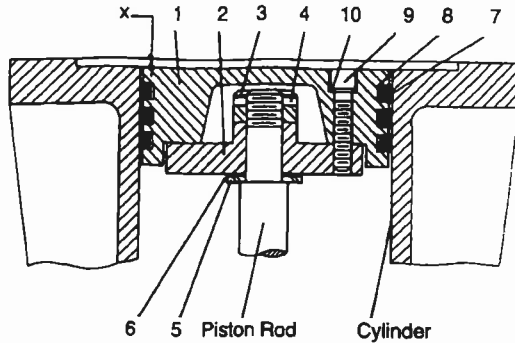


**PISTON ASSEMBLIES
MODEL 91 - 691**

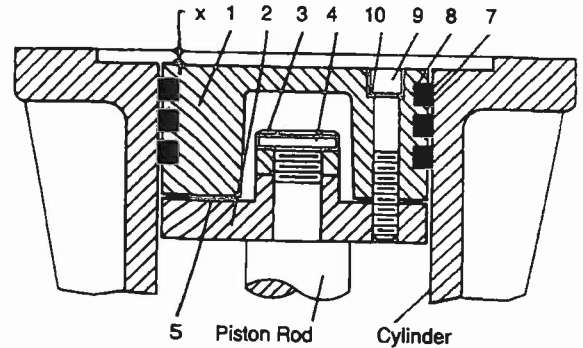
SERVICE PAGE **MANUAL E200L**

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 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	1528	As Req.	1378	As Req.	1528	As Req.	1528	As Req.	1735	As Req.	1735	As Req.
	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												

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	1528	As Req.	1528	As Req.	1528	As Req.	1735	As Req.	1735	As Req.
	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.

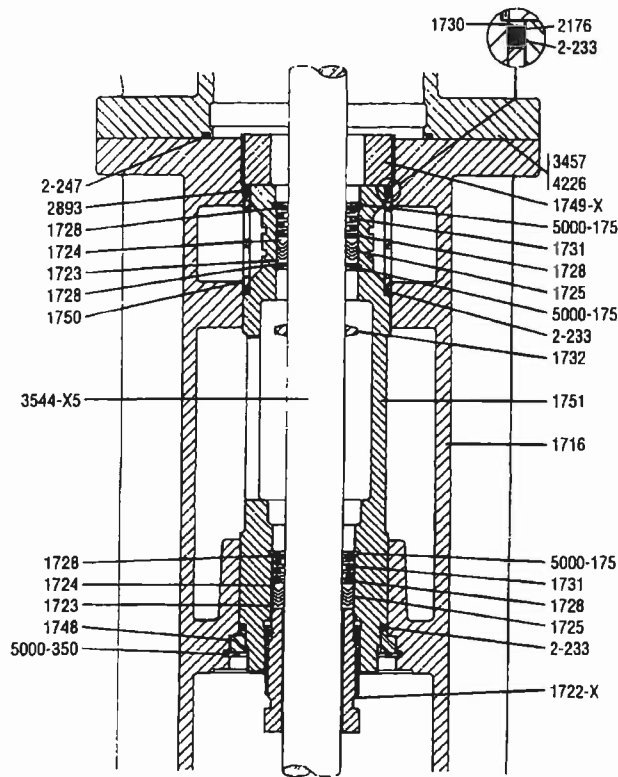
**CAUTION: ALWAYS RELIEVE PRESSURE
IN THE UNITS BEFORE
ATTEMPTING ANY REPAIRS.**

DISTANCE PIECE DETAILS

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

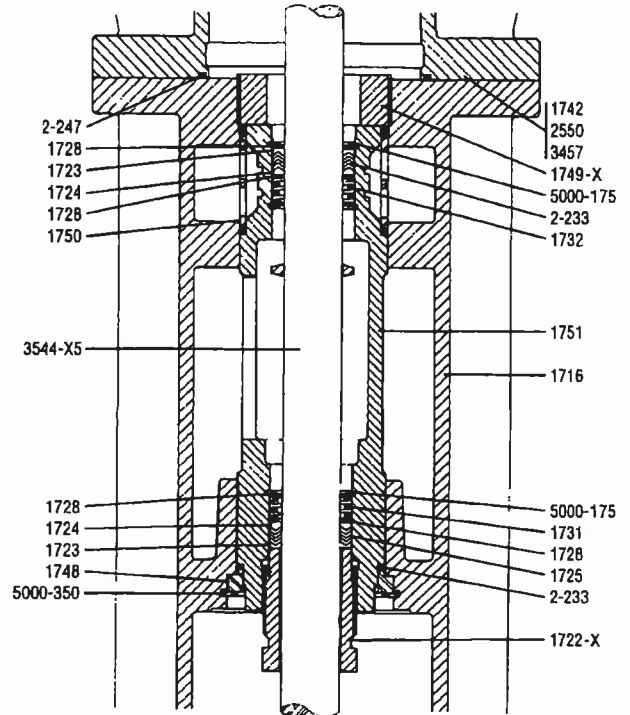
ALL SPECIFICATIONS

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).

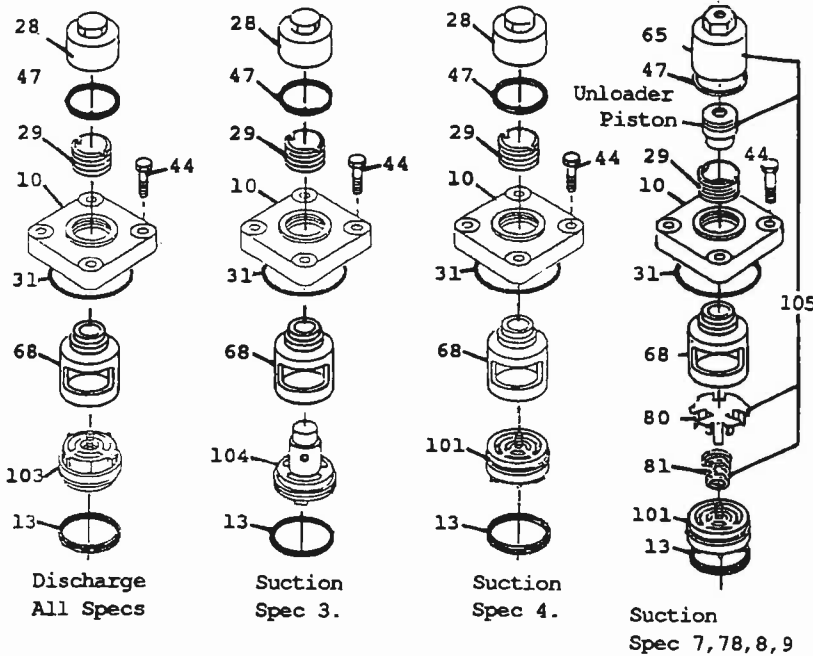
Assembly Note: Use packing installation cone *3905 when installing packing cartridge on piston rod.

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

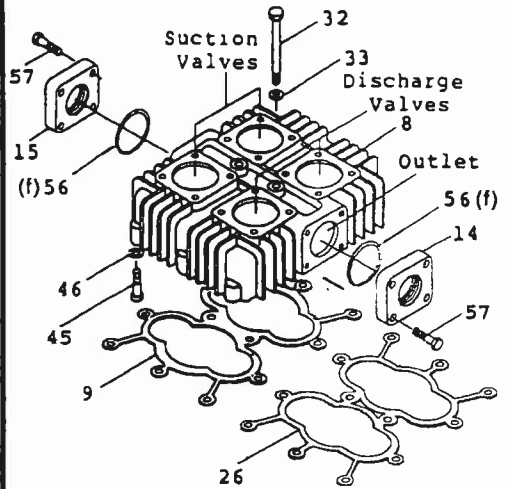
HEAD ASSEMBLY DETAILS
 MODEL 690, W690, 691, WA691, D690,
 D690-4, D691, WD690, WD690-4
 S/N MR50653 AND LATER
 ALL SPECIFICATIONS

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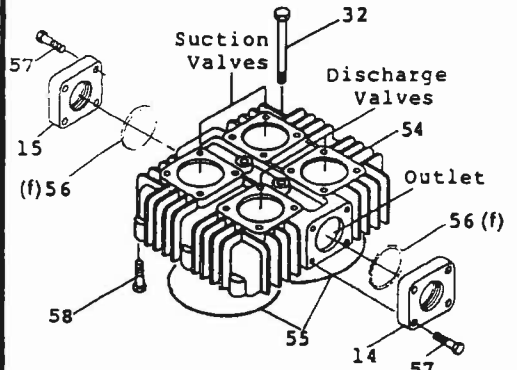
November 1991
 Supersedes E330E



Model: 690, A690, D690, D690-4



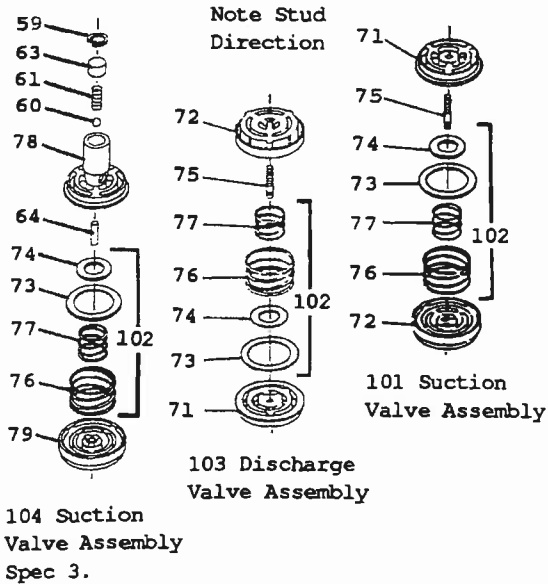
Model: 691, D691



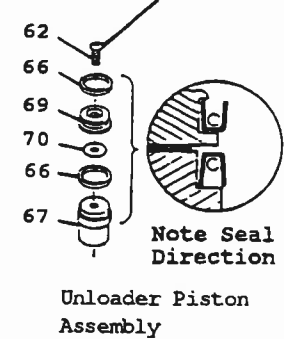
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

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

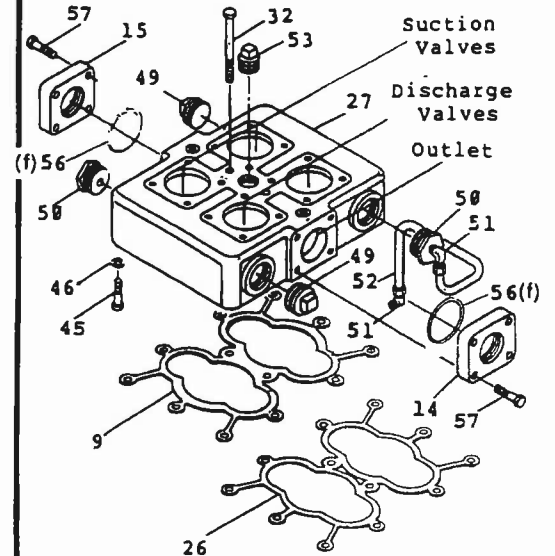
Valve Details



Apply Loctite #290 when assembling



Model: W690, WA690, WD690, WD690-4



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 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

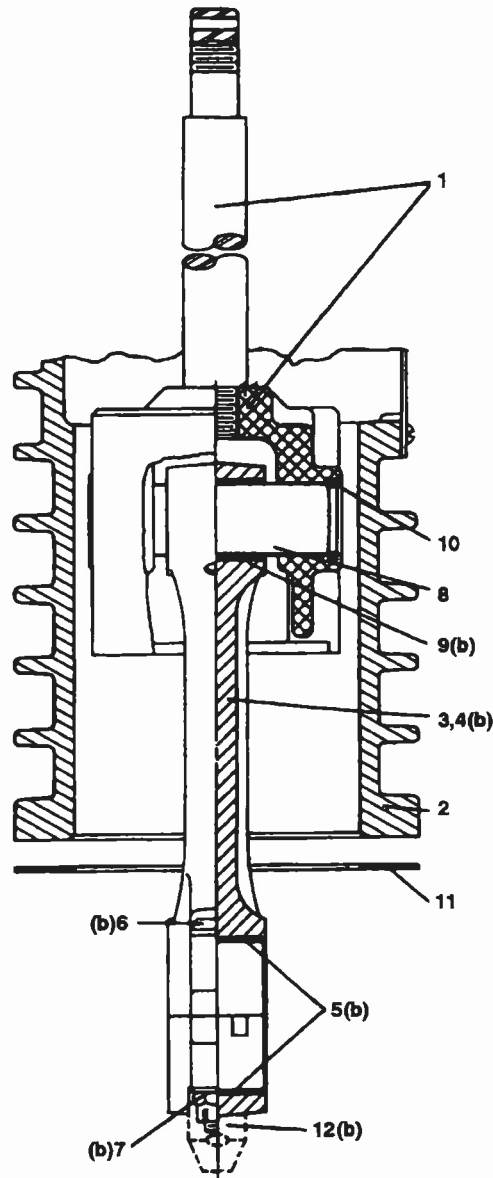
Spec.	Head Assy No.	Model No.
3:	1743-X	690,D690,D690-4,
3:	2579-X	W690,WD690,WD690-4,
3:	3458-X	691,D691
4:	1743-X1	690,D690,D690-4,A690
4:	2579-X1	W690,WD690,WD690-4,WA690
4:	3458-X1	691,D691
7,78,8,9:	1743-X2	690,D690,D690-4
7,78,8,9:	1743-X3	A690
7,78,8,9:	2579-X2	W690,WD690,WD690-4
7,78,8,9:	2579-X3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

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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(e)	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	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
- (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.

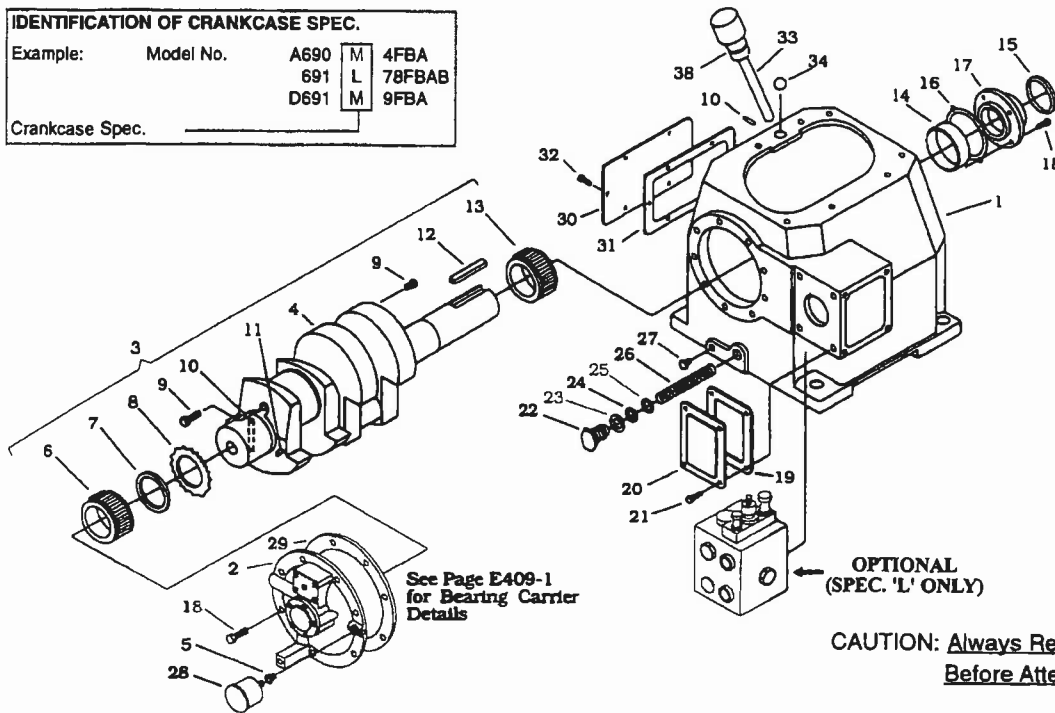
CRANKCASE DETAILS
ALL MODELS 590, 591, 690, 691, D791, D891
CRANKCASE SPECIFICATION: M
CRANKCASE SPECIFICATION: L (S/N KR48400 AND LATER)

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AUGUST 1999
SUPERSEDES E408-1B

IDENTIFICATION OF CRANKCASE SPEC.
Example: Model No. A690

M
L
M

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



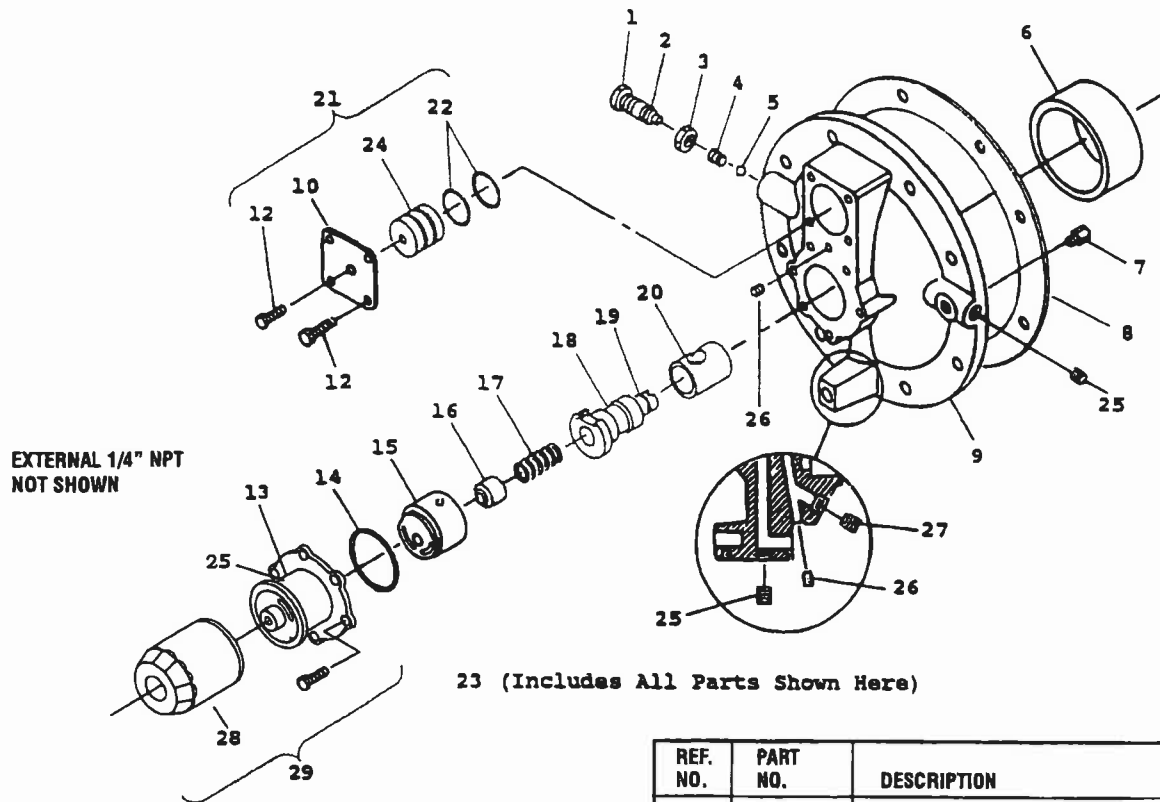
CAUTION: Always Relieve Pressure In The Unit Before Attempting Any Repairs.

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

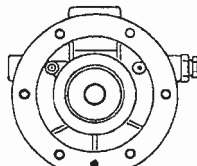
REF. NO.	PART NO.	DESCRIPTION
27	3443	Pipe Plug, 1/2" NPT Steel
28	1302	Oil Pressure Gauge
29	2131	Gasket, Bearing Carrier
30	2122	Inspection Cover
31	2123	Gasket, Inspection Cover
32	7001-031	
	NC075A	Bolt, 5/16 - 18 x 3/4" Hex Head
33	3225-X1	Oil Bayonet Assembly (w/ O-ring)
34	2126	Breather Ball (Not 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



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.