O-ring—1st stage (all models)	1
3.	5000-125	Retainer ring	6
4.	1714	Packing box washer	10
5.	1628	Packing spring	4
6.	1453-1	Male packing ring	4
7.	1454	Packing ring	20
8.	1452-1	Female packing ring	4
9.	2801	Cartridge holddown screw	2
10.	2778	Spacer	2
11.	2-227 <sup>a</sup>	O-ring	4
12.	2776 <sup>d</sup>	Packing cartridge	2
13.	1677-1	Oil deflector ring	2
14.	1387-X	Adjustment screw assembly (includes part number 1192)	2
	1192	Locking device TFE 1/8" dia. x 1/4" long	2
15.	2773-X	Crosshead guide assembly	1
16.	2777 <sup>c</sup>	Cartridge plate	2
17.	5000-262 <sup>c</sup>	Retainer ring	2
18.	7005-043NC125A	Ferry head bolt	12
	7206-043A	Lock washer	6
19.	1489	Crankcase gasket	1
20.	1488	Inspection plate gasket	1
21.	1487	Inspection plate	1
22.	7003-025NC037E	1/4-20x3/8"	8
23.	1452-1X3	Packing set (PTFE standard) includes 1452-1, 1453-1, 1454 (5), 1628, 1714	4
	1452-2X3	Packing set (Alloy 50 optional) includes 1452-1, 1453-1, 1454 (5), 1628, 1714	4

O-ring Code	
A	Buna-N
B	Neoprene <sup>®b</sup>
D	Viton <sup>®b</sup>
E	PTFE
K	Kalrez <sup>®b</sup>

<sup>a</sup> \_ denotes O-ring code. See O-ring chart for details.

<sup>b</sup> Registered trademark of the DuPont company.

<sup>c</sup> Included with crosshead guide assembly 2773-X.

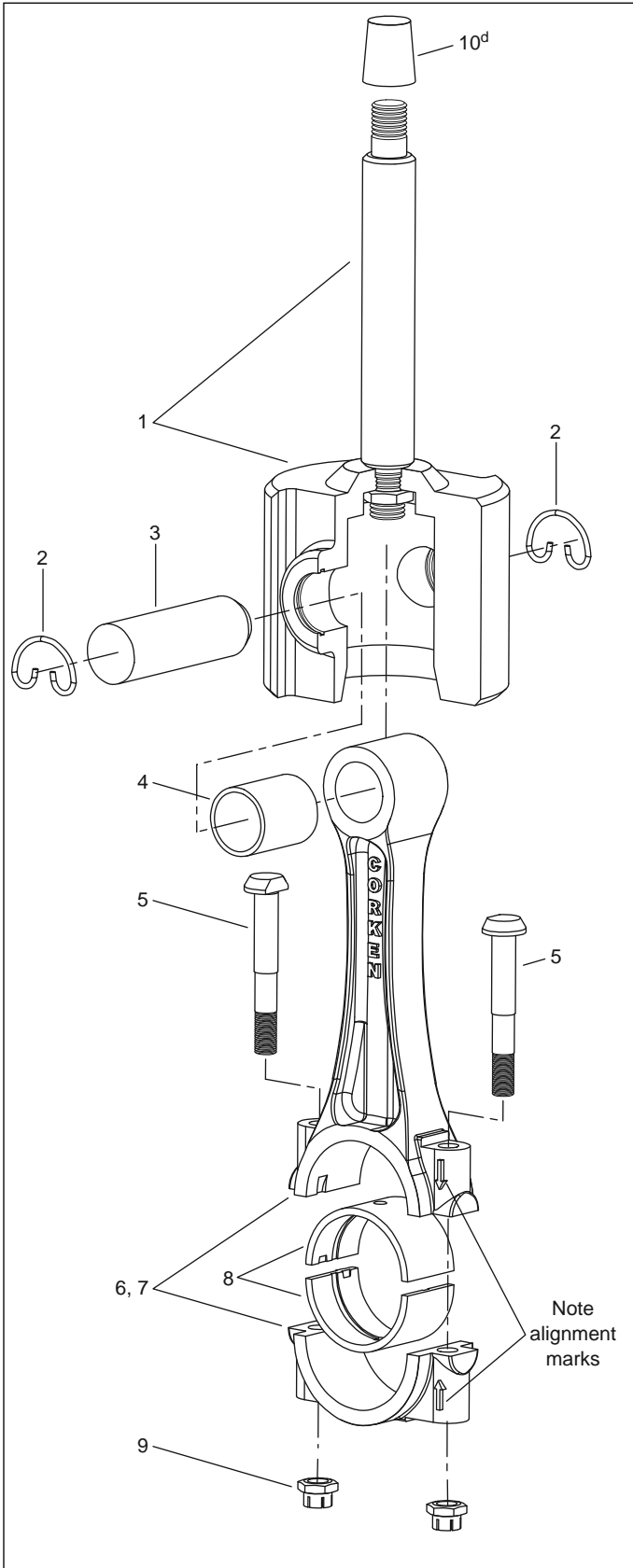
<sup>d</sup> Before installing the packing cartridge and packing on the piston rod, use packing cone (part number 4005) on the 1st stage of model 351 and both stages of model 391. Use packing cone (part number 5268) on the 2nd stage of model 351 only. See crosshead and connecting rod assembly details for more information.



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

# Appendix E—Crosshead and Connecting Rod Assembly Details—All D-Style Models 351 and 391

## Connecting Rod Assembly Bill of Materials



Ref No.	Part No.	Description	Qty.
1.	1384-X1	Crosshead assembly—1st stage (351 only)	1
		Crosshead assembly—1st and 2nd stage (391 only)	2
	1384-X4	Crosshead assembly—1st and 2nd stage (391 only) - chrome oxide (opt.)	2
	1384-X5	Crosshead assembly—2nd stage (351 only)	1
2.	1498	Retainer ring	4
3.	1496	Wrist pin	2
4.	1495-X <sup>a,b</sup>	Wrist pin bushing	2
5.	1492 <sup>b</sup>	Bolt	4
6.	1490-X	Connecting rod assembly	2
7.	1490 <sup>b</sup>	Connecting rod	2
8.	1491 <sup>b</sup>	Connecting rod bearing	2
9.	1493 <sup>b,c</sup>	Nut	4
10.	4005 <sup>d</sup>	Packing cone—1st stage (351 only)	1
		Packing cone—1st and 2nd stage (391 only)	1
	5268 <sup>d</sup>	Packing cone—2nd stage (351 only)	1

<sup>a</sup>Must be rebores after replacing (0.8754/0.8751 dia.)

<sup>b</sup>Included with connecting rod assembly

<sup>c</sup>Torque connecting rod nut to value shown in Appendix B.

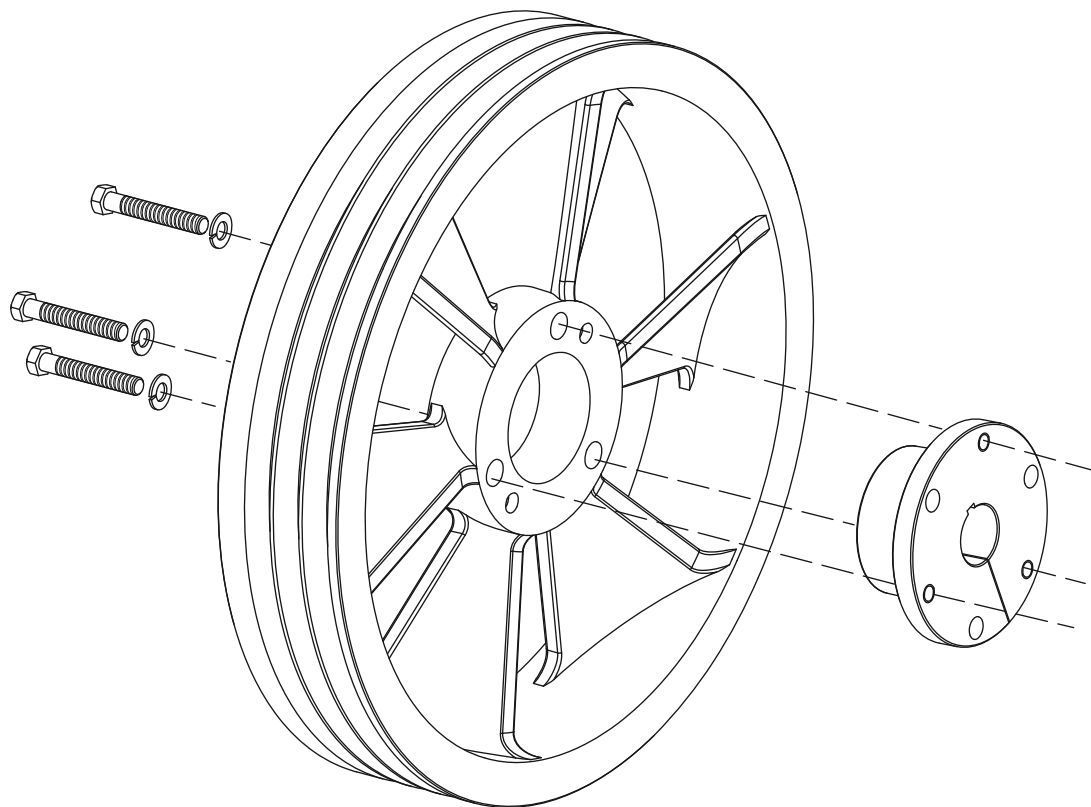
<sup>d</sup>Only used when installing the packing cartridge and packing on the piston rod.

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

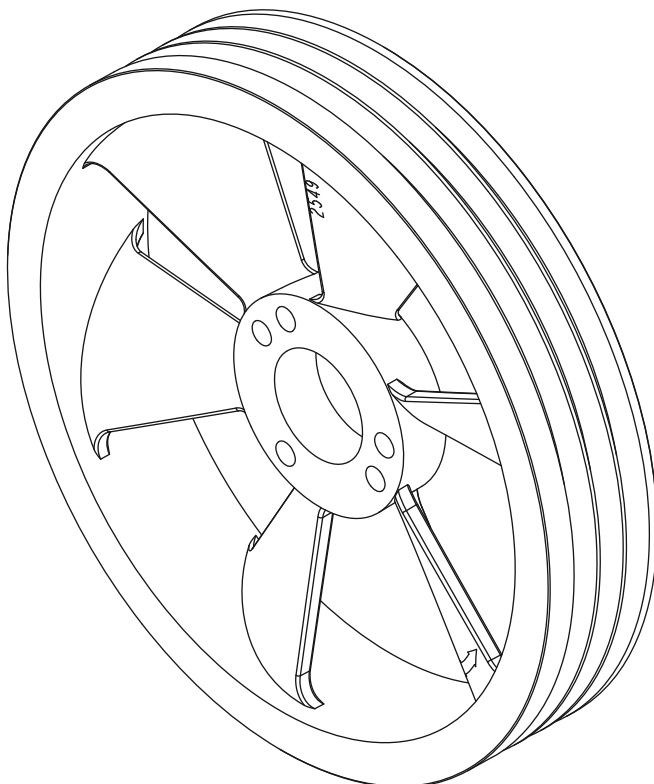


**CAUTION:** Always relieve pressure in the unit before attempting any repairs.

# Appendix E—Flywheel Assembly Details—All D-Style Models 351 and 391



Back Side



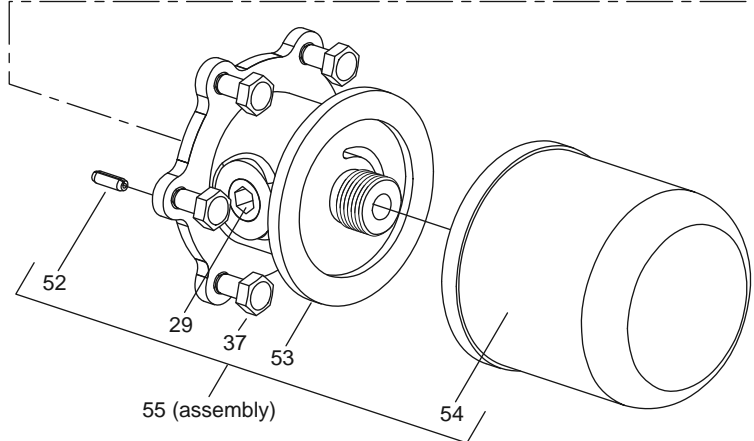
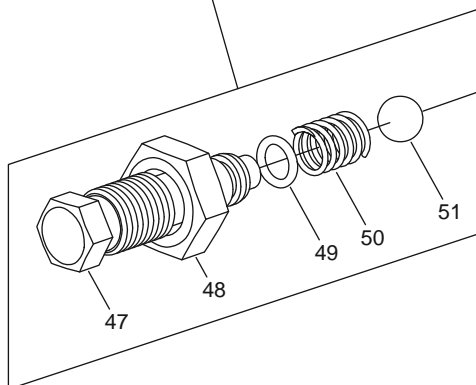
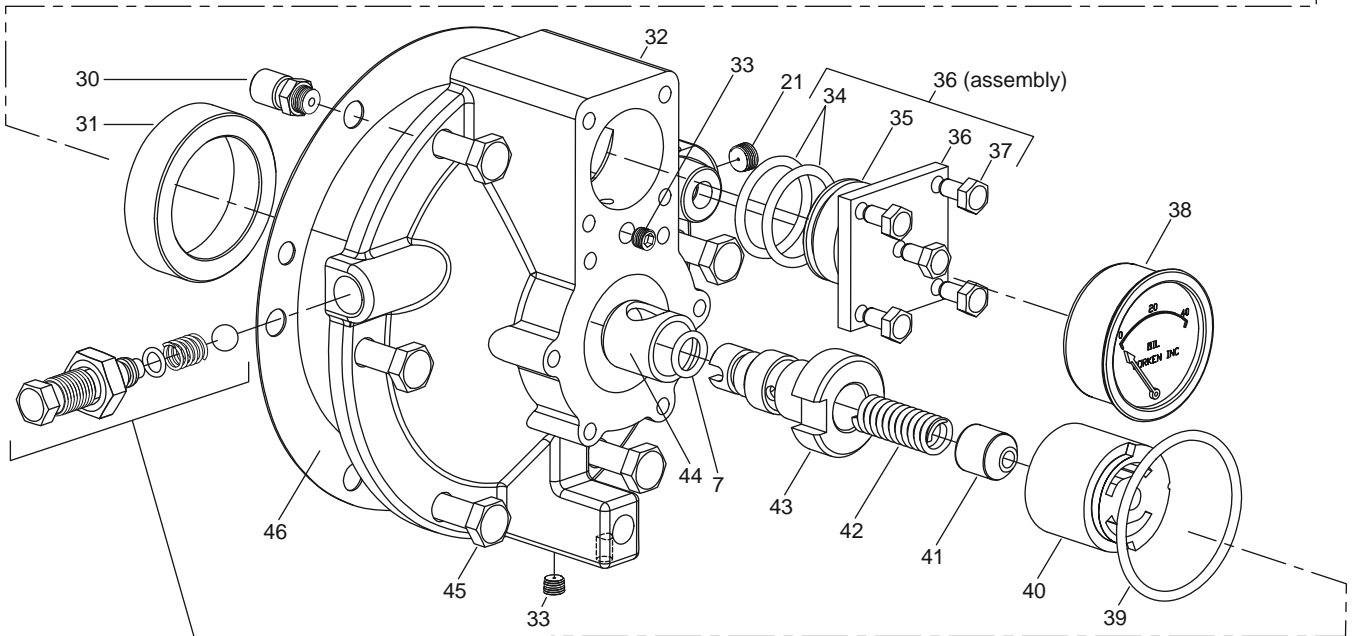
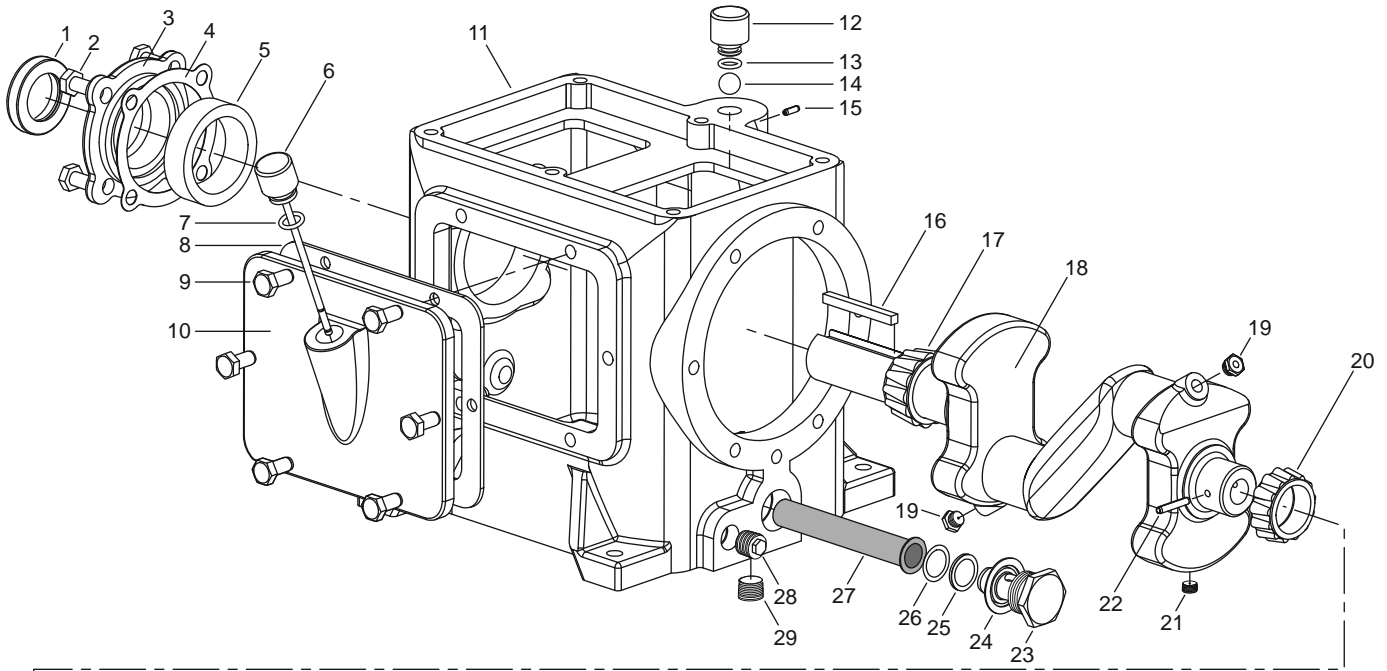
Front Side

## Flywheel Assembly Bill of Materials

Assembly Number	Assembly Name
2549-X	Flywheel assembly (flywheel, hub, three bolts and lockwashers)
2549	Flywheel: 16" O.D., 3 groove
H SF-1.375	Hub with three bolts and lockwashers

*NOTE: For details on flywheel runout, refer to the Clearances and Dimensions in Appendix B.*

# Appendix E—Crankcase Assembly Details—All D-Style Models 351 and 391





# Appendix E—Crankcase Assembly Details—All D-Style Models 351 and 391

## Crankcase Assembly Bill of Materials

Ref No.	Part No.	Description
1.	4438	Oil seal
2.	7001-037NC075A	Hex head bolt 3/8-16 x 3/4
3.	2847-1	Bearing cover
	2847-1X	Bearing cover assembly (includes 2847-1, 4438)
4.	1504	Bearing adjustment shim (0.005")
	1504-1	Bearing adjustment shim (0.007")
	1504-2	Bearing adjustment shim (0.020")
5.	1502	Bearing cup
6.	1508-X	Oil bayonet
	1508-X1	Oil bayonet assembly (includes part numbers 1508-X, 2-112A)
7.	2-112A <sup>b</sup>	O-ring (oil bayonet & pump shaft)
8.	1511	Crankcase inspection plate gasket
9.	7001-031NC075A	Hex head bolt 5/16-18 x 3/4
10.	2853	Crankcase inspection plate
11.	2803 <sup>a</sup>	Crankcase
12.	1279	Breather cap
	1279-X	Breather cap assembly (includes part numbers 1279, 2-111A)
13.	2-111A <sup>b</sup>	O-ring (breather cap)
14.	2796	Breather ball
15.	1483	Lock pin
16.	1663	Flywheel key
17.	1501	Bearing cone
18.	1499-X	Crankshaft assembly—standard (includes part numbers 1284 (2), 1286, 1499, 1501, 1503, 2590)
	1499-SX	Extended crankshaft assembly—optional (includes part numbers 1284 (2), 1286, 1499-S, 1501, 1503, 2590)
19.	1284	Crankcase orifice (2)
20.	1503	Bearing cone
21.	1459	Crankshaft plug
	2590	Pipe plug
22.	1286	Pump shaft drive pin
23.	1280	Filter screw
24.	1281	Filter screen screw gasket
25.	2-116A <sup>b</sup>	O-ring (filter screen)
26.	1276	Filter screen washer
27.	1275	Oil filter screen
28.	1661	Plug 3/8" NPT
29.	3289	Pipe plug
30.	2961-X	Air release valve assembly (includes part numbers 2961, 2962, 2963)
31.	1500	Bearing cup

Ref No.	Part No.	Description
32.	2804	Bearing carrier
	2804-X	Bearing carrier assembly (includes part numbers 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, 7001-025NC050A (10))
33.	1629	1/16" NPT pipe plug, flush seal
34.	2-218A <sup>b</sup>	O-ring for closure body (2) (Spec. 4, 8, 9 only)
35.	1516	Closure body
36.	1515	Closure cap
	1515-X	Closure cap assembly (includes part numbers 2-218A (2), 1516, 1515, 7001-025NC050A) (Spec. 4, 8, 9 only)
37.	7001-025NC050A	Hex head bolt 1/4-20 x 1/2
38.	1302	Oil pressure gauge
39.	2-228A <sup>b</sup>	O-ring (pump cover)
40.	2849-X	Oil pump assembly
41.	2851	Spring guide
42.	2852	Oil pump spring
43.	2850	Pump shaft adapter
44.	2805-X	Pump shaft bushing
45.	7001-037NC100A	Hex head bolt 3/8-16 x 1
46.	1513	Bearing carrier gasket
47.	1290	Relief valve adjusting screw
48.	1291	Adjusting screw locknut
49.	2-011A <sup>b</sup>	O-ring (relief valve adjusting screw)
50.	1292	Relief valve spring
51.	1293	Relief valve ball
52.	2798	Pump cover pin (included with part number 2848-X)
	2848-X	Pump cover (includes pin)
53.	4222	Oil filter adapter
54.	4225	Oil filter
55.	4222-X	Oil filter assembly—external

O-ring Code	
A	Buna-N

<sup>a</sup>Crankcase capacity: 3 quarts (2.8 liters)

<sup>b</sup>See O-ring chart above for details.



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