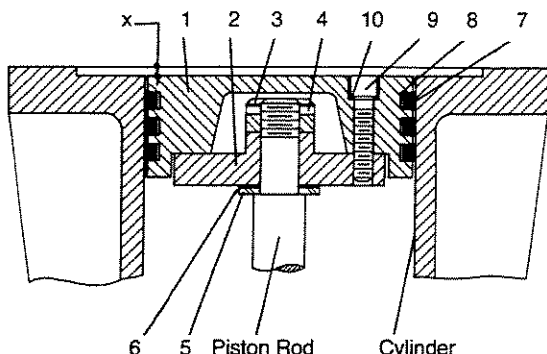
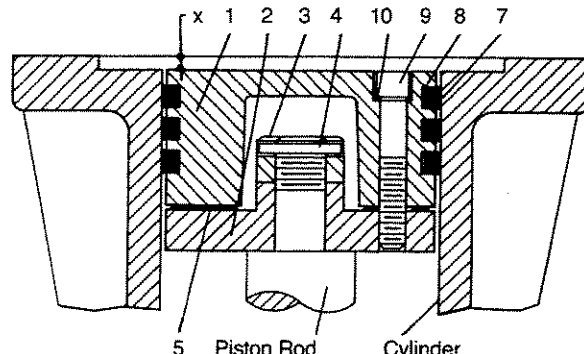


MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



Piston Assembly No.	ALL MODELS 190/191				ALL MODELS 390/391				ALL MODELS 590/591			
	1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter	3" (7.62 cm)		1 3/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 1/4" (8.26 cm)	
Ref. No.	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2. Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3. Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick	1528	As	1378	As	1528	As	1528	As	1735	As	1735	As
Shim Washer, Thin	1528-1	Req.		Req.	1528-1	Req.	1528-1	Req.	1735-1	Req.	1735-1	Req.
7. Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8. Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9. Screw, Soc. Hd.	7002-010		7002-008		7002-025		7002-008		7002-025		7002-025	
	OC100A	4	NC125A	4	OC125A	8	NC125A	6	OC175A	8	OC175A	4
10. Lock Washer	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4

Piston Assembly No.	ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
	1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter	3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4.5" (11.43 cm)		4" (10.16 cm)	
Ref. No.	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2. Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3. Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick	1528	As	1528	As	1528	As	1735	As	1735	As
Shim Washer, Thin	1528-1	Req.	1528-1	Req.	1528-1	Req.	1735-1	Req.	1735-1	Req.
7. Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8. Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9. Screw, Soc. Hd.	7002-010		7002-025		7002-010		7002-025		7002-025	
	OC100A	4	OC125A	8	OC100A	4	OC125A	8	OC125A	8
10. Lock Washer	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8

PISTON CLEARANCE (COLD)

MODEL	"X" INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D491, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

NOTES:

- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

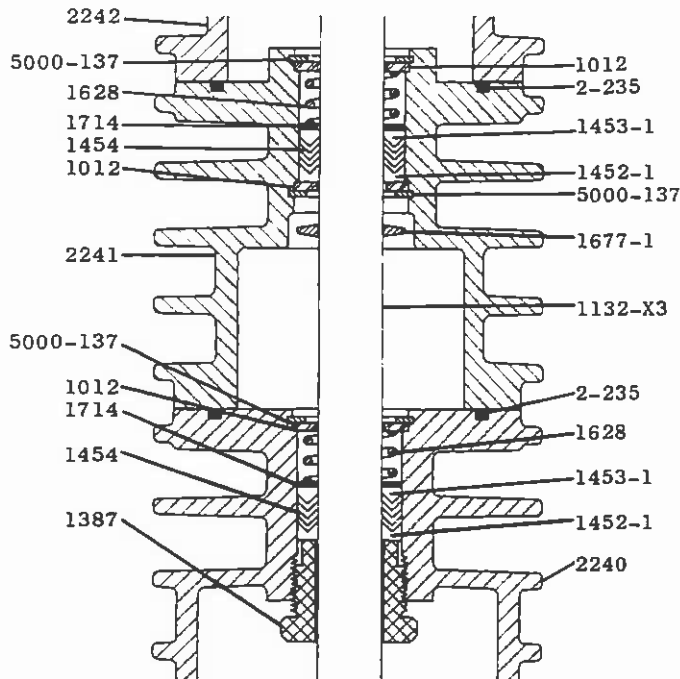
**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS
 MODEL D90, D91 COMPRESSORS
 ALL SPECIFICATIONS

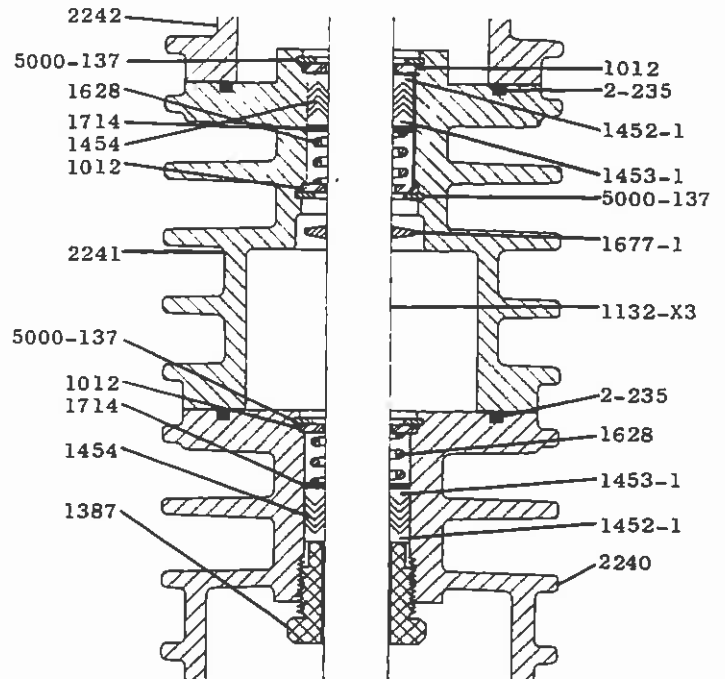
SERVICE MANUAL
 PAGE E274J

January 1986
 Supersedes E274H

MODELS D90A, D91A



MODELS D90B, D91B



PART NUMBER	PART NAME	ASSEMBLY NUMBER	ASSEMBLY NAME
1012	Washer		
1387	Adjusting Screw		
1452-1	Female Packing Ring		
1453-1	Male Packing Ring		
1454	Packing Ring		
1628	Packing Spring		
1677-1	Oil Deflector Ring		
1714	Packing Box Washer		
2240	Crosshead Guide, Gas		
2241	Distance Piece, Gas		
2242	Cylinder		
5000-137	Retainer Ring		
2-235	'O' Ring		
		1132-X3	Crosshead-Piston Rod Assembly
		1452-1X3	Packing Set with 1452-1, 1453-1, 1454 (6), 1628, 1714

The quantity of 1454 Packing Rings required will vary due to tolerances.

For 'O' Ring Material Coding see Page A500.

See Page E270 for description and application of distance piece arrangements.

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

DISTANCE PIECE DETAILS
MODEL T91 COMPRESSOR
ALL SPECIFICATIONS

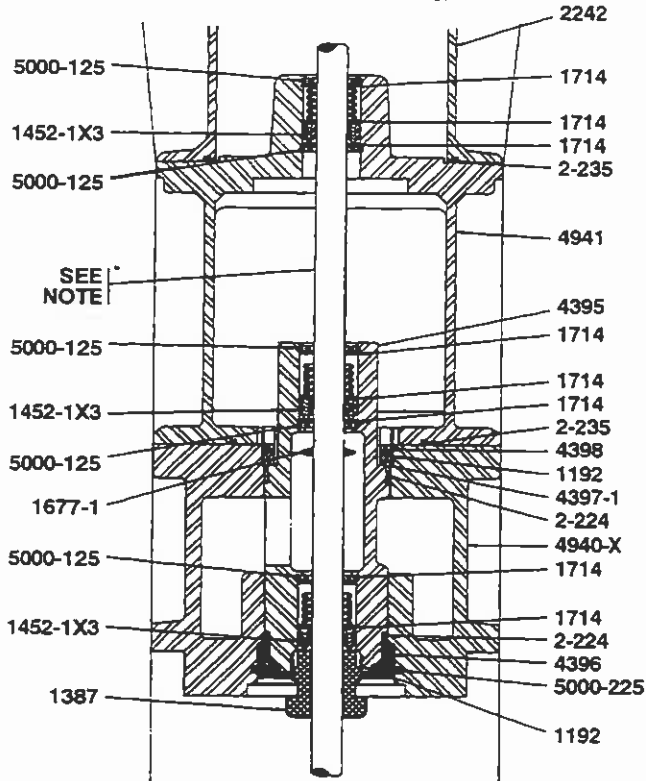
SERVICE
PAGE

MANUAL
E286

MAY
FIRST

1997
ISSUE

PACKING SPEC. G



PART NO.	PART NAME
1192	LOCKING DEVICE TFE 1/8" DIA. X 1/4" LONG
1387	ADJUSTMENT SCREW
1452-1	FEMALE PACKING RING
1453-1	MALE PACKING RING
1454	PACKING RING
1628	PACKING SPRING
1677-1	OIL DEFLECTOR RING
1714	PACKING BOX WASHER
2242	CYLINDER
4395	PACKING CARTRIDGE
4396	CARTRIDGE PLATE
4397-1	SPACER
4398	CARTRIDGE HOLDDOWN SCREW
4940-X	CROSSHEAD GUIDE
4941	DISTANCE PIECE
5000-125	RETAINER RING
5000-225	RETAINER RING
2-224	O-RING
2-235	O-RING

NOTE:

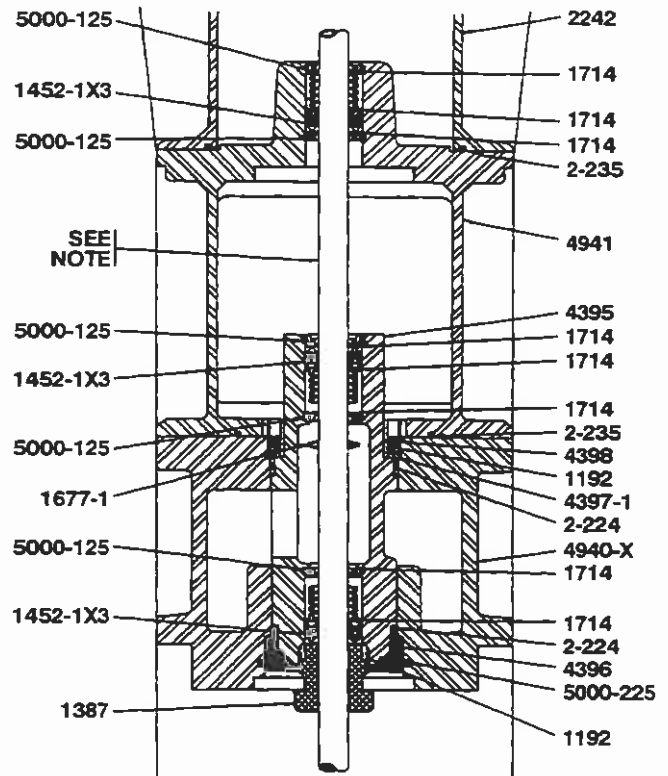
ASSEMBLY NO.	ASSEMBLY NAME
1132-X7	QUANTITY 1 (T91 - NITROTEC)
1132-X9	QUANTITY 1 (T91 - C,O ₂)
1452-1X3	PACKING SET WITH 1452-1, 1453-1, 1454 (5), 1628, 1714
1452-2X3	PACKING SET - ALLOY - D STYLE
4940-X	CROSSHEAD GUIDE ASSEMBLY WITH 2777, 5000-262, 4940, 4396, 5000-225

USE CONE 4005 FOR INSTALLATION OF PACKING.

THE QUANTITY OF 1454 PACKING RINGS REQUIRED WILL VARY DUE TO TOLERANCES.

FOR O-RING MATERIAL CODING SEE PAGE A500.

PACKING SPEC. H

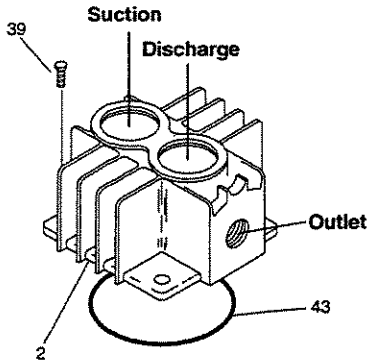


CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT BEFORE ATTEMPTING ANY REPAIRS.

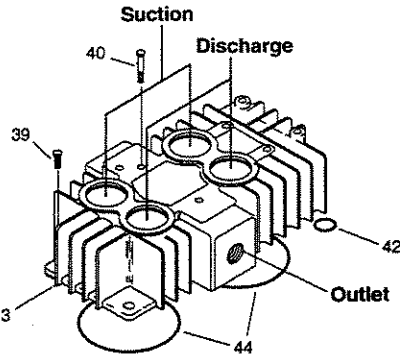
HEAD ASSEMBLY DETAILS
 ALL MODELS 91 AND 291 S/N JW47628 AND LATER
 ALL MODELS 191

SERVICE MANUAL
 PAGE E300L
 OCTOBER 1994
 SUPERSEDES E300K

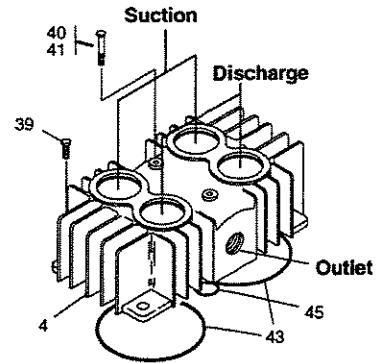
HEAD 90/91



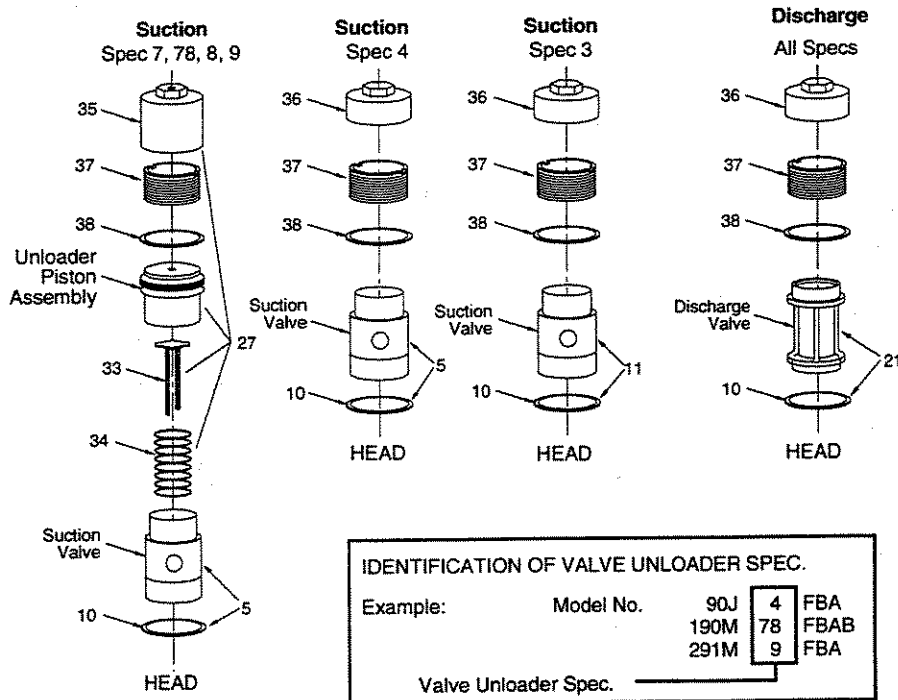
191



290/291

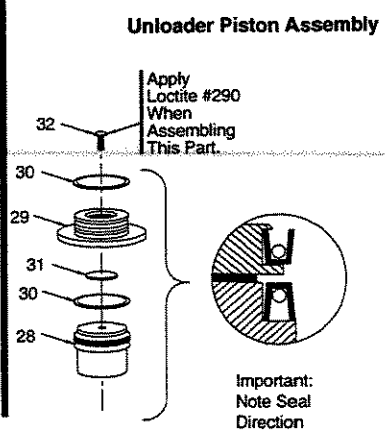
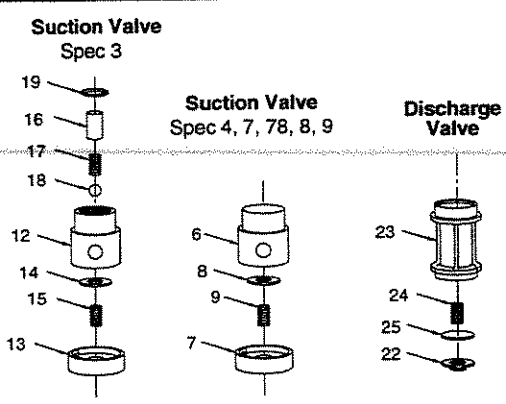


VALVE REMOVAL



IDENTIFICATION OF VALVE UNLOADER SPEC.			
Example:	Model No.	90J	4 FBA
		190M	78 FBAB
		291M	9 FBA
	Valve Unloader Spec.		

VALVE DETAILS



HEAD ASSEMBLY DETAILS
 ALL MODELS 91 AND 291 S/N JW47628 AND LATER
 ALL MODELS 191

NOTE: When ordering parts use
 "PART NO." not "REF NO."

REF NO.	PART NO.	DESCRIPTION
(a)1.	2374-X	Head Assy, Spec 3, Model 90, 91, D90, D91
	2463-X1	Head Assy, Spec 3, Model 290, D290
	2912-X1	Head Assy, Spec 3, Model 291, D291
	2374-X1	Head Assy, Spec 4, Model 90, 91, D90, D91, A90, A91
	4013-X1	Head Assy, Spec 4, Model 191, A191, D191
	2463-X2	Head Assy, Spec 4, Model 290, A290, D290
	2912-X2	Head Assy, Spec 4, Model 291, D291
	2374-X2	Head Assy, Spec 8,9, Model 90, 91, D90, D91
	2374-X3	Head Assy, Spec 8,9, Model A90, A91
	4013-X2	Head Assy, Spec 7,78,8,9, Model 191, A191, D191
	2463-X3	Head Assy, Spec 7,78,8,9, Model 290, D290
	2463-X4	Head Assy, Spec 7,78,8,9, Model A290
	2912-X3	Head Assy, Spec 7,78,8,9, Model 291, D291
2.	2374	Head Model 90, 91
	4302	Head Model F91 (ANSI FLANGE)
3.	4013	Head Model 191
	4371	Head Model F191 (ANSI FLANGE)
4.	2463	Head Model 290, A290, D290 (Obsolete replace by 2912)
	2912	Head Model 291, A291, D291
	4300	Head Model F291 (ANSI FLANGE)
5.	3483-X	Suction Valve Assy, Spec 4,7,78,8,9
(b)	3483-X1	Same as above but with Copper Gaskets
(b)	3483-X2	Same as above but with Iron-Lead Gaskets
6.	3483	Suction Valve Seat
7.	3484	Suction Valve Bumper
8.	3972	Suction Valve Plate
9.	4009	Suction Spring
10.	2717	Valve Gasket, Alum.
(b)	2717-1	Valve Gasket, Copper
(b)	2717-2	Valve Gasket, Iron-Lead
11.	3483-1X	Suction Valve Assy, Spec 3
(b)	3483-1X1	Same as above but with Copper Gaskets
(b)	3483-1X2	Same as above but with Iron-Lead Gaskets
12.	3483-1	Suction Valve Seat, Spec 3
13.	3484	Suction Valve Bumper
14.	3972	Suction Valve Plate
15.	4009	Suction Spring
16.	3977	Suction Valve Relief Housing
17.	1411	Spring
18.	1410	Ball
19.	5000-77	Retainer Ring
20.		
21.	3485-X	Discharge Valve Assy
(b)	3485-X1	Same as above but with Copper Gaskets
(b)	3485-X2	Same as above but with Iron-Lead Gaskets
22.	3485	Discharge Valve Seat
23.	3486	Discharge Valve Bumper
24.	4008	Discharge Spring
25.	3973	Discharge Valve Plate

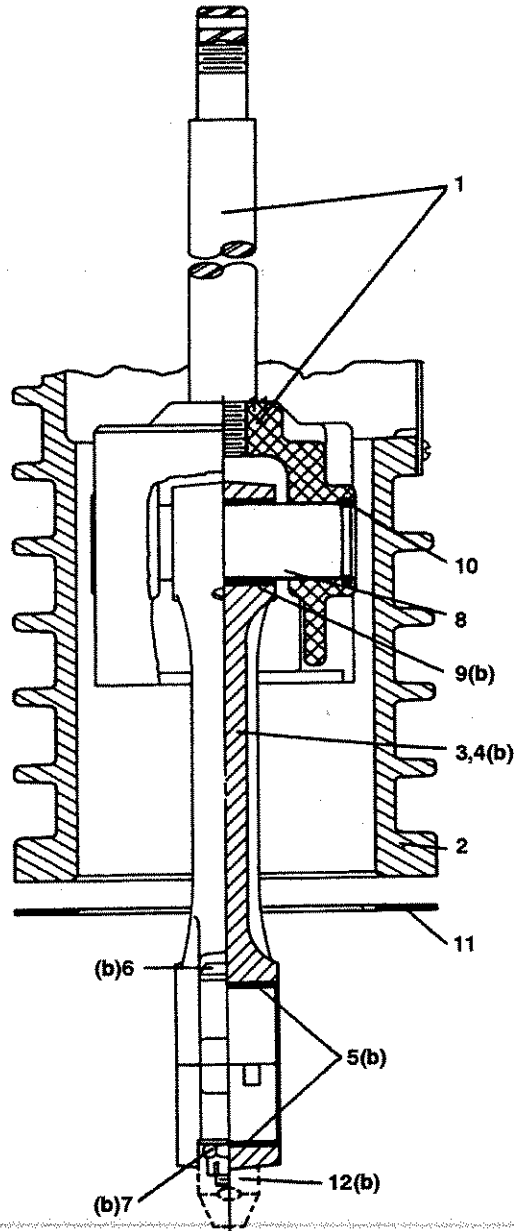
REF NO.	PART NO.	DESCRIPTION
27.	3919-X	Unloader Assy
28.	3919	Unloader Piston
29.	2857	Piston Cap
30.	2619-X	Piston Seat Assy
31.	2858	Unloader Piston Cap Gasket
32.	1910	Bolt 1/4-20 x 1/2 Soc. Button Hd.
33.	3975	Unloader Actuator
34.	3976	Unloader Spring
35.	2598-1	Unloader Cap
36.	2714-1	Valve Cap
37.	2715	Holddown Screw
(c)38.	2-031_	O-ring
39.	7001-037 NC100A	Bolt, 3/8-16 x 1" Gr.5 Hex Hd.
40.	2731	Center Headbolt
41.	2732	Gasket
42.	2-118E	O-ring, Teflon (Intercooler)
(c)43.	2-235_	O-ring
(c)44.	2-236_	O-ring
(c)45.	2-113_	O-ring

NOTES:
 (a) Not Shown.
 (b) Optional.
 (c) For O-ring material coding see page A500

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

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

SERVICE
PAGE

MANUAL
E351L

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

MAY
SUPERSEDES

1997
E351K

MODEL NUMBER	91	A91 D91	T91	181	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	D791 D8091
NO.	DESCRIPTION												SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY		
1.	CROSSHEAD ASSEMBLY	1132-X2	1132-X3 1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 (h) 1132-X7 1132-X9 (i) 1132-X10 (j)(k)	1132-X2 (l)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1394-X 2765(h) 1366(i)	1394-X1 1394-X4 (f)	1394-X2 1394-X3 (f)	1717-X 1716-X	1717-X1 2405-X	3544-X5 3544-X4	3544-X3	
2.	CROSSHEAD GUIDE	2240	4940-X	4393	4383	4383-X	4393	4383-X	4383-X	1490-X	1490-X	2773-X	1716-X	2405-X	1716-X	2405-1	
3.	CONN. ROD ASSY.	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1490-X	1490-X	1490-X	1720-X	1720-X	3785-X1	3785-X	
4.	CONNECTING ROD	1889-1	1889-1	1889	1889	1889	1889	1889	1889	1490	1490	1490	1720	1720	3785	3785	
5.	CONN. ROD BEARING	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1719	1719	3542	3542	
6.	BOLT	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1726	1726	1726	1726	
7.	NUT	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1493(d)	1493(d)	1493(d)	1727(e)	1727(e)	1727(e)	1727(e)	
8.	WRIST PIN	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1718	1718	3540	3540	
9.	WRIST PIN BUSHING	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	3541-X(k)	3541-X(k)	
10.	RETAINER RING	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	3590	3590	
11.	CRANKCASE GASKET	2526	2526	2702	2702	2702	2702	2702	2702	1489	1489	1489	1761	1761	1761	1761	
12.	DIPPER	2011	2011	2011	2011	2011	2011	2011	2011	*****	*****	*****	*****	*****	*****	*****	

NOTES:

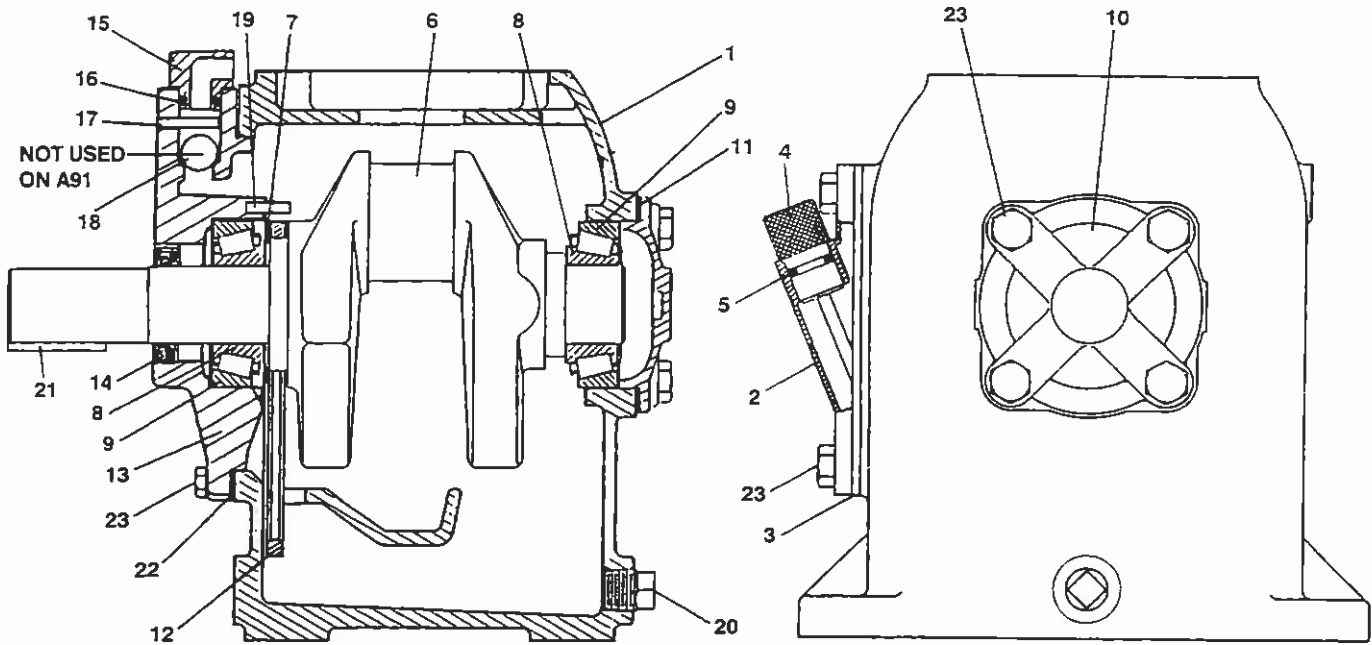
- (a) Must be rebored after replacing (0.8754/0.8751 Dia.)
- (b) Included with Connecting Rod Assembly
- (c) Torque Connecting Rod Nut to 28 ft. lbs.
- (d) Torque Connecting Rod Nut to 30 ft. lbs.
- (e) Torque Connecting Rod Nut to 40 ft. lbs.
- (f) Optional Chrome Oxide Piston Rods Only
- (g) Second Stage (Smaller Piston)
- (h) S/N XC30633 and Later
- (i) Prior to S/N XC30633
- (k) Must be rebored after replacing (1.1256/1.1252 Dia.)

Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

CRANKCASE DETAILS
 MODELS 91, A91, D91, T91 COMPRESSORS
 CRANKCASE SPECIFICATION: J
 S/N KP48099 AND LATER

SERVICE PAGE	MANUAL E400E
MAY SUPERSEDES	1997 E400D

CRANKCASE ASSEMBLY NO. 2554-X1



REF NO.	PART NO.	DESCRIPTION
1.	2554	CRANKCASE
2.	2728	CRANKCASE INSPECTION PLATE
3.	2729	INSPECTION PLATE GASKET
4.	1368-X1	OIL BAYONET ASSEMBLY (WITH O-RING)
5.	2-112A	O-RING
6.	2476	CRANKSHAFT
7.	2290	OIL RING RETAINER WASHER
8.	2719	BEARING CONE
9.	2718	BEARING CUP
10.	2720	BEARING CAP
11.	2721	BEARING ADJ. SHIM (0.005)
	2721-1	BEARING ADJ. SHIM (0.007)
	2721-2	BEARING ADJ. SHIM (0.020)
12.	2723	OIL CIRCULATING RING
13.	3260	BEARING CARRIER
14.	3259	OIL SEAL
15.	1279-X	BREATHER CAP ASSEMBLY (WITH O-RING)
16.	2-111A	O-RING
17.	1483	ROLL PIN - 1/8 X 1"
18.	2796	BREATHER BALL
19.	1807	ROLL PIN - 1/8 X 5/8"
20.	1661	PIPE PLUG - 3/8 NPT SQ. OR HEX
21.	2289	FLYWHEEL KEY

REF NO.	PART NO.	DESCRIPTION
22.	2725	BEARING CARRIER GASKET
23.	7001-037 NC075A	HEX HEAD 3/8-16 x 3/4", GR 5

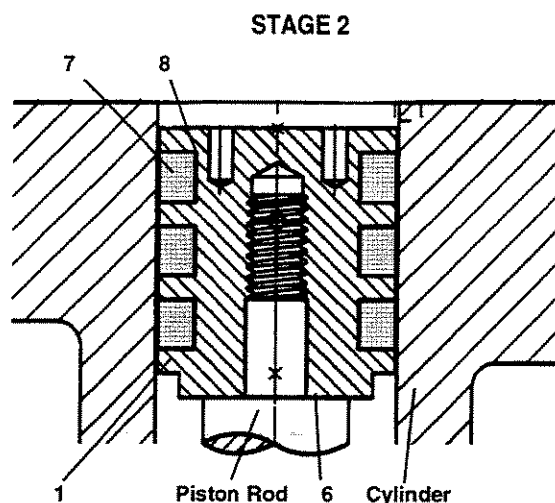
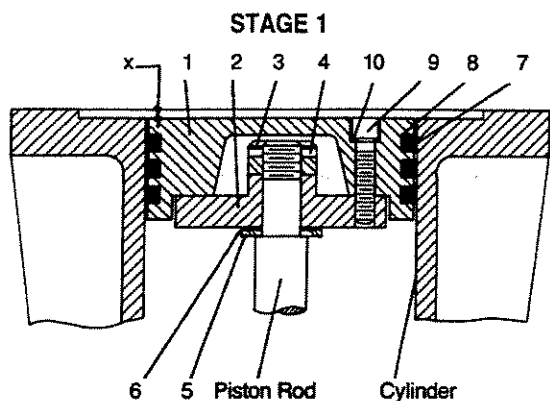
ASSEMBLY NO.	ASSEMBLY NAME
2476-X	CRANKSHAFT ASSEMBLY WITH 2476, 2290 AND 2719
2476-SX	EXTENDED CRANKSHAFT ASSEMBLY WITH 2719 (2) AND 2290. (OPTIONAL)
3260-X	BEARING CARRIER ASSEMBLY WITH 3260, 2718, 3259; 1279-X, 2-111, 1483, 2796 AND 1807
(a)3271-X2	FLYWHEEL ASSEMBLY 14" - 2 GROOVE WITH H SF-1.125 AND 3271

NOTES:
 (a) NOT SHOWN, NOT PART OF THE CRANKCASE ASSEMBLY.
 CRANKCASE CAPACITY: 0.9 QUARTS (0.8 LITERS)

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT
 BEFORE ATTEMPTING ANY REPAIRS.**

PISTON ASSEMBLIES MODEL FD151

SERVICE PAGE	MANUAL E201
AUGUST FIRST	1999 ISSUE



TWO-STAGE		MODEL FD151			
Piston Assembly No.		1981-1X		5201-X	
Piston Diameter		2-1/2" (6.35 cm) Stage 1		1-1/4" (3.17 cm) Stage 2	
Ref. No.	Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston
1.	Head, Iron	1981-1	1	5201	1
2.	Piston Platform	1982-1	1		
3.	Locknut	1482	1 -Torque to		
4.	Lock Pin	1483	1 60 Ft. Lbs.		
5.	Thrust Washer	1527	1		
6.	Shim Washer, Thick	1528	As	1378	As
	Shim Washer, Thin	1528-1	Req.		Req.
7.	Piston Ring	1771	3	3572	3
8.	Ring Expander	1774	3	4209	3
9.	Screw, Sco. Hd.	7002-008 NC125A	6 -Torque to	*	
10.	Lock Washer	7207-008A	6 36 In. Lbs.		

PISTON CLEARANCE (COLD)

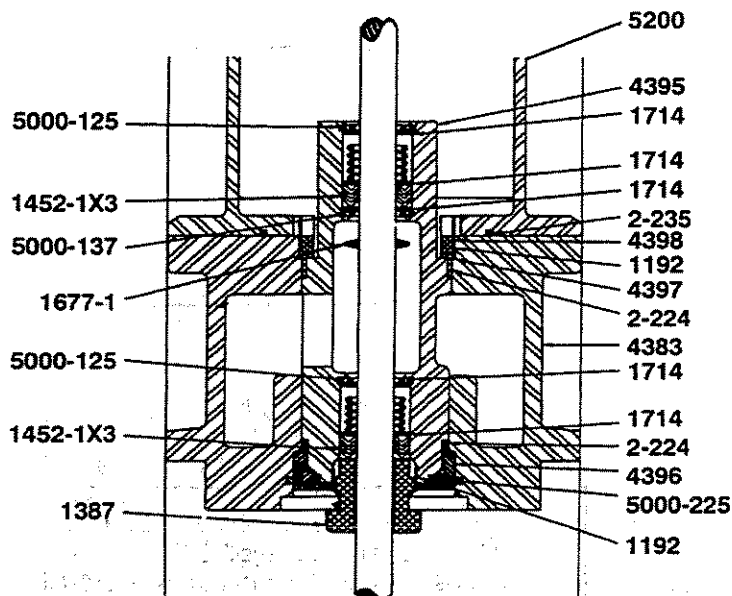
MODEL	"X" INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
FD151	0.025 (0.64)	0.049 (1.24)

* Assemble piston head to piston rod using wrench no. 5207-X and piston alignment tool no. 5267-X. Torque piston to 15 Ft. Lbs.

Caution: Always relieve pressure in the units before attempting any repairs.

DISTANCE PIECE DETAILS MODEL FD151 COMPRESSOR

Packing Spec. A



PART NO.	PART NAME
1192	Locking Device TFE 1/8" dia. x 1/4" long
1387	Adjustment Screw
1452-1	Female Packing Ring
1453-1	Male Packing Ring
1454	Packing Ring
1628	Packing Spring
1677-1	Oil Deflector Ring
1714	Packing Box Washer
4383	Crosshead Guide
4395	Packing Cartridge
4396	Cartridge Plate
4397	Spacer
4398	Cartridge Holddown Screw
5200	Cylinder (FD151)
1183-6	Adapter Plate
5000-125	Retainer Ring
5000-225	Retainer Ring
2-224J	O-Ring - H.D. Viton
2-235J	O-Ring - H.D. Viton
4005	Packing Inst. Tool - Not Shown

ASSEMBLY NO.	PART NAME
1132-X	Crosshead-Piston Rod Assembly
1132-X3	Quantity 1 (FD151)
1132-X4	Quantity 1 (FD151 - 2nd Stage)
1452-1X3	Packing Set with 1452-1, 1453-1, 1454 (5), 1628, 1714
1452-2X3	Packing Set - Alloy - (Optional)
4383-X	Crosshead Guide Assembly with 4383, 4396, 5000-225

Use cone 4005 for installation of packing.

Replace the same quantity of 1454 packing rings that were removed.

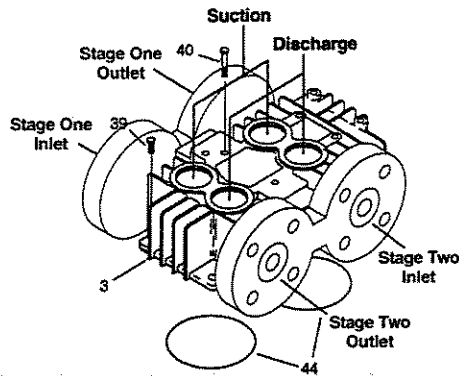
For O-ring Material Coding See Page A500.

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

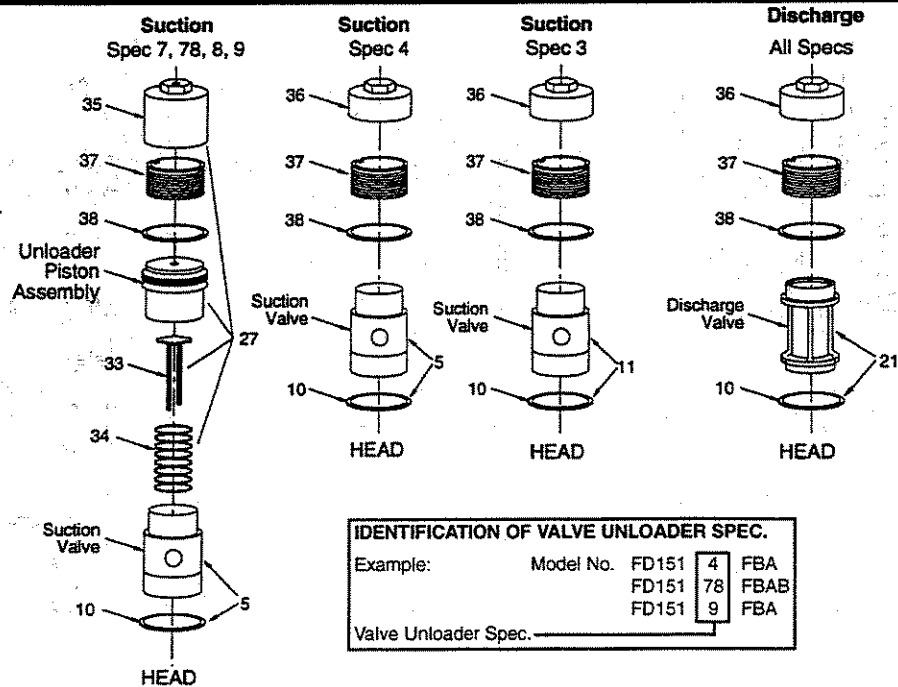
HEAD ASSEMBLY DETAILS FD151 ALL MODELS

SERVICE PAGE	MANUAL E302
AUGUST FIRST	1999 ISSUE

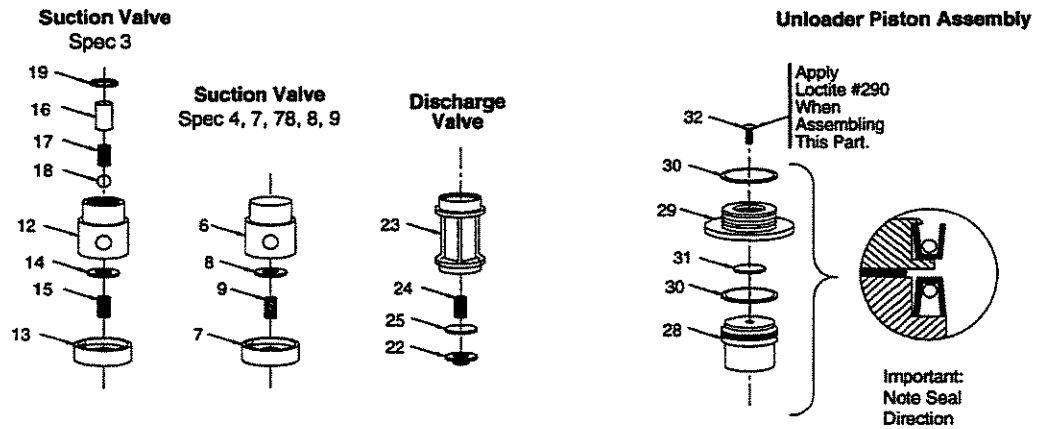
HEAD



VALVE REMOVAL



VALVE DETAILS



HEAD ASSEMBLY DETAILS
FD151
ALL MODELS

Refer to diagram on previous page.

REF. NO.	PART NO.	PART NAME
3.	4371-3C	Head Model (ANSI Flange) Coated
5.	3483-X	Suction Valve Assy, Spec 4,7,78,8,9
(b)	3483-X1	Same as above but with Copper Gaskets
(b)	3483-X2	Same as above but with Iron-Lead Gaskets
6.	3483	Suction Valve Seat
7.	3484	Suction Valve Bumper
8.	3972	Suction Valve Plate
9.	4009	Suction Spring
10.	2717	Valve Gasket, Alum.
(b)	2717-1	Valve Gasket, Copper
(b)	2717-2	Valve Gasket, Iron-Lead
11.	3483-4X	Suction Valve Assy, Spec 3
(b)	3483-4X1	Same as above but with Copper Gaskets
(b)	3483-4X2	Same as above but with Iron-Lead Gaskets
13.	3484	Suction Valve Bumper
14.	3972	Suction Valve Plate
15.	4009	Suction Spring
16.	3977	Suction Valve Relief Housing
17.	1411	Spring
18.	1410	Ball
19.	5000-77	Retainer Ring
21.	3485-X	Discharge Valve Assy
(b)	3485-X1	Same as above but with Copper Gaskets
(b)	3485-X2	Same as above but with Iron-Lead Gaskets
22.	3485	Discharge Valve Seat
23.	3486	Discharge Valve Bumper
24.	4008	Discharge Spring
25.	3973	Discharge Valve Plate
27.	3919-X	Unloader Assy
28.	3919	Unloader Piston
29.	2857	Piston Cap
30.	2619-X	Piston Seat Assy
31.	2858	Unloader Piston Cap Gasket
32.	1910	Bolt 1/4-20 x 1/2 Soc. Button Hd.
33.	3975	Unloader Actuator
34.	3976	Unloader Spring
35.	2598-1	Unloader Cap
36.	2714-1C	Valve Cap - Coated
37.	2715C	Holddown Screw - Coated
(c) 38.	2-031J	O-ring (H.D. Viton)
39.	7001-050	
	NC100A	Bolt, 1/2" x 13 x 1" Gr. 5 Hex Hd.
40.	7001-050	
	NC300A	Center Head Bolt (4)
41.	2732	Gasket
(c) 44.	2-236J	O-ring (H.D. Viton)

Note: When ordering parts use
"PART NO." not "REF NO."

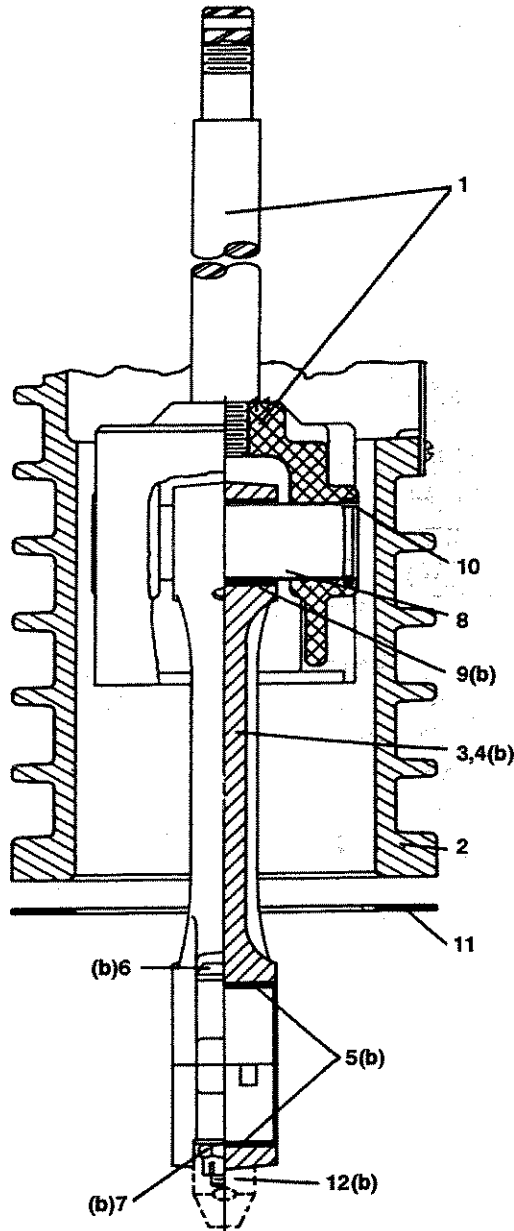
CAUTION: Always Relieve Pressure In The Unit
Before Attempting Any Repairs.

NOTES:

- (a) Not Shown.
- (b) Optional.
- (c) For O-ring Material Coding see Page A500.

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
 ALL MODELS
 ALL SPECIFICATIONS

MODEL NUMBER	91	A91 D91	T91	191	A191 D191 FO151	T191	291	A291 D291	T291	391 W391 481	A391 W391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	SPEC. M ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	590 W590 W690 691	D791 D8091
NO.	DESCRIPTION																		
1.	1132-X2	1132-X3	1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 (h) 1132-X9 (i) 1132-X10 (j)(g)	1132-X2 (f)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1384-X 2785(f) 1366(f)	1384-X1 1384-X4 (f)	1384-X2 1384-X3 (f)	1717-X	SPEC. M ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3544-X5 3544-X4	3544-X3
2.	2240	2240	4940-X	4393	4383	4383-X	4393	4383-X	4383-X	2773-X	2773-X	2773-X	1716-X	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	2405-X	2405-1
3.	1889-1X	1889-1X	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889-X	1889-X	1490-X	1490-X	1490-X	1720-X	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3785-X1	3785-X
4.	1889-1	1889-1	1889-1	1889	1889	1889	1889	1889	1889	1490	1490	1490	1720	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3785	3785
5.	1367	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1719	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3542	3542
6.	1599	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1726	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	1726	1726
7.	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600	1600(c)	1600(c)	1600	1493(d)	1493(d)	1493(d)	1727(e)	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	1727(e)	1727(e)
8.	2505	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1718	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3540	3540
9.	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3541-X(k)	3541-X(k)
10.	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	3590	3590
11.	2526	2526	2526	2702	2702	2702	2702	2702	2702	1489	1489	1489	1761	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	1761	1761
12.	2011	2011	2011	2011	2011	2011	2011	2011	2011	1761	1761	1761	1761	SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY	1761	1761

NOTES:

- (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.
- (d) Torque Connecting Rod Nut to 30 ft.lbs.
- (e) Torque Connecting Rod Nut to 40 ft.lbs.
- (f) Optional Chrome Oxide Piston Rods Only

- (g) Second Stage (Smaller Piston)
- (h) S/N XC30633 and Later
- (i) Prior to S/N XC30633
- (k) Must be rebored after replacing (1.1256/1.1252 Dia.)

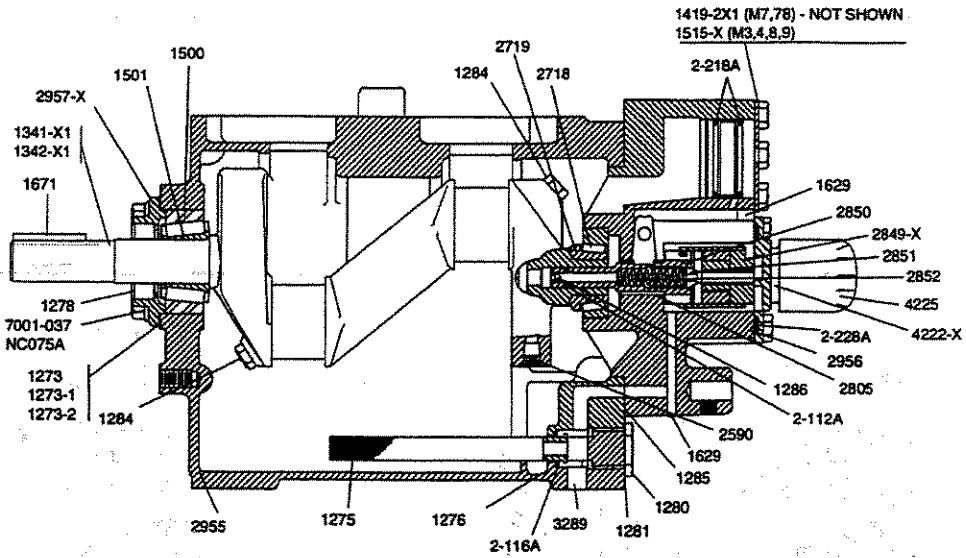
Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

**CRANKCASE DETAILS
ALL MODELS 151, 191, 291
COMPRESSORS
CRANKCASE SPECIFICATION: M**

SERVICE PAGE	MANUAL E402G
DECEMBER 1999	
SUPERSEDES	E402F

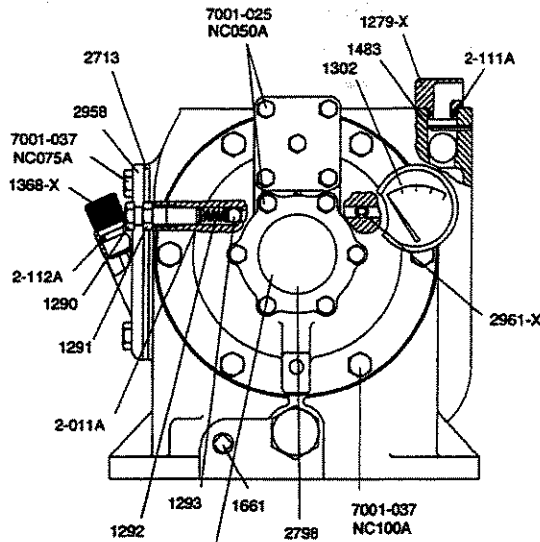
CRANKCASE DETAILS - FD151

IDENTIFICATION OF VALVE/UNLOADER SPEC.
 Example: Model No. FD151AM **4** FBA
 Valve/Unloader Spec. _____



**Crankcase Assembly No. 2955-X1 (M3, 4, 8, 9)
 Crankcase Assembly No. 2955-X2 (M7, 78)**

**2549-X1 Flywheel Assembly Not Shown (16")
 Optional Flywheel Assembly 3271-X1 Not Shown (14")**



2848-X USED ON ALL COMPRESSORS
 WITHOUT OIL FILTER ASSEMBLY

Caution: Always relieve pressure in the units
 before attempting any repairs.

CRANKCASE DETAILS
ALL MODELS 151, 191, 291
COMPRESSORS
CRANKCASE SPECIFICATION: M

PART NO.	PART NAME
1273	Bearing Adjustment Shim (0.005")
1273-1	Bearing Adjustment Shim (0.007")
1273-2	Bearing Adjustment Shim (0.020")
1275	Oil Filter Screen
1276	Filter Screen Washer
1278	Oil Seal
1279	Breather Cap
1280	Filter Screw
1281	Filter Screen Screw Gasket
1284	Crankshaft Orifice (2)
1285	Bearing Carrier Gasket
1286	Pump Shaft Drive Pin
1290	Relief Valve Adjusting Screw
1291	Adjusting Screw Locknut
1292	Relief Valve Spring
1293	Relief Valve Ball
1302	Oil Pressure Gauge
1368-X	Oil Bayonet
1483	Piston Lock Pin - 1/8 x 1"
1500	Bearing Cup
1501	Bearing Cone
1629	Pipe Plug - 1/16 NPT, Flush Seal
1661	Pipe Plug - 3/8 NPT
1671	Flywheel Key
2590	Pipe Plug - 1/8 NPT, Flush Seal
2713	Crankcase Inspection Plate Gasket
2718	Bearing Cup
2719	Bearing Cone
2796	Breather Ball
2798	Pump Cover Pin
2805	Pump Shaft Bushing
2848-X	Pump Cover (Includes Pin)
2849-X	Oil Pump Assembly (Individual pump parts not available)
2850	Pump Shaft Adapter
2851	Spring Guide
2852	Oil Pump Spring
2955	Crankcase
2956	Bearing Carrier
2957	Bearing Cover
2958	Crankcase Inspection Plate
3289	Pipe Plug - 1/4 NPT, Flush Seal
4222-X	Oil Filter Assembly
4225	Filter
2-011A	O-Ring (Relief Valve Adj. Screw)
2-111A	O-Ring (Breather Cap)
2-112A	O-Ring (Oil Bayonet)
2-112A	O-Ring (Pump Shaft)
2-116A	O-Ring (Filter Screen)
2-218A	O-Ring (Closure Body) (2 Required) (Spec 3, 4, 8, 9 Only)
2-228A	O-Ring (Pump Cover)
7001-025 NC050A	Bolt, 1/4-20 x 1/2, Hex Head
7001-037 NC075A	Bolt, 3/8-16 x 3/4, Hex Head
7001-037 NC100A	Bolt, 3/8-16 x 1, Hex Head

ASSEMBLY NO.	ASSEMBLY NAME
1279-X	Breather Cap Assembly with 1279, 2-111A
1341 -X1	Crankshaft Assembly with 1284 (2), 1286, 1341, 1501, 2590, 2719
(a) 1342-XI	Extended Crankshaft Assembly with 1284 (2), 1286, 1342, 1501, 2590, 2719
1368-XI	Oil Bayonet Assembly with 1368-X, 2-112A
1419-2X1	Hydraulic Unloader Assembly (Up to 200 psi) (Spec 7, 78 Only)
(a) 1419-2X2	Hydraulic Unloader Assembly (200 psi & Above) (Spec 7, 78 Only)
1515-X	Closure Cap Assembly including 2-218A (2) (Spec 3, 4, 8, 9 Only)
2549-X1	Flywheel Assembly, 16" O.D. 3 Groove with 2549 and 3218 (Not part of Crankcase Assembly) (Not Shown)
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
2961 -X	Air Release Valve Assembly with 2961, 2962, 2963
(a) 3271-X1	Flywheel Assembly, 14" O.D. 2 Groove with 3218 and 3271 (Not part of Crankcase Assembly) (Not Shown)
4222-X	Oil Filter Assembly with 4222, 4225, 2798 (Standard on All Models Starting January 1, 1993)

NOTES:

(a) Optional Equipment

Crankcase Capacity: 1.5 Quarts (1.4 Liters)

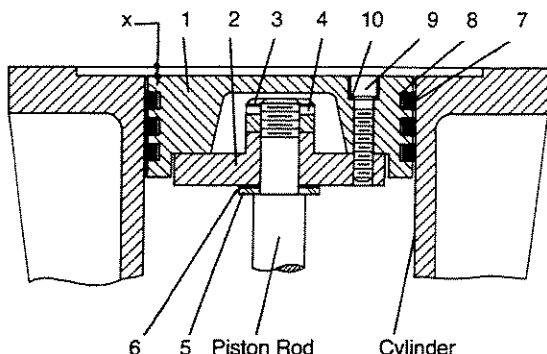
Caution: Always relieve pressure in the unit before attempting any repairs.

Bill of Materials

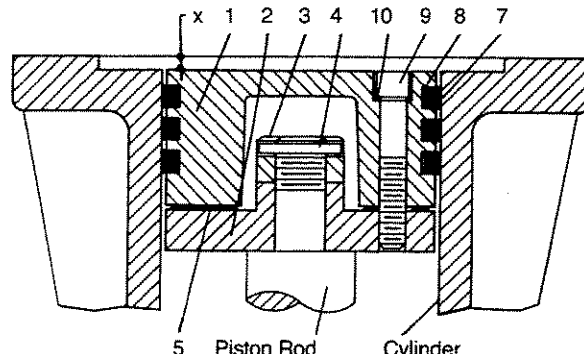


Equipment	Part No.	Qty	Description
3206-X1J	2-236J	2	O-RING, VITON - HIGH PRESSURE
	1285	1	BEARING CARRIER GASKET - 191/2
	1651	1	INSPECTION PLATE GASKET - 191/
	1771	3	PISTON RING-TEFLON - 2-1/2"
	1774	3	RING EXPANDER - 2-1/2", 2-3/4"
	2-031J	4	O-RING, VITON - HIGH PRESSURE
	2-224J	4	O-RING, VITON - HIGH PRESSURE
	1281	1	FILTER SCREEN SCREW GASKET
	2-235J	2	O-RING, VITON - HIGH PRESSURE
	P1452-1X3	4	PACKING SET-TEFLON - 'D' STYLE
	2702	1	CRANKCASE GASKET - 191/291
	2713	1	CRANKCASE INSPECTION PLATE GAS
	2717	4	VALVE GASKET, ALUMINUM - 91-29
	3483-5X2	2	SUCTION VALVE ASSY, IRON-LEAD,
	3485-X2	2	DISCHARGE VALVE ASSY, IRON-LEA
	4209	3	RING EXPANDER - 1-1/4"
	5297	3	PISTON RING-TEFLON - 1-1/4"
	2-228A	1	O-RING, BUNA N

MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



Piston Assembly No.	ALL MODELS 190/191				ALL MODELS 390/391				ALL MODELS 590/591			
	1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter	3" (7.62 cm)		1 3/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 1/4" (8.26 cm)	
Ref. No. Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2. Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3. Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1378	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7. Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8. Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9. Screw, Soc. Hd.	7002-010 OC100A	4	7002-008 NC125A	4	7002-025 OC125A	8	7002-008 NC125A	6	7002-025 OC175A	8	7002-025 OC175A	4
10. Lock Washer	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4

Piston Assembly No.	ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
	1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter	3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4.5" (11.43 cm)		4" (10.16 cm)	
Ref. No. Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2. Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3. Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7. Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8. Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9. Screw, Soc. Hd.	7002-010 OC100A	4	7002-025 OC125A	8	7002-010 OC100A	4	7002-025 OC125A	8	7002-025 OC125A	8
10. Lock Washer	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8

PISTON CLEARANCE (COLD)

MODEL	"X" INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D491, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

NOTES:

- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

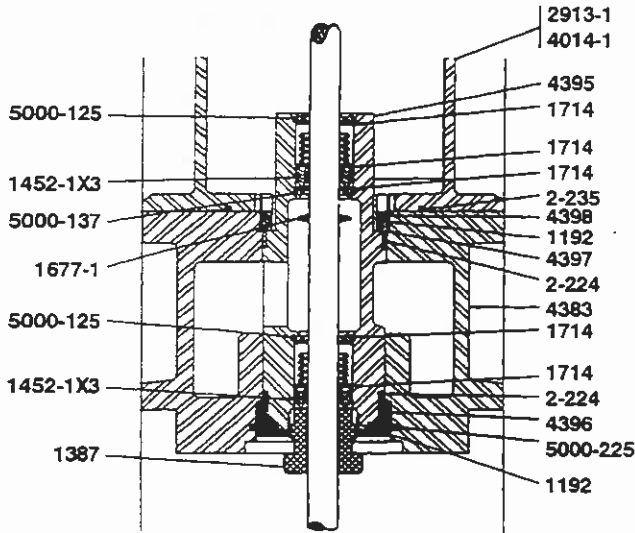
**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS
 MODELS D191 AND D291 COMPRESSORS
 S/N SS55685 AND LATER

SERVICE MANUAL
 PAGE E272L

MARCH 1997
 SUPERSEDES E272K/E275J

PACKING SPEC. A



PART NO.	PART NAME
1192	LOCKING DEVICE TFE 1/8" DIA. X 1/4" LONG
1387	ADJUSTMENT SCREW
1452-1	FEMALE PACKING RING
1453-1	MALE PACKING RING
1454	PACKING RING
1628	PACKING SPRING
1677-1	OIL DEFLECTOR RING
1714	PACKING BOX WASHER
4383	CROSSHEAD GUIDE
4395	PACKING CARTRIDGE
4396	CARTRIDGE PLATE
4397	SPACER
4398	CARTRIDGE HOLDDOWN SCREW
2913-1	CYLINDER
1183-6	ADAPTER PLATE
4014-1	CYLINDER (191)
5000-125	RETAINER RING
5000-225	RETAINER RING
2-224	O-RING
2-235	O-RING
4005	PACKING INST. TOOL

NOTE:

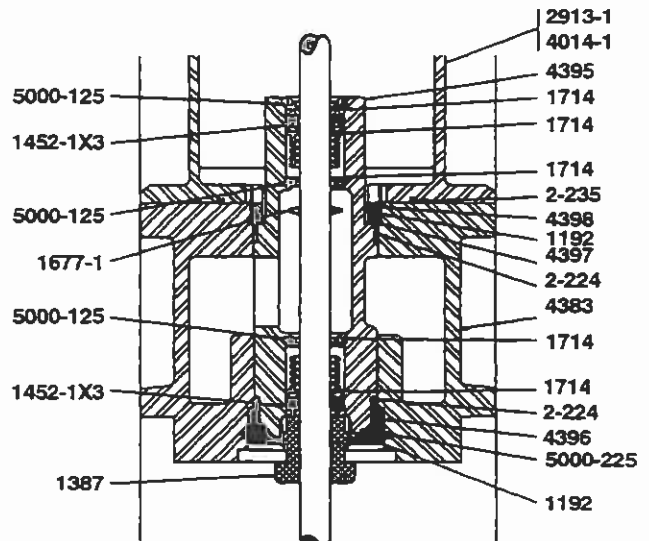
ASSEMBLY NO.	ASSEMBLY NAME
1132-X	CROSSHEAD-PISTON ROD ASSEMBLY
1132-X3	QUANTITY 2 (D291)
1132-X5	QUANTITY 2 (D291 - CHROME OXIDE)
1132-X3	QUANTITY 1 (D191)
1132-X4	QUANTITY 1 (D191 - 2ND STAGE)
1132-X5	QUANTITY 1 (D191 - CHROME OXIDE)
1132-X6	QUANTITY 1 (D191 - CHROME OXIDE - 2ND STAGE)
1452-1X3	PACKING SET WITH 1452-1, 1453-1, 1454(5), 1628, 1714
1452-2X3	PACKING SET - ALLOY - D STYLE
4383-X	CROSSHEAD GUIDE ASSEMBLY WITH 4383, 4396, 5000-225

USE CONE 4005 FOR INSTALLATION OF PACKING.

THE QUANTITY OF 1454 PACKING RINGS REQUIRED WILL VARY DUE TO TOLERANCES.

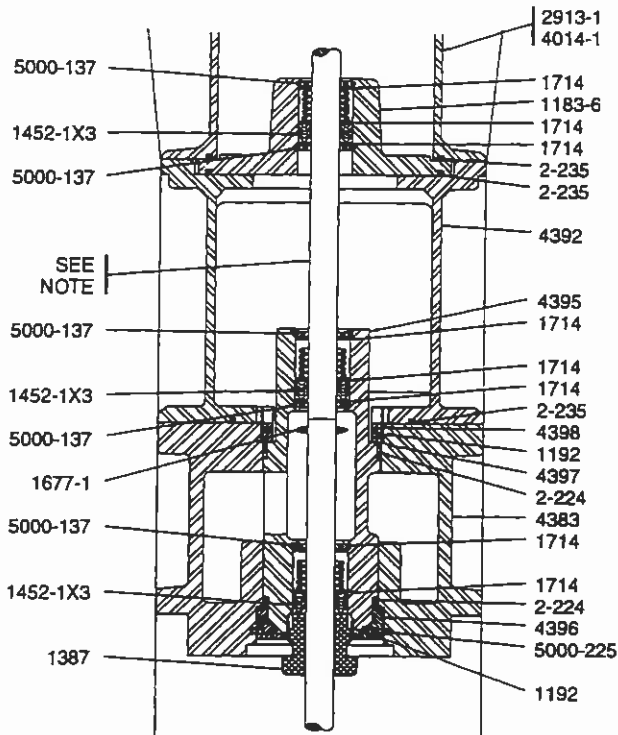
CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT BEFORE ATTEMPTING ANY REPAIRS.

PACKING SPEC. B



DISTANCE PIECE DETAILS
 MODELS T191 AND T291 COMPRESSORS
 ALL SPECIFICATIONS

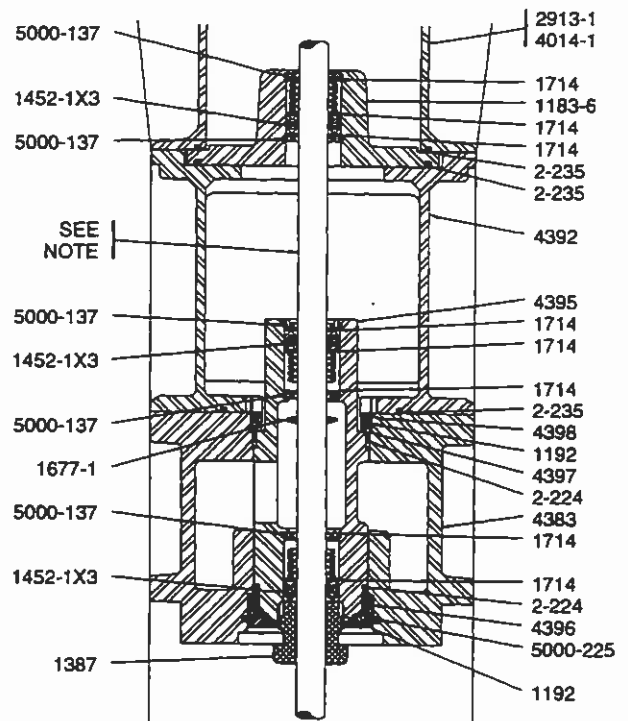
PACKING SPEC. G



PART NO.	PART NAME
1192	Locking Device TFE 1/8" Dia. x 1/4" Long
1387	Adjustment Screw
1452-1	Female Packing Ring
1453-1	Male Packing Ring
1454	Packing Ring
1628	Packing Spring
1677-1	Oil Deflector Ring
1714	Packing Box Washer
2288-1	Cylinder
4383	Crosshead Guide
4395	Packing Cartridge
4396	Cartridge Plate
4397	Spacer
4398	Cartridge Holddown Screw
2913-1	Cylinder (T291)
4392	Distance Piece
1183-6	Adapter Plate
4014-1	Cylinder (T191)
5000-137	Retainer Ring
5000-225	Retainer Ring
2-224	O-ring
2-235	O-ring

SEE NOTE

PACKING SPEC. H



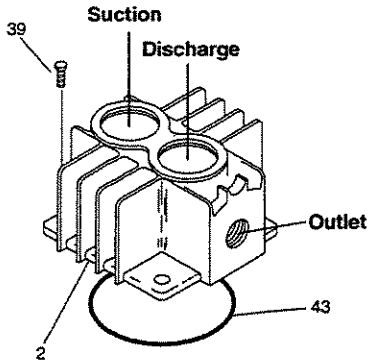
NOTE:

ASSEMBLY NO.	ASSEMBLY NAME
1132-X7	Quantity 2 (T291 - Nitrotec)
1132-X9	Quantity 2 (T291 - C _r O ₂)
1132-X7	Quantity 1 (T191 - Nitrotec)
1132-X8	Quantity 1 (T191 - Nitrotec) (2nd Stage)
1132-X9	Quantity 1 (T191 - C _r O ₂)
1132-X10	Quantity 1 (T191 - C _r O ₂) (2nd Stage)
1384-X2	Crosshead-Piston Rod Assembly (Coated Piston Rods)
1132-X10	Crosshead Assembly Chrome Oxide T191
1384-X3	Crosshead-Piston Rod Assembly (Chrome Oxide Piston Rods)
1452-1X3	Packing Set with 1452-1, 1453-1, 1454(5), 1628, 1714
1452-2X3	Packing Set-Alloy-D Style
2773-X	Crosshead Guide Assembly with 2773, 2777, 5000-262

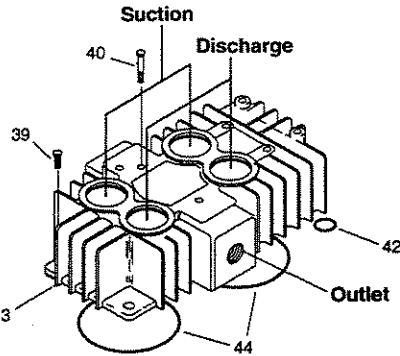
Use cone 4005 for installation of packing.
 The quantity of 1454 Packing Rings required will vary due to tolerances.
 For O-ring Material Coding See Page A500.

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

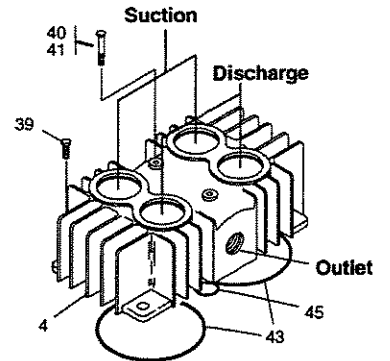
HEAD 90/91



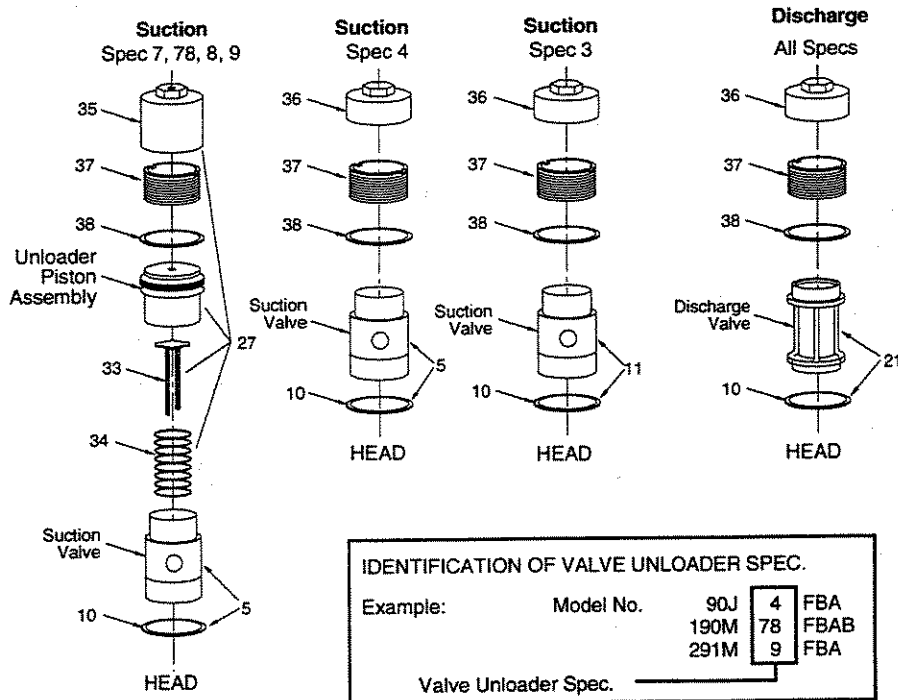
191



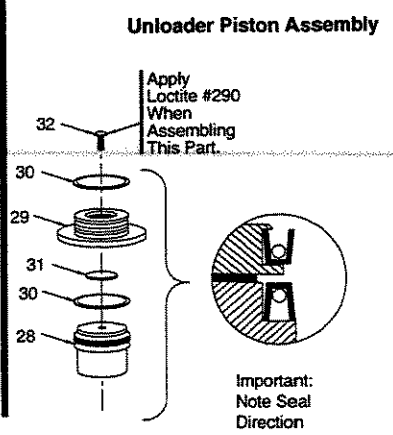
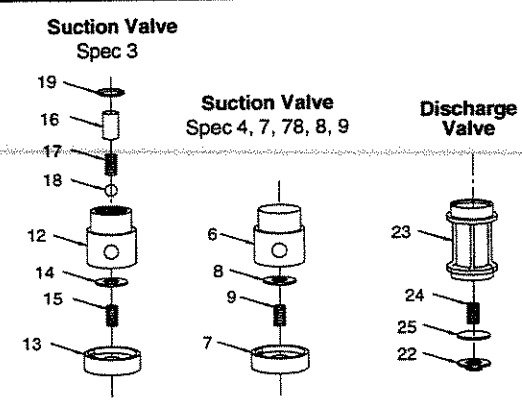
290/291



VALVE REMOVAL



VALVE DETAILS



HEAD ASSEMBLY DETAILS
 ALL MODELS 91 AND 291 S/N JW47628 AND LATER
 ALL MODELS 191

NOTE: When ordering parts use
 "PART NO." not "REF NO."

REF NO.	PART NO.	DESCRIPTION
(a)1.	2374-X	Head Assy, Spec 3, Model 90, 91, D90, D91
	2463-X1	Head Assy, Spec 3, Model 290, D290
	2912-X1	Head Assy, Spec 3, Model 291, D291
	2374-X1	Head Assy, Spec 4, Model 90, 91, D90, D91, A90, A91
	4013-X1	Head Assy, Spec 4, Model 191, A191, D191
	2463-X2	Head Assy, Spec 4, Model 290, A290, D290
	2912-X2	Head Assy, Spec 4, Model 291, D291
	2374-X2	Head Assy, Spec 8,9, Model 90, 91, D90, D91
	2374-X3	Head Assy, Spec 8,9, Model A90, A91
	4013-X2	Head Assy, Spec 7,78,8,9, Model 191, A191, D191
	2463-X3	Head Assy, Spec 7,78,8,9, Model 290, D290
	2463-X4	Head Assy, Spec 7,78,8,9, Model A290
	2912-X3	Head Assy, Spec 7,78,8,9, Model 291, D291
2.	2374	Head Model 90, 91
	4302	Head Model F91 (ANSI FLANGE)
3.	4013	Head Model 191
	4371	Head Model F191 (ANSI FLANGE)
4.	2463	Head Model 290, A290, D290 (Obsolete replace by 2912)
	2912	Head Model 291, A291, D291
	4300	Head Model F291 (ANSI FLANGE)
5.	3483-X	Suction Valve Assy, Spec 4,7,78,8,9
(b)	3483-X1	Same as above but with Copper Gaskets
(b)	3483-X2	Same as above but with Iron-Lead Gaskets
6.	3483	Suction Valve Seat
7.	3484	Suction Valve Bumper
8.	3972	Suction Valve Plate
9.	4009	Suction Spring
10.	2717	Valve Gasket, Alum.
(b)	2717-1	Valve Gasket, Copper
(b)	2717-2	Valve Gasket, Iron-Lead
11.	3483-1X	Suction Valve Assy, Spec 3
(b)	3483-1X1	Same as above but with Copper Gaskets
(b)	3483-1X2	Same as above but with Iron-Lead Gaskets
12.	3483-1	Suction Valve Seat, Spec 3
13.	3484	Suction Valve Bumper
14.	3972	Suction Valve Plate
15.	4009	Suction Spring
16.	3977	Suction Valve Relief Housing
17.	1411	Spring
18.	1410	Ball
19.	5000-77	Retainer Ring
20.		
21.	3485-X	Discharge Valve Assy
(b)	3485-X1	Same as above but with Copper Gaskets
(b)	3485-X2	Same as above but with Iron-Lead Gaskets
22.	3485	Discharge Valve Seat
23.	3486	Discharge Valve Bumper
24.	4008	Discharge Spring
25.	3973	Discharge Valve Plate

REF NO.	PART NO.	DESCRIPTION
27.	3919-X	Unloader Assy
28.	3919	Unloader Piston
29.	2857	Piston Cap
30.	2619-X	Piston Seat Assy
31.	2858	Unloader Piston Cap Gasket
32.	1910	Bolt 1/4-20 x 1/2 Soc. Button Hd.
33.	3975	Unloader Actuator
34.	3976	Unloader Spring
35.	2598-1	Unloader Cap
36.	2714-1	Valve Cap
37.	2715	Holddown Screw
(c)38.	2-031_	O-ring
39.	7001-037 NC100A	Bolt, 3/8-16 x 1" Gr.5 Hex Hd.
40.	2731	Center Headbolt
41.	2732	Gasket
42.	2-118E	O-ring, Teflon (Intercooler)
(c)43.	2-235_	O-ring
(c)44.	2-236_	O-ring
(c)45.	2-113_	O-ring

NOTES:
 (a) Not Shown.
 (b) Optional.
 (c) For O-ring material coding see page A500

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

SERVICE
PAGE

MANUAL
E351L

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

MAY
SUPERSEDES

1997
E351K

MODEL NUMBER	91	A91 D91	T91	181	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	D791 D8091	
NO.	DESCRIPTION												SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY			
1.	CROSSHEAD ASSEMBLY	1132-X2	1132-X3 1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 (h) 1132-X7 1132-X9 (f) 1132-X10 (f)(g)	1132-X2 (f)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1394-X 2765(h) 1366(i)	1384-X1 1384-X4 (f)	1394-X2 1394-X3 (f)	1717-X	1716-X	1716-X	1716-X	2405-X	2405-1
2.	CROSSHEAD GUIDE	2240	4940-X	4383	4383	4383-X	4393	4383-X	4383-X	1889-X	1889-X	1889-X	1889-X	1889-1X	1889-1X	1889-1X	1889-1X	1889-1X
3.	CONN. ROD ASSY.	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1	1889-1
4.	CONNECTING ROD	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367	1367
5.	CONN. ROD BEARING	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599	1599
6.	BOLT	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)
7.	NUT	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505	2505
8.	WRIST PIN	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)
9.	WRIST PIN BUSHING	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498
10.	RETAINER RING	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526	2526
11.	CRANKCASE GASKET	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011
12.	DIPPER																	

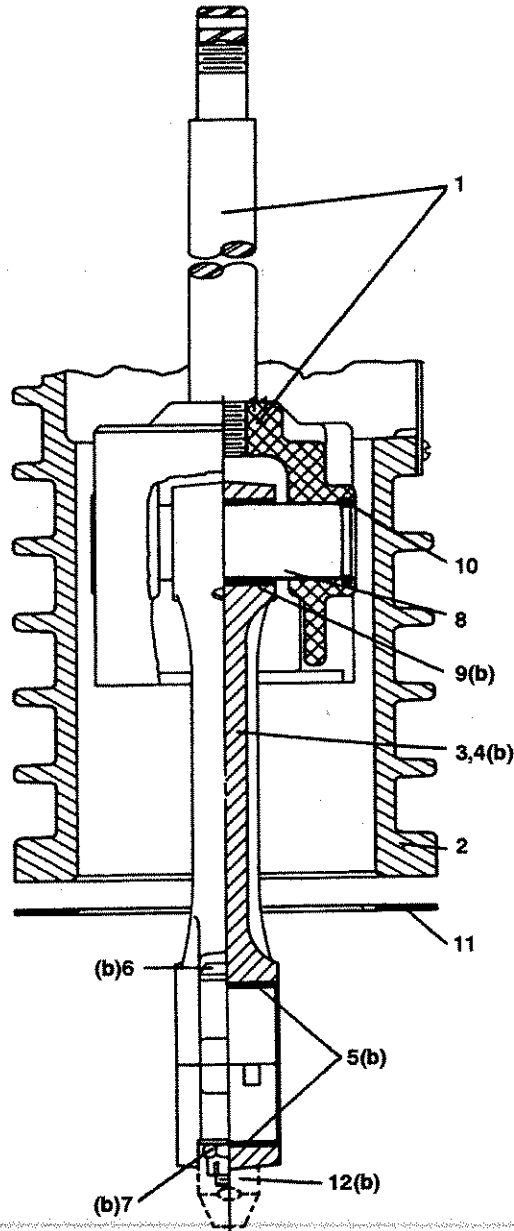
NOTES:

- (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.
- (d) Torque Connecting Rod Nut to 30 ft. lbs.
- (e) Torque Connecting Rod Nut to 40 ft. lbs.
- (f) Optional Chrome Oxide Piston Rods Only
- (g) Second Stage (Smaller Piston)
- (h) S/N XC30633 and Later
- (i) Prior to S/N XC30633
- (k) Must be rebored after replacing (1.1256/1.1252 Dia.)

Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

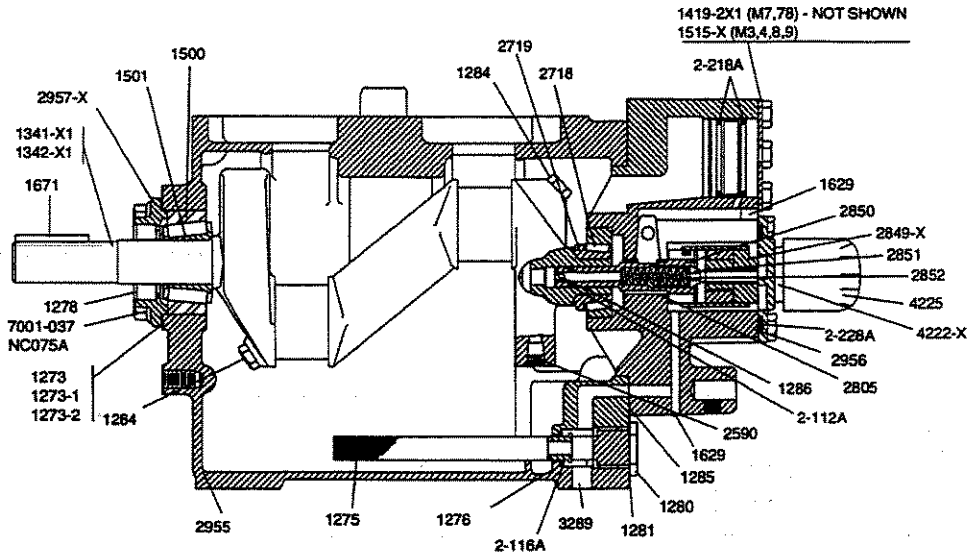
**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

**CRANKCASE DETAILS
ALL MODELS 151, 191, 291
COMPRESSORS
CRANKCASE SPECIFICATION: M**

SERVICE PAGE	MANUAL E402G
DECEMBER 1999	
SUPERSEDES	E402F

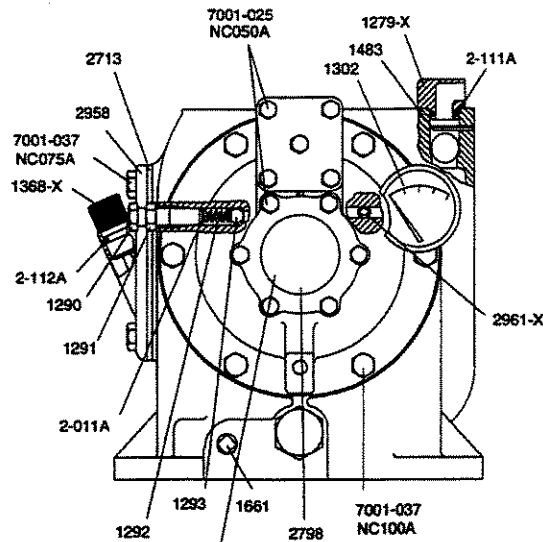
CRANKCASE DETAILS - FD151

IDENTIFICATION OF VALVE/UNLOADER SPEC.
 Example: Model No. FD151AM FBA
 Valve/Unloader Spec. _____



**Crankcase Assembly No. 2955-X1 (M3, 4, 8, 9)
Crankcase Assembly No. 2955-X2 (M7, 78)**

**2549-X1 Flywheel Assembly Not Shown (16")
Optional Flywheel Assembly 3271-X1 Not Shown (14")**



2848-X USED ON ALL COMPRESSORS
WITHOUT OIL FILTER ASSEMBLY

Caution: Always relieve pressure in the units
before attempting any repairs.

CRANKCASE DETAILS
ALL MODELS 151, 191, 291
COMPRESSORS
CRANKCASE SPECIFICATION: M

PART NO.	PART NAME
1273	Bearing Adjustment Shim (0.005")
1273-1	Bearing Adjustment Shim (0.007")
1273-2	Bearing Adjustment Shim (0.020")
1275	Oil Filter Screen
1276	Filter Screen Washer
1278	Oil Seal
1279	Breather Cap
1280	Filter Screw
1281	Filter Screen Screw Gasket
1284	Crankshaft Orifice (2)
1285	Bearing Carrier Gasket
1286	Pump Shaft Drive Pin
1290	Relief Valve Adjusting Screw
1291	Adjusting Screw Locknut
1292	Relief Valve Spring
1293	Relief Valve Ball
1302	Oil Pressure Gauge
1368-X	Oil Bayonet
1483	Piston Lock Pin - 1/8 x 1"
1500	Bearing Cup
1501	Bearing Cone
1629	Pipe Plug - 1/16 NPT, Flush Seal
1661	Pipe Plug - 3/8 NPT
1671	Flywheel Key
2590	Pipe Plug - 1/8 NPT, Flush Seal
2713	Crankcase Inspection Plate Gasket
2718	Bearing Cup
2719	Bearing Cone
2796	Breather Ball
2798	Pump Cover Pin
2805	Pump Shaft Bushing
2848-X	Pump Cover (Includes Pin)
2849-X	Oil Pump Assembly (Individual pump parts not available)
2850	Pump Shaft Adapter
2851	Spring Guide
2852	Oil Pump Spring
2955	Crankcase
2956	Bearing Carrier
2957	Bearing Cover
2958	Crankcase Inspection Plate
3289	Pipe Plug - 1/4 NPT, Flush Seal
4222-X	Oil Filter Assembly
4225	Filter
2-011A	O-Ring (Relief Valve Adj. Screw)
2-111A	O-Ring (Breather Cap)
2-112A	O-Ring (Oil Bayonet)
2-112A	O-Ring (Pump Shaft)
2-116A	O-Ring (Filter Screen)
2-218A	O-Ring (Closure Body) (2 Required) (Spec 3, 4, 8, 9 Only)
2-228A	O-Ring (Pump Cover)
7001-025 NC050A	Bolt, 1/4-20 x 1/2, Hex Head
7001-037 NC075A	Bolt, 3/8-16 x 3/4, Hex Head
7001-037 NC100A	Bolt, 3/8-16 x 1, Hex Head

ASSEMBLY NO.	ASSEMBLY NAME
1279-X	Breather Cap Assembly with 1279, 2-111A
1341 -X1	Crankshaft Assembly with 1284 (2),1286,1341, 1501,2590,2719
(a) 1342-XI	Extended Crankshaft Assembly with 1284 (2),1286, 1342,1501, 2590, 2719
1368-XI	Oil Bayonet Assembly with 1368-X, 2-112A
1419-2X1	Hydraulic Unloader Assembly (Up to 200 psi) (Spec 7, 78 Only)
(a) 1419-2X2	Hydraulic Unloader Assembly (200 psi & Above) (Spec 7, 78 Only)
1515-X	Closure Cap Assembly including 2-218A (2) (Spec 3, 4, 8, 9 Only)
2549-X1	Flywheel Assembly, 16" O.D. 3 Groove with 2549 and 3218 (Not part of Crankcase Assembly) (Not Shown)
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
2961 -X	Air Release Valve Assembly with 2961, 2962, 2963
(a) 3271-X1	Flywheel Assembly, 14" O.D. 2 Groove with 3218 and 3271 (Not part of Crankcase Assembly) (Not Shown)
4222-X	Oil Filter Assembly with 4222, 4225, 2798 (Standard on All Models Starting January 1, 1993)

NOTES:

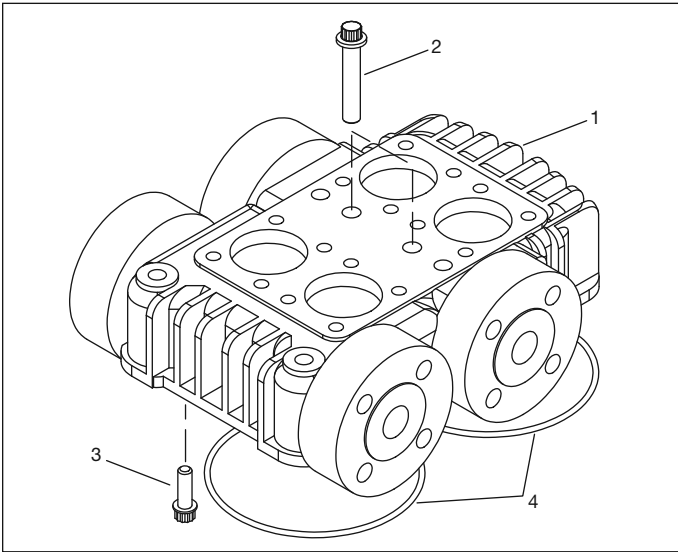
(a) Optional Equipment

Crankcase Capacity: 1.5 Quarts (1.4 Liters)

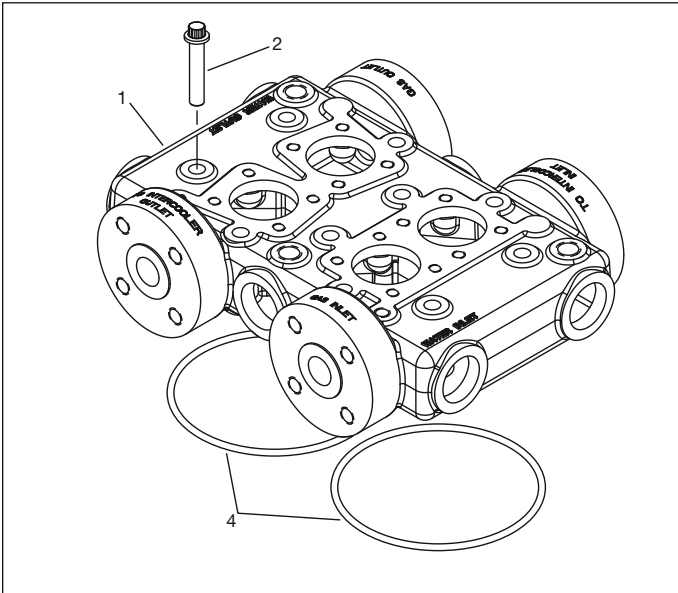
Caution: Always relieve pressure in the unit before attempting any repairs.

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

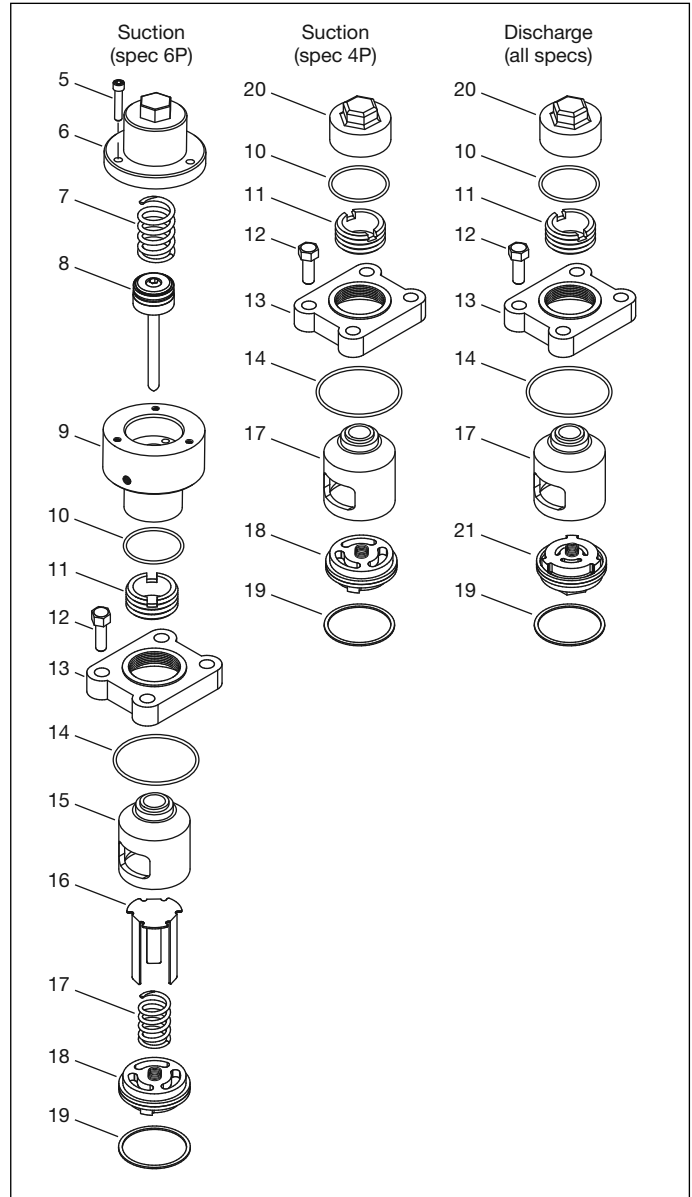
FD Head



WFD Head

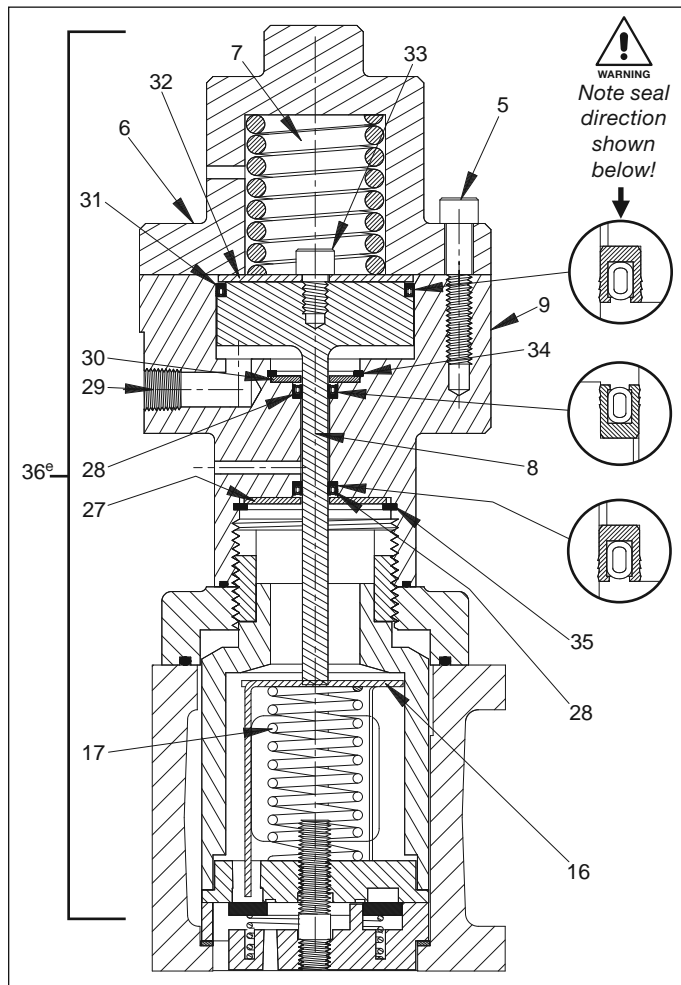


Valve Holddown Assemblies

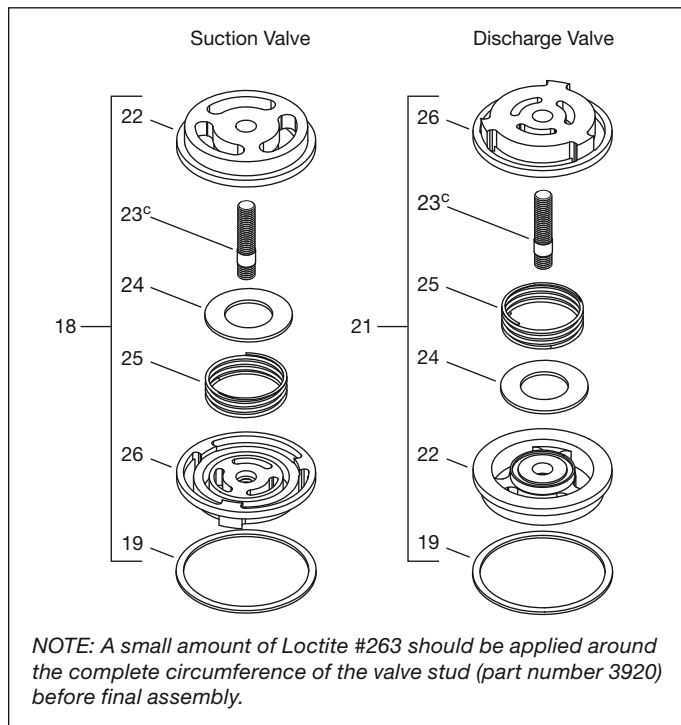


Appendix E—Head and Valve Assembly Details—All D-Style Models 351

Unloader Assembly (5320-X1^e)



Valve Assemblies



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 _a	O-ring—1st stage & 2nd stage (FD351 only)	2
	2-253 _a	O-ring—2nd stage (WFD351 only)	1
	2-256 _a	O-ring—1st stage (WFD351 only)	1
5.	7002-025TP125A ^f	Socket head 1/4"-20 x 1-1/4"	6
6.	5275 ^f	Unloader body cap (spec 6P)	2
7.	5277 ^f	Unloader spring (spec 6P)	2
8.	5273	Unloader piston (spec 6P)	2
9.	5345 ^f	Unloader body (spec 6P)	2
10.	2-031 _a	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 _a	O-ring	4
15.	5319	Valve cage	4
16.	5320 ^f	Unloader actuator (spec 6P)	2
17.	5277 ^f	Unloader spring (spec 6P)	2
18.	5311-3X _d	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 _d	Discharge valve assembly	2
	5311	Valve seat	4
23.	3920 ^c	Valve stud	4
24.	5312	Valve plate	4
25.	5313	Valve spring	4
26.	5318-3	Valve bumper	4
27.	5281 ^f	Unloader washer	1
28.	5278-X ^f	Piston seal assembly	2
29.	2590 ^f	Pipe plug 1/8" NPT flush	1
30.	5280 ^f	Unloader washer	1
31.	5279-X ^f	Piston seal assembly	1
32.	5272 ^f	Unloader piston cap	1
33.	7002-025NC037A ^f	Bolt 1/4-20 soc. button hd	1
34.	5000-87SS ^f	Retainer ring	1
35.	5000-150SS ^f	Retainer ring	1
36.	5320-X1 ^e	Unloader assembly	1

O-ring Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

Gasket Material Code	
	Aluminum
1	Copper
2	Iron-lead

^a denotes O-ring code. See O-ring chart for details.

^bRegistered trademark of the DuPont company.

^cApply Loctite #263 before final assembly.

^d denotes gasket material.

^eOnly the numbered items are included in the assembly.

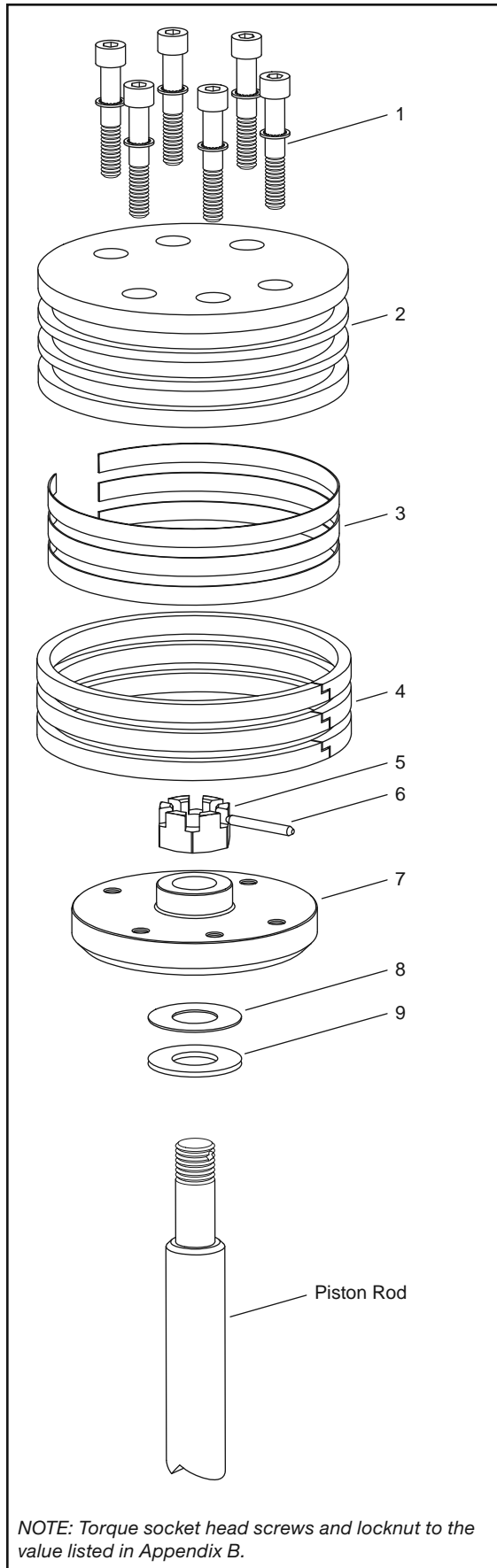
^fIncluded with unloader assembly #5320-X1.



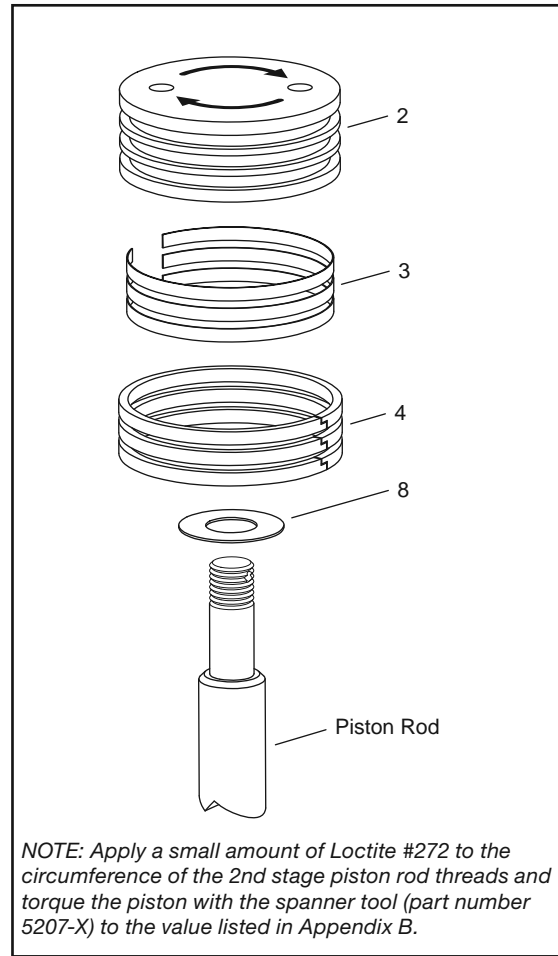
CAUTION: Always relieve pressure in the unit before attempting any repairs.

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

1st Stage



2nd Stage

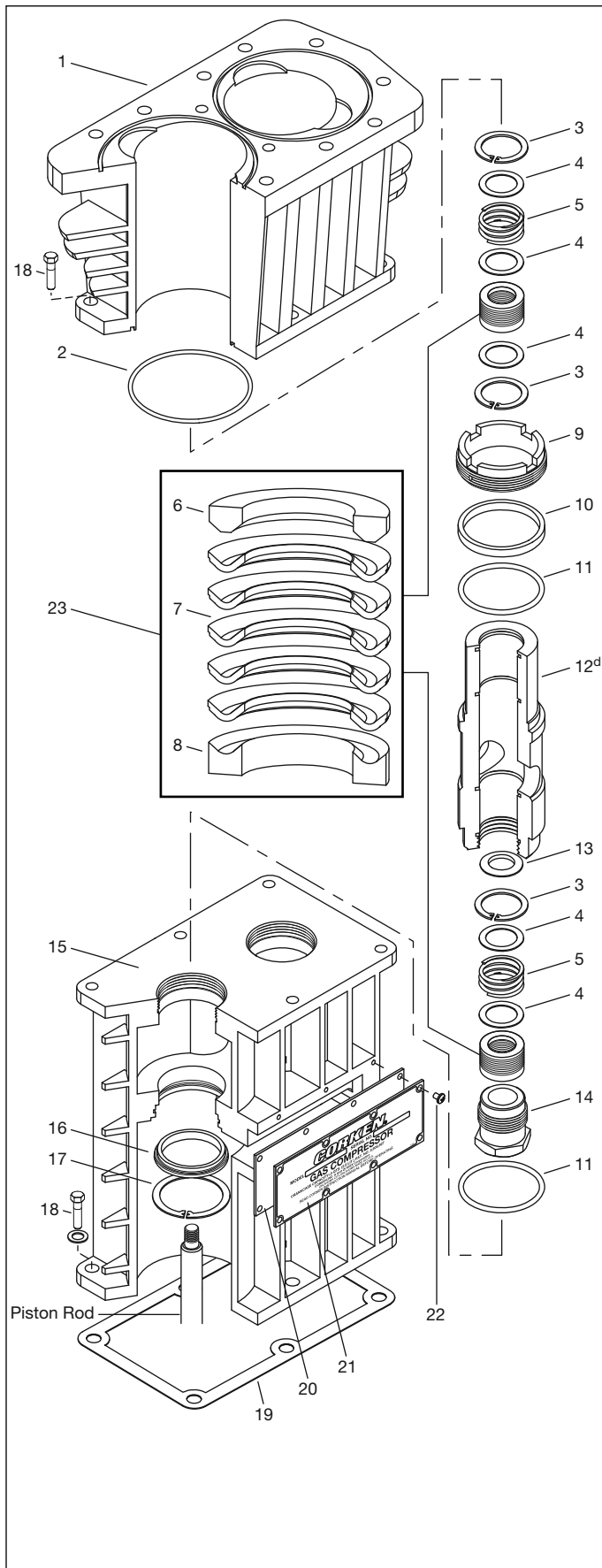


Piston Assembly Bill of Materials

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 ^a	O-ring—2nd stage (all models)	1
	2-247 ^a	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 ^a	O-ring	4
12.	2776 ^d	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 ^c	Cartridge plate	2
17.	5000-262 ^c	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 ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.

^cIncluded with crosshead guide assembly 2773-X.

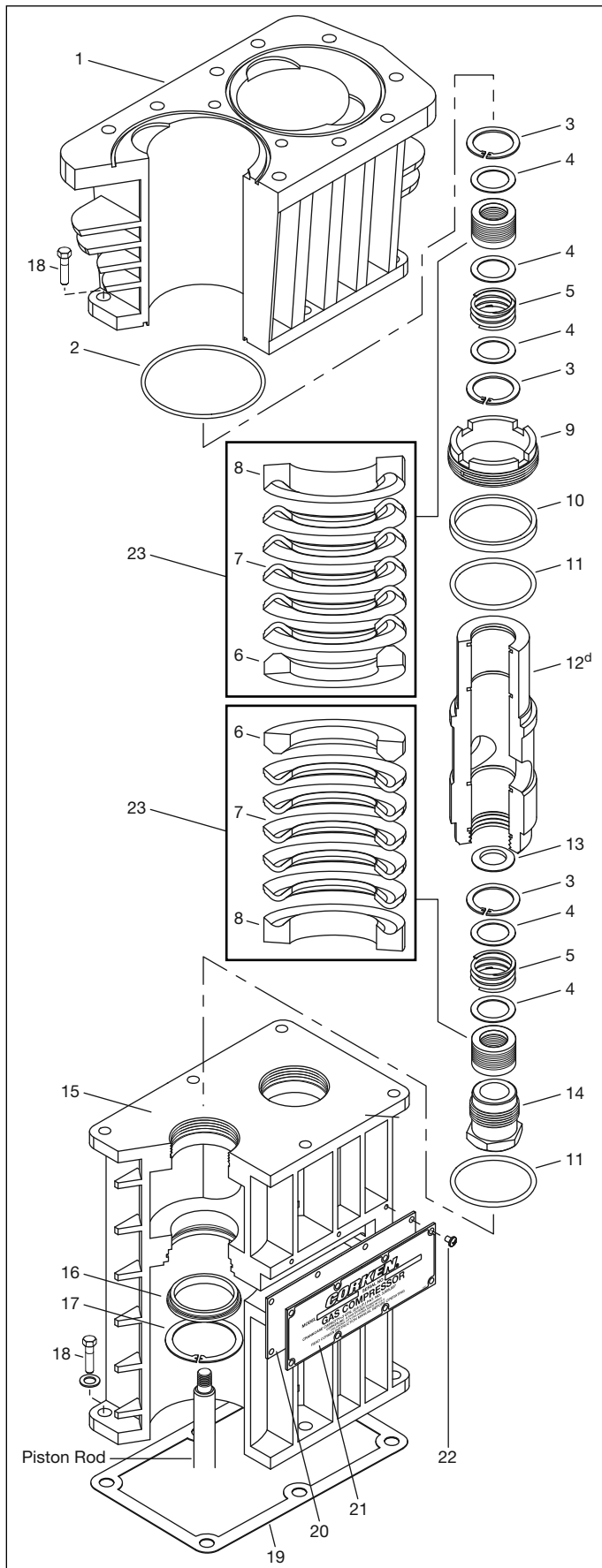
^dBefore installing the packing cartridge and packing on the piston rod, use packing cone (part number 4005) on the 1st stage of model 351 and both stages of model 391. Use packing cone (part number 5268) on the 2nd stage of model 351 only. See crosshead and connecting rod assembly details for more information.



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 ^a	O-ring—2nd stage (all models)	1
	2-247 ^a	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 ^a	O-ring	4
12.	2776 ^d	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 ^c	Cartridge plate	2
17.	5000-262 ^c	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 ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^b Registered trademark of the DuPont company.

^c Included with crosshead guide assembly 2773-X.

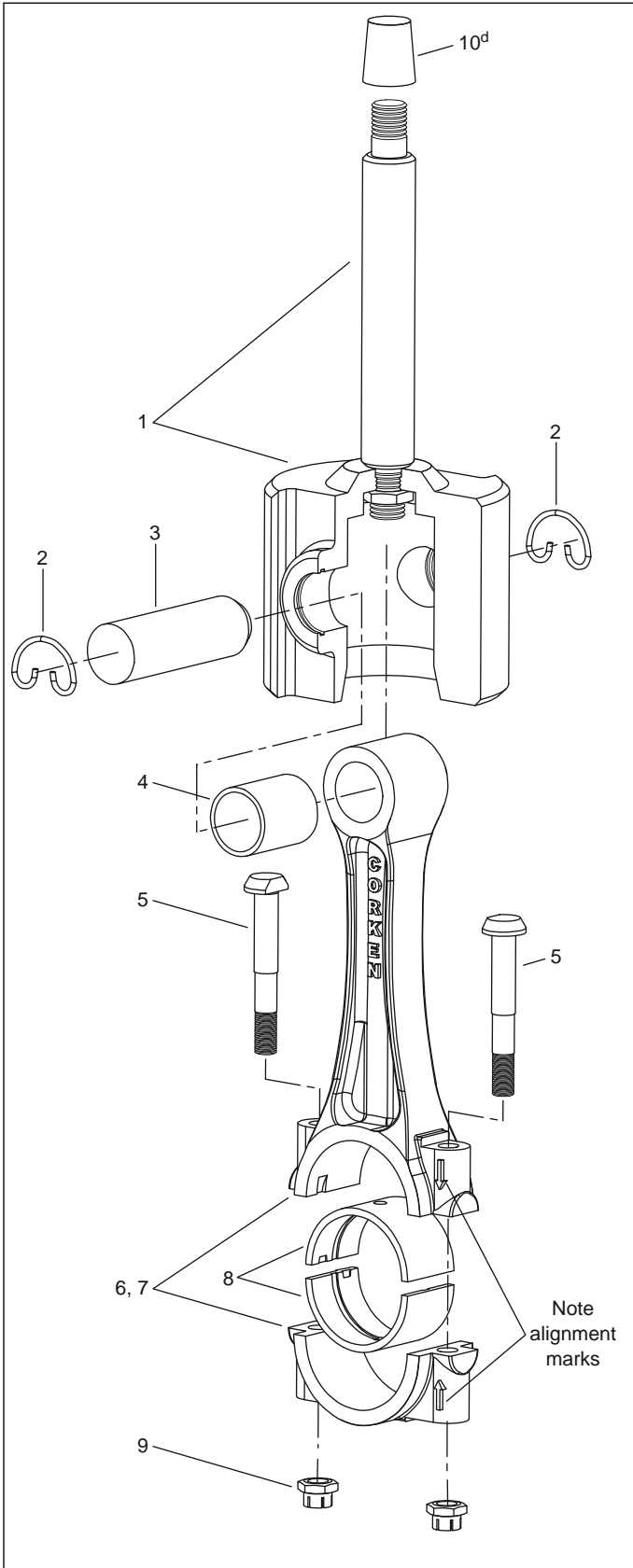
^d Before installing the packing cartridge and packing on the piston rod, use packing cone (part number 4005) on the 1st stage of model 351 and both stages of model 391. Use packing cone (part number 5268) on the 2nd stage of model 351 only. See crosshead and connecting rod assembly details for more 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 ^{a,b}	Wrist pin bushing	2
5.	1492 ^b	Bolt	4
6.	1490-X	Connecting rod assembly	2
7.	1490 ^b	Connecting rod	2
8.	1491 ^b	Connecting rod bearing	2
9.	1493 ^{b,c}	Nut	4
10.	4005 ^d	Packing cone—1st stage (351 only)	1
		Packing cone—1st and 2nd stage (391 only)	1
	5268 ^d	Packing cone—2nd stage (351 only)	1

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

^bIncluded with connecting rod assembly

^cTorque connecting rod nut to value shown in Appendix B.

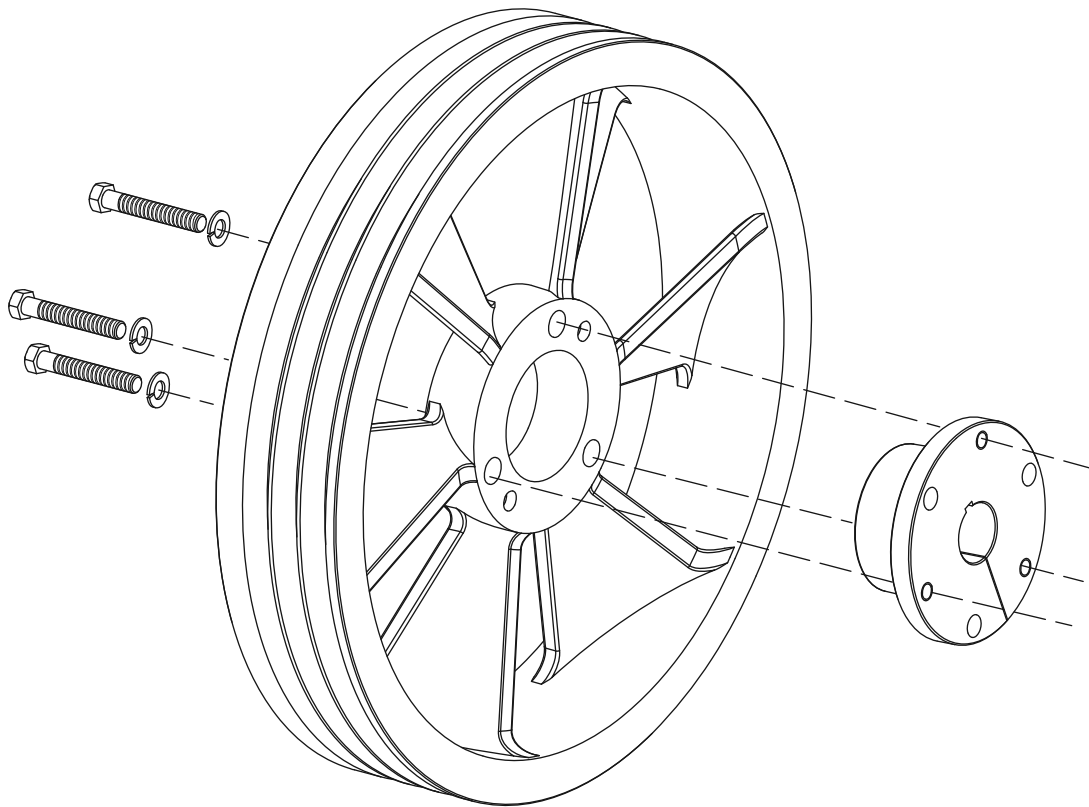
^dOnly used when installing the packing cartridge and packing on the piston rod.

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

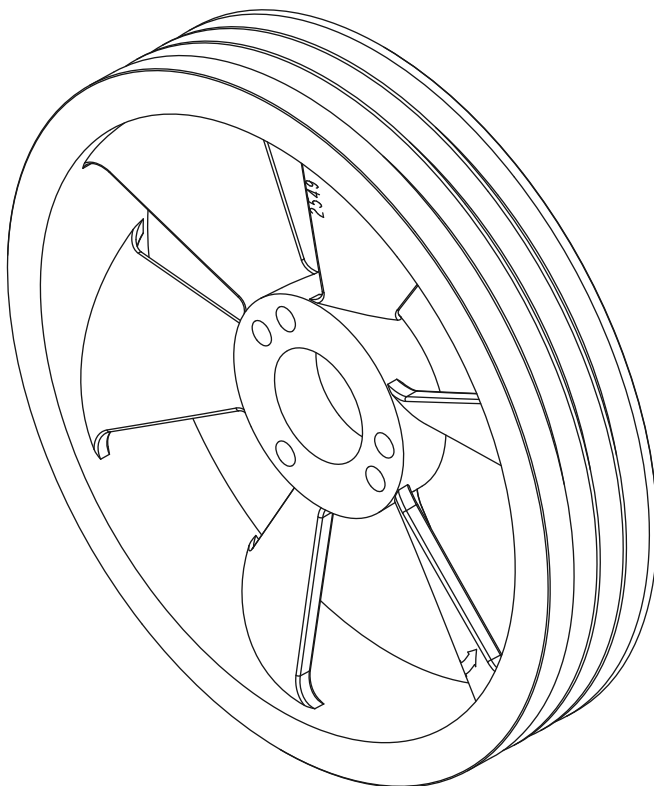


CAUTION: Always relieve pressure in the unit before attempting any repairs.

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



Back Side



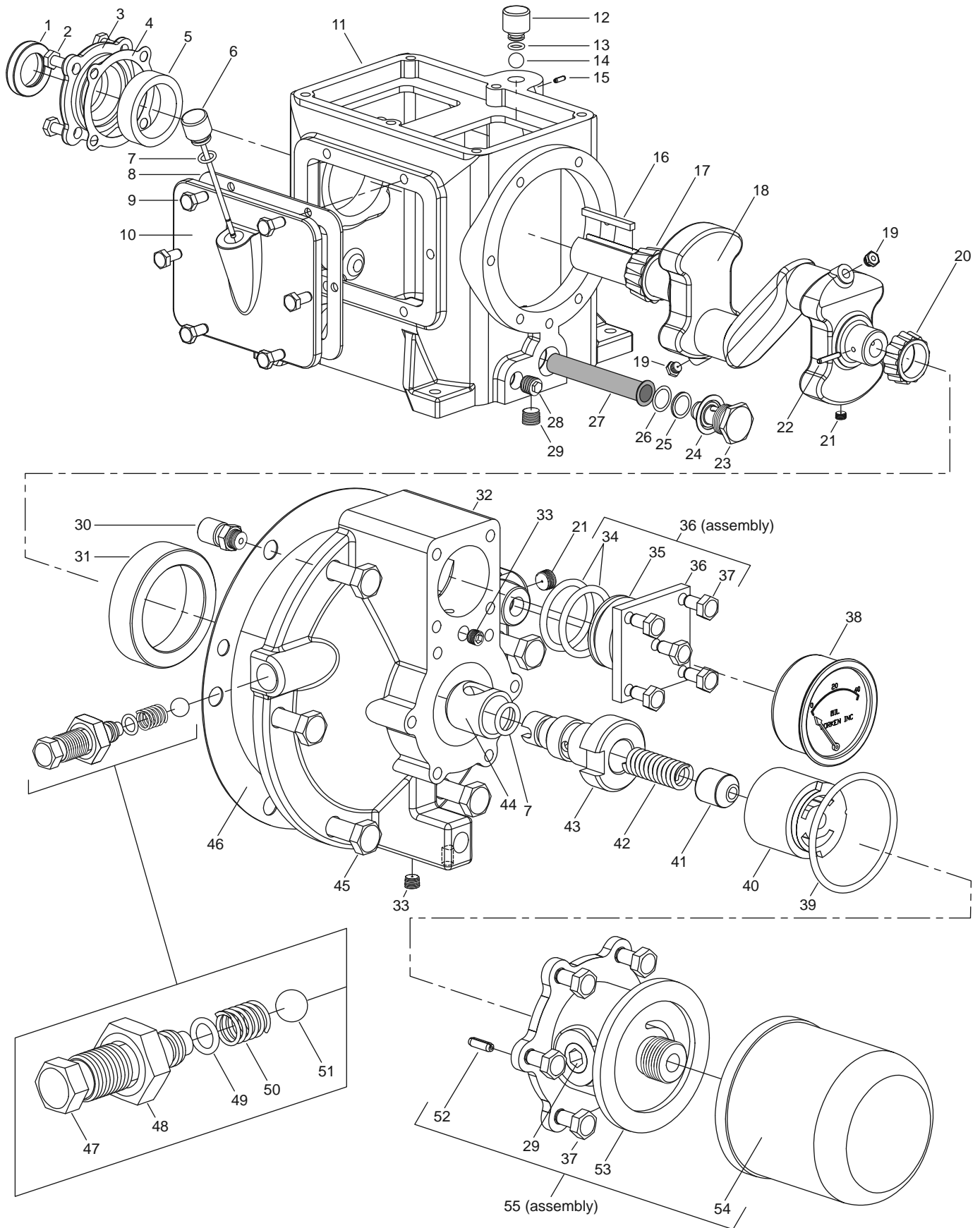
Front Side

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 ^b	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 ^a	Crankcase
12.	1279	Breather cap
	1279-X	Breather cap assembly (includes part numbers 1279, 2-111A)
13.	2-111A ^b	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 ^b	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 ^b	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 ^b	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 ^b	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

^aCrankcase capacity: 3 quarts (2.8 liters)

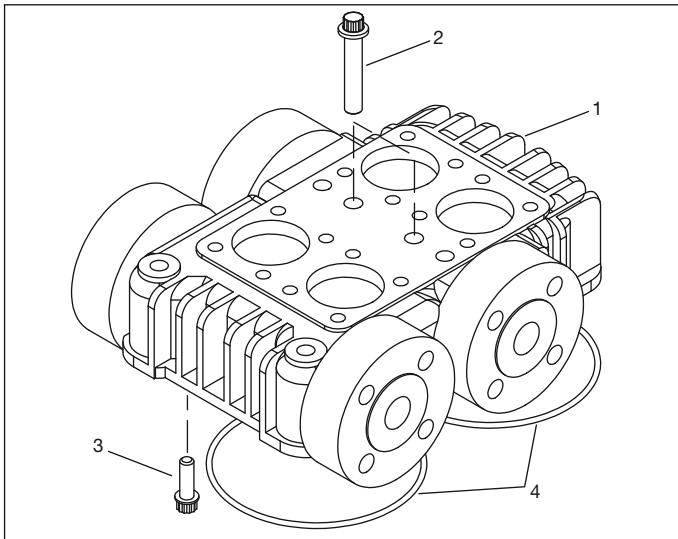
^bSee O-ring chart above for details.



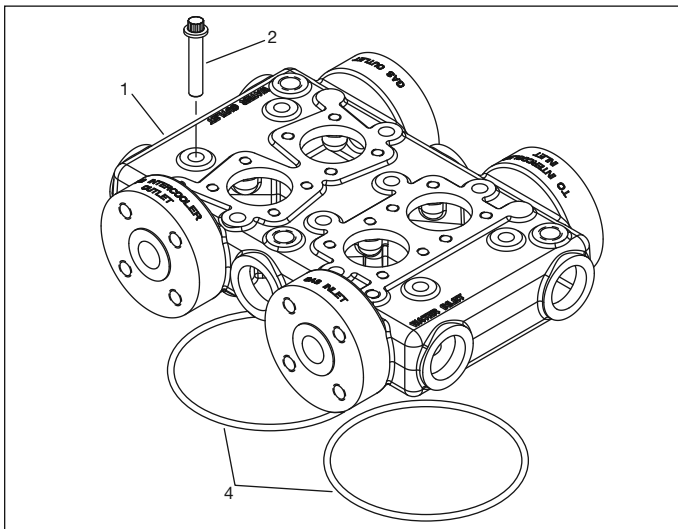
CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Head and Valve Assembly Details—All D-Style Models 391

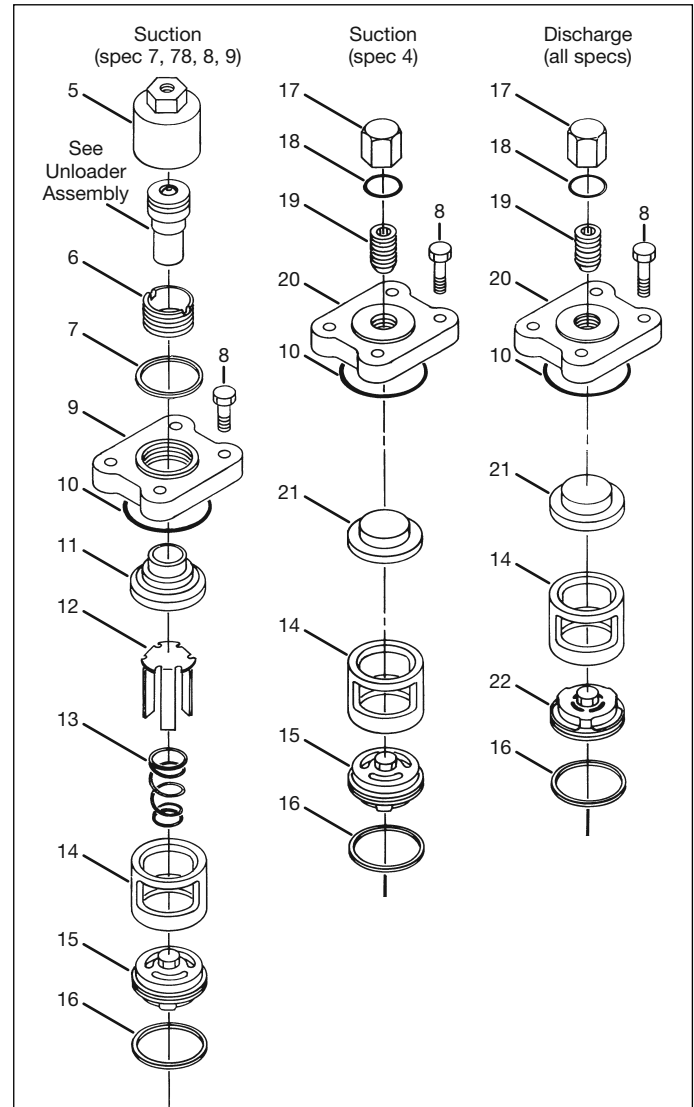
FD Head Shown Below



WFD Head Shown Below



Valve Holddown Assemblies



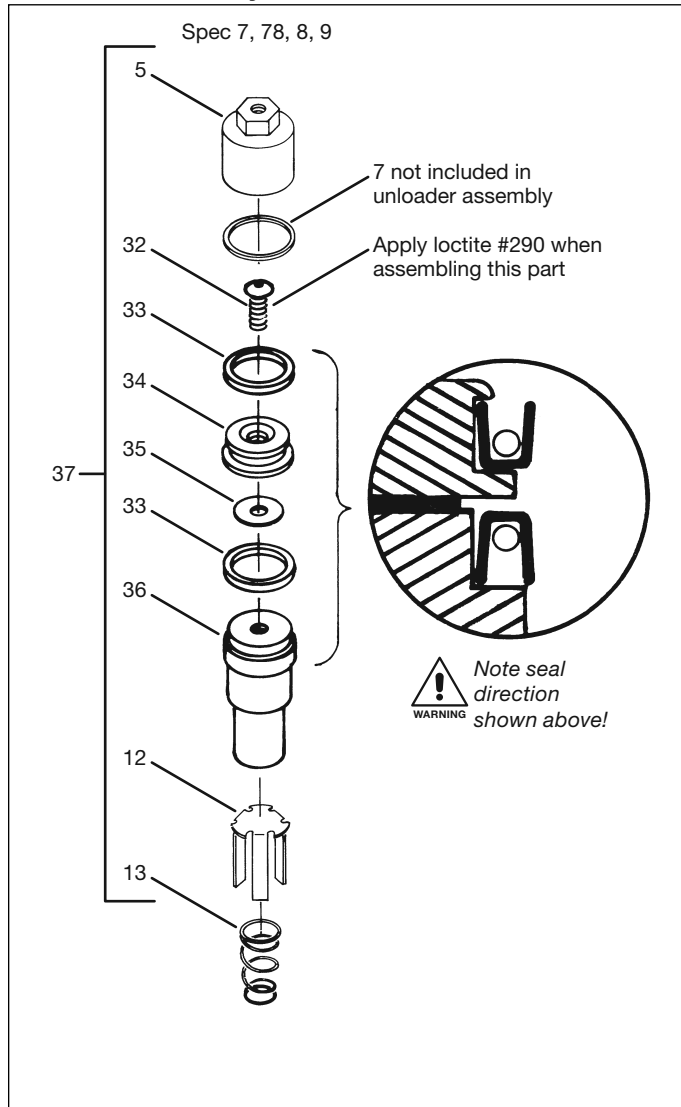
Head and Valve Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1	4159	Head—D391	1
	4366	Head—FD391	1
	3745	Head—WD391	1
	4372-3	Head—WFD391	1
2	1647	Center head bolt—D391, FD391 only	2
	1647	Head bolt—WD391, WFD391 only	10
3	7005-043NC150A	Head bolt—D391, FD391 only	12
4	2-253_a	O-ring—1st stage & 2nd stage (D391, FD391 only)	2
	2-253_a	O-ring—2nd stage (WD391, WFD391 only)	1
	2-256_a	O-ring—1st stage (WD391, WFD391 only)	1
5	2598-1	Unloader cap (spec 7, 78, 8, 9)	2
6	2715	Holddown screw (spec 7, 78, 8, 9)	2
7	2-031_a	O-ring (spec 7, 78, 8, 9)	2
8	7001-043NC125A	Bolt—7/16-14x1-1/4" hex head	16

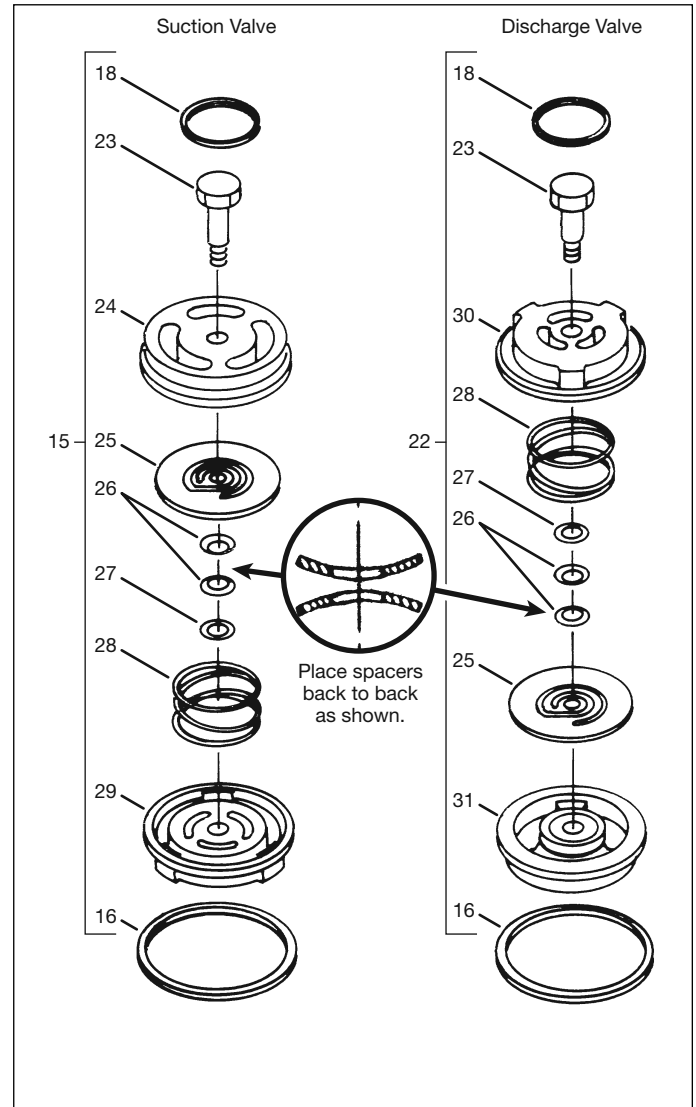
Ref No.	Part No.	Description	Qty.
9	2205	Valve cover plate (spec 7, 78, 8, 9)	2
10	2-143_a	O-ring	4
11	2207	Valve spacer (spec 7, 78, 8, 9)	2
12	2449	Unloader actuator (spec 7, 78, 8, 9)	2
13	2450	Unloader spring (spec 7, 78, 8, 9)	2
14	2448	Cage	4
15	2438-X	Suction valve assembly (aluminum standard)	2
	2438-X1	Same as 2438-X but with copper gaskets (optional)	2
	2438-X2	Same as 2438-X but with iron-lead gaskets (optional)	2
16	1418	Valve gasket (aluminum standard)	4
	1418-1	Valve gasket (copper optional)	4
	1418-2	Valve gasket (iron-lead optional)	4
17	1477	Valve screw nut (spec 4 and discharge)	4

Appendix E—Head and Valve Assembly Details—All D-Style Models 391

Unloader Assembly



Valve Assemblies



Ref No.	Part No.	Description	Qty.
18	1478	Gasket—steel (standard) (spec 4 and discharge)	4
	1478-1	Gasket—copper (optional) (spec 4 and discharge)	4
19	1476	Valve holddown screw (spec 4 and discharge)	4
20	1475	Valve cover plate (spec 4 and discharge)	4
21	1409	Valve spacer (spec 4 and discharge)	4
22	2439-X	Discharge valve assembly (aluminum standard)	2
	2439-X1	Same as 2439-X but with copper gaskets (optional)	2
	2439-X2	Same as 2439-X but with iron-lead gaskets (optional)	2
23	2446	Valve bolt	4
24	2438	Suction valve seat	2
25	2442	Valve plate	4
26	2445 ^b	Spacer (two per valve)	8

Ref No.	Part No.	Description	Qty.
27	3355	Washer	4
28	1407	Valve spring	4
29	2440	Suction valve bumper	2
30	2441	Discharge valve bumper	2
31	2439	Discharge valve seat	2
32	1910	Bolt (1/4-20 X 1/2 hex socket)	2
33	2619-X	Piston seal assembly	2
34	2857	Piston cap	2
35	2858	Gasket	2
36	2618	Unloader piston	2
37	2618-X	Unloader assembly	2

O-ring Code	
A	Buna-N
B	Neoprene ^{®c}
D	Viton ^{®c}
E	PTFE
K	Kalrez ^{®c}

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

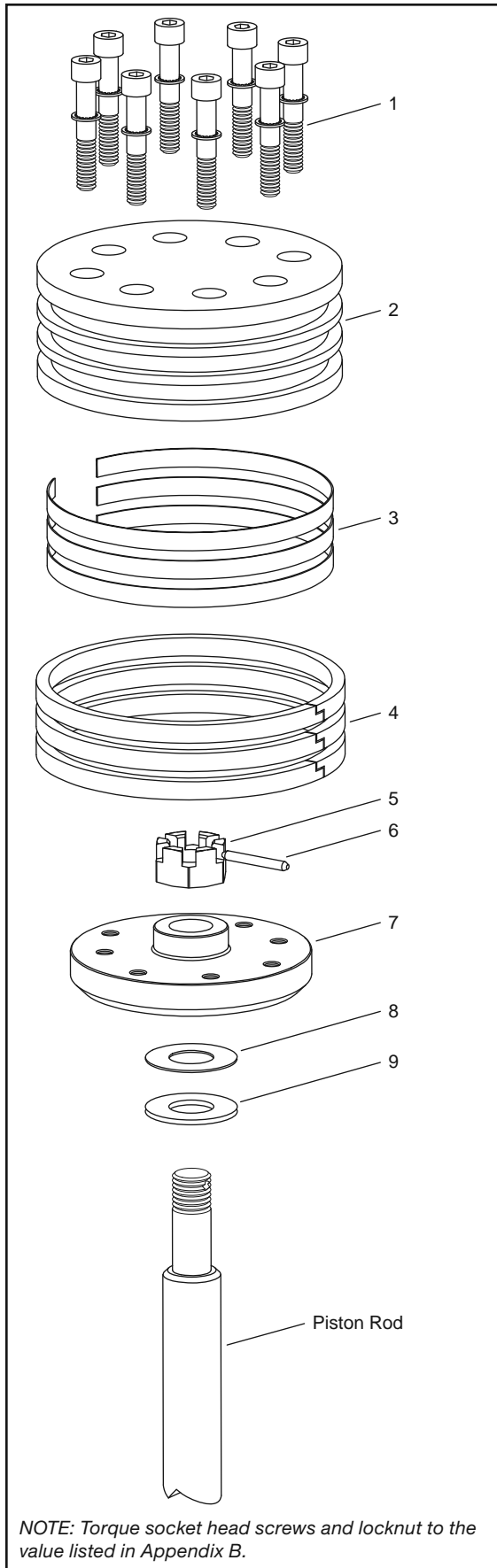
^bIncluded with valve assembly.

^cRegistered trademark of the DuPont company.

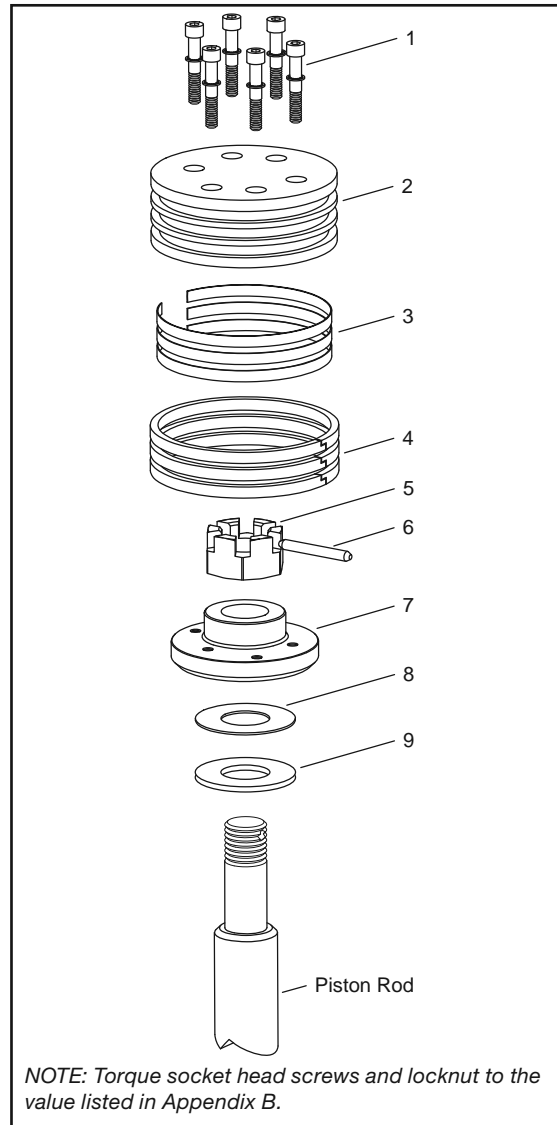
WARNING CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—Piston Assembly Details—All D-Style Models 391

1st Stage



2nd Stage

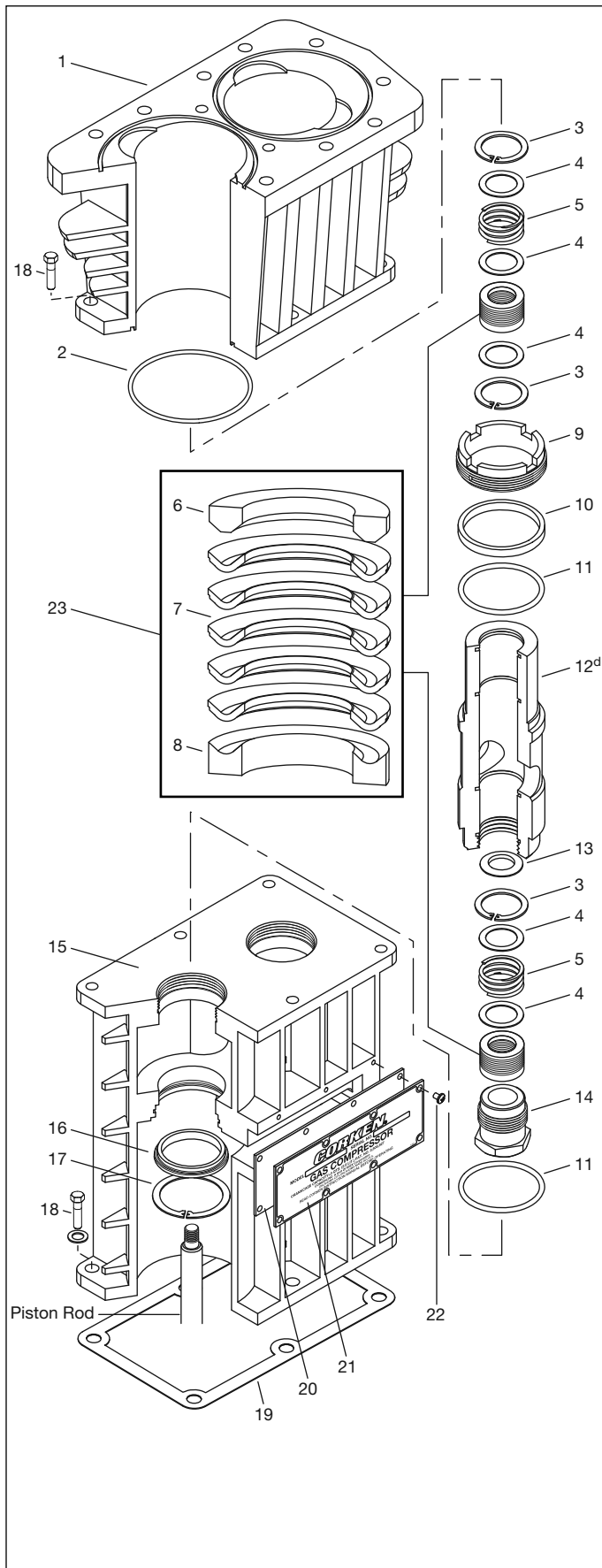


Piston Assembly Bill of Materials

Piston Assembly No.	1st Stage			2nd Stage	
	1987-X			1981-X	
Piston Diameter		4-1/2" (11.43 cm)		2-1/2" (6.35 cm)	
Ref. No.	Part Name	Part No.	Qty.	Part No.	Qty.
1.	Screw, sockethead	7002-025 OC125A	8	7002-008 NC125A	6
	Lock washer	7207-025A	8	7207-008A	6
2.	Piston head	1987	1	1981	1
3.	Ring expander	1740	3	1774	3
4.	Piston ring	1739—PTFE (std.)	3	1771—PTFE (std.)	3
		1739-2—Alloy 50 (opt.)	3	1771-2—Alloy 50 (opt.)	3
		1739-3—PEEK (opt.)	3	1771-3—PEEK (opt.)	3
5.	Locknut	1482	1	1482	1
6.	Lock pin	1483	1	1483	1
7.	Piston platform	1986	1	1982	1
8.	Shim washer, thick	1528	As req.	1528	As req.
	Shim washer, thin	1528-1		1528-1	
9.	Thrust washer	1527	1	1527	1

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 ^a	O-ring—2nd stage (all models)	1
	2-247 ^a	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 ^a	O-ring	4
12.	2776 ^d	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 ^c	Cartridge plate	2
17.	5000-262 ^c	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 ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.

^cIncluded with crosshead guide assembly 2773-X.

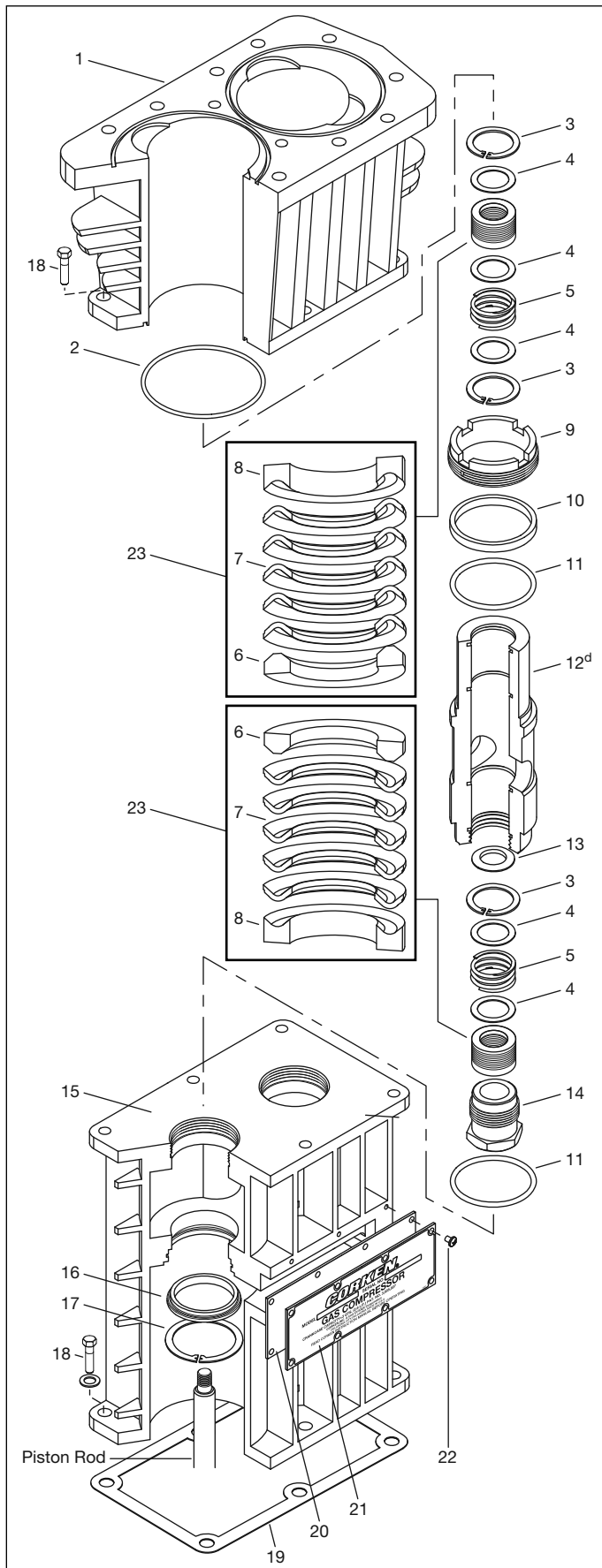
^dBefore installing the packing cartridge and packing on the piston rod, use packing cone (part number 4005) on the 1st stage of model 351 and both stages of model 391. Use packing cone (part number 5268) on the 2nd stage of model 351 only. See crosshead and connecting rod assembly details for more information.



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 ^a	O-ring—2nd stage (all models)	1
	2-247 ^a	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 ^a	O-ring	4
12.	2776 ^d	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 ^c	Cartridge plate	2
17.	5000-262 ^c	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 ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^b Registered trademark of the DuPont company.

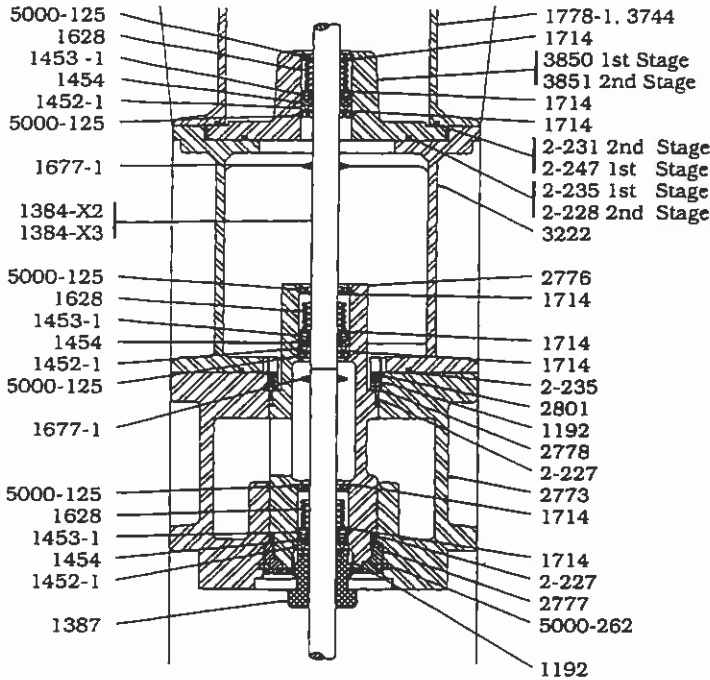
^c Included with crosshead guide assembly 2773-X.

^d 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.

PACKING SPEC. G



PART NO.	PART NAME
1192	Locking Device TFE 1/8" Dia. x 1/4" Long
1387	Adjustment Screw
1452-1	Female Packing Ring
1453-1	Male Packing Ring
1454	Packing Ring
1628	Packing Spring
1677-1	Oil Deflector Ring
1714	Packing Box Washer
1778-1	Cylinder (T390 Only)
2773	Crosshead Guide
2776	Packing Box Cartridge
2777	Cartridge Plate
2778	Spacer
2801	Cartridge Holddown Screw
3222	Distance Piece
3744	Cylinder (WT391 Only)
3850	Adapter Plate 1st Stage
3851	Adapter Plate 2nd Stage
5000-125	Retainer Ring
5000-262	Retainer Ring
2-227	O-ring
2-228	O-ring
2-231	O-ring
2-235	O-ring
2-247	O-ring

ASSEMBLY NO.

ASSEMBLY NAME

1384-X2	Crosshead-Piston Rod Assembly (Chrome Piston Rods)
1384-X3	Crosshead-Piston Rod Assembly (Chrome Oxide Piston Rods)
1452-1X3	Packing Set with 1452-1, 1453-1, 1454(5), 1628, 1714
2773-X	Crosshead Guide Assembly with 2773, 2777, 5000-262

***Optional-Chrome Oxide Piston Rods Only:**

New Crosshead Assemblies with Chrome Oxide Piston Rods installed in the field require a break-in period of approximately 10 hours. After this break-in, it is usually necessary to replace all of the packing.

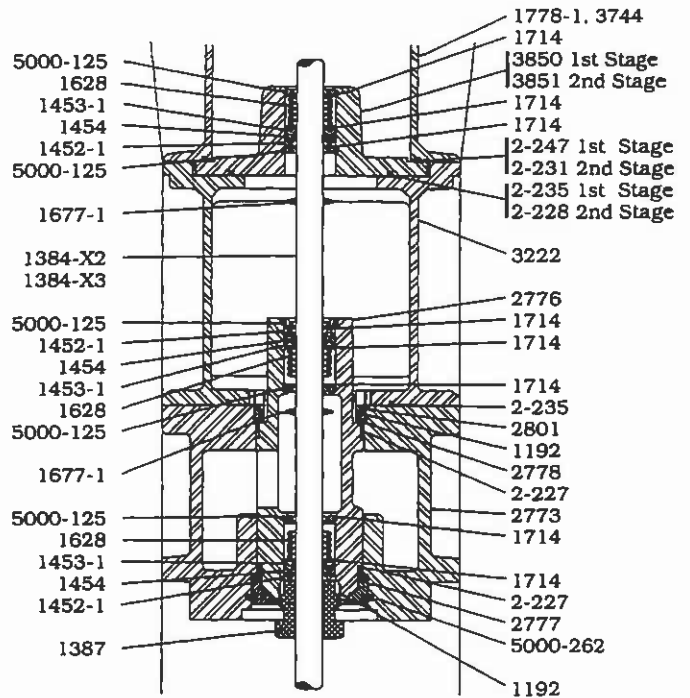
Use cone 4005 for installation of packing.

The quantity of 1454 Packing Rings required will vary due to tolerances.

For O-ring Material Coding See Page A500.

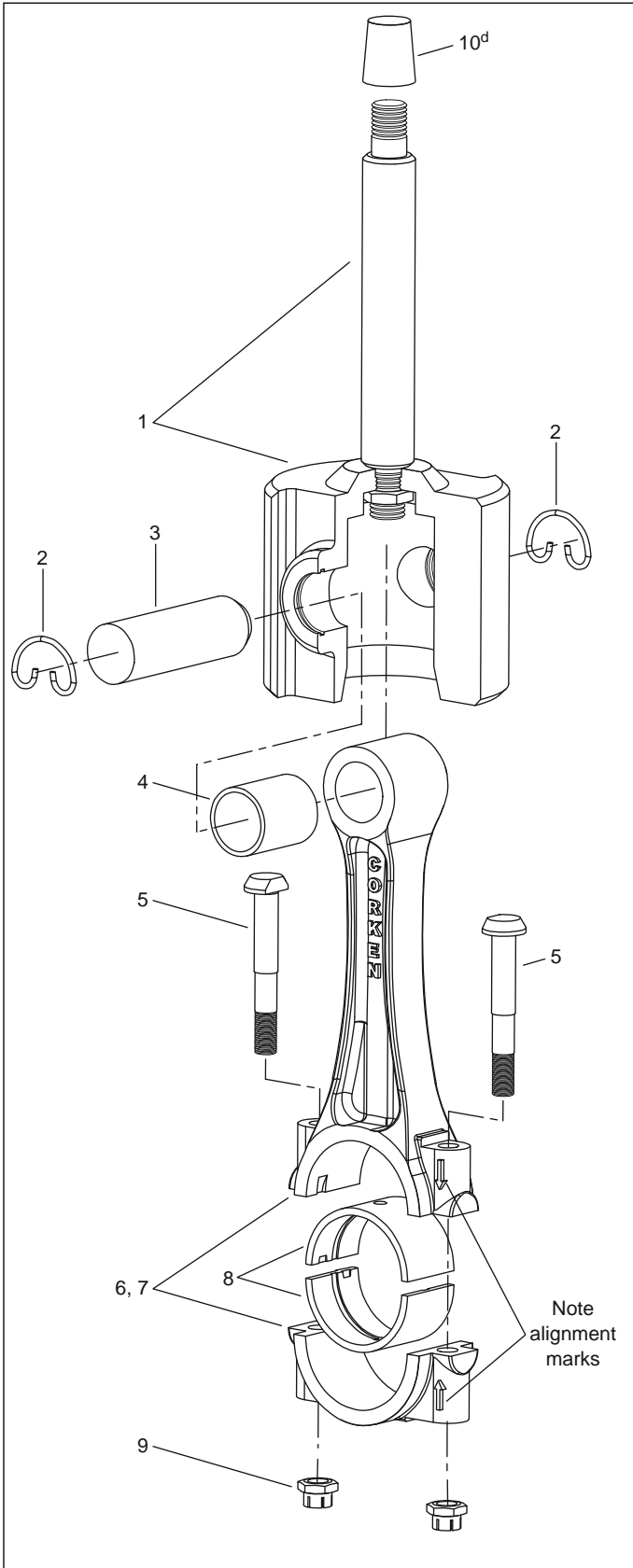
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

PACKING SPEC. H



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 ^{a,b}	Wrist pin bushing	2
5.	1492 ^b	Bolt	4
6.	1490-X	Connecting rod assembly	2
7.	1490 ^b	Connecting rod	2
8.	1491 ^b	Connecting rod bearing	2
9.	1493 ^{b,c}	Nut	4
10.	4005 ^d	Packing cone—1st stage (351 only)	1
		Packing cone—1st and 2nd stage (391 only)	1
	5268 ^d	Packing cone—2nd stage (351 only)	1

^aMust be rebores after replacing (0.8754/0.8751 dia.)

^bIncluded with connecting rod assembly

^cTorque connecting rod nut to value shown in Appendix B.

^dOnly used when installing the packing cartridge and packing on the piston rod.

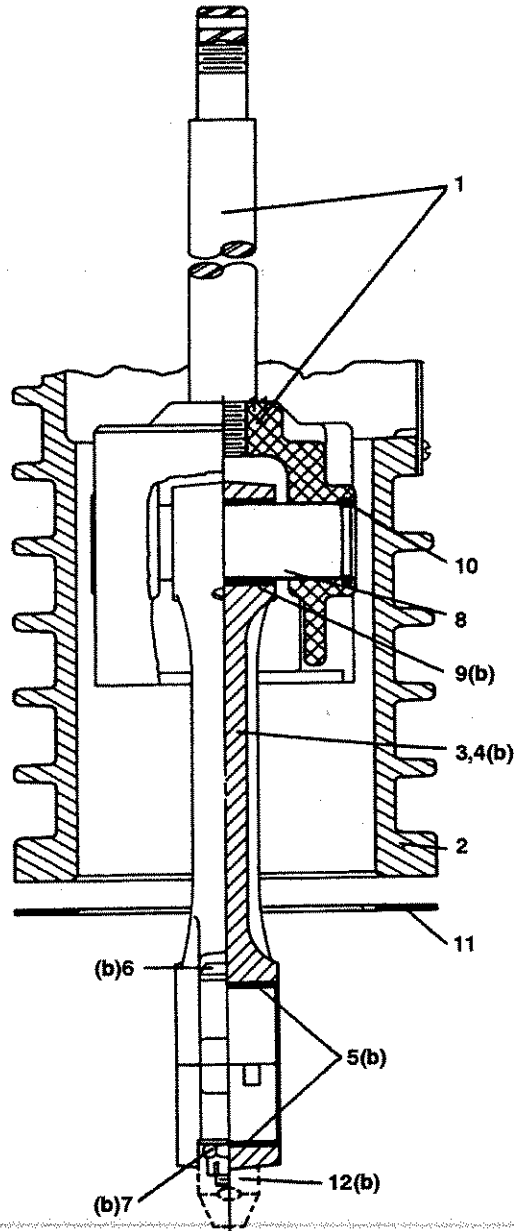
Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.



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

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

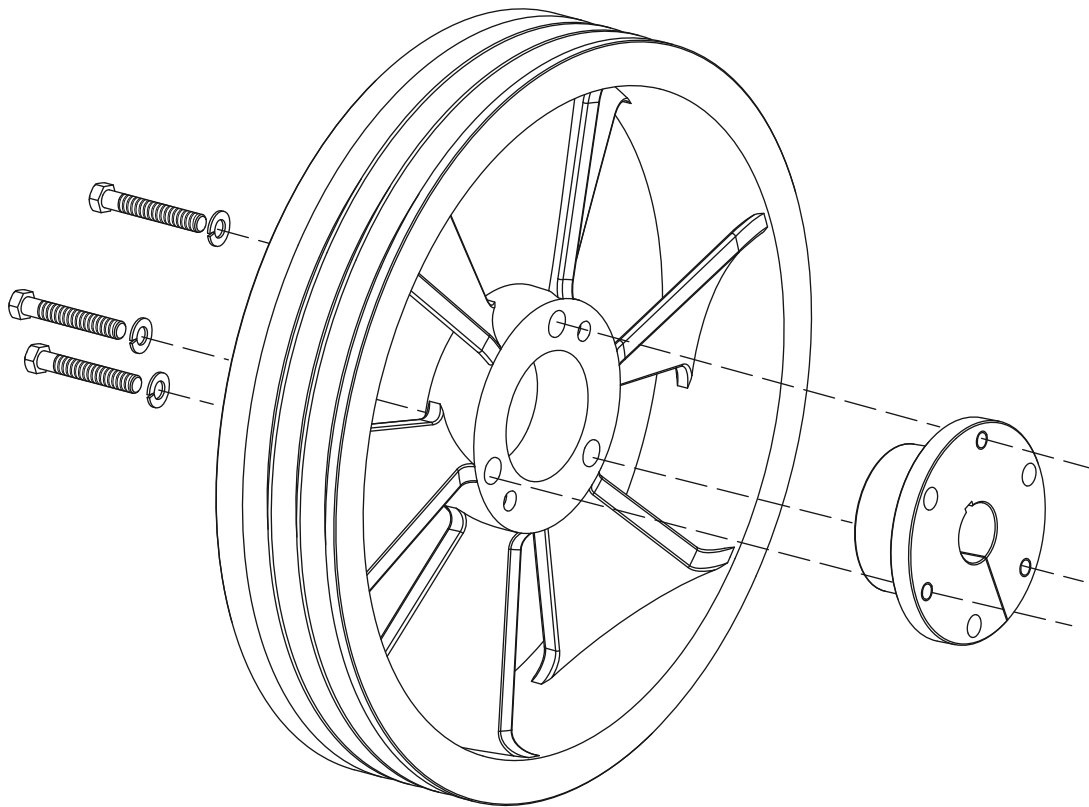
**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

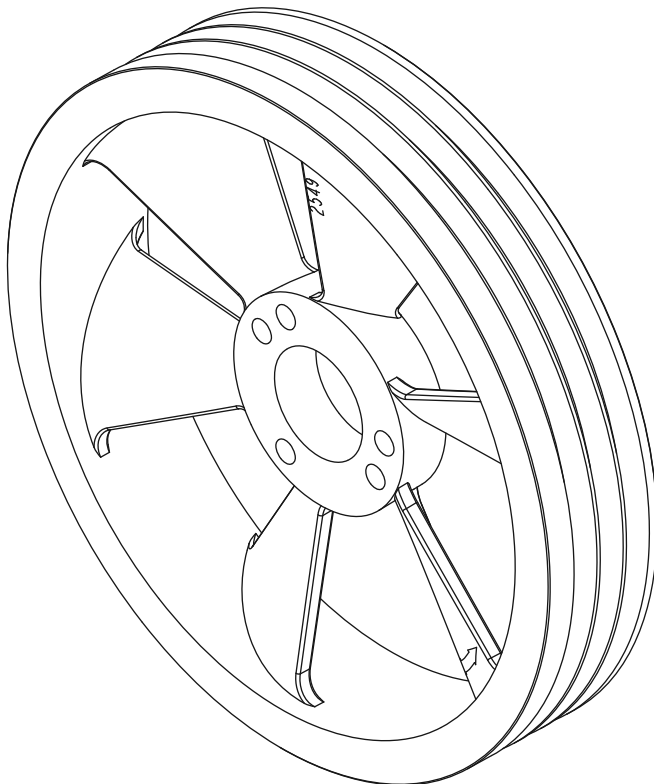
MODEL NUMBER	91	A91 D91	T91	181	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	SPEC. K,P ONLY	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	SPEC. M ONLY	590 W590 W690 691	D791 D8091
NO.	DESCRIPTION																		
1.	CROSSHEAD ASSEMBLY	1132-X2	1132-X3 1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 (h) 1132-X7 1132-X9 (i) 1132-X10 (j)(k)	1132-X2 (l)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1394-X 2765(h) 1366(i)	1384-X1 1384-X4 (f)	1394-X2 1394-X3 (f)	1717-X 1716-X	SPEC. M ONLY	3544-X4 2405-X	1717-X1 1716-X	SPEC. M ONLY	3544-X5 2405-X	3544-X3
2.	CROSSHEAD GUIDE	2240	4940-X	4383	4383	4383-X	4393	4383-X	4383-X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	2405-1
3.	CONN. ROD ASSY.	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1490-X	1490-X	1490-X	1720-X	1720-X	1720-X	1720-X	1720-X	1720-X	3785-X
4.	CONNECTING ROD	1889-1	1889-1	1889	1889	1889	1889	1889	1889	1490	1490	1490	1720	1720	1720	1720	1720	1720	3785
5.	CONN. ROD BEARING	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1719	1719	1719	1719	1719	1719	3542
6.	BOLT	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1726	1726	1726	1726	1726	1726	1726
7.	NUT	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1493(d)	1493(d)	1493(d)	1727(e)	1727(e)	1727(e)	1727(e)	1727(e)	1727(e)	1727(e)
8.	WRIST PIN	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1718	1718	1718	1718	1718	1718	3540
9.	WRIST PIN BUSHING	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	3541-X(k)
10.	RETAINER RING	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	3590
11.	CRANKCASE GASKET	2526	2526	2702	2702	2702	2702	2702	2702	1489	1489	1489	1761	1761	1761	1761	1761	1761	1761
12.	DIPPER	2011	2011	2011	2011	2011	2011	2011	2011	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

NOTES:
 (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.
 (d) Torque Connecting Rod Nut to 30 ft. lbs.
 (e) Torque Connecting Rod Nut to 40 ft. lbs.
 (f) Optional Chrome Oxide Piston Rods Only
 (g) Second Stage (Smaller Piston)
 (h) S/N XC30633 and Later
 (i) Prior to S/N XC30633
 (k) Must be rebored after replacing (1.1256/1.1252 Dia.)
 Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

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



Back Side



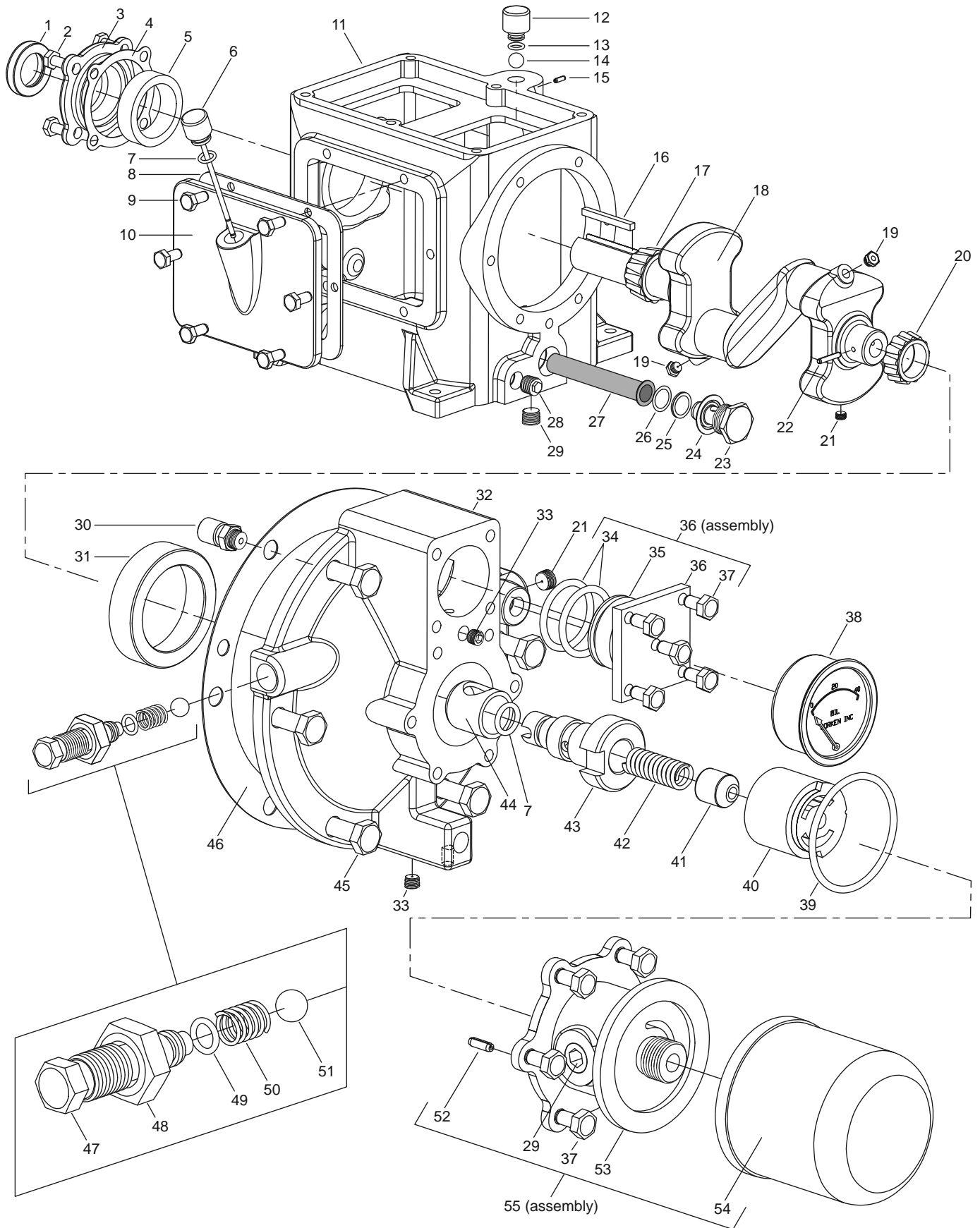
Front Side

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 ^b	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 ^a	Crankcase
12.	1279	Breather cap
	1279-X	Breather cap assembly (includes part numbers 1279, 2-111A)
13.	2-111A ^b	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 ^b	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 ^b	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 ^b	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 ^b	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

^aCrankcase capacity: 3 quarts (2.8 liters)

^bSee O-ring chart above for details.



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

PISTON ASSEMBLIES
MODEL 91 - 691

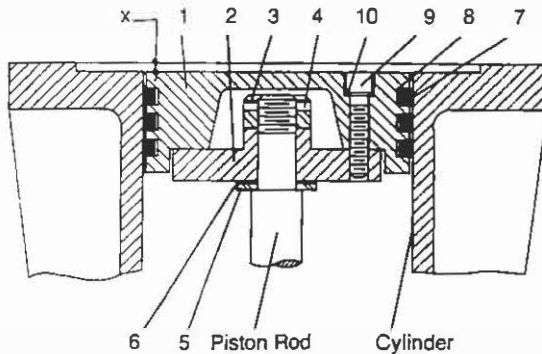
SERVICE
PAGE

MANUAL
E200L

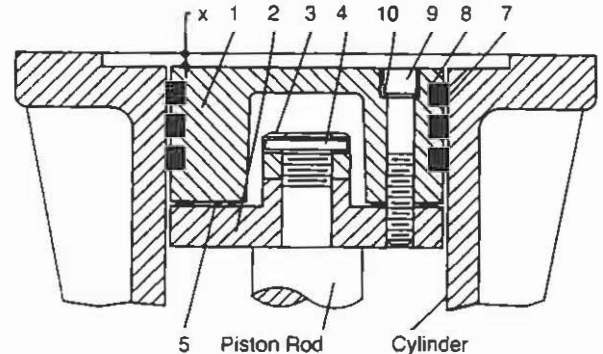
MAY
SUPERSEDES

1997
E200K

MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



TWO-STAGE		ALL MODELS 190/191				ALL MODELS 390/391				ALL MODELS 590/591			
Piston Assembly No		1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter		3" (7.62 cm)		1 3/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 1/4" (8.26 cm)	
Ref No	Part Name	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston
1	Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2	Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3	Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4	Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5	Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6	Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1378	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7	Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8	Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9	Screw, Soc. Hd.	7002-010 OC100A	4	7002-008 NC125A	4	7002-025 OC125A	8	7002-008 NC125A	6	7002-025 OC175A	8	7002-025 OC175A	4
10	Lock Washer	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4

SINGLE STAGE		ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
Piston Assembly No.		1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter		3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4 5/8" (11.43 cm)		4" (10.16 cm)	
Ref. No.	Part Name	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston	Part No	Qty./Piston
1.	Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2.	Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3.	Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4.	Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5.	Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6.	Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7.	Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8.	Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9.	Screw, Soc Hd.	7002-010 OC100A	4	7002-025 OC125A	8	7002-010 OC100A	4	7002-025 OC125A	8	7002-025 OC125A	8
10.	Lock Washer	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8

PISTON CLEARANCE (COLD)

MODEL	X" INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

NOTES:

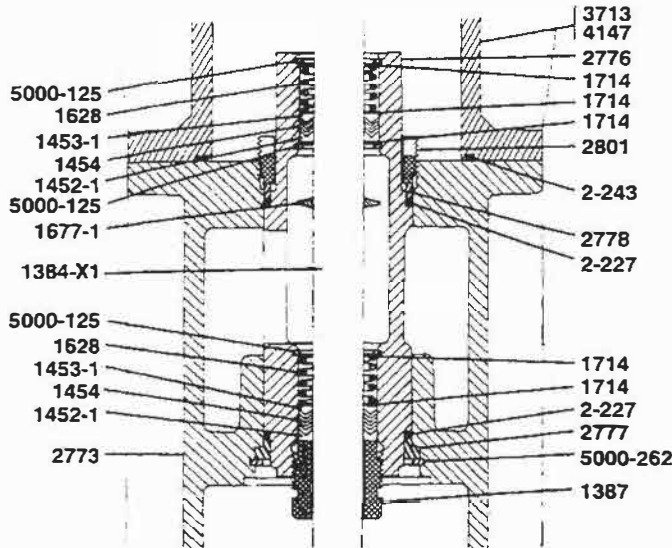
- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

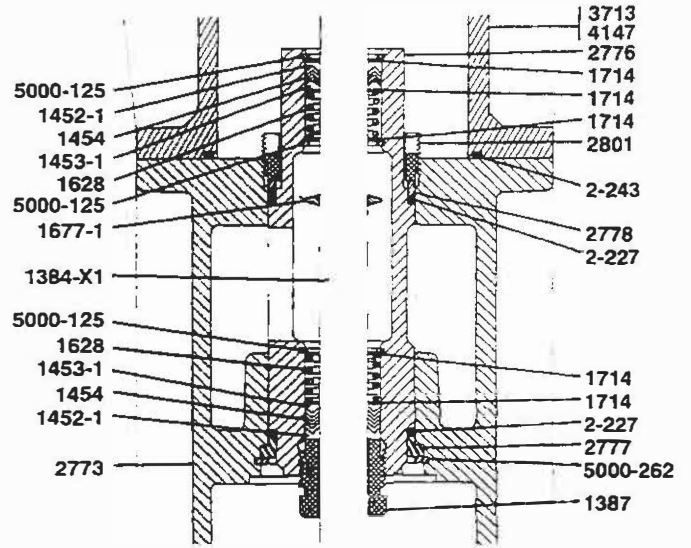
DISTANCE PIECE DETAILS
 MODELS D491, D491-3 COMPRESSORS
 ALL SPECIFICATIONS
 SERIAL NO. FZ44188 AND LATER

SERVICE	MANUAL
PAGE	E276G
JULY	1997
SUPERSEDES	E276F

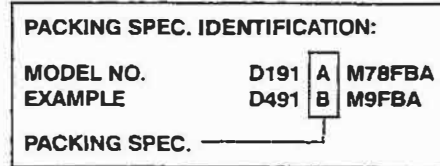
PACKING SPEC. A



PACKING SPEC. B



PART NO.	PART NAME
1387	ADJUSTMENT SCREW
1452-1	FEMALE PACKING RING
1453-1	MALE PACKING RING
1454	PACKING RING
1628	PACKING SPRING
1677-1	OIL DEFLECTOR RING
1714	PACKING BOX WASHER
2773	CROSSHEAD GUIDE
2776	PACKING BOX CARTRIDGE
2777	CARTRIDGE PLATE
2778	SPACER
2801	CARTRIDGE HOLDDOWN SCREW
3713	CYLINDER (D491 ONLY)
4147	CYLINDER (D491-3 ONLY)
5000-125	RETAINER RING
5000-262	RETAINER RING
2-227	O-RING
2-243	O-RING



THE QUANTITY OF 1454 PACKING RINGS REQUIRED WILL VARY DUE TO TOLERANCES.

FOR O-RING MATERIAL CODING SEE PAGE A500.

SEE PAGE E270 FOR DESCRIPTION AND APPLICATION OF DISTANCE PIECE ARRANGEMENTS.

NOTE:
 MODELS BUILT WITH COATING OPTION MC1002 USE SOME COATED PARTS. COATED PARTS MUST BE SPECIFIED WITH A "C" AT THE END OF THE PART NUMBER (EXAMPLE 3713C).

ASSEMBLY NUMBER	ASSEMBLY NAME
1384-X1	CROSSHEAD-PISTON ROD ASSEMBLY
1384-X4	CROSSHEAD-PISTON ROD ASSEMBLY (CHROME OXIDE - OPTIONAL)
1452-1X3	PACKING SET WITH 1452-1, 1453-1, 1454 (6) 1628, 1714
1452-2X3	PACKING SET - ALLOY 50 (OPTIONAL)
1452-1X6	PACKING SET - W/K-RING SPACERS (OPT.)
1452-2X6	PACKING SET ALLOY W/K-RING (OPT.)
2773-X	CROSSHEAD GUIDE ASSEMBLY WITH 2773, 2777 (2), 5000-262 (2)

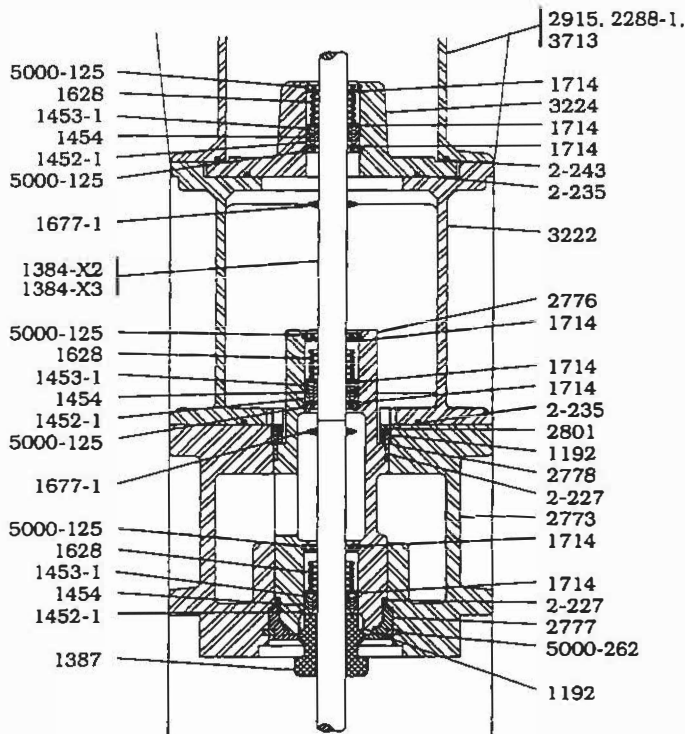
CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT BEFORE ATTEMPTING ANY REPAIRS.

DISTANCE PIECE DETAILS
MODELS T490-3 AND T491 COMPRESSORS

SERVICE PAGE	MANUAL E290E
FEBRUARY 1993	1993 E290D
SUPERSEDES	

ALL SPECIFICATIONS

PACKING SPEC. G



PART NO.	PART NAME
1192	Locking Device TFE 1/8" Dia. x 1/4" Long
1387	Adjustment Screw
1452-1	Female Packing Ring
1453-1	Male Packing Ring
1454	Packing Ring
1628	Packing Spring
1677-1	Oil Deflector Ring
1714	Packing Box Washer
2288-1	Cylinder (T490-3 Only)
2773	Crosshead Guide
2776	Packing Box Cartridge
2777	Cartridge Plate
2778	Spacer
2801	Cartridge Holddown Screw
2915	Cylinder (T491 Only Prior to S/N FZ44188)
3222	Distance Piece
3224	Adapter Plate
3713	Cylinder (T491 S/N FZ44188 and Later)
5000-125	Retainer Ring
5000-262	Retainer Ring
2-227	O-ring
2-235	O-ring
2-243	O-ring

ASSEMBLY NO.	ASSEMBLY NAME
1384-X2	Crosshead-Piston Rod Assembly (Chrome Piston Rods)
1384-X3	Crosshead-Piston Rod Assembly (Chrome Oxide Piston Rods)
1452-1X3	Packing Set with 1452-1, 1453-1, 1454(5), 1628, 1714
2773-X	Crosshead Guide Assembly with 2773, 2777, 5000-262

***Optional Chrome Oxide Piston Rods only:**

New Crosshead Assemblies with Chrome Oxide Piston Rods installed in the field require a break-in period of approximately 10 hours. After this break-in, it is usually necessary to replace all of the packing.

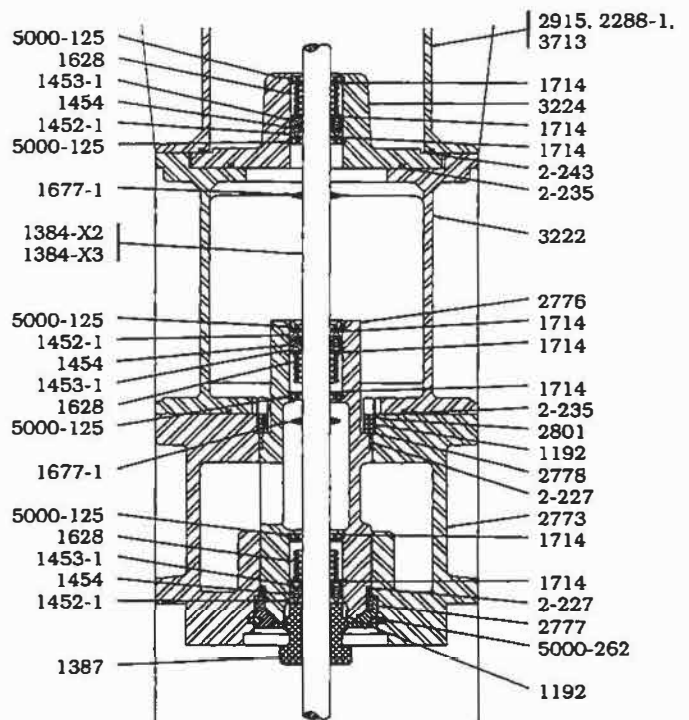
Use cone 4005 for installation of packing.

The quantity of 1454 Packing Rings required will vary due to tolerances.

For O-ring Material Coding See Page A500.

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

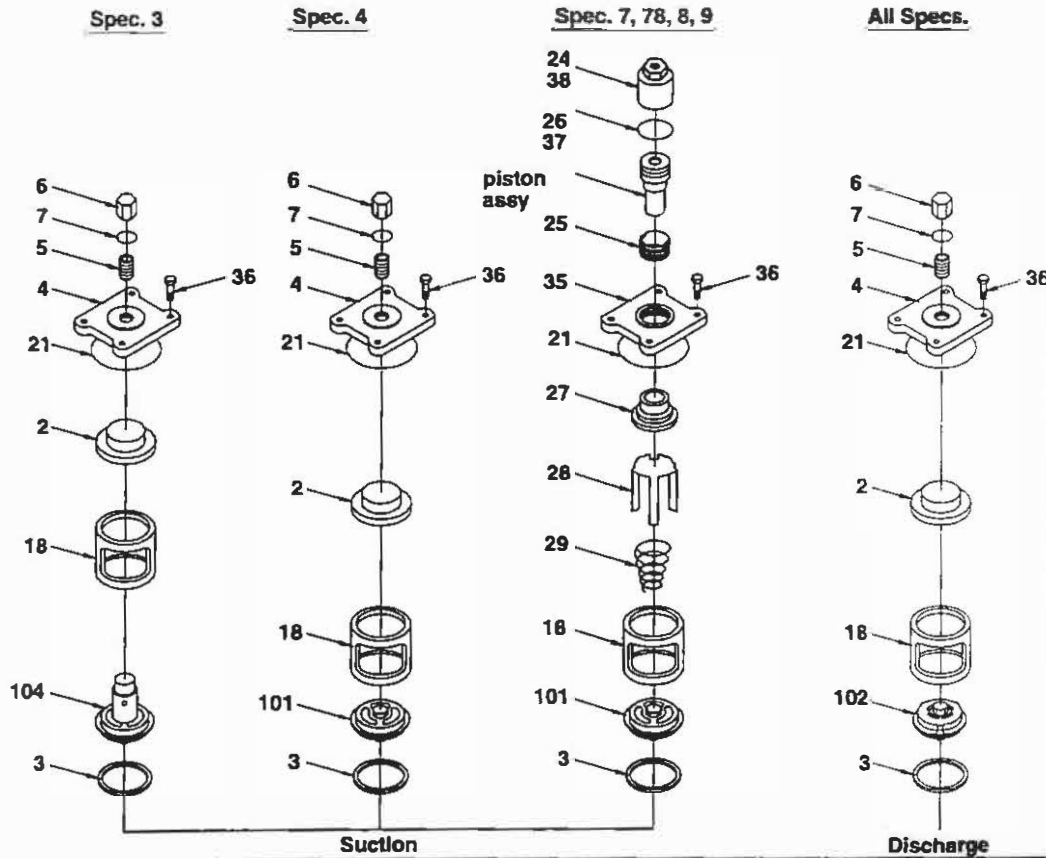
PACKING SPEC. H



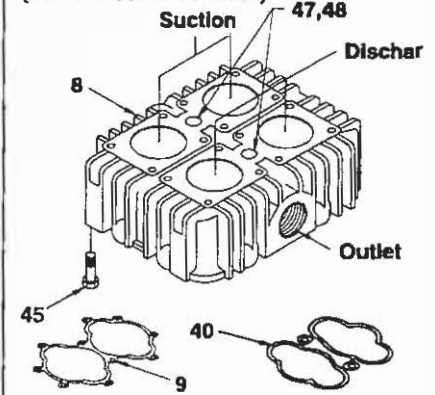
HEAD ASSEMBLY DETAILS
MODEL 490, 491, ALL CONFIGURATIONS
SERIAL NO. VK28082 AND LATER, SPEC 4, 7, 78, 8, 9
SERIAL NO. YC32239 AND LATER, SPEC 3

SERVICE MANUAL
PAGE E322F

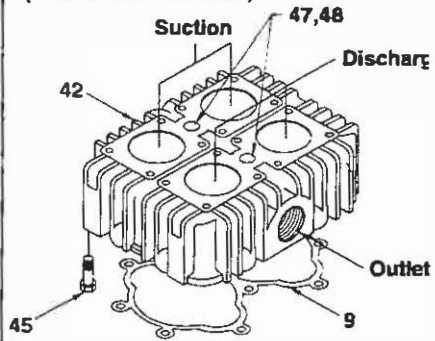
MAY 1996
SUPERSEDES E322E



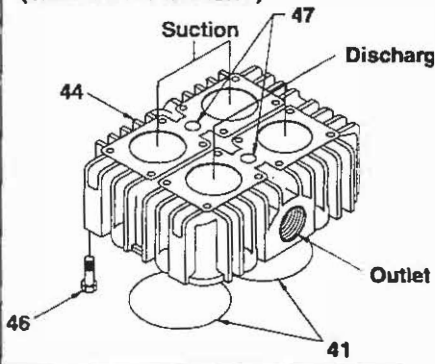
Model: 490, A490, D490, D490-3, T490-3
(S/N VK28082 and later.)



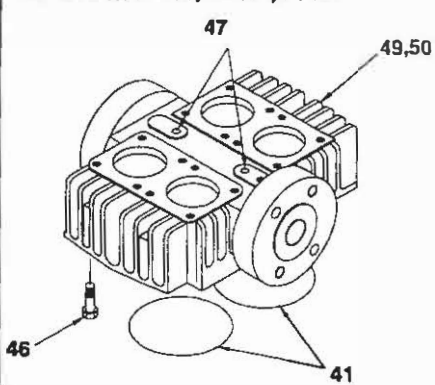
Model: 491, D491, T491.
(Prior to S/N FZ44188.)



Model: 491, D491, T491.
(S/N FZ44188 and later.)

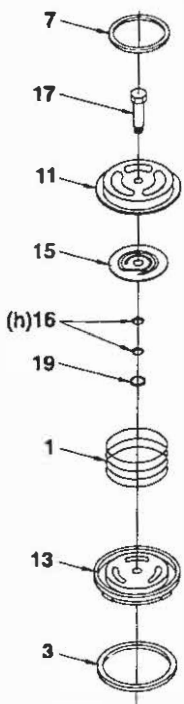


All models: F491, FD491, FT491

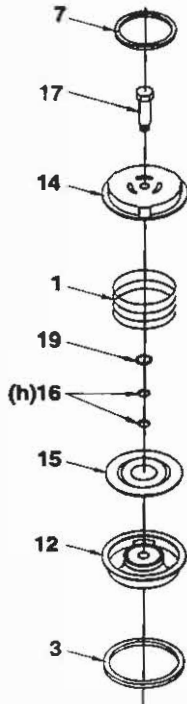


VALVE ASSEMBLY DETAILS

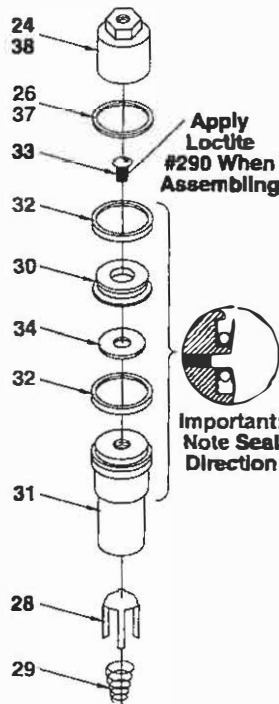
101 Suction Valve Assembly
Spec. 4, 7, 78, 8, 9.



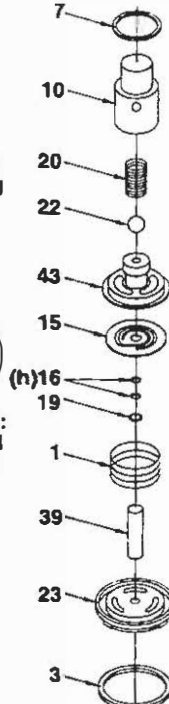
102 Discharge Valve Assembly
All Specs.



103 Unloader Valve Assembly
Spec. 7, 78, 8, 9



104 Suction Valve Assembly
Spec. 3.



HEAD ASSEMBLY DETAILS
MODEL 490, 491, A490, D490, D490-3, D491, T490-3, T491
COMPRESSORS
SERIAL NO. VK28082 AND LATER, SPEC 4, 7, 78, 8, 9
SERIAL NO. YC32239 AND LATER, SPEC 3

REF NO.	PART NO.	DESCRIPTION	REF NO.	ASSEMBLY NO.	DESCRIPTION
1.	1407	Valve Spring	101.	2438-X	Suction Valve Assy with
2.	1409	Valve Spacer			1, 3, 7, 11, 13, 15, 16(2), 17, 19
3.	1418	Valve Gasket, Aluminum	(a)	2438-X1	Same as 2438-X but with Copper
(a)	1418-1	Valve Gasket, Copper			Gaskets
(a)	1418-2	Valve Gasket, Iron	(a)	2438-X2	Same as 2438-X but with Iron-Lead
4.	1475	Valve Cover Plate			Gaskets
5.	1476	Valve Holddown Screw	102.	2439-X	Discharge Valve Assy with
6.	1477	Valve Screw Nut			1, 3, 7, 12, 14, 15, 16(2), 17, 19
7.	1478	Gasket, Steel	(a)	2439-X1	Same as 2439-X but with Copper
(a)	1478-1	Gasket, Copper			Gaskets
8.	1394	Head (490, D490, D490-3 Only)	(a)	2439-X2	Same as 2439-X but with Iron-Lead
(c)	9.	Head Gasket (490, 491, A490, D490, D491, T491)			Gaskets
10.	2533-1	Adjusting Screw	103.	2618-X	Unloader Assy with 24, 26, 28, 29, 30,
11.	2438	Suction Valve Seat			31, 32(2), 33, 34
12.	2439	Discharge Valve Seal	104.	2532-1X	Suction Valve Assy with 1, 3, 7, 10, 15,
13.	2440	Suction Valve Bumper			16, 19, 20, 22, 23, 39
14.	2441	Discharge Valve Bumper		2532-1X1	Same as 2532-1X but with Copper
15.	2442	Valve Plate		2532-1X2	Same as 2532-1X but with Iron-Lead
(h)	16.	Spacer (2 Per Valve)			
17.	2446	Bolt			
18.	2448	Cage			
19.	3355	Washer			
20.	1411	Relief Ball Spring			
(b)	21.	2-143 O-ring, Cover Plate			
22.	1410	Relief Ball			
23.	2447	Suction Valve Bumper			
(d)	24.	2598 Unloader Cap			
25.	2715	Holddown Screw			
(d)	26.	2716 Valve Cap Gasket, Aluminum			
		2716-1 Valve Cap Gasket, Copper			
		2716-2 Valve Cap Gasket, Iron-Lead			
27.	2207	Valve Spacer			
28.	2449	Unloader Actuator			
29.	2450	Unloader Spring			
30.	2857	Piston Cap			
31.	2618	Unloader Piston			
32.	2619-X	Piston Seal Assembly			
33.	1910	Bolt			
34.	2858	Gasket			
35.	2205	Valve Cover Plate			
36.	7001-043NC125A	Bolt, 7/16-14 x 1 1/4" Hex Head			
(b,e)	37.	2-031 O-ring, Unloader Cap			
(e)	38.	2598-1 Unloader Cap			
39.	2534-1	Suction Valve Post			
(c)	40.	2345 Head Gasket (D490-3, T490-3 Only)			
(b, c, g)	41.	2-253 O-ring (491, D491, T491 Only)			
(f)	42.	2914 Head, Ductile Iron (491, D491, T491 Only)			
43.	2532-1	Suction Valve Seat			
(g)	44.	3712 Head Ductile Iron (491, D491, T491 Only)			
(c)	45.	7005-043NC125A Bolt, 7/16-14 x 1 1/4" Ferry Head			
(c, g)	46.	7005-043NC150A Bolt, 7/16-14 x 1 1/2" Ferry Head (491, D491, T491)			
(c)	47.	1479 Center Head Bolt			
(c)	48.	1480 Center Head Bolt Gasket, Steel			
(a, c)	49.	1480-1 Center Heat Bolt Gasket, Copper			
		4297 Head ANSI Flanged (F491, FD491, FT491)			
50.	4297-1	Head Flanged - Din Spec. Only (F492, FD492, FT492)			

IDENTIFICATION OF VALVE UNLOADER SPEC.

EXAMPLE: MODEL 490M 4 FBA
A490M 78 FBA
D490AM 9 FBA

VALVE UNLOADER SPEC. _____

HEAD ASSY NO.	MODELS	VALVE SPEC.
1394-X8	490, A490, D490, D490-3, T490-3	4
1394-X9	490, A490, D490, D490-3, T490-3	7, 78, 8, 9
1394-X10	490, D490, D490-3, T490-3	3
(f) 2914-X2	491, D491, T491	4
(f) 2914-X3	491, D491, T491	7, 78, 8, 9
(f) 2914-X4	491, D491, T491	3
(g)3712-X1	491, D491, T491	3
(g)3712-X2	491, D491, T491	4
(g)3712-X3	491, D491, T491	7, 78, 8, 9
(j) 4297-X1		3
(j) 4297-X2		4
(j) 4297-X3		7, 8, 9
4297-1X1		3
4297-1X2		4
4297-1X3		7, 8, 9

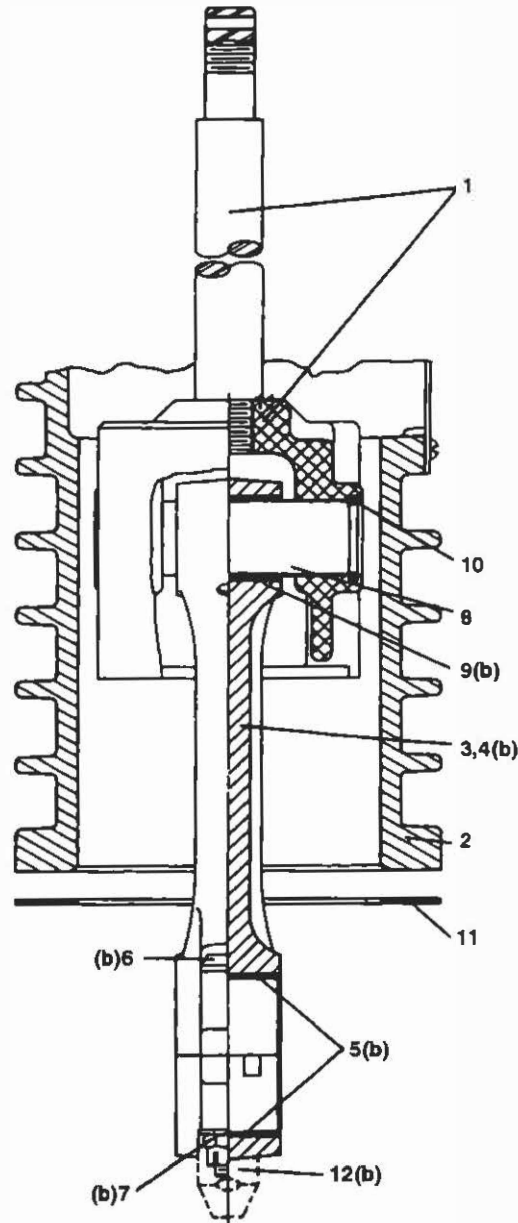
NOTES:

- (a) Optional equipment
- (b) For O-ring material coding see page A500.
- (c) Not included in Head Assembly.
- (d) Prior to S/N FU43504 Unloader Cap.
- (e) S/N FU43504 and later. Valve Cap 2714 (with 2716) is interchangeable with Valve Cap 2714-1 ([with 2-031]).
- (f) Prior to S/N FZ44188.
- (g) S/N FZ44188 and later.
- (h) Place Spacers back to back as shown.
- (j) Flanged models only.

CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT BEFORE ATTEMPTING ANY REPAIRS.

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

MODEL NUMBER	91	A91 D91	T91	191	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	D791 D8091	
													SPEC. K,P ONLY	SPEC. K,P ONLY	SPEC. M ONLY	SPEC. M ONLY		
NO.	DESCRIPTION																	
1.	CROSSHEAD ASSEMBLY	1132-X2	1132-X3	1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 (g) 1132-X7 1132-X9 (f) 1132-X10 (f)(g)	1132-X2 (f)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1384-X	1384-X1 1384-X4 (f)	1384-X2 1384-X3 (f)	1717-X	1717-X1	3544-X5	3544-X4	3544-X3
2.	CROSSHEAD GUIDE	2240	2240	4940-X	4393	4383	4383-X	4393	4383-X	4383-X	2765(h) 1366(f)	2773-X	2773-X	1716-X	2405-X	1716-X	2405-X	2405-1
3.	CONN. ROD ASSY.	1889-1X	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1490-X	1490-X	1490-X	1720-X	1720-X	3785-X1	3785-X1	3785-X
4.	CONNECTING ROD	1889-1	1889-1	1889-1	1889	1889	1889	1889	1889	1889	1490	1490	1490	1720	1720	3785	3785	3785
5.	CONN. ROD BEARING	1367	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1719	1719	3542	3542	3542
6.	BOLT	1599	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1726	1726	1726	1726	1726
7.	NUT	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600	1600(c)	1600(c)	1600	1493(d)	1493(d)	1493(d)	1727(e)	1727(e)	1727(e)	1727(e)	1727(e)
8.	WRIST PIN	2505	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1718	1718	3540	3540	3540
9.	WRIST PIN BUSHING	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	3541-X(k)	3541-X(k)	3541-X(k)
10.	RETAINER RING	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	3590	3590	3590
11.	CRANKCASE GASKET	2526	2526	2526	2702	2702	2702	2702	2702	2702	1489	1489	1489	1761	1761	1761	1761	1761
12.	DIPPER	2011	2011	2011	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

NOTES:

- (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.
- (d) Torque Connecting Rod Nut to 30 ft.lbs.
- (e) Torque Connecting Rod Nut to 40 ft.lbs.
- (f) Optional Chrome Oxide Piston Rods Only

- (g) Second Stage (Smaller Piston)
- (h) S/N XC30633 and Later
- (j) Prior to S/N XC30633
- (k) Must be rebored after replacing (1.1256/1.1252 Dia.)

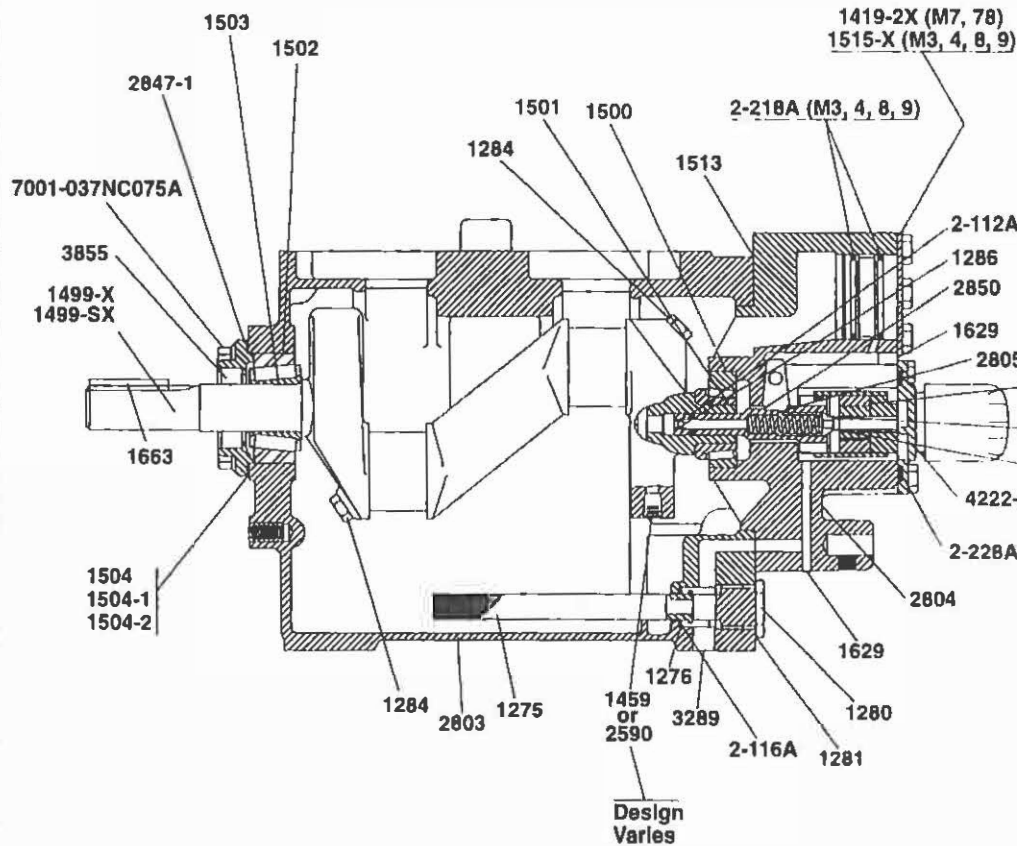
Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

IDENTIFICATION OF CRANKCASE SPEC.:

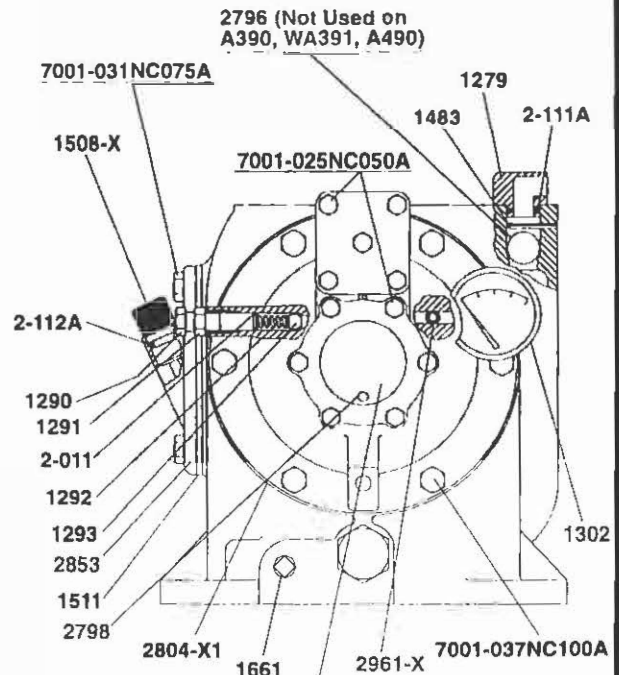
Example: Model No. A390 M 4FBA
 491 M 78FBAB
 D491 M 9FBA

Crankcase Spec. _____

CRANKCASE ASSEMBLY NO. 2803-X; M3, 4, 8, 9
 CRANKCASE ASSEMBLY NO. 2803-X1; M7, 78



2549-X1 FLYWHEEL ASSEMBLY NOT SHOWN
 OPT. FLYWHEEL ASSEMBLY 3271-X NOT SHOWN.



2848-X USED ON ALL COMPRESSORS WITHOUT OIL FILTER ASSEMBLY

CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT BEFORE ATTEMPTING ANY REPAIRS.

CRANKCASE DETAILS
 MODELS 390, W391, A390, WA391, D390, D391, T390, WD391, WT391, 490, 491, A491, D491, D490-3, D491, T490-3, T491 COMPRESSORS
 CRANKCASE SPEC.: M

SERVICE MANUAL
 PAGE E404-1G
 JULY 1996
 SUPERSEDES E404-1F

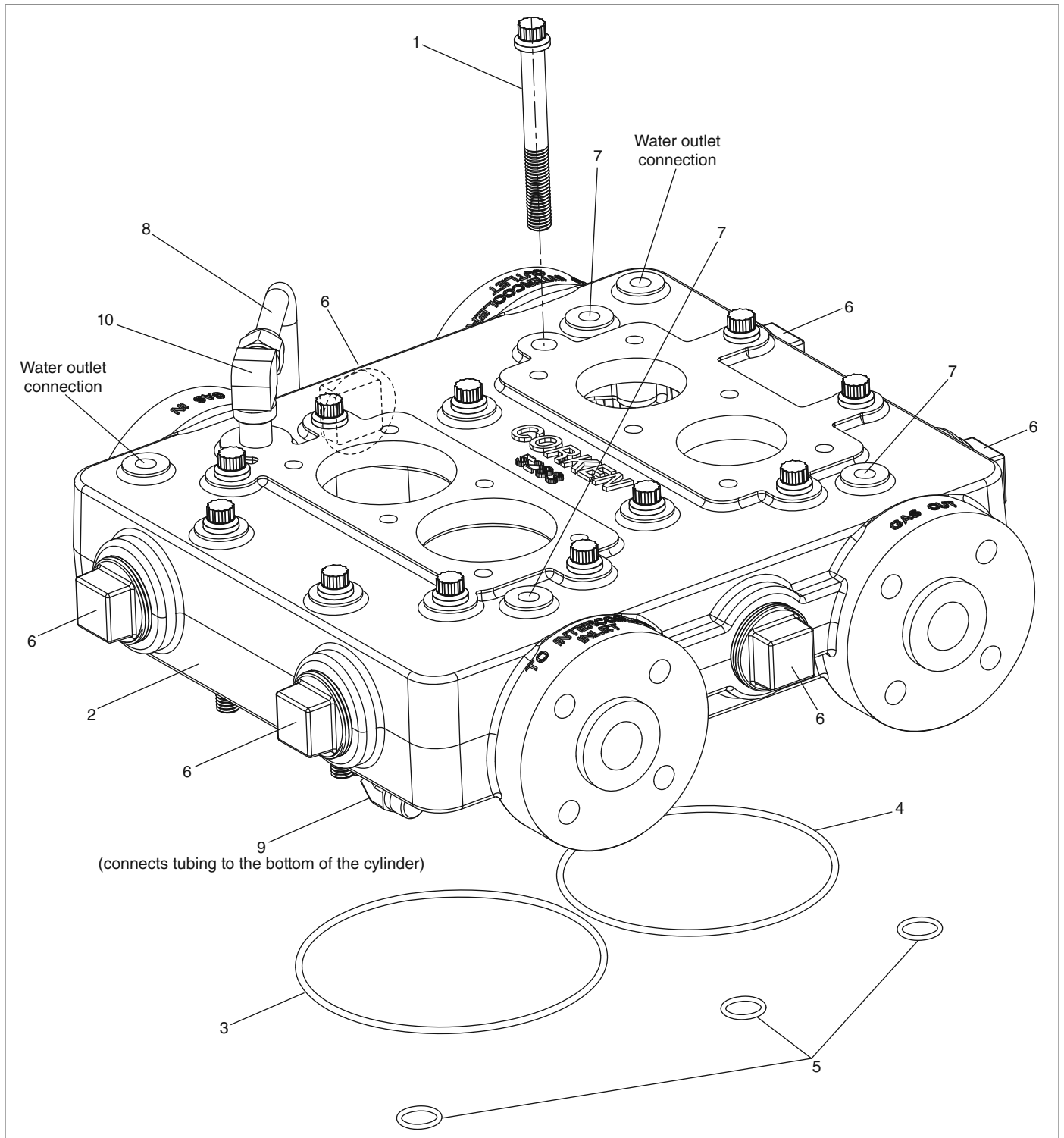
SERVICE MANUAL
PAGE E405-1G
JULY 1996
SUPERSEDES E405-1F

CRANKCASE DETAILS
MODELS 390, W391, A390, WA391, D390, T390, WD391, WT391, 490,
491, A490, D490, D490-3, D491, T490-3, T491 COMPRESSORS
CRANKCASE SPEC.: M

PART NUMBER	PART NAME	PART NUMBER	PART NAME
1275	Oil Filter Screen	2-011A	O-Ring (Relief Valve Adjusting Screw)
1276	Filter Screen Washer	2-111A	O-Ring (Breather Cap)
1279	Breather Cap	2-112A	O-Ring (Oil Bayonet)
1280	Filter Screw	2-112A	O-Ring (Pump Shaft)
1281	Filter Screen Screw Gasket	2-116A	O-Ring (Filter Screen)
1284	Crankcase Orifice (2)	2-218A	O-Ring (Closure Body) (2) (Spec. 3, 4, 8, 9 Only)
1286	Pump Shaft Drive Pin	2-228A	O-Ring (Pump Cover)
1290	Relief Valve Adjusting Screw	7001-025	
1291	Adjusting Screw Locknut	NC050A	Hex Head Bolt 1/4-20 x 1/2
1292	Relief Valve Spring	7001-031	
1293	Relief Valve Ball	NC075A	Hex Head Bolt 5/16-18 x 3/4
1302	Oil Pressure Gauge	7001-037	
1459	Crankshaft Plug	NC075A	Hex Head Bolt 3/8-16 x 3/4
1483	Lock Pin	7001-037	
1499	Crankshaft	NC100A	Hex Head Bolt 3/8-16 x 1
* 1499-S	Extended Crankshaft		
1500	Bearing Cup		
1501	Bearing Cone		
1502	Bearing Cup		
1503	Bearing Cone		
1504	Bearing Adjustment Shim (0.005")		
1504-1	Bearing Adjustment Shim (0.007")		
1504-2	Bearing Adjustment Shim (0.020")		
1508-X	Oil Bayonet		
1511	Crankcase Inspection Plate Gasket		
1513	Bearing Carrier Gasket		
1629	1/16" NPT Pipe Plug, Flush Seal		
1661	Plug 3/8" NPT		
1663	Flywheel Key		
2549	Flywheel, 16" O.D. 3 Groove (Requires 3217 Flywheel Bushing for Mounting. See Assembly No. 2549-X) (Not Part of Crankcase Assembly) (Not Shown)		
2590	Pipe Plug		
2796	Breather Ball		
2798	Pump Cover Pin with 2848-X		
2803	Crankcase		
2804	Bearing Carrier		
2805	Pump Shaft Bushing		
2847-1	Bearing Cover		
2848-X	Pump Cover		
2849-X	Oil Pump Assembly (Individual Pump Parts Not Available)		
2850	Pump Shaft Adapter		
2851	Spring Guide		
2852	Oil Pump Spring		
2853	Crankcase Inspection Plate		
2961-X	Air Release Valve Assembly with 2961, 2962, 2963		
3217	Flywheel Bushing (Not Part of Crankcase Assembly) (Not Shown)		
* 3271	Flywheel, 14" O.D. 2 Groove (Requires 3217 Flywheel Bushing for Mounting. See Assembly No. 3271-X) (Not Part of Crankcase Assembly) (Not Shown)		
3855	Oil Seal		
4222-X	Oil Filter Assembly - External		
		ASSEMBLY	ASSEMBLY NAME
		1279-X	Breather Cap Assembly with 1279, 2-111A
		1419-2X1	Hydraulic Unloader Assembly (Up to 200 PSI) (Spec. 7, 78 Only)
		* 1419-2X2	Hydraulic Unloader Assembly (200 PSI and above) (Spec. 7, 78 Only)
		1499-X	Crankshaft Assembly with 1284 (2), 1286, 1499, 1501, 1503, 2590
		* 1499-SX	Extended Crankshaft Assembly with 1284 (2), 1286, 1499-S, 1501, 1503, 2590
		1508-X1	Oil Bayonet Assembly with 1508-X 2-112A
		1515-X	Closure Cap Assembly including 2-218A (2), (Spec. 3, 4, 8, 9 Only)
		2549-X	Flywheel Assembly with 2549, 3217 (Not Part of Crankcase Assembly) (Not Shown)
		2804-X1	Bearing Carrier Assembly with 1290, 1291, 1292, 1293, 1500, 1508-X1, 1513, 1515-X, 1629 (2), 2590, 2804, 2848-X, 2849-X, 2850, 2851, 2852, 2961-X, 2-011A, 2-112A, 2-228A
		2847-1X	Bearing Cover Assembly with 2847-1, 3855
		* 3271-X	Flywheel Assembly with 3271, 3217 (Not Part of Crankcase Assembly) (Not Shown)
		* Optional Equipment	Crankcase Capacity: 3 Quarts (2.8 Liters)

CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT BEFORE ATTEMPTING ANY REPAIRS.

Appendix E—Head Assembly Details for Model WFD551



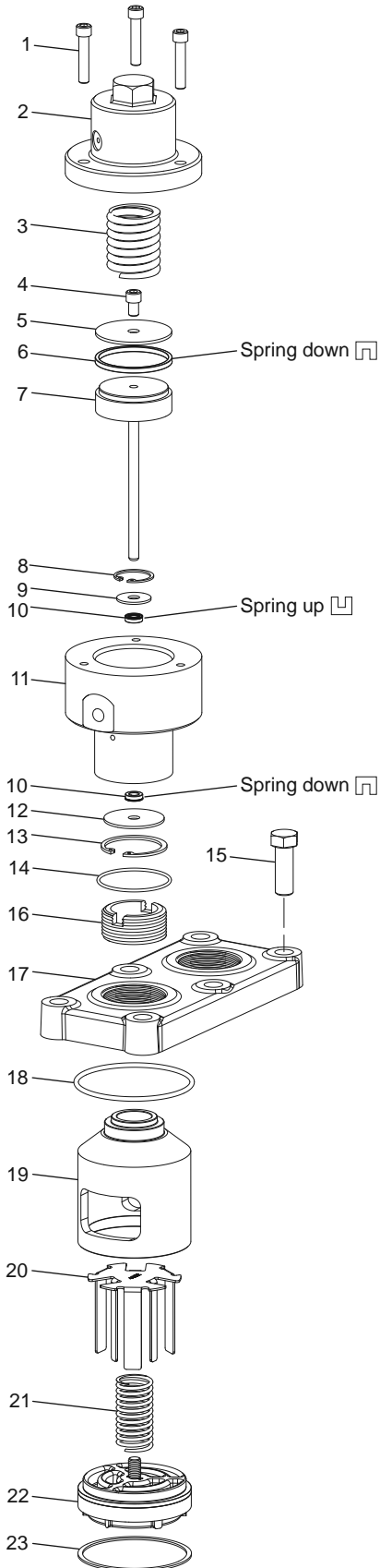
Head Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	2136	Center head bolt	1
2.	5283	Head	1
3.	2-259	O-ring—1st stage	1
4.	2-255	O-ring—2nd stage	1
5.	2-116	O-ring	3
6.	2825	Pipe plug (1-1/2" NPT)	6

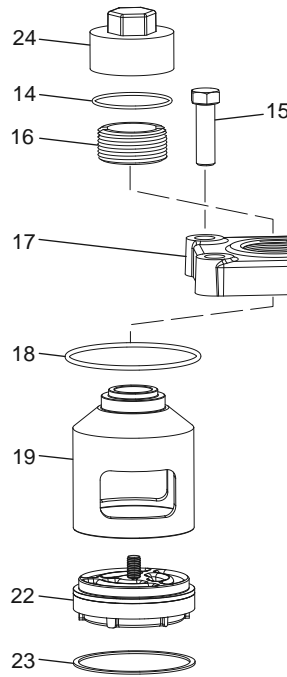
Ref No.	Part No.	Description	Qty.
7.	3442	Pipe plug (1/4" NPT) remove for pressure gauge connection	4
8.	2918	Tubing - 1/2 x .032 copper	1
9.	2267	Tube elbow 45 degree-1/2T x 3/8	1
10.	2268	Tube female elbow-1/2T x 3/8	1

Appendix E—1st Stage Valve Assembly Details for Model WFD551

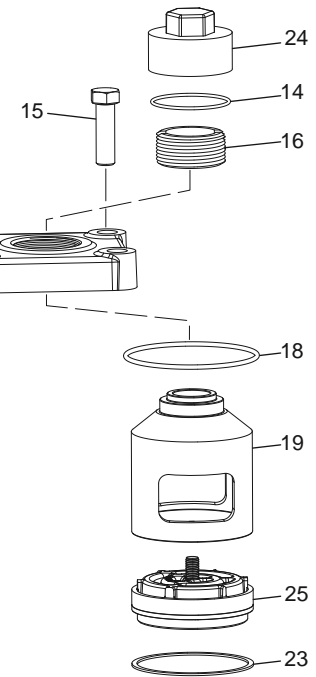
1st Stage Suction
(Specification 6P—Reverse Unloader)



1st Stage Suction
(Specification 4P—Standard)



1st Stage Discharge
(All Specifications)



Head and Valve Assembly Bill of Materials

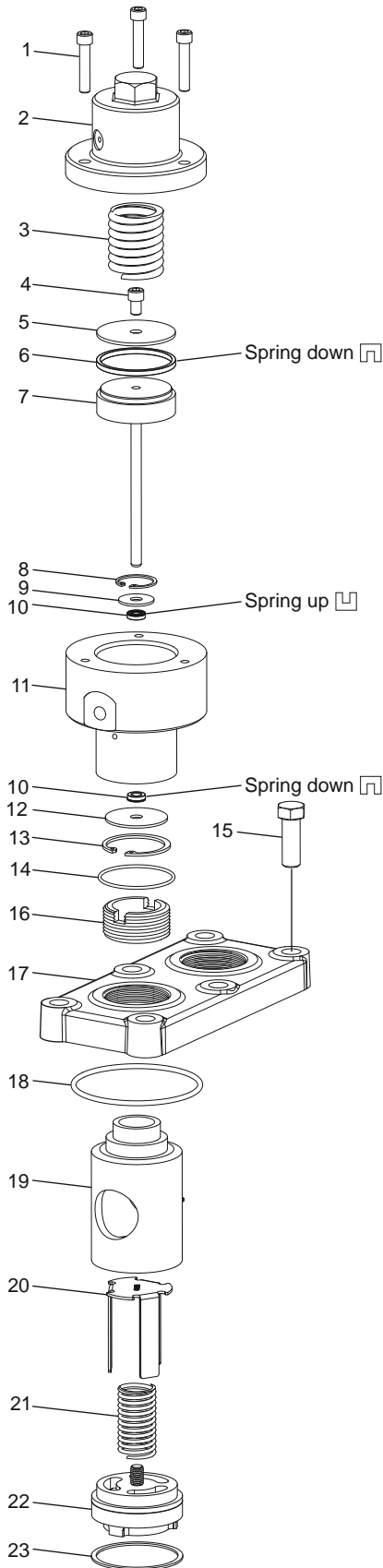
Ref No.	Part No.	Description	Qty.
1.	7002-025TP125A	Socket head 1/4"-20 x 1-1/4"	3
2.	5275	Unloader body cap (spec 6P)	1
3.	5277	Unloader spring (spec 6P)	1
4.	7002-025NC037A	Socket head 1/4"-20 x 3/8"	1
5.	5272	Unloader piston cap	1
6.	5279-X	Piston seal assembly	1
7.	5276	Unloader piston (spec 6P)	1
8.	5000-87SS	Retainer ring	1
9.	5280	Unloader washer	1
10.	5278-X	Piston seal assembly	2
11.	5345	Unloader body (spec 6P)	1
12.	5281	Unloader washer	1
13.	5000-150SS	Retainer ring	1
14.	2-031_a	O-ring	2
15.	7001-043NC125A	Hex head 7/16-14 x 1-1/4"	8
16.	2715	Valve hold-down screw	2
17.	1763	Cover plate	1
18.	2-151_a	O-ring	2
19.	2797	Valve cage	2
20.	4032	Unloader actuator (spec 6P)	1
21.	5284	Actuator spring (spec 6P)	1
22.	3856-3X2	Suction valve assembly	1
23.	2114-2	Valve gasket (iron-lead standard)	2
	2114-1	Valve gasket (copper optional)	2
	2114	Valve gasket (aluminum optional)	2
24.	2714-1	Valve cap (spec 4P and discharge)	2
25.	3857-2X2	Discharge valve assembly	1



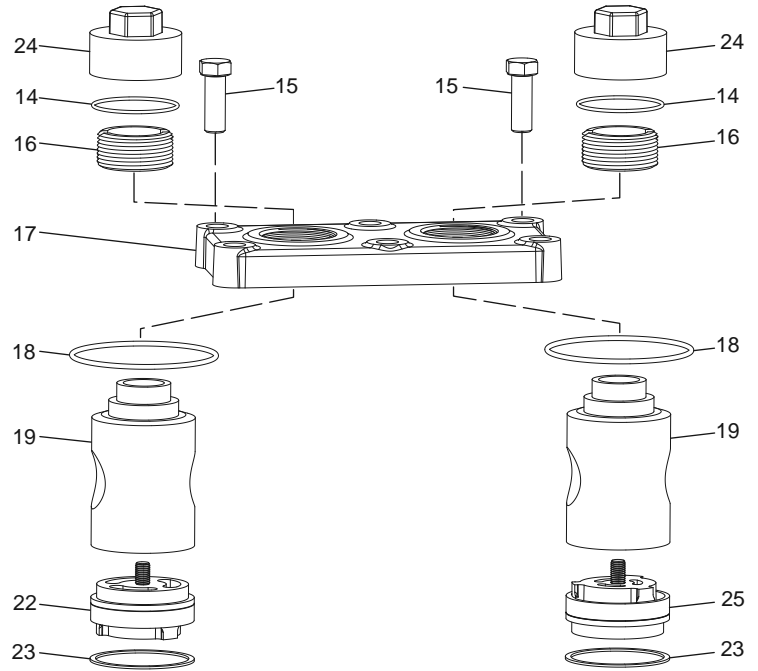
Always relieve pressure in the unit before attempting any repairs.

Appendix E—2nd Stage Valve Assembly Details for Model WFD551

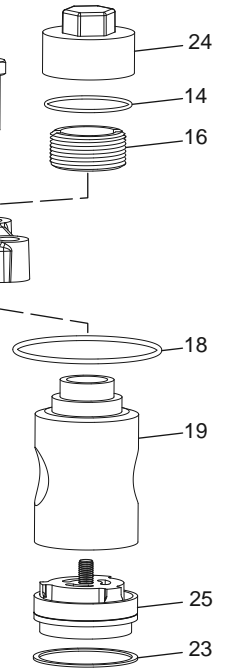
2nd Stage Suction
(Specification 6P—Reverse Unloader)



2nd Stage Suction
(Specification 4P—Standard)



2nd Stage Discharge
(All Specifications)



Head and Valve Assembly Bill of Materials

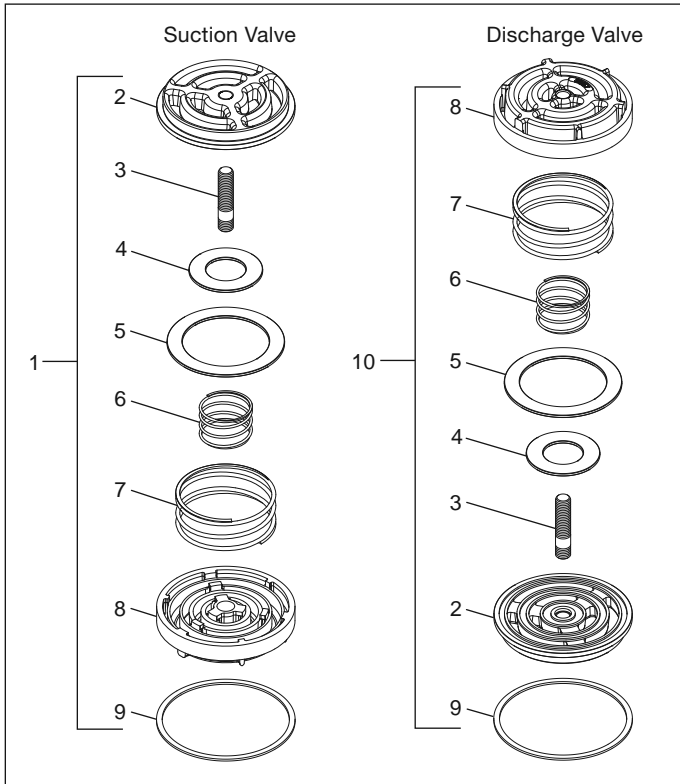
Ref No.	Part No.	Description	Qty.
1.	7002-025TP125A	Socket head 1/4"-20 x 1-1/4"	6
2.	5275	Unloader body cap (spec 6P)	2
3.	5277	Unloader spring (spec 6P)	2
4.	7002-025NC037A	Socket head 1/4"-20 x 3/8"	1
5.	5272	Unloader piston cap	1
6.	5279-X	Piston seal assembly	1
7.	5276	Unloader piston (spec 6P)	1
8.	5000-87SS	Retainer ring	1
9.	5280	Unloader washer	1
10.	5278-X	Piston seal assembly	2
11.	5345	Unloader body (spec 6P)	1
12.	5281	Unloader washer	1
13.	5000-150SS	Retainer ring	1
14.	2-031_a	O-ring	2
15.	7001-043NC125A	Hex head 7/16-14 x 1-1/4"	8
16.	2715	Valve hold-down screw	2
17.	1763	Cover plate	1
18.	2-143_a	O-ring	2
19.	5319-1	Valve cage	2
20.	5320	Unloader actuator (spec 6P)	1
21.	5284	Actuator spring (spec 6P)	1
22.	5311-3X2	Suction valve assembly	1
23.	1418-2	Valve gasket (iron-lead standard)	2
	1418-1	Valve gasket (copper optional)	2
	1418	Valve gasket (aluminum optional)	2
24.	2714-1	Valve cap (spec 4P and discharge)	2
25.	5318-3X2	Discharge valve assembly	1



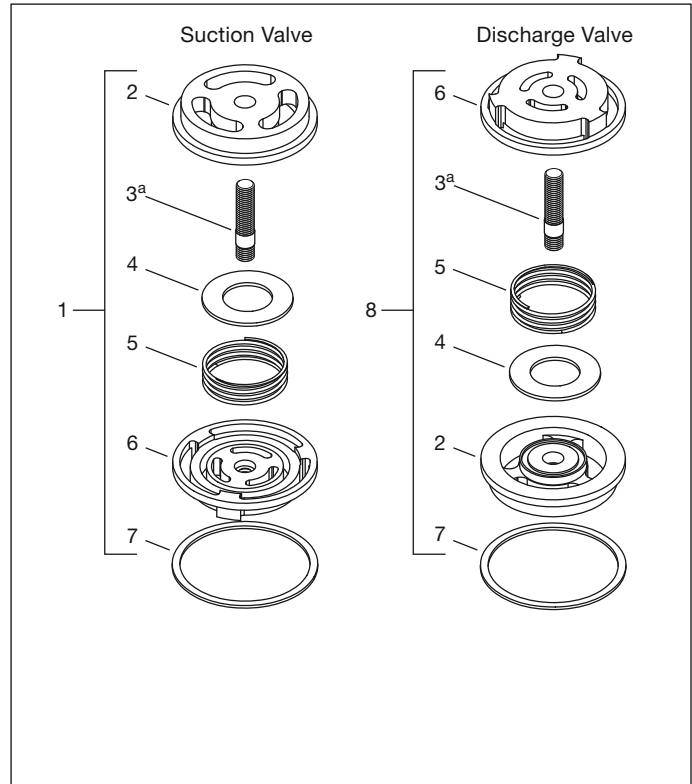
Always relieve pressure in the unit before attempting any repairs.

Appendix E—Valve Assembly Details for Model WFD551

Valve Assemblies—First Stage



Valve Assemblies—Second Stage



Valve Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	3856-3X2	Suction valve assembly	2
2.	3856	Valve seat	4
3.	3920 ^a	Valve stud	4
4.	4230	Inner valve plate	4
5.	4229	Outer valve plate	4
6.	3951	Inner valve spring	4
7.	3993	Outer valve spring	4
8.	3857-1	Valve bumper	4
9.	2114-2	Valve gasket (iron-lead standard)	4
	2114-1	Valve gasket (copper optional)	4
	2114	Valve gasket (aluminum optional)	4
10.	3857-2X2	Discharge valve assembly	2

Valve Assembly Bill of Materials

Ref No.	Part No.	Description	Qty.
1.	5311-3X2	Suction valve assembly	2
2.	5311	Valve seat	4
3.	3920 ^a	Valve stud	4
4.	5312	Valve plate	4
5.	5313	Valve spring	4
6.	5318-3	Valve bumper	4
7.	1418-2	Valve gasket (iron-lead standard)	4
	1418-1	Valve gasket (copper optional)	4
	1418	Valve gasket (aluminum optional)	4
8.	5318-3X2	Discharge valve assembly	2

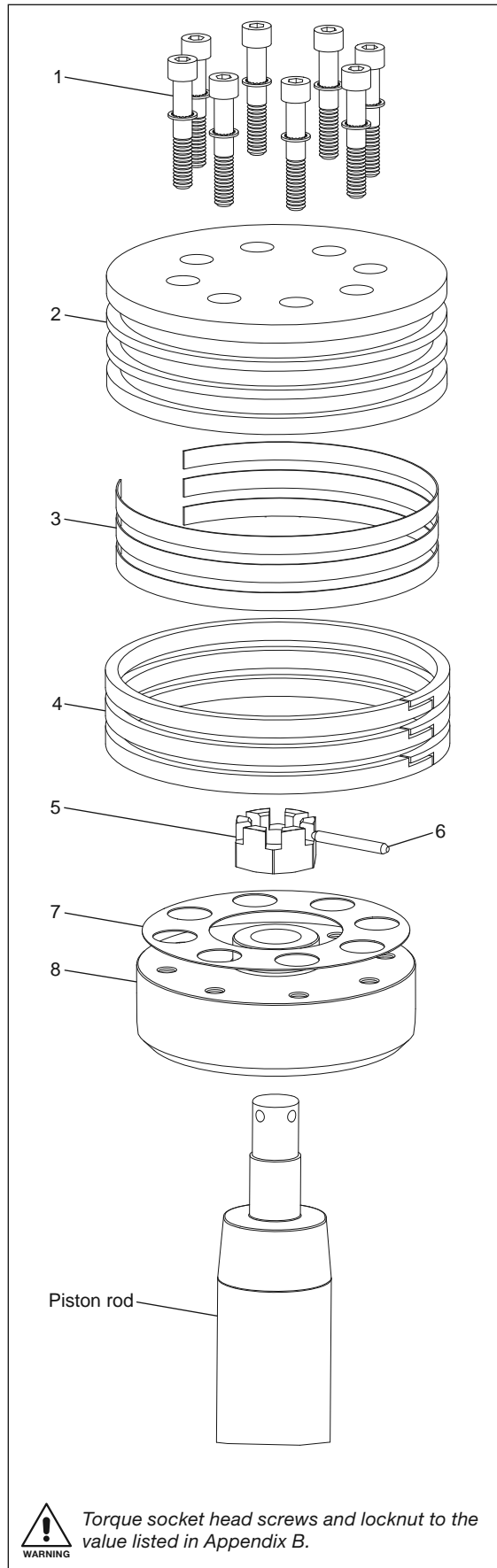
Apply Loctite #263.



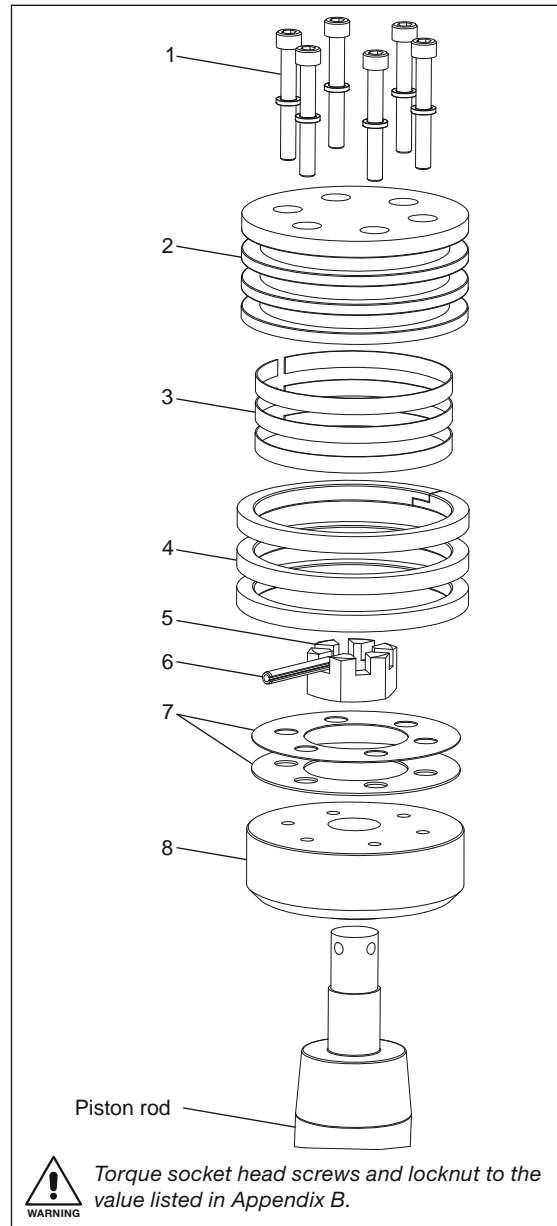
Always relieve pressure in the unit before attempting any repairs.

Appendix E—Piston Assembly Details for Model WFD551

First Stage



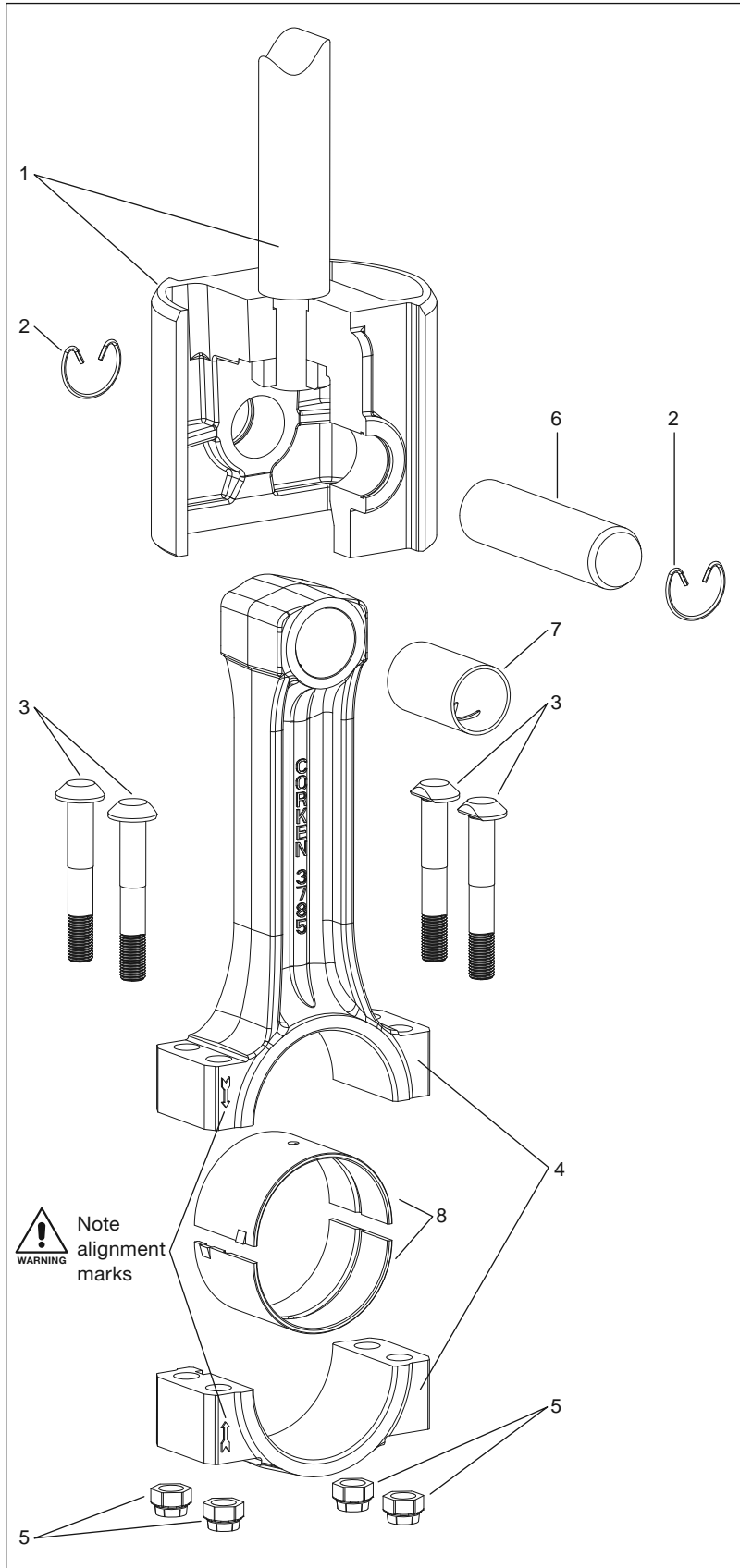
Second Stage



Piston Assembly Bill of Materials

Piston Assembly No.	1st Stage			2nd Stage	
	1987-X			1981-X	
Piston Diameter		4" (10.16 cm)		2-1/2" (6.35 cm)	
Ref. No.	Part Name	Part No.	Qty.	Part No.	Qty.
1.	Screw, sockethead	7002-025 OC125A	8	7002-008 NC125A	6
	Lock washer	7207-025A	8	7207-008A	6
2.	Piston head	1985	1	1981	1
3.	Ring expander	1776	3	1774	3
		1773—PTFE (std.)	3	1771—PTFE (std.)	3
		1773-2—Alloy 50 (opt.)	3	1771-2—Alloy 50 (opt.)	3
4.	Piston ring	1773-3—PEEK (opt.)	3	1771-3—PEEK (opt.)	3
		1482	1	1482	1
		1483	1	1483	1
5.	Locknut	1735	As req.	6599	As req.
		1735-1	As req.	6599-1	As req.
6.	Lock pin	1483	1	1483	1
7.	Shim washer, thick	1735	As req.	6599	As req.
		1735-1	As req.	6599-1	As req.
8.	Piston platform	1986	1	1982	1

Appendix E—Connecting Rod Assembly Details for Model WFD551



Connecting Rod and Crosshead Assembly Bill of Materials

Ref No.	Part No.	Description
1.	3544-X5	Crosshead assembly
	3544-X6	Crosshead assembly—coated piston rod
2.	3590	Retainer ring
3.	1726 ^b	Bolt
4.	3785-X1	Connecting rod assembly
	3785 ^{a,d}	Connecting rod
5.	1727 ^{a,b}	Nut
6.	3540	Wrist pin
7.	3541 ^{a,c}	Wrist pin bushing
8.	3542 ^a	Connecting rod bearing

^aIncluded with connecting rod assembly

^bTorque connecting rod nut to 40 ft. lbs.

^cMust be rebored after replacing (1.1258/1.1254 dia.)

^dNot sold separately

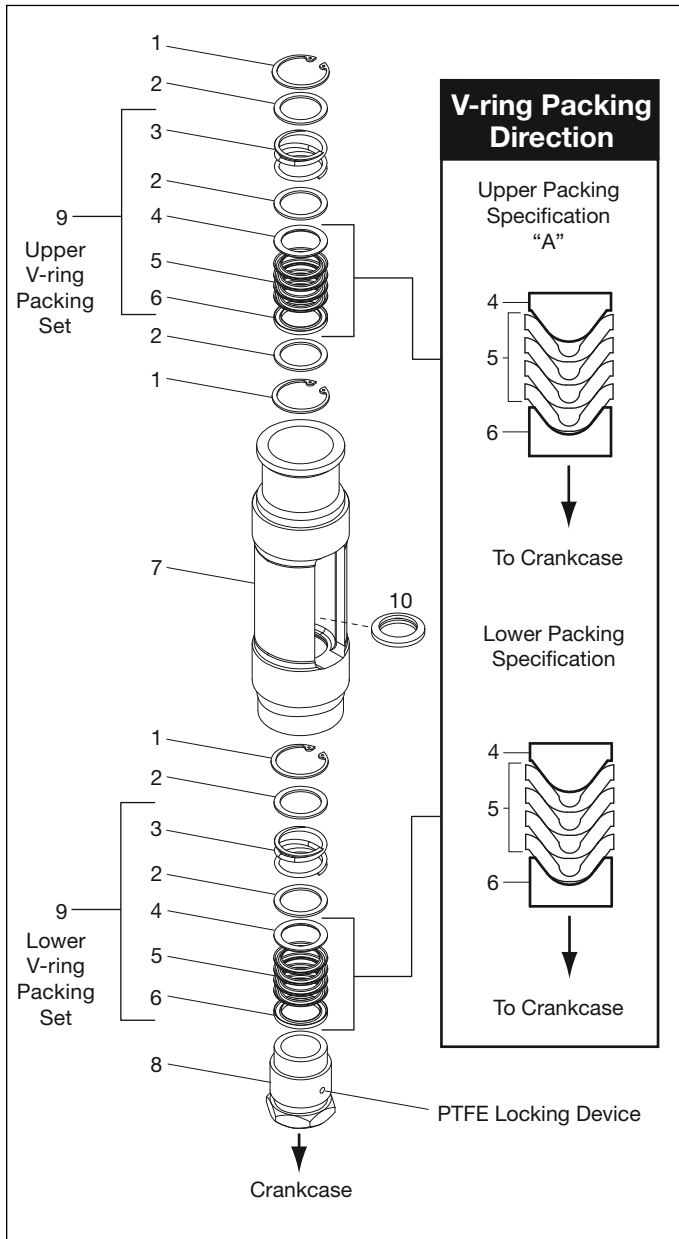


Never attempt to separate the piston rod and crosshead. When repair becomes necessary, the entire crosshead assembly must be replaced.



Always relieve pressure in the unit before attempting any repairs.

Appendix E—Packing Assembly Details for Model WFD551



Packing Assembly Bill of Materials

Ref No.	Part No.	Description
1.	5000-175	Retainer ring
2.	1728	Washer
3.	1731	Spring
4.	1724	Male packing ring
5.	1725	V-ring packing
6.	1723	Female packing ring
7.	1751	Cartridge
8.	1722-X	Adjusting screw
9.	1725-2X	V-ring packing set
10.	1732 ^a	Oil deflector ring

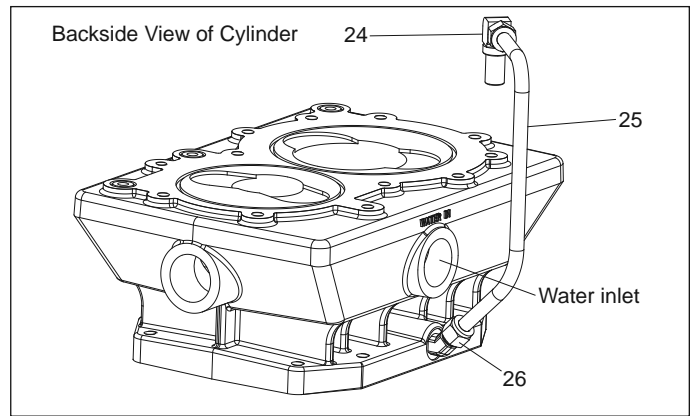
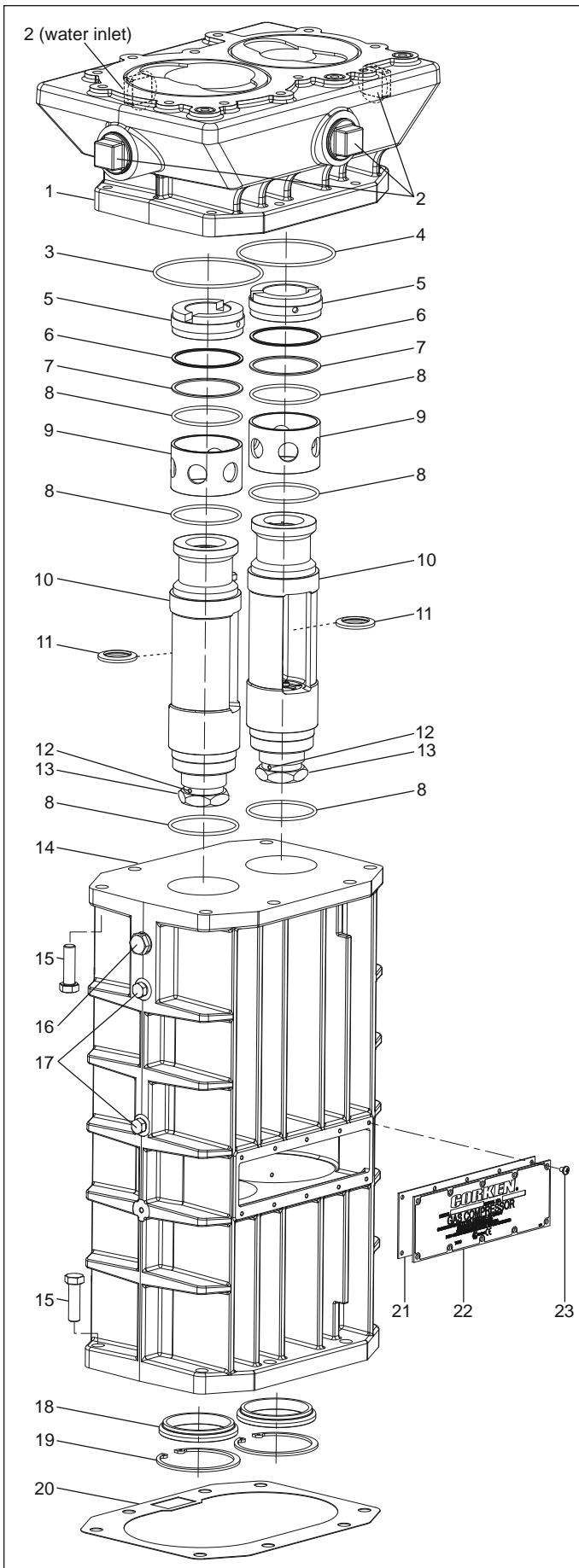
^aDeflector ring is loose within the packing cartridge until fitted on the piston rod. Must be put in from the bottom of the cartridge.

IMPORTANT: Identify and line up the packing rings before installing. Be sure they face the way shown above.

Identification of Packing Specification

Example: Model Number WFD551 **A** M4PFDAFSNN
 Packing Spec. _____

Appendix E—Crosshead Guide Assembly Details for Model WFD551



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty
1.	5269	Cylinder	1
2.	2825	Pipe plug (1-1/2" NPT)	3
3.	2-243_	O-ring	1
4.	2-247_	O-ring	1
5.	1749	Cartridge holddown screw	2
6.	1730	Cage washer	2
7.	2176	Back-up ring	2
8.	2-233_	O-ring	2
9.	1750	Packing box cage	2
10.	1751	Packing box cartridge	2
11.	1732	Oil deflector ring	2
12.	1192	Locking device	2
13.	1722-X	Adjusting screw assembly	2
14.	1716	Crosshead guide	1
15.	7005-050175A	Bolt (1/2" 13 x 1-3/4" ferry head)	16
16.	3443	Pipe plug (1/2" NPT)	2
17.	3442	Pipe plug (1/4" NPT)	3
18.	1748	Cartridge plate	2
19.	5000-350	Retainer ring	2
20.	1761	Crankcase gasket	1
21.	1760	Inspection plate gasket	1
22.	1721	Inspection plate	1
23.	7012-010NC025B	Screw (10 - 24 x 1/4" Phillips hd.)	10
24.	2268	Tube female elbow-1/2T x 3/8	1
25.	2918	Tubing - 1/2 x .032 copper	1
26.	2267	Tube elbow 45 degree-1/2T x 3/8	1

O-ring Code

A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.



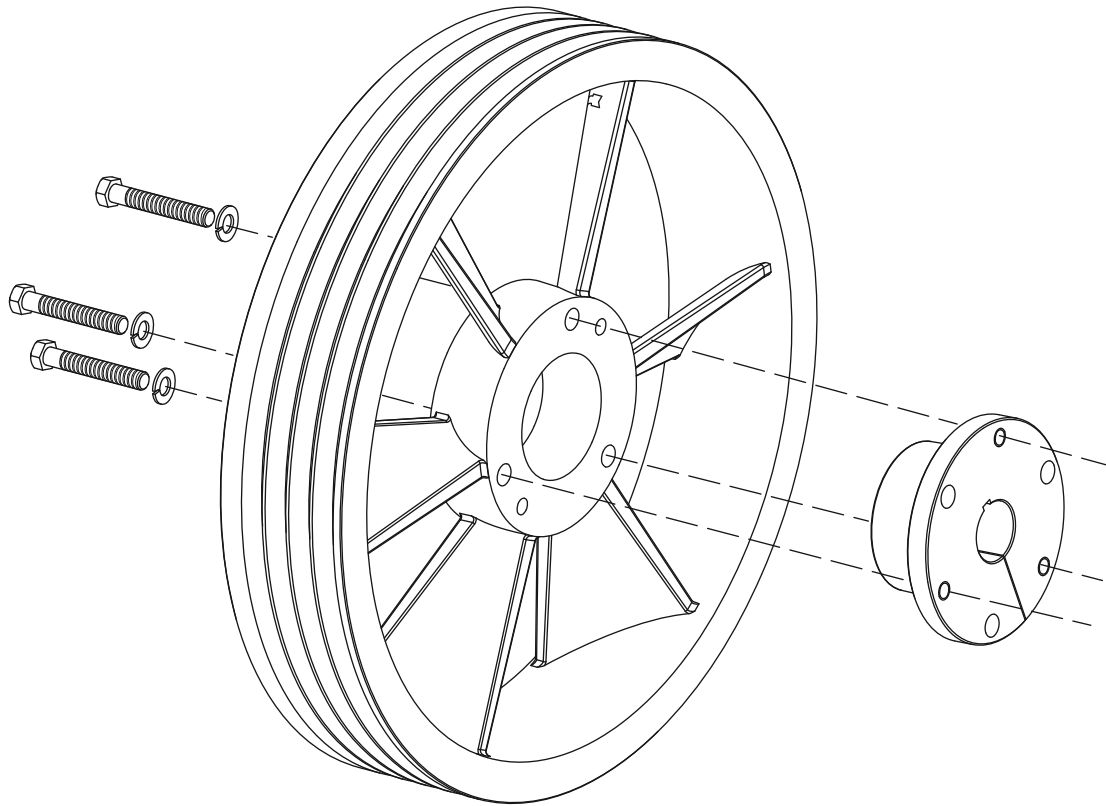
Always relieve pressure in the unit before attempting any repairs.

NOTE:

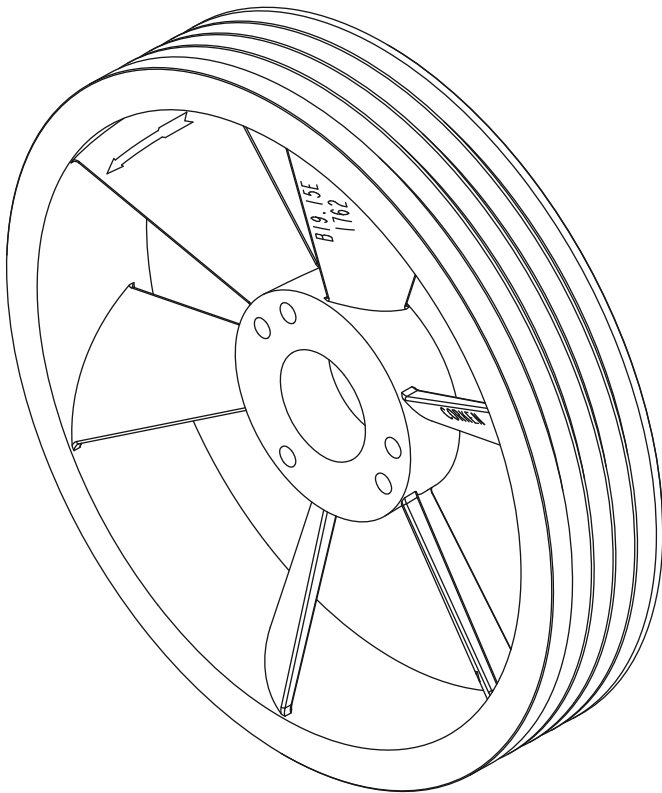
Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix E—Flywheel Assembly Details for Model WFD551



Back Side

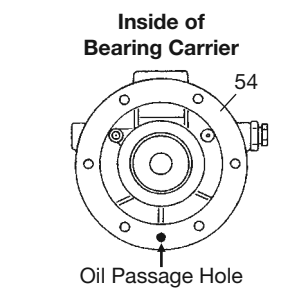
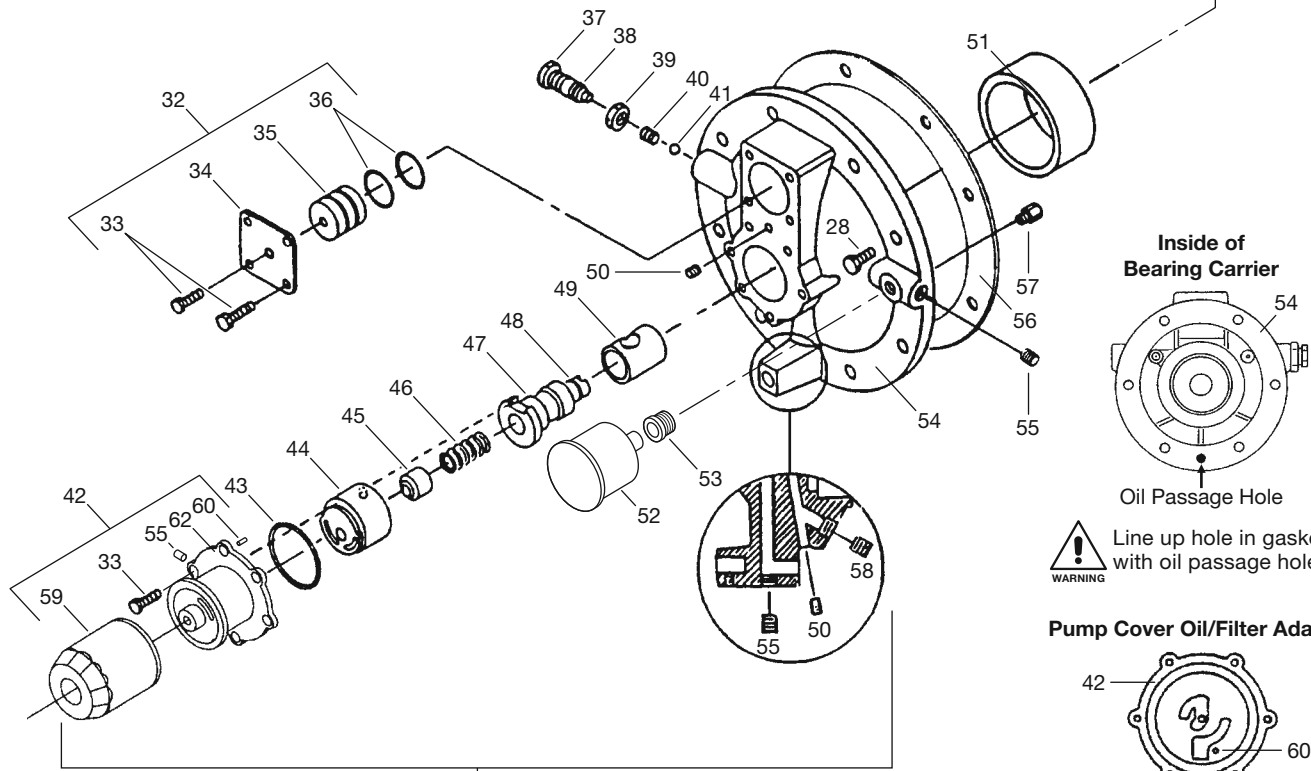
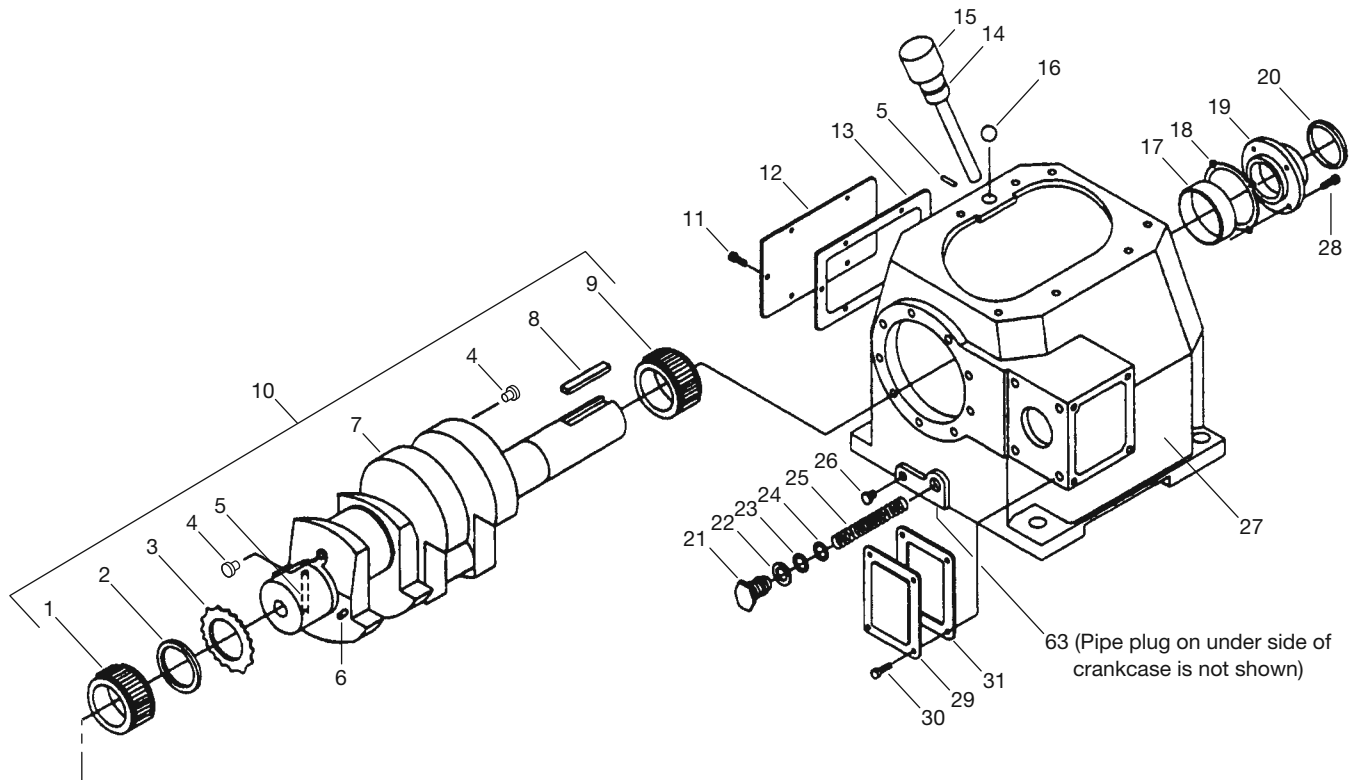


Front Side

Flywheel Assembly Bill of Materials

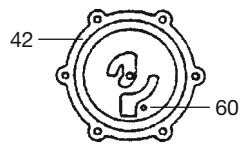
Assembly Number	Assembly Name
1762-X	Flywheel assembly (flywheel, hub, and three bolts)
1762	Flywheel: 19.5" O.D., 4 groove
H E-2.125	Hub with three bolts and lockwashers

Appendix E—Crankcase Assembly Details



WARNING Line up hole in gasket with oil passage hole.

Pump Cover Oil/Filter Adapter



Pumpsided of adapter shown for proper orientation of cover and location of pump cover pin.

61
(Includes all parts shown except #52 and #53)

Appendix E—Crankcase Assembly Details

Crankcase Assembly Bill of Materials

Ref No.	Part No.	Description
1.	1737	Bearing cone
2.	3638	Spacer
3.	3635	Drive sprocket
4.	1284	Crankshaft orifice
5.	2135	Drive pin
6.	2933	Link pin
7.	3786	Crankshaft
8.	3503	Flywheel key
9.	3580	Bearing cone
10.	3786-X1	Crankshaft assembly
11.	7001-031NC075A	Bolt (5/16 - 18 x 3/4" hex head)
12.	2122	Inspection cover
13.	2123	Gasket, inspection cover
14.	2-112A ^C	O-ring
15.	3225-X1	Oil bayonet assembly (w/O-ring)
16.	2126	Breather ball
17.	3579	Bearing cup
18.	3589	Bearing adjustment shim (.005")
	3589-1	Bearing adjustment shim (.007")
	3589-2	Bearing adjustment shim (.020")
19.	3539	Bearing cover
20.	3526	Oil seal
21.	1280	Filter screw
22.	1281	Gasket, filter
23.	2-116A ^C	O-ring
24.	1276	Washer
25.	1275	Oil filter screen
26.	3443	Pipe plug (1/2" NPT steel)
27.	3221	Crankcase
28.	7001-037NC100A	Bolt (3/8 - 16 x 1" hex head Gr. 5)
29.	3875	Access cover
30.	7003-025NC037E	Screw (1/4 - 20 x 3/8")
31.	3874	Gasket (access cover)
32.	1515-X	Closure cap assembly
33.	7001-025NC050A	Bolt (1/4 - 20 x 1/2" hex head)
34.	1515	Closure cap
35.	1516	Closure body
36.	2-118A ^C	O-ring
37.	1290	Relief valve adjusting screw
38.	2-011A ^C	O-ring
39.	1291	Adjusting screw locknut
40.	1292	Relief valve spring
41.	1293	Relief valve ball
42.	4222-X ^b	Oil filter adapter assembly (w/pin)
43.	2-228A ^C	O-ring
44.	2849-1X ^b	Oil pump assembly
45.	2851	Spring guide
46.	2852	Oil pump spring
47.	3219	Pump shaft adapter

Ref No.	Part No.	Description
48.	2-112A ^C	O-ring
49.	2805-X ^a	Pump shaft bushing
50.	1629	Pipe plug (1/16 NPT fl. seal)
51.	1736	Bearing cup
52.	1302	Oil pressure gauge
53.	1044	Bushing (1/8 x 1/4 NPT)
54.	3220-2	Bearing carrier
55.	3289	Pipe plug (1/4 NPT fl. seal)
56.	2131	Bearing carrier gasket
57.	2961-X	Air release valve assembly
58.	2590	Pipe plug (1/8 NPT fl. seal)
59.	4225	Filter
60.	2798	Pump cover pin (included w/4222-X)
61.	3220-2X	Bearing carrier assembly
62.	4222	Oil filter adapter
63.	3289	Pipe plug (1/4" x 18 NPTF x 7/8")

Assembly Number	Assembly Name
3221-X1	Crankcase assembly (M, 4, 8, 9) without lubricator
3221-X2	Crankcase assembly (M7, 78) without lubricator
3221-X3	Crankcase assembly (L, 4, 8, 9) with lubricator
3221-X4	Crankcase assembly (L7, 78) with lubricator

O-ring Code

A	Buna-N
---	--------

^aMust be rebored and honed after replacing (0.876"/0.875" diameter)

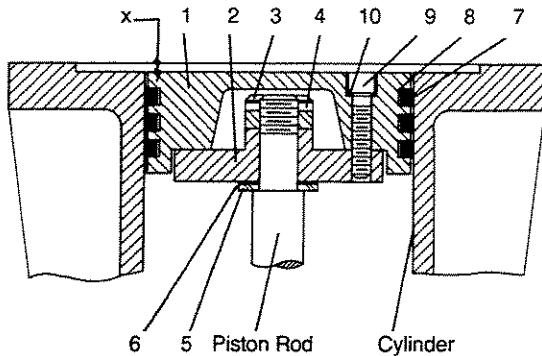
^bCaution: To avoid damage during assembly, refer to installation Instruction Manual IE400.

^cSee O-ring chart above for details.

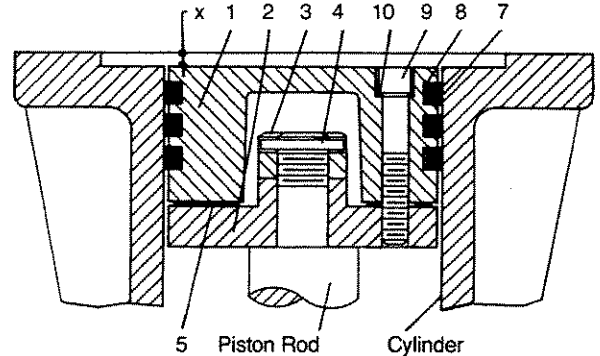


Always relieve pressure in the unit before attempting any repairs.

MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



Ref. No.	Part Name	ALL MODELS 190/191		ALL MODELS 390/391		ALL MODELS 590/591							
		Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston						
TWO-STAGE		1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Assembly No.		1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter		3" (7.62 cm)		1 3/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 1/4" (8.26 cm)	
1.	Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2.	Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3.	Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4.	Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5.	Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6.	Shim Washer, Thick	1528	As	1378	As	1528	As	1528	As	1735	As	1735	As
	Shim Washer, Thin	1528-1	Req.		Req.	1528-1	Req.	1528-1	Req.	1735-1	Req.	1735-1	Req.
7.	Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8.	Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9.	Screw, Soc. Hd.	7002-010		7002-008		7002-025		7002-008		7002-025		7002-025	
		OC100A	4	NC125A	4	OC125A	8	NC125A	6	OC175A	8	OC175A	4
10.	Lock Washer	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4

Ref. No.	Part Name	ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
		Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
SINGLE STAGE		1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Assembly No.		1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter		3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4.5" (11.43 cm)		4" (10.16 cm)	
1.	Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2.	Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3.	Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4.	Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5.	Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6.	Shim Washer, Thick	1528	As	1528	As	1528	As	1735	As	1735	As
	Shim Washer, Thin	1528-1	Req.	1528-1	Req.	1528-1	Req.	1735-1	Req.	1735-1	Req.
7.	Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8.	Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9.	Screw, Soc. Hd.	7002-010		7002-025		7002-010		7002-025		7002-025	
		OC100A	4	OC125A	8	OC100A	4	OC125A	8	OC125A	8
10.	Lock Washer	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8

PISTON CLEARANCE (COLD)

MODEL	*X* INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D491, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

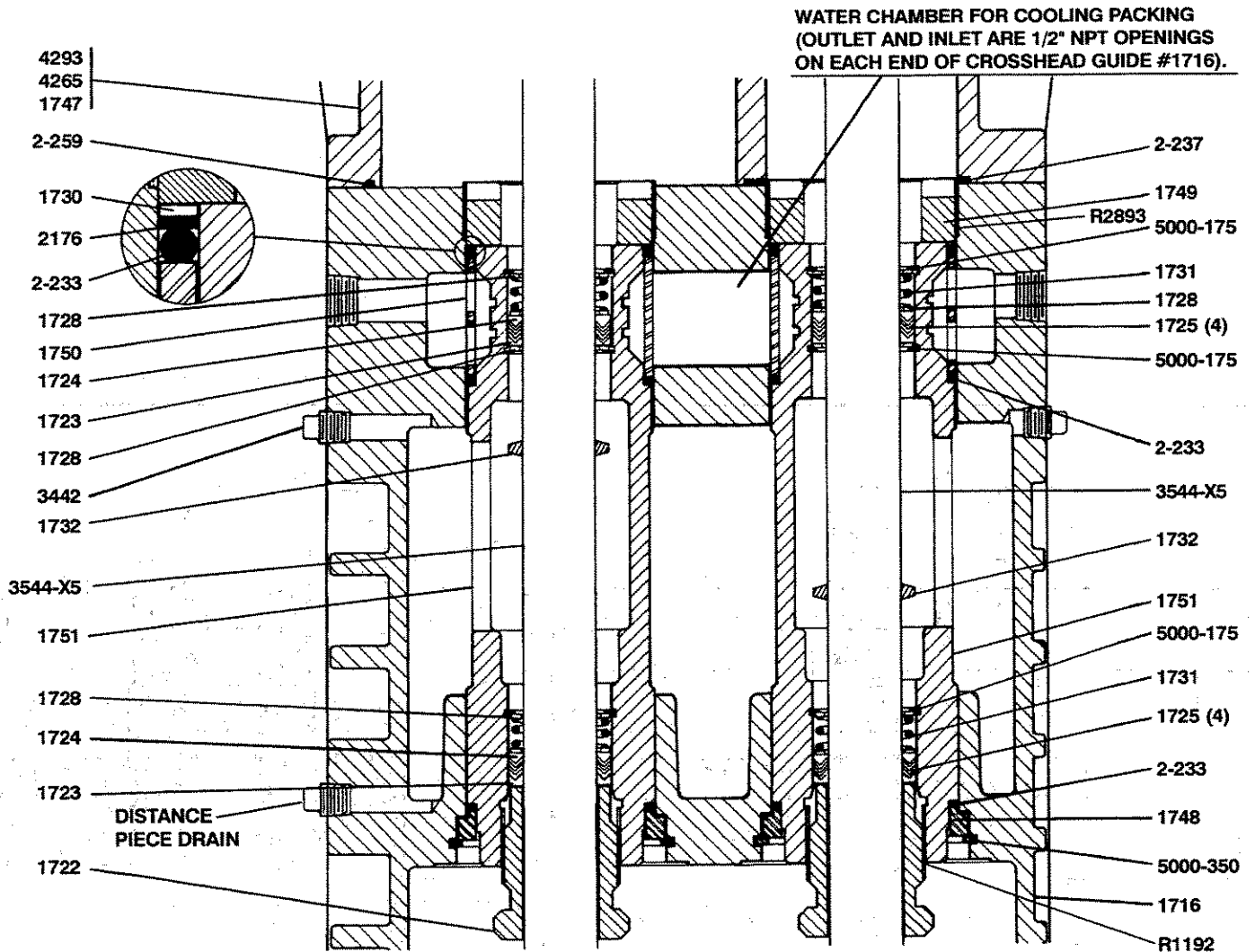
NOTES:

- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS
 MODELS D590A, WD590A, FD591, WFD591 COMPRESSORS
 M-STYLE CRANKCASE - ALL SPECIFICATIONS

SERVICE PAGE	MANUAL E282E
MARCH SUPERSEDES	1997 E282D



PART NO.	PART NAME
1716	CROSSHEAD GUIDE
1722	ADJUSTING SCREW
1723	FEMALE PACKING RING
1724	MALE PACKING RING
1725	PACKING RING
1728	PACKING WASHER
1730	CAGE WASHER
1731	PACKING SPRING
1732	OIL DEFLECTOR RING
1747	CYLINDER (D/WD590 ONLY)
1748	CARTRIDGE PLATE
1749	CARTRIDGE HOLDDOWN SCREW
1750	PACKING BOX CAGE
1751	PACKING BOX CARTRIDGE
2176	BACK-UP RING (TFE)
3442	PIPE PLUG, 1/4" NPT
5000-175	RETAINER RING
5000-350	RETAINER RING
2-233	O-RING
2-237	O-RING
2-259	O-RING
4293	CYL FD591
4265	CYL WFD591

ASSEMBLY NO.	ASSEMBLY NAME
1716-X	CROSSHEAD GUIDE ASSEMBLY WITH 1716, 1748 (2), 5000-350 (2)
3544-X5	CROSSHEAD-PISTON ROD ASSEMBLY - STD.
*3544-X6	CROSSHEAD-PISTON ROD ASSEMBLY - CHROME OXIDE
1725-2X	PACKING SET WITH 1723, 1724, 1725, (4), 1728, 1731
*1725-2X2	PACKING SET - ALLOY/K-RING

*OPTIONAL

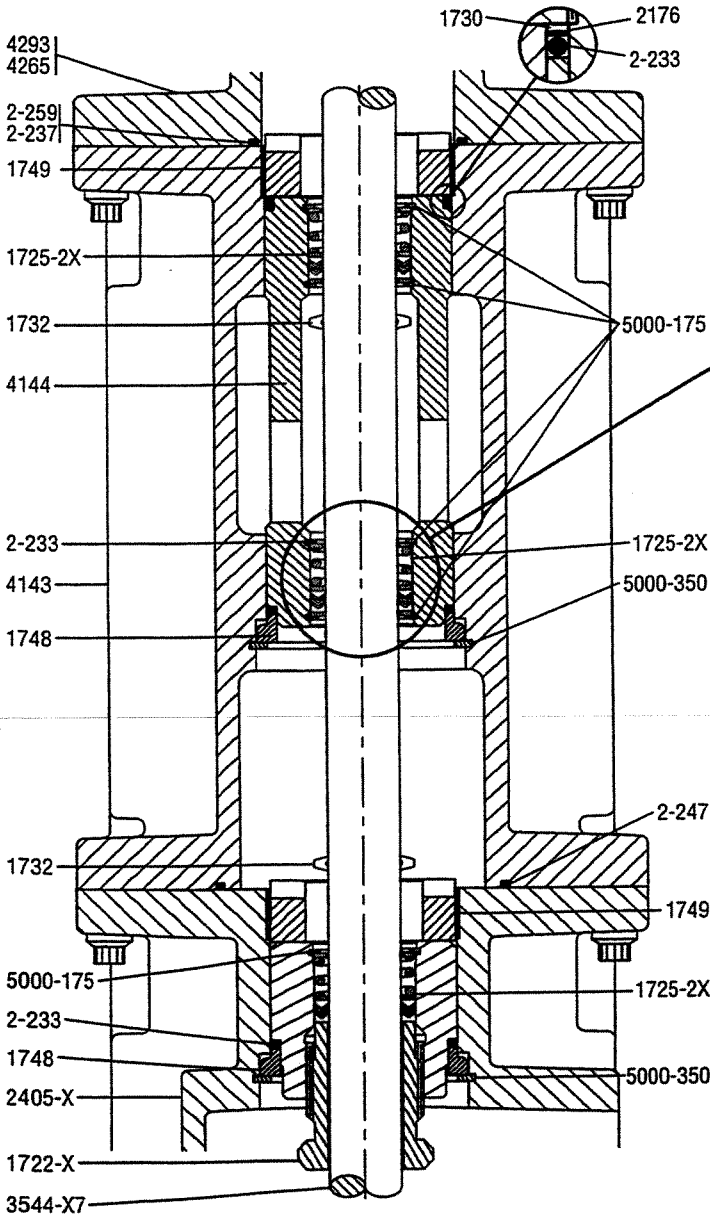
USE 3905 CONE FOR PACKING INSTALLATION.
 FOR O-RING MATERIAL CODING SEE PAGE A500.
 SEE PAGE E270 FOR DESCRIPTION AND APPLICATION OF
 DISTANCE PIECE ARRANGEMENTS.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT
 BEFORE ATTEMPTING ANY REPAIRS.**

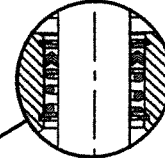
**DISTANCE PIECE DETAILS
ALL MODELS T591 COMPRESSORS
ALL SPECIFICATIONS**

PACKING SPEC. G

PACKING SPEC. H



Invert middle packing set only for packing specification 'H' as shown below.



PART NO.	PART NAME
1722	ADJUSTING SCREW WITH LOCKING DEVICE
1723	FEMALE PACKING RING
1724	MALE PACKING RING
1725	PACKING RING
1728	PACKING WASHER
1730	CAGE WASHER
1731	PACKING SPRING
1732	OIL DEFLECTOR RING
1748	CARTRIDGE PLATE
1749	CARTRIDGE HOLDDOWN SCREW
1750	PACKING BOX CAGE
1751	PACKING BOX CARTRIDGE
2176	BACKUP RING (TFE)
2405-X	CROSSHEAD GUIDE
2893	LOCKING DEVICE
4143	DISTANCE PIECE
4144	PACKING CARTRIDGE
4265	CYLINDER - WFD591 (WATER COOLED)
4293	CYLINDER - FD151
5000-175	RETAINER RING
5000-350	RETAINER RING
2-233	O-RING
2-237	O-RING - STAGE 2
2-259	O-RING - STAGE 1

ASSEMBLY NUMBER	ASSEMBLY NAME
1725-2X	PACKING SET WITH 1723, 1724, 1725 (4), 1728, 1731
1725-2X2	PACKING SET WITH K-RING SPACERS (OPTIONAL)
2405-X	CROSSHEAD-GUIDE ASSEMBLY WITH 2405, 1748 (2), 5000-350 (2)
3544-X7	CROSSHEAD PISTON ROD ASSEMBLY
3544-X8	CROSSHEAD PISTON ROD ASSEMBLY - CHROME OXIDE (OPTIONAL)

PACKING SPEC. IDENTIFICATION:

Example: Model No. T691 **G** M4
WFT691 **H** M9

Packing Spec. _____

For o-ring material coding see page A500.

Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example 3713C).

Assembly Note: Use packing installation cone *3905 when installing packing cartridge on piston rod.

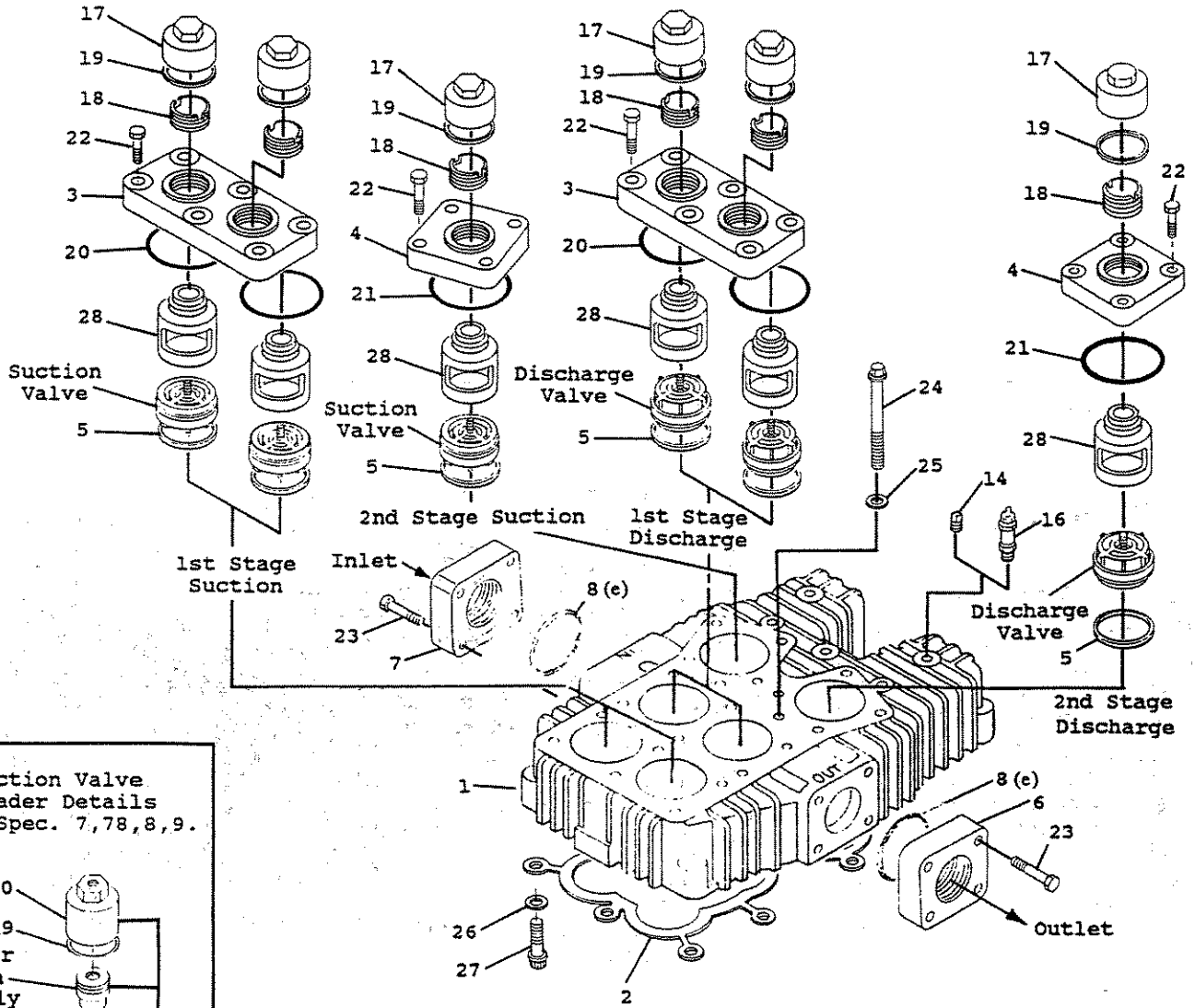
HEAD ASSEMBLY DETAILS

MODEL 590, W590, WA590, D590, WD590
 S/N MR50653 AND LATER
 ALL SPECIFICATIONS

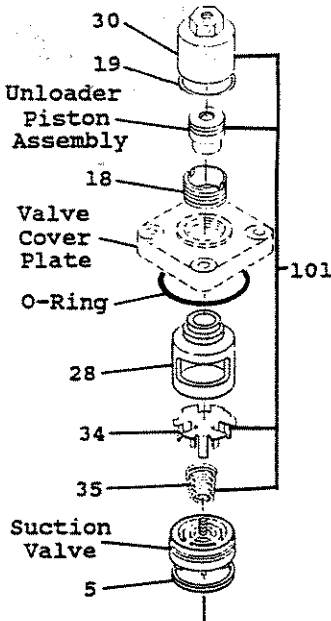
SERVICE MANUAL
 PAGE E326E

November 1991
 Supersedes E326D

Head Assembly, Valve Spec. 4 Shown:

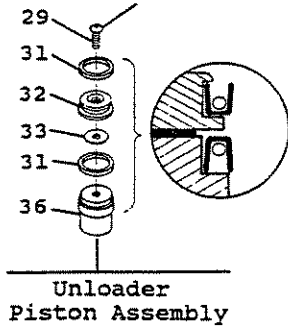


Suction Valve Unloader Details
 Valve Spec. 7,78,8,9.

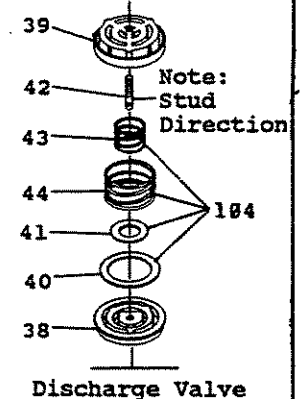
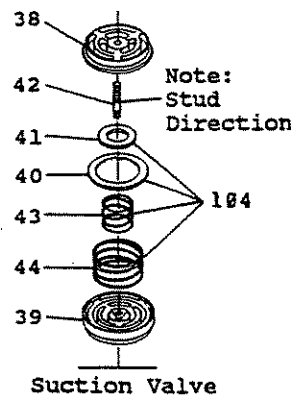


Unloader Piston Details

Apply Loctite #290 when assembling



Valve Details



NOTE: When ordering parts use
"Part No." not "Ref. No."

REF. PART NO. NO.	PART NAME
1. 4003	Head (590,A590,D590 Only)
2566	Head (W590,WA590,WD590 Only) (Not Shown)
(a) 2. 1746	Head Gasket
(a,c) 1746-1	Head Gasket (Grafoil)
3. 1763	Valve Cover Plate
4. 1764	Valve Cover Plate
5. 2114	Valve Gasket, Aluminum
(a) 2114-1	Valve Gasket, Copper
(a) 2114-2	Valve Gasket, Iron
6. 2144-1.5	Discharge Flange, 1-1/2"NPT
(a) 2144-1.5S	Discharge Flange, 1-1/2" Weld
7. 2144-2	Suction Flange, 2" NPT
(a) 2144-2S	Suction Flange, 2" Weld
(e) 8. 2-231	O-Ring
9. 2201	Unloader Piston, Steel
10. —	Omitted
11. —	Omitted
12. —	Omitted
13. —	Omitted
14. 3442	Plug, 1/4" NPT
15. —	Omitted
16. 2415	Interstage Relief Valve (A590, WA590 Only)
17. 2714-1	Valve Cap(Grooved for O-Ring)
18. 2715	Holddown Screw
(b) 19. 2-031	O-Ring, Valve Cap
(b) 20. 2-151	O-Ring, Cover Plate
(b) 21. 2-235	O-Ring, Cover Plate
22. 7001-043	
NC125A	Bolt,Hex Hd 7/16-14 x 1-1/4
23. 7001-043	
NC150A	Bolt,Hex Hd 7/16-14 x 1-1/2
(c) 24. 2136	Center Head Bolt
(c) 25. 1625	Center Head Bolt Gasket, Steel
(a,c) 1625-1	Center Head Bolt Gasket, Copper
26. 7005-050	
NC150A	Bolt, 1/2-13 x 1-1/2" Ferry Hd
27. 7206-050A	Regular Lockwasher - 1/2
28. 2797	Valve Cage
29. 1910	Bolt, 1/4-20 x 1/2" Soc Button Hd
30. 2598-1	Unloader Cap
31. 2619-X	Piston Seal Assembly
32. 2857	Piston Cap
33. 2858	Unloader Piston Cap Gasket
34. 4032	Unloader Actuator
35. 4033	Unloader Spring
36. 2710	Unloader Piston
37. —	Omitted
38. 3856	Valve Seat
39. 3857	Valve Bumper
40. 3871	Outer Valve Plate
41. 3872	Inner Valve Plate
42. 3920	Valve Stud
43. 3929	Inner Valve Spring - Heavy
44. 3928	Outer Valve Spring - Heavy

REF. ASSY. NO. NO.	ASSEMBLY NAME
101. 4032-X	Suction Valve Unloader Assembly w/ 29,30,31,32,33,34,35,36.
102. 3856-X	Suction Valve Assembly w/ 5,38,39,40,41,42,43,44.
(a) 3856-X1	Same as above but with Copper Gaskets.
(a) 3856-X2	Same as above but with Iron-Lead Gaskets.
103. 3857-X	Discharge Valve Assembly w/ 5,38,39,40,41,42,43,44.
(a) 3857-X1	Same as above but with Copper Gaskets.
(a) 3857-X2	Same as above but with Iron-Lead Gaskets.
104. 3146-X1	Valve Repair Kit (Suction or Discharge)

IDENTIFICATION OF VALVE UNLOADER SPEC.

Example: Model No. 590M 4 FBA
590K 78 FBAB
590L 9 FBA

Valve Unloader Spec.

Spec.	Head Assy No.	Model No.
4	4003-X	590, D590
4	2566-X	W590,WD590.
4	4003-X3	MODEL A590.
4	2566-X3	MODEL WA590.
7,78,8,9	4003-X1	590,D590.
7,78,8,9	2566-X	W590,WD590.
7,78,8,9	4003-X2	MODEL A590.
7,78,8,9	2566-X2	MODEL WA590.

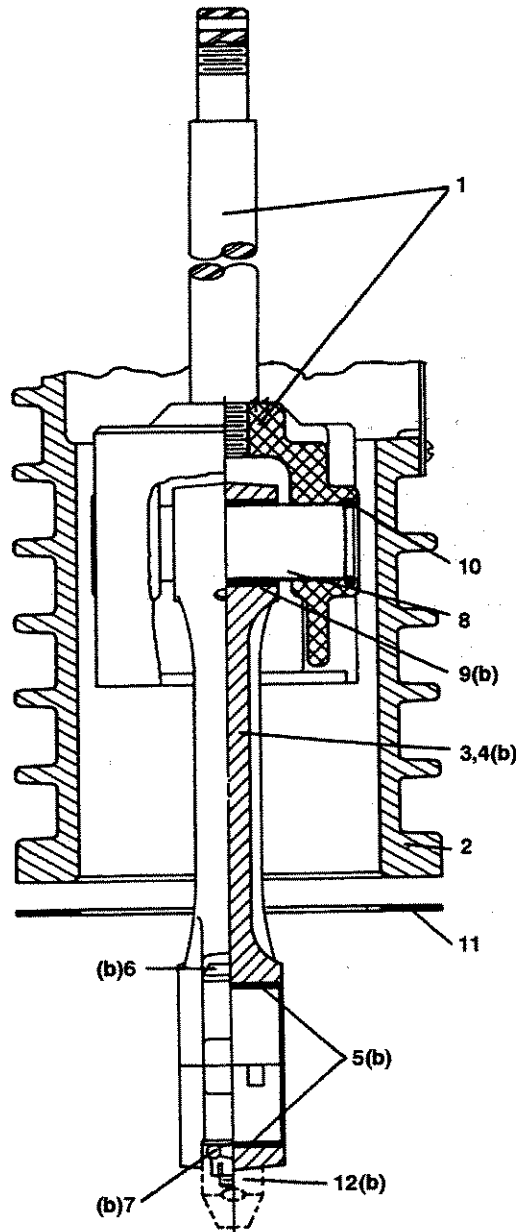
NOTES:

- (a) Optional.
- (b) For O-Ring Material Coding see Page A500.
- (c) Not Included in Head Assembly.
- (d) Effective S/N JX47791 This Head (4003) is interchangeable with the old head (1725), but a new intercooler must be used (4011-1 Steel or 4011-2 Copper).
- (e) S/N NQ51455 and later. Earlier models use Gasket #2177.

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

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

MODEL NUMBER	91	A91 D91	191	191	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	SPEC. K,P ONLY	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	SPEC. M ONLY	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	SPEC. M ONLY	590 W590 W690 691	D791 DR091
NO.	DESCRIPTION																					
1.	1132-X2	1132-X3	1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 1132-X7 1132-X9 1132-X10 (f)(g)	1132-X2 (f)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1394-X 2765(h) (366(i))	1384-X1 1384-X4 (f)	1394-X2 1394-X3 (f)	1717-X 1717-X1	SPEC. K,P ONLY	1717-X 1717-X1	SPEC. M ONLY	1717-X 1717-X1	SPEC. M ONLY	1717-X 1717-X1	SPEC. M ONLY	1717-X 1717-X1	3544-X3 3544-X4 3544-X5
2.	2240	2240	4940-X	4393	4383	4383-X	4393	4383-X	4383-X	2765(h) (366(i))	2773-X	2773-X	1716-X 1716-X	SPEC. K,P ONLY	2405-X 2405-X	SPEC. M ONLY	2405-X 2405-X	SPEC. M ONLY	2405-X 2405-X	SPEC. M ONLY	2405-X 2405-X	2405-X 2405-1
3.	1889-1X	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889-X	1889-X	1889-X	1490-X	1490-X	1490-X	1720-X 1720-X	SPEC. K,P ONLY	1720-X 1720-X	SPEC. M ONLY	1720-X 1720-X	SPEC. M ONLY	1720-X 1720-X	SPEC. M ONLY	1720-X 1720-X	3785-X 3785-X
4.	1889-1	1889-1	1889-1	1889	1889	1889	1889	1889	1889	1490	1490	1490	1720 1720	SPEC. K,P ONLY	1720 1720	SPEC. M ONLY	1720 1720	SPEC. M ONLY	1720 1720	SPEC. M ONLY	1720 1720	3785 3785
5.	1367	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1719 1719	SPEC. K,P ONLY	1719 1719	SPEC. M ONLY	1719 1719	SPEC. M ONLY	1719 1719	SPEC. M ONLY	1719 1719	3542 3542
6.	1599	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1726 1726	SPEC. K,P ONLY	1726 1726	SPEC. M ONLY	1726 1726	SPEC. M ONLY	1726 1726	SPEC. M ONLY	1726 1726	1726 1726
7.	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600	1600(c)	1600(c)	1600	1493(g)	1493(d)	1493(d)	1727(e) 1727(e)	SPEC. K,P ONLY	1727(e) 1727(e)	SPEC. M ONLY	1727(e) 1727(e)	SPEC. M ONLY	1727(e) 1727(e)	SPEC. M ONLY	1727(e) 1727(e)	1727(e) 1727(e)
8.	2505	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1718 1718	SPEC. K,P ONLY	1718 1718	SPEC. M ONLY	1718 1718	SPEC. M ONLY	1718 1718	SPEC. M ONLY	1718 1718	3540 3540
9.	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	SPEC. K,P ONLY	1495-X(a) 1495-X(a)	SPEC. M ONLY	1495-X(a) 1495-X(a)	SPEC. M ONLY	1495-X(a) 1495-X(a)	SPEC. M ONLY	1495-X(a) 1495-X(a)	3541-X(k) 3541-X(k)
10.	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	SPEC. K,P ONLY	1498 1498	SPEC. M ONLY	1498 1498	SPEC. M ONLY	1498 1498	SPEC. M ONLY	1498 1498	3590 3590
11.	2526	2526	2526	2702	2702	2702	2702	2702	2702	1489	1489	1489	1761 1761	SPEC. K,P ONLY	1761 1761	SPEC. M ONLY	1761 1761	SPEC. M ONLY	1761 1761	SPEC. M ONLY	1761 1761	1761 1761
12.	2011	2011	2011	2011	2011	2011	2011	2011	2011	1489	1489	1489	1761 1761	SPEC. K,P ONLY	1761 1761	SPEC. M ONLY	1761 1761	SPEC. M ONLY	1761 1761	SPEC. M ONLY	1761 1761	1761 1761

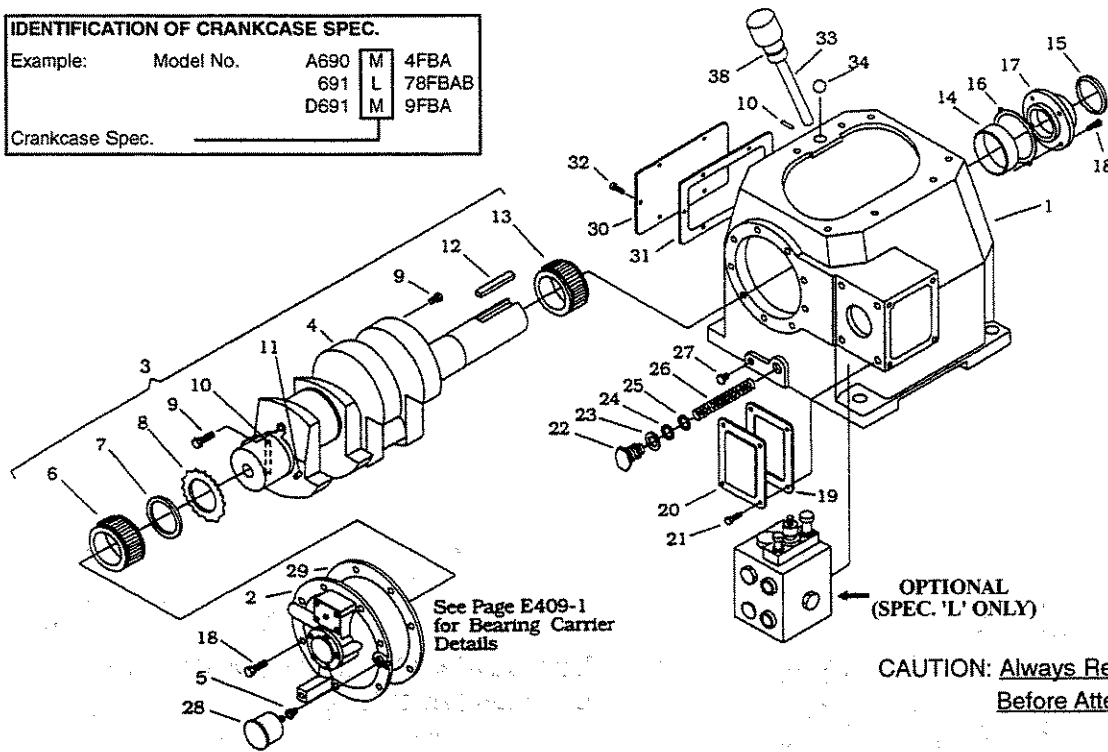
NOTES:

- (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.
 - (d) Torque Connecting Rod Nut to 30 ft.lbs.
 - (e) Torque Connecting Rod Nut to 40 ft.lbs.
 - (f) Optional Chrome Oxide Piston Rods Only
 - (g) Second Stage (Smaller Piston)
 - (h) S/N XC30633 and Later
 - (i) Prior to S/N XC30633
 - (k) Must be rebored after replacing (1.1256/1.1252 Dia.)
- Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

CRANKCASE DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)

SERVICE MANUAL
 PAGE E408-1C
 AUGUST 1999
 SUPERSEDES E408-1B

IDENTIFICATION OF CRANKCASE SPEC.			
Example:	Model No.	A690	M 4FBA
		691	L 78FBAB
		D691	M 9FBA
Crankcase Spec. _____			



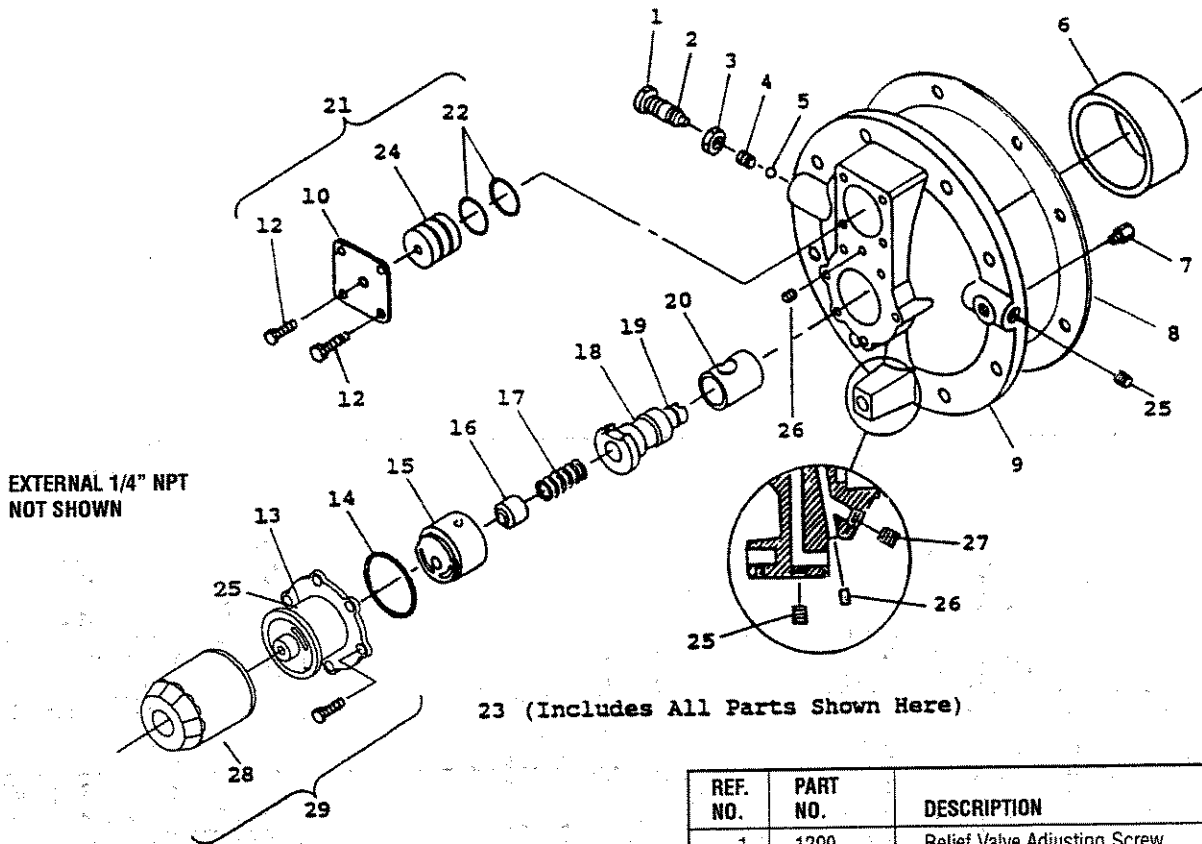
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

REF. NO.	PART NO.	DESCRIPTION
1	3221	Crankcase
2	3220-2X	Bearing Carrier Assembly
3	3786-X1	Crankshaft Assembly
4	3786	Crankshaft
5	1044	Bushing, 1/8 x 1/4 NPT
6	1737	Bearing Cone
7	3638	Spacer
8	3635	Drive Sprocket
9	1284	Crankshaft Orifice
10	2135	Drive Pin
11	2933	Link Pin
12	3503	Flywheel Key
13	3580	Bearing Cone
14	3579	Bearing Cup
15	3526	Oil Seal
16	3589	Bearing Adjustment Shim (.005")
	2589-1	Bearing Adjustment Shim (.007")
	2589-2	Bearing Adjustment Shim (.020")
17	3539	Bearing Cover
18	7001-037 NC100A	Bolt, 3/8 - 16 x 1" Hex Head Gr 5
19	3874	Gasket, Access Cover
20	3875	Access Cover
21	7003-025 NC037E	Screw, 1/4 - 20 x 3/8"
22	1280	Filter Screw
23	1281	Gasket, Filter
24	2-116A	O-ring
25	1276	Washer
26	1275	Oil Filter Screen

REF. NO.	PART NO.	DESCRIPTION
27	3443	Pipe Plug, 1/2" NPT Steel
28	1302	Oil Pressure Gauge
29	2131	Gasket, Bearing Carrier
30	2122	Inspection Cover
31	2123	Gasket, Inspection Cover
32	7001-031 NC075A	Bolt, 5/16 - 18 x 3/4" Hex Head
33	3225-X1	Oil Bayonet Assembly (w/ O-ring)
34	2126	Breather Ball (Not Used on A590, WA590, A690, WA690)
35	—	—
36	1885-1	Blank Flange
37	2010	Flange Gasket
38	2-210A	O-ring
(a) —	3852-X	Flywheel Assembly (D791, D891 Only)
(a) —	1762-X	Flywheel Assembly (590/690 Models Only)
(a) —	3852	Flywheel 21.2", 5V, 5 Groove
(a) —	3918	Flywheel Hub Type J2 - 1/8" Bore (D791, D891 Only)
(a) —	1762	Flywheel 19 - 1/2" AB, 4 Groove
(a) —	3918	Flywheel Hub Type E 2 - 1/8" Bore (590 / 690 Models Only)
(a) —	3221-X1	Crankcase Assembly (M3, 4, 8, 9) w/o Lub.
(a) —	3221-X2	Crankcase Assembly (M7, 78) w/o Lub.
(a) —	3221-X3	Crankcase Assembly (L3, 4, 8, 9) w/o Lub.
(a) —	3221-X4	Crankcase Assembly (L7, 78) w/o Lub.

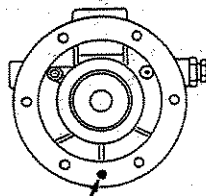
NOTES:
 (a) Not Shown

BEARING CARRIER DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)



23 (Includes All Parts Shown Here)

Inside of
Bearing Carrier



Oil Passage Hole

IMPORTANT

Line up hole in gasket with oil passage hole.

PUMP COVER OIL/FILTER ADAPTER



Pumpsides of adapter shown for proper orientation of cover and location of pump cover pin.

REF. NO.	PART NO.	DESCRIPTION
1	1290	Relief Valve Adjusting Screw
2	2-011A	O-ring
3	1291	Adjusting Screw Locknut
4	1292	Relief Valve Spring
5	1293	Relief Valve Ball
6	1736	Bearing Cup
7	2961-X	Air Release Valve Assembly
8	2131	Bearing Carrier Gasket
9	3220-2	Bearing Carrier
10	1515	Closure Cap
11	2798	Pump Cover Pin (Included w/ 4222-X)
12	7001-025 NC050A	Bolt, 1/4 - 20 x 1/2" Hex Head
(b) 13	4222-X	Oil Filter Adapter Assembly (w/ pin)
14	2-228A	O-ring
(b) 15	2849-1X	Oil Pump Assembly
16	2851	Spring Guide
17	2852	Oil Pump Spring
18	3219	Pump Shaft Adapter
19	2-112A	O-ring
(a) 20	2805-X	Pump Shaft Bushing
21	1515-X	Closure Cap Assembly
22	2-118A	O-ring
23	3220-2X	Bearing Carrier Assembly
24	1516	Closure Body
25	3289	Pipe Plug, 1/4 NPT Fl. Seal
26	1629	Pipe Plug, 1/16 NPT Fl. Seal
27	2590	Pipe Plug, 1/8 NPT Fl. Seal
28	4225	Filter
29	4222-X	Filter Adapter Assembly

NOTES:

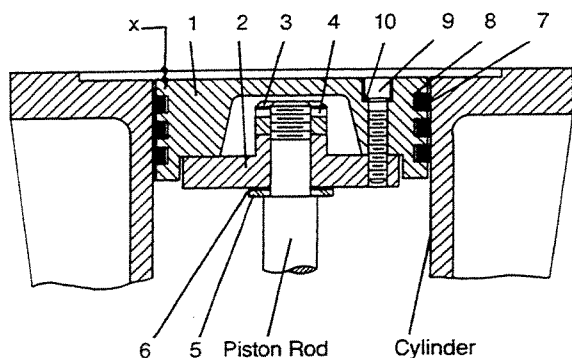
- (a) Must be rebores and honed after replacing. (0.876"/0.875" Diameter)
- (b) Caution: To avoid damage during assembly, refer to Installation Instruction Manual IE400.

PISTON ASSEMBLIES
MODEL 91 - 691

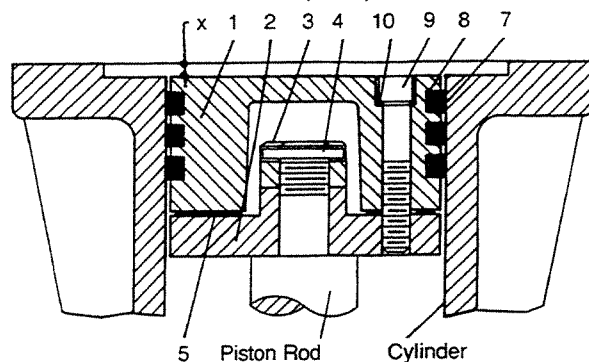
SERVICE PAGE
MANUAL E200L

MAY 1997
SUPERSEDES E200K

MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



TWO-STAGE		ALL MODELS 190/191				ALL MODELS 390/391				ALL MODELS 590/591			
Piston Assembly No.		1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter		3" (7.62 cm)		1 1/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 1/4" (8.26 cm)	
Ref. No.	Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1.	Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2.	Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3.	Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4.	Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5.	Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6.	Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1378	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7.	Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8.	Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9.	Screw, Soc. Hd.	7002-010 OC100A	4	7002-008 NC125A	4	7002-025 OC125A	8	7002-008 NC125A	6	7002-025 OC175A	8	7002-025 OC175A	4
10.	Lock Washer	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4

SINGLE STAGE		ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
Piston Assembly No.		1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter		3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4.5" (11.43 cm)		4" (10.16 cm)	
Ref. No.	Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1.	Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2.	Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3.	Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4.	Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5.	Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6.	Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7.	Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8.	Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9.	Screw, Soc. Hd.	7002-010 OC100A	4	7002-025 OC125A	8	7002-010 OC100A	4	7002-025 OC125A	8	7002-025 OC125A	8
10.	Lock Washer	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8

PISTON CLEARANCE (COLD)

MODEL	X" INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D491, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

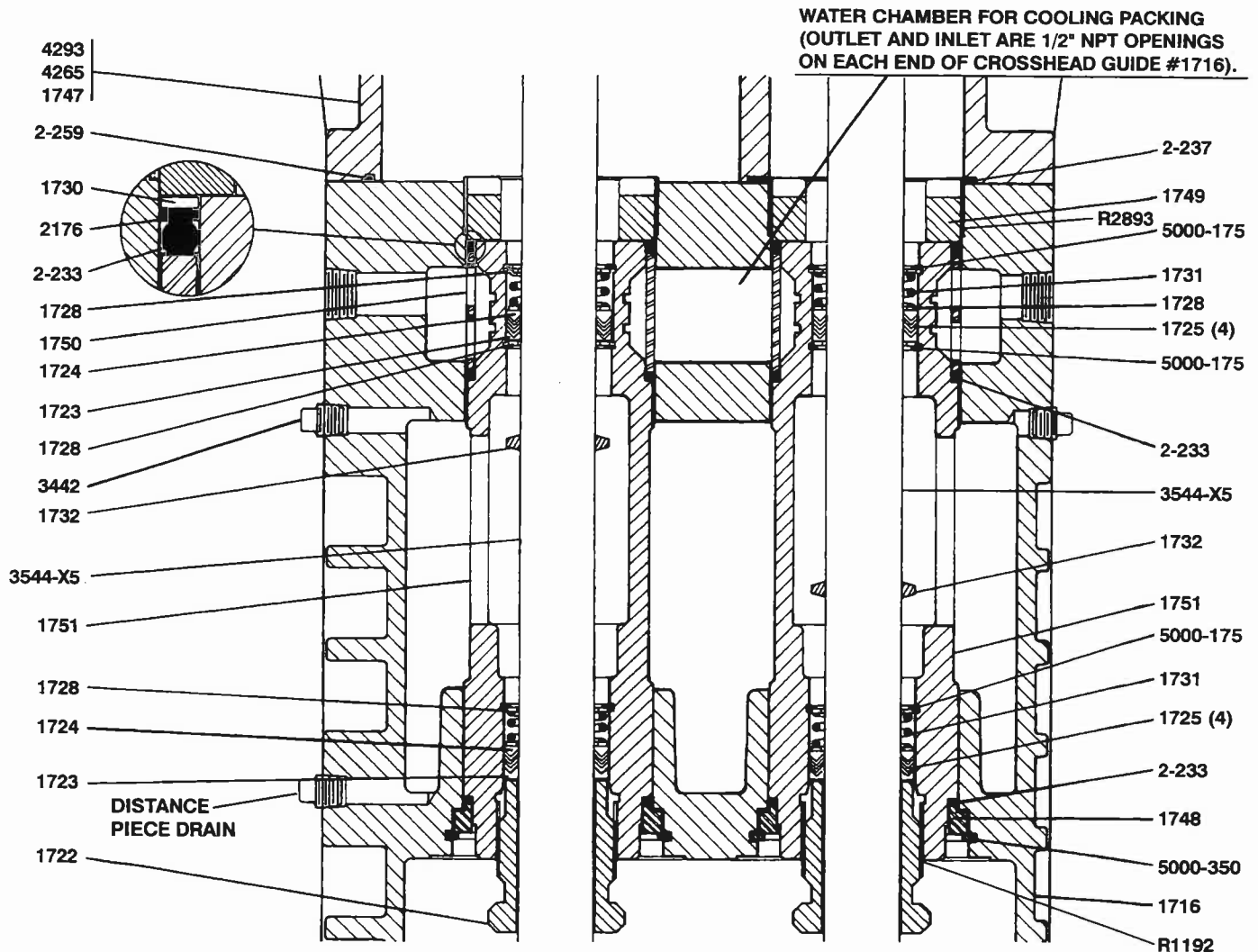
NOTES:

- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS
MODELS D590A, WD590A, FD591, WFD591 COMPRESSORS
M-STYLE CRANKCASE - ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E282E
MARCH	1997
SUPERSEDES	E282D



PART NO.	PART NAME
1716	CROSSHEAD GUIDE
1722	ADJUSTING SCREW
1723	FEMALE PACKING RING
1724	MALE PACKING RING
1725	PACKING RING
1728	PACKING WASHER
1730	CAGE WASHER
1731	PACKING SPRING
1732	OIL DEFLECTOR RING
1747	CYLINDER (D/WD590 ONLY)
1748	CARTRIDGE PLATE
1749	CARTRIDGE HOLDDOWN SCREW
1750	PACKING BOX CAGE
1751	PACKING BOX CARTRIDGE
2176	BACK-UP RING (TFE)
3442	PIPE PLUG, 1/4" NPT
5000-175	RETAINER RING
5000-350	RETAINER RING
2-233	O-RING
2-237	O-RING
2-259	O-RING
4293	CYL FD591
4265	CYL WFD591

ASSEMBLY NO.	ASSEMBLY NAME
1716-X	CROSSHEAD GUIDE ASSEMBLY WITH 1716, 1748 (2), 5000-350 (2)
3544-X5	CROSSHEAD-PISTON ROD ASSEMBLY - STD.
*3544-X6	CROSSHEAD-PISTON ROD ASSEMBLY - CHROME OXIDE
1725-2X	PACKING SET WITH 1723, 1724, 1725, (4), 1728, 1731
*1725-2X2	PACKING SET - ALLOY/K-RING

*OPTIONAL

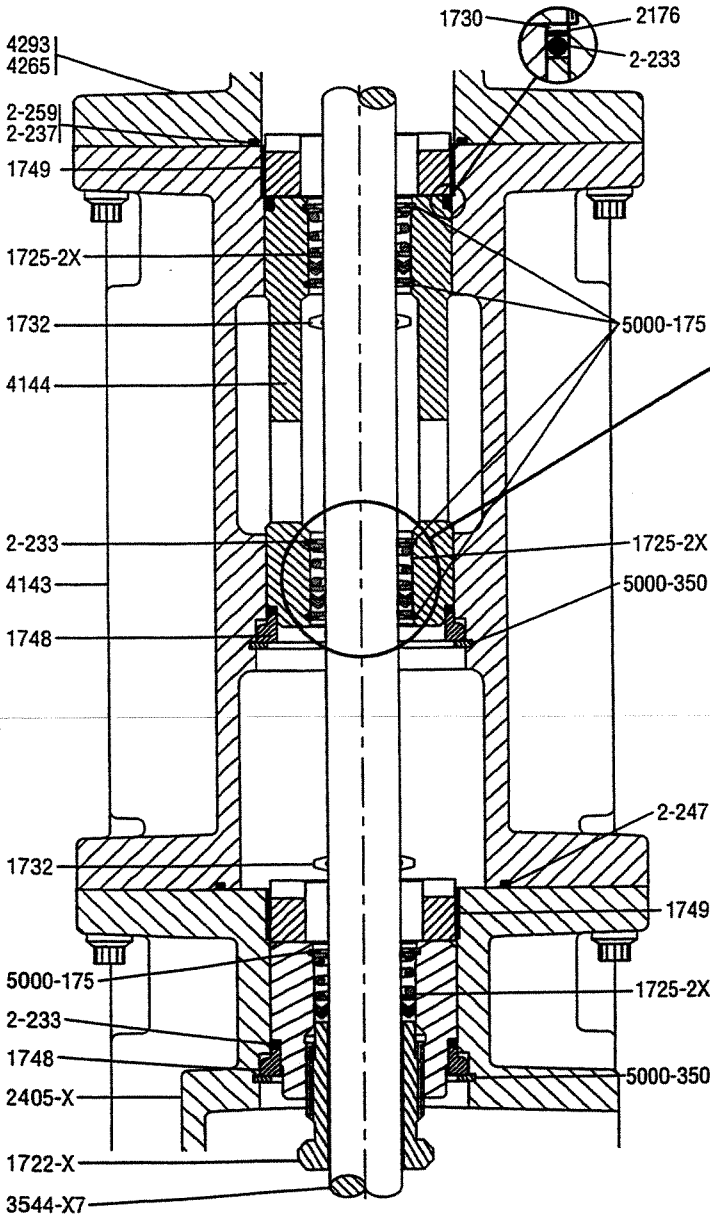
**USE 3905 CONE FOR PACKING INSTALLATION.
FOR O-RING MATERIAL CODING SEE PAGE A500.
SEE PAGE E270 FOR DESCRIPTION AND APPLICATION OF
DISTANCE PIECE ARRANGEMENTS.**

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE UNIT
BEFORE ATTEMPTING ANY REPAIRS.**

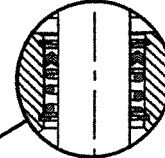
**DISTANCE PIECE DETAILS
ALL MODELS T591 COMPRESSORS
ALL SPECIFICATIONS**

PACKING SPEC. G

PACKING SPEC. H



Invert middle packing set only for packing specification 'H' as shown below.



PART NO.	PART NAME
1722	ADJUSTING SCREW WITH LOCKING DEVICE
1723	FEMALE PACKING RING
1724	MALE PACKING RING
1725	PACKING RING
1728	PACKING WASHER
1730	CAGE WASHER
1731	PACKING SPRING
1732	OIL DEFLECTOR RING
1748	CARTRIDGE PLATE
1749	CARTRIDGE HOLDDOWN SCREW
1750	PACKING BOX CAGE
1751	PACKING BOX CARTRIDGE
2176	BACKUP RING (TFE)
2405-X	CROSSHEAD GUIDE
2893	LOCKING DEVICE
4143	DISTANCE PIECE
4144	PACKING CARTRIDGE
4265	CYLINDER - WFD591 (WATER COOLED)
4293	CYLINDER - FD151
5000-175	RETAINER RING
5000-350	RETAINER RING
2-233	O-RING
2-237	O-RING - STAGE 2
2-259	O-RING - STAGE 1

ASSEMBLY NUMBER	ASSEMBLY NAME
1725-2X	PACKING SET WITH 1723, 1724, 1725 (4), 1728, 1731
1725-2X2	PACKING SET WITH K-RING SPACERS (OPTIONAL)
2405-X	CROSSHEAD-GUIDE ASSEMBLY WITH 2405, 1748 (2), 5000-350 (2)
3544-X7	CROSSHEAD PISTON ROD ASSEMBLY
3544-X8	CROSSHEAD PISTON ROD ASSEMBLY - CHROME OXIDE (OPTIONAL)

PACKING SPEC. IDENTIFICATION:

Example: Model No. T691 **G** M4
WFT691 **H** M9

Packing Spec. _____

For o-ring material coding see page A500.

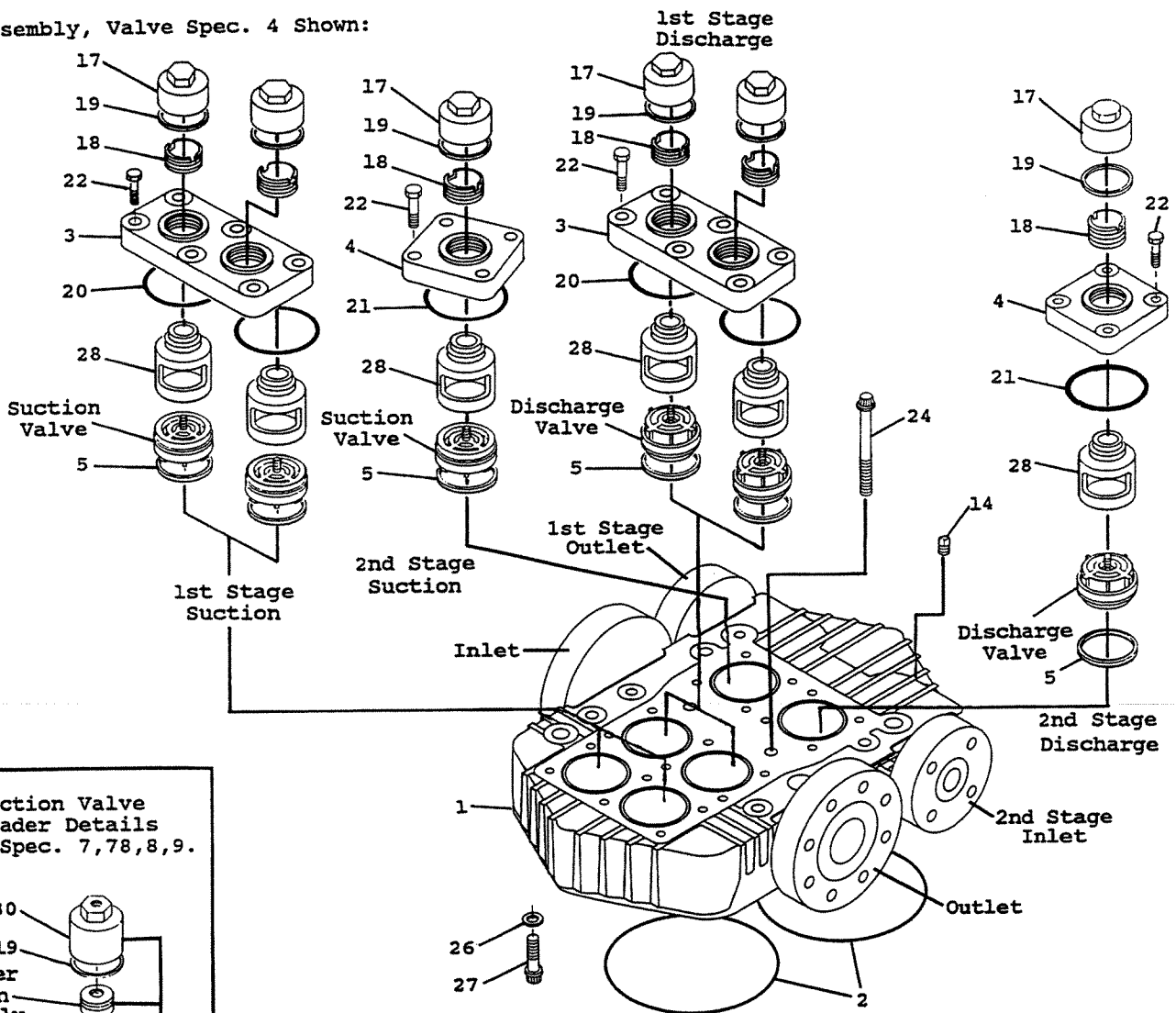
Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example 3713C).

Assembly Note: Use packing installation cone *3905 when installing packing cartridge on piston rod.

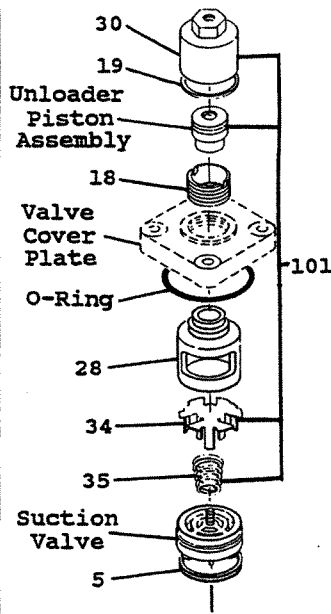
HEAD ASSEMBLY DETAILS
FD/FT591, WFD/WFT 591
ALL MODELS
ALL SPECIFICATIONS

SERVICE MANUAL
 PAGE E328
 AUGUST 1999
 FIRST ISSUE

Head Assembly, Valve Spec. 4 Shown:

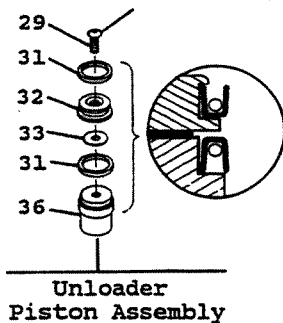


Suction Valve
 Unloader Details
 Valve Spec. 7,78,8,9.

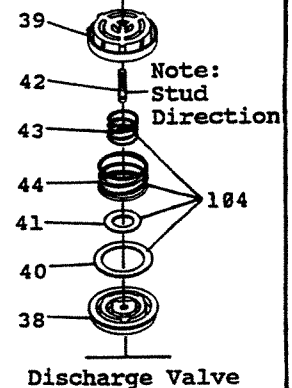
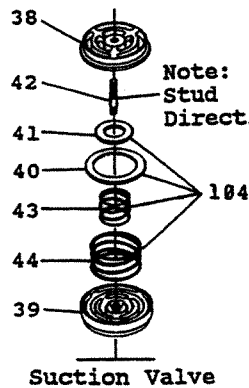


Unloader Piston Details

Apply Loctite #290
 when assembling



Valve Details



HEAD ASSEMBLY DETAILS
FD/FT591, WFD/WFT 591
ALL MODELS
ALL SPECIFICATIONS

REF. NO.	PART NO.	PART NAME
1.	4294	Head (FD591 Only)
	4264	Head (WFD591 Watercool) (Not Shown)
2.	2-259	Head Gasket O-ring - 2 Required
3.	1763	Valve Cover Plate
4.	1764	Valve Cover Plate
5.	2114	Valve Gasket, Aluminum
(a)	2114-1	Valve Gasket, Copper
(a)	2114-2	Valve Gasket, Iron
6.	—	Omitted
7.	—	Suction Flange
(a)	—	Suction Flange
8.	—	Omitted
9.	2201	Unloader Piston, Steel
10.	—	Omitted
11.	—	Omitted
12.	—	Omitted
13.	—	Omitted
14.	3442	Plug, 1/4" NPT
15.	—	Omitted
16.	—	Omitted
17.	2714-1	Valve Cap (Grooved for O-ring)
18.	2715	Holddown Screw
(b)	2-031	O-ring, Valve Cap
(b)	2-151	O-ring, Cover Plate
(b)	2-235	O-ring, Cover Plate
22.	7001-043	
	NC125A	Bolt, Hex Hd 7/16-14 x 1-1/4
23.	7001-043	
	NC150A	Bolt, Hex Hd 7/16-14 x 1-1/2
24.	2136	Center Head Bolt
25.	—	Omitted
26.	7005-050	
	NC150A	Bolt, 1/2-13 x 1-1/2" Ferry Hd
27.	7206-050A	Regular Lockwasher, 1/2
28.	2797	Valve Cage
29.	1910	Bolt, 1/4-20 x 1/2" Soc Button Hd
30.	2598-1	Unloader Cap
31.	2619-X	Piston Seal Assembly
32.	2857	Piston Cap
33.	2858	Unloader Piston Cap Gasket
34.	4032	Unloader Actuator
35.	4033	Unloader Spring
36.	2710	Unloader Piston
37.	—	Omitted
38.	3856	Valve Seat
39.	3857	Valve Bumper
40.	3871	Outer Valve Plate
41.	3872	Inner Valve Plate
42.	3920	Valve Stud
43.	3929	Inner Valve Spring - Heavy
44.	3928	Outer Valve Spring - Heavy

NOTES:

- (a) Optional.
- (b) For O-ring Material Coding see Page A500.

REF. NO.	ASSY. NO.	ASSEMBLY NAME
101.	4032-X	Suction Valve Unloader Assembly with 29, 30, 31, 32, 33, 34, 35, 36.
102.	3856-X	Suction Valve Assembly with 5, 38, 39, 40, 41, 42, 43, 44.
(a)	3856-X1	Same as above but with Copper Gaskets
(a)	3856-X2	Same as above but with Iron-Lead Gaskets
103.	3857-X	Discharge Valve Assembly with 5, 38, 39, 40, 41, 42, 43, 44.
(a)	3857-X1	Same as above but with Copper Gaskets
(a)	3857-X2	Same as above but with Iron-Lead Gaskets
104.	3146-X1	Valve Repair Kit (Suction or Discharge)

NOTES:

- (a) Optional.

IDENTIFICATION OF VALVE UNLOADER SPEC.

Example: Model No. 591M FBA
 Valve/Unloader Spec. _____

SPEC.	HEAD ASSY. NO.	MODEL NUMBER
4	4294-X2	FD591
7, 78, 8, 9	4294-X3	FD591
4	4264-X2	WFD591
7, 78, 8, 9	4264-X3	WFD591

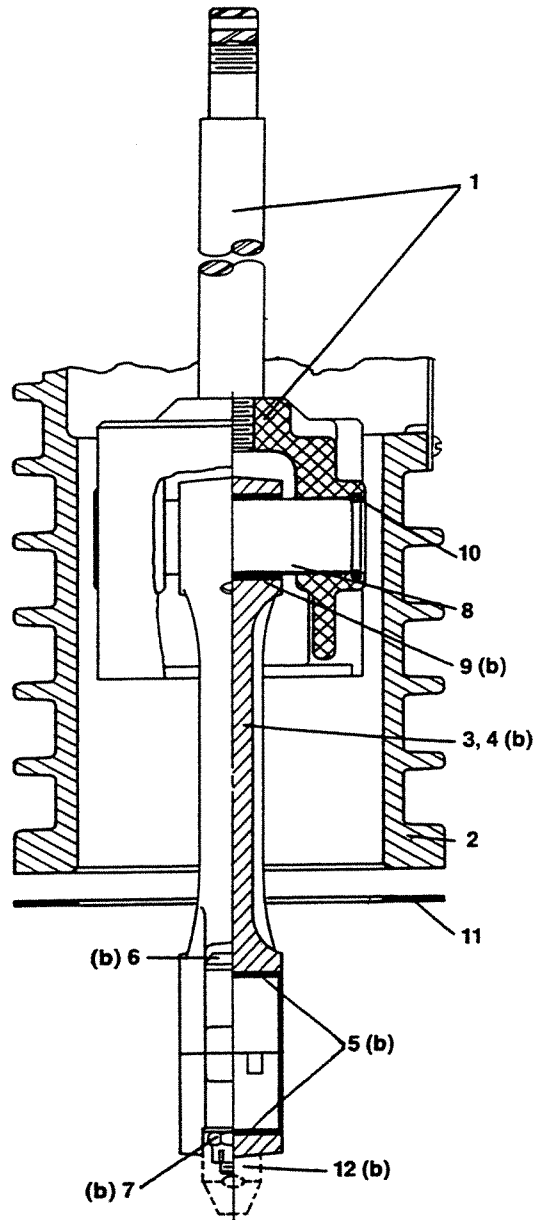
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

NOTE:

Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example 4294C).

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



Refer to Parts List
on back side of this
sheet.

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

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

MODEL NUMBER	91	A91 D91	T91	191	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	D791 D8091	
NO.	DESCRIPTION																			
1.	CROSSHEAD ASSEMBLY																			
2.	CROSSHEAD GUIDE																			
3.	CONN. ROD ASSY.																			
4.	CONNECTING ROD																			
5.	CONN. ROD BEARING																			
6.	BOLT																			
7.	NUT																			
8.	WRIST PIN																			
9.	WRIST PIN BUSHING																			
10.	RETAINER RING																			
11.	CRANKCASE GASKET																			
12.	DIPPER																			

NOTES:

- (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.
- (d) Torque Connecting Rod Nut to 30 ft.lbs.
- (e) Torque Connecting Rod Nut to 40 ft.lbs.
- (f) Optional Chrome Oxide Piston Rods Only

- (g) Second Stage (Smaller Piston)
- (h) S/N XC30633 and Later
- (i) Prior to S/N XC30633
- (k) Must be rebored after replacing (1.1256/1.1252 Dia.)

Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

CRANKCASE DETAILS

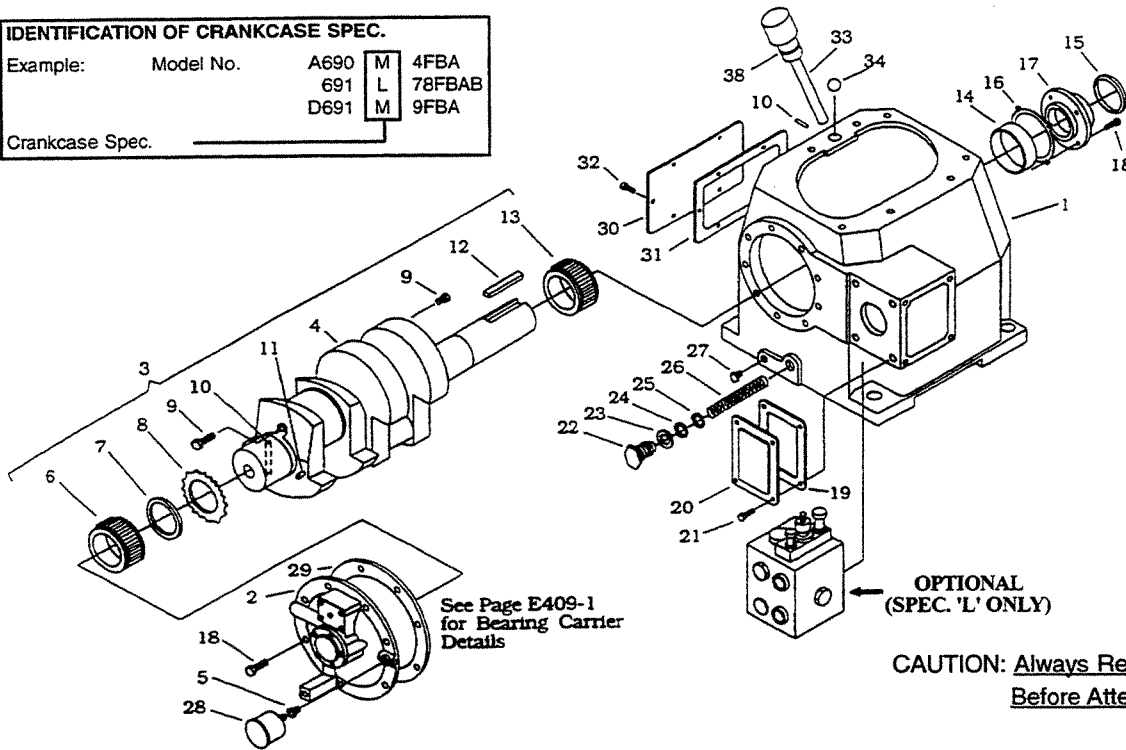
ALL MODELS 590, 591, 690, 691, D791, D891

CRANKCASE SPECIFICATION: M

CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)

SERVICE PAGE	MANUAL E408-1C
AUGUST	1999
SUPERSEDES	E408-1B

IDENTIFICATION OF CRANKCASE SPEC.			
Example:	Model No.	A690	M 4FBA
		691	L 78FBAB
		D691	M 9FBA
Crankcase Spec.			



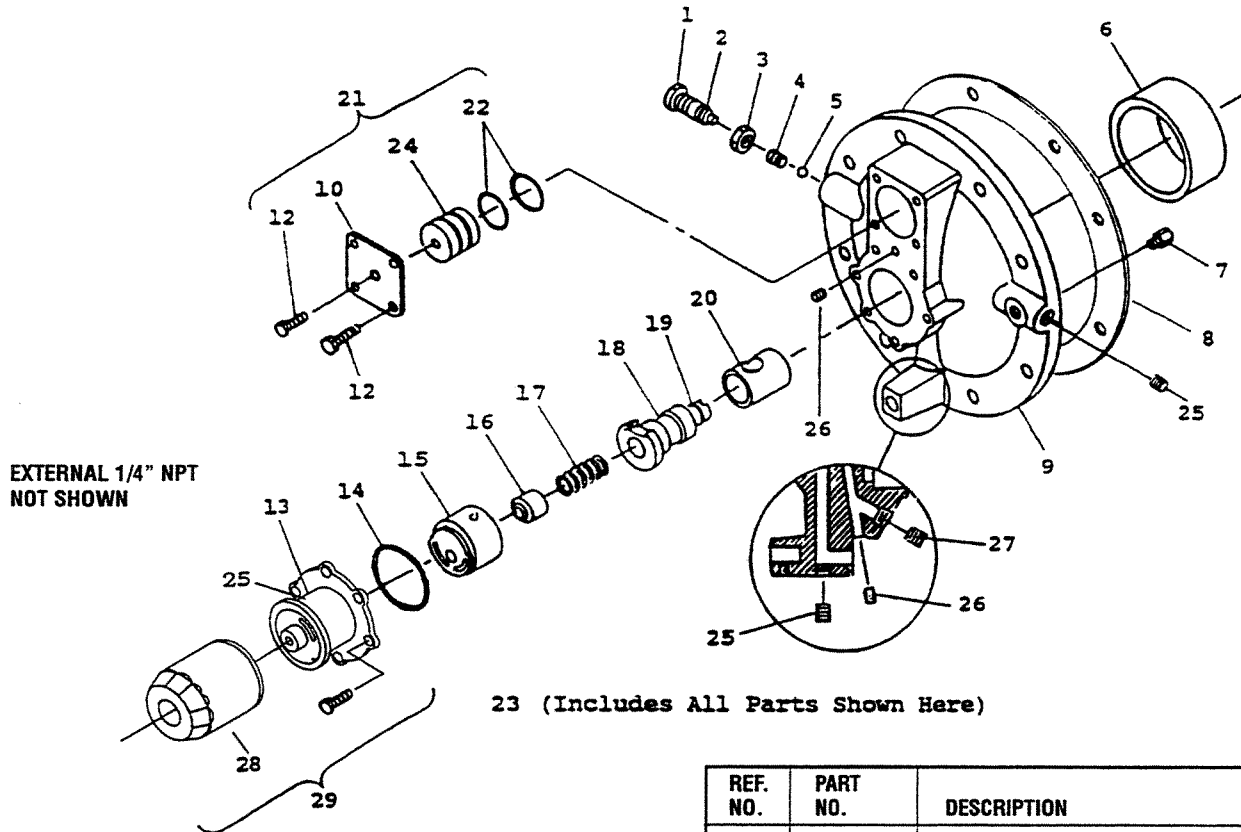
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

REF. NO.	PART NO.	DESCRIPTION
1	3221	Crankcase
2	3220-2X	Bearing Carrier Assembly
3	3786-X1	Crankshaft Assembly
4	3786	Crankshaft
5	1044	Bushing, 1/8 x 1/4 NPT
6	1737	Bearing Cone
7	3638	Spacer
8	3635	Drive Sprocket
9	1284	Crankshaft Orifice
10	2135	Drive Pin
11	2933	Link Pin
12	3503	Flywheel Key
13	3580	Bearing Cone
14	3579	Bearing Cup
15	3526	Oil Seal
16	3589	Bearing Adjustment Shim (.005")
	2589-1	Bearing Adjustment Shim (.007")
	2589-2	Bearing Adjustment Shim (.020")
17	3539	Bearing Cover
18	7001-037	
	NC100A	Bolt, 3/8 - 16 x 1" Hex Head Gr 5
19	3874	Gasket, Access Cover
20	3875	Access Cover
21	7003-025	
	NC037E	Screw, 1/4 - 20 x 3/8"
22	1280	Filter Screw
23	1281	Gasket, Filter
24	2-116A	O-ring
25	1276	Washer
26	1275	Oil Filter Screen

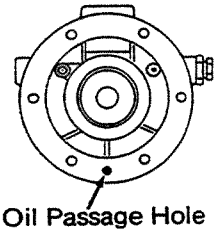
REF. NO.	PART NO.	DESCRIPTION
27	3443	Pipe Plug, 1/2" NPT Steel
28	1302	Oil Pressure Gauge
29	2131	Gasket, Bearing Carrier
30	2122	Inspection Cover
31	2123	Gasket, Inspection Cover
32	7001-031	
	NC075A	Bolt, 5/16 - 18 x 3/4" Hex Head
33	3225-X1	Oil Bayonet Assembly (w/ O-ring)
34	2126	Breather Ball (Not Used on A590, WA590, A690, WA690)
35	—	—
36	1885-1	Blank Flange
37	2010	Flange Gasket
38	2-210A	O-ring
(a) —	3852-X	Flywheel Assembly (D791, D891 Only)
(a) —	1762-X	Flywheel Assembly (590/690 Models Only)
(a) —	3852	Flywheel 21.2", 5V, 5 Groove
(a) —	3918	Flywheel Hub Type J2 - 1/8" Bore (D791, D891 Only)
(a) —	1762	Flywheel 19 - 1/2" AB, 4 Groove
(a) —	3918	Flywheel Hub Type E 2 - 1/8" Bore (590 / 690 Models Only)
(a) —	3221-X1	Crankcase Assembly (M3, 4, 8, 9) w/o Lub.
(a) —	3221-X2	Crankcase Assembly (M7, 78) w/o Lub.
(a) —	3221-X3	Crankcase Assembly (L3, 4, 8, 9) w/o Lub.
(a) —	3221-X4	Crankcase Assembly (L7, 78) w/o Lub.

NOTES:
(a) Not Shown

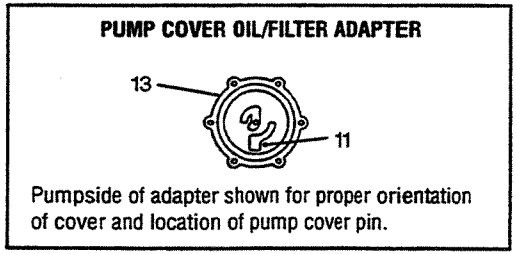
BEARING CARRIER DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)



Inside of Bearing Carrier



IMPORTANT
 Line up hole in gasket with oil passage hole.



23 (Includes All Parts Shown Here)

REF. NO.	PART NO.	DESCRIPTION
1	1290	Relief Valve Adjusting Screw
2	2-011A	O-ring
3	1291	Adjusting Screw Locknut
4	1292	Relief Valve Spring
5	1293	Relief Valve Ball
6	1736	Bearing Cup
7	2961-X	Air Release Valve Assembly
8	2131	Bearing Carrier Gasket
9	3220-2	Bearing Carrier
10	1515	Closure Cap
11	2798	Pump Cover Pin (Included w/ 4222-X)
12	7001-025 NC050A	Bolt, 1/4 - 20 x 1/2" Hex Head
(b) 13	4222-X	Oil Filter Adapter Assembly (w/ pin)
14	2-228A	O-ring
(b) 15	2849-1X	Oil Pump Assembly
16	2851	Spring Guide
17	2852	Oil Pump Spring
18	3219	Pump Shaft Adapter
19	2-112A	O-ring
(a) 20	2805-X	Pump Shaft Bushing
21	1515-X	Closure Cap Assembly
22	2-118A	O-ring
23	3220-2X	Bearing Carrier Assembly
24	1516	Closure Body
25	3289	Pipe Plug, 1/4 NPT Fl. Seal
26	1629	Pipe Plug, 1/16 NPT Fl. Seal
27	2590	Pipe Plug, 1/8 NPT Fl. Seal
28	4225	Filter
29	4222-X	Filter Adapter Assembly

NOTES:
 (a) Must be rebores and honed after replacing. (0.876"/0.875" Diameter)
 (b) Caution: To avoid damage during assembly, refer to Installation Instruction Manual IE400.

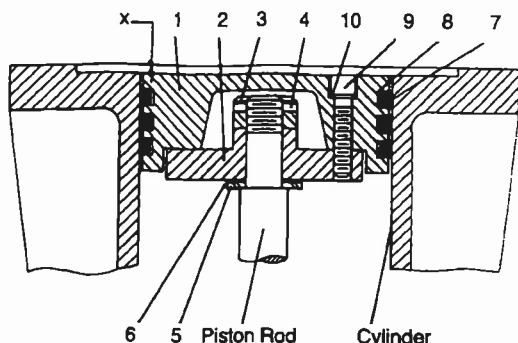
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

**PISTON ASSEMBLIES
MODEL 91 - 691**

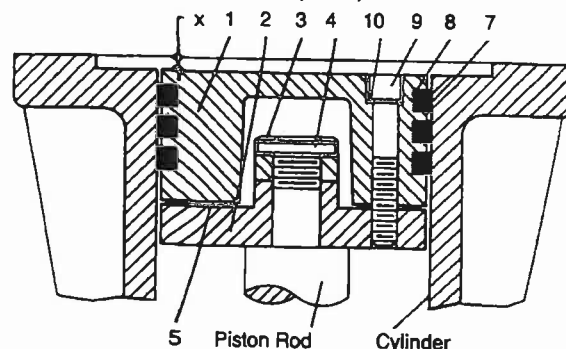
SERVICE PAGE **MANUAL E200L**

MAY 1997
SUPERSEDES E200K

MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



Piston Assembly No.	ALL MODELS 190/191				ALL MODELS 390/391				ALL MODELS 590/591			
	1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter	3" (7.62 cm)		1 3/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 3/4" (8.26 cm)	
Ref. No.	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2. Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3. Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick	1528	As Req.	1378	As Req.	1528	As Req.	1528	As Req.	1735	As Req.	1735	As Req.
6. Shim Washer, Thin	1528-1				1528-1		1528-1		1735-1		1735-1	
7. Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8. Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9. Screw, Soc. Hd.	7002-010		7002-008		7002-025		7002-008		7002-025		7002-025	
	OC100A	4	NC125A	4	OC125A	8	NC125A	6	OC175A	8	OC175A	4
	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4
10. Lock Washer												

Piston Assembly No.	ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
	1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter	3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4.5" (11.43 cm)		4" (10.16 cm)	
Ref. No.	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2. Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3. Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick	1528	As Req.	1528	As Req.	1528	As Req.	1735	As Req.	1735	As Req.
6. Shim Washer, Thin	1528-1		1528-1		1528-1		1735-1		1735-1	
7. Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8. Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9. Screw, Soc. Hd.	7002-010		7002-025		7002-010		7002-025		7002-025	
	OC100A	4	OC125A	8	OC100A	4	OC125A	8	OC125A	8
	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8
10. Lock Washer										

PISTON CLEARANCE (COLD)

MODEL	X" INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D491, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

NOTES:

- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

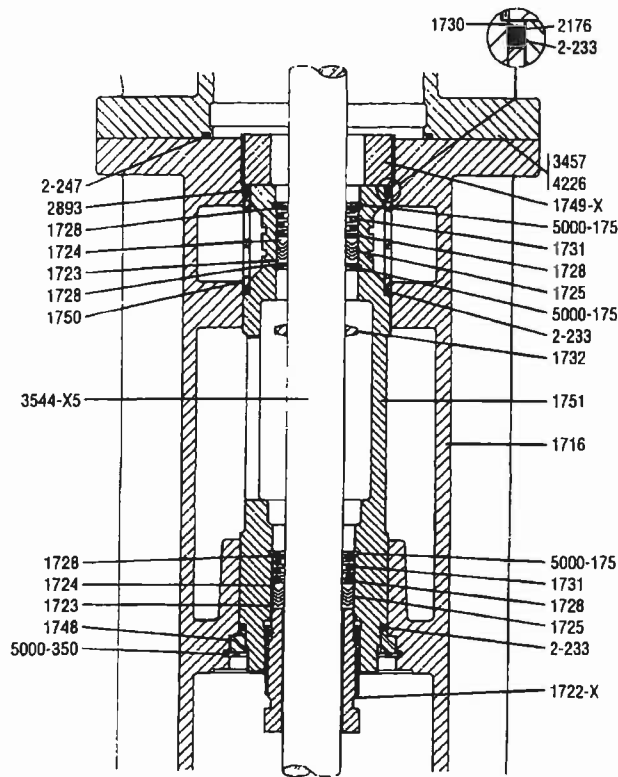
**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS

MODELS D691, D691-4, WFD691, WFD691-4 COMPRESSORS

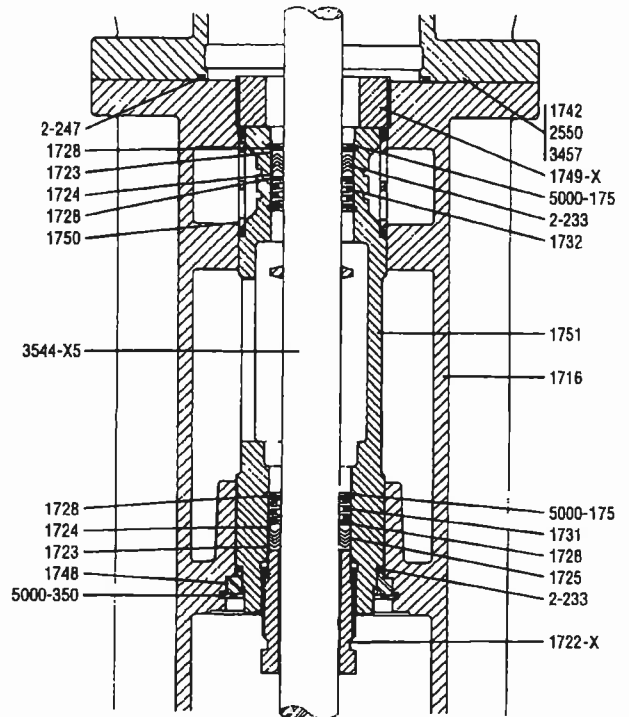
ALL SPECIFICATIONS

PACKING SPEC. A



PACKING SPEC. B

Water chamber for cooling packing. (Inlet and outlet are 1/2" NPT openings on each end of crosshead guide 1716. on WD691 and WD691-4 outlet is tubed to water-cooled head.)



PART NO.	PART NAME
1716	Crosshead Guide
1722-X	Adjusting Screw
1723	Female Packing Ring
1724	Male Packing Ring
1725	Packing Ring
1728	Packing Washer
1730	Cage Washer
1731	Packing Spring
1732	Oil Deflector Ring
1748	Cartridge Plate
1749-X	Cartridge Holddown Screw
1750	Packing Box Cage
1751	Packing Box Cartridge
2176	Backup Ring (TFE)
2893	Locking Device
3457	Cylinder (D691 and WFD691 Only)
4226	Cylinder (D691-4 and WFD691-4 Only)
5000-175	Retainer Ring
5000-350	Retainer Ring
2-233	O-Ring
2-247	O-Ring

PACKING SPEC. IDENTIFICATION:

MODEL NO.	D191	A	M78
EXAMPLE	D491	B	M9
PACKING SPEC.			

ASSEMBLY NUMBER	ASSEMBLY NAME
1716-X	Crosshead-Guide Assembly with 1716, 1748 (2), 5000-350 (2)
1725-2X	Packing Set with 1723, 1724, 1725 (4), 1728, 1731
1725-2X2	Packing Set w/ K-Ring Spacers (Optional)
3544-X5	Crosshead-Piston Rod Assembly
3544-X6	Crosshead Piston Rod Assembly - Chrome Oxide (Optional)

For O-ring material coding see page A500.

See page E270 for description and application of distance piece arrangements.

Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example 3713C).

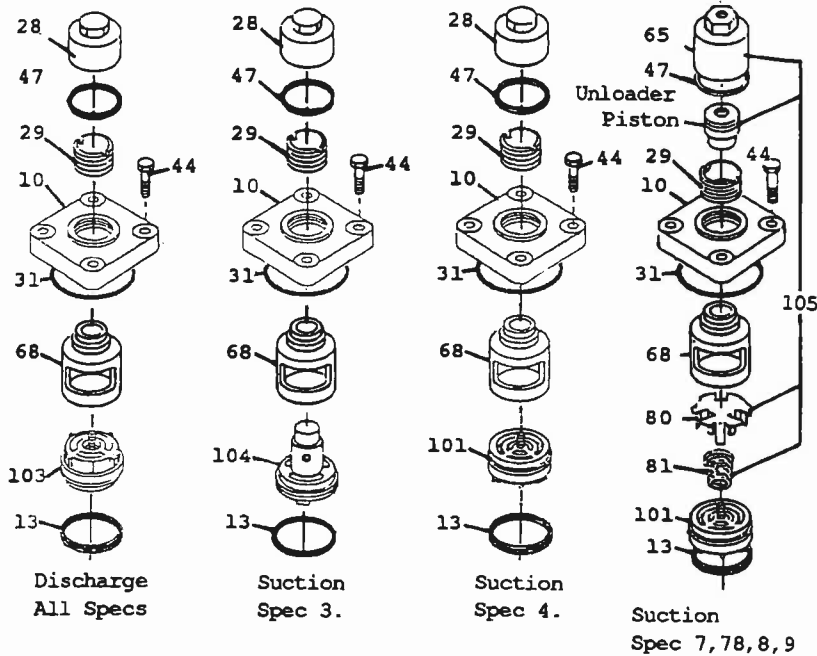
Assembly Note: Use packing installation cone *3905 when installing packing cartridge on piston rod.

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

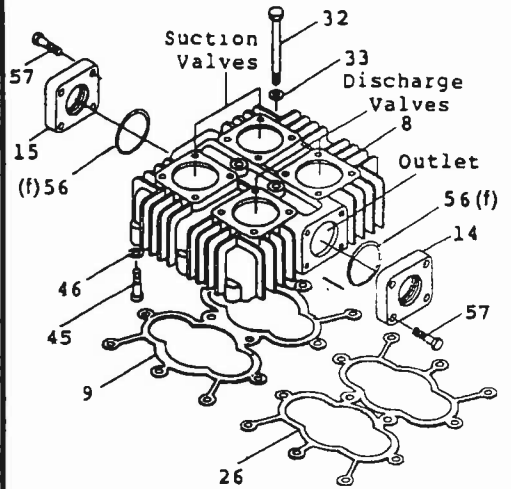
HEAD ASSEMBLY DETAILS
 MODEL 690, W690, 691, WA691, D690,
 D690-4, D691, WD690, WD690-4
 S/N MR50653 AND LATER
 ALL SPECIFICATIONS

SERVICE MANUAL
 PAGE E330F

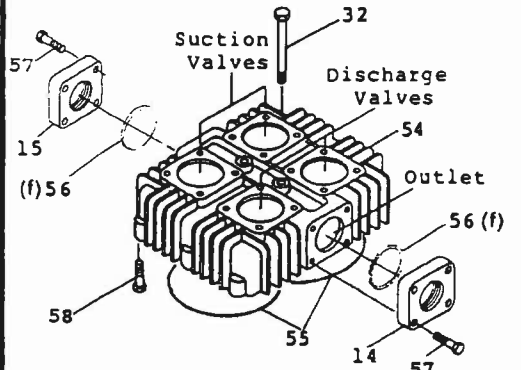
November 1991
 Supersedes E330E



Model: 690, A690, D690, D690-4



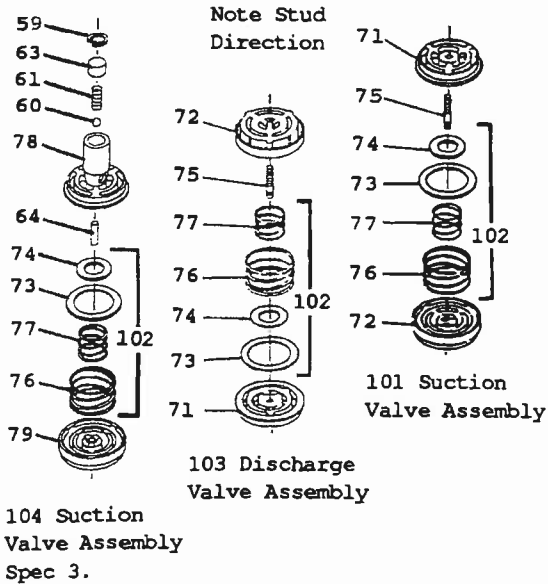
Model: 691, D691



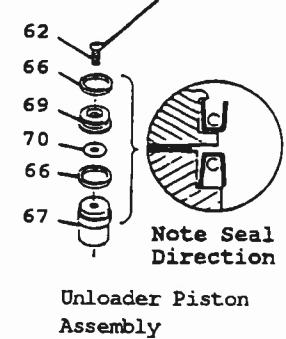
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

IDENTIFICATION OF VALVE UNLOADER SPEC.			
Example:	Model No.	690P	4
		690K	78
		690M	9
			FBA
			FBAB
			FBA
	Valve Unloader Spec.		

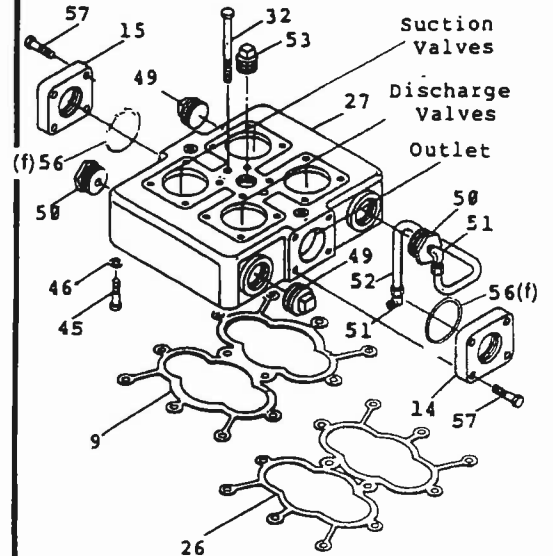
Valve Details



Apply Loctite #290 when assembling



Model: W690, WA690, WD690, WD690-4



SERVICE MANUAL
 PAGE E331F
 November 1991
 Supersedes E331E

HEAD ASSEMBLY DETAILS
 MODEL 690, W690, 691, WA691, D690,
 D690-4, D691, WD690, WD690-4
 S/N MR50653 AND LATER
 ALL SPECIFICATIONS

REF. PART NO. NO.	PART NAME
1. thru 7.	Omitted
8. 1743	Head (690,A690,D690,D690-4 Only)
(d) 9. 1744	Head Gasket (690,W690,A690,WA690, D690, WD690 Only)
(e) 1744-1	Head Gasket Grafoil
10. 1764	Valve Cover Plate
11. ---	Omitted
12. ---	Omitted
13. 2114	Valve Gasket, Aluminum
(e) 2114-1	Valve Gasket, Copper
(e) 2114-2	Valve Gasket, Iron
14. 2144-1.5	Flange(Discharge) 1-1/2" NPT
2144-1.5S	Flange 1-1/2" Weld
15. 2144-2	Flange(Suction) 2" NPT
(e) 2144-2S	Flange 2" Weld
16. thru 25.	Omitted
(d) 26. 2498	Head Gasket (D690-4,WD690-4 Only)
(e) 2498-1	Head Gasket, Grafoil
27. 2579	Head, Water-Cooled (W690,WA690, WD690, WD690-4 Only)
(a) 28. 2714	Valve Cap
(b) 2714-1	Valve Cap, Grooved for O-ring
29. 2715	Holddown Screw
(a) 30. 2716	Valve Cap Gasket, Aluminum
(e) 2716-1	Valve Cap Gasket, Copper
(e) 2716-2	Valve Cap Gasket, Lead
(c) 31. 2-235	O-ring (Cover Plate)
32. 2136	Center Head Bolt
33. 1625	Center Head Bolt Gasket, Aluminum
(e) 1625-1	Center Head Bolt Gasket, Copper
(e) 1625-2	Center Head Bolt Gasket, Iron-Lead
34. thru 42.	Omitted
43. 7001-021	NC075A Screw, 1/4-20 x 3/4" Hex Hd.Gr 5
44. 7001-043	NC137A Bolt, 7/16-14 x 1-3/8" Hex Hd.
45. 7005-043	NC125A Bolt, 7/16-14 x 1-1/4" Ferry Hd.
46. 7006-043A	Reg. Lockwasher 7/16"
(c) 47. 2-031	O-ring, Valve Cap
49. 2825	Pipe Plug 1-1/2" NPT
50. 2876	Bushing 1-1/2 x 1/2 Galv.
51. 2322	Elbow, 1/2P x 1/2T Brass
(e) 2322-1	Elbow, 1/2P x 1/2T Steel
52. R2918	Tube, 1/2" (Specify Length), Copper
(e) R3433	Tube, 1/2" (Specify Length), Steel
53. 3643	Pipe Plug, 1" NPT
54. 3458	Head (691,D691 Only)
(c) 55. 2-261	O-Ring, Head(691,D691) WFD691-4
(f) 56. 2-231	O-Ring
57. 7001-043	NC150A Bolt, 7/16-14 x 1-1/2" Hex Hd.
58. 7005-050	NC150A Bolt, 1/2-13 x 1-1/2" Ferry Hd.
59. 5000-77	Retainer Ring
60. 1410	Relief Ball
61. 1411	Spring
62. 1910	Bolt, 1/4-20 x 1/2 Soc. Button Hd.
63. 3977	Suction Valve Relief Housing (Spec 3)
64. 2534-1	Suction Valve Post (Spec 3)
65. 2598-1	Unloader Cap

REF. PART NO. NO.	PART NAME
66. 2619-X	Piston Seal Assembly
67. 2710	Unloader Piston
68. 2797	Valve Cage
69. 2857	Piston Cap
70. 2858	Unloader Piston Cap Gasket
71. 3856	Valve Seat
72. 3857	Valve Bumper
73. 3871	Outer Valve Plate
74. 3872	Inner Valve Plate
75. 3920	Valve Stud
76. 3928	Outer Valve Spring
77. 3929	Inner Valve Spring
78. 3948	Valve Seat (Spec. 3)
79. 3949	Valve Bumper (Spec. 3.)
80. 4032	Unloader Actuator
81. 4033	Unloader Spring

REF ASSY. NO. NO.	ASSEMBLY NAME
101. 3856-X	Suction Valve Assy (Incl.Valve Gasket)
(e) 3856-X1	Same as above but with Copper Gasket
(e) 2255-X2	Same as above but with Iron-Lead Gasket
102. 3146-X1	Valve Repair Kit (Suction & Discharge)
103. 3857-X	Discharge Valve Assy (Incl.Valve Gasket)
(e) 3857-X1	Same as above but with Copper Gasket
(e) 3857-X2	Same as above but with Iron-Lead Gasket
104. 3948-X	Suction Valve Assembly (Spec.3) (Incl. Valve Gasket)
(e) 3948-X1	Same as above but with Copper Gasket
(e) 3948-X2	Same as above but with Iron-Lead Gasket
105. 4032-X	Suction Valve Unloader Assembly

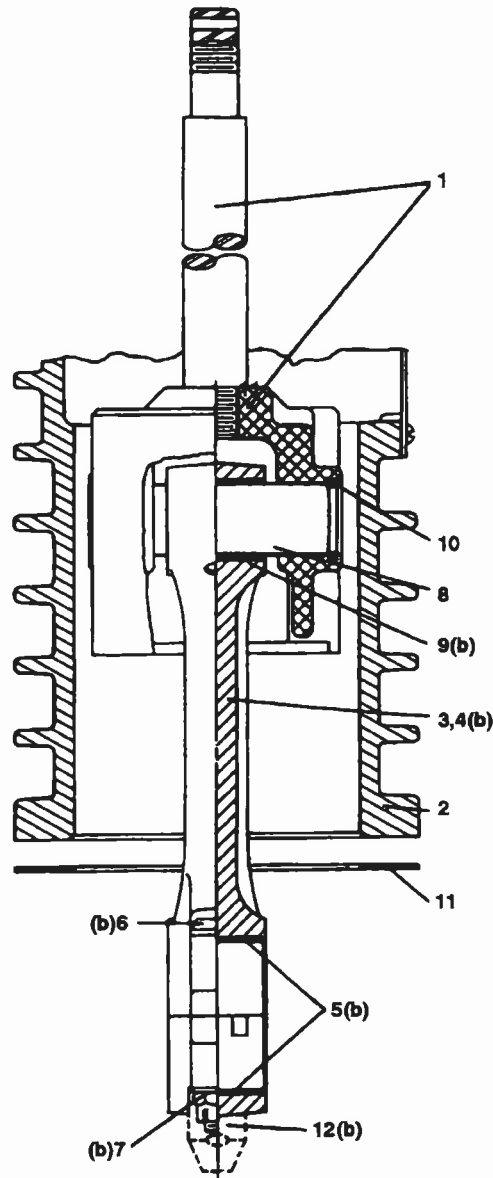
Spec.	Head Assy No.	Model No.
3:	1743-X	690,D690,D690-4,
3:	2579-X	W690,WD690,WD690-4,
3:	3458-X	691,D691
4:	1743-X1	690,D690,D690-4,A690
4:	2579-X1	W690,WD690,WD690-4,WA690
4:	3458-X1	691,D691
7,78,8,9:	1743-X2	690,D690,D690-4
7,78,8,9:	1743-X3	A690
7,78,8,9:	2579-X2	W690,WD690,WD690-4
7,78,8,9:	2579-X3	WA690
7,78,8,9:	3458-X2	691,D691

NOTES:
 (c) For O-Ring Material Coding see Page A500.
 (d) Not Included in Head Assembly.
 (e) Optional.
 (f) S/N NQ51455 and later. Earlier models use Gasket #2177

54. 4373 Head (WFD691, 691-4)
4373-X2 Head Assy. (WFD691, 691-4 spec 4)

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE	MANUAL
PAGE	E350J
MAY	1997
SUPERSEDES	E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

MODEL NUMBER	91	A91 D91	191	191	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	D791 D8091	
NO.	DESCRIPTION																	
1.	CROSSHEAD ASSEMBLY	1132-X2	1132-X3	1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4	1132-X8 (g) 1132-X7 1132-X9 (f) 1132-X10 (f)(g)	1132-X2 (f)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1384-X	1384-X1 1384-X4 (f)	1384-X2 1384-X3 (f)	1717-X	1717-X1	3544-X5	3544-X4	3544-X3
2.	CROSSHEAD GUIDE	2240	4940-X	4383-X	4383	4383-X	4383-X	4383-X	4383-X	2773-X	2773-X	2773-X	1716-X	2405-X	1716-X	2405-X	2405-1	
3.	CONN. ROD ASSY.	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889	1889-X	1889-X	1490-X	1490-X	1490-X	1720-X	3785-X1	3785-X1	3785-X1	3785-X	
4.	CONNECTING ROD	1889-1	1889-1	1889	1889	1889	1889	1889	1889	1490	1490	1490	1720	3785	3785	3785	3785	
5.	CONN. ROD BEARING	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1719	3542	3542	3542	3542	
6.	BOLT	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1726	1726	1726	1726	1726	
7.	NUT	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1600(c)	1493(d)	1493(d)	1493(d)	1727(e)	1727(e)	1727(e)	1727(e)	1727(e)	
8.	WRIST PIN	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1718	3540	3540	3540	3540	
9.	WRIST PIN BUSHING	1846-X(e)	1846-X(e)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1498	1498	1498	1495-X(a)	3541-X(k)	3541-X(k)	3541-X(k)	3541-X(k)	
10.	RETAINER RING	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	3590	3590	3590	3590	
11.	CRANKCASE GASKET	2526	2526	2526	2526	2526	2526	2526	2526	1761	1761	1761	1761	1761	1761	1761	1761	
12.	DIPPER	2011	2011	2011	2011	2011	2011	2011	2011	1761	1761	1761	1761	1761	1761	1761	1761	

NOTES:

- (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.
- (d) Torque Connecting Rod Nut to 30 ft.lbs.
- (e) Torque Connecting Rod Nut to 40 ft.lbs.
- (f) Optional Chrome Oxide Piston Rods Only

(g) Second Stage (Smaller Piston)

(h) S/N XC30633 and Later

(i) Prior to S/N XC30633

(k) Must be rebored after replacing (1.1256/1.1252 Dia.)

Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

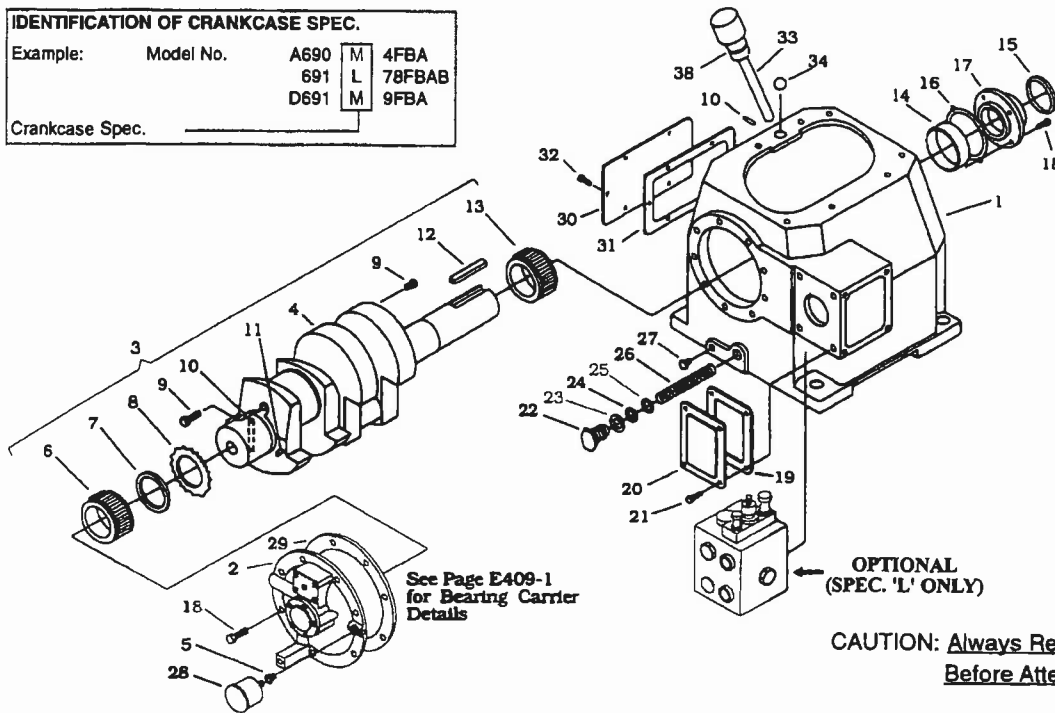
CRANKCASE DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)

SERVICE MANUAL
PAGE E408-1C
AUGUST 1999
SUPERSEDES E408-1B

IDENTIFICATION OF CRANKCASE SPEC.
Example: Model No. A690

M
L
M

 4FBA
691 78FBAB
D691 9FBA
Crankcase Spec. _____

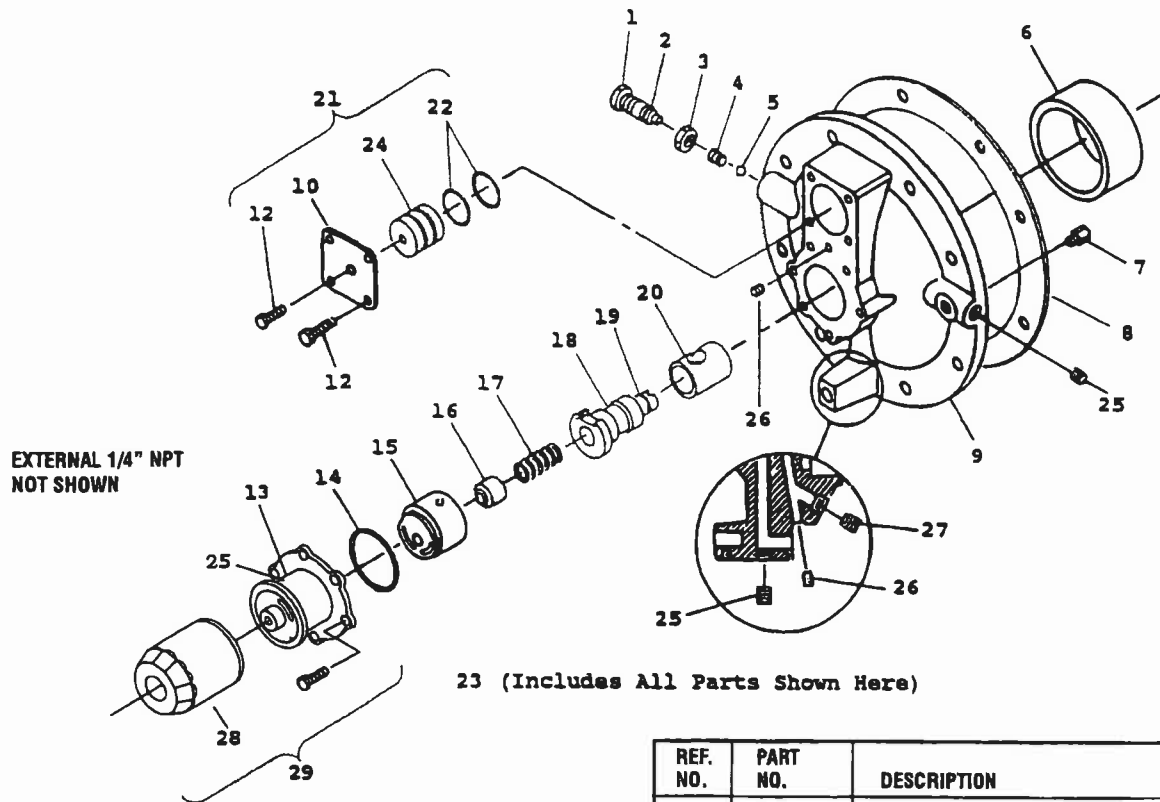


REF. NO.	PART NO.	DESCRIPTION
1	3221	Crankcase
2	3220-2X	Bearing Carrier Assembly
3	3786-X1	Crankshaft Assembly
4	3786	Crankshaft
5	1044	Bushing, 1/8 x 1/4 NPT
6	1737	Bearing Cone
7	3638	Spacer
8	3635	Drive Sprocket
9	1284	Crankshaft Orifice
10	2135	Drive Pin
11	2933	Link Pin
12	3503	Flywheel Key
13	3580	Bearing Cone
14	3579	Bearing Cup
15	3526	Oil Seal
16	3589	Bearing Adjustment Shim (.005")
	2589-1	Bearing Adjustment Shim (.007")
	2589-2	Bearing Adjustment Shim (.020")
17	3539	Bearing Cover
18	7001-037	
	NC100A	Bolt, 3/8 - 16 x 1" Hex Head Gr 5
19	3874	Gasket, Access Cover
20	3875	Access Cover
21	7003-025	
	NC037E	Screw, 1/4 - 20 x 3/8"
22	1280	Filter Screw
23	1281	Gasket, Filter
24	2-116A	O-ring
25	1276	Washer
26	1275	Oil Filter Screen

REF. NO.	PART NO.	DESCRIPTION
27	3443	Pipe Plug, 1/2" NPT Steel
28	1302	Oil Pressure Gauge
29	2131	Gasket, Bearing Carrier
30	2122	Inspection Cover
31	2123	Gasket, Inspection Cover
32	7001-031	
	NC075A	Bolt, 5/16 - 18 x 3/4" Hex Head
33	3225-X1	Oil Bayonet Assembly (w/ O-ring)
34	2126	Breather Ball (Not Used on A590, WA590, A690, WA690)
35	—	—
36	1885-1	Blank Flange
37	2010	Flange Gasket
38	2-210A	O-ring
(a) —	3852-X	Flywheel Assembly (D791, D891 Only)
(a) —	1762-X	Flywheel Assembly (590/690 Models Only)
(a) —	3852	Flywheel 21.2", 5V, 5 Groove
(a) —	3918	Flywheel Hub Type J2 - 1/8" Bore (D791, D891 Only)
(a) —	1762	Flywheel 19 - 1/2" AB, 4 Groove
(a) —	3918	Flywheel Hub Type E 2 - 1/8" Bore (590 / 690 Models Only)
(a) —	3221-X1	Crankcase Assembly (M3, 4, 8, 9) w/o Lub.
(a) —	3221-X2	Crankcase Assembly (M7, 78) w/o Lub.
(a) —	3221-X3	Crankcase Assembly (L3, 4, 8, 9) w/o Lub.
(a) —	3221-X4	Crankcase Assembly (L7, 78) w/o Lub.

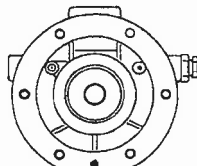
NOTES:
(a) Not Shown

BEARING CARRIER DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)



23 (Includes All Parts Shown Here)

Inside of Bearing Carrier



Oil Passage Hole

IMPORTANT

Line up hole in gasket with oil passage hole.

PUMP COVER OIL/FILTER ADAPTER



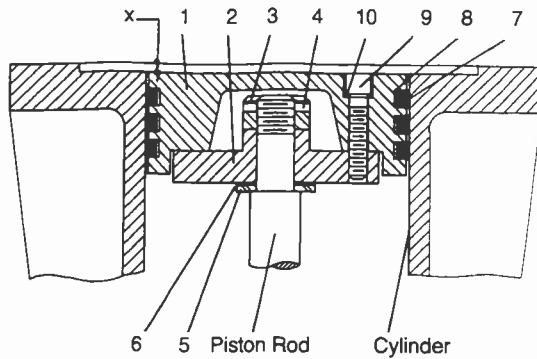
Pumpsides of adapter shown for proper orientation of cover and location of pump cover pin.

REF. NO.	PART NO.	DESCRIPTION
1	1290	Relief Valve Adjusting Screw
2	2-011A	O-ring
3	1291	Adjusting Screw Locknut
4	1292	Relief Valve Spring
5	1293	Relief Valve Ball
6	1736	Bearing Cup
7	2961-X	Air Release Valve Assembly
8	2131	Bearing Carrier Gasket
9	3220-2	Bearing Carrier
10	1515	Closure Cap
11	2798	Pump Cover Pin (Included w/ 4222-X)
12	7001-025 NC050A	Bolt, 1/4 - 20 x 1/2" Hex Head
(b) 13	4222-X	Oil Filter Adapter Assembly (w/ pin)
14	2-228A	O-ring
(b) 15	2849-1X	Oil Pump Assembly
16	2851	Spring Guide
17	2852	Oil Pump Spring
18	3219	Pump Shaft Adapter
19	2-112A	O-ring
(a) 20	2805-X	Pump Shaft Bushing
21	1515-X	Closure Cap Assembly
22	2-118A	O-ring
23	3220-2X	Bearing Carrier Assembly
24	1516	Closure Body
25	3289	Pipe Plug, 1/4 NPT Fl. Seal
26	1629	Pipe Plug, 1/16 NPT Fl. Seal
27	2590	Pipe Plug, 1/8 NPT Fl. Seal
28	4225	Filter
29	4222-X	Filter Adapter Assembly

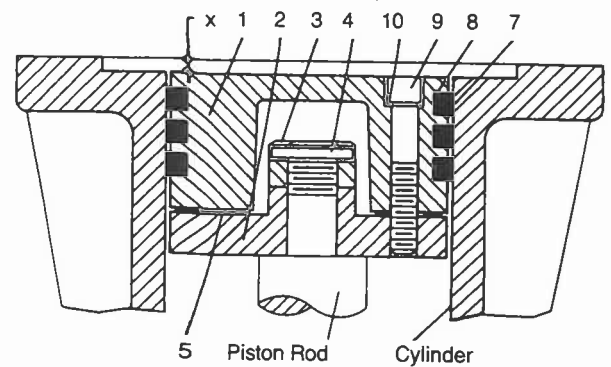
NOTES:

- (a) Must be rebored and honed after replacing. (0.876"/0.875" Diameter)
- (b) Caution: To avoid damage during assembly, refer to Installation Instruction Manual IE400.

MODELS 91, 191, 291, 391, 491, 491-3



MODELS 590, 691, 691-4



TWO-STAGE Piston Assembly No.	ALL MODELS 190/191				ALL MODELS 390/391				ALL MODELS 590/591			
	1983-X		2001-X		1987-X		1981-X		1754-X		1755-X	
Piston Diameter	3" (7.62 cm)		1 3/4" (4.45 cm)		4 1/2" (11.43 cm)		2 1/2" (6.35 cm)		6" (15.24 cm)		3 3/4" (8.26 cm)	
Ref. No. Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	2001	1	1987	1	1981	1	1754	1	1755	1
2. Piston Platform	1984	1	2002	1	1986	1	1982	1	1986	1	1986-1	1
3. Locknut	1482	1	1448	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	None	-	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1378	As Req.	1528 1528-1	As Req.	1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7. Piston Ring	1772	3	1770	3	1739	3	1771	3	1752	3	1756	3
8. Ring Expander	1775	3	2015	3	1740	3	1774	3	1753	3	1757	3
9. Screw, Soc. Hd.	7002-010 OC100A	4	7002-008 NC125A	4	7002-025 OC125A	8	7002-008 NC125A	6	7002-025 OC175A	8	7002-025 OC175A	4
10. Lock Washer	7207-010A	4	7207-008A	4	7207-025A	8	7207-008A	6	7207-025A	8	7207-025A	4

SINGLE STAGE	ALL MODELS 90/91, 290/291		ALL MODELS 490/491		ALL MODELS 491-3		ALL MODELS 690/691		ALL MODELS 690-4/691-4	
Piston Assembly No.	1983-X		1985-X		1983-X1		1987-X1		1985-X1	
Piston Diameter	3" (7.62 cm)		4" (10.16 cm)		3" (7.62 cm)		4.5" (11.43 cm)		4" (10.16 cm)	
Ref. No. Part Name	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston	Part No.	Qty./Piston
1. Head, Iron	1983	1	1985	1	1983	1	1987	1	1985	1
2. Piston Platform	1984	1	1986	1	1984-1	1	1986	1	1986	1
3. Locknut	1482	1	1482	1	1482	1	1482	1	1482	1
4. Lock Pin	1483	1	1483	1	1483	1	1483	1	1483	1
5. Thrust Washer	1527	1	1527	1	1527	1	None	-	None	-
6. Shim Washer, Thick Shim Washer, Thin	1528 1528-1	As Req.	1528 1528-1	As Req.	1528 1528-1	As Req.	1735 1735-1	As Req.	1735 1735-1	As Req.
7. Piston Ring	1772	3	1773	3	1772	3	1739	3	1773	3
8. Ring Expander	1775	3	1776	3	1775	3	1740	3	1776	3
9. Screw, Soc. Hd.	7002-010 OC100A	4	7002-025 OC125A	8	7002-010 OC100A	4	7002-025 OC125A	8	7002-025 OC125A	8
10. Lock Washer	7207-010A	4	7207-025A	8	7207-010A	4	7207-025A	8	7207-025A	8

PISTON CLEARANCE (COLD)

MODEL	*X INCHES (MILLIMETER)	
	MINIMUM	MAXIMUM
91, 191, 291, 491 (b)	.020 (.51)	.044 (1.12)
A91, D91, A191, D191, A291, D291, WA391, WD391, D491, 491-3 (b)	.025 (.64)	.049 (1.24)
T91, T191, T291, FT191, FT291	.030 (.76)	.054 (1.35)
T690-4, WT690-4, WT690, WT590	.100 (2.54)	.112 (2.84)
T691	.115 (2.92)	.127 (3.22)
190, 390, 490, 491 (a)	.000 (.00)	.024 (.61)
A190, D190, A390, D390, A490, D490, D491, D490-3, D491-3	.005 (.13)	.029 (.74)
T491, T490-3	.010 (.25)	.034 (.86)
WT391, T491, T491-3 (b)	.030 (.76)	.054 (1.36)
590, 690, W690	.000 (.00)	.012 (.30)
691	.015 (.38)	.027 (.68)
A590, WA590, A690, WA690	.045 (1.14)	.057 (1.45)
D590, WD590, D690, D690-4, WD690, WD690-4	.050 (1.27)	.062 (1.57)
D691	.065 (1.65)	.077 (1.95)

NOTES:

- (a) For 491 Compressor with flat gasket.
- (b) For 491 Compressor with head o-rings.

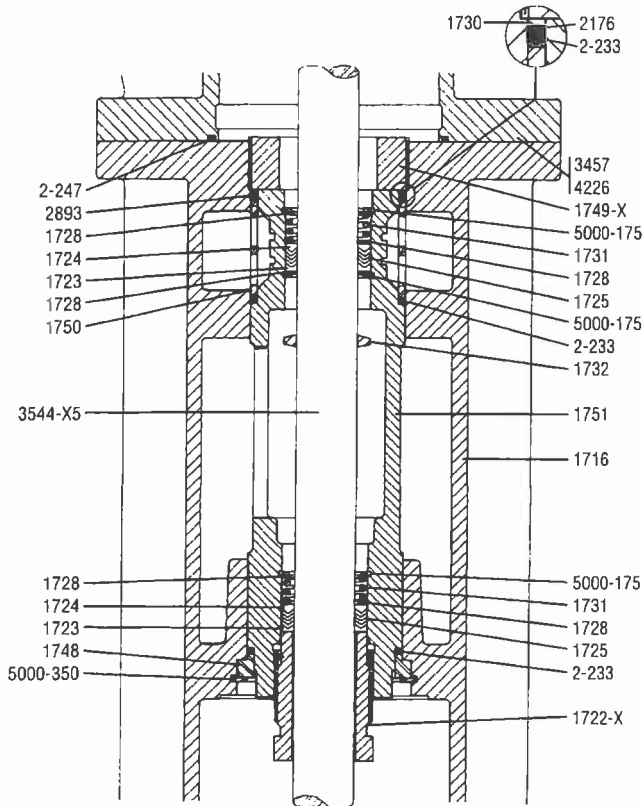
**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS

MODELS D691, D691-4, WFD691, WFD691-4 COMPRESSORS

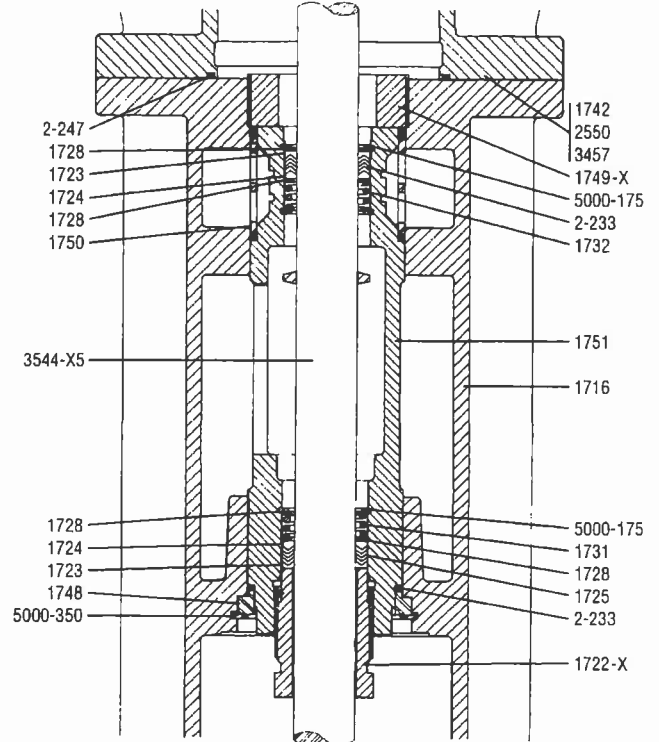
ALL SPECIFICATIONS

PACKING SPEC. A



PACKING SPEC. B

Water chamber for cooling packing. (Inlet and outlet are 1/2" NPT openings on each end of crosshead guide 1716. on WD691 and WD691-4 outlet is tubed to water-cooled head.)



PART NO.	PART NAME
1716	Crosshead Guide
1722-X	Adjusting Screw
1723	Female Packing Ring
1724	Male Packing Ring
1725	Packing Ring
1728	Packing Washer
1730	Cage Washer
1731	Packing Spring
1732	Oil Deflector Ring
1748	Cartridge Plate
1749-X	Cartridge Holddown Screw
1750	Packing Box Cage
1751	Packing Box Cartridge
2176	Backup Ring (TFE)
2893	Locking Device
3457	Cylinder (D691 and WFD691 Only)
4226	Cylinder (D691-4 and WFD691-4 Only)
5000-175	Retainer Ring
5000-350	Retainer Ring
2-233	O-Ring
2-247	O-Ring

PACKING SPEC. IDENTIFICATION:			
MODEL NO.	D191	A	M78
EXAMPLE	D491	B	M9
PACKING SPEC.			

ASSEMBLY NUMBER	ASSEMBLY NAME
1716-X	Crosshead-Guide Assembly with 1716, 1748 (2), 5000-350 (2)
1725-2X	Packing Set with 1723, 1724, 1725 (4), 1728, 1731
1725-2X2	Packing Set w/ K-Ring Spacers (Optional)
3544-X5	Crosshead-Piston Rod Assembly
3544-X6	Crosshead Piston Rod Assembly - Chrome Oxide (Optional)

For O-ring material coding see page A500.

See page E270 for description and application of distance piece arrangements.

Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example 3713C).

Assembly Note: Use packing installation cone *3905 when installing packing cartridge on piston rod.

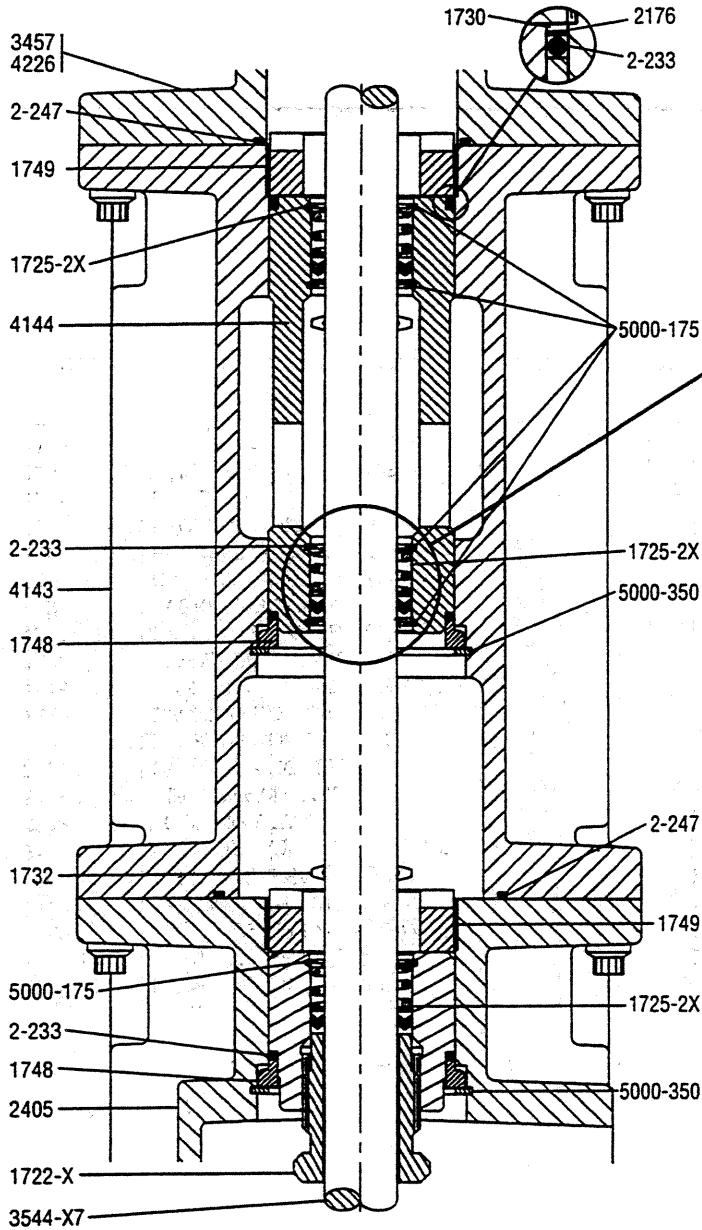
Caution: Always relieve pressure in the unit before attempting any repairs.

**DISTANCE PIECE DETAILS
ALL MODELS T691, T691-4 COMPRESSORS
ALL SPECIFICATIONS**

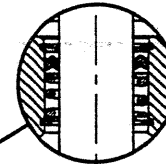
SERVICE	MANUAL
PAGE	E292
AUGUST	1999
FIRST	ISSUE

PACKING SPEC. G

PACKING SPEC. H



Invert middle packing set only for packing specification 'H' as shown below.



PART NO.	PART NAME
1722-X	ADJUSTING SCREW WITH LOCKING DEVICE
1723	FEMALE PACKING RING
1724	MALE PACKING RING
1725	PACKING RING
1728	PACKING WASHER
1730	CAGE WASHER
1731	PACKING SPRING
1732	OIL DEFLECTOR RING
1748	CARTRIDGE PLATE
1749	CARTRIDGE HOLDDOWN SCREW
1750	PACKING BOX CAGE
1751	PACKING BOX CARTRIDGE
2176	BACKUP RING (TFE)
2405-X	CROSSHEAD GUIDE
2893	LOCKING DEVICE
3457	CYLINDER (D691 AND WFD691 ONLY)
4143	DISTANCE PIECE
4144	PACKING CARTRIDGE
4226	CYLINDER (D691-4 AND WFD691-4 ONLY)
5000-175	RETAINER RING
5000-350	RETAINER RING
2-233	O-RING
2-247	O-RING

ASSEMBLY NUMBER	ASSEMBLY NAME
1725-2X	PACKING SET WITH 1723, 1724, 1725 (4), 1728, 1731
1725-2X2	PACKING SET WITH K-RING SPACERS (OPTIONAL)
2405-X	CROSSHEAD-GUIDE ASSEMBLY WITH 2405, 1748 (2), 5000-350 (2)
3544-X7	CROSSHEAD PISTON ROD ASSEMBLY
3544-X8	CROSSHEAD PISTON ROD ASSEMBLY - CHROME OXIDE (OPTIONAL)

PACKING SPEC. IDENTIFICATION:			
Example:	Model No.	T691	G M4
		WFT691	H M9
Packing Spec.			

For o-ring material coding see page A500.

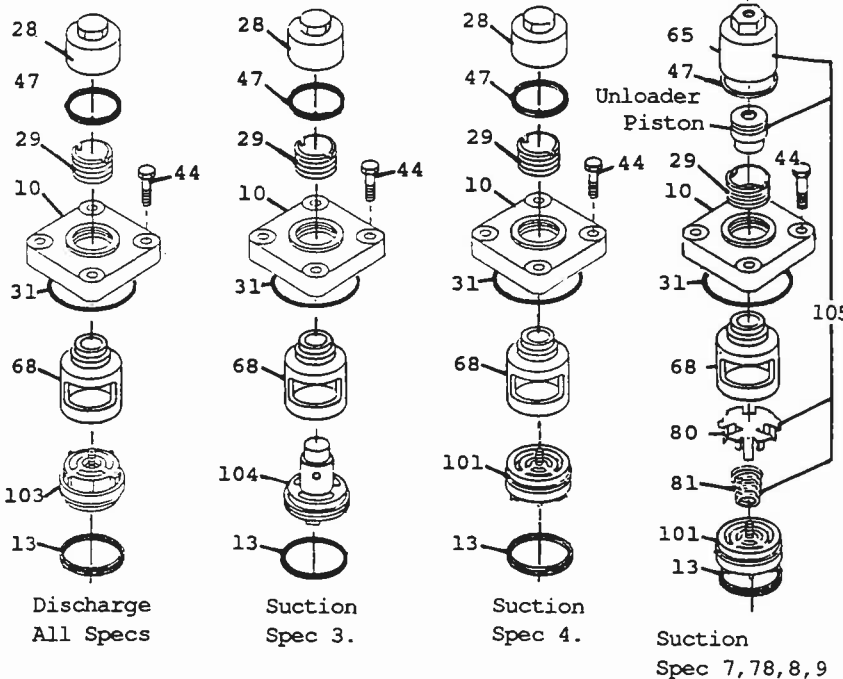
Note: Models built with coating option MC1002 use some coated parts. Coated parts must be specified with a "C" at the end of the part number (Example 3713C).

Assembly Note: Use packing installation cone *3905 when installing packing cartridge on piston rod.

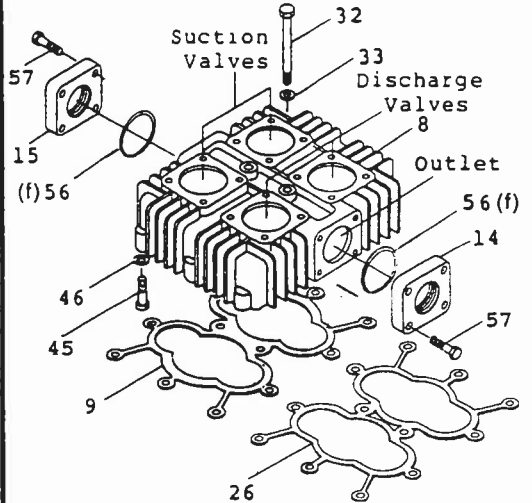
HEAD ASSEMBLY DETAILS
 MODEL 690, W690, 691, WA691, D690,
 D690-4, D691, WD690, WD690-4
 S/N MR50653 AND LATER
 ALL SPECIFICATIONS

SERVICE MANUAL
 PAGE E330F

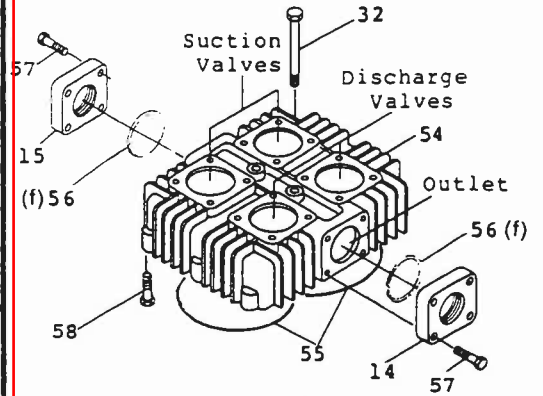
November 1991
 Supersedes E330E



Model: 690, A690, D690, D690-4



Model: 691, D691

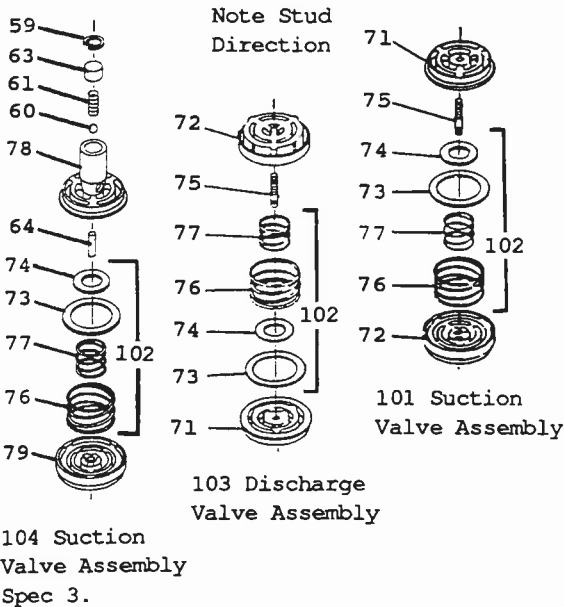


CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

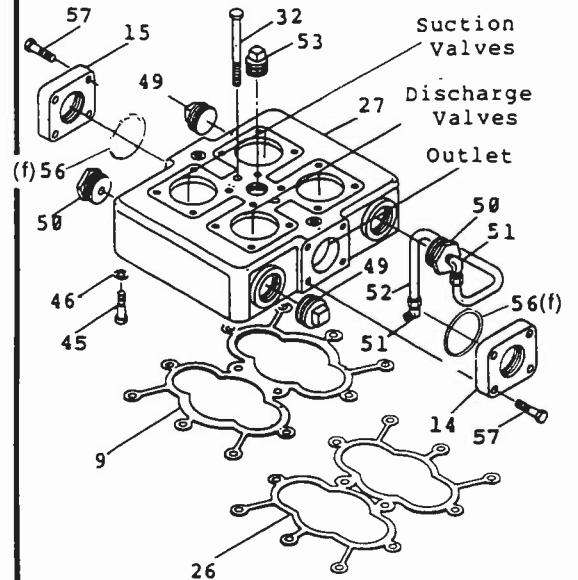
IDENTIFICATION OF VALVE UNLOADER SPEC.			
Example:	Model No.	690P	4 FBA
		690K	78 FBAB
		690M	9 FBA
	Valve Unloader Spec.		

Valve Details

Apply Loctite #290 when assembling



Model: W690, WA690, WD690, WD690-4



SERVICE MANUAL
 PAGE E331F
 November 1991
 Supersedes E331E

HEAD ASSEMBLY DETAILS
 MODEL 690, W690, 691, WA691, D690,
 D690-4, D691, WD690, WD690-4
 S/N MR50653 AND LATER
 ALL SPECIFICATIONS

REF. PART NO. NO.	PART NAME	When ordering parts use "Part No." not "Ref No."
1. thru 7.	Omitted	
8. 1743	Head (690,A690,D690,D690-4 Only)	
(d) 9. 1744	Head Gasket (690,W690,A690,WA690, D690, WD690 Only)	
(e) 1744-1	Head Gasket Grafoil	
10. 1764	Valve Cover Plate	
11. —	Omitted	
12. —	Omitted	
13. 2114	Valve Gasket, Aluminum	
(e) 2114-1	Valve Gasket, Copper	
(e) 2114-2	Valve Gasket, Iron	
14. 2144-1.5	Flange(Discharge) 1-1/2" NPT	
2144-1.5S	Flange 1-1/2" Weld	
15. 2144-2	Flange(Suction) 2" NPT	
(e) 2144-2S	Flange 2" Weld	
16. thru 25.	Omitted	
(d) 26. 2498	Head Gasket (D690-4,WD690-4 Only)	
(e) 2498-1	Head Gasket, Grafoil	
27. 2579	Head, Water-Cooled (W690,WA690, WD690, WD690-4 Only)	
(a) 28. 2714	Valve Cap	
(b) 2714-1	Valve Cap, Grooved for O-ring	
29. 2715	Holddown Screw	
(a) 30. 2716	Valve Cap Gasket, Aluminum	
(e) 2716-1	Valve Cap Gasket, Copper	
(e) 2716-2	Valve Cap Gasket, Lead	
(c) 31. 2-235	O-ring (Cover Plate)	
32. 2136	Center Head Bolt	
33. 1625	Center Head Bolt Gasket, Aluminum	
(e) 1625-1	Center Head Bolt Gasket, Copper	
(e) 1625-2	Center Head Bolt Gasket, Iron-Lead	
34. thru 42.	Omitted	
43. 7001-021	NC075A Screw, 1/4-20 x 3/4" Hex Hd.Gr 5	
44. 7001-043	NC137A Bolt, 7/16-14 x 1-3/8" Hex Hd.	
45. 7005-043	NC125A Bolt, 7/16-14 x 1-1/4" Ferry Hd.	
46. 7006-043A	Reg. Lockwasher 7/16"	
(c) 47. 2-031	O-ring, Valve Cap	
49. 2825	Pipe Plug 1-1/2" NPT	
50. 2876	Bushing 1-1/2 x 1/2 Galv.	
51. 2322	Elbow, 1/2P x 1/2T Brass	
(e) 2322-1	Elbow, 1/2P x 1/2T Steel	
52. R2918	Tube, 1/2" (Specify Length), Copper	
(e) R3433	Tube, 1/2" (Specify Length), Steel	
53. 3643	Pipe Plug, 1" NPT	
54. 3458	Head (691,D691 Only)	
(c) 55. 2-261	O-Ring, Head(691,D691 Only)	
(f) 56. 2-231	O-Ring	
57. 7001-043	NC150A Bolt, 7/16-14 x 1-1/2" Hex Hd.	
58. 7005-050	NC150A Bolt, 1/2-13 x 1-1/2" Ferry Hd.	
59. 5000-77	Retainer Ring	
60. 1410	Relief Ball	
61. 1411	Spring	
62. 1910	Bolt, 1/4-20 x 1/2 Soc. Button Hd.	
63. 3977	Suction Valve Relief Housing (Spec 3)	
64. 2534-1	Suction Valve Post (Spec 3)	
65. 2598-1	Unloader Cap	

REF. PART NO. NO.	PART NAME
66. 2619-X	Piston Seal Assembly
67. 2710	Unloader Piston
68. 2797	Valve Cage
69. 2857	Piston Cap
70. 2858	Unloader Piston Cap Gasket
71. 3856	Valve Seat
72. 3857	Valve Bumper
73. 3871	Outer Valve Plate
74. 3872	Inner Valve Plate
75. 3920	Valve Stud
76. 3928	Outer Valve Spring
77. 3929	Inner Valve Spring
78. 3948	Valve Seat (Spec. 3)
79. 3949	Valve Bumper (Spec. 3.)
80. 4032	Unloader Actuator
81. 4033	Unloader Spring

REF ASSY. NO. NO.	ASSEMBLY NAME
101. 3856-X	Suction Valve Assy (Incl.Valve Gasket)
(e) 3856-X1	Same as above but with Copper Gasket
(e) 2255-X2	Same as above but with Iron-Lead Gasket
102. 3146-X1	Valve Repair Kit (Suction & Discharge)
103. 3857-X	Discharge Valve Assy (Incl.Valve Gasket)
(e) 3857-X1	Same as above but with Copper Gasket
(e) 3857-X2	Same as above but with Iron-Lead Gasket
104. 3948-X	Suction Valve Assembly (Spec.3) (Incl. Valve Gasket)
(e) 3948-X1	Same as above but with Copper Gasket
(e) 3948-X2	Same as above but with Iron-Lead Gasket
105. 4032-X	Suction Valve Unloader Assembly

Spec.	Head Assy No.	Model No.
3:	1743-X	690,D690,D690-4,
3:	2579-X	W690,WD690,WD690-4,
3:	3458-X	691,D691
4:	1743-X1	690,D690,D690-4,A690
4:	2579-X1	W690,WD690,WD690-4,WA690
4:	3458-X1	691,D691
7,78,8,9:	1743-X2	690,D690,D690-4
7,78,8,9:	1743-X3	A690
7,78,8,9:	2579-X2	W690,WD690,WD690-4
7,78,8,9:	2579-X3	WA690
7,78,8,9:	3458-X2	691,D691

NOTES:
 (c) For O-Ring Material Coding see Page A500.
 (d) Not Included in Head Assembly.
 (e) Optional.
 (f) S/N NQ51455 and later. Earlier models use Gasket #2177

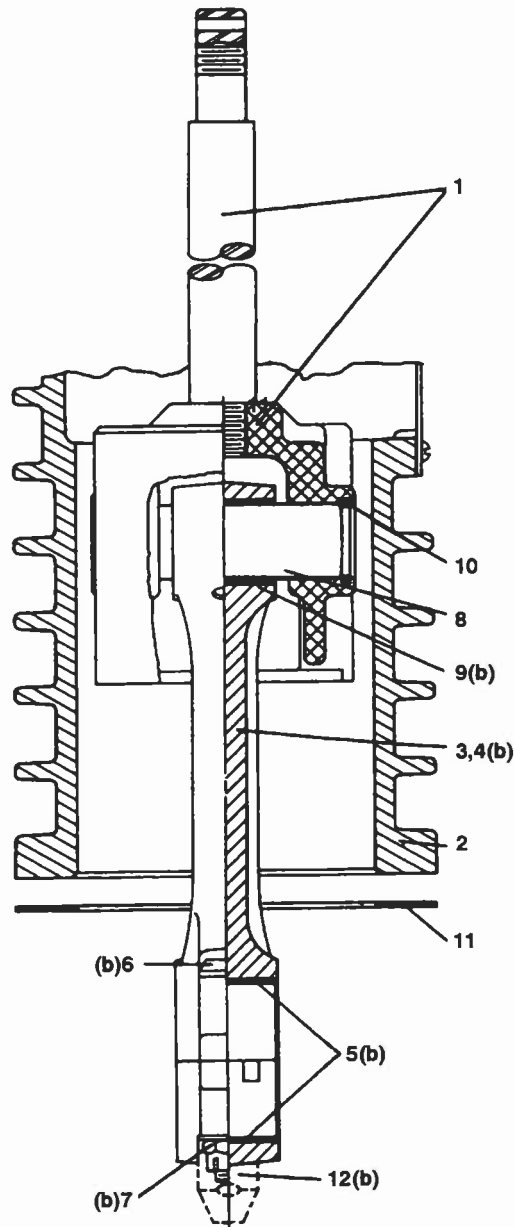
CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

SERVICE
PAGE

MANUAL
E350J

MAY
SUPERSEDES

1997
E350I



REFER TO PARTS LIST
ON BACK SIDE OF
THIS SHEET.

**CAUTION: ALWAYS RELIEVE PRESSURE IN THE
UNIT BEFORE ATTEMPTING ANY REPAIRS.**

CONNECTING ROD AND CROSSHEAD ASSEMBLY DETAILS
ALL MODELS
ALL SPECIFICATIONS

MODEL NUMBER	91	A91 D91	T91	191	A191 D191	T191	291	A291 D291	T291	391 W391 491	A391 WA391 D391 WD391 A491 D491-3 D491	T391 T491-3 T491	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	A590 WA590 D590 WD590 A691 WA690 D691 D691-4 WD690 WD690-4	590 W590 W690 691	D791 D8091		
NO.	DESCRIPTION																		
1.	CROSSHEAD ASSEMBLY	1132-X2	1132-X3	1132-X7 1132-X9 (f)	1132-X1 (g) 1132-X2	1132-X3 1132-X4 (g)	1132-X8 (g) 1132-X7 1132-X9 (f) 1132-X10 (f)(g)	1132-X2 (f)	1132-X3 1132-X5	1132-X7 1132-X9 (f)	1384-X 2765(h) 1366(f)	1384-X1 1384-X4 (f)	1384-X2 1384-X3 (f)	1717-X	1717-X1	1717-X	1717-X1	3544-X3	
2.	CROSSHEAD GUIDE	2240	2240	4940-X	4383	4383-X	4393	4383-X	4383-X	4383-X	4383-X	2773-X	2773-X	1716-X	2405-X	1716-X	2405-X	2405-1	
3.	CONN. ROD ASSY.	1889-1X	1889-1X	1889-1X	1889-X	1889-X	1889-X	1889-X	1889-X	1490-X	1490-X	1490-X	1490-X	1720-X	1720-X	1720-X	1720-X	3785-X	
4.	CONNECTING ROD	1889-1	1889-1	1889-1	1889	1889	1889	1889	1889	1490	1490	1490	1490	1720	1720	1720	1720	3785	
5.	CONN. ROD BEARING	1367	1367	1367	1367	1367	1367	1367	1367	1491	1491	1491	1491	3542	3542	3542	3542	3542	
6.	BOLT	1599	1599	1599	1599	1599	1599	1599	1599	1492	1492	1492	1492	1726	1726	1726	1726	1726	
7.	NUT	1600(c)	1600(c)	1600(c)	1600(c)	1600	1600(c)	1600(c)	1600	1493(d)	1493(d)	1493(d)	1493(d)	1727(e)	1727(e)	1727(e)	1727(e)	1727(e)	
8.	WRIST PIN	2505	2505	2505	2505	2505	2505	2505	2505	1496	1496	1496	1496	3540	3540	3540	3540	3540	
9.	WRIST PIN BUSHING	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1846-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	1495-X(a)	3541-X(k)	3541-X(k)	3541-X(k)	3541-X(k)	3541-X(k)	
10.	RETAINER RING	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	1498	3590	3590	3590	3590	3590	
11.	CRANKCASE GASKET	2526	2526	2526	2702	2702	2702	2702	2702	1489	1489	1489	1489	1761	1761	1761	1761	1761	
12.	DIPPER	2011	2011	2011	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

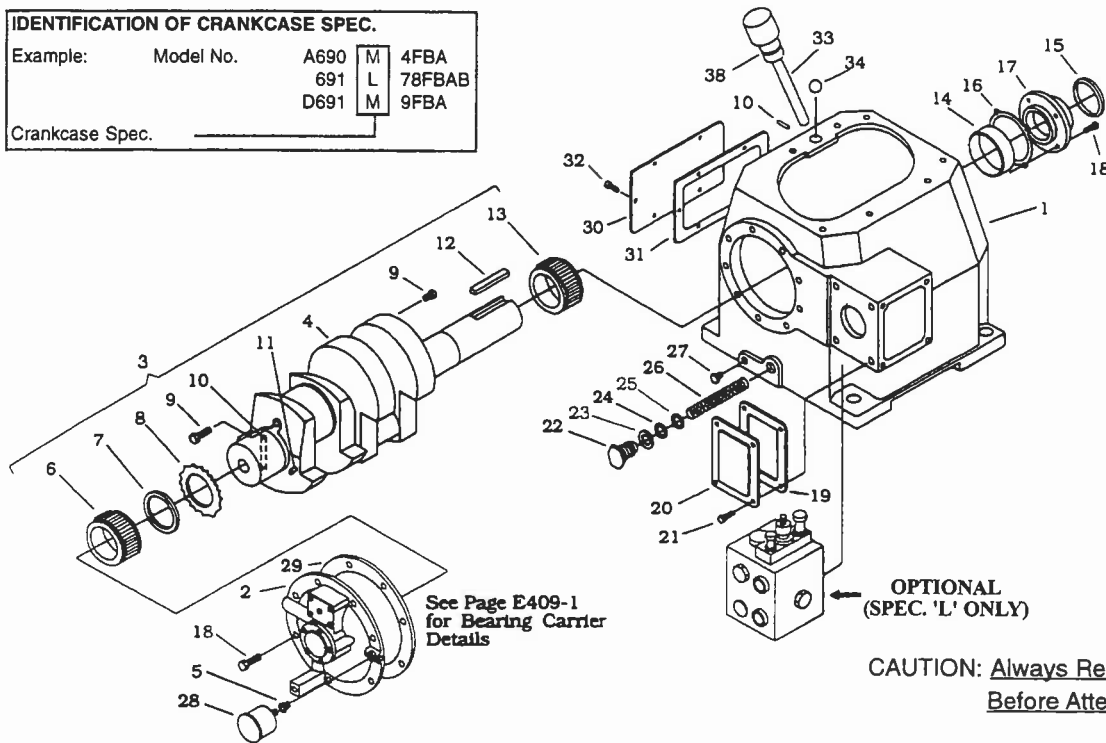
NOTES:

- (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.
 - (d) Torque Connecting Rod Nut to 30 ft.lbs.
 - (e) Torque Connecting Rod Nut to 40 ft.lbs.
 - (f) Optional Chrome Oxide Piston Rods Only
 - (g) Second Stage (Smaller Piston)
 - (h) S/N XC30633 and Later
 - (i) Prior to S/N XC30633
 - (k) Must be rebored after replacing (1.1256/1.1252 Dia.)
- Never attempt to separate the Piston Rod and Crosshead. When repair becomes necessary the entire Crosshead Assembly must be replaced.

CRANKCASE DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)

SERVICE MANUAL
 PAGE E408-1C
 AUGUST 1999
 SUPERSEDES E408-1B

IDENTIFICATION OF CRANKCASE SPEC.			
Example:	Model No.	A690	M 4FBA
		691	L 78FBAB
		D691	M 9FBA
Crankcase Spec.		_____	



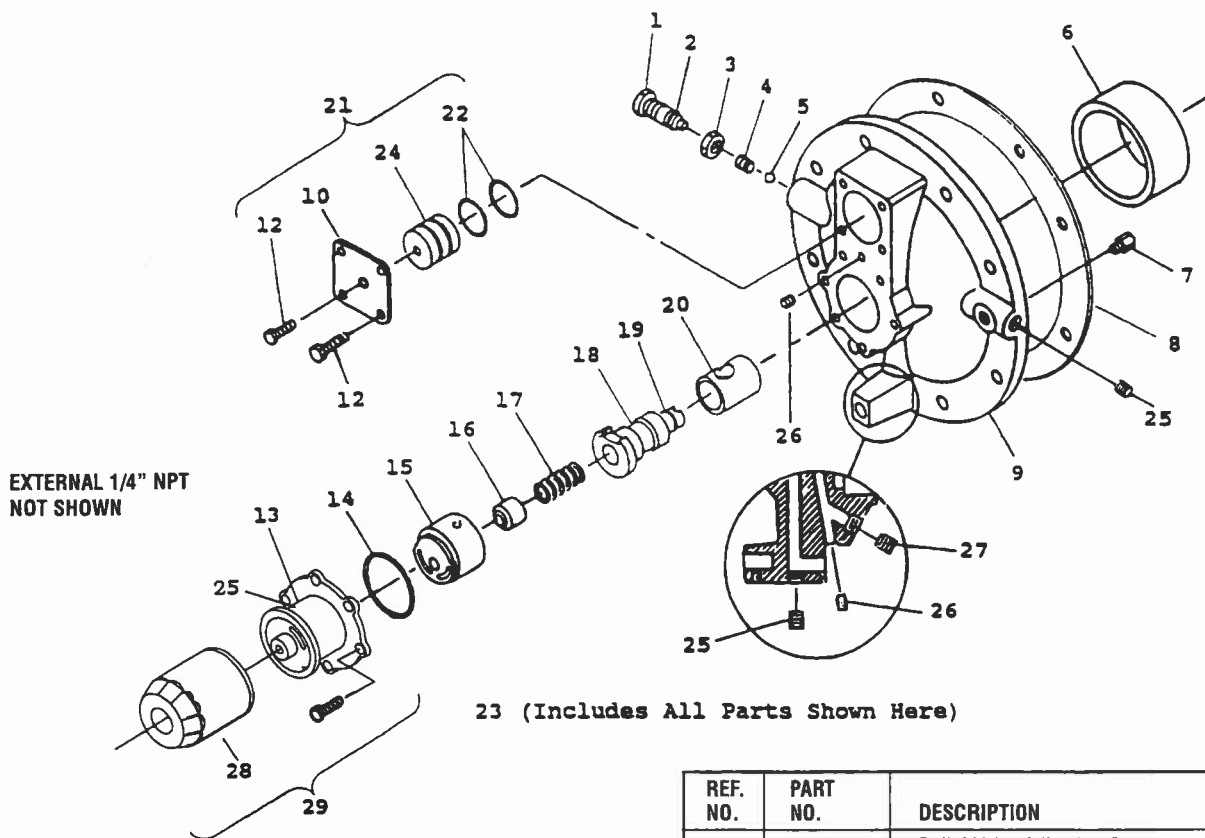
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

REF. NO.	PART NO.	DESCRIPTION
1	3221	Crankcase
2	3220-2X	Bearing Carrier Assembly
3	3786-X1	Crankshaft Assembly
4	3786	Crankshaft
5	1044	Bushing, 1/8 x 1/4 NPT
6	1737	Bearing Cone
7	3638	Spacer
8	3635	Drive Sprocket
9	1284	Crankshaft Orifice
10	2135	Drive Pin
11	2933	Link Pin
12	3503	Flywheel Key
13	3580	Bearing Cone
14	3579	Bearing Cup
15	3526	Oil Seal
16	3589	Bearing Adjustment Shim (.005")
	2589-1	Bearing Adjustment Shim (.007")
	2589-2	Bearing Adjustment Shim (.020")
17	3539	Bearing Cover
18	7001-037 NC100A	Bolt, 3/8 - 16 x 1" Hex Head Gr 5
19	3874	Gasket, Access Cover
20	3875	Access Cover
21	7003-025 NC037E	Screw, 1/4 - 20 x 3/8"
22	1280	Filter Screw
23	1281	Gasket, Filter
24	2-116A	O-ring
25	1276	Washer
26	1275	Oil Filter Screen

REF. NO.	PART NO.	DESCRIPTION
27	3443	Pipe Plug, 1/2" NPT Steel
28	1302	Oil Pressure Gauge
29	2131	Gasket, Bearing Carrier
30	2122	Inspection Cover
31	2123	Gasket, Inspection Cover
32	7001-031 NC075A	Bolt, 5/16 - 18 x 3/4" Hex Head
33	3225-X1	Oil Bayonet Assembly (w/ O-ring)
34	2126	Breather Ball (Not Used on A590, WA590, A690, WA690)
35	—	—
36	1885-1	Blank Flange
37	2010	Flange Gasket
38	2-210A	O-ring
(a) —	3852-X	Flywheel Assembly (D791, D891 Only)
(a) —	1762-X	Flywheel Assembly (590/690 Models Only)
(a) —	3852	Flywheel 21.2", 5V, 5 Groove
(a) —	3918	Flywheel Hub Type J2 - 1/8" Bore (D791, D891 Only)
(a) —	1762	Flywheel 19 - 1/2" AB, 4 Groove
(a) —	3918	Flywheel Hub Type E 2 - 1/8" Bore (590 / 690 Models Only)
(a) —	3221-X1	Crankcase Assembly (M3, 4, 8, 9) w/o Lub.
(a) —	3221-X2	Crankcase Assembly (M7, 78) w/o Lub.
(a) —	3221-X3	Crankcase Assembly (L3, 4, 8, 9) w/o Lub.
(a) —	3221-X4	Crankcase Assembly (L7, 78) w/o Lub.

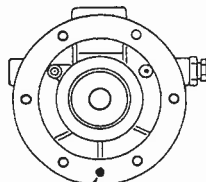
NOTES:
 (a) Not Shown

BEARING CARRIER DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)



23 (Includes All Parts Shown Here)

Inside of Bearing Carrier



Oil Passage Hole

IMPORTANT

Line up hole in gasket with oil passage hole.

PUMP COVER OIL/FILTER ADAPTER



Pumpsides of adapter shown for proper orientation of cover and location of pump cover pin.

REF. NO.	PART NO.	DESCRIPTION
1	1290	Relief Valve Adjusting Screw
2	2-011A	O-ring
3	1291	Adjusting Screw Locknut
4	1292	Relief Valve Spring
5	1293	Relief Valve Ball
6	1736	Bearing Cup
7	2961-X	Air Release Valve Assembly
8	2131	Bearing Carrier Gasket
9	3220-2	Bearing Carrier
10	1515	Closure Cap
11	2798	Pump Cover Pin (Included w/ 4222-X)
12	7001-025 NC050A	Bolt, 1/4 - 20 x 1/2" Hex Head
(b) 13	4222-X	Oil Filter Adapter Assembly (w/ pin)
14	2-228A	O-ring
(b) 15	2849-1X	Oil Pump Assembly
16	2851	Spring Guide
17	2852	Oil Pump Spring
18	3219	Pump Shaft Adapter
19	2-112A	O-ring
(a) 20	2805-X	Pump Shaft Bushing
21	1515-X	Closure Cap Assembly
22	2-118A	O-ring
23	3220-2X	Bearing Carrier Assembly
24	1516	Closure Body
25	3289	Pipe Plug, 1/4 NPT Fl. Seal
26	1629	Pipe Plug, 1/16 NPT Fl. Seal
27	2590	Pipe Plug, 1/8 NPT Fl. Seal
28	4225	Filter
29	4222-X	Filter Adapter Assembly

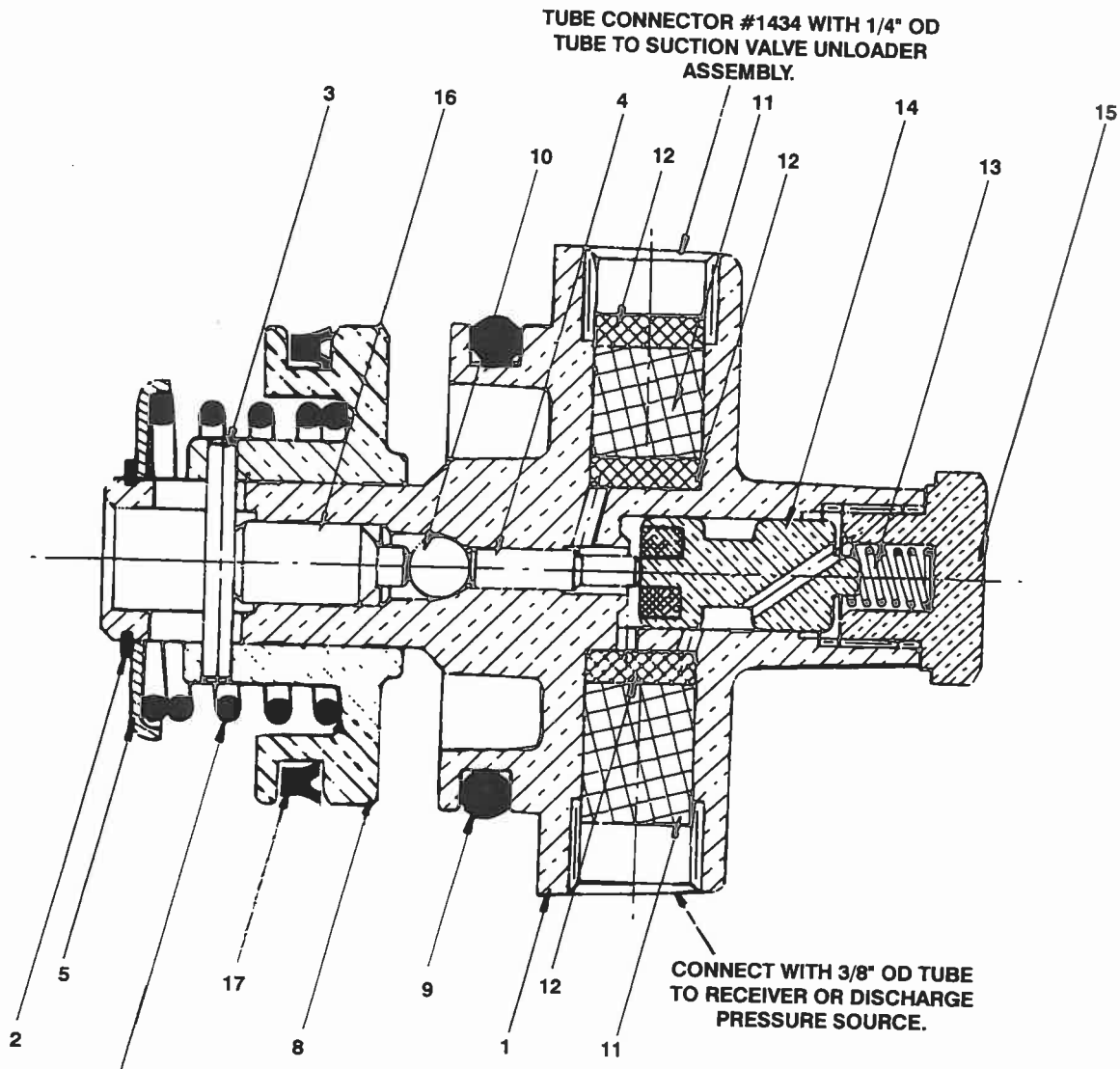
NOTES:

- (a) Must be rebores and honed after replacing. (0.876"/0.875" Diameter)
- (b) Caution: To avoid damage during assembly, refer to Installation Instruction Manual IE400.

HYDRAULIC UNLOADER ASSEMBLY NO. 1419-2X
 ALL MODELS
 SPECIFICATIONS 7, 78
 SERIAL NO. PM19910 AND LATER

SERVICE PAGE
 SEPTEMBER SUPERCEDES

MANUAL E426D
 1996 E426C



SPRING NO. 6 USED IN ASSEMBLY 1419-2X1 (FOR PRESSURES UP TO 200 PSI) ←
 SPRING NO. 7 USED IN ASSEMBLY 1419-2X2 (FOR PRESSURES ABOVE 200 PSI)
 CRANKCASE OIL PRESSURE MUST BE MAINTAINED AT 20 PSI.

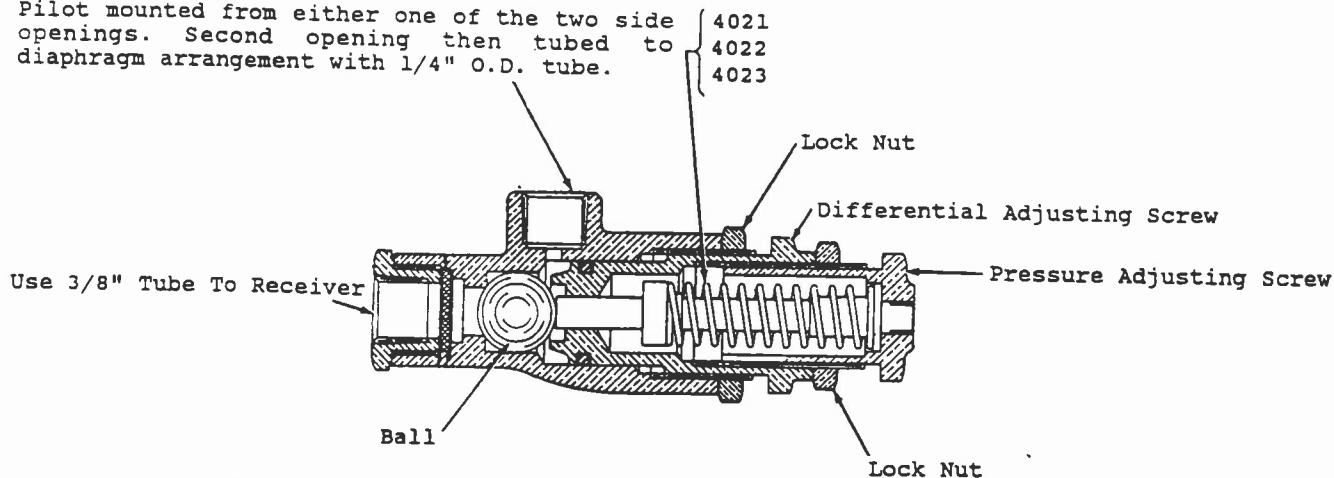
1	1419-1	BODY	10	1429	BALL
2	1420	RETAINER RING	11	1430	FILTER, FELT (2)
3	1421	PIN	12	1431	SCREEN, FILTER FELT (3)
4	1423	PLUNGER, SMALL	13	2137	SPRING, SMALL
5	1424	SPRING RETAINER	14	2138	OUTER PLUNGER
6	1425	SPRING, LARGE, 200 PSI	15	2139	SPRING NUT
7	1426	SPRING, LARGE, OVER 200 PSI	16	2140	PLUNGER, LARGE
8	1427-1	HYDRAULIC PISTON	17	2226	CUP RING
9	1428	O-RING			

NOTE: SERVICED AS ASSEMBLY ONLY! NO SERVICE PARTS ARE AVAILABLE.

UNLOADER PILOT VALVE ASSEMBLY
 ALL MODELS
 VALVE SPEC.: 78, 8
 SERIAL NO. HX46618 AND LATER

SERVICE MANUAL
 PAGE E430
 January 1987
 Supersedes E428, E429

Pilot mounted from either one of the two side openings. Second opening then tubed to diaphragm arrangement with 1/4" O.D. tube.



- Assembly No. 4020-X1 (with Spring No. 4021)
(30-70 psi)
- Assembly No. 4020-X2 (with Spring No. 4022)
(71-150 psi)
- Assembly No. 4020-X3 (with Spring No. 4023)
(151-500 psi)

PART NO. DESCRIPTION

- 2-112 O-Ring
- 4021 Spring, Range 30-70 psi
(Color - Red)
- 4022 Spring, Range 71-150 psi
(Color - Light Yellow)
- 4023 Spring, Range 151-500 psi
(Color - Light Green)

OPERATION INSTRUCTIONS

APPLICATION:

Pilot Valve-Suction Unloaders are recommended for use on CORKEN Compressors where the compressor is to run continuously and a constant pressure is to be maintained. The purpose is to automatically unseat the suction valve of the compressor when the gas supply is greater than the demand.

The CORKEN Pilot Valve-Suction Unloader consists of unloading arrangements on the compressor head, having a plunger to contact the suction valve and an unloader pilot valve to automatically regulate the passing of discharge pressure or receiver pressure to the unloading arrangement.

OPERATION:

Unloading occurs when the discharge or receiver pressure is sufficient to overcome the spring pressure. The ball is then unseated and instantly seated on differential adjusting screw allowing the discharge

pressure to pass to the unloading arrangements. The Compressor will then run unloaded until the pressure drops to a predetermined pressure at which time the action of the ball is reversed shutting off discharge pressure to the unloader arrangement releasing all gas from the unloader to the atmosphere, allowing the compressor to load. The drive, either electric motor or gasoline engine runs continuously and must be started manually and shut off when the job is finished.

INSTALLATION:

The Pilot Valve is to be connected to the receiver or discharge piping using a minimum of 3/8" O.D. tube.

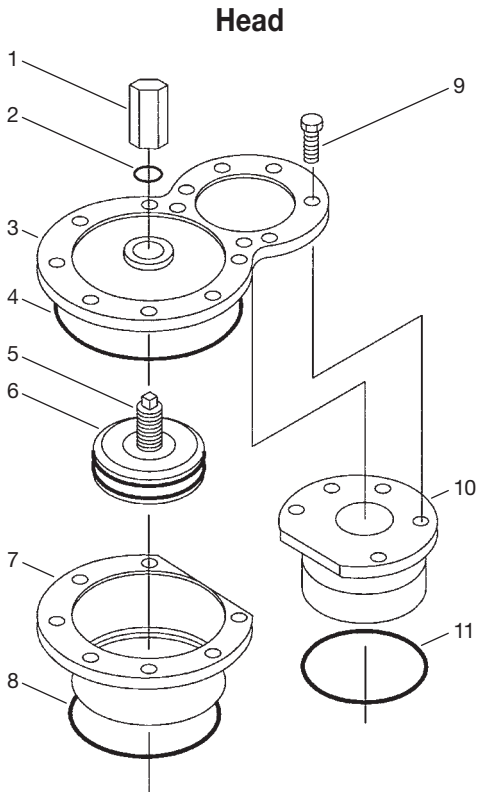
The Pilot Valve is mounted directly on the head of one of the Suction Unloader arrangements with a 1/4" nipple from either one of two side openings. The second opening is then tubed to the second Suction Unloader arrangement with 1/4" O.D. tube.

SERVICING:

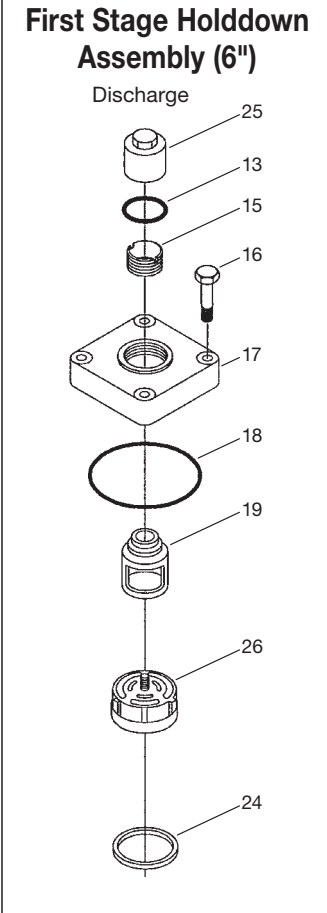
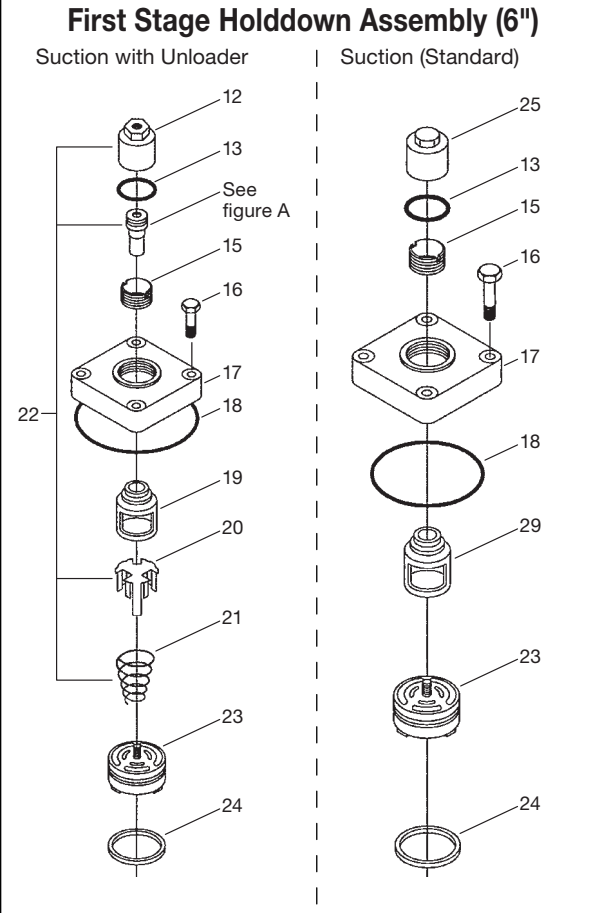
The unloading pressure is adjustable and is regulated by the pressure adjusting screw (turn clockwise to increase and counter-clockwise to decrease). Tighten lock nut after adjusting.

The differential (difference between unloading and loading pressure) is obtained by the differential adjusting screw, increase by turning clockwise, decrease by turning counter-clockwise. After changing, tighten lock nut.

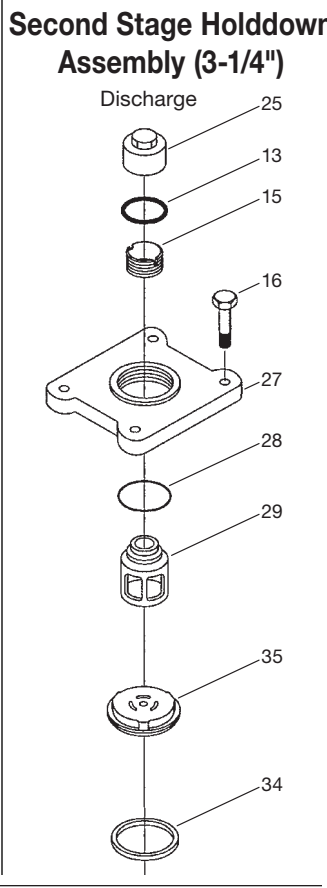
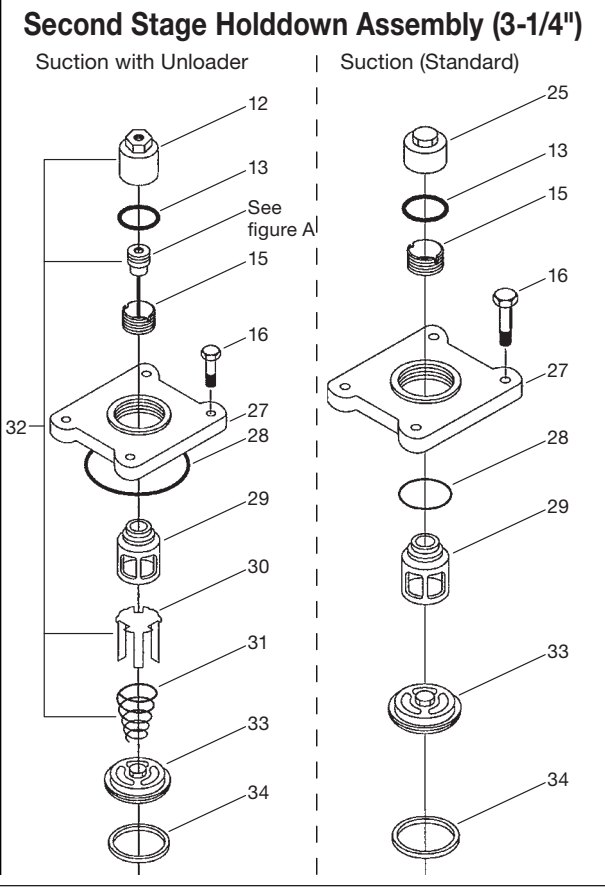
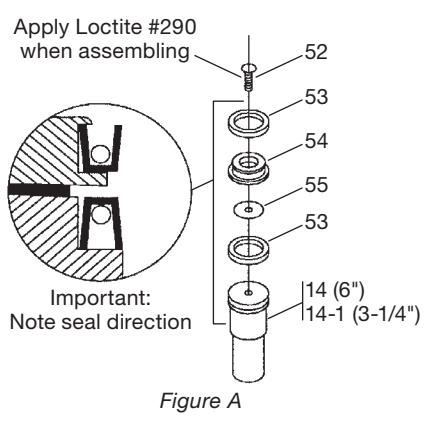
Appendix E—D791 and T791 Head and Valve Holddown Assembly Details



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

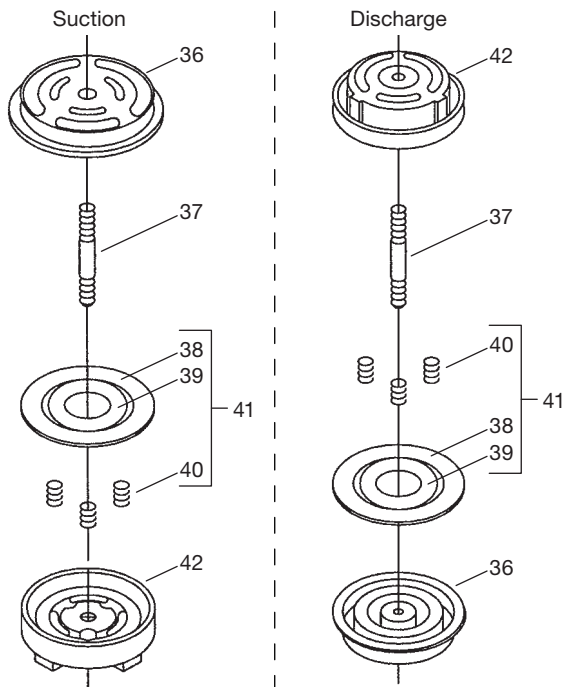


Unloader Piston Assembly Details

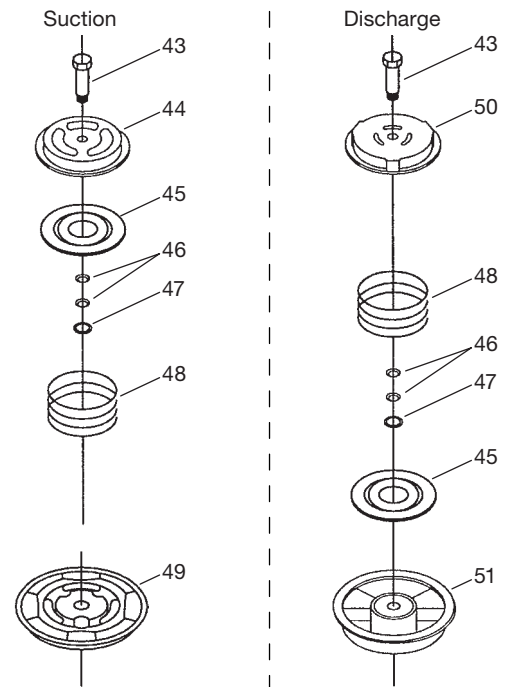


Appendix E—D791 and T791 Head and Valve Holddown Assembly Details

First Stage Valve Assembly (6")



Second Stage Valve Assembly (3-1/4 inch)



Ref No.	Part No.	Description
1.	3665	Adjusting screw nut
2.	2-127_a	O-ring
3.	3867	Cylinder cap
4.	2-250_a	O-ring
5.	3663	Adjusting cup
6.	2-248_a	O-ring
7.	3876	Cylinder head (6")
8.	2-258	O-ring
9.	7001-050-NC150A	Bolt (1/2-13x1-1/2" hex hd gr 5)(Torque to 65 ft•lbs)
10.	3877	Cylinder head (3-1/4")
11.	2-236_a	O-ring
12.	2598-1c	Unloader cap
13.	2-031_a	O-ring
14.	3696c	Unloader piston (6")
14-1.	2618c	Unloader piston (3-1/4")
15.	2715	Holddown screw
16.	7001-043-NC150A	Bolt (7/16-14x1-1/2" hex hd)(Torque to 37 ft•lbs)
17.	1764	Valve cover plate
18.	2-235_a	O-ring
19.	3570-1	Valve cage
20.	3694c	Actuator
21.	3695c	Spring
22.	3694-X	Unloader assembly (6")
23.	3732-X	Suction valve assembly (6")
24.	2114b	Valve gasket
25.	2714-1	Valve cap
26.	3733-X	Discharge valve assembly (6")
27.	2205	Valve cover plate
28.	2-143_a	O-ring
29.	3569	Valve cage
30.	3689c	Actuator

Ref No.	Part No.	Description
31.	3690c	Spring
32.	3689-X	Unloader assembly (3-1/4")
33.	2438-X	Suction valve assembly (3-1/4")
34.	1418-2b	Valve gasket
35.	2439-X	Discharge valve assembly (3-1/4")
36.	3827	Valve seat (6")
37.	3828	Stud
38.	3830d	Outer valve plate
39.	3831d	Inner valve plate
40.	3829d	Spring
41.	3805-X1	Valve repair kit
42.	3826	Valve bumper (6")
43.	2446	Bolt
44.	2438	Suction valve seat (3-1/4")
45.	2442	Valve plate
46.	2445e	Spacer (two per valve)
47.	3355	Washer
48.	1407	Spring
49.	2440	Suction valve bumper (3-1/4")
50.	2441	Discharge valve bumper (3-1/4")
51.	2439	Discharge valve seat (3-1/4")
52.	1910c	Bolt
53.	2619-Xc	Unloader piston seal assembly
54.	2857c	Unloader piston cap
55.	2858c	Gasket

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

^bIncluded with valve assembly.

^cIncluded with unloader assembly.

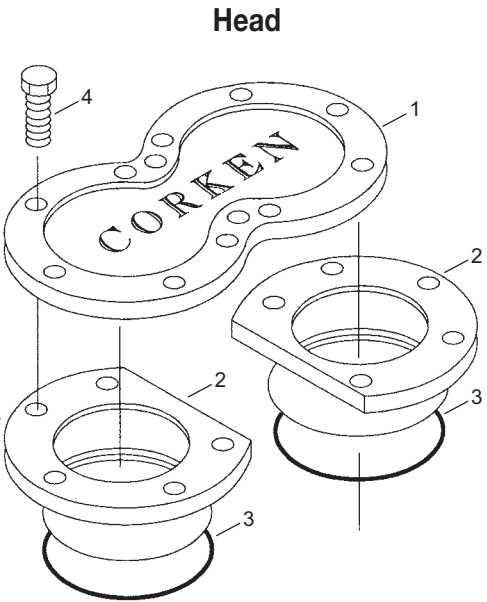
^dIncluded with valve repair kit.

^eInstall spacers back to back.

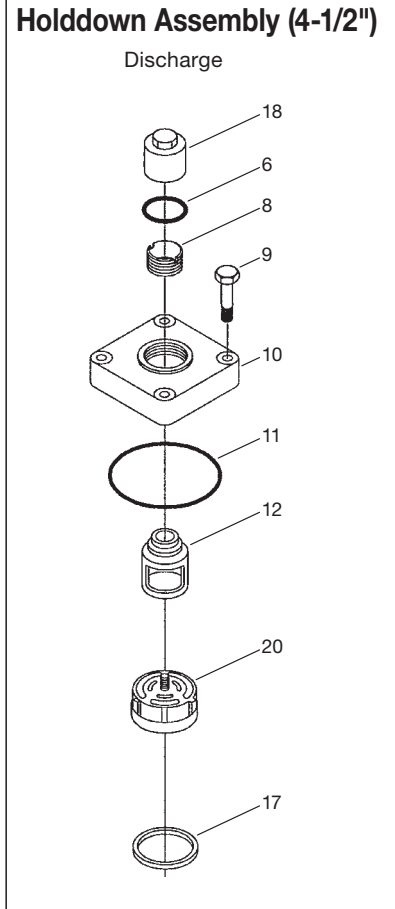
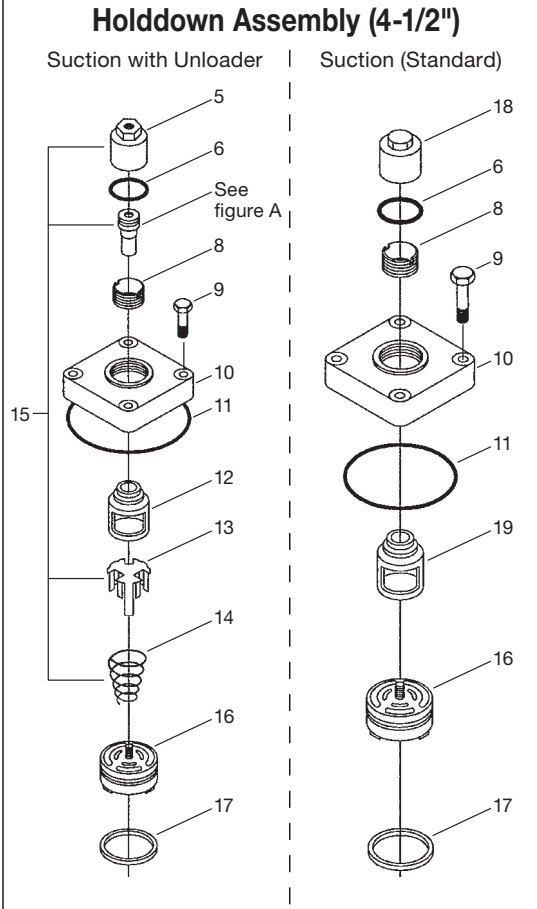
^fRegistered trademark of the DuPont company.

O-ring Code	
A	Buna-N
B	Neoprene ^{®f}
D	Viton ^{®f}
E	PTFE
K	Kalrez ^{®f}

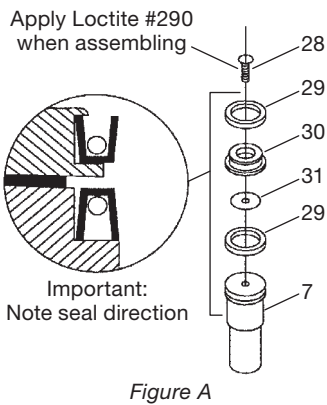
Appendix E—D891 and T891 Head and Valve Holddown Assembly Details



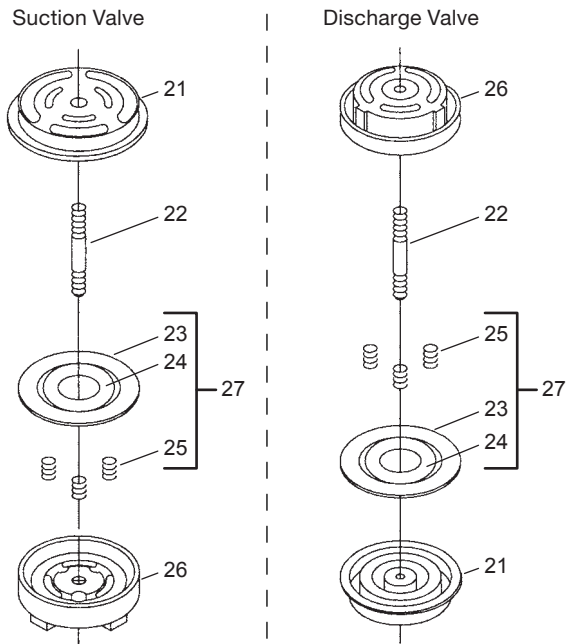
CAUTION: Always relieve pressure in the unit before attempting any repairs.



Unloader Assembly Part Details



Valve Assemblies (4-1/2")



Appendix E—D891 and T891 Head and Valve Holddown Assembly Details

Compressor Head and Valve Bill of Materials

Ref No.	Part No.	Description
1.	3923	Cylinder cap
2.	3924	Cylinder head (4-1/2")
3.	2-246__ ^a	O-ring
4.	7001-050 NC150A	Bolt (1/2 - 13 x 1-1/2" hex head Gr 5) (Torque to 65 ft•lbs)
5.	2598-1 ^c	Unloader cap
6.	2-031__ ^a	O-ring
7.	3696 ^c	Unloader piston
8.	2715	Holddown screw
9.	7001-043 NC150A	Bolt (7/16 - 14 x 1-1/2" hex head)(Torque to 37 ft•lbs)
10.	1764	Valve cover plate
11.	2-235__ ^a	O-ring
12.	3570-1	Valve cage
13.	3694 ^c	Actuator
14.	3695 ^c	Spring
15.	3694-X	Unloader assembly (4-1/2")
16.	3732-X	Suction valve assembly (4-1/2")
17.	2114 ^b	Valve gasket

Ref No.	Part No.	Description
18.	2714-1	Valve cap
19.	3569	Valve cage
20.	3733-X	Discharge valve assembly (4-1/2")
21.	3827	Valve seat (4-1/2")
22.	3828	Stud
23.	3830 ^d	Valve plate (outer)
24.	3831 ^d	Valve plate (inner)
25.	3829 ^d	Spring
26.	3826	Valve bumper (4-1/2")
27.	3805-X1	Valve repair kit
28.	1910 ^c	Bolt
29.	2619-X ^c	Unloader piston seal assembly
30.	2857 ^c	Unloader piston cap
31.	2858 ^c	Gasket

^a__ denotes O-ring code. See O-ring chart below for details.

^bIncluded with valve assembly

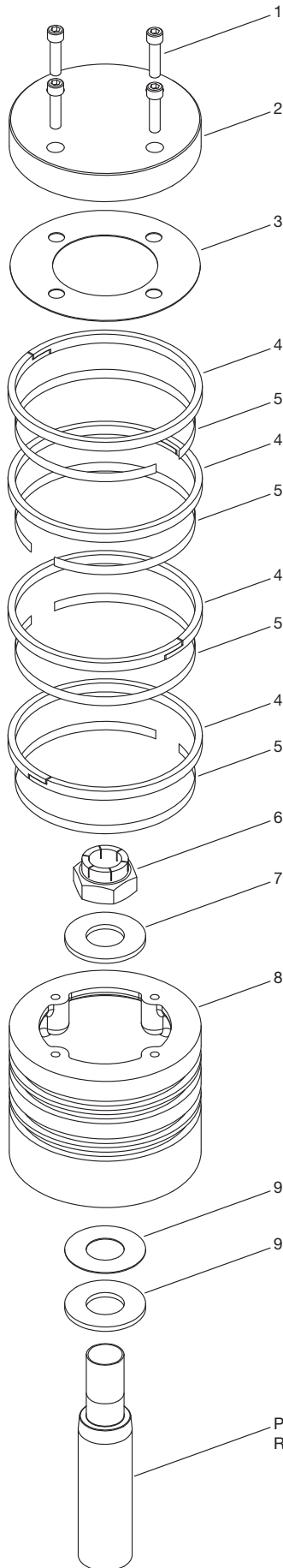
^cIncluded with unloader assembly

^dIncluded with valve repair kit.

^eRegistered trademark of the DuPont company.

O-ring Code	
A	Buna-N
B	Neoprene ^{®e}
D	Viton ^{®e}
E	PTFE
K	Kalrez ^{®e}

Appendix E—D791, T791, D891 and T891 Piston Assembly Details



Piston Assembly Bill of Materials

Ref. No.	Part No.			Description	Qty
	D/T791 1st Stage 3879-X1 (6")	D/T791 2nd Stage 3884-X1 (3-1/4")	D/T891 3925-X1 (4-1/2")		
1.	7002-025-TP100A	7002-010-TP100A	7002-025-TP100A	Screw, orlo gr. 8 (torque to 8 ft•lbs)	4
2.	3562 ^a	3561 ^a	3927 ^a	Piston cap	1
3.	3625	3731	2902	Shim washer (thick)	As req.
	3625-1	3731-1	2902-1	Shim washer (thin)	
4.	1752	1756	1739	Piston rings	4
	1752-2	1756-4	1739-2	Alloy 50 rings (opt.)	
	1752-3	1756-3	1739-3	Peek rings (opt.)	
5.	1753	1757	1740	Expander ring	4
6.		3604		Lock nut (torque to 150 ft•lbs)	1
7.		3730		Thrust washer	2
8.	3879 ^a (6" diameter)	3884 ^a (3-1/4" diameter)	3925 ^a (4-1/2" diameter)	Piston	1
9.		3603		Shim washer (thick)	As req.
		3603-1		Shim washer (thin)	
10.		3812 (not shown)		Loctite tube (620)	1

^aMC1002 coated piston and cap available. Add "C" to end of a standard part number (e.g. 3562C)

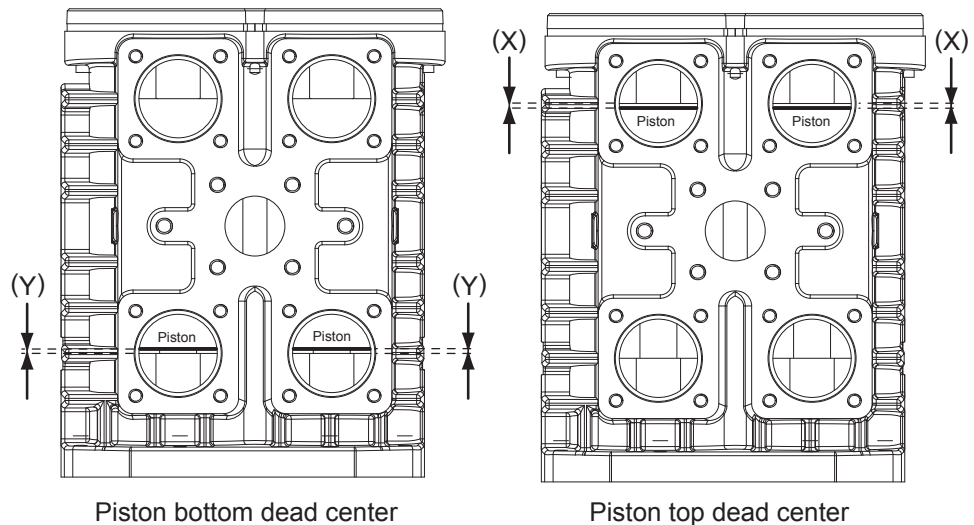
Piston Clearance (Cold)

Model	(Y) Bottom Min. ^c	(Y) Bottom Max. ^c	(X) Top Min. ^b	(X) Top Max. ^b
D791/D891	0.010" (0.25 mm)	0.020" (0.50 mm)	0.084" (2.13 mm)	0.104" (2.64 mm)
T791/T891	0.005" (0.13 mm)	0.015" (0.38 mm)	0.089" (2.26 mm)	0.109" (2.77 mm)

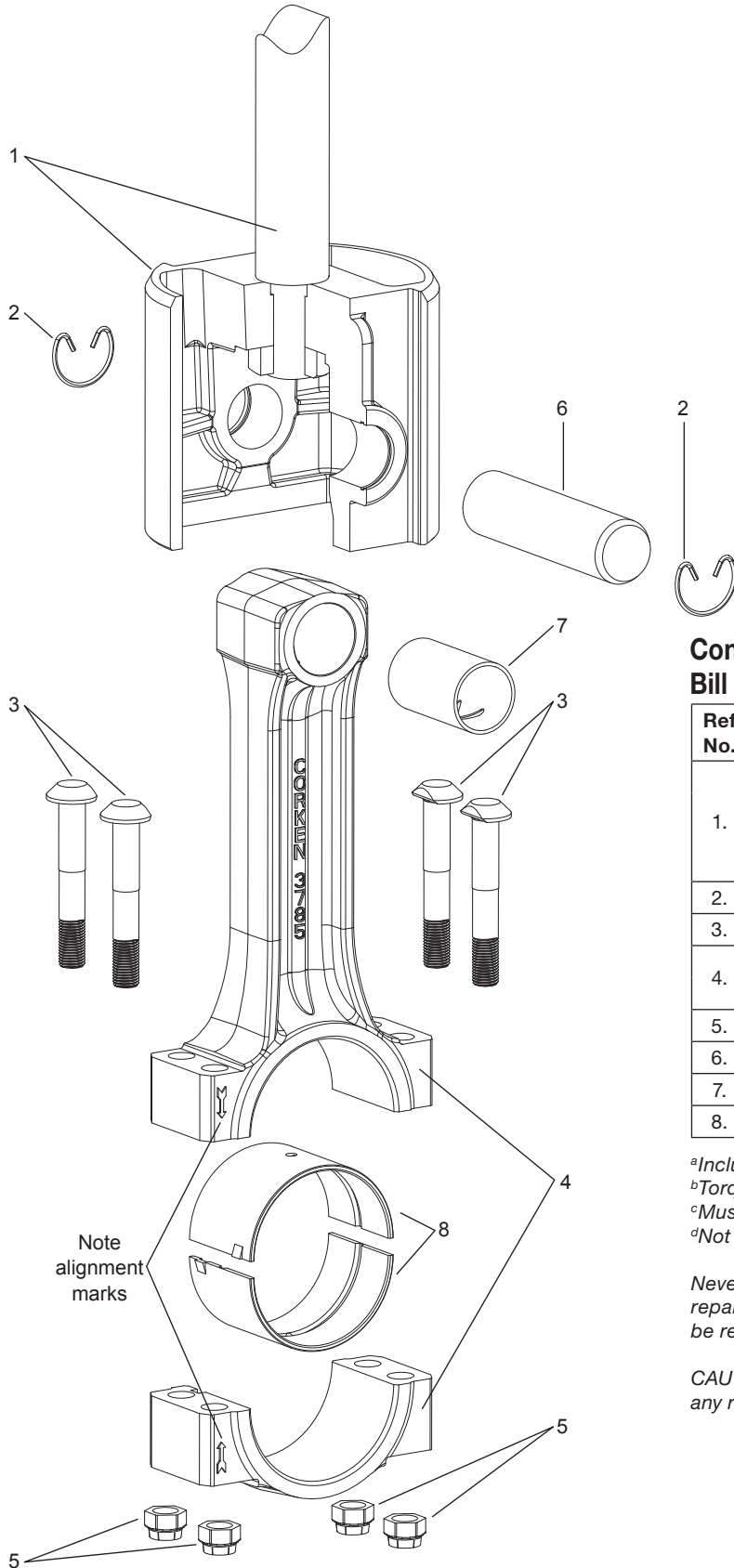
^bThe distance from the bottom of the head to the top of the piston.

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

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



Appendix E—D791, T791, D891 and T891 Connecting Rod and Crosshead Assembly Details



Connecting Rod and Crosshead Assembly Bill of Materials

Ref No.	Part No.	Description
1.	3544-X3	Crosshead assembly (D791, D891)
	3544-X9	Crosshead assembly (T791, T891)
	3544-X10	Crosshead assembly—coated piston rod (T791, T891)
2.	3590	Retainer ring
3.	1726 ^b	Bolt
4.	3785-X1	Connecting rod assembly
	3785 ^{a,d}	Connecting rod
5.	1727 ^{a,b}	Nut
6.	3540	Wrist pin
7.	3541 ^{a,c}	Wrist pin bushing
8.	3542 ^a	Connecting rod bearing

^aIncluded with connecting rod assembly

^bTorque connecting rod nut to 40 ft. lbs.

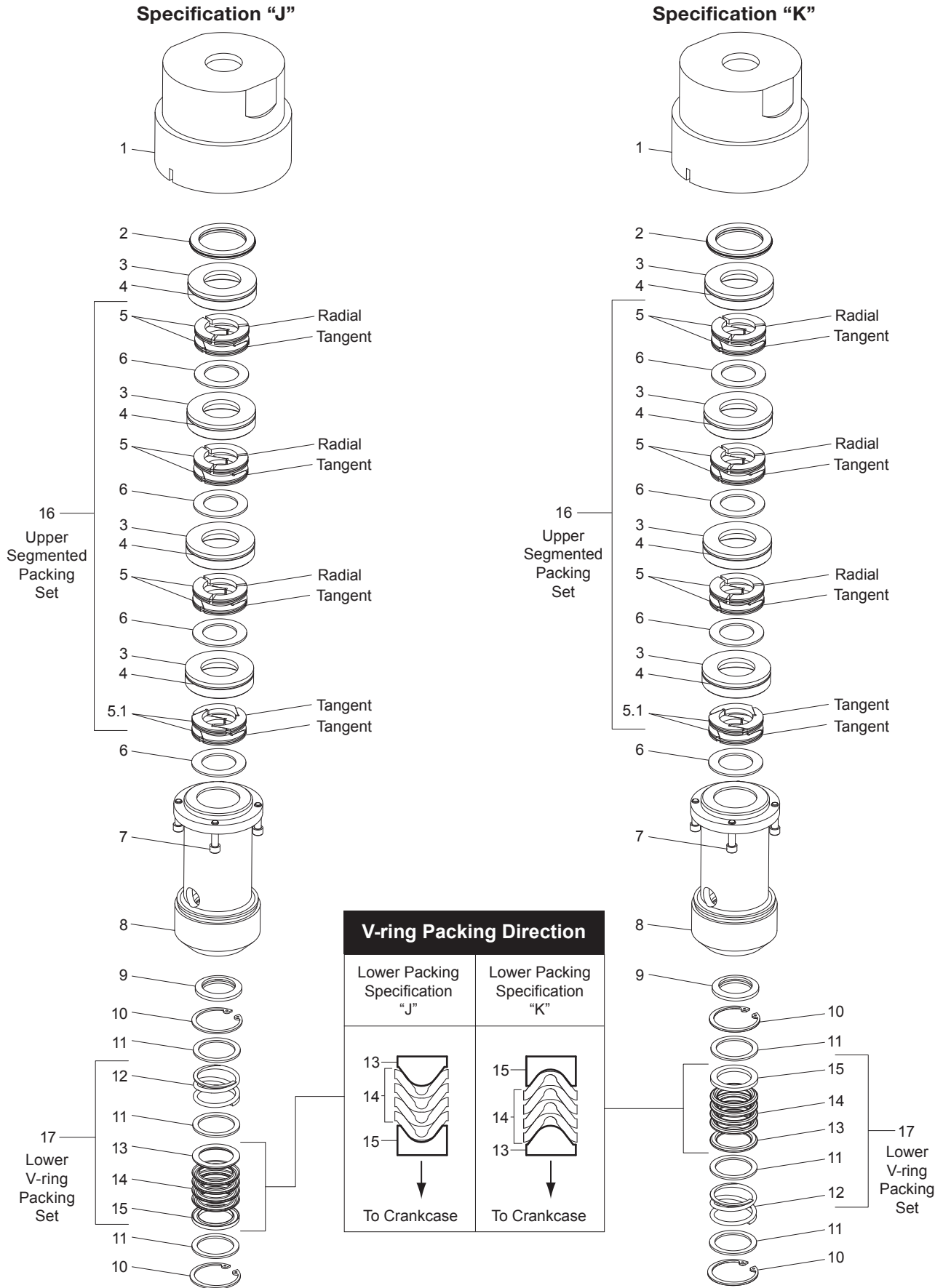
^cMust be rebored after replacing (1.1258/1.1254 dia.)

^dNot sold separately

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

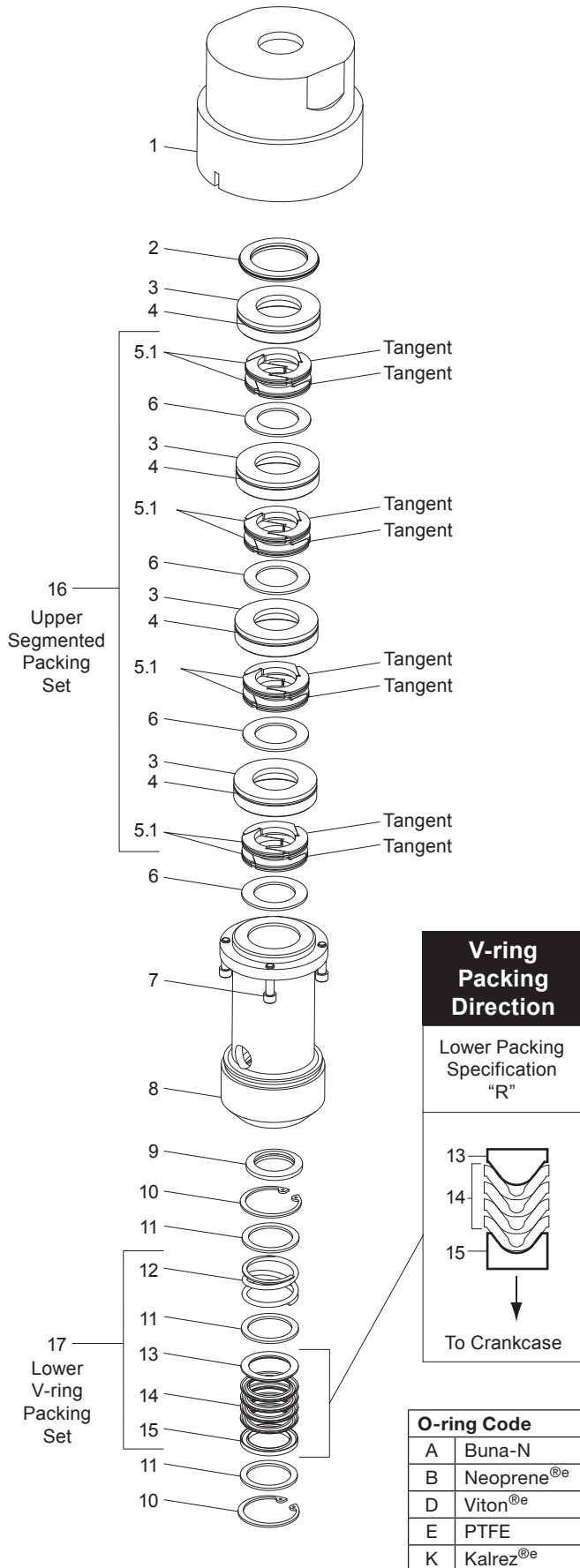
CAUTION: Always relieve pressure in the unit before attempting any repairs.

Appendix E—D791 and D891 Packing Assembly Details



Appendix E—D791 and D891 Packing Assembly Details

Specification "R"



Packing Assembly Bill of Materials

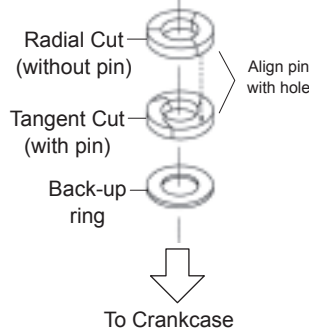
Ref No.	Part No.	Description
1.	3886	Packing barrel (3-1/4")(791 second stage)
	3887	Packing barrel (6")(791 first stage)
	3926	Packing barrel (4-1/2")(891 only)
2.	3906	Crush gasket
3.	3817	Packing cup (Not included in 3810-X1 packing set)
4.	2-036_ ^{a,c,d}	Cup O-ring
5.	3810	Segmented packing (radial—tangent) pair
5.1.	3814	Segmented packing (tangent—tangent) pair
6.	3811	Back-up ring
7.	7002-025OC100A	Screw (1/4-20 x 1" socket head)
8.	3885	Cartridge
9.	1732 ^b	Oil deflector ring
10.	5000-175	Retainer ring
11.	1728	Washer
12.	1731	Spring
13.	1724	Male packing ring
14.	1725	V-ring packing
15.	1723	Female packing ring
16.	3810-X1 ^d	Segmented packing set
17.	1725-2X	V-ring packing set

Identification of Packing Specification

Example: Model Number D891 **K** M4FBA
 Packing Spec. _____

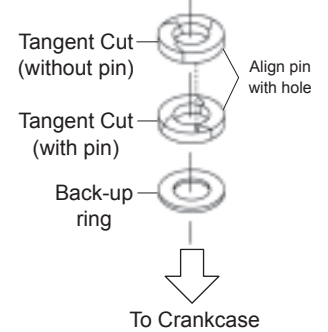
Segmented Packing for Specification "J" & "K"

Piston (Pressure) Side



Segmented packing for Specification "J", "K", & "R"

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 O-ring code. See O-ring chart for details.

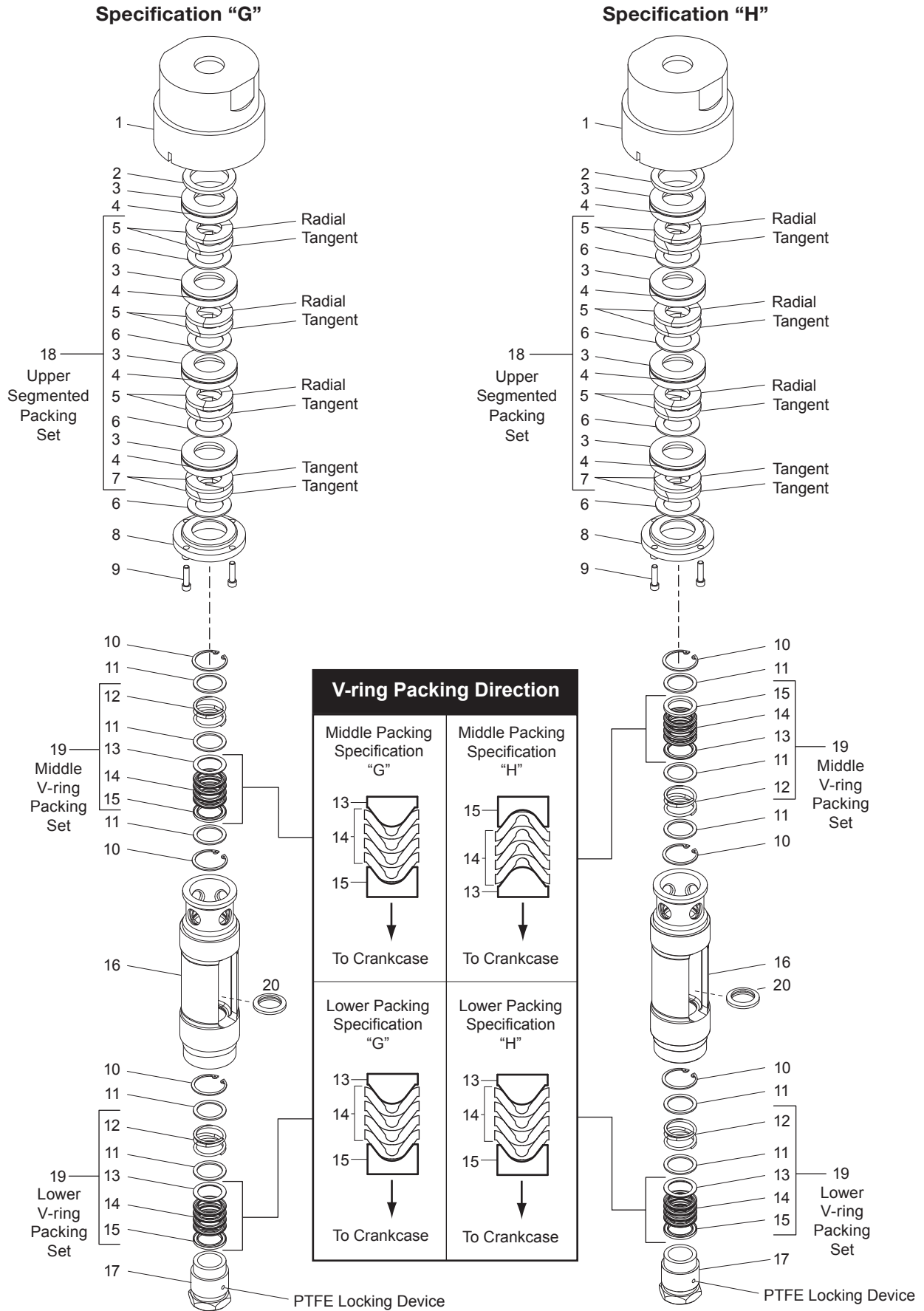
^b Deflector ring is loose within the packing cartridge until fitted on the piston rod. Must be put in from the bottom of the cartridge.

^c Starting with S.N. NN51397.

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

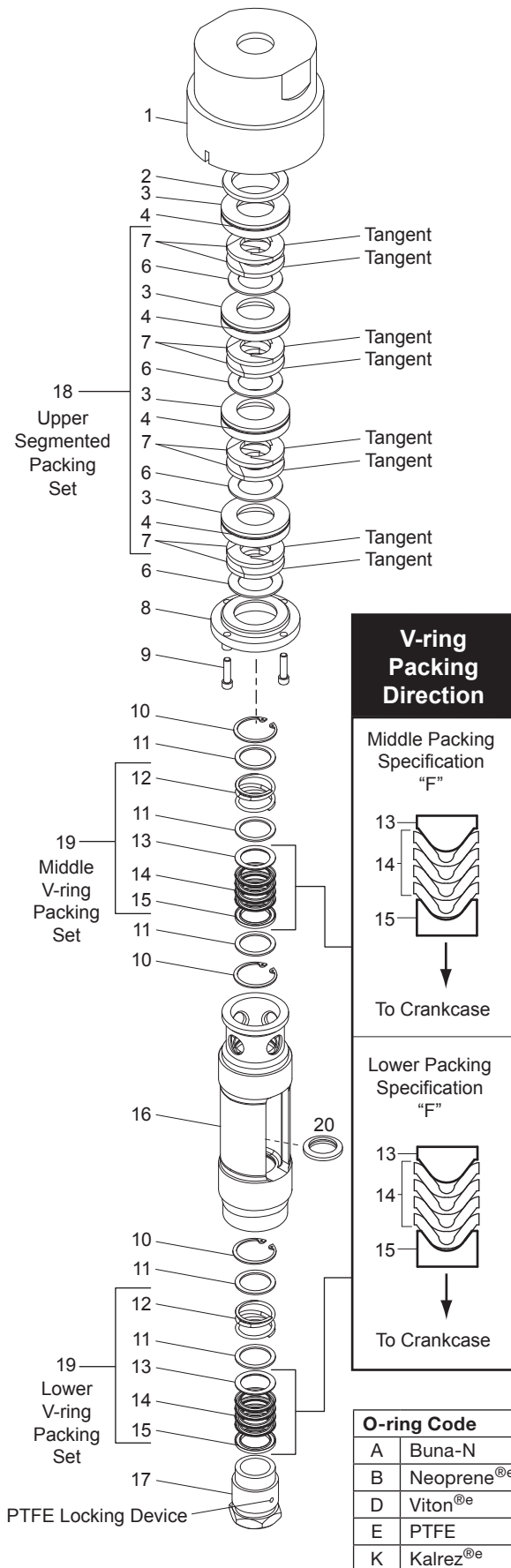
^e Registered trademark of the DuPont company.

Appendix E—T791 and T891 Packing Assembly Details



Appendix E—T791 and T891 Packing Assembly Details

Specification "F"



Packing Assembly Bill of Materials

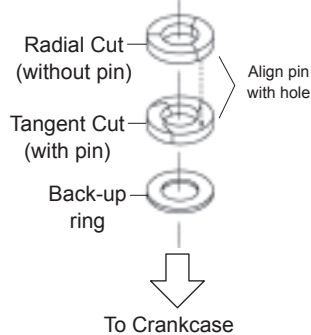
Ref No.	Part No.	Description
1.	3886	Packing barrel (3-1/4")(791 second stage)
	3887	Packing barrel (6")(791 first stage)
	3926	Packing barrel (4-1/2")(891 only)
2.	3906	Crush gasket
3.	3817	Packing cup (Not included in 3810-X1 packing set)
4.	2-036_ ^{a,c,d}	Cup O-ring
5.	3810	Segmented packing (radial—tangent) pair
6.	3811	Back-up ring
7.	3814	Segmented packing (tangent—tangent) pair
8.	4748	Packing adapter
9.	7002-025OC100A	Screw (1/4-20 x 1" socket head)
10.	5000-175	Retainer ring
11.	1728	Washer
12.	1731	Spring
13.	1724	Male packing ring
14.	1725	V-ring packing
15.	1723	Female packing ring
16.	4746	Cartridge
17.	1722-X	Adjusting screw
18.	3810-X1 ^d	Segmented packing set
19.	1725-2X	V-ring packing set
20.	1732	Oil deflector ring

Identification of Packing Specification

Example: Model Number T891 **G** L4FBDNSNC
 Packing Spec. _____

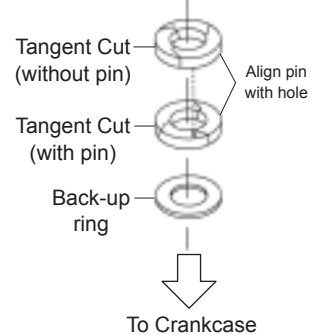
Segmented Packing for Specification "F" & "G"

Piston (Pressure) Side



Segmented packing for Specification "F", "G", & "H"

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 O-ring code. See O-ring chart for details.

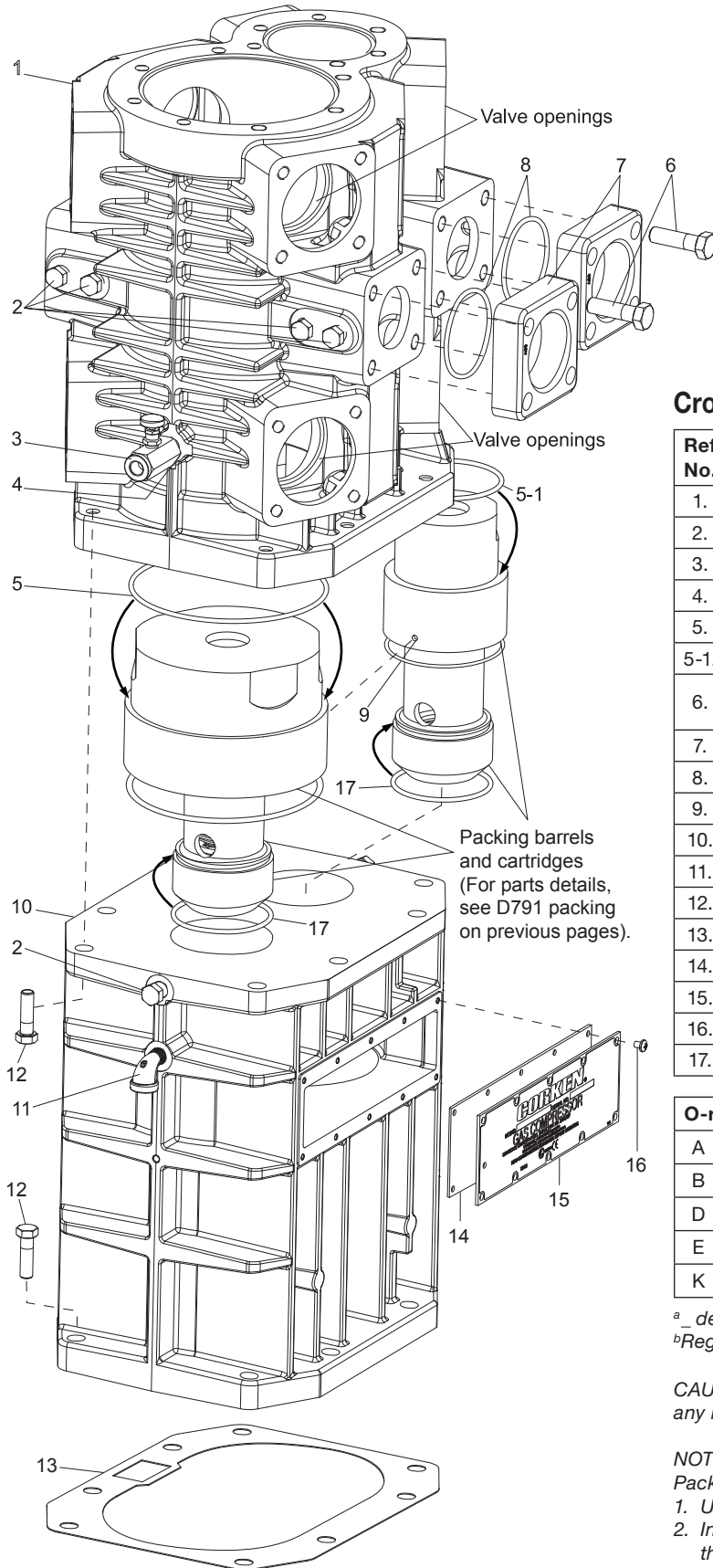
^bDeflector ring is loose within the packing cartridge until fitted on the piston rod. Must be put in from the bottom of the cartridge.

^cStarting with S.N. NN51397.

^dPacking cup O-ring not included in packing set.

^eRegistered trademark of the DuPont company.

Appendix E—D791 Crosshead Guide Assembly Details



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty
1.	3866	Cylinder	1
2.	3442	Pipe plug (1/4" NPT)	10
3.	1054	Drain valve (lubricated models)	1
4.	1071	Nipple (1/4" x close)	1
5.	2-258 ^a	O-ring for cylinder (1st stage)	1
5-1.	2-236 ^a	O-ring for cylinder (2nd stage)	1
6.	7001-050NC175A	Bolt (1/2" - 13 x 1-3/4" hex head gr 5)	16
7.	3793-2S	Flange (inlet/outlet)	4
8.	2-231 ^a	O-ring for flange	4
9.	3253	Roll pin	1
10.	2405-1	Crosshead guide	1
11.	1064	Elbow (1/4" NPT)	1
12.	7005-050175A	Bolt (1/2" 13 x 1-3/4" ferry head)	16
13.	1761	Gasket (crankcase)	1
14.	1760	Gasket (inspection cover)	1
15.	1721	Inspection cover	1
16.	7012-010NC025B	Bolt (10 - 24 x 1/4" Phillips hd.)	10
17.	2-231 ^a	O-ring	2

O-ring Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.

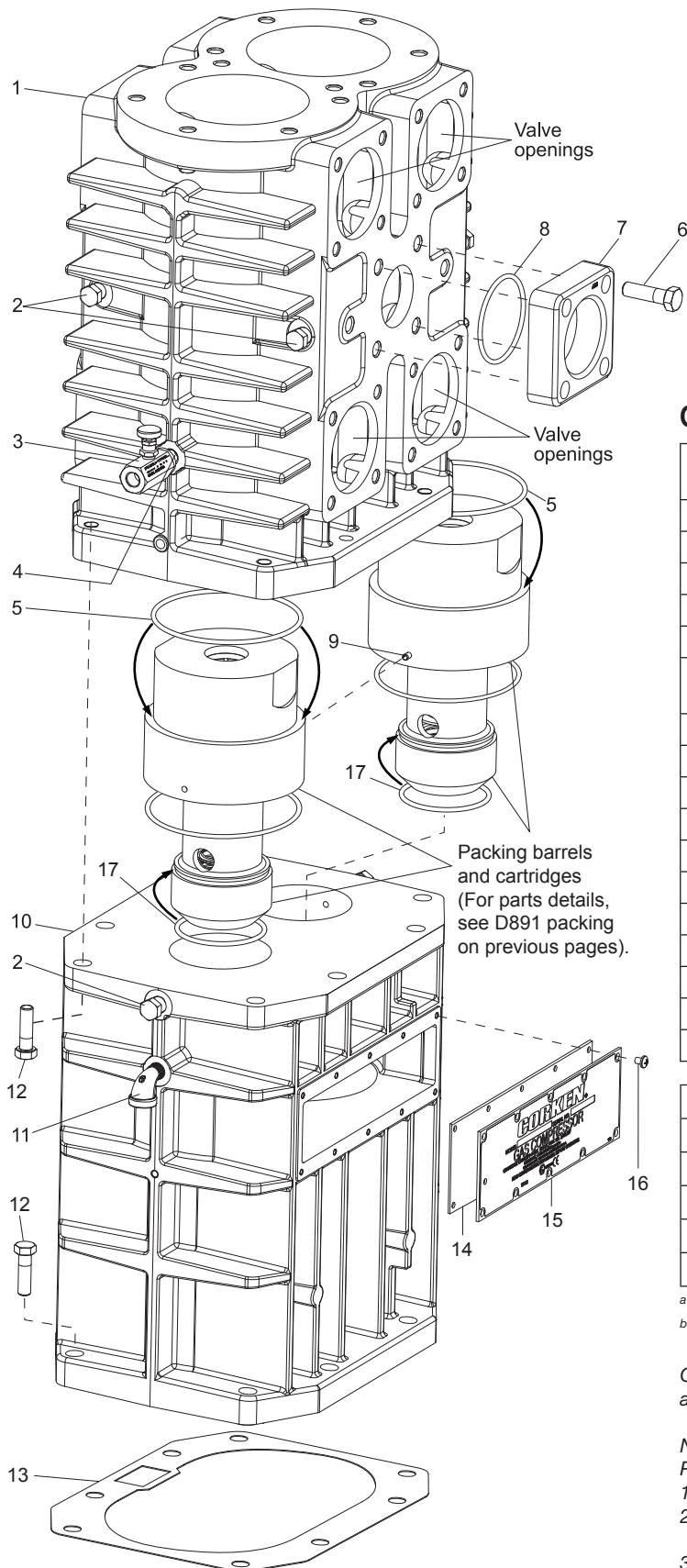
CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix E—D891 Crosshead Guide Assembly Details



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty
1.	3922	Cylinder	1
2.	3442	Pipe plug (1/4" NPT)	6
3.	1054	Drain valve (lubricated models)	1
4.	1071	Nipple (1/4" x close)	1
5.	2-246_a	O-ring for cylinder	2
6.	7001-050NC175A	Bolt (1/2"- 13 x 1-3/4" hex head gr 5)	8
7.	3793-2S	Flange (inlet/outlet)	2
8.	2-231_a	O-ring for flange	2
9.	3253	Roll pin	1
10.	2405-1	Crosshead guide	1
11.	1064	Elbow (1/4" NPT)	1
12.	7005-050175A	Bolt (1/2" 13 x 1-3/4" ferry head)	16
13.	1761	Gasket (crankcase)	1
14.	1760	Gasket (inspection cover)	1
15.	1721	Inspection cover	1
16.	7012-010NC025B	Screw (10 - 24 x 1/4" Phillips hd.)	10
17.	2-231_a	O-ring	2

O-ring Code

A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.

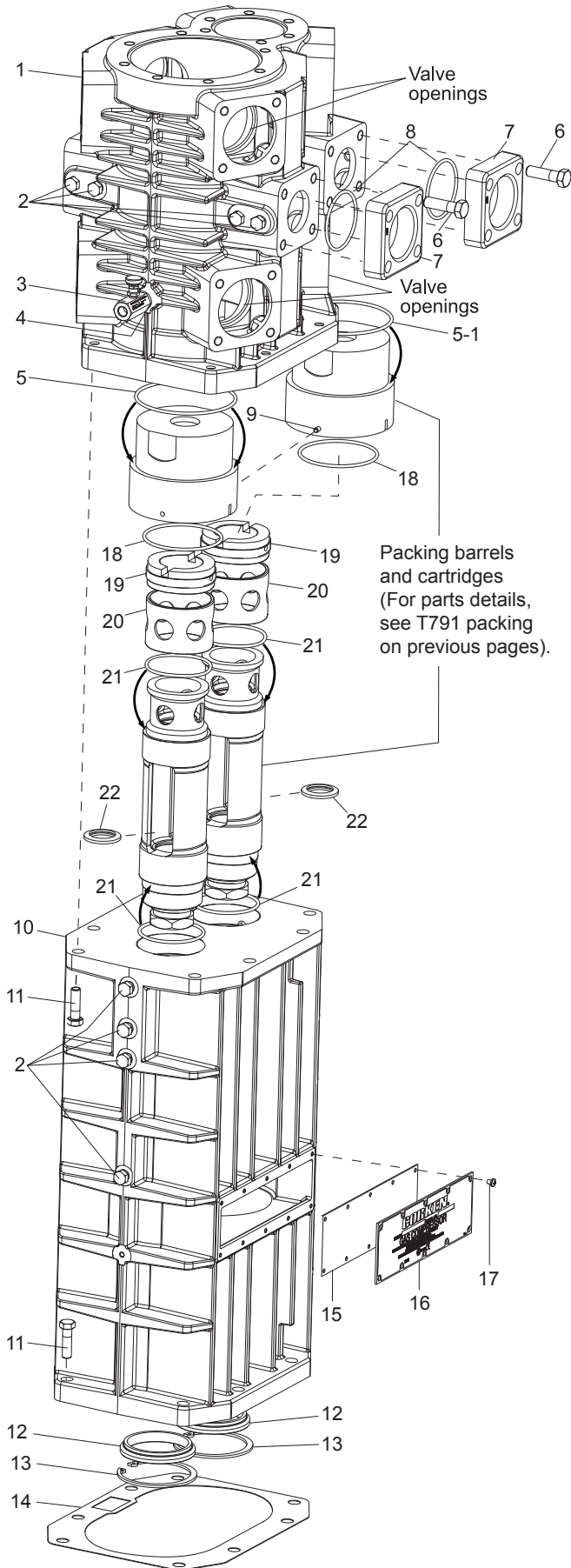
CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix E—T791 Crosshead Guide Assembly Details



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty
1.	3866	Cylinder	1
2.	3442	Pipe plug (1/4" NPT)	16
3.	1054	Drain valve (lubricated models)	1
4.	1071	Nipple (1/4" x close)	1
5.	2-258 ^a	O-ring for cylinder (1st stage)	1
5-1.	2-236 ^a	O-ring for cylinder (2nd stage)	1
6.	7001-050NC175A	Bolt (1/2" 13 x 1-3/4" hex head gr 5)	16
7.	3793-2S	Flange (inlet/outlet)	4
8.	2-231 ^a	O-ring for flange	4
9.	3253	Roll pin	1
10.	1716-4	Crosshead guide	1
11.	7005-050175A	Bolt (1/2" 13 x 1-3/4" ferry head)	16
12.	1748	Cartridge plate	2
13.	5000-350	Retainer ring	2
14.	1761	Gasket (crankcase)	1
15.	1760	Gasket (inspection cover)	1
16.	1721	Inspection cover	1
17.	7012-010NC025B	Bolt (10 - 24 x 1/4" Phillips hd.)	10
18.	2-238 ^a	O-ring	2
19.	1749	Cartridge holddown screw	2
20.	4747	Cage	2
21.	2-233 ^a	O-ring	2
22.	1732	Oil deflector ring	2

O-ring Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.

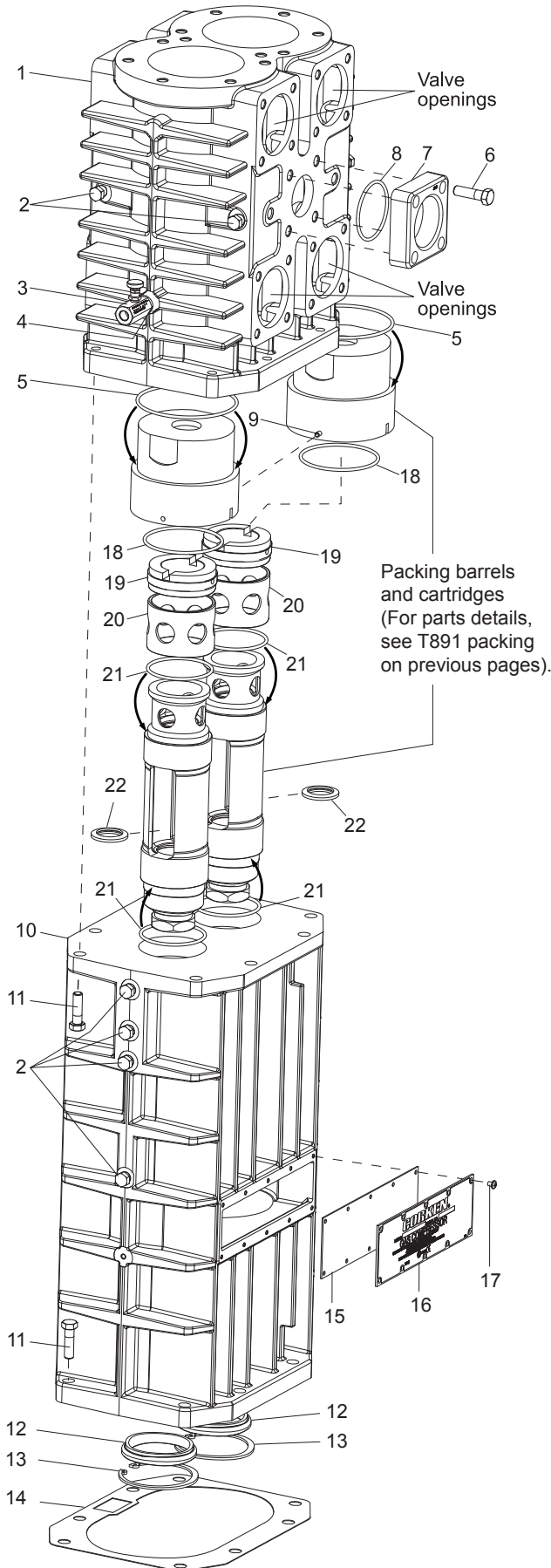
CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix E—T891 Crosshead Guide Assembly Details



Crosshead Guide Bill of Materials

Ref No.	Part No.	Description	Qty
1.	3922	Cylinder	1
2.	3442	Pipe plug (1/4" NPT)	12
3.	1054	Drain valve (lubricated models)	1
4.	1071	Nipple (1/4" x close)	1
5.	2-246 ^a	O-ring for cylinder	2
6.	7001-050NC175A	Bolt (1/2" 13 x 1-3/4" hex head gr 5)	6
7.	3793-2S	Flange (inlet/outlet)	2
8.	2-231 ^a	O-ring for flange	2
9.	3253	Roll pin	1
10.	1716-4	Crosshead guide	1
11.	7005-050175A	Bolt (1/2" 13 x 1-3/4" ferry head)	16
12.	1748	Cartridge plate	2
13.	5000-350	Retainer ring	2
14.	1761	Gasket (crankcase)	1
15.	1760	Gasket (inspection cover)	1
16.	1721	Inspection cover	1
17.	7012-010NC025B	Bolt (10 - 24 x 1/4" Phillips hd.)	10
18.	2-238 ^a	O-ring	2
19.	1749	Cartridge holddown screw	2
20.	4747	Cage	2
21.	2-233 ^a	O-ring	2
22.	1732	Oil deflector ring	2

O-ring Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

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

^bRegistered trademark of the DuPont company.

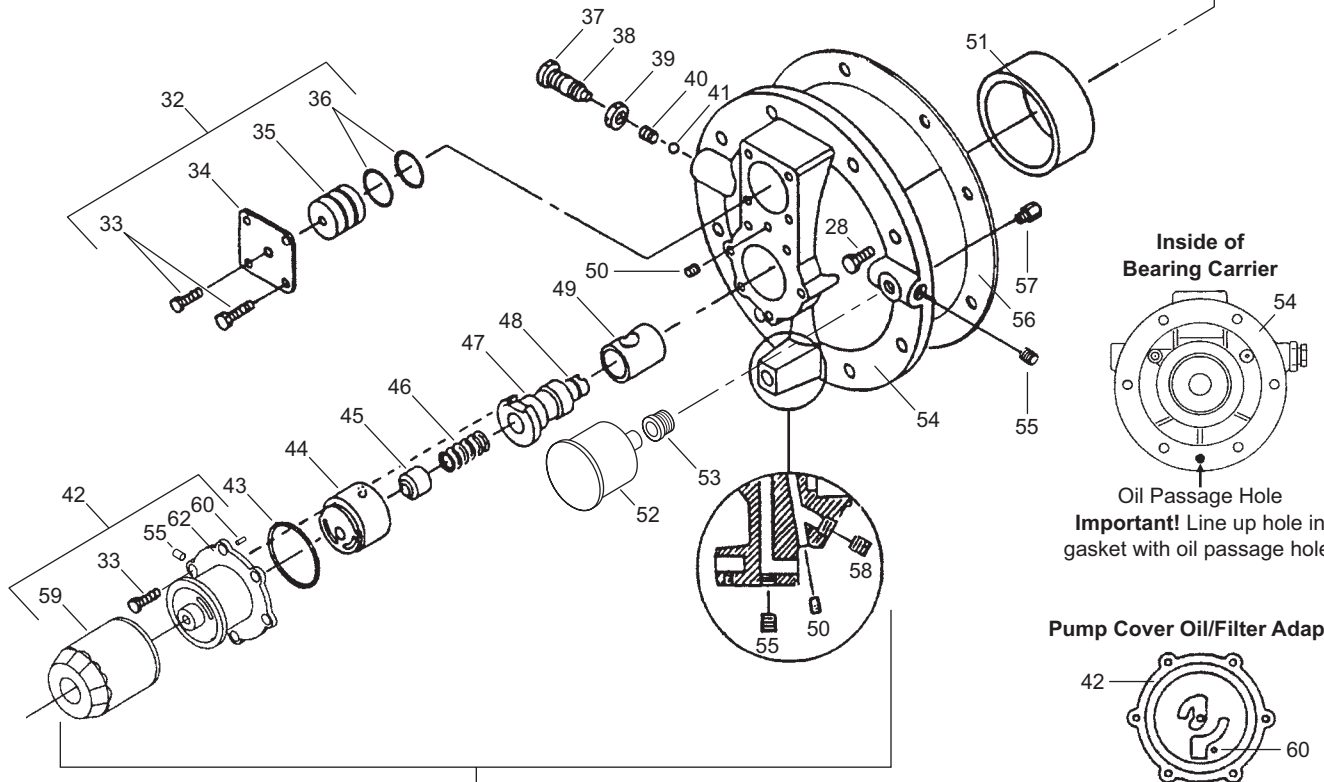
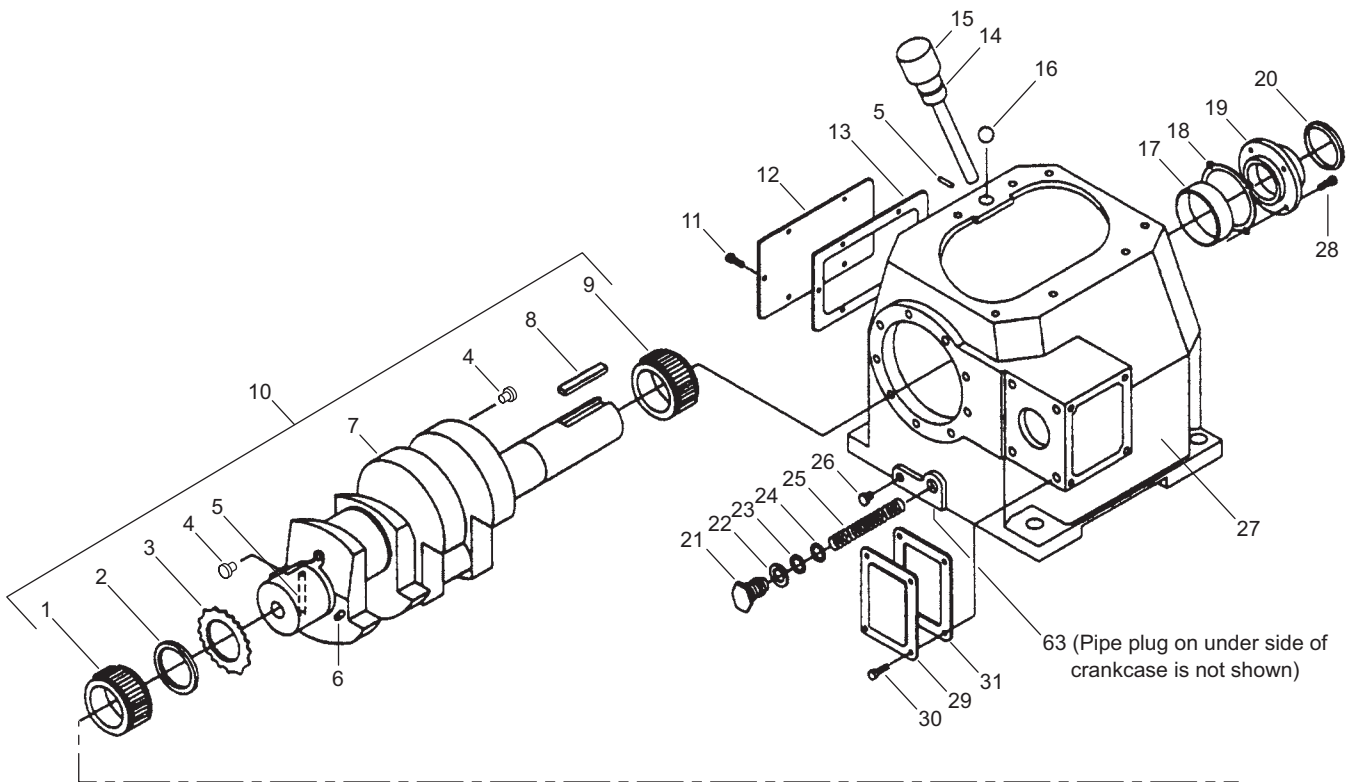
CAUTION: Always relieve pressure in the unit before attempting any repairs.

NOTE:

Packing barrel installation:

1. Use packing installation cone #3905 on the piston rod.
2. Insert small barrel first, use finger holes to align slinger ring on to the rod. Slip the packing barrel into place.
3. Align pin with slot in large packing barrel.
4. Slip large packing barrel in place.

Appendix E—Crankcase Assembly Details



61
 (Includes all parts shown except #52 and #53)

Appendix E—Crankcase Assembly Details

Crankcase Assembly Bill of Materials

Ref No.	Part No.	Description
1.	1737	Bearing cone
2.	3638	Spacer
3.	3635	Drive sprocket
4.	1284	Crankshaft orifice
5.	2135	Drive pin
6.	2933	Link pin
7.	3786	Crankshaft
8.	3503	Flywheel key
9.	3580	Bearing cone
10.	3786-X1	Crankshaft assembly
11.	7001-031NC075A	Bolt (5/16 - 18 x 3/4" hex head)
12.	2122	Inspection cover
13.	2123	Gasket, inspection cover
14.	2-112 _c	O-ring
15.	3225-X1	Oil bayonet assembly (w/O-ring)
16.	2126	Breather ball
17.	3579	Bearing cup
18.	3589	Bearing adjustment shim (.005")
	3589-1	Bearing adjustment shim (.007")
	3589-2	Bearing adjustment shim (.020")
19.	3539	Bearing cover
20.	3526	Oil seal
21.	1280	Filter screw
22.	1281	Gasket, filter
23.	2-116 _c	O-ring
24.	1276	Washer
25.	1275	Oil filter screen
26.	3443	Pipe plug (1/2" NPT steel)
27.	3221	Crankcase
28.	7001-037NC100A	Bolt (3/8 - 16 x 1" hex head Gr. 5)
29.	3875	Access cover
30.	7003-025NC037E	Screw (1/4 - 20 x 3/8")
31.	3874	Gasket (access cover)
32.	1515-X	Closure cap assembly
33.	7001-025NC050A	Bolt (1/4 - 20 x 1/2" hex head)
34.	1515	Closure cap
35.	1516	Closure body
36.	2-118 _c	O-ring
37.	1290	Relief valve adjusting screw
38.	2-011 _c	O-ring
39.	1291	Adjusting screw locknut
40.	1292	Relief valve spring
41.	1293	Relief valve ball
42.	4222-X ^b	Oil filter adapter assembly (w/pin)
43.	2-228 _c	O-ring
44.	2849-1X ^b	Oil pump assembly
45.	2851	Spring guide
46.	2852	Oil pump spring

Ref No.	Part No.	Description
47.	3219	Pump shaft adapter
48.	2-112 _c	O-ring
49.	2805-X ^a	Pump shaft bushing
50.	1629	Pipe plug (1/16 NPT fl. seal)
51.	1736	Bearing cup
52.	1302	Oil pressure gauge
53.	1044	Bushing (1/8 x 1/4 NPT)
54.	3220-2	Bearing carrier
55.	3289	Pipe plug (1/4 NPT fl. seal)
56.	2131	Bearing carrier gasket
57.	2961-X	Air release valve assembly
58.	2590	Pipe plug (1/8 NPT fl. seal)
59.	4225	Filter
60.	2798	Pump cover pin (included w/4222-X)
61.	3220-2X	Bearing carrier assembly
62.	4222	Oil filter adapter
63.	3289	Pipe plug (1/4" x 18 NPTF x 7/8")

Assembly Number	Assembly Name
3221-X1	Crankcase assembly (M, 4, 8, 9) without lubricator
3221-X2	Crankcase assembly (M7, 78) without lubricator
3221-X3	Crankcase assembly (L, 4, 8, 9) with lubricator
3221-X4	Crankcase assembly (L7, 78) with lubricator

O-ring Code	
A	Buna-N
B	Neoprene ^{®b}
D	Viton ^{®b}
E	PTFE
K	Kalrez ^{®b}

^aMust be rebored and honed after replacing (0.876"/0.875" diameter)

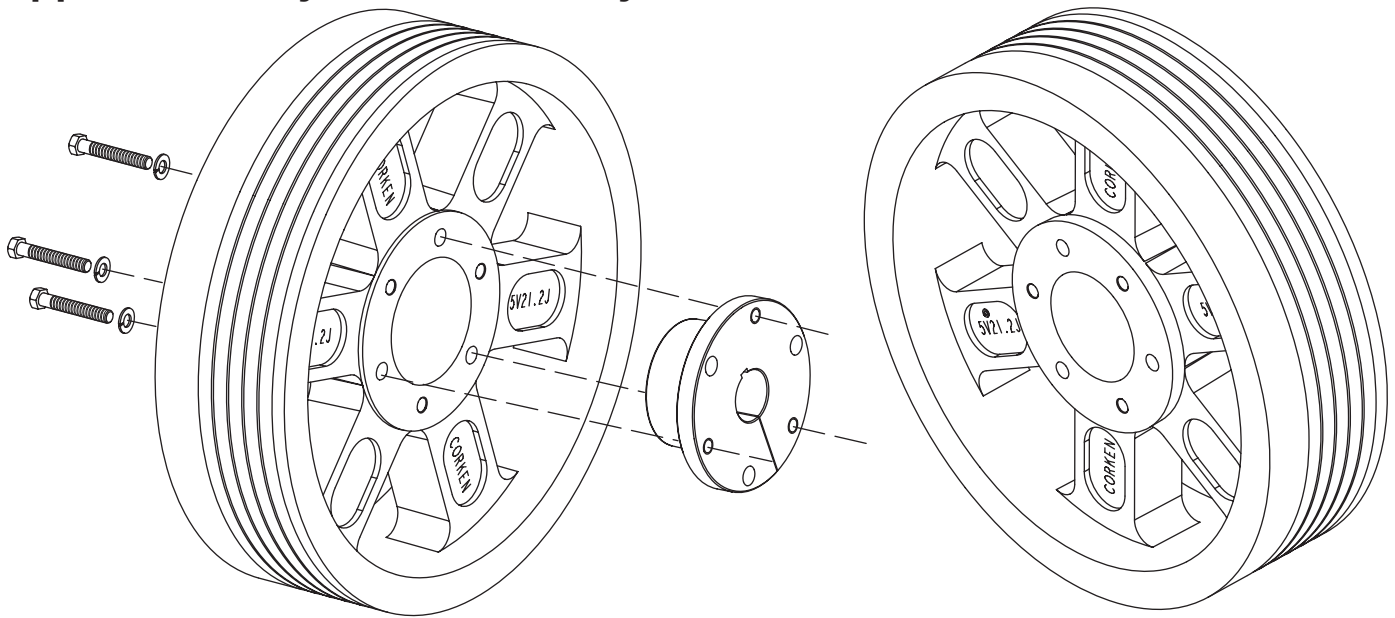
^bCaution: To avoid damage during assembly, refer to installation Instruction Manual IE400.

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

^dRegistered trademark of the DuPont company.

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

Appendix E—Flywheel Assembly Details



Back Side

Front Side

Flywheel Assembly Bill of Materials

Assembly Number	Assembly Name
3852-X	Flywheel assembly (flywheel, hub, and three bolts)
3852	Flywheel: 21.2" O.D., 5 groove
H J-2.125	Hub with three bolts and lockwashers