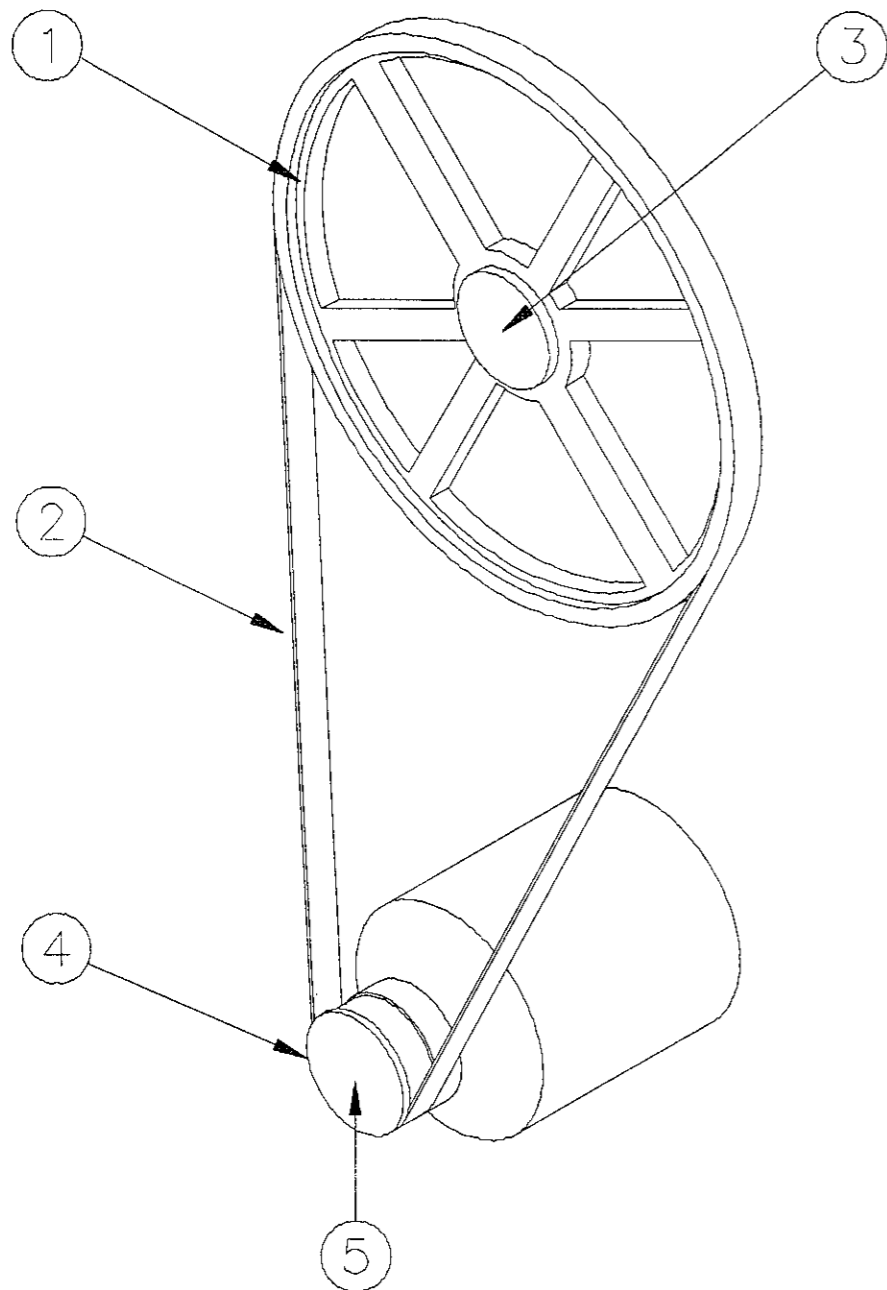


**DRAWING AND PARTS LIST**

(See other page for more, if applicable.)

**DRIVE CHART**  
**30015 & 30022 S4A,S4G,S4J,S4T**

**BMP930015/95077V (Page 1)**



ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	D33 03150	94000Z DRIVE CHART=3015/22S4 50CYC	3015/20S4X 50 CYCLE
00B	D33 03160	94000Z DRIVE CHART=3015/22S4 60CYC	3015/20S4X 60 CYCLE
001	560205R2SD	VPUL 2G3V20.5 (SD) MTO SPECIAL	
002	56VR0750M2	VBELT 3V750 MATCHSET=2 "EA"=1 BELT	
003	56Q1KSD	1+1/2" BUSHING VPUL QD TYPE "SD"	
004A	560280R2JA	VPUL 2G3V2.80 QD TYPE JA	00A
004B	560235R2JA	VPUL 2G3V2.35 QD TYPE JA	00B
005	56Q0RJA	7/8" BUSHING VPUL QD TYPE "JA"	
		***** END OF PARTS LIST *****	

**How to Read Parts List**

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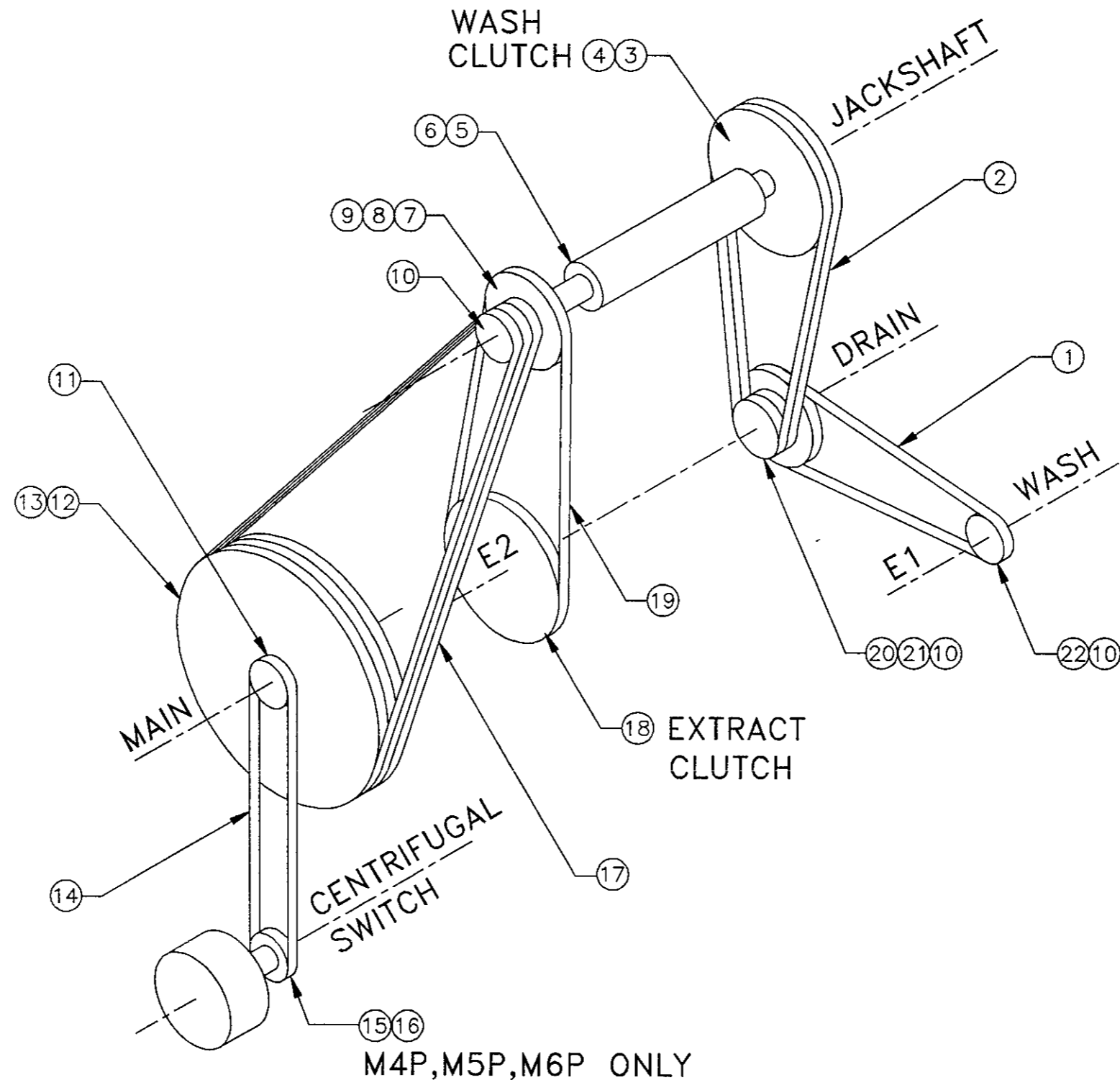
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DRAWING  
(See other page for parts list,  
if applicable.)

**DRIVE CHART - 30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**



PARTS LIST

(See other page for drawing.)

**DRIVE CHART - 30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)	ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	D33 01150	83433M*DRIVECHART=C6M 50CYC	50C-3015M6P	012C	02 03625	87187C PULLEY=FLATFACE 21.44PD CAST	3020-M4X,M5X,M7X;3022-M4X,M5X
00B	D33 01160	83433M*DRIVECHART=C6M 60CYC	60C-3015M6P	013A	56Q1KP1	1+1/2" BUSHING,VPUL BROWNING "P1"	00A,00B,00G-00K,00N-00R
00C	D33 01250	83433M*DRIVECHART=C4M 50CYC	50C-3015M4P	013B	56Q1KP1S	02Z 1.5" SHORT P1 BUSHING B#PE-5073	00C-00F-00L,00M
00D	D33 01260	83433M*DRIVECHART=C4M 60CYC	60C-3015M4P	014	56V40470S	FHP V-BELT 4L470 "A" SECTION DAYCO	00A-00D,00G,00H
00E	D33 01350	83433Q*DRIVECHART=CWE+3015N4S 50CYC	50C-3015M4A,C4A,M4G,M4J & 3020C4A	015	56030A1H	VPUL 1A3.0/L2.66 B#AK32H OR EQUAL	00A-00D,00G,00H
00F	D33 01360	83433P*DRIVECHART=CWE+3015N4S 60CYC	60C-3015M4A/G/J/T,C4A/T,M6A/T & 3020C4A,M4J	016	56Q0MHS	04Z .627" BUSHING,VPUL TYPE H,DORQT	00A-00D,00G,00H
00G	D33 01450	83433L*DRIVECHART=3020C5M 50CYC	50C-3020M5P	017A	56VA079P	VBELT AP79 MATCHSET=3 "EA"=1 BELT	00G,00J,00N
00H	D33 01460	83433L*DRIVECHART=3020C5M 60CYC	60C-3020/3022M5P	017B	56VA078X	T-NAME VBELT AX78 MATCHSET=3"EA=1 B	00H,00K,00P
00J	D33 01550	83433M*DRIVECHART=3020N4S 50CYC	50C-3020M4A,M5G,M5J,M5P	017C	56VA071X	VBELT AX71 MATCHSET= 2 "EA"=1 BELT	00A-00F,00L,00M
00K	D33 01560	83433M*DRIVECHART=3020N4S 60CYC	60C-3020M4A,M5X & 3022 M4X,C5X	017D	56VA080X	VBELT AX80 DAYCO RAWEDGE COG	00Q,00R
00L	D33 01650	83433M*DRIVECHART=N6E 50 CYC	50C-3015M6G,M6J	018	54H160A	05Z CLUTCH 12VDC #29-02=CWE+C46M	00G,00H,00N-00R
00M	D33 01660	83433J*DRIVECHART=N6E 60CYC	60C-3015M6G,M6J	019A	56VA037X	VBELT DAYCO#AX37 (EA=1 BELT)	00J,00K
00N	D33 01750	83433M*DRIVECHART=N5E 50CYC	50C-3020M5G,M5J	019B	56VA038X	VBELT AX38 DAYCO SA6 51 ONLY	00A,00L
00P	D33 01760	83433J*DRIVECHART=N5E 60CYC	60C-3020M5G,M5J & 3022M5X	019C	56VA036X	VBELT DAYCO#AX36 (EA=1 BELT)	00B-00M
00Q	D33 01850	89507#*DRIVECHART=3020M7 50CYC	50C-3020M7G,M7J,M7P	019D	56VA036S	VBELT A36	00C-00F
00R	D33 01860	89507L*DRIVECHART=3020M7 60CYC	60C-3020M7G,M7J,M7P	019E	56VA0383	VBELT AX38.3 COGGED	00G-00K,00N-00R
001A	56VA034X	VBELT AX34 DAYCO RAWEDGE COG	00A-00F,00L,00M	020A	02 03622B	83123B VPUL=.875BORE A2G2.4+A1G6.25	00A-00F,00L,00M
001B	56VA037X	VBELT DAYCO#AX37 (EA=1 BELT)	00G-00K,00N-00R	020B	02 03312A	83123B VPUL=.875BORE A2G2.0+A1G5.00	
002A	56VA035X	VBELT DAYCO#AX35 (EA=1 BELT)	00A-00F,00L,00M	021	15Q072	SOKSETSCR CUP1/4-20X1/4BLKALLENONLY	00G-00K,00N-00R
002B	56VA038X	VBELT AX38 DAYCO SA6 51 ONLY	00G-00K,00N,00P	022A	56028A10R	VPUL 1A2.8/L2.46 7/8"ID BROWN AK30	00A,00B,00L,00M
002C	56VA042X	VBELT AX42 MATCHSET= 3 "EA"=1 BELT	00Q,00R	022B	56025A10R	VPUL 1A2.5/L2.16 7/8"ID BROWN AK27	00C-00F
003	02 03624	74451C VPUL=CLUTCH A2G8.5	00C,00G-00K,00N,00P	022C	56025A10M	VPUL 1A2.5/L2016 5/8" ID BROWN AK27	
004A	54H160A	05Z CLUTCH 12VDC #29-02=CWE+C46M	00A-00B,00D-00F,00L,00M			***** END OF PARTS LIST *****	
004B	54H164A	07Z CLUTCH 12VDC #28S-02 75FT/LB	00C,00G-00K,00N,00P				
005	15K039	HXCAPSCR 1/4-20UNC2AX3/4 GR5 ZNC/CD					
006	15U180	LOCKWASHER MEDIUM 1/4 ZINCP					
007A	02 03623A	85046B VPUL=JACKSHFT A3G3.72A1G3.53	00G,00N				
007B	02 03623	85046B VPUL=JACKSHAFT A3G3.1A1G3.53	00H,00P				
007C	02 03717	75522B VPUL=JACKSHFT A3G3.72+A1G4.3	00J				
007D	02 03716	87091B VPUL=JACKSHAFT A3G3.1+A1G4.3	00K				
007E	02 03552A	78337B VPUL=JACKSHFT A2G3.0+A1G2.80	00A,00L				
007F	C2 03552	91353B VPUL=JACKSHFT A2G2.6+A1G2.96	00B,00M				
007G	02 03449A	81482B VPUL=JACKSHFT A2G3.12+A1G4.3	00C,00E				
007H	C2 03449	77517B VPUL=JACKSHFT A2G2.6+A1G4.30	00D,00F				
007J	02 03623B	90363C VPUL=A3G5.25+A1G3.53=50CYC	00Q				
007K	02 03623C	90363C VPUL=A3G4.19+A1G3.41=60CYC	00R				
008	15E210	SQMACHKEY 1/4X2 NOTAPER-NOHEADC1018					
009	15Q072	SOKSETSCR CUP1/4-20X1/4BLKALLENONLY					
010	20C011C	RETAINING CMPD 250 CC LOCT#609-41					
011	02 03656A	86266B VPUL=CENT SW W/2-1/8 PILOT	00A,00D,00G,00H				
012A	56180A2SDA	91392D VPUL 2A18.0 (SD) TYPE QD CWE	3015-C4X,M4AGJT,M6AGJT; 3020-C4A;3022-C5X				
012B	56180A2SDB	91392# VPUL 2A18.0(SD) BACKFACE CWM	3015-M4P,M6P				

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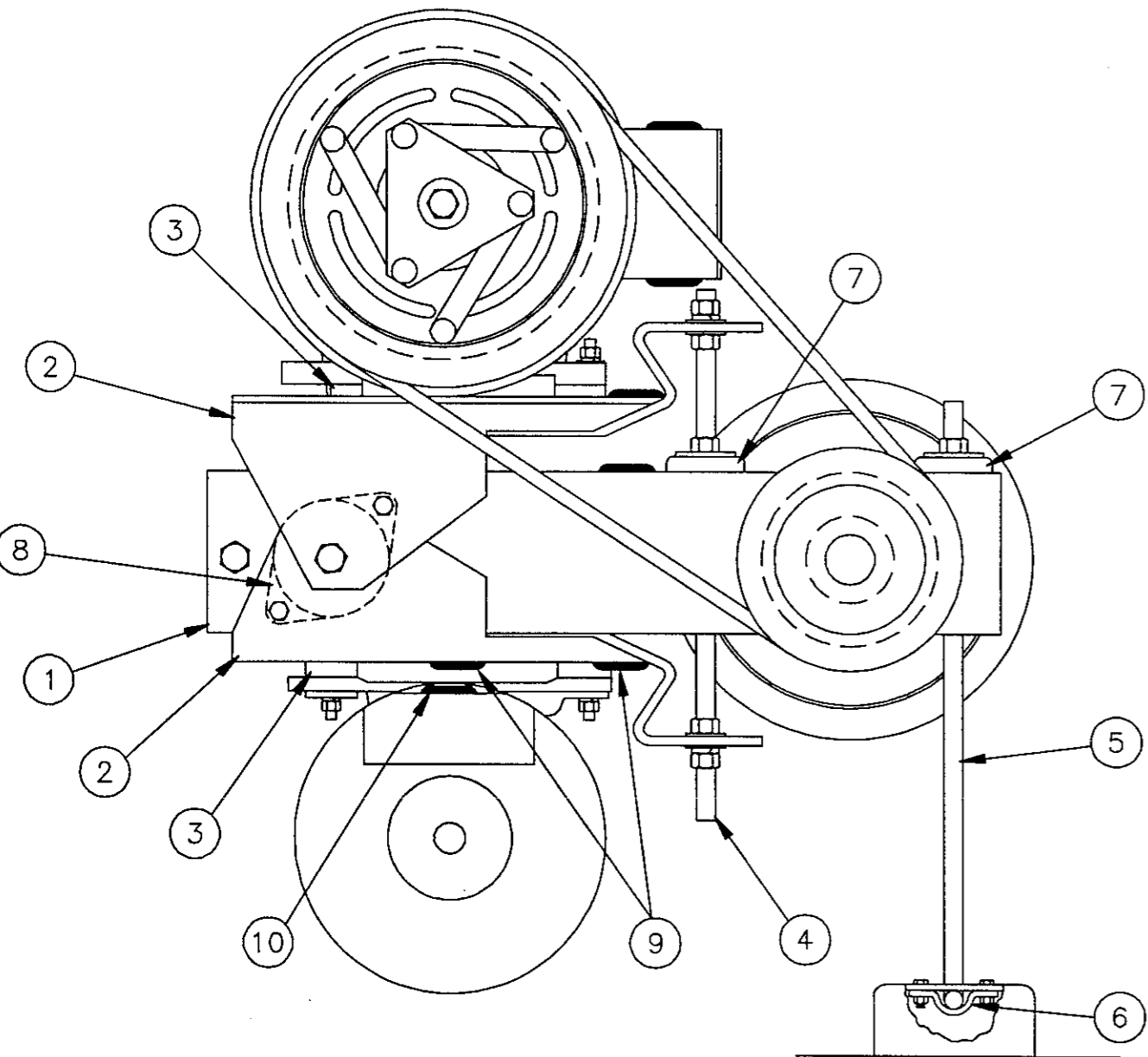
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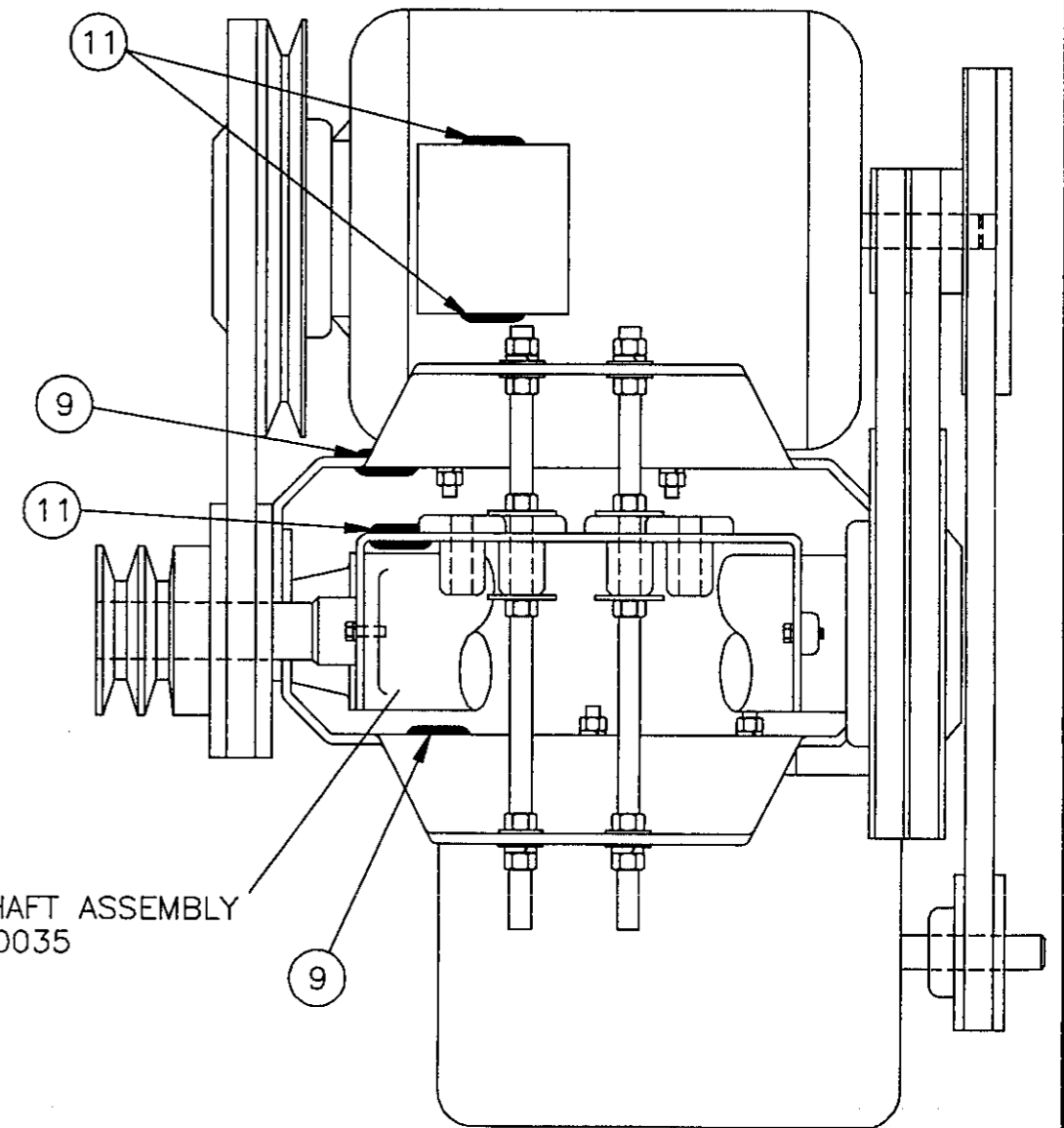
DRAWING  
(See other page for parts list,  
if applicable.)

**MOTOR MOUNT ASSEMBLY**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920027/93251V (Page 5)



FOR JACKSHAFT ASSEMBLY  
SEE BMP910035



**PARTS LIST**

(See other page for drawing.)

**MOTOR MOUNT ASSEMBLY**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	A33 08100	84173J*MOTOR MOUNT 3P C5M	30020M5P,M7P 3P+30022M5P
00B-1	A33 08100A	84173J*MOTOR MOUNT 3P N5E+N4S/3020	30020M5G/J,M7G/J,M4X(3P50C+3P60C24V&UNDER)
00B-2	A33 08100A	84173J*MOTOR MOUNT 3P N5E+N4S/3020	30022M4X,M5A,M5G,M5J,M5T
00C	A33 08171	780632*MOTOR MOUNT 1P CWE+N4E+N4S1	30015M4A/G/J,C4A 1P
00D	A33 08171A	89406N*MOTOR MOUNT 1PH CWM	30015M4P 1P
00E	A33 08174	841731*MOTOR MOUNT 3P C4M	30015M4P 3P
00F	A33 08174A	84173J*MOTOR MOUNT 3P C6M	30015M6P 3P
00G	A33 08174B	84173J*MOTOR MOUNT=3P N6E	30015M6G/J 3P
00H-1	A33 08174C	84173J*MOTOR MOUNT 3P CWE+N4E+N4S1	30015M4A/G/J,C4A 3P+3020C4A,M4X(3P60C380V&UP)
00H-2	A33 08174C	84173J*MOTOR MOUNT 3P CWE+N4E+N4S1	30022C5A,C5T+30015M4T,C4T,M6A,M6T
001	02 03503A	84173D MOTOR MOUNT	
002	02 03549	88427D MOTORMOUNT=E2 MOTOR	
003	02 13156	72344A SPACER-MOTOR MOUNTING	00A,00E,00H
004	02 03551	83433B ADJROD=MOTOR (3/8-16X12")ZNC	
005	02 03394	TEEROD=MTRMOUNT	
006	02 03409	67413AADJ STRAP MTRMOUNT	
007	60B065	RUBBER MOUNT CENTER BONDED 40 DURO	
008A	60B055	01Z VIBRO ISOLATER REINFORCED 70 D	00A-00B,00F-00G
008B	60B070	01Z VIBRO-ISOLATOR REINFORCED 40 D	00C-00E,00H
009	12P1APSB	SNAPBUSH .75MHX.627 T=.25HEYCO#2840	
010	12P1ARSB	SNAPBUSH 7/8MHX3/8 T=1/8 HEYCO#2110	
011	12P1ARNB	SHORTYBUSH 7/8MHX.75ID HEYCO #2850 ***** END OF PARTS LIST *****	

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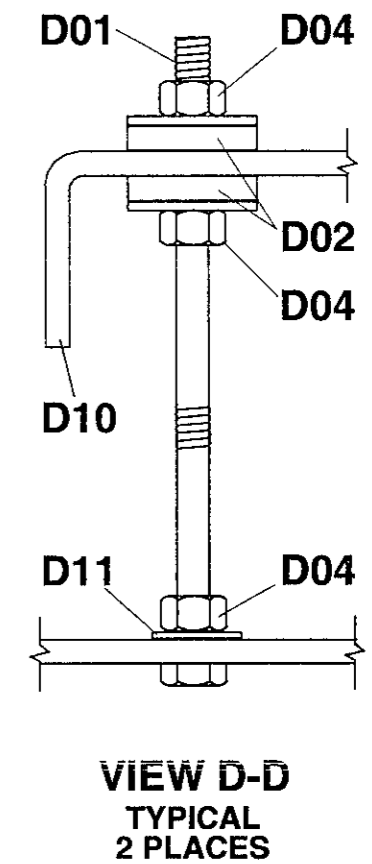
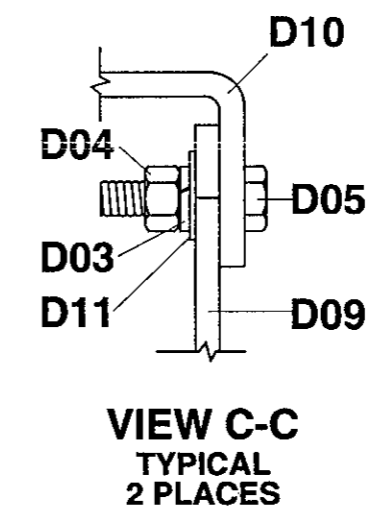
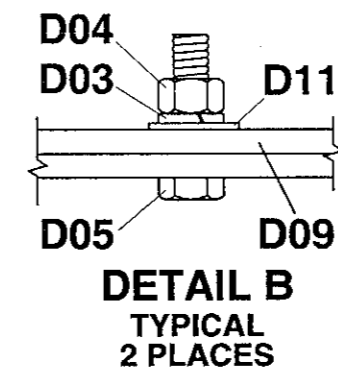
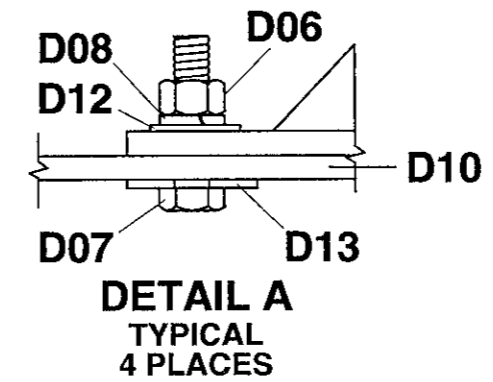
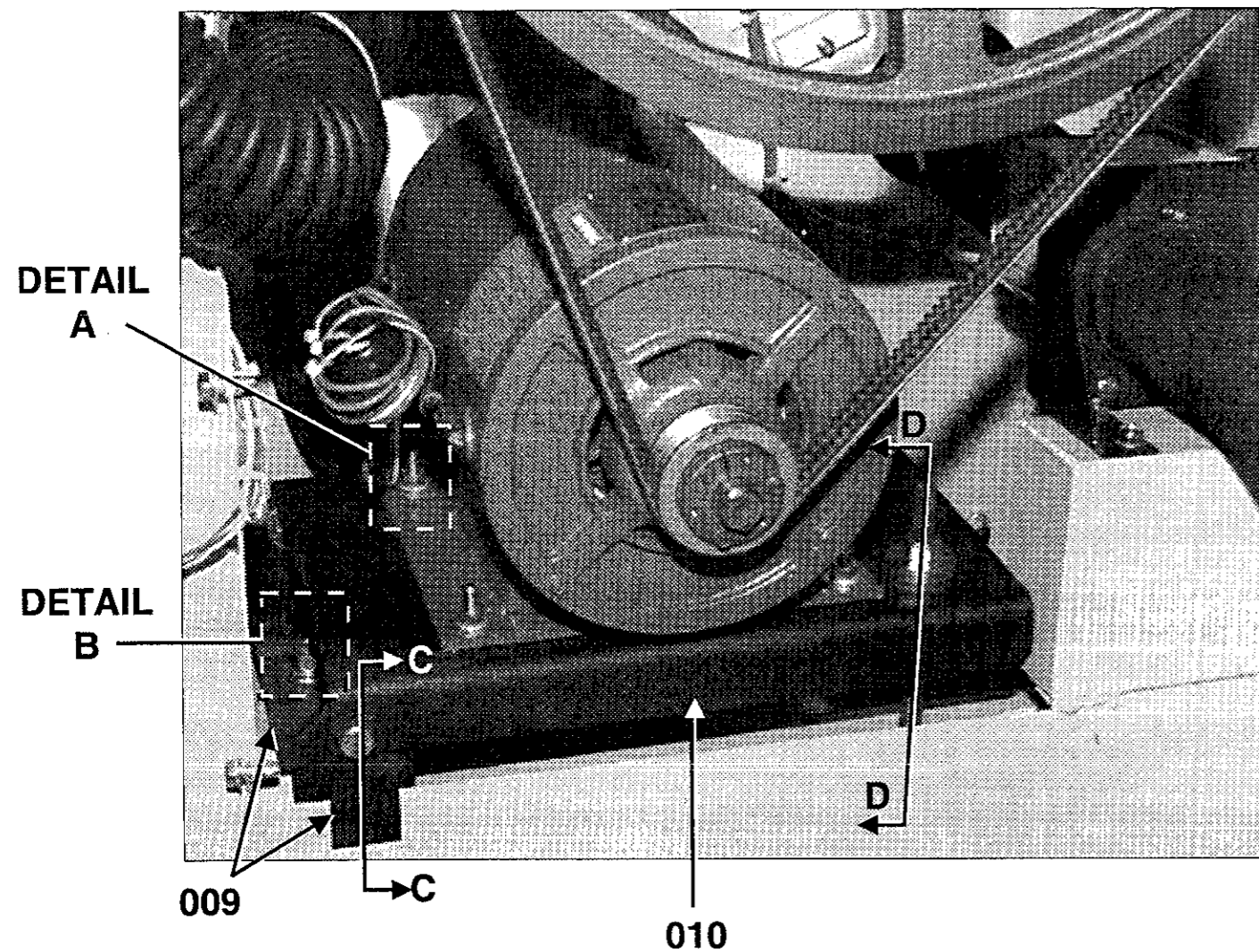
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DRAWING  
(See other page for parts list,  
if applicable.)

**MOTOR MOUNT**  
**30015 & 30022 S4A,S4G,S4J,S4T**

BMP950003/95107V (Page 1)





**PARTS LIST**

(See other page for drawing.)

**MOTOR MOUNT  
 30015 & 30022 S4A,S4G,S4J,S4T**

**BMP950003/95107V (Page 2)**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
D01	17R022A08A	THRD ROD 1/2-13UNCX8" LG ZN PL GR 2	
D02	17W025	03Z SPHERICAL WASHER SET 9/16 M/F	
D03	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
D04	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
D05	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 PLATED	
D06	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
D07	15K095	SKSCR 3/8-16UNC2AX1"GR5 ZNC/CAD	
D08	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
D09	02 03792B	93501C PIVOT BRKT SINGLE MTR TALL	
D10	02 03791A	93201C MOTOR MOUNTING PLT SNGL MTR	
D11	15U280	01Z FL+WASHER(USS STD)1/2 ZNC PL+D	
D12	15U240	FLATWASHER(USS STD) 3/8" ZNC PLT	
D13	15U241	FLATWASHER 13/32IDX1+3/4ODX14GA ZNC ***** END OF PARTS LIST *****	

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## REPLACING MAIN BEARINGS AND SEALS ON 30015, 30020, 30022Cxx, Kxx, Sxx, AND Mxx MODELS

### ⚠ DANGER ⚠



**ELECTROCUTION HAZARD**—High voltage is present inside electric boxes, motors, and many other components, even when Master switch is off and/or any emergency stop is off. You can be killed or seriously injured on contact with high voltage.

☞ **Lock OFF and tag out power at the wall disconnect before servicing.**

☞ **Maintenance must be performed by qualified, authorized service personnel.**

Oil or water dripping from the leak-off, or water in the bearing oil indicates leaking seals. Bearing oil containing metal particles indicates damaged bearings. Ordinarily, only the shell front and cylinder need to be removed to replace the seals and bearings. Replacing the entire bearing housing assembly or a major bearing housing component requires removal of the shell.

Maintenance procedures require:

- Cylinder puller kit P/N PK33-008 (or equivalent) available from Milnor® on a rental or purchase basis.
- Loctite 242, 271, and 504 adhesives, Loctite PST stainless steel sealant, Dow Corning RTV 732, and Permatex 2 (or equivalents).
- Shell clamps.

### Removing the Shell Front and Cylinder

Refer to “CYLINDER + SHELL + BEARING + CONSOLE INSTALLATION . . .” (see Table of Contents) and proceed as follows:

1. Remove the door interlock housing cover. Mark the terminal position of the wires and remove the wires from the *interlock switch*. Loosen the two conduit connections and move the conduit so the shell front can be removed.
2. Remove all shell attachments including pipes, hoses, and optional equipment. Drain oil from the bearing housing and inspect.
3. Remove the shell mount ring clip guard located on the top of the shell clamp ring, then mark the position of the shell front with respect to the shell.
4. Support the shell front and remove the bolts, shell clamp ring, rubber extrusion, and shell front.
5. Remove the shaft retainer bolt, cover, spacer, and the two allen screws covering the puller mounting holes. Mount the puller and remove the cylinder.

## Replacing Seals with Bearing Housing In Place

**NOTE:** See the appropriate bearing assembly drawing.

If no water or metal particles are present in drained oil, replace seals and o-rings as follows. If bearing oil contains water or metal particles, see “Replacing Bearings with Bearing Housing in Place” below.

1. Remove front shaft seal holder (push-off holes are provided).
2. Inspect the shaft seal sleeve for nicks, gouges, or excessive wear. If a replacement is necessary, heat and tap the damaged sleeve off of the shaft. Before installing the new sleeve, ensure that the shaft and sleeve are clean and free from oil. Apply Loctite 271 to the inside of the sleeve, tap sleeve onto the shaft, then remove excess Loctite.
3. Replace the seals and o-rings. Apply Loctite 271 to the outside of the seals and install in shaft seal holder. Ensure that the new seals are parallel within the shaft seal holder. Use Loctite 242 when re-installing the front seal holder bolts.

## Replacing Bearings with Bearing Housing In Place

**NOTE:** Set bearing clearances only if major components of the original bearing housing (front shaft seal holder, rear seal/bearing holder, shaft, or shims) are replaced. See “Setting Clearances” in this section after replacing major components.

Often, the bearing housing does not need to be removed to change the bearings. Remove the shell and bearing housing only if insufficient space exists for the following procedures, or if the bearing housing (or housing major components) must be replaced:

1. Remove the front shaft seal holder and rear seal/bearing holder (containing the rear bearing). Note the position and number of shims under the rear seal/bearing holder. **The shims must be installed exactly as removed.**
2. Remove the main shaft, front bearing, and bearing cup through the front of the bearing housing. Remove and discard used bearings, cups, seals, and o-rings.
3. Install a new seal, bearing, and cup in the rear seal/bearing holder. Install the shims and rear seal/bearing holder.
4. Press a new front bearing on the shaft then guide the shaft into the rear seal/bearing holder. **Do not scrape the new bearings against the inside of the bearing housing.**
5. Center the shaft within the housing, then gently tap in the front bearing cup. Install the front shaft seal holder. The shaft should turn in the housing.

## Setting Clearances

**NOTE:** This procedure is required only when a major bearing housing component is replaced. See "Removing and Re-installing the Shell and Bearing Housing" below.

1. Remove all shims from the rear seal/bearing holder. Install the rear seal/bearing holder. Leave a small gap between the bearing housing and the rear seal/bearing holder.
2. Insert a lead wire (e.g., soldering wire) in the gap between flanges. Tighten each bolt slowly while turning the shaft. Stop tightening when the shaft just begins to drag or bind. Remove the rear seal/bearing holder, **being careful not to mark or damage the lead wire.**
3. Using a micrometer, measure the thickness of the lead wire. Add .002" (.050 millimeters) to the thickness of the lead wire and install the rear seal/bearing holder using this amount of shims. The shaft should turn in the housing.

## Removing and Re-installing the Shell and Bearing Housing

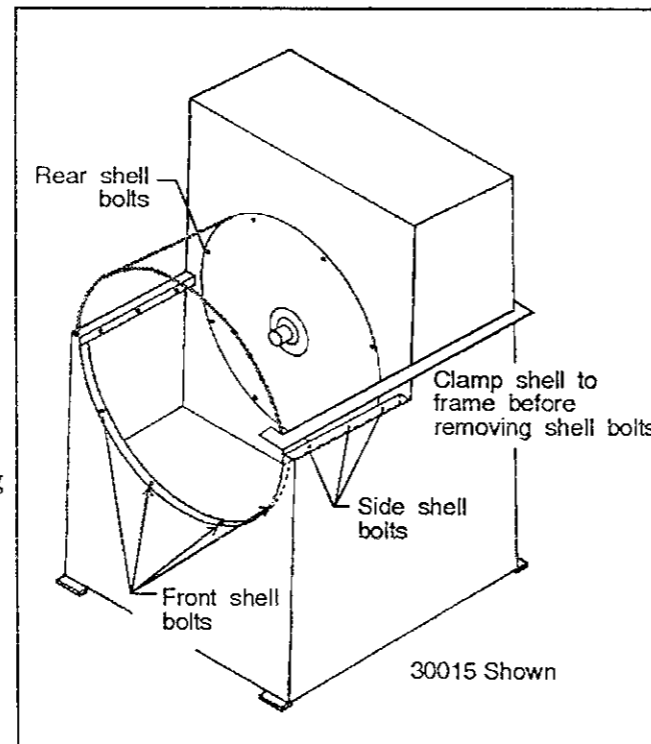
Replacing the entire bearing housing assembly or a major bearing housing component requires removal of the shell.

### Removing the Shell

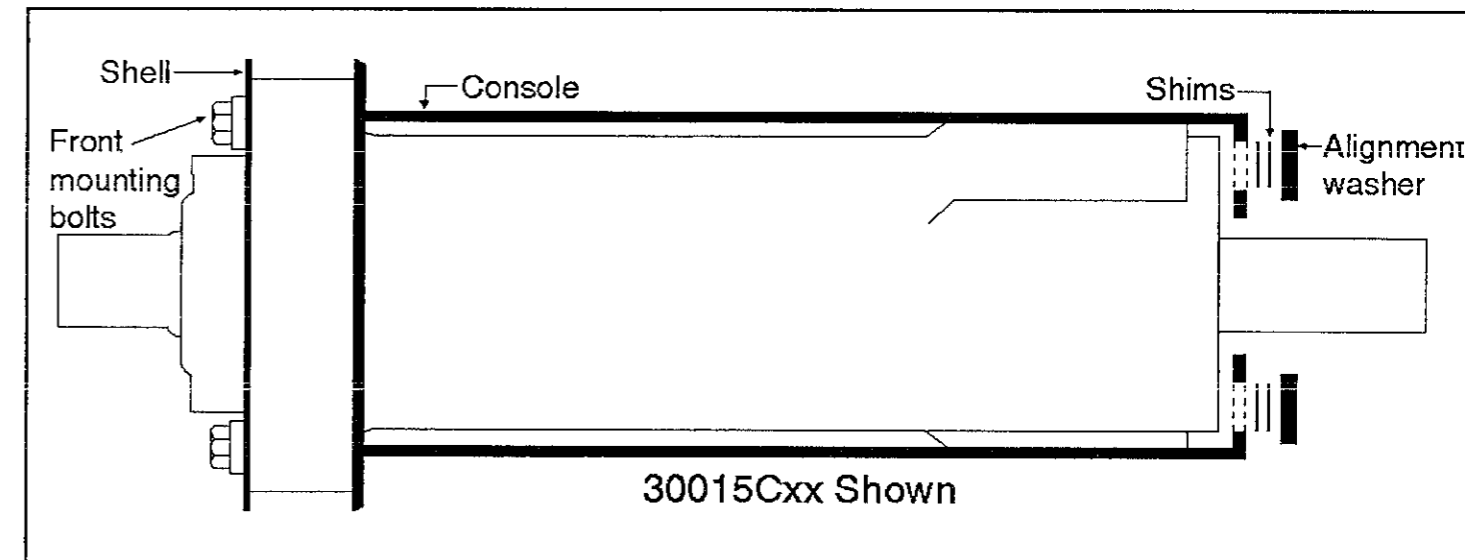
**NOTE 1:** 30015 front bearing housing bolts are provided with self-locking nuts.

**NOTE 2:** 30020 and 30022 shell back clamp rings have three push-off holes to aid in removal. Replace the three plastic set screws with three bolts then tighten evenly to separate the ring from the shell.

1. Clamp the shell to the frame before removing the shell bolts (as shown in FIGURE 1).
2. Remove the self-locking nut and clamp used to secure the level switch sensor hose to the shell mounting screw. Remove all shell bolts, front bearing housing bolts (do not remove the rear bearing housing bolts), and shell back clamp ring, then remove the shell (and bearing housing reinforcing plate if so equipped) from the frame.
3. Remove the belt guard and the top console cover by prying out the four plugs and removing the bolts. Loosen and remove the main drive belts (and *centrifugal switch* if so equipped), and the main drive pulley. For further information see "DRIVE TRAIN SERVICE" (see Table of Contents).



**FIGURE 1** (MSSM0708BE)  
Clamping the Shell



**FIGURE 2** (MSSM0708BE)  
Typical Main Bearing Mounting

### Removing the Bearing Housing

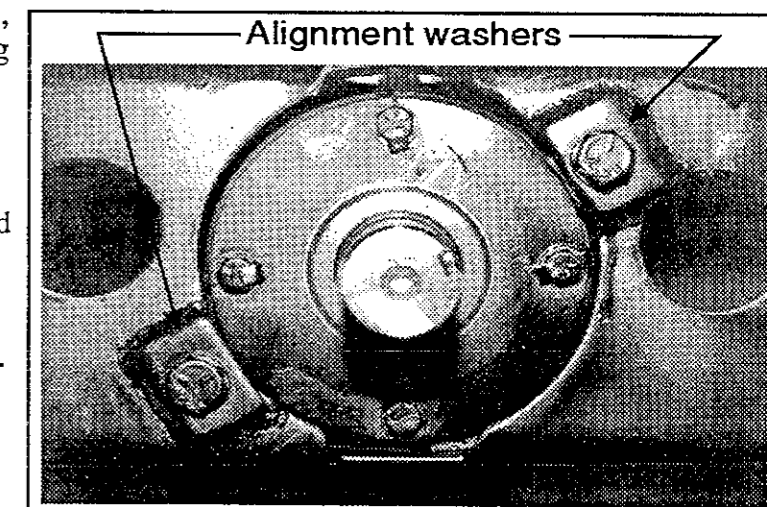
**NOTE 1:** Shims (shown in FIGURE 2) are factory installed between the bearing housing and the alignment washers. These shims must be removed and replaced in their exact original positions.

**NOTE 2:** 30015M6 models are equipped with a rear reinforcing plate (see FIGURES 4 and 6). Use 30020 and 30022 instructions when removing and installing the bearing housings on these models.

Drain the oil from the bearing housing and remove all fittings and connections from the top and bottom of the bearing housing; then follow the procedure for your machine.

**On 30015 Machines**—Considerably loosen, but do not fully remove the two rear bearing housing mounting bolts.

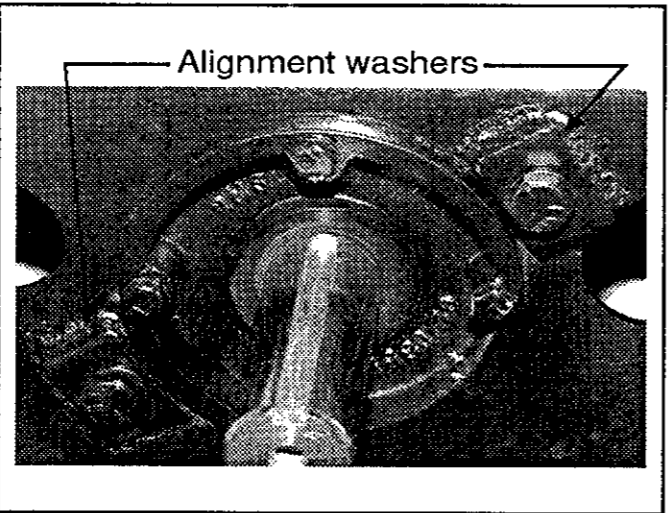
1. Pry the bearing housing out of the console until the rear mounting bolts bottom out.
2. Remove the rear mounting bolts one at a time and catch the shims with your fingers through the holes in the rear console member (next to the bearing housing). **Note the position of the shims; they must be replaced in the same position.**
3. Remove the bearing housing from the frame. Grind off the alignment washers as shown in FIGURE 3 and discard old alignment washers.
4. Grind the rear console smooth in preparation for main bearing re-installation.



**FIGURE 3** (MSSM0708BE)  
Alignment Washers  
30015 Models (see Note 2 above)

**On 30020 and 30022 Machines**—Remove the rear bearing housing and rear reinforcing plate mounting bolts.

1. Remove the rear reinforcing plate very carefully, noting the position of bearing support tap strips and shims. **Note the position of the shims; they must be replaced in the same position.**
2. Remove the bearing housing from the frame. Remove plate and grind off the alignment washers (as shown in FIGURE 4). and discard old alignment washers.
3. Grind rear reinforcing plate smooth in preparation for main bearing re-installation.



**FIGURE 4** (MSSM0708BE)  
**Alignment Washers**  
30020 and 30022 Models

**Installing the Bearing Housing and Shell**

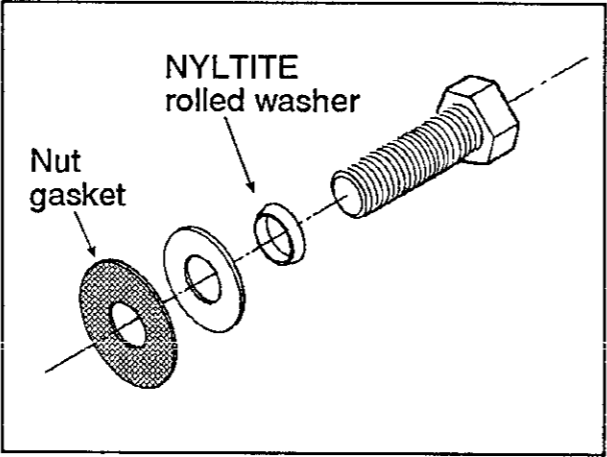
**NOTE 1:** Use new bolts when reassembling the machine.

**NOTE 2:** Apply Permatex 2C adhesive (or equivalent) to both sides of the new bearing housing gaskets.

**NOTE 3:** Install a new NYLTITE washer and nut gasket on each new shell bolt (see FIGURE 5).

**On 30015 Machines**—Replace the four J-type nuts along the rim of the front console with new clips.

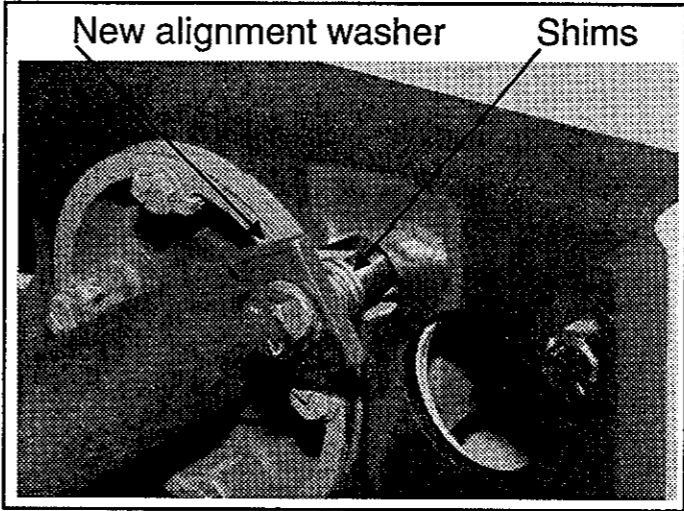
1. Determine that all threaded holes are clean and in good condition by screwing a new bolt into each hole (if necessary, tap out any damaged threads).
2. Position the bearing housing in the console.
3. Mount the gasket on the front of the bearing housing.
4. Determine that the shell is clean and free from any old gasket material, then mount the shell onto the console using new shell bolts (FIGURE 5).
5. Using drift pins, install the rear shell bolts first (FIGURE 1), then tighten to draw the shell into place.
6. Install all other shell bolts and tighten evenly. Liberally apply Dow Corning RTV 732 sealant over the inside shell bolts and washers.



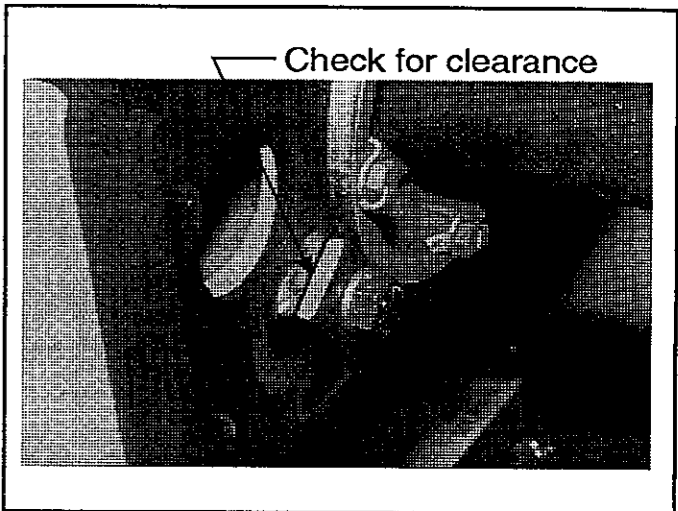
**FIGURE 5** (MSSM0708BE)  
**Shell Bolt**

7. Mount the gasket and the new ring to the inside of the shell.
8. Install the front bearing mounting bolts through the ring and bearing housing, and tighten front bolts. Install new alignment washers and original shims on rear mounting bolts (FIGURE 2). **Replace the shims on rear mounting bolts exactly as removed.**

9. Tighten bolts. Insure there is approximately .0625 inch (1.6 mm) clearance between the alignment washers and the console as shown in FIGURE 7. Add or subtract shims as required to obtain the specified clearance. Weld the new alignment washers to the console.
10. Install all of the original lubrication fittings and connections to the new bearing housing.
11. Secure the level switch sensor hose using a new clip and self-locking nut.



**FIGURE 6** (MSSM0708BE)  
**Installing New Alignment Washers**



**FIGURE 7** (MSSM0708BE)  
**Alignment Washer to Console**

**On 30020 and 30022 Machines**—Replace the four J-type nuts and determine that all threaded holes are clean and in good condition.

1. Position the bearing housing in the console.
2. Mount the gasket, housing reinforcing plate, and second gasket.
3. Determine that the shell is clean and free from any old gasket material, then using new shell bolts (FIGURE 5), mount the shell onto the console.
4. Mount the gasket and ring to the inside of the shell.
5. Using Loctite 504, install the front bearing housing bolts and lockstraps through the ring and the bearing housing. Tighten the bolts and bend the lockstraps as applicable.
6. Pre-position the two bearing support tap strips, then install the rear reinforcing plate. Install new alignment washers and original shims on rear mounting bolts (FIGURE 6). **Replace the shims on rear mounting bolts exactly as removed.**
7. Tighten bolts. Insure there is approximately .0625 inch (1.6 mm) clearance between the alignment washer and the reinforcing plate as shown in FIGURE 7. Add or subtract shims as required to obtain specified clearance. Weld the new alignment washers to the reinforcing plate.
8. Install all of the original lubrication fittings and connections to the new bearing housing.
9. Secure the level switch sensor hose.

## Installing the Cylinder and Shell Front

1. Screw two new allen screws into the cylinder puller mounting holes; **do not obstruct the shaft retainer spacer seat.**
2. Determine that the main shaft is clean and free from any foreign material and that the key is properly seated.
3. Apply a stainless steel pipe sealant (such as Loctite PST) to retainer bolt threads. Slide the cylinder onto the shaft and install a new shaft retainer bolt and washer with the original cover and spacer.
4. Determine that the shell front and front lip of the shell is clean and free from burrs, sharp edges, or sealants.

### **▲ CAUTION ▲**

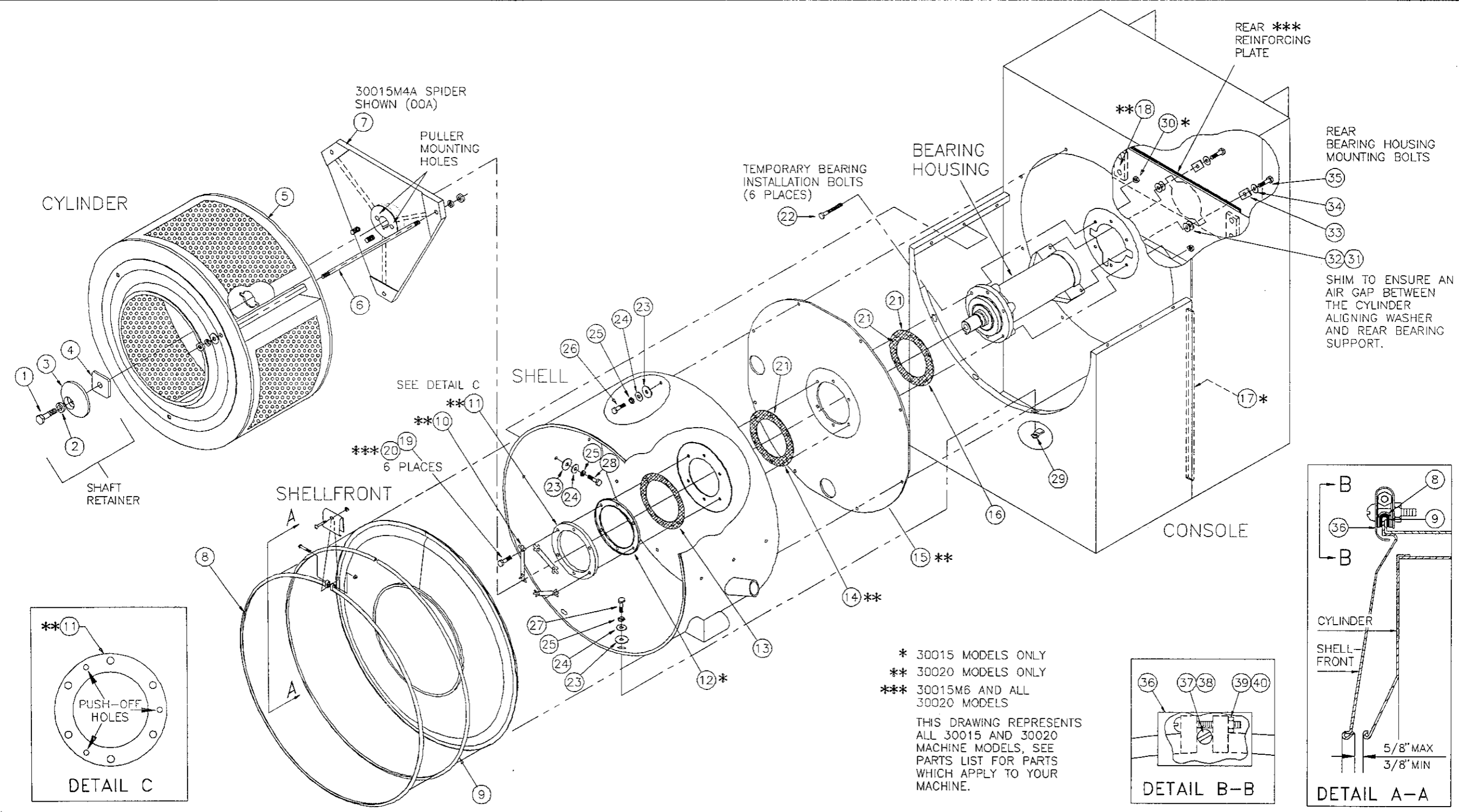
**A metal hammer can crack stainless steel components.**

**☞ Do not use a metal hammer to seat the shell front or install the ring.**

5. Using clamps, mount and support the shell front in place (align it with the mark made before it was removed). If necessary, use a rubber or rawhide maul to strike the shell front so it seats within the shell. After the shell front is seated properly on the shell, check the gap between the shell front and the lip on the shell. If necessary, use a rubber or rawhide maul on the shell lip to close the gap.
6. Pack a small amount of Permatex 2 adhesive (or similar) into the top center gap of the shell front and shell, two inches on both sides of the shell weld.
7. Install the new rubber extrusion starting at the 10 o'clock position. Trim off any excess.
8. Install the shell clamp ring on the shell front with the ring gap at the top center of the shell. Tap around the ring (bottom to top) with a rubber maul until a clamp can be installed on the ends of the shell clamp ring. Repeat this procedure and tighten the clamp until the bolt can be installed. Tap around the ring again, and tighten the bolt. Install the shell mount ring clip guard.
9. Reconnect door interlock conduit and wires.
10. See "DRIVE TRAIN SERVICE" (see Table of Contents) to replace pulleys, belts, and to set belt tension.

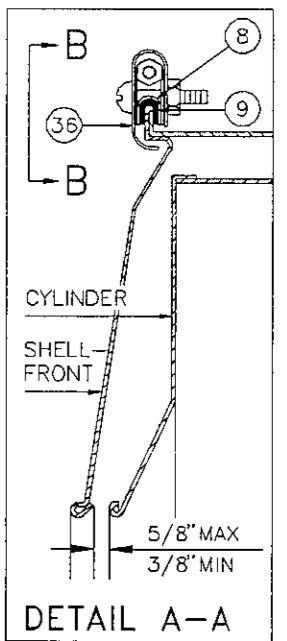
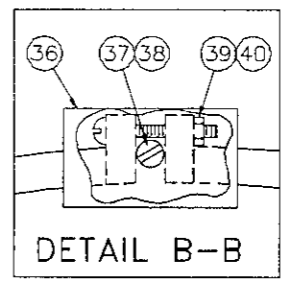
DRAWING  
(See other page for parts list,  
if applicable.)

# CYLINDER + SHELL + BEARING + CONSOLE INSTALLATION 30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS



\* 30015 MODELS ONLY  
 \*\* 30020 MODELS ONLY  
 \*\*\* 30015M6 AND ALL 30020 MODELS

THIS DRAWING REPRESENTS ALL 30015 AND 30020 MACHINE MODELS, SEE PARTS LIST FOR PARTS WHICH APPLY TO YOUR MACHINE.



PARTS LIST

(See other page for drawing.)

**CYLINDER + SHELL + BEARING + CONSOLE INSTALLATION  
30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

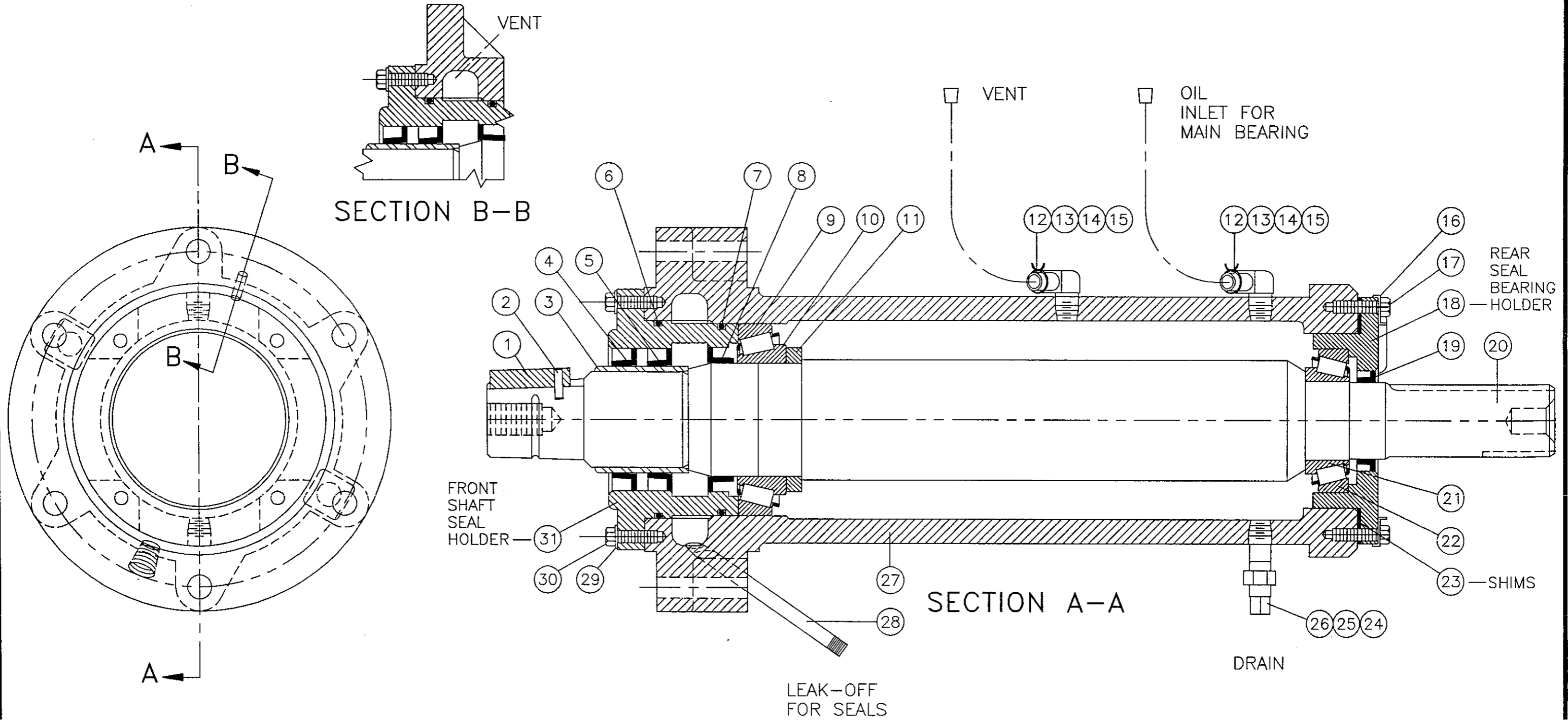
ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)	ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	ACA02CWE	91431C* CYL ASSY=3015CWE/NMA/C4M/OE	30015C4A,M4X,C4T,K5X,S5X				
00B	ACA33C6M	91431C* CYL ASSY=3015C6M	30015M6X	012	02 03444	79381M RING=SHELL BACK CLAMP	30015 ONLY
00C	ACA33C5M	91386C* CYL ASSY=3020C5M	30020M4A,C4A,M5X	013A	02 03446	93123A1 GASKET=SHELLBACK CLAMP RING	30015 ONLY
00D	ACA3020M7	92161C*CYL ASSY=3020 M7J/G/P	30020M7X	013B	02 03575	93123A GASKET=SHELLBACKCLAMP RING=CWM	30020+30022 MODELS ONLY
00E	ACA3022M5	93000Z CYL ASSY=3022 M5/C/K/S	30022M4X,M5X,K5X,C5X	014	02 03574	92601B GASKET=MAIN BEARINGHOUSE=CWM	30020+30022 MODELS ONLY
00F	ASH33023	91396Z SHELL+CONSOLE 3015M4A	30015M4A,M4T	015	02 03568	90127D PLATE-BG HOUSING REINFORCING	30020+30022 MODELS ONLY
00G	ASH33008	90387E SHELL+CONSOLE 3015C4-MICRO	30015C4A,C4T	016A	02 03574	92601B GASKET=MAIN BEARINGHOUSE=CWM	30020+30022 MODELS ONLY
00H	ASH33015	89000Z SHELL+CONSOLE 3015M4	30015M4G,M4J,M4P	016B	02 03335	92601B GASKET BEARING HOUSING CWE	30015 MODELS ONLY
00I	ASH33007	88000Z SHELL+CONSOLE 3015 M6-MICRO	30015M6A,M6G,M6J,M6P,M6T	017	02 03749	84442B BAR=REINF STRIP 3015	30015 MODELS ONLY
00J	ASH33030	93000Z SHELL+CONSOLE 3015K4	30015K5A,K5T	018	02 03560	70093A TAPSTRIP=BEARING SUPPORT	30020+30022 MODELS ONLY
				019A	15K126	HEXCAPSCR 3/8-16NCX2+1/2SS18-8	30015 MODELS ONLY
00K	ASH33031	93000Z SHELL+CONSOLE 3015S5	30015S5A,S5G,S5J,S5T				
00L	ASH33024	91396Z SHELL+CONSOLE 3020M4A	30020M4A	019B	15K196	HEXCAPSCR 1/2-13UNC2X3 18-8SS	30020+30022 MODELS ONLY
00M	ASH33010	88000Z SHELL+CONSOLE 3020C4A-MICRO	30020C4A	020	20C013C	GASKET ELIMINATOR 250 CC LOC#504-41	
00N	ASH33009	88000Z SHELL+CONSOLE 3020M5-MICRO	30020M5G,M5J,M5P	021	20C036A	PERMATEX NO 2C IN 11 OZ TUBES	
00O	ASH33019	91041D SHELL+CONSOLE 3020M7-MICRO	30020M7G,M7J,M7P	022	15K182	HEXTAPSCR 1/2-13X2ZINC GR5 FULLTHRD	
00P	ASH33032	93000Z SHELL+CONSOLE 3022K4	30022K5A,K5T	023	02 02293	92601A DOOR HANDLE NUT GASKET	
00Q	ASH33033	93000Z SHELL+CONSOLE 3022S5	30022S5A,S5G,S5J,S5T	024	15U245	01Z FLT WASH 3/8 STD COMM 18-8 SS	
00R	ASH33034	93000Z SHELL+CONSOLE 3022M5	30022M4X,M5X	025	24G030N	ROLLED WASHER .379"ID NYLTITE #37W	
00S	ASH33035	93000Z SHELL+CONSOLE 3022C4	30022C5X	026A	15K096	HEXCAPSCR 3/8-16UNC2X1SS18-8	30015C4A,M4A
001	15B200	HEXCAPSCR 3/4-10X1+3/4 SS18-8		026B	15K100	HEXCAPSCR 3/8-16X1+1/4 SS18-8	30015M6X,30020+30022ALL
				027	15K086	HXCAPSCR 3/8-16NCX3/4 SS18-8	
002	15U350	LOCKWASHER 3/4 MED SS18-8					
003	02 11196	92567B COVER=SHAFT RETAINER=304S/S		028	15K086	HXCAPSCR 3/8-16NCX3/4 SS18-8	30015C4A,M4A
004	02 14359	SPACER SHAFTRETAINER-LG		029	17N071	NUT J-TYPE T#C33952-3816-3B 3/8-16	
005A	ACA02CWE	91431C* CYL ASSY=3015CWE/NMA/C4M/OE	00A	030	15G218	01Z HXLOKNUT NYL 3/8-16 STL/ZNC	30015MODELS ONLY
005B	ACA33C6M	91431C* CYL ASSY=3015C6M	00B	031	15U245	01Z FLT WASH 3/8 STD COMM 18-8 SS	
005C	ACA33C5M	91386C* CYL ASSY=3020C5M	00C	032	15U312	FLAWASHER 3/4ODX33/64IDX11GA ZINCPL	
005D	ACA3020M7	92161C*CYL ASSY=3020 M7J/G/P	00D	033	02 03397	87173A CYLINDER ALIGNING WASHER	
005E	ACA3022M5	93000Z CYL ASSY=3022 M5/C/K/S	00E	034	15U300	LOK WASHER REGULAR 1/2 ZINC PLT	
006A	02 02138A	87517A CYLTIEROD-3/3015W+CWU 18-8SS	PART OF 005A & 005B	035	15K182	HEXTAPSCR 1/2-13X2ZINC GR5 FULLTHRD	
006B	02 03703	74486B CYLINDER TIE ROD C5M	PART OF 005C	036	02 02181	85332B GUARD=SHELL MOUNT RING CLIP	
				037	15K046S	HEXCAPSCR 1/4-20UNC2A X 2.25 SS18-8	
006C	02 03703A	91386B CYLINDER TIE ROD 3020M7	PART OF 005D				
006D	02 03703J	93191B CYLINDER TIE ROD 3022S5	PART OF 005E	038	15G168	SQ NUT 1/4-20UNC2 SS18-8	
007A	X2 02758	87382C SPIDER=1/CWU+25W	PART OF 005A	039	15N146	RDMACHSCR 10-24UNC2X1 SS18-8	
007B	X2 03561	92087# SPIDER=C6M ONLY-CASTIRON	PART OF 005B	040	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
007C	X2 03561A	92087C SPIDER C5M	PART OF 005C & 005E				
007D	X2 03561B	92242C SPIDER=FABRICATED 3020M7	PART OF 005D				
008	Y2 02059	70256A*SHELL CLAMP RING=30" MACHINE					
009	02 02087C	EXTRUS*ION-SHELL=30" MACHINES (8.5FT					
010	02 03629	70238A LOCKSTRAP=BEAR HOUS S/S	30020+30022 MODELS ONLY				
011	X2 03576	87326C RING=SHELL BACK CLAMP=1/C6M	30020+30022 MODELS ONLY				



DRAWING  
(See other page for parts list,  
if applicable.)

**MAIN BEARING ASSEMBLY**  
**30015C4x,M4x,K5x,S5x**

BMP910032/96141V (Page 1)





PARTS LIST

(See other page for drawing.)

MAIN BEARING ASSEMBLY  
30015C4x,M4x,K5x,S5x

BMP910032/96141V (Page 2)

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	SA 33 030	94147Y* MAIN BEARASY 3015CWE+NMA+C4	REFERENCE
00B	SA 33 030V	94147@ MAIN BEARASY 3015C4/M4-VITON	REFERENCE
001	02 02294A	87477B SHAFT KEY 3/8 X 3/8	
002	15H089S	SPRINGPIN 1/8"DIA X 5/8" LONG S/S	
003	02 03311	SHAFT SEAL SLEEVE=CWE	
004A	24S005	02Z SEAL 2.25 X 3.0 X .375 SS BUNA	00A
004B	24S005V	00ZSEAL2.25X3.0X.375#0225-10289LUPV	00B
005A	24S005	02Z SEAL 2.25 X 3.0 X .375 SS BUNA	00A
005B	24S005V	00ZSEAL2.25X3.0X.375#0225-10289LUPV	00B
006	60C151	O-RING 3+7/8IDX1/8CS BUNA-N 70 #241	
007	60C150	ORING 3+3/4ID 1/8CS BN 70 DURO #240	
008	24S015	06Z SEAL 2.265X3.256X.433 CR#23678	
009	54A319	CUP 28920 TIMKEN 2-24 1/BOX+PT#	
010	54A320	CONE 28985 TIMKEN 2-51 1/BOX+PT#	
011	02 03392	88257A BEARING BACKUP WASR OILCOAT	
012	5SL0EBEC	NPT ELBOW 90DEG STRT 1/4" BRASS 125	
013	03 01142	76465A NIPPLE 1/4X1+1/4 BRASS	
014	27A043A	HOSECLAMP .562"DIA SPRINGTYPE #R9	
015	60E005P	04Z PVC TUBING 1/2"ID X 5/8"OD *	
016	02 03407	LOCKINGWASHER-CADSTL	
017	15K095	HXCPSR 3/8-16UNC2AX1 GR5 ZINC/CAD	
018	X2 03660	94147B HOUSE=SEAL+BRG-24S048AAA CWU	
019	24S048AAA	04Z SEAL 1.625X2.375X.375 CS/BUNA	
020	X2 03314	MAIN SHAFT CWE25	
021	54A306	CONE 24780 TIMKEN 2-51 1/BOX+PT#	
022	54A305	CUP 24720 TIMKEN 2-24 1/BOX+MARKPT#	
023A	02 03323	94387B SHIM=.003 CRS GREEN	AS REQUIRED
023B	02 03323A	94387# SHIM=.005 CRS BLUE	AS REQUIRED
023C	02 03323B	94387# SHIM=.010 CRS RED	AS REQUIRED
023D	02 03323C	94387# SHIM=.0075 CRS BLACK	AS REQUIRED
024	5SP0EFFSSM	NPT PLUG 1/4 SQSLDMAGNET BLKST	
025	5N0E01KBE2	NPT NIPPLE 1/4X1.5 TBE BRASS 125#	
026	5SCC0EBE	NPT COUP 1/4 BRASS 125# #103	
027	X2 03436	94147D HOUSING-MAIN BEARING=1/CWU	
028	5N0E05AG42	NPT NIPPLE 1/4X5 TBE GALSTL SK40	
029	02 03564	BOLTLOKTAB	
030	15B080	HEXCAPSCR 5/16 X1+1/4 SS-18-8	
031	X2 03437	93431C HOLDER=SHAFT SEAL=1/CWU	
		***** END OF PARTS LIST *****	

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

1. The part number for the entire assembly depicted in the drawing or a major sub-assembly thereof, and/or
2. The range of machine models this drawing applies to.  
If more than one reference item appears, this usually means this drawing applies to more than one assembly (and thus to more than one range of machines).

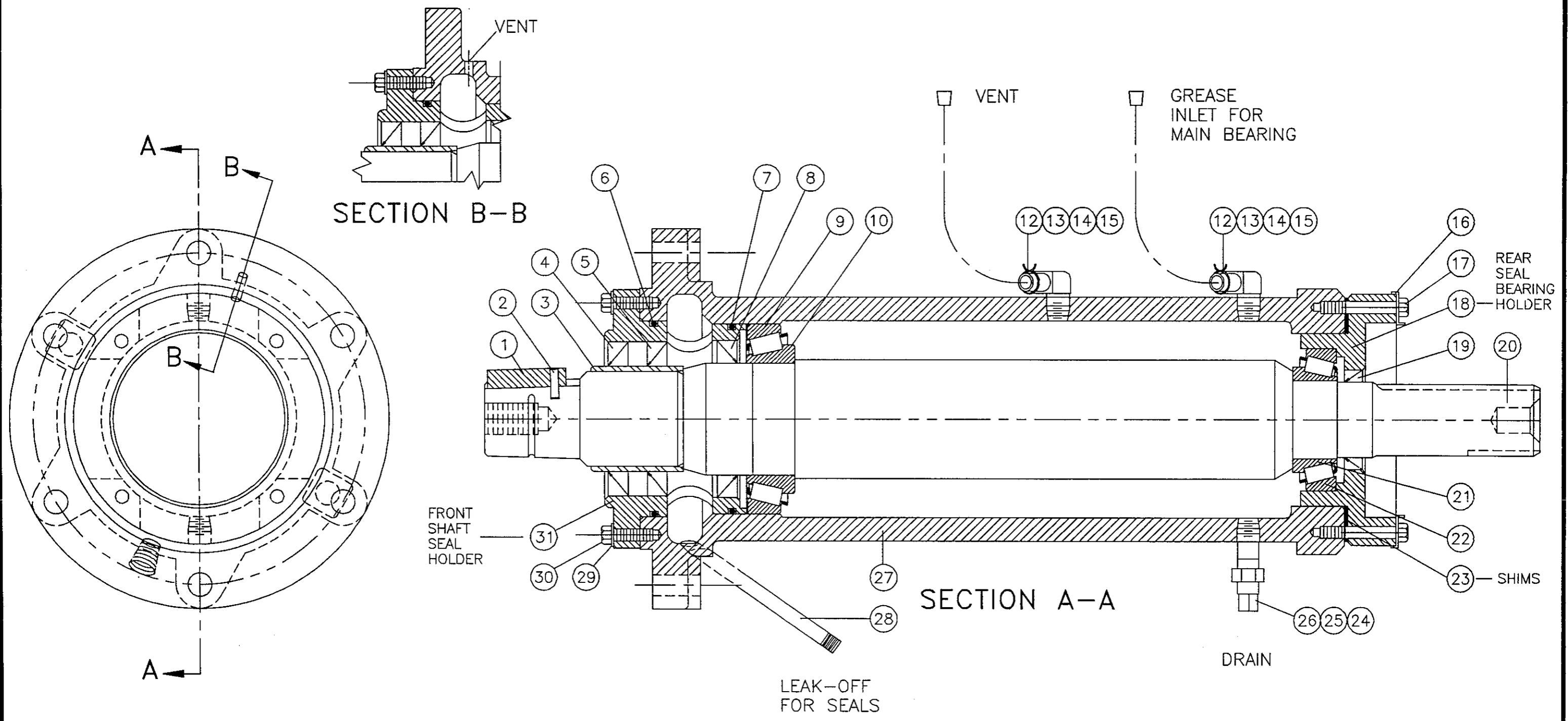
**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.



**DRAWING**  
(See other page for parts list,  
if applicable.)

# MAIN BEARING ASSEMBLY

BMP910033/96141V (Page 1)



**PARTS LIST**

(See other page for drawing.)

**MAIN BEARING ASSEMBLY**

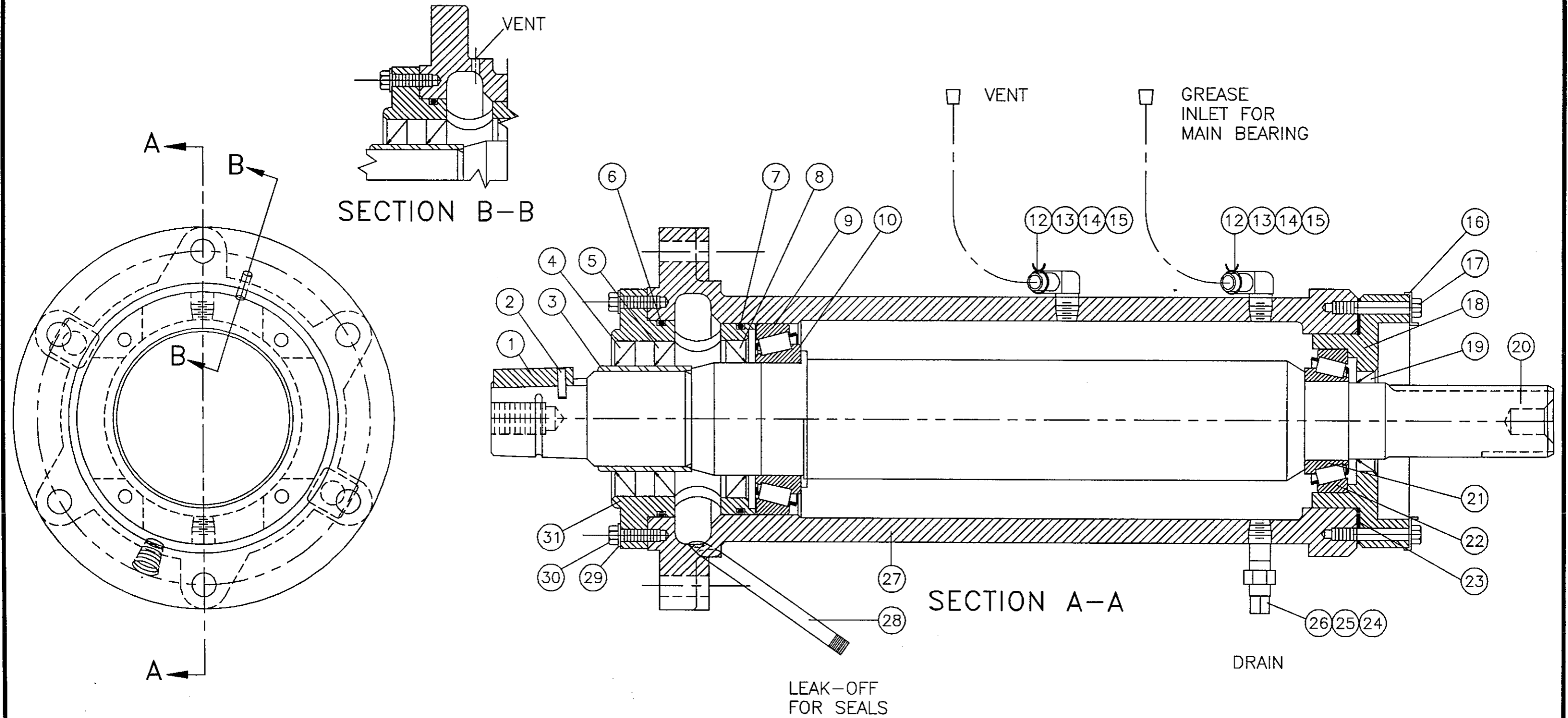
ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	A33 09901	94147Y* BEARING ASSY=C5M + N4M	30020M4A,C4A,M5X+30022M4X,M5X,C5X,S5X,K5X
00B	ABM33001	94082Y*BEARING ASSY=3020M7	30020M7X
001	15H089S	SPRINGPIN 1/8"DIA X 5/8" LONG S/S	
002	02 02294A	87477B SHAFT KEY 3/8 X 3/8	
003	02 13143	95103B SEALSLEEVE=SWE-1/SWE	
004	24S053	03Z SEAL 2.625X3.625X.437 #10050LUP	
005	24S053	03Z SEAL 2.625X3.625X.437 #10050LUP	
006	60C151	O-RING 3+7/8IDX1/8CS BUNA-N 70 #241	
007	60C151	O-RING 3+7/8IDX1/8CS BUNA-N 70 #241	
008	24S052A	06Z SEAL 2.559X3.55X.315 CR#25430	
009	54A916	TIMKEN CUP #JLM710910 (1/BOX+PT.#)	
010	54A915	TIMKEN CONE #JLM710949C (1PER BOX)	
012	5SL0EBEC	NPT ELBOW 90DEG STRT 1/4" BRASS 125	
013	03 01142	76465A NIPPLE 1/4X1+1/4 BRASS	
014	27A043A	HOSECLAMP .562"DIA SPRINGTYPE #R9	
015	60E005P	04Z PVC TUBING 1/2"ID X 5/8"OD *	
016	02 03407	LOCKINGWASHER-CADSTL	
017	15K127	01Z HEXFLGSCR 3/8-16X2 GR8 CS	
018	X2 03659A	93352B HOUSE=SEAL+BRG 30M,V7	
019	24S048AAA	04Z SEAL 1.625X2.375X.375 CS/BUNA	
020	X2 13103A	92236C SHAFT,MAIN FOR 3020C5M+N4M	
021	54A308	M802048 TIMKEN 20024 1/BX+MARK PT#	
022	54A307	CUP M802011 TIMKEN 2-24 1/BX + PT #	
023A	02 03323	94387B SHIM=.003 CRS GREEN	AS REQUIRED
023B	02 03323A	94387# SHIM=.005 CRS BLUE	AS REQUIRED
023C	02 03323B	94387# SHIM=.010 CRS RED	AS REQUIRED
023D	02 03323C	94387# SHIM=.0075 CRS BLACK	AS REQUIRED
024	5SP0EFFSSM	NPT PLUG 1/4 SQSLDMAGNET BLKST	
025	5N0E01KBE2	NPT NIPPLE 1/4X1.5 TBE BRASS 125#	
026	5SCC0EBE	NPT COUP 1/4 BRASS 125# #103	
027A	X2 03573A	94147D HOUSING BEARING C5M	00A
027B	X2 13105A	93323D HOUSING=MAIN BEARING 3020M7	00B
028	5N0E05AG42	NPT NIPPLE 1/4X5 TBE GALSTL SK40	
029	02 03564	BOLTLOKTAB	
030	15B080	HEXCAPSCR 5/16 X1+1/4 SS-18-8	
031	X2 13144A	90276C HOLDER=SHFT SEAL(05=24S052A) ***** END OF PARTS LIST *****	



DRAWING  
(See other page for parts list,  
if applicable.)

**MAIN BEARING ASSEMBLY**  
**30015M6x**

**BMP910034/95116V (Page 1)**





PARTS LIST

(See other page for drawing.)

MAIN BEARING ASSEMBLY  
 30015M6x

BMP910034/95116V (Page 2)

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	SA 33 048	94147Y* BEARING ASSY 3015C6M ONLY	REFERENCE
001	02 02294A	87477B SHAFT KEY 3/8 X 3/8	
002	15H089S	SPRINGPIN 1/8"DIA X 5/8" LONG S/S	
003	02 03311	SHAFT SEAL SLEEVE=CWE	
004	24S005	02Z SEAL 2.25 X 3.0 X .375 SS BUNA	
005	24S005	02Z SEAL 2.25 X 3.0 X .375 SS BUNA	
006	60C151	O-RING 3+7/8ID X 1/8CS BUNA-N 70 #241	
007	60C150	ORING 3+3/4ID 1/8CS BN 70 DURO #240	
008	24S015	06Z SEAL 2.265X3.256X.433 CR#23678	
009	54A319	CUP 28920 TIMKEN 2-24 1/BOX+PT#	
010	54A320	CONE 28985 TIMKEN 2-51 1/BOX+PT#	
012	5SL0EBEC	NPT ELBOW 90DEG STRT 1/4" BRASS 125	
013	03 01142	76465A NIPPLE 1/4X1+1/4 BRASS	
014	27A043A	HOSECLAMP .562"DIA SPRINGTYPE #R9	
015	60E005P	04Z PVC TUBING 1/2"ID X 5/8"OD *	
016	02 03407	LOCKINGWASHER-CADSTL	
017	15K127	01Z HEXFLGSCR 3/8-16X2 GR8 CS	
018	X2 03659A	93352B HOUSE=SEAL+BRG 30M,V7	
019	24S048AAA	04Z SEAL 1.625X2.375X.375 CS/BUNA	
020	X2 03314A	90147C MAIN SHAFT=3015N6E+C6M	
021	54A308	M802048 TIMKEN 20024 1/BX+MARK PT#	
022	54A307	CUP M802011 TIMKEN 2-24 1/BX + PT #	
023A	02 03320B	93353A SHIM .003 ARTUS GREEN	
023B	02 03320C	93353# SHIM .005 ARTUS BLUE	
023C	02 03320D	93353# SHIM .010 ARTUS BROWN	
023D	02 03320G	93353# SHIM .0075 ARTUS TRANSMATTE	
024	5SP0EFFSSM	NPT PLUG 1/4 SQSLDMAGNET BLKST	
025	5N0E01KBE2	NPT NIPPLE 1/4X1.5 TBE BRASS 125#	
026	5SCC0EBE	NPT COUP 1/4 BRASS 125# #103	
027	X2 03573	94147D BEARHOUSE=C6M ONLY	
028	5N0E05AG42	NPT NIPPLE 1/4X5 TBE GALSTL SK40	
029	02 03564	BOLTLOKTAB	
030	15B080	HEXCAPSCR 5/16 X1+1/4 SS-18-8	
031	X2 03437	93431C HOLDER=SHAFT SEAL=1/CWU ***** END OF PARTS LIST *****	

# JACKSHAFT BEARING REPLACEMENT

## Removing the Jackshaft

### ⚠ DANGER ⚠



**ELECTROCUTION HAZARD**—High voltage is present inside electric boxes, motors, and many other components. Power switches on machine control panels disable only control circuit power in certain boxes. You can be killed or seriously injured on contact with high voltage.

☞ **Lock OFF and tag out power at the wall disconnect before servicing.**

Dual motor drive 30015, 30020, and 30022 machines are equipped with jackshafts. Replace worn bearings as described below.

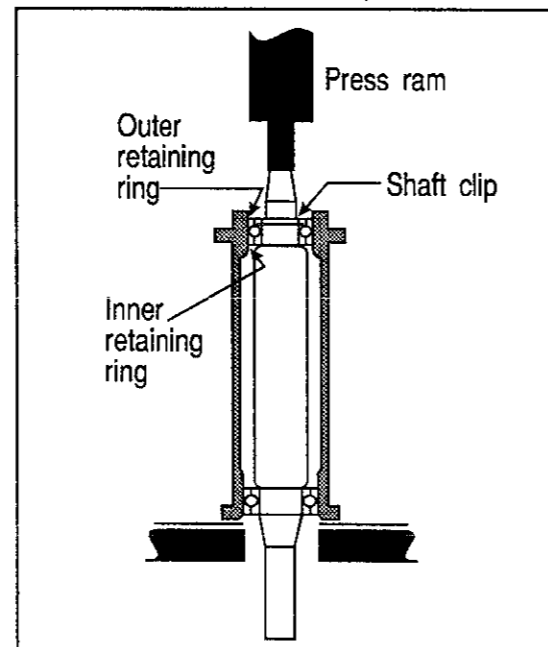
See “JACKSHAFT ASSEMBLY” (see Table of Contents) during the following procedures:

1. With the power locked OFF, remove the top console cover by prying out the four plugs and unscrewing the four bolts. Remove the rear belt guard.
2. Loosen and remove the belts from the jackshaft. Remove the straight bore pulley, electric clutch and coil from the jackshaft (for further information see “DRIVE TRAIN SERVICE” in the Table of Contents).
3. Remove the four jackshaft mounting screws.

## Replacing the Bearing

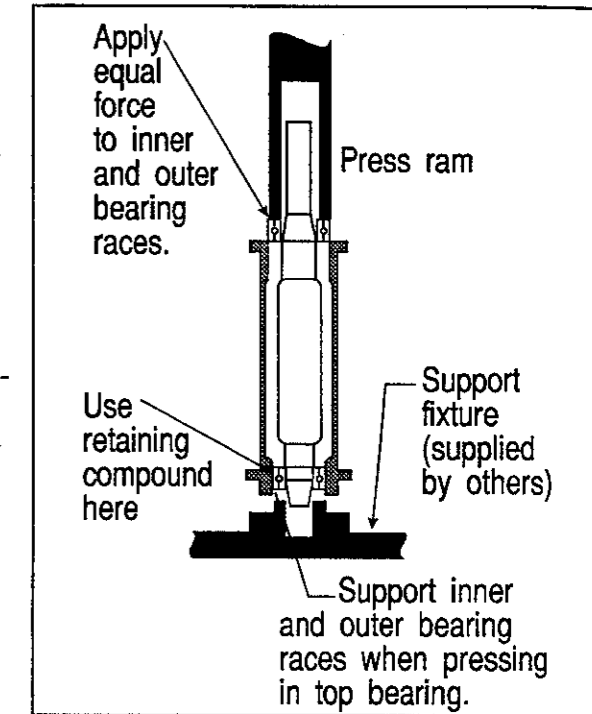
**NOTE:** Provide enough clearance around the bottom of the housing (FIGURE 1) as the bearing will come out with the shaft.

1. Remove and discard the shaft clip and place the assembly in a press with the tapered shaft end pointing up as shown in FIGURE 1. Press the shaft down. When the lower bearing clears the housing, the shaft will drop out with the lower bearing remaining on the shaft.
2. Place the shaft in the press and remove the bearing from the shaft. Remove the outer retaining ring from the housing and discard. Place the housing in the press with the bearing facing downward, then press the bearing out. Remove the inner retaining ring and discard all retaining rings.



**FIGURE 1** (MSSM0709BE)  
Removing Jackshaft Bearings

3. Thoroughly clean all parts with solvent. **The bearing housing and shaft must be absolutely clean and free of dirt and adhesives.**
4. Install a new inner retaining ring inside the housing and apply a small amount of retaining compound (Loctite 271 or similar) around the bearing seating surface of the bearing housing as shown in FIGURE 2. Press the new bearing in the housing, applying equal force to the inner and outer bearing races. Install a new outer retaining ring in the housing.
5. Slide the other new bearing onto the shaft and place the shaft inside the housing with the tapered end into the installed bearing. Place the assembly under the press with the housing completely supported by the inner and outer race of the bearing as shown in FIGURE 2. Simultaneously press the bearing onto the shaft and into the housing until the bearing bottoms out, applying equal force to both inner and outer bearing races. Install a new shaft clip (tapered end only).



**FIGURE 2** (MSSM0709BE)  
Replacing Jackshaft Bearings

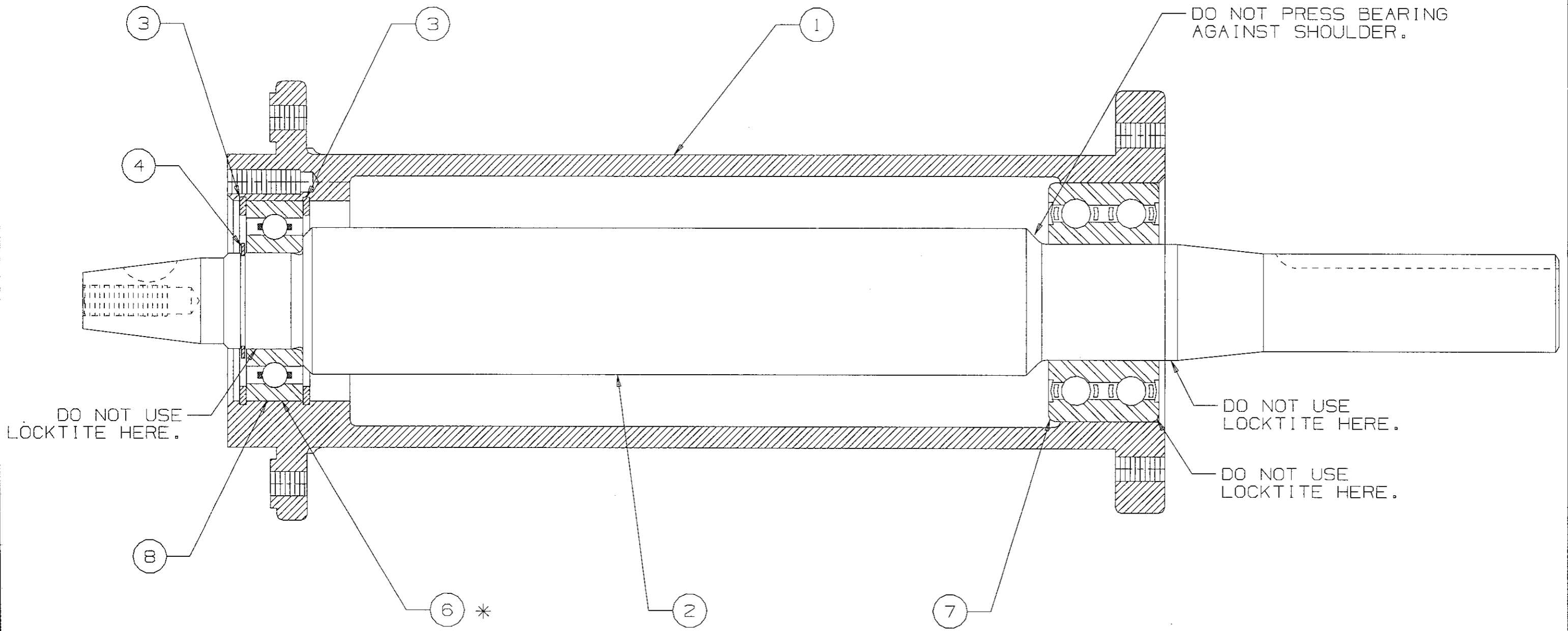
## Installing the Jackshaft

1. Replace the jackshaft and all related components in reverse order of disassembly.
2. Align pulleys and set belt tension as explained in “DRIVE TRAIN SERVICE”.

DRAWING  
(See other page for parts list,  
if applicable.)

**JACKSHAFT ASSEMBLY**  
**30015,30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP910035/93251V (Page 1)



\* USE LOCKTITE (BEARING MOUNT GRADE) BETWEEN FRONT BEARING AND HOUSING ONLY.

**PARTS LIST**

(See other page for drawing.)

**JACKSHAFT ASSEMBLY**

**30015,30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	SA 13 013	85242D\$ JKSHAFT ASSY DBLROW=	30020M4X,M5X,M7X+3022M4X,M5X
00B	SA 33 034	85251D\$ JKSHAFT ASSY SGLROW=CWE+C4	30015C4X,M4X,M6X+30020C4A,M4X+3022C5X
001	X2 03308	91212C HSG-JACKSHAFT=1/CWU+3626SWE	
002	02 13163	92233D JACKSHAFT=3626SWE	
003	17B135	EXT. RET RING 4000-200-ST-ZD	
004	17B155	EXTERNAL RETAINING RING	
006	54A070	BALLBEAR FAFNIR P205PP FA52908 1/BX	
007A	54A926	BALLBEAR DOUBLE ROW TYPE 5206	00A (DOUBLE ROW BEARING)
007B	54A080	BALLBEAR FAFNIR P206PP FA52908 1/BX	00B (SINGLE ROW BEARING)
008	20C005C	ADH/SEALANT 250 CC LOCTITE #271-41	
		***** END OF PARTS LIST *****	

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

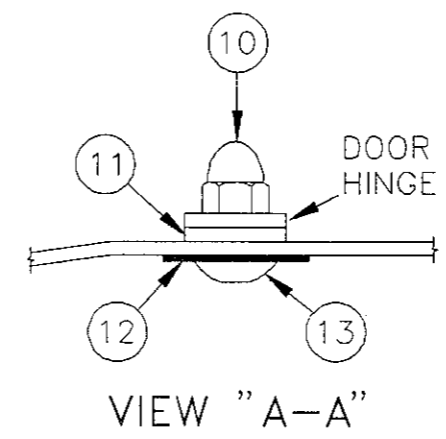
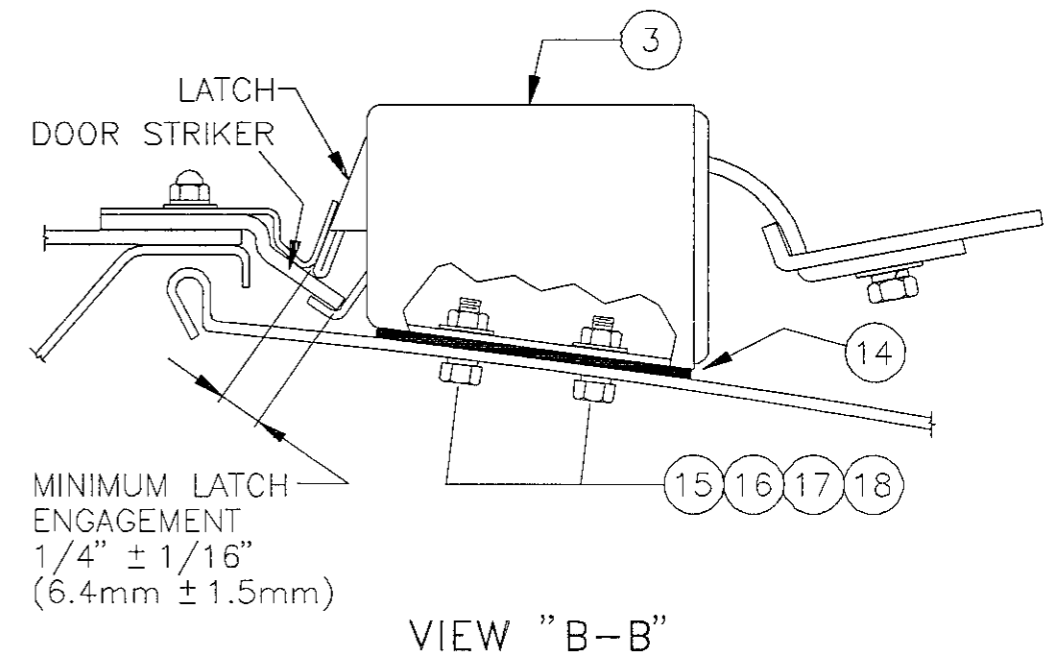
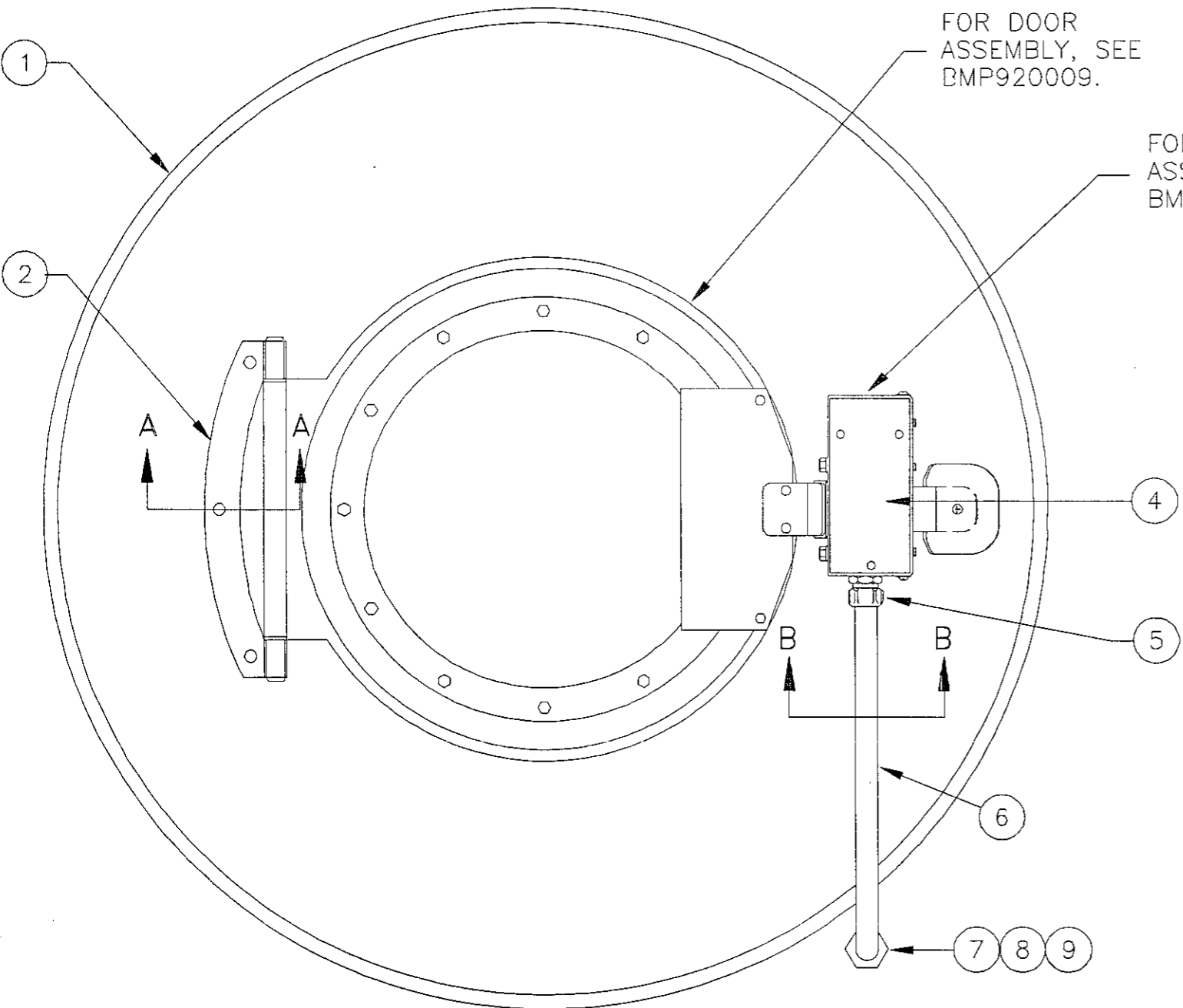
1. The part number for the entire assembly depicted in the drawing or a major sub-assembly thereof, and/or
2. The range of machine models this drawing applies to.

If more than one reference item appears, this usually means this drawing applies to more than one assembly (and thus to more than one range of machines).

**Component Item Numbers**—For any item on the drawing (e.g., item ⓐ), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. “How Part Is Used In Assembly” identifies which components apply to your machine, by listing either the machine model, or the

**DRAWING**  
(See other page for parts list, if applicable.)

**SHELLFRONT ASSEMBLY, CONDUIT & INTERLOCK INSTALLATION**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**



**ADJUSTMENTS:**

1. ADJUST DOOR STRIKER SO THAT IT TOUCHES THE LATCH SQUARELY AND EVENLY.
2. ADJUST THE LATCH SO THAT THE MINIMUM ENGAGEMENT WITH THE DOOR FULLY CLOSED EQUALS 1/4" ± 1/16" (6.4mm ± 1.5mm).



## PARTS LIST

(See other page for drawing.)

**SHELLFRONT ASSEMBLY, CONDUIT & INTERLOCK INSTALLATION  
30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920024/93251V (Page 2)

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	G33 04000H	91477# CONDUIT+SHELLFT 3015/3020M4A	REFERENCE
00C	A33 10100H	91477# SHELL FRONT ASSY 3015/20M4A	REFERENCE
00D	A33 10100C	91477#*SHLASSY (IDNT) UNLOK N4P	REFERENCE
001	X2 02361B	92567D SHELLFRONT,30",ELECTRIC LOCK	
002	A33 07100C	91477#*DRASSY(INDNT)LK,LOGO N4,5,6P	
003	EDL00171	88093# INTRLKHSG ASSY=N/UNLOCK 240V	
004	01 10422	88302C NPLATE:DOOR ILOC-N4,5,6 P	
005	12K040	1/2" COND.EMT CONDUIT PECO #260B	
006	03 01446	87306B 1/2 EMT CONDUIT 900D=DR INTR	
007	10Y71M4GEX	88466N*M4G EXTERNAL CONNECTIONS	
008	12K040	1/2" COND.EMT CONDUIT PECO #260B	
009	12P1ASSB	SNAPBUSH 7/8MHX11/16 HEYCO #2126	
010	15G200C	01Z HXCPNUT HI 3/8-16 BRASS NIK PLT	
011	02 02819B	84383C SPACER HINGE S/S	
012	02 02293	92601A DOOR HANDLE NUT GASKET	
013	15K084	85196B TRUSS HXSOK 3/8-16 X 23/32SS	
014	02 03669	92601A GASKET=INTRLK HOUSING	
015	15N174	HXCAPSCR 1/4-20UNC2X5/8SS18-8	
016	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
017	24G020N	ROLLED WASHER .252"ID NYLTITE #25W	
018	15G168	SQNUT 1/4-20UNC2 SS18-8 ***** END OF PARTS LIST *****	

**How to Read Parts List**

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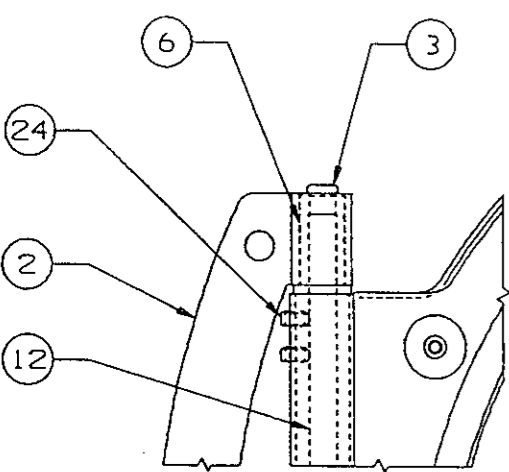
**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.



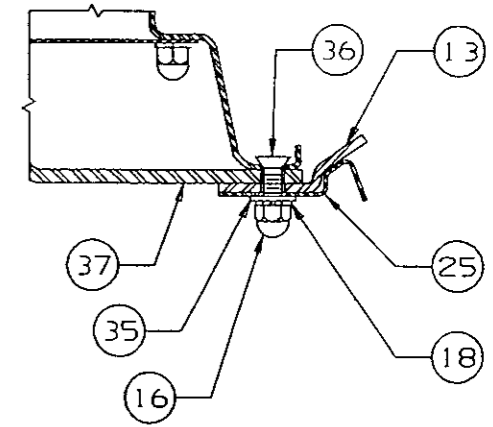
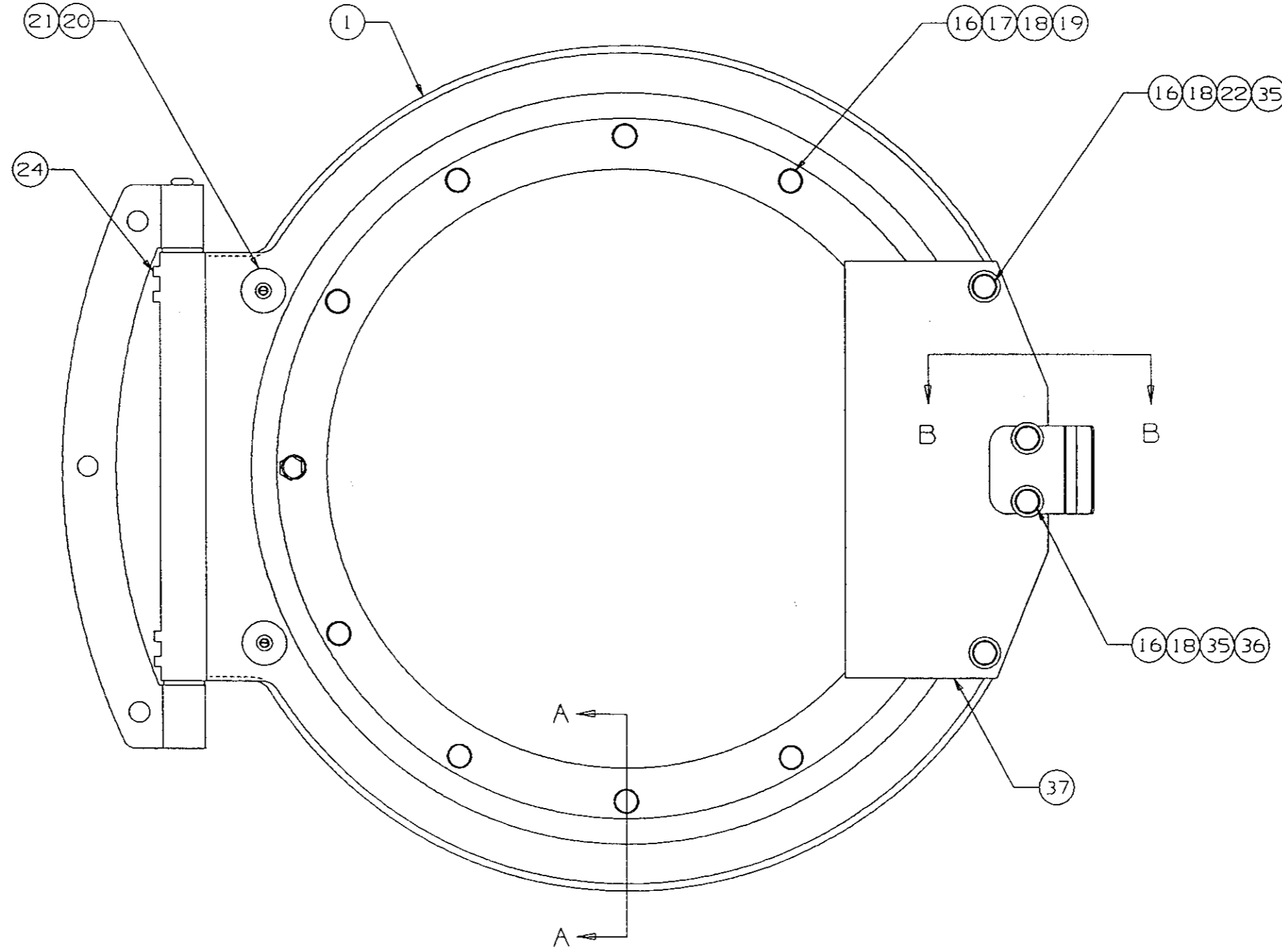
DRAWING  
(See other page for parts list,  
if applicable.)

**DOOR ASSEMBLY**  
**30015 & 30020 RIGID MOUNT WASHER-EXTRACTORS**

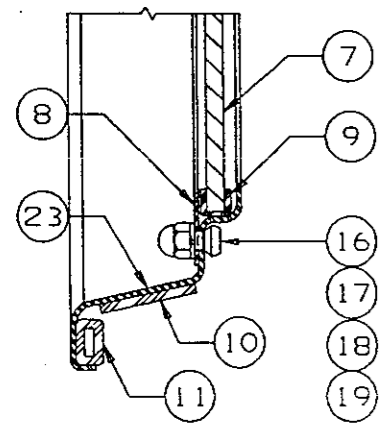
BMP920009/94491V (Page 1)



HINGE DETAIL



VIEW B-B



VIEW A-A

**PARTS LIST**

(See other page for drawing.)

**DOOR ASSEMBLY**

**30015 & 30020 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	A33 07100C	93207#*DRASSY(INDNT)LK,LOGO N4,5,6P	ALL MODELS EXCEPT M4A
00B	A33 07100H	93207# DOOR ASY 3015/3020M4A	30015M4A+30020M4A ONLY
00C	A33 06900F	93207@ ASSY=DOOR W/MLOGO DKRED 3022	3022F8J/F8P/F8W
001	X2 02814C	94267D DOOR=SHELL W/LOK-3020	
002	02 02819	88481C HINGE=STAMPED DOOR 25#	
003	12P1AGHP1	HOLEPLUG LPE BLK 3/8*CAPLUG#BPF-3/8	
006	02 02817	71108A FLANGE BRG=DOOR HINGE-NYLON	
007A	02 09215D	93237D DR GLASS=N4,5,6P W/MIL LOGO	00A
007B	02 09215A	88452C DORGLAS=DRAW W/MILNOR LOGO	00B
007C	02 09215E	93237# DOOR GLASS W/MIL LOGO (RED)	00C
008	02 09021	79436A RING=DOOR GLASS PRESSURE	
009	02 02366	93516A GASKET DOORGLAS GTR52-5220-3	
010	02 10545	81116B EXTR BAND-STAMPED SS CYLDOOR	
011	02 10342A	GASKET=15" DOOR	
012	02 02764	77482A HINGEPIN=SHELLDOOR L=10+5/8"	
013	03 01420C	91062B DOOR STRIKER=ILOC	
016	15G140	03Z HXCPNT 1/4-20 #C250=20 NKLPLT	
017	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	
018	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
019	24G020N	ROLLED WASHER .252"ID NYLTITE #25W	
020	60C080	RECESS BUMPER RUBBERLAVELLE #718-R	
021	15P103	TRDCUT-F RDHDSLOT 8-32UNCX1/2 SS410	
022	15N173A	FLTMACSCR 1/4-20 UNCX5/8 UCUTSS18-8	
023	20C044	ADHESIVE 3M EC-1300 IN PINT CONT.	
024	15Q077	SOKSETSCR 1/4-20X1/4 ZINC ALLENONLY	
025	03 01423C	86206B LATCH GUARD ILOC 3015-20	
035	15U188	01Z FLTWASH 1/4 STD COMM SS18-8	
036	15N191	FLATMACHSCR 1/4-20X7/8 SS18-8 U/CUT	
037	03 01420D	87487Y DOOR HANDLE=ILOC 3015-20	
		***** END OF PARTS LIST *****	

**How to Read Parts List**

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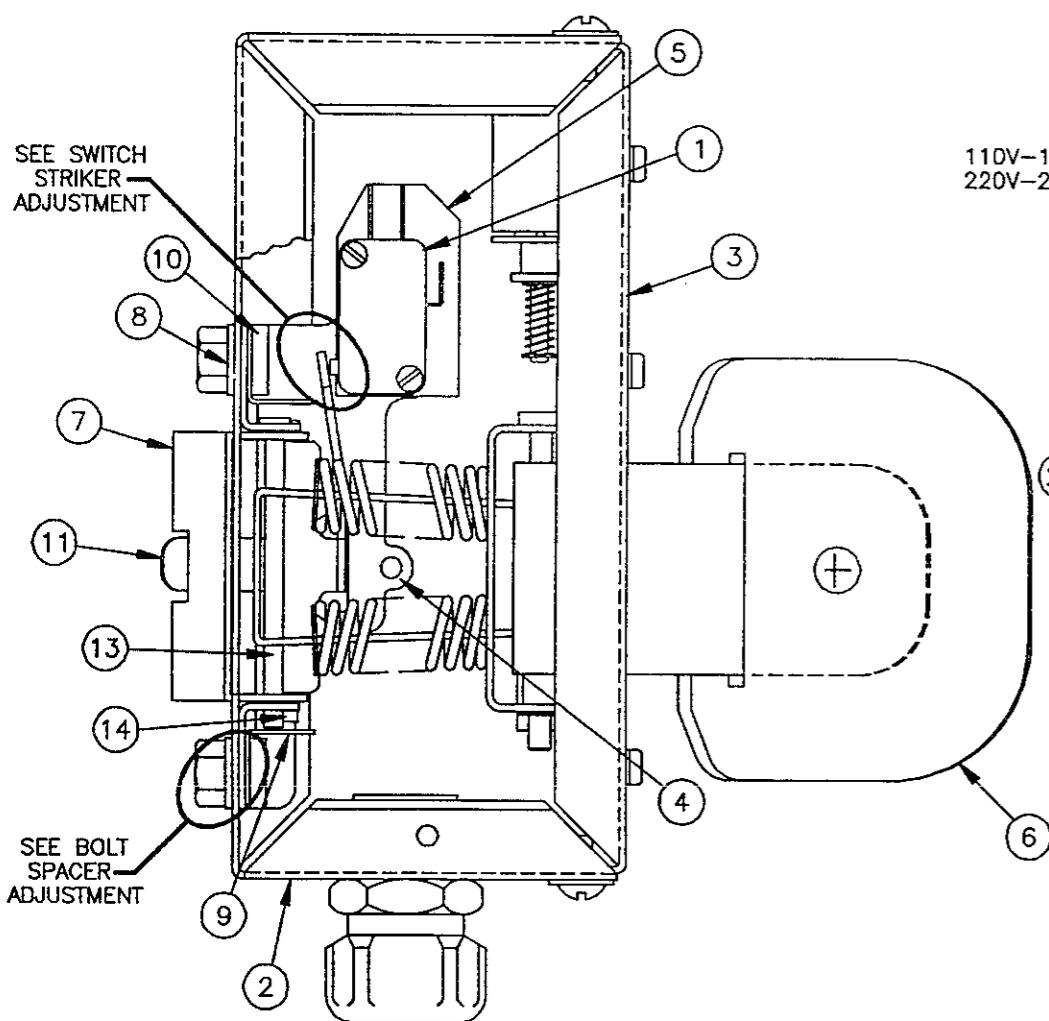
**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.



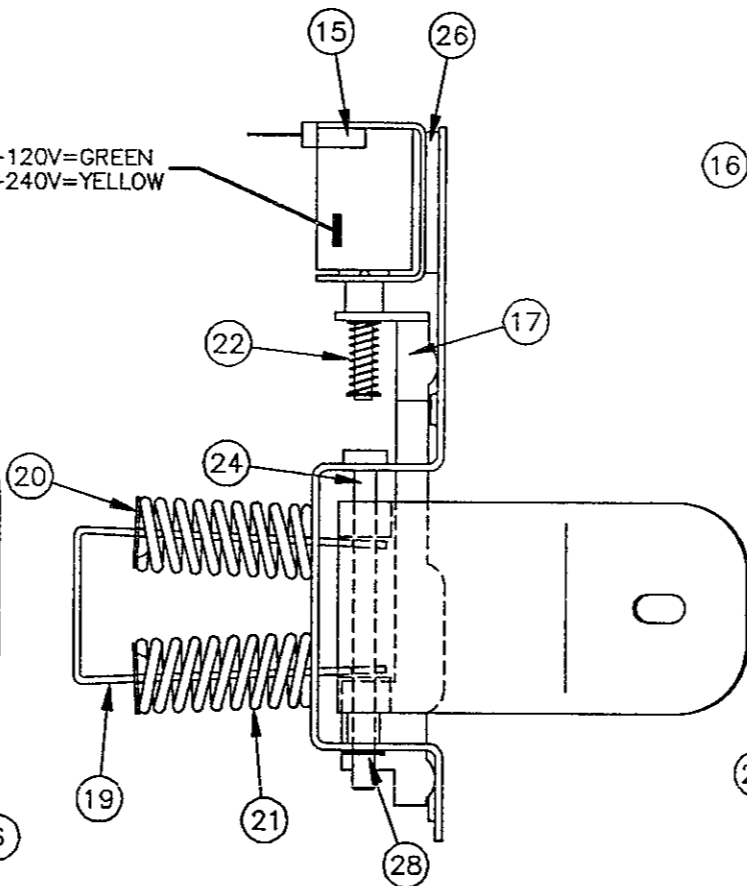
**DRAWING**  
 (See other page for parts list,  
 if applicable.)

**INTERLOCK ASSEMBLY**

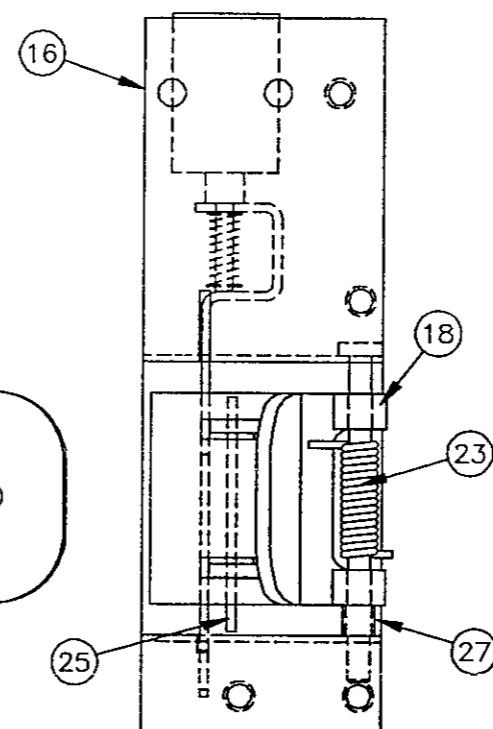
**BMP750046/95077V (Page 1)**



110V-120V=GREEN  
 220V-240V=YELLOW



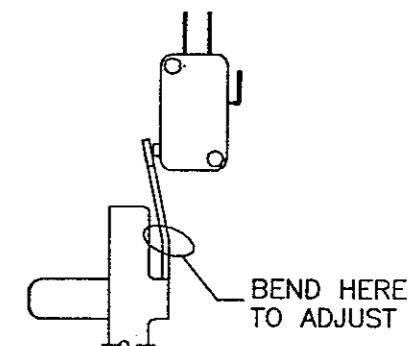
FRONT VIEW



SIDE VIEW

ASSEMBLIES 00AA,00BB,00CC

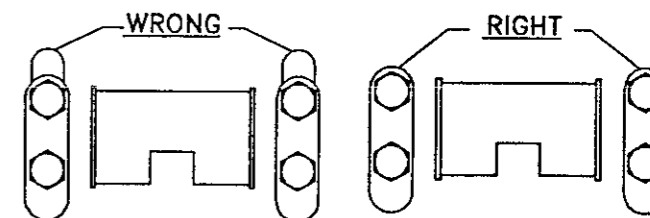
**SWITCH STRIKER ADJUSTMENT**



ADJUST THE SWITCH STRIKER ARM BY BENDING AS SHOWN SO THAT:

1. THE SWITCH IS ACTIVATED WHEN DOOR IS CLOSED
2. THE SWITCH DOES NOT ACTUATE WHEN THE UNLATCHING LEVER IS FULLY DEPRESSED WITH THE DOOR OPEN
3. THE ARM DOES NOT OVERTRAVEL AND HIT THE SWITCH HOUSING WHEN THE DOOR IS CLOSED AND THE SWITCH IS ACTIVATED

**BOLT SPACER ADJUSTMENT**



1. ON A NEW MACHINE THE SLOTS ON THE FRONT HOUSING SHOULD NOT SHOW A GAP PAST THE BOLT SPACERS
2. THE SPACERS SHOULD BE INSTALLED WITH THE LONG SIDE TOWARD THE SHELL FRONT



PARTS LIST

(See other page for drawing.)

INTERLOCK ASSEMBLY

BMP750046/95077V (Page 2)

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	EDL00171	88093# INTRK HSG ASSY=N/UNLOCK 240V	3015+3020MXX/CXX
00AA	EDL00171A	93207@ RR PIVOT PL ASSY=N/UNLOCK 240V	USED ON 00A (CONTAINS ITEMS 15-28)
00B	EDL00271	88093#*INTRK HSG ASSY=N/LOCK 220V	36021CPE (ITEMS 1-14); 3022F8J/F8P/F8W
00BB	EDL00271A	93207#*RR PIVOT PL ASSY=N/LOCK 220V	USED ON 00B (CONTAINS ITEMS 15-28)
00C	EDL00337	88093#*INTRK HSG ASSY=N/LOCK 120V	3621Q/NSP/BWP; 3626Q; 4226Q; 4232F7J
00CC	EDL00337A	93207# RR PIVOT PL ASSY=N/LOCK 120V	USED ON 00C (CONTAINS ITEMS 15-28)
00D	EDL00371	94000Z INTERLK HSG=N/LOCK+SWITCH 240V	3015+3022K4X/54X SINGLE MOTOR MODELS
00DD	EDL00271A	93207#*RR PIVOT PL ASSY=N/LOCK 220V	USED ON 00D (CONTAINS ITEMS 15- )
001	09R014A	05Z MINI-SW SPDT STAKON #V15G1C26K	
002A	03 01426	77201D HOUSING=FRONT=ILOC	
002B	03 01426A	94186D HOUSING=FRONT= ILOC W/UNLATCH	00D ONLY
003A	03 01427A	77181C HOUSING=REAR=ILOC (C-7)	
003B	03 01427B	94186D HOUSING=REAR=ILOC W/UNLATCH	00D ONLY
004	03 01429	75479C PLATE=FNT PIVOT=ILOC	
005	03 01335	INSULATOR=AUTOSPOT	
006	03 01425A	92683C DOOR HANDLE EXTENSION	
007	03 01423	75736B LATCH = INTERLOCK	
008	03 01417	75100B PLATE=SPACER=ILOC	
009	03 01418B	75194B KEEPER=LATCH PIN/NOTCH	
010	03 01418	75100B TAP STRIP=ILOC	
011	03 01424A	90501B STRIKER=SWITCH=LONG TAB	
012	03 01442	92697B SOLENOID INSULATION=DR INTRK	(NOT SHOWN)
013	03 01443	84251 AFLATHDRIVET 5/32X2+5/16 ZINC	
014	15H091	01Z STRGHTPIN 5/32"X2.25 LG ZINC	
015A	09K062B71	04Z SOLENOID 240/60-220/50 = ILOC	00AA,00BB,00DD
015B	09K062B37	03Z SOLENOID(C-7)120/60-110/50	00CC
016	03 01428A	93207C PLATE=REAR PIVOT=ILOC (C-7)	
017A	03 01421B	93207B SLIDE=NORMALLY OPEN(C7 SOL)	00AA
017B	03 01421A	75736B SLIDE=NORMALLY LOCKED=ILOC	00BB,00DD
017C	03 01421D	77341B SLIDE=NORMALLY LOCKED(C7-S)	00CC
018	03 01425	75479B HANDLE=ILOC	
019	03 01422	94256C KEEPER=SPRING=ILOC	
020	03 01444A	77503B SPRING CUP = ILOC	
021	03 01444	82293ASPRING .51/1.69/46+CADPL	
022	03 01445	88481ASPRING .2/.625/.319+CADPL	
023	03 01445B	75935B TORQUE SPRING (.53 IN-#)CDPL	
024	03 01443	84251 AFLATHDRIVET 5/32X2+5/16 ZINC	
025	15H090I	STRAIGHT PIN 5/32"DIAX1.75"LG ZINC	
026	03 S1X1	88172B SHIM:DOOR INTLK SOLENOID N4P	00AA ONLY
027	27B205080Z	SPACER ROLL.177ID.218L.027T STL/ZNC	
028	03 01418C	75736B KEEPER=NORMLOCKED SLIDE=ILOC ***** END OF PARTS LIST *****	00BB,00CC,00DD

## REPLACING AND ADJUSTING THE POWER SUPPLY

In the unlikely event of a power supply failure, see the replacement and adjustment instructions for the machine in this section. Use a high quality digital voltmeter (Fluke model 77 or similar) for measuring voltages.

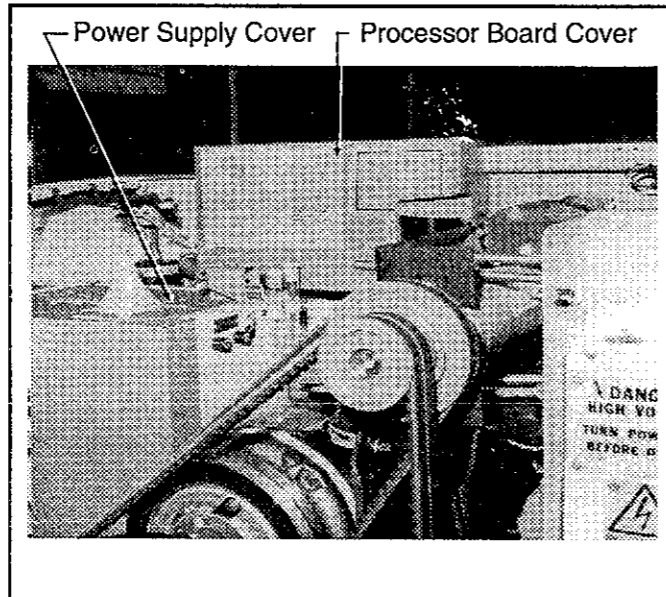
**For C4A, M4A, System 7<sup>®</sup>, and E-P Plus<sup>®</sup> Models**

### ⚠ DANGER ⚠



**ELECTROCUTION HAZARD—**High voltage is present inside electric boxes, motors, and many other components. Power switches on machine disable only control circuit power in certain boxes. You can be killed or seriously injured on contact with high voltage.

☞ Lock OFF and tag out power at the wall disconnect before servicing.



**FIGURE 1 (MSSM0711AE)**  
Location of Power Supply and Processor Board ( E-P Plus<sup>®</sup> shown)

**Replacing the Power Supply**—See FIGURE 1 during the following procedures:

1. Remove the console top and belt guard.
2. Remove the power supply and processor board covers.
3. After replacing the power supply, see “Adjusting Output Voltage” in this section.

### Adjusting Output Voltage

### ⚠ DANGER ⚠



**CRUSH AND ENTANGLE HAZARD—**Machine power is ON and covers are removed for the following procedures. Rotating machinery can entangle and crush body parts.

☞ Before turning power ON, open shell door to prevent machine rotation.

### ⚠ DANGER ⚠



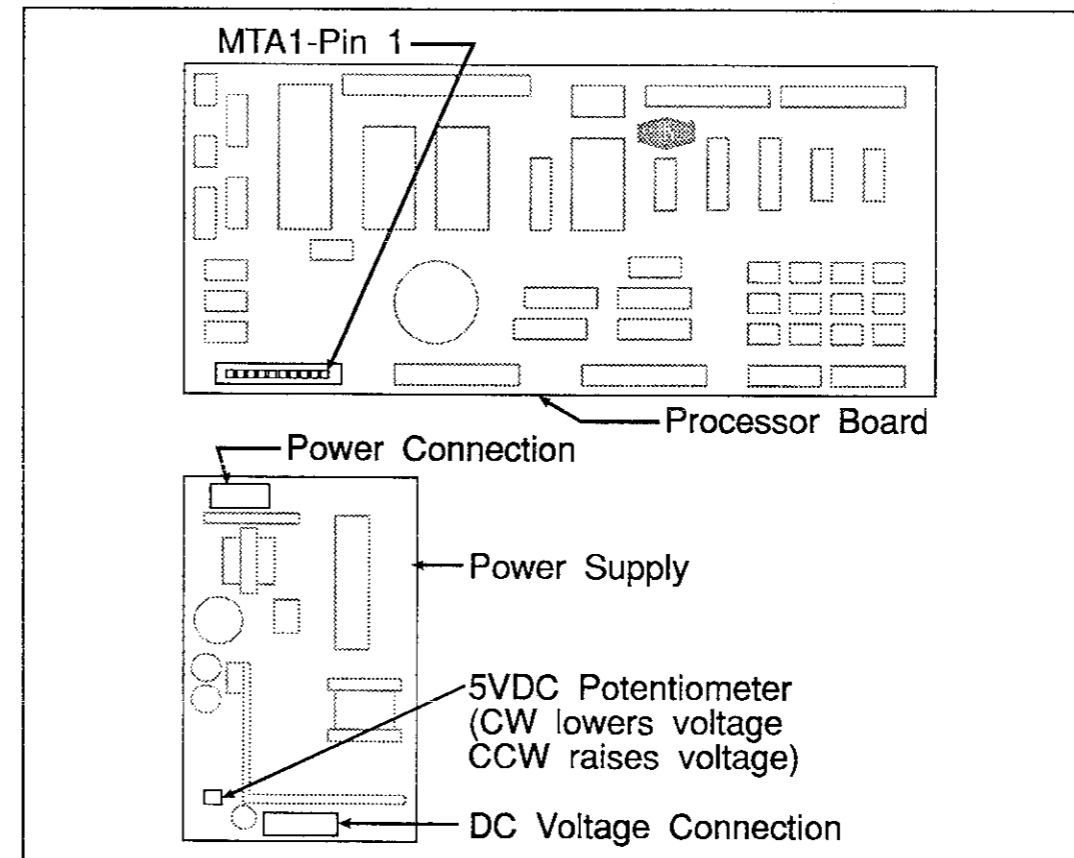
**ELECTROCUTION HAZARD—**Machine power is ON and covers are removed for the following procedures. You can be killed or severely injured by contact with exposed components which are energized at 120VAC or higher.

☞ DO NOT touch any components while adjusting output voltage.

See FIGURE 2 during the following procedures:

1. Restore power at the wall disconnect.
2. Locate connector MTA1 on the processor board. Touch the negative meter probe to the rear of pin 9 (ground connection).
3. Touch the positive meter probe to the rear of pin 3 (+5VDC).

Voltage must be between 4.95 and 5.06VDC. If not, turn the 5VDC potentiometer slowly (clockwise to lower, counterclockwise to raise) until the meter displays the correct value. **The microprocessor will not operate if this voltage is not within tolerance.** After setting 5VDC output voltage, with the negative meter probe still touching the rear of pin 9 (ground connection):



1. Touch the positive meter probe to the rear of pin 5. The voltage must be between +11.5 to +13.5VDC .
2. Touch the positive meter probe to the rear of pin 7. The voltage must be between -11.5 to -13.5VDC.

**FIGURE 2 (MSSM0711AE)**  
Location of Output Voltage Potentiometer and Connector MTA1

## For MARK II Models

### Replacing the Power Supply

The Mark II power supply mounts inside of the Mark II control box atop the machine. After replacing the power supply, see "Adjusting Output Voltage" in this section.

#### ⚠ DANGER ⚠



**ELECTROCUTION HAZARD**—High voltage is present inside electric boxes, motors, and many other components. Power switches on machine disable only control circuit power in certain boxes. You can be killed or seriously injured on contact with high voltage.

☞ Lock OFF and tag out power at the wall disconnect before servicing.

### Adjusting Output Voltage

#### ⚠ DANGER ⚠



**ELECTROCUTION HAZARD**—High voltage is present inside electrical box during the following procedure. You can be killed or seriously injured by contact with exposed components which are energized at 120VAC or higher.

☞ DO NOT touch any components while adjusting output voltage.

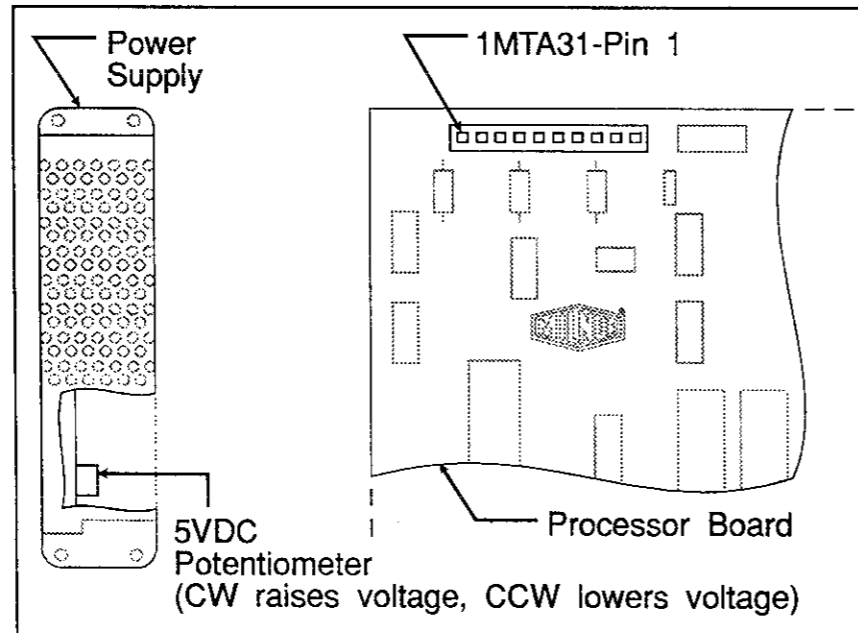
See FIGURES 3 and 4 during the following procedures:

**NOTE 1:** The 5VDC potentiometer (power supplies prior to Mildate 92753) can be seen through the perforations in the metal case.

**NOTE 2:** On some machines it may be necessary to remove the mounting screws and tilt the power supply to reach the 5VDC potentiometer.

Locate connector 1MTA31 on the processor board.

1. Restore power at the wall disconnect.
2. Touch the negative meter probe to the rear of pin 9 (this is a ground and has no wire connection to it).



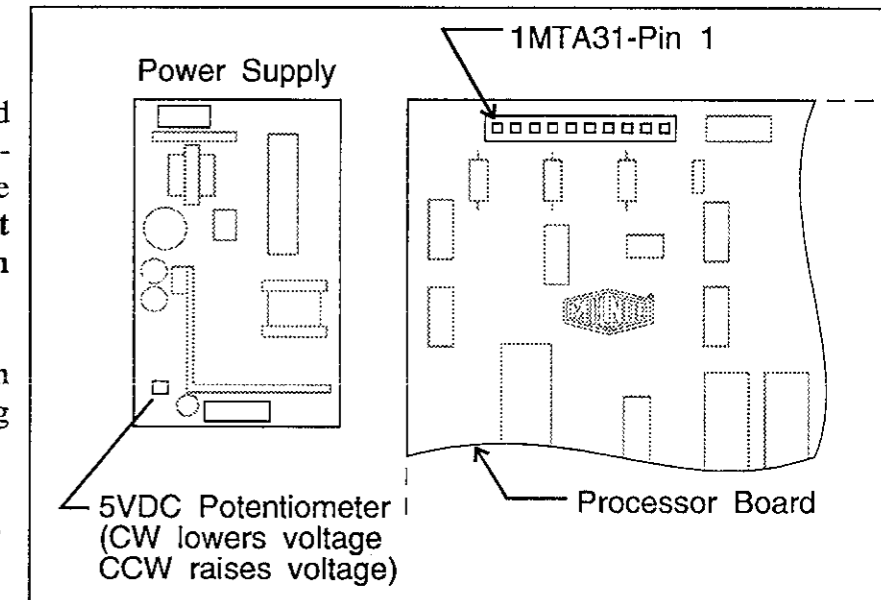
**FIGURE 3** (MSSM0711AE)  
**Location of Output Voltage Potentiometer and Connector 1MTA31 (prior to Mildate 92753)**

2. Touch the positive meter probe to the rear of pin 3 (+5VDC).

Voltage must be between 4.95 and 5.06VDC. If not, turn the 5VDC potentiometer slowly until the meter displays the correct value. **The microprocessor will not operate if this voltage is not within tolerance.**

After setting 5VDC output voltage, (with the negative meter probe still touching pin 9):

1. Touch the positive meter probe to pin 5. The voltage must be between +11.5 to +13.5VDC.
2. Touch the positive meter probe to pin 7. The voltage must be between -11.5 to -13.5VDC.

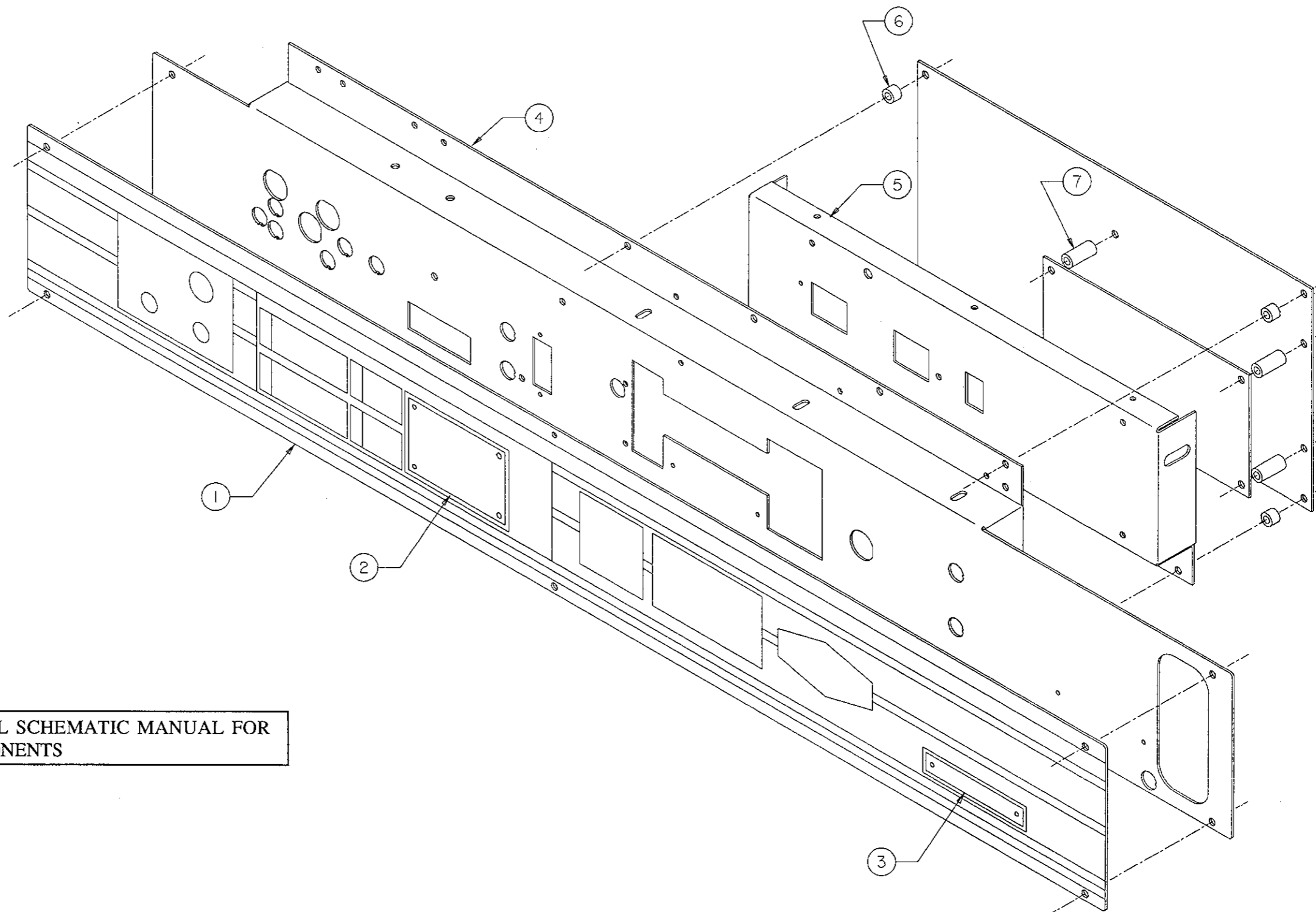


**FIGURE 4** (MSSM0711AE)  
**Location of Output Voltage Potentiometer and Connector 1MTA31 (After Mildate 92753)**

**DRAWING**  
(See other page for parts list,  
if applicable.)

**SWITCH PANEL ASSEMBLY**  
**30015, 30020 & 30022 MXG, MXJ, CXX, K5A**

**BMP880028/96143V (Page 1)**



**NOTE: SEE ELECTRICAL SCHEMATIC MANUAL FOR ALL ELECTRICAL COMPONENTS**



**PARTS LIST**

(See other page for drawing.)

**SWITCH PANEL ASSEMBLY  
30015, 30020 & 30022 MXG,MXJ,CXX,K5A**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00P	ESP71CME	89421N SWPNL 3015/20 MIC1 COIN MACH	REFERENCE
00Q	ESP71EP1PL	91171N SWPNL:3015/20 M4,5,6J EPPLUS	REFERENCE
00R	ESP71M1ME	88403N SWPNL 3015/20 SYS7HOTEL-MOT	REFERENCE
00S	ESP71M1HE	88403N SWPNL 3015/20 SYS7HLTHCARE	REFERENCE
00T	ESP71M1RE	88403N SWPNL 3015/20 SYS7RESTAURNT	REFERENCE
00U	ESP71M1AE	88403N SWPNL 3015/20 SYS7ATHLETIC	REFERENCE
00V	ESP71M1SE	88403N SWPNL 3015/20 SYS7SHIRT LAN	REFERENCE
00W	ESP71M1CE	88403N SWPNL 3015/20 SYS7COMMERCIL	REFERENCE
00X	ESP71M1OE	89131N SWPNL 3015/20 SYS7OFFSHORE	REFERENCE
00Y	ESP71M1JE	89392N SWPNL 3015/20 SYS7CORRECTIN	REFERENCE
00Z	ESP71M1FE	90436N SWPNL 3015/20 SYS7FAIRFIELD	REFERENCE
001A	01 10531X	96143B NPLT 3015/22 M J-EP-PLUSISO	00Q
001B	01 10440	94297E GRAPHIC PANEL SYS 7 M4,5,6G	00R-00Z
001C	01 10457	94356E GRAPHIC PNL SYSTEM 7 COIN	OOP
002A	01 10441A	90436C GPX PNL SYS7 HOTEL-MOTEL PRG	00R,00Y
002B	01 10441B	90436# GPX PNL SYS7 HEALTHCARE PROG	00S
002C	01 10441C	90436# GPX PNL SYS7 RESAURANT-PROG	00T
002D	01 10441D	90436# GPX PNL SYS7 ATHLETIC-PROG	00U
002E	01 10441E	90436# GPX PNL SYS 7 SHIRT LNDY-PRG	00V
002F	01 10441F	90436# GPX PNL SYS 7 COMMERC-PROG	00W
002G	01 10441G	90436#GRAPHIC PNL OFFSHORE PROG	00X
002H	01 10441K	90436# GRAP.PNL FAIRFIELD INN PROG.	00Z
003A	01 10442A	91393C GPX PNL SYS 7 HOTEL-MOTEL	00R
003B	01 10442B	91393# GPX PNL SYS 7 HEALTHCARE	00S
003C	01 10442C	91393# GPX PNL SYS 7 RESTAURANTS	00T
003D	01 10442D	91393# GPX PNL SYS 7 ATHLETIC	00U
003E	01 10442E	91393# GPX PNL SYS 7 SHIRT LAUNDRY	00V
003F	01 10442F	91393# GPX PNL SYS 7 COMMERCIAL	00W
003G	01 10442G	91393#GRAPHIC PNL OFFSHORE	00X
003H	01 10442J	91393# GPX PNL SYS 7 CORRECTIONAL	00Y
003I	01 10442K	91393# GRAPHIC PNL FAIRFIELD INN	00Z
004	03 E5X34	92356D ENCL:SYSTEM 7 GRAPHIC PNLMTG	00Z
005A	03 BU413U	92356D+BRKT:M4,5,6J LCD FILTER-EP10	00Q
005B	03 BU4X13	92356C BRKT:SYSTEM 7 LED FILTER	00P,00R-00Z
006	27B175I	01Z SPACER PLASTIC1/4ODX.175IDX1/4	
007	27B17514SN	01Z SPACER .171IDX1/4ODX7/8LG NYLON	NOT USED ON 00P
		***** END OF PARTS LIST *****	

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

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**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.

# ABOUT THE COIN COUNTER

## Description

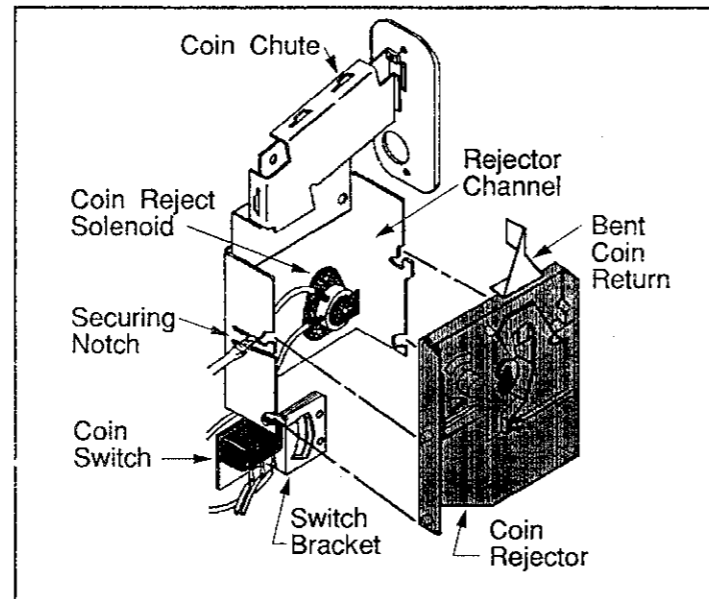
**NOTE:** Ensure that the machine is level for proper coin counter operation.

The coin counter can be adjusted to count from 1 to 63 coins without tools or extra parts (for further information see "HOW TO SET REQUIRED NUMBER OF COINS" in the "PROGRAMMING, OPERATING AND TROUBLESHOOTING" manual). A coin depressing the *coin switch actuator* (FIGURES 1 and 2) causes an input to the microprocessor. Operation begins when the microprocessor receives the correct number of inputs.

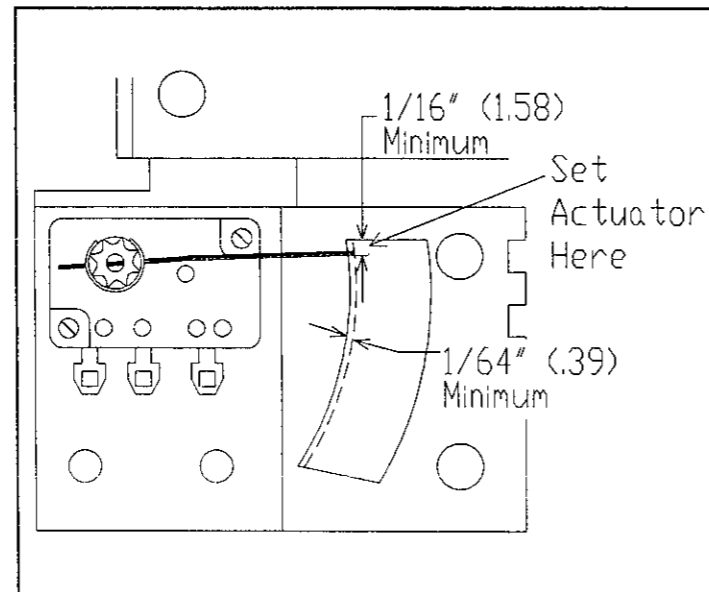
Each coin is analyzed as it passes through the coin counter. Valid coins are counted, invalid coins are automatically ejected or held in the rejector channel (the bent coin release returns the coin). The furnished U.S. coin rejector (foreign coin rejectors optional) accepts quarters only, smaller coins are rejected, and larger coins will not fit in the slot.

Four notches hold the coin rejector. One notch secures the coin rejector in place. To release the coin rejector, bend this notch slightly open with a screwdriver (see FIGURE 1). Position the bent coin release lever as shown. The coin rejector normally does not require any adjustment, but periodically wash the coin rejector in hot soapy water and remove metal filings from the coin reject solenoid.

Coins are accepted only when the coin return solenoid is energized (whenever the machine is idle with the power ON and the door closed). When de-energized (power OFF, door open, or machine operating) the coin reject solenoid inserts a pin in the coin path, automatically ejecting coins to the return slot. The solenoid momentarily de-energizes as each coin depresses the *coin switch actuator*, preventing uncounted coins. Any excess coins deposited (coins in excess of the proper amount) are rejected.



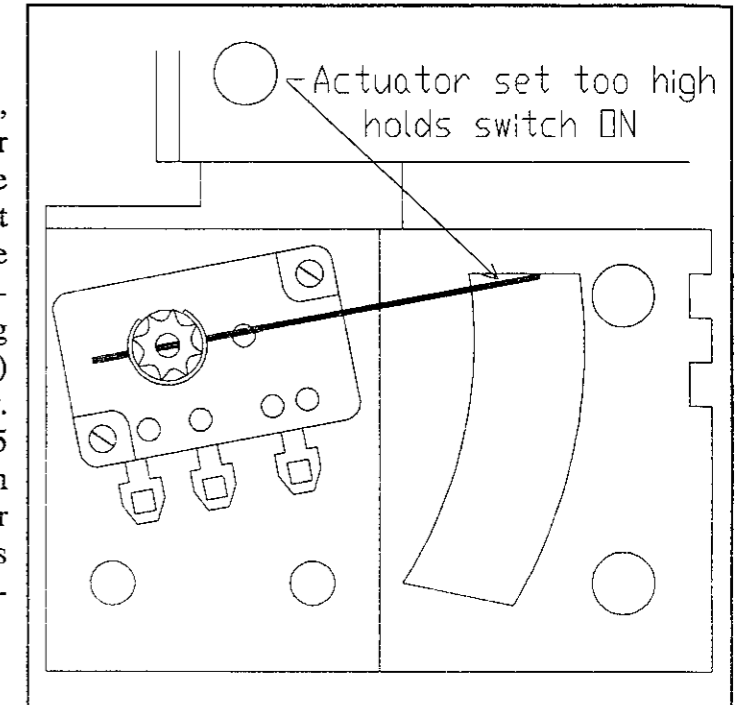
**FIGURE 1 (MSFD0501BE)**  
The Coin Counter



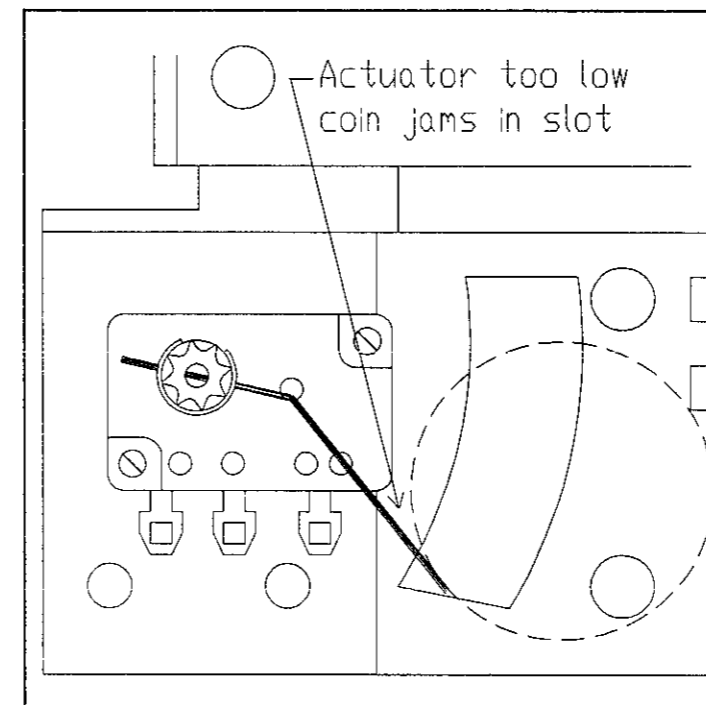
**FIGURE 2 (MSFD0501BE)**  
Correct Coin Switch Actuator Position

## Troubleshooting

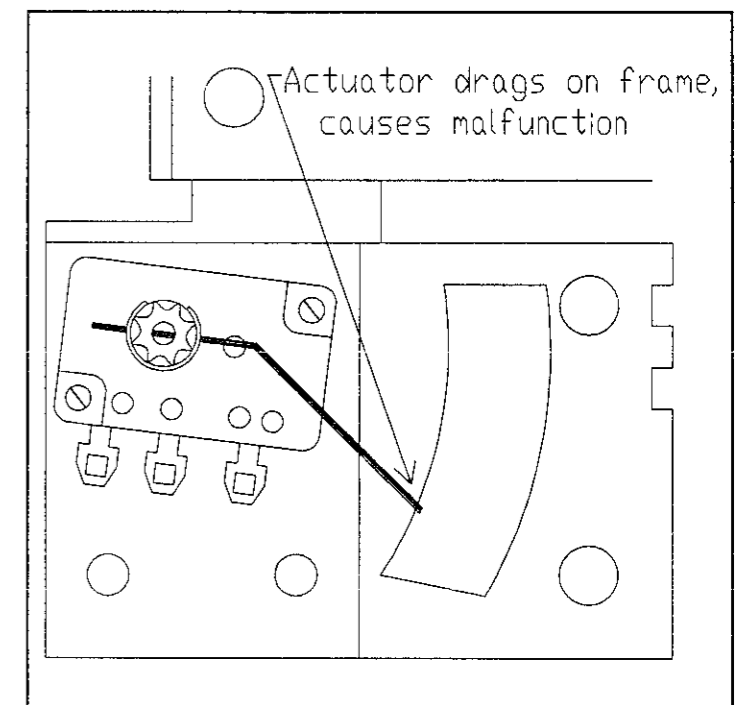
If the coin reject solenoid buzzes when energized, dirt is preventing it from seating fully. If the coin counter mechanism is rejecting all coins, the solenoid should be replaced. The *coin switch* is factory adjusted and does not require field adjustment. If miscounts occur, check the *coin switch* alignment (FIGURE 2). Ensure that the actuator is properly seated on the shaft before attempting alignment. Note the minimum 1/64 inch (.39 millimeter) clearance between the inside coin slot arc and the actuator. Set the *coin switch* to click OFF at least 1/16 inch (1.5 millimeter) before the actuator reaches the top of the coin slot arc. Bend the actuator slightly, if necessary, for proper adjustment. To reposition the switch, loosen both screws on the switch and move as necessary. Avoid all three conditions shown in FIGURES 3, 4, and 5.



**FIGURE 3 (MSFD0501BE)**  
Coin Switch Actuator Too High



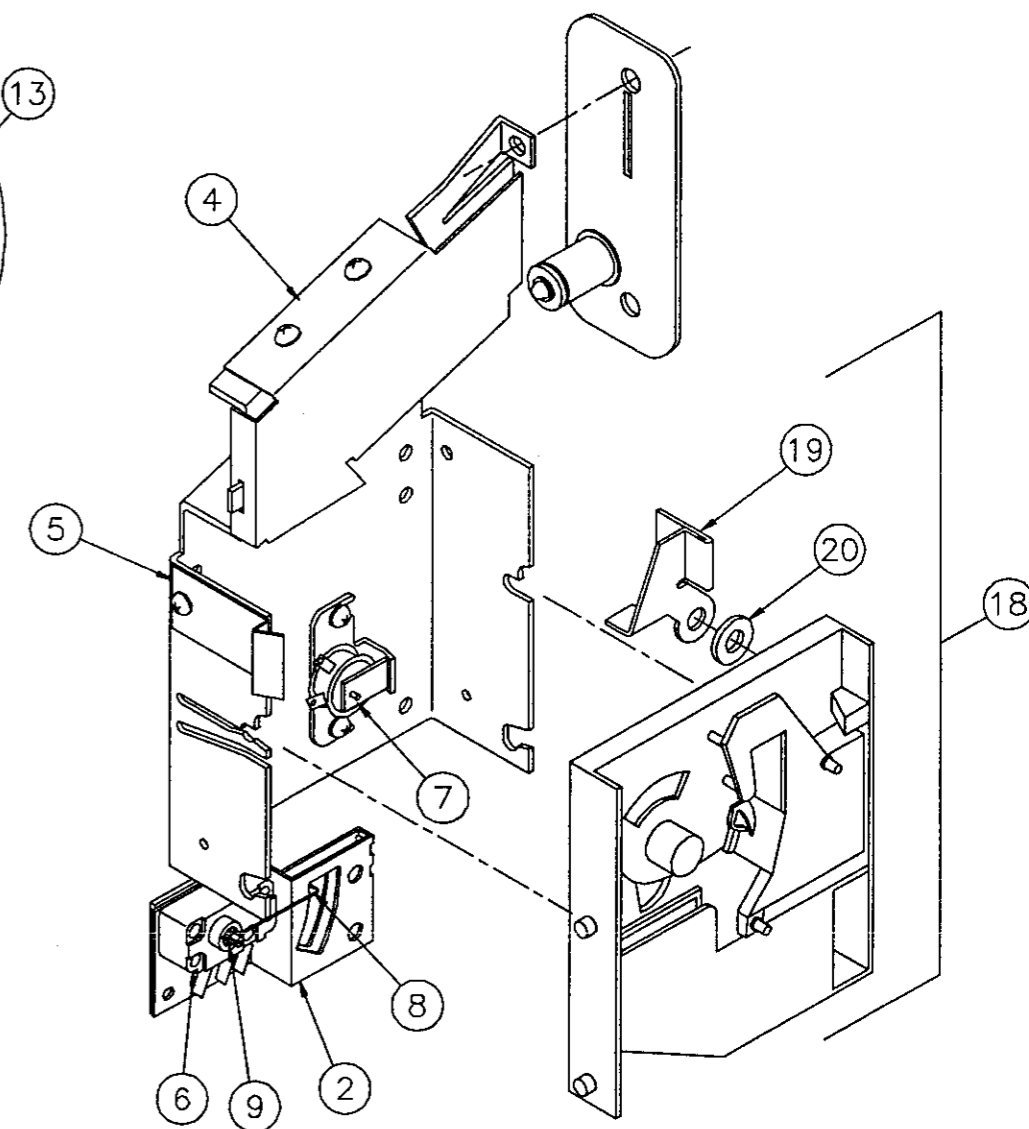
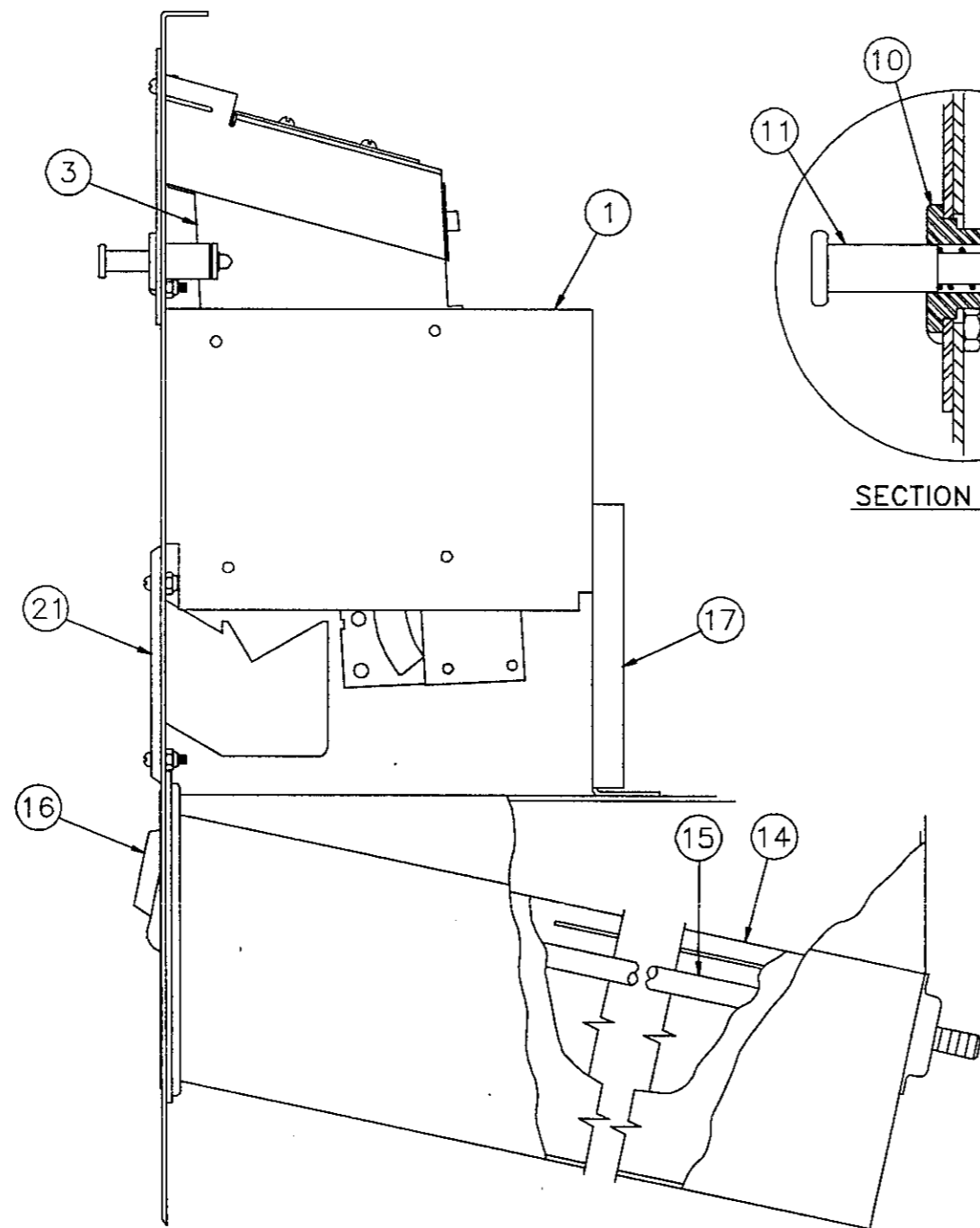
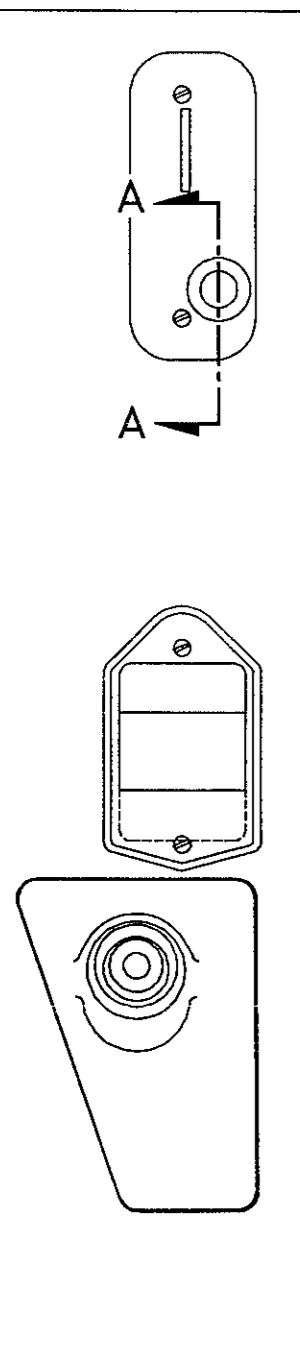
**FIGURE 4 (MSFD0501BE)**  
Coin Switch Actuator Too Low



**FIGURE 5 (MSFD0501BE)**  
Coin Switch Dragging Frame

DRAWING  
(See other page for parts list,  
if applicable.)

**COIN ASSEMBLY INSTALLATION-240V**  
**30015, 30020 & 30022 COIN MACHINES**



REAR ISOMETRIC VIEW OF ASSEMBLIES  
38C062M AND ACM33001A

(ITEM 1 NOT SHOWN IN THIS VIEW FOR CLARITY)

**PARTS LIST**

(See other page for drawing.)

**COIN ASSEMBLY INSTALLATION-240V  
30015, 30020 & 30022 COIN MACHINES**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	GCM33001A	90281Z COIN ASSY INSTALL 240V	REFERENCE INSTALLATION COIN MACHINES
00B	ACM33001A	90281Z*COIN ASSY 240V	CONTAINS ITEMS 1-9
00C	38C062M	91237B*COIN INSERT ASSEMBLY US25	CONTAINS ITEMS 10-13
00D	A33 08500	85443C COIN BOX ASSY-13.5"LONG	CONTAINS ITEMS 14-16
00E	SA 33 068	84507B\$ COINREJECTOR ASS=NEW CAN.25	CONTAINS ITEMS 18B,19-20
001	02 03761	90012C COIN REJECTOR BRKT SUPT 3621	
002	03 01472	76457B BRACKET=COIN SW ACTUATOR	
003	03 01473B	89293D BRKT=COIN REJECTOR MTG SLIM	
004	02 03348B	85324C GUIDE=COINCHUTE-CAD SLIME	
005	02 03759	85324B CLIP FOR COIN REJECTOR	
006	38C058	02Z ROTARY COIN SW CHERRY #E51-98R	
007	38C071	03Z ELECMAGNT 240V60C #CR15-1100F	
008	38C056	75729C WIRE=ROTARY SW-US.25 COIN	
009	17B002	EXT.RET RING 6100-12-ST-PA	
010	38C062J	85324B PLATE+SCAVENGING P/N ASSY	
011	38C062A	78342B SCAVENGING PIN	
012	38C062D	78342B SCAVENGING PIN SPRING	
013	17B005	EXTRETRING IND#1000-X18-ST-ZD ZINC	
014	W2 03654	89527C* BOX=13.5"X12DEG=COIN WELD	
015	38C152A	10Z LOCK+2KEY CONSEC NO.15+1/8"LG	
016	02 03426	86503A WASHER-LOCK PROTECT-CHROME	
017	02 03761A	91047C REAR SUPT=COIN REJECTOR BKT	
018A	38C050AMET	METAL COIN ACCEPTOR 25J (COIN-MECH)	CONTAINS ITEMS 19-20
018B	38C049A	REJECTOR NEW CANADA 25J SEE SA33-68	OPT CANADIAN COIN REJECT
019	02 03302A	87211B INSERT CRANK =SLIMLINE	
020	02 03361	68020A CRANKWASHER CADPLATE	
021	X2 03363	87262A COIN RETURN RECEPTACLE ***** END OF PARTS LIST *****	

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

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## VIBRATION SAFETY SWITCH ADJUSTMENTS

The *vibration safety switch* pictured below is an important safety feature. If properly adjusted, the switch will momentarily actuate as a result of repeated machine movement caused by an out-of-balance condition. Table A below illustrates the effect of the *vibration safety switch* on Milnor<sup>®</sup> machine models.

**Table A—Effect of Tripping Vibration Safety Switch**

Machine Model	Function of Vibration Safety Switch
30015, 30020, and 30022	Disables high speed extract
All microprocessor-controlled washer-extractors not listed above, and all dye machines	De-energizes three-wire relay, effectively terminating machine operation

### Adjustments

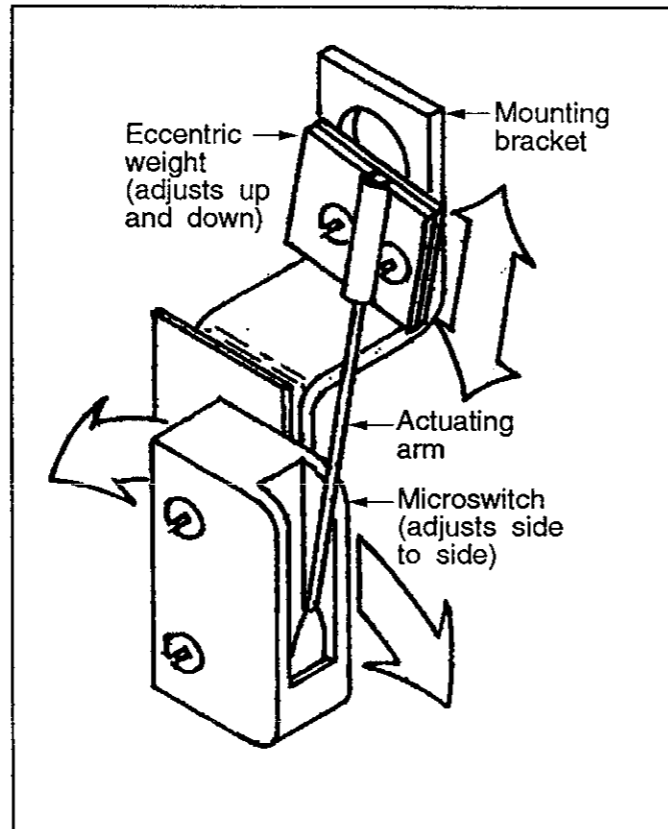
When the machine leaves Milnor<sup>®</sup>, the actuator arm is tie-wrapped to prevent damage (except on 30015, 30020, and 30022 models). **This tie wrap must be removed after the machine is set into position but before the machine is operated.**

Adjustment of this switch from the factory setting is not recommended; however, it should be checked for proper functioning and adjusted if its proper setting is lost.

As shown at right in FIGURE 1, the unit consists of a *sensitive micro-switch* with an extended actuating arm supporting an eccentric weight. The weight may be adjusted by moving it up and down on the arm and by rotating it on the arm. In addition, the *micro-switch* itself may be tilted from side to side.

**The sensitivity of the switch increases as the eccentric-weight is raised on the actuating arm and decreases as the weight is lowered.**

The unit should be adjusted so that the actuating arm will always reset by itself, this being accomplished by rotating either the switch or the weight to give just enough bias to cause the switch to reset. Check the adjustment by moving the arm to the left then slowly releasing it. Make sure the micro-switch clicks when the arm is slowly released, thus indicating that it has reset. In the released position the arm should rest lightly but definitely against the stop on the *micro-switch* case that prevents any further arm movement to the left.



**FIGURE 1 (MSSMA408BE)  
Vibration Safety Switch**

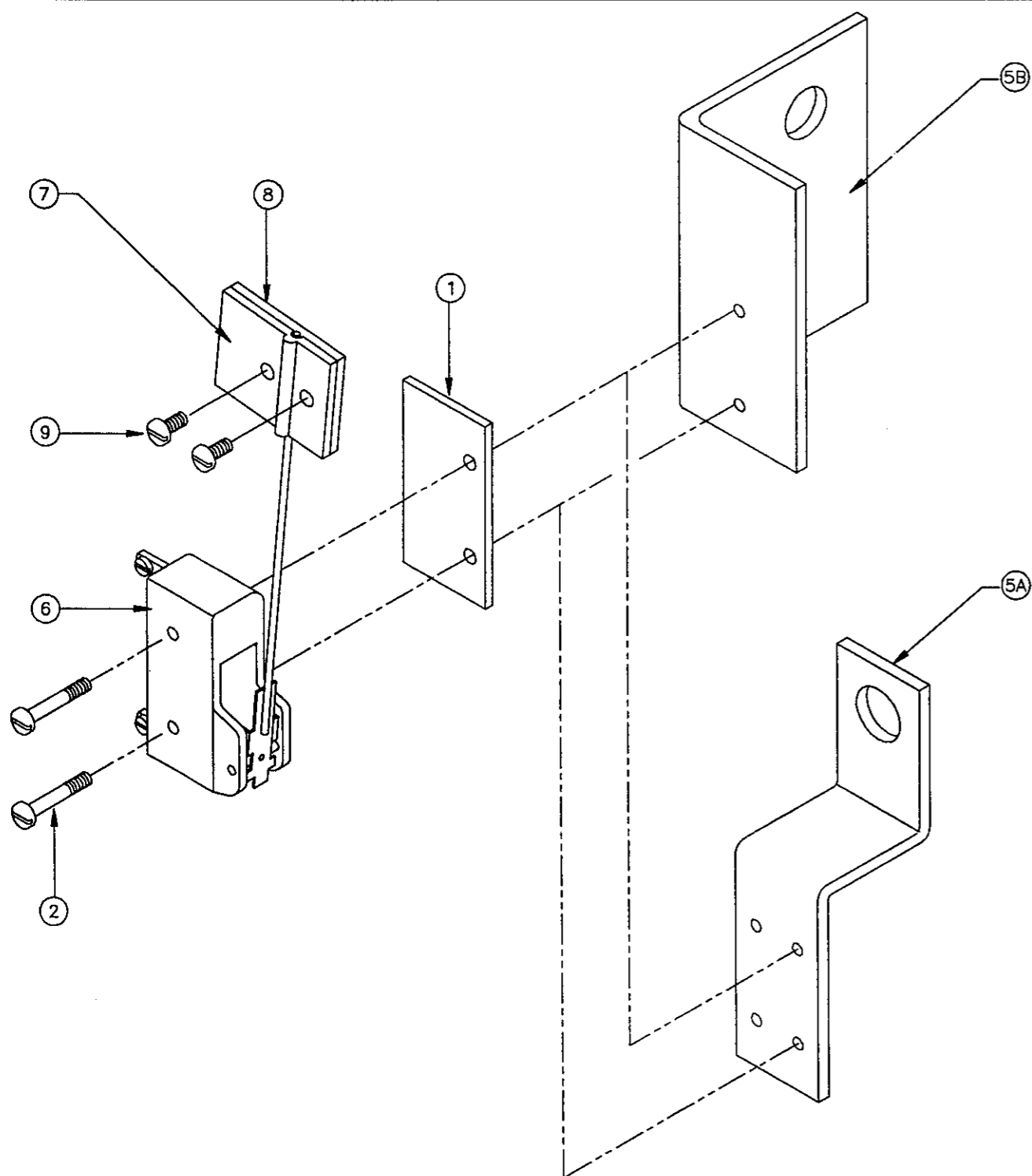
For machines with rigid mounted shells, where the machine is bolted to a very substantial foundation, very little machine movement will occur for a given degree of out-of-balance. Under such conditions it may be better to adjust the switch to be very sensitive. With less substantial foundations (e.g., ones where the sub-soil is mushy or springy or otherwise not as desirable), considerably greater machine movement will occur for a given degree of out-of-balance, in which case a less sensitive *vibration switch* setting may be indicated.

**DRAWING AND PARTS LIST**

(See other page for more, if applicable.)

**VIBRATION SAFETY SWITCH**

**BMP910038/92343V (Page 1)**



ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	SAE03 151	80142B\$ ASSY-VIBRATION SWT=LG CONTR	CONTAINS 001,002,005A-009
00B	SAE03 151A	80142B\$ASSY-VIBRATION SWT=BALCOM	CONTAINS 001,002,005B-009
001	02 02038	85482A PLATE INSULATING SMALL9NOV51	
002	15P008	02Z TRDCUT PANHD 6-32X1 NIKSTL +WAX	
005A	02 15119	BRACKET = VIBRATION SWITCH	00A
005B	02 10264	BRACKET=SAFESW CAD	00B
006	09R020	04Z SWITCH NC VIBR #WZ-2RW84429-P52	
007	03 01059	91046A VIBSWITCH CLAMP CADSTL	
008	03 01058	89417A VIBSWITCH WEIGHT-CADSTL	
009	15P101	04Z TRDCUT-F PANHD 8-32X3/8 NIKSTL	
***** END OF PARTS LIST *****			

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

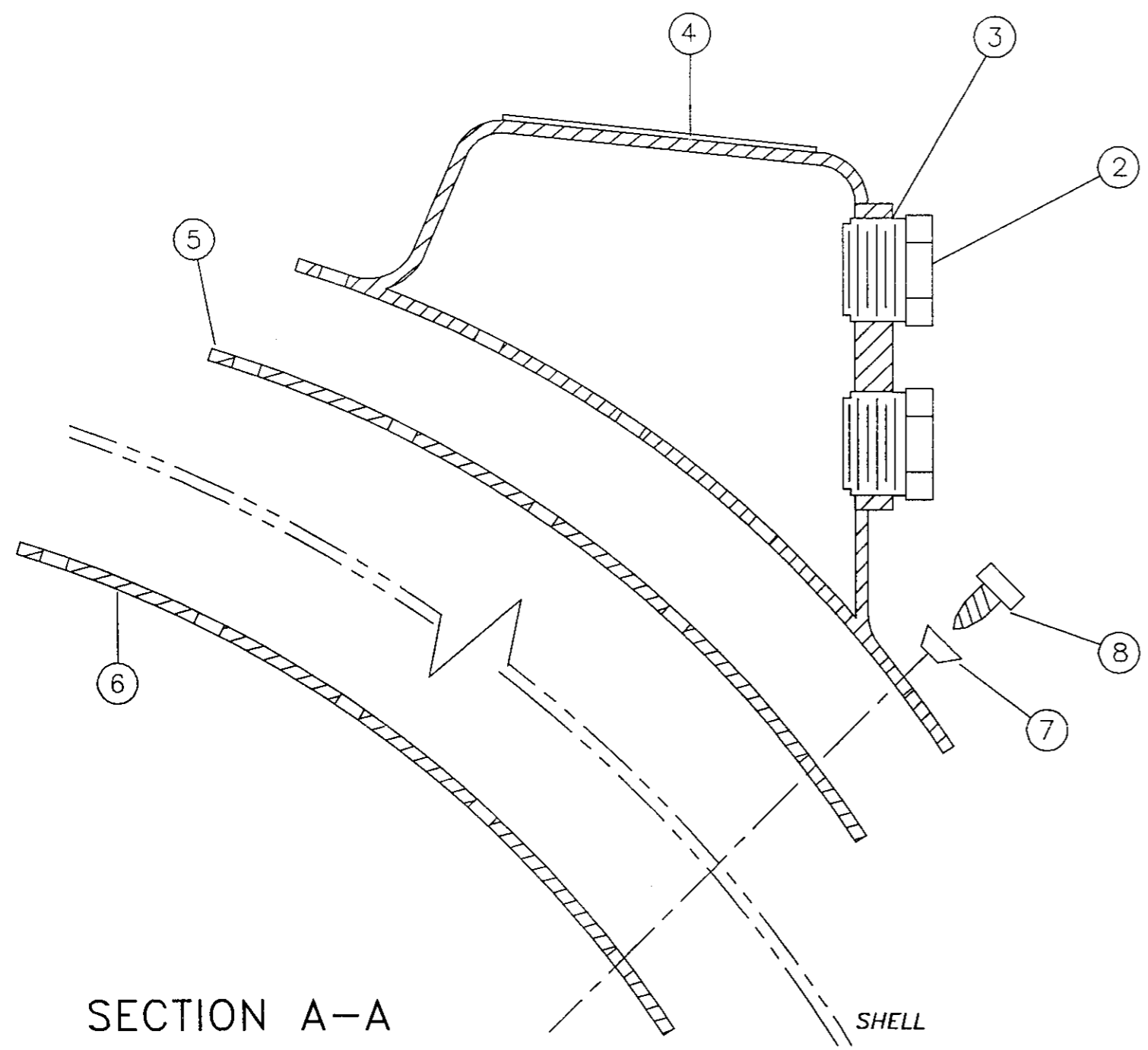
1. The part number for the entire assembly depicted in the drawing or a major sub-assembly thereof, and/or
2. The range of machine models this drawing applies to.

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**DRAWING**  
(See other page for parts list,  
if applicable.)

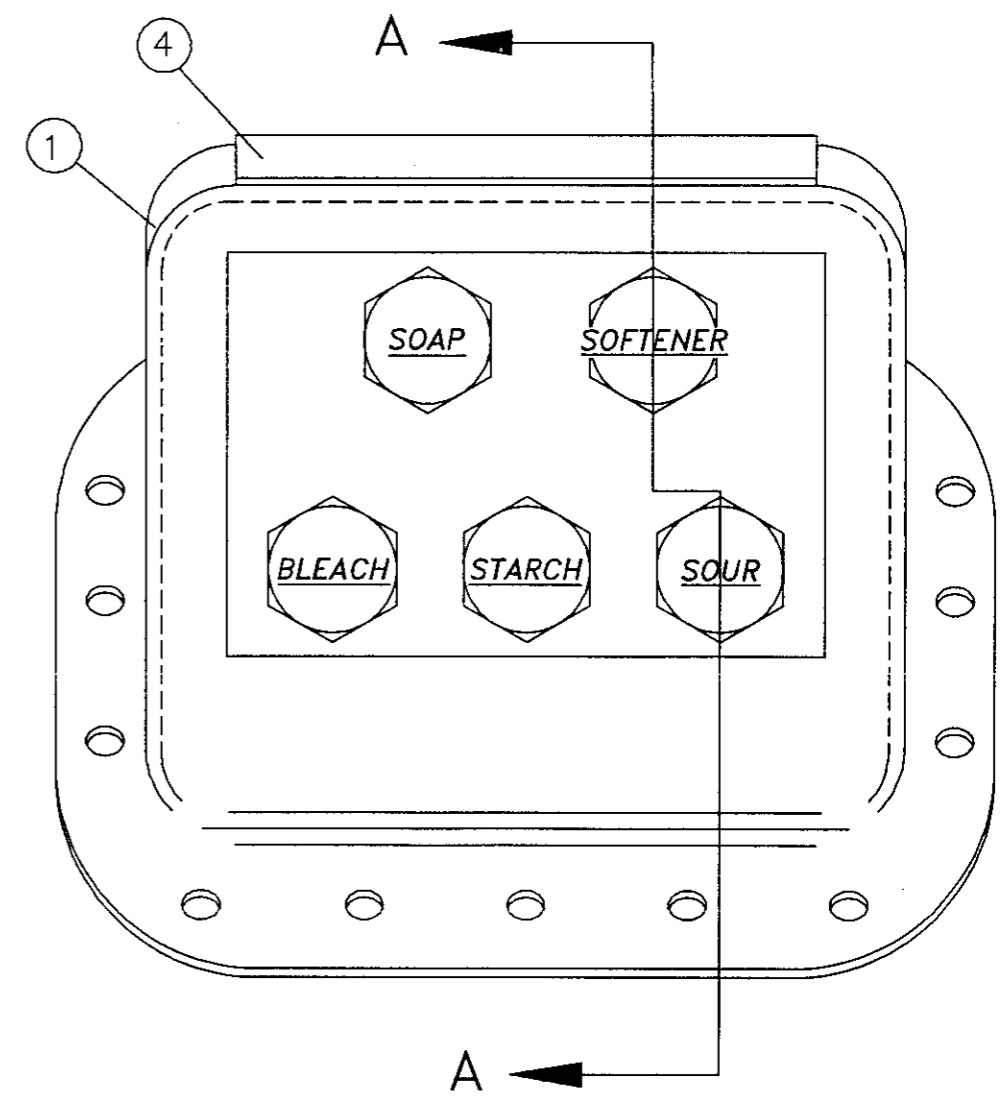
### LIQUID SUPPLY INLET SIDE MOUNT



FOR INFORMATION ON :

- 1) HOW PUMPED CHEMICAL SYSTEMS CAN INTERNALLY DAMAGE THE WASHER EXTRACTOR
- 2) LOCATING CHEMICAL SYSTEM COMPONENTS TO REDUCE THE RISK OF INTERNAL DAMAGE
- 3) PREVENTING LEAKS WHICH CAN INJURE PERSONNEL AND CAUSE EXTERNAL DAMAGE

SEE INSTRUCTION "B2TAG86033" ON MACHINE.



**PARTS LIST**

(See other page for drawing.)

**LIQUID SUPPLY INLET SIDE MOUNT**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	SA 33 058K	94091D ASSY=SH MNT PERSTL SDINLT HS	REFERENCE ASSEMBLY
001	W2 03589Y	94121D*WLMT=SH MT PERSTL NPT SDINLT	
002	5SP0KXFHS	01Z HEX HEAD PIPE PLUG 1/2"	
003	20C040	SIL SEAL RTV BLACK 85GR #59330	
004	B2TAG89067	94146V SYS7 CHEM INJ INST & LOC	
005	02 03304A	90493C GASKET=SOAP CHUTE 1/8"EPDM	
006	02 03589J	89183C TAP PLATE=PERISTALTIC SUPPLY	
007	24G018N	ROLLED WASHER .194"ID NYLTITE #10W	
008	15P010	12Z PHILPAN TRDCUTSCRTP10-24X1/2SS	
***** END OF PARTS LIST *****			

**How to Read Parts List**

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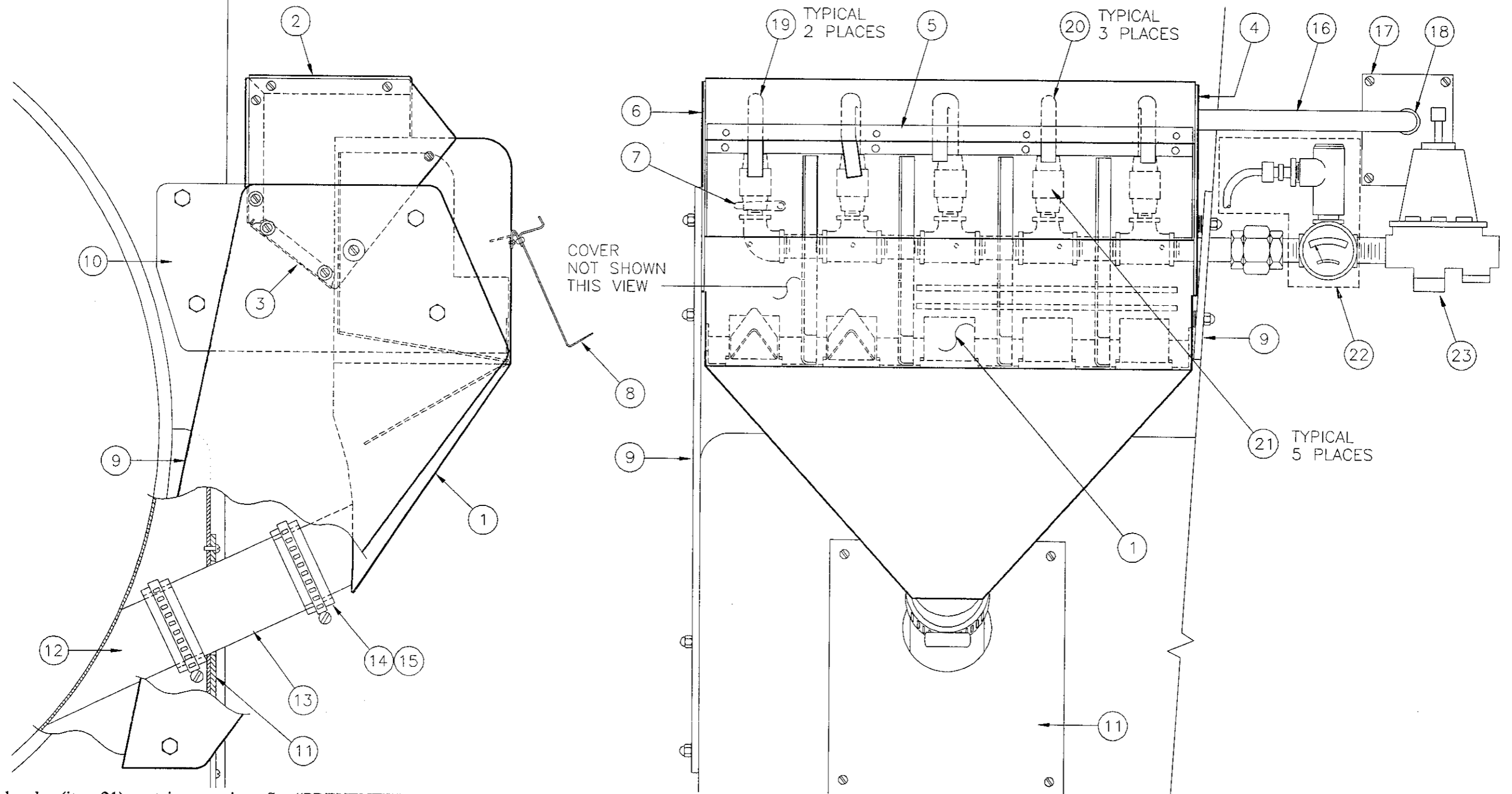
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**DRAWING**  
(See other page for parts list,  
if applicable.)

**SUPPLY INJECTOR AND INSTALLATION**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**



**NOTE:** Each valve (item 21) contains a strainer. See "PREVENTIVE MAINTENANCE" in the Table of Contents for cleaning schedule.

**PARTS LIST**

(See other page for drawing.)

**SUPPLY INJECTOR AND INSTALLATION  
30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	AD 33 027C	85032#*SUPPLY INJECT INSTALL C46P	INSTALLATION PARTS 30015
00B	AD 33 027B	85032#* SUPPLY INJECTOR INSTAL C5P	INSTALLATION PARTS 30020 & 30022
00C	SA 33 059A	85032J*SUPPLY ASSY=C6P+C5P+C4P	MAJOR ASSEMBLY
00D	SA 02 039D	91017# PIPING/5FLSHSUP=30"UNI(240V)	PART OF 00C(SEE 19,20,21)
00E	AVW33001	81482B\$PRESSGUAGE+REGULATOR ASSY CM	PART OF 00C(SEE 22,23)
001	W2 03611	75392D* SUP-CHUTE 5-FLUSH=30"C456M	00C (WELDMENT)
002	02 02646	87261C ENCLOSURE=VALVE SUP INJ.	00C
003	02 02664	87522C ENCLOSURE=VALVE-LOWER SIDE	00C
004	02 02648	ENCLOSURE-REAR=SUPPLY INJECTOR	00C
005	02 02701	87286B BAFFLE-CONDENSATION=SUPINJ	00C
006	02 02647	ENCLOSURE-FRONT=SUPPLY INJECTOR	00C
007	27A017	1/2"PIPESTRAP 1HOLE R.COND TB#1276	00C
008	SA 02 066	70297B*COVER ASSY=SUPPINJ	00C
009	02 03617	89406D PLATE=SUPPINJ MT-FRONT	00A,00B
010	02 03613	77361C PLATE-REAR MOUNT-SUPPINJ-CWM	00A,00B
011	02 03612	92202B PLATE=COVER SUPINJ CWM	00A,00B
012	02 03615	78073A TUBE=2+1/2ODX062S/S 5"LG	00A,00B(WELDED TO CYL.)
013	02 15773	86356B PINCHVALVE TUBE-HYPALON	00A,00B
014	02 03427	83197A DRAIN SUMP CLAMP PAD	00A,00B
015	27A082	HOSECLAMP,2+9/16-3.5" CADSCR HS-48	00A,00B
016A	03 CL2X2	85027C 1/2 CONDUIT=90DEG 1.62X1.75	00A
016B	03 CL2X5	85027# 1/2 CONDUIT 5X1.75	00B
017	03 01471	87371B PLATE=ADAPT TO 3/8 OR 1/2FIT	00A,00B
018	12K040	1/2" COND.EMT CONDUIT PECO #260B	00A,00B
019	02 02730	75832A NIPPLE=SUP INJ 215DEG	00D
020	02 02703	70089A NIPPLE=SUPINJ 180DEG	00D
021	96P011A71	07Z 1/4" 2 WAY 240V60 220V50	00D
022	SA 14 039	75627B\$ PRESSGAGE,FLUSHSUP 30+36	00E
023	96J030D	1/2" PRESREGULTR SET 28# FEM-UNION ***** END OF PARTS LIST *****	00E

**How to Read Parts List**

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# 3 Compartment Supply Injector

30015, 30020 & 30022 Rigid Mount Washer Extractors

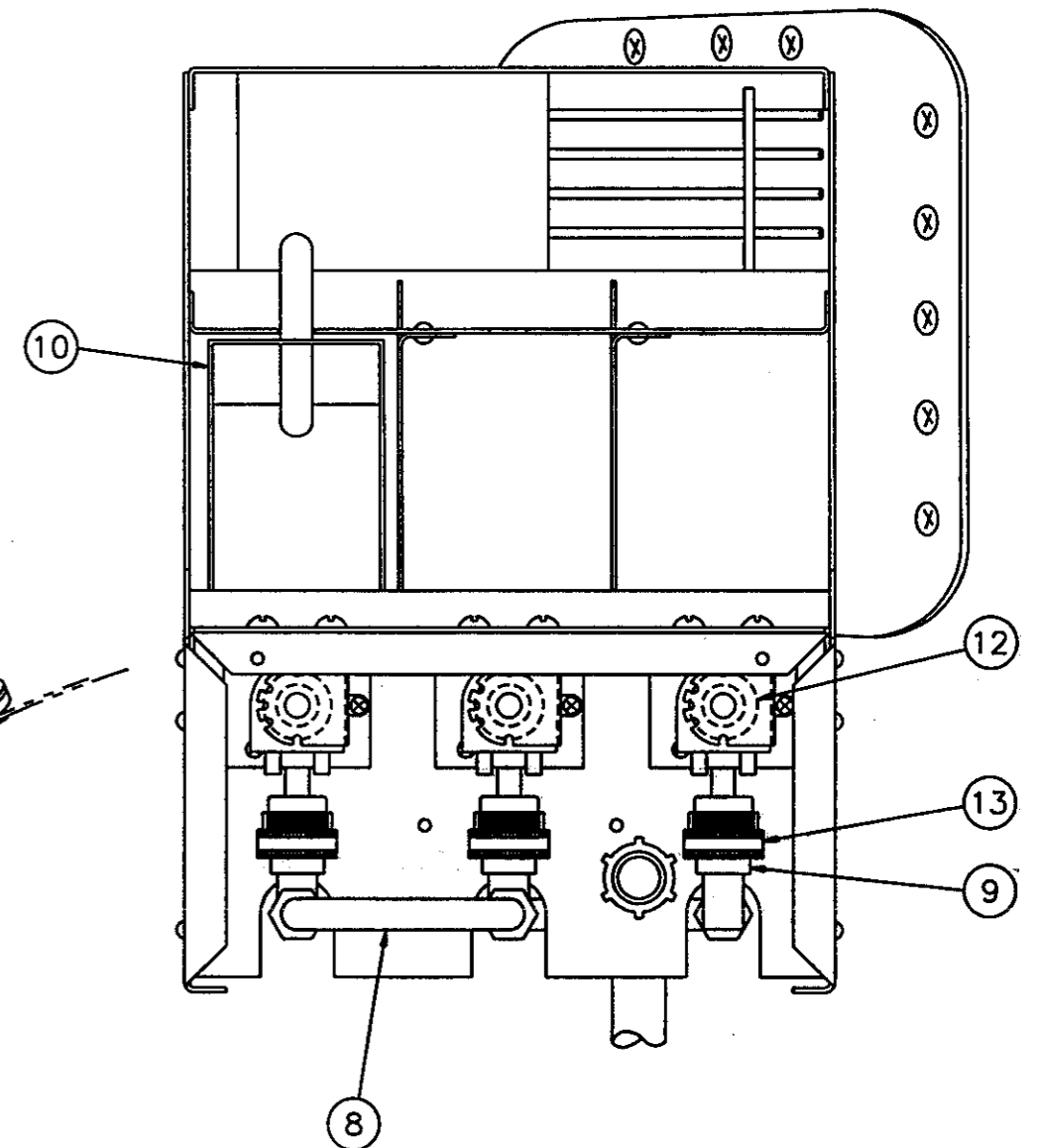
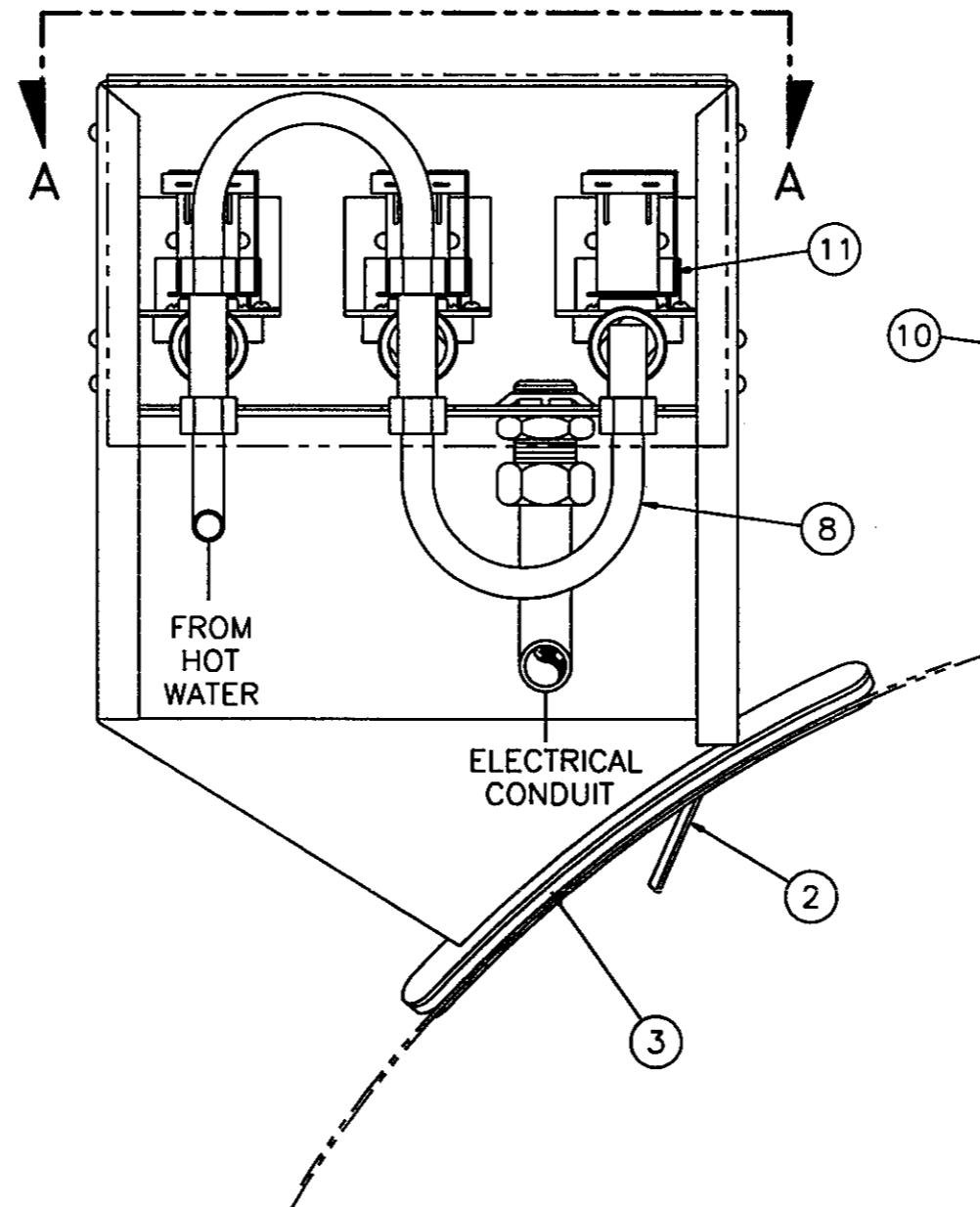
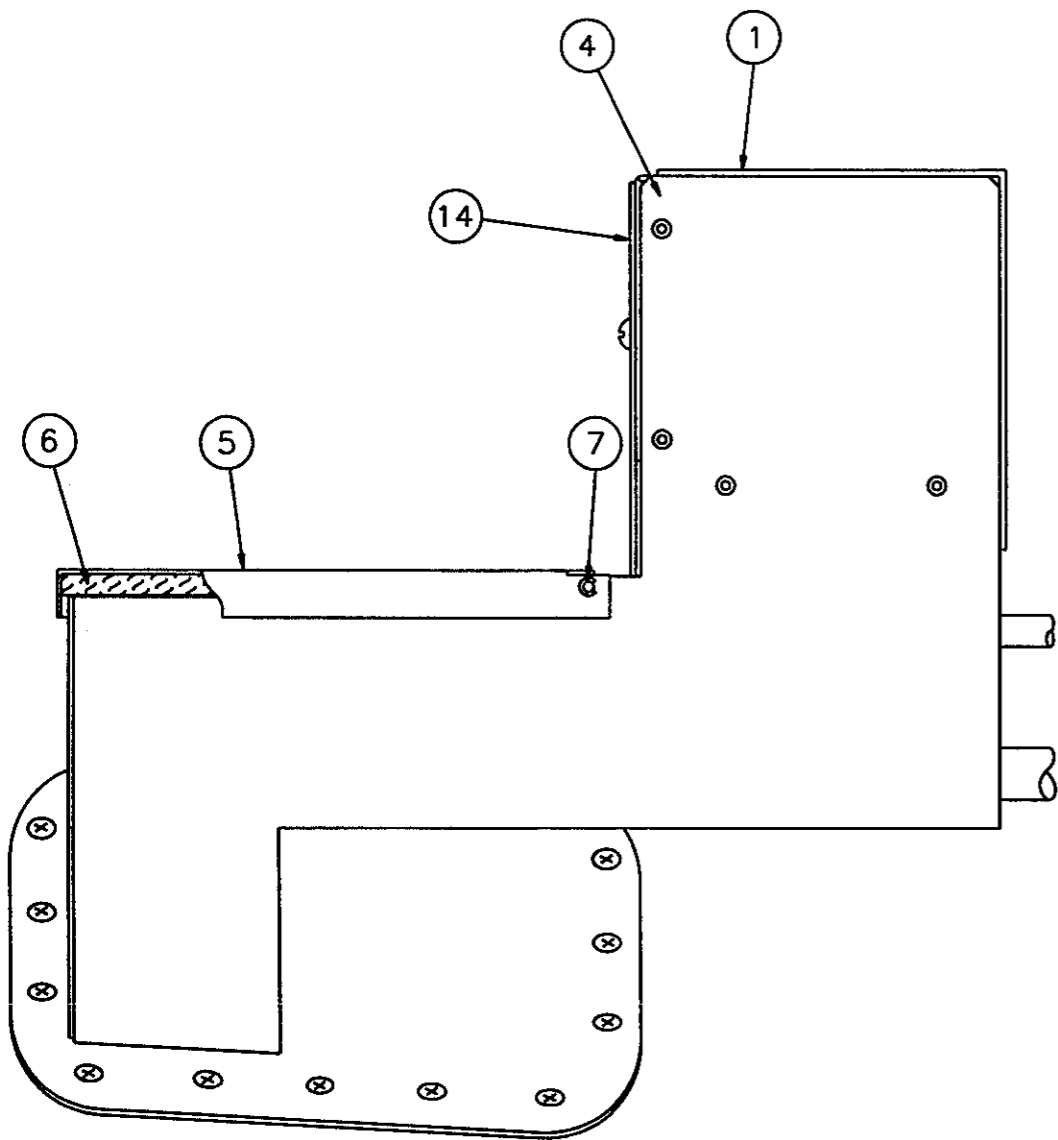
BMP770149/96113V  
(Sheet 1 of 2)



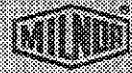
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BMP770149/96113V (1 of 2)

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**VIEW "A-A"**  
ITEMS 1, 5-7 LEFT OFF  
THIS VIEW FOR CLARITY



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**Parts List—3 Compartment Supply Injector**

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

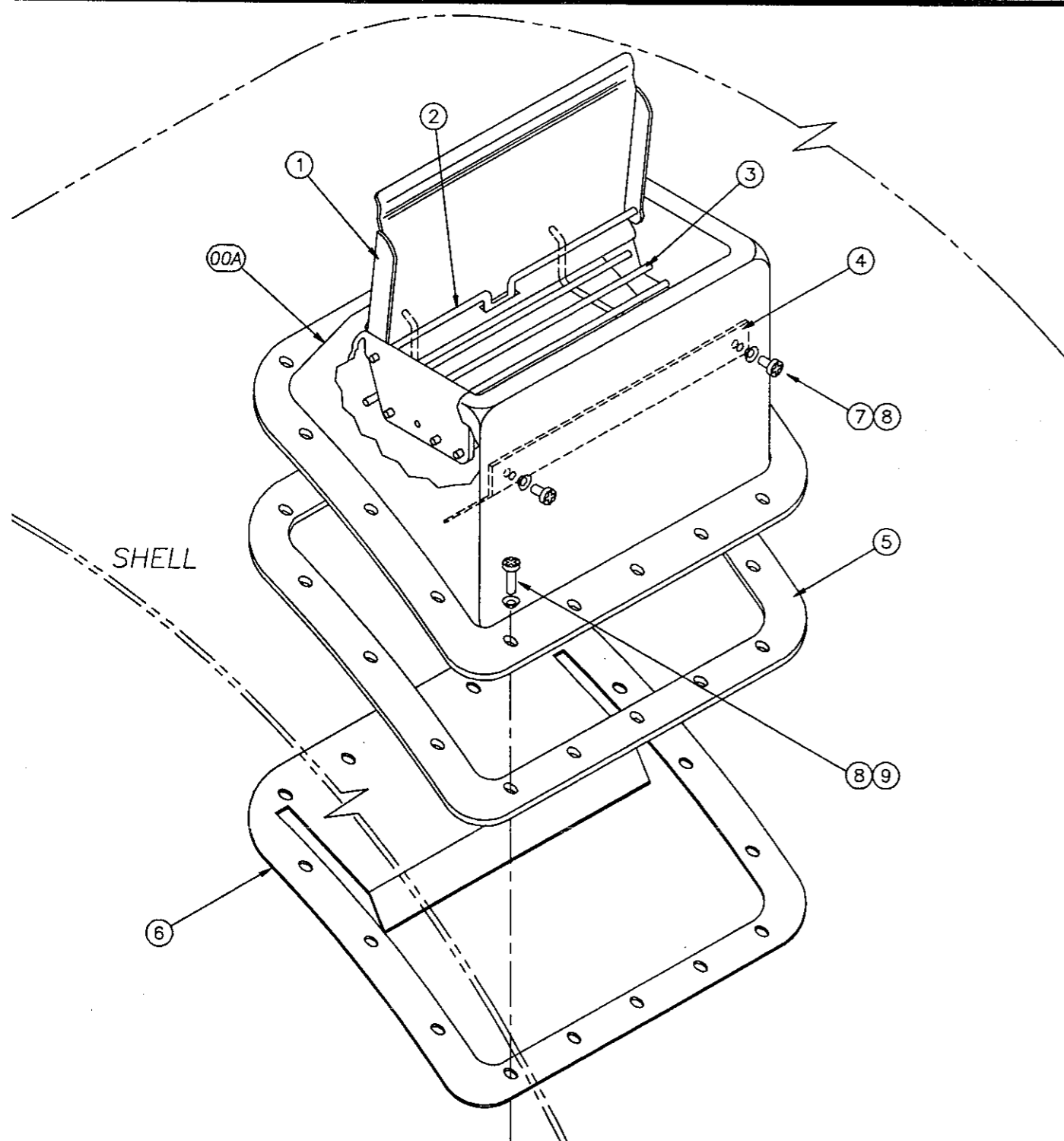
Used In	Item	Part Number	Description	Comments
-----ASSEMBLIES-----				
	A	GWS33001B	89241@ INSTALL 4SUP INJ SYSTEM 7	CONTAINS ITEMS 4-13
	B	AWS33001B	89241D*ASSY=3FLUSH SUP INJ SYSTEM 7	
-----COMPONENTS-----				
all	1	02 03732B	94031B COVER 4 COMP SUPPLY VALVES	
all	2	02 03732F	90346C TAPPED PLATE=SUPPLY MOUNT	
all	3	02 03304A	94493C GASKET=SOAP CHUTE 1/8"EPDM	
all	4	W2 03732	93102D* SUPPLY INJECTOR 4 COMP SUPP	
all	5	02 03732G	87501C LID=4 COMPARTMENT SUPPLY	
all	6	02 03732U	78302B GASKET=LID 4 COMP SUPPLY	
all	7	02 03732S	78132B HINGE PIN=LID 4 COMP SUPPLY	
all	8	02 03732T	77411B TUBE COPPER-VALVE CONN. 3/8	
all	9	02 03732Z	83446B ADAPTER HOSE THD 3/4"X1/4 NPT	
all	10	W2 03732A	93303B* SUPPLY CUP WLMT 4 COMP SUPP	
all	11	96P013B71	04Z 3/4" 2WAY PLASTIC VALVE 240V60C	
all	12	60C007	RUBGROM #2861 1/2ID-13/16X1/8PNL MT	
all	13	53A060H	KNURLED HOSE NUT 3/4-HOSE PH#94GH-12	
all	14	01 10438X	95072B NPLT:3POCK SUPPLY SYSTEM7ISO	SYS 7 - HOTEL
all	14	01 10438Y	95072B NPLT:3POCK SUPPLY EP-PLUSISO	EP PLUS
all	14	01 10438L	92343C NPLT:M4A 3 COMPARTMENT SUPPY	M4A

**DRAWING AND PARTS LIST**

(See other page for more, if applicable.)

**SOAP CHUTE + INSTALLATION**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

**BMP920013/93251V (Page 7)**



ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	SA 33 058	81343C SOAPCHUTE-STAINLESS STEEL	ASSEMBLY
001	02 03593	LID=SOAPCHUTE=CWU(STAINLESS STEEL)	PART OF 00A
002	02 03595	90193A PIN SOAP CHUTE HINGE=CWU	PART OF 00A
003	02 03594	70109B GUARD SOAP CHUTE=CWU	PART OF 00A
004	02 03630A	90452B SPLASH GUARD= SOAP CHUTE	PART OF 00A
005	02 03304A	90493C GASKET=SOAP CHUTE 1/8"EPDM	
006	02 03732F	90346C TAPPED PLATE=SUPPLY MOUNT	
007	15P050AB	02Z TRDFRM-AB PANHD10-16X3/4 SS 410	PART OF 00A
008	24G018N	ROLLED WASHER .194"ID NYLTITE #10W	
009	15P010AB	01Z TRDFRM-AB PANHD10-16X1/2 SS410	
		***** END OF PARTS LIST *****	

**How to Read Parts List**

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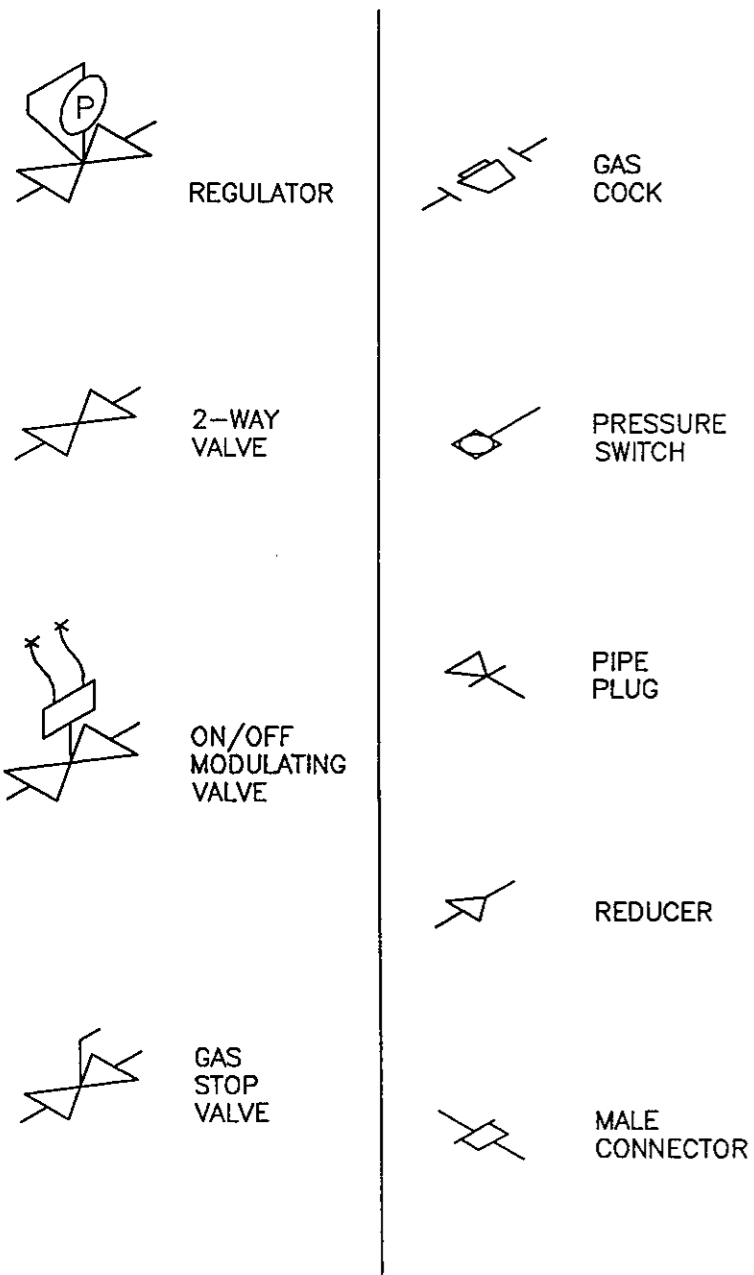


**DRAWING**  
 (See other page for parts list,  
 if applicable.)

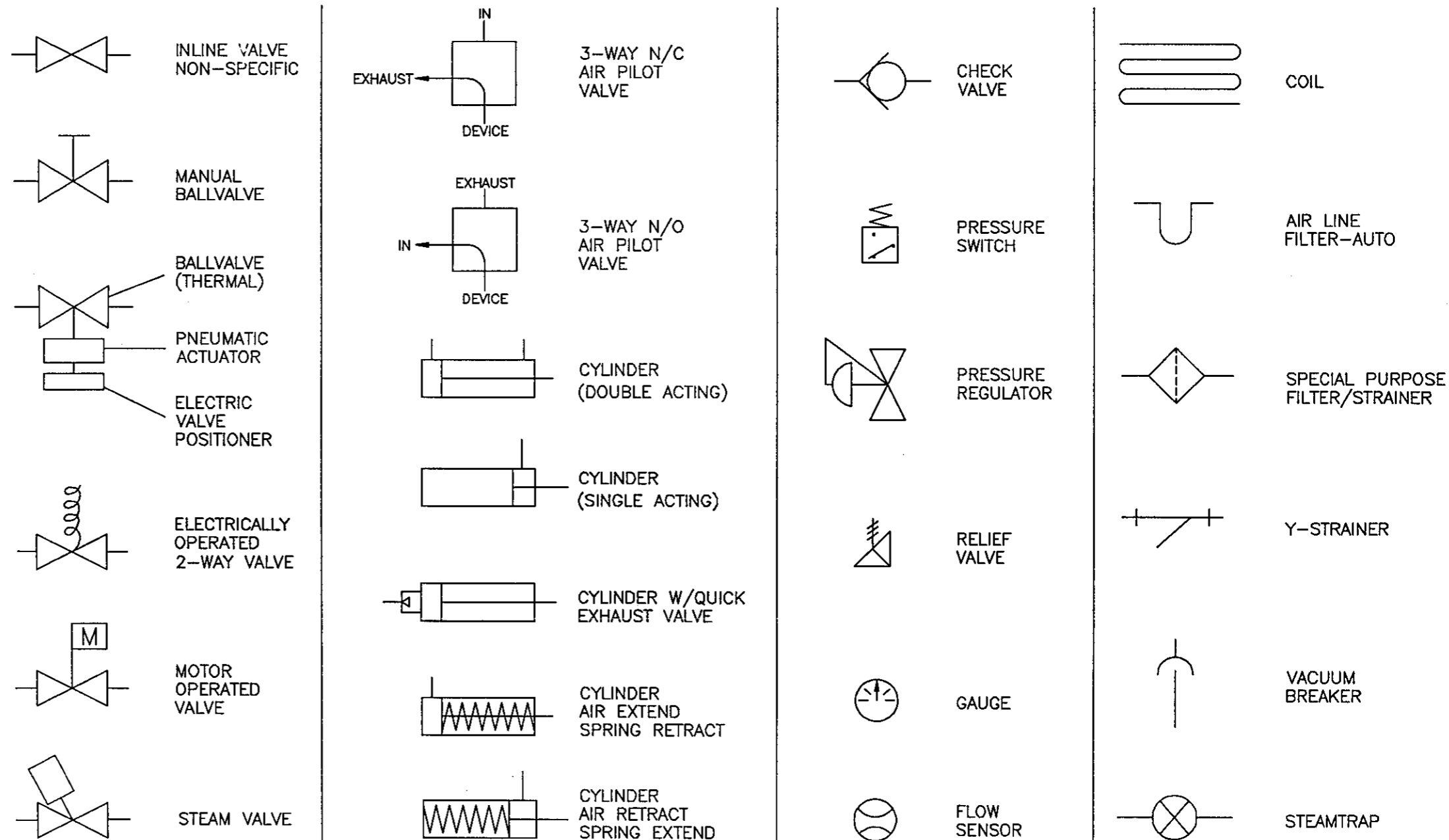
**SCHEMATIC SYMBOLS KEY**

**BMP920008/93027V (Page 1)**

**ISOMETRIC SYMBOLS**



**STANDARD SYMBOLS**

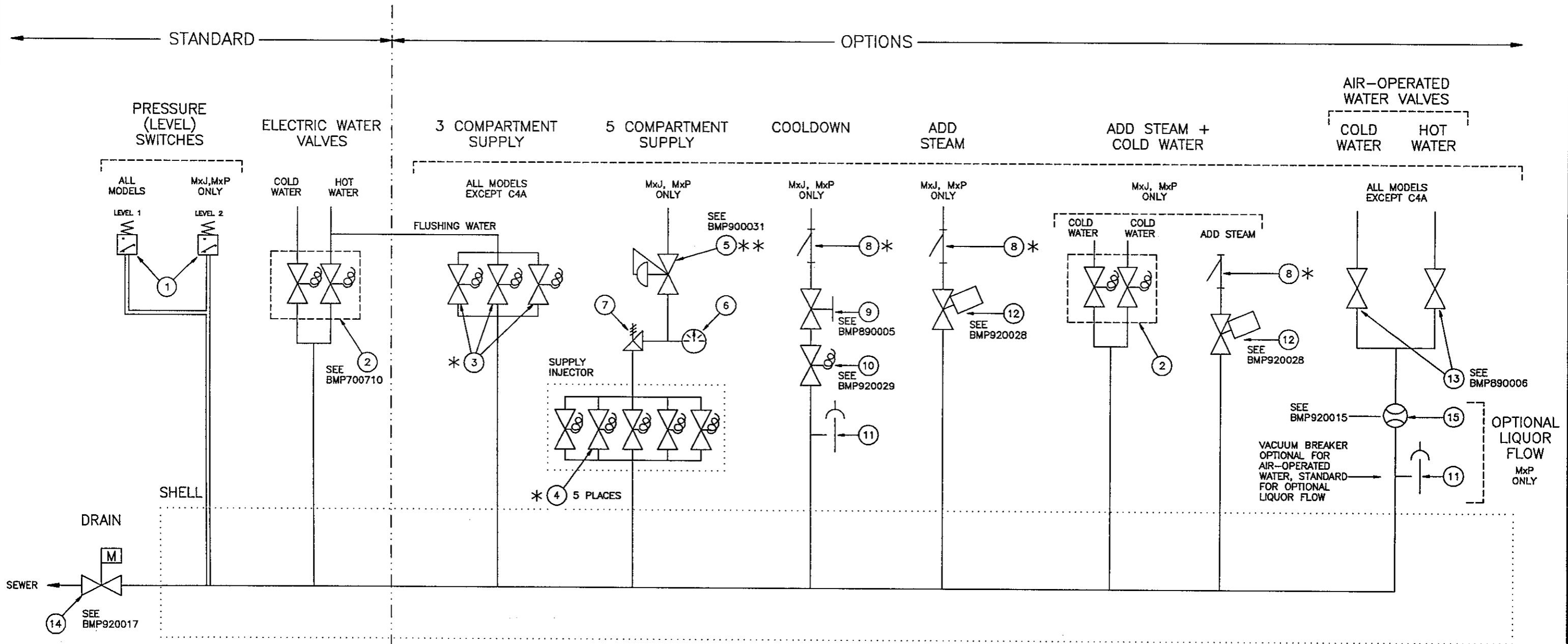




DRAWING  
 (See other page for parts list,  
 if applicable.)

**WATER / STEAM / DRAIN SCHEMATICS**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920015/96132V (Page 1)



\* - STRAINER MUST BE CLEANED, SEE "PREVENTIVE MAINTENANCE" IN THE TABLE OF CONTENTS.  
 \*\* - PRESSURE REGULATOR MUST REMAIN SET AT THE FACTORY SETTING OF 28 P.S.I. SEE BMP900031 FOR MAINTENANCE PROCEDURES.



PARTS LIST

(See other page for drawing.)

**WATER / STEAM / DRAIN SCHEMATICS**  
**30015,30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920015/96132V (Page 2)

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	AD 33 011D	92426# FILL TUBE & DRAIN ASSY 240V	REFERENCE-STANDARD ALL
00B	AWS33001B	89241D*ASSY=3FLUSH SUP INJ SYSTEM 7	REFERENCE-3 FLUSH SUPPLY
00C	SA 02 039D	91017# PIPING/5FLSHSUP=30"UNI(240V)	REFERENCE-5 FLUSH SUPPLY
00D	AVW33001	81482B*PRESSGUAGE+REGULATOR ASSY CM	REFERENCE-5 FLUSH SUPPLY
00E	SA 14 039	75627B* PRESSGAGE,FLUSHSUP 30+36	00D(CONTAINS 006&007)
00F	SA 33 054A	91107B*INLET ASSY=CLDN M4567J/P CWM	REFERENCE-COOLDOWN
00G	A33 10700A	90482#*STEAM INLET ASSY 120V60C+	REFER-STEAM 3015/3020MXP
00H	A33 10700B	90482# STEAM INLET ASSY 240V50/60	REFER-STEAM 3015/3020MXJ
00J	A33 01200	91221C* ASSY WATERIN ONE 1" BALVALV	REFER-AIR OPERATED WATER
00K	AVW33002	92126M ASSY=FLOWMETER 3015/3020MXP	REFERENCE-LIQUOR FLOW
001	09N086A	05Z PRESS SWITCH EATON #738-761	00A
002	96P016A71	05Z 1/2" DUOVAL 240V HAYS3108-6121	00A
003	96P013B71	04Z 3/4" 2WAY PLASTIC VALVE 240V60C	00B
004	96TBC2AA71	03Z 1/4" N/C 2WAY 240V50/60C	00C
005	96J030D	01Z 1/2" PRESREGULTR SET 28# FEM-UN	00D
006	30N100	07Z PRESSGUAGE 1/8"BACKCONN 0-30PSI	PART OF 00E
007	96M001	02Z 1/2" X 3/8" RELIEF VAL. SET 31#	PART OF 00E
008	51T025	01Z Y-STRAINER 1/2" CAST IRON	00F,00G,00H
009	96D034	04Z BALLVALVE 1/2" WATTS #6400-SS	00F
010	96TDC2AA71	04Z 1/2" N/C 2WAY 240V50/60C VALVE	00F
011	96M021	1/2"VACBREAK	
012A	96P039A37	01Z 1/2"STEMVALVE 120V50/60C 150PSI	00G
012B	96P039A71	01Z 1/2" STEMVALVE 240V50/60 150PSI	00H
013	96D085BCSR	93513S 1.00WAT BVAL+ACT/BR/NC/ST/RH	00J
014	96D350A71	07Z DRAINVAL 3" MTRDRIVE 240V 50/60C	00A
015	30F515	FLOW SENSOR SIGNET P51530-P0	00K
		***** END OF PARTS LIST *****	

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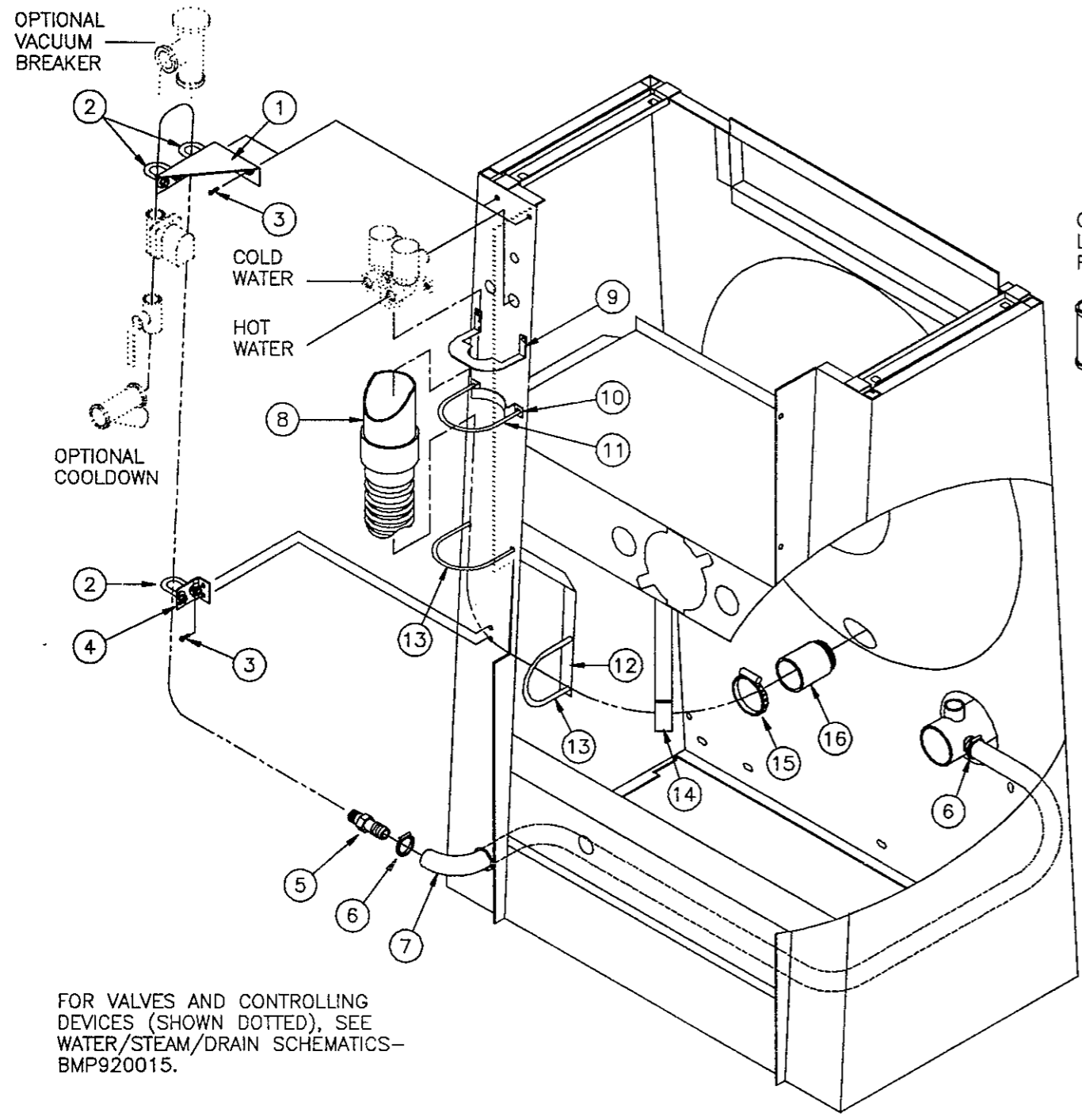
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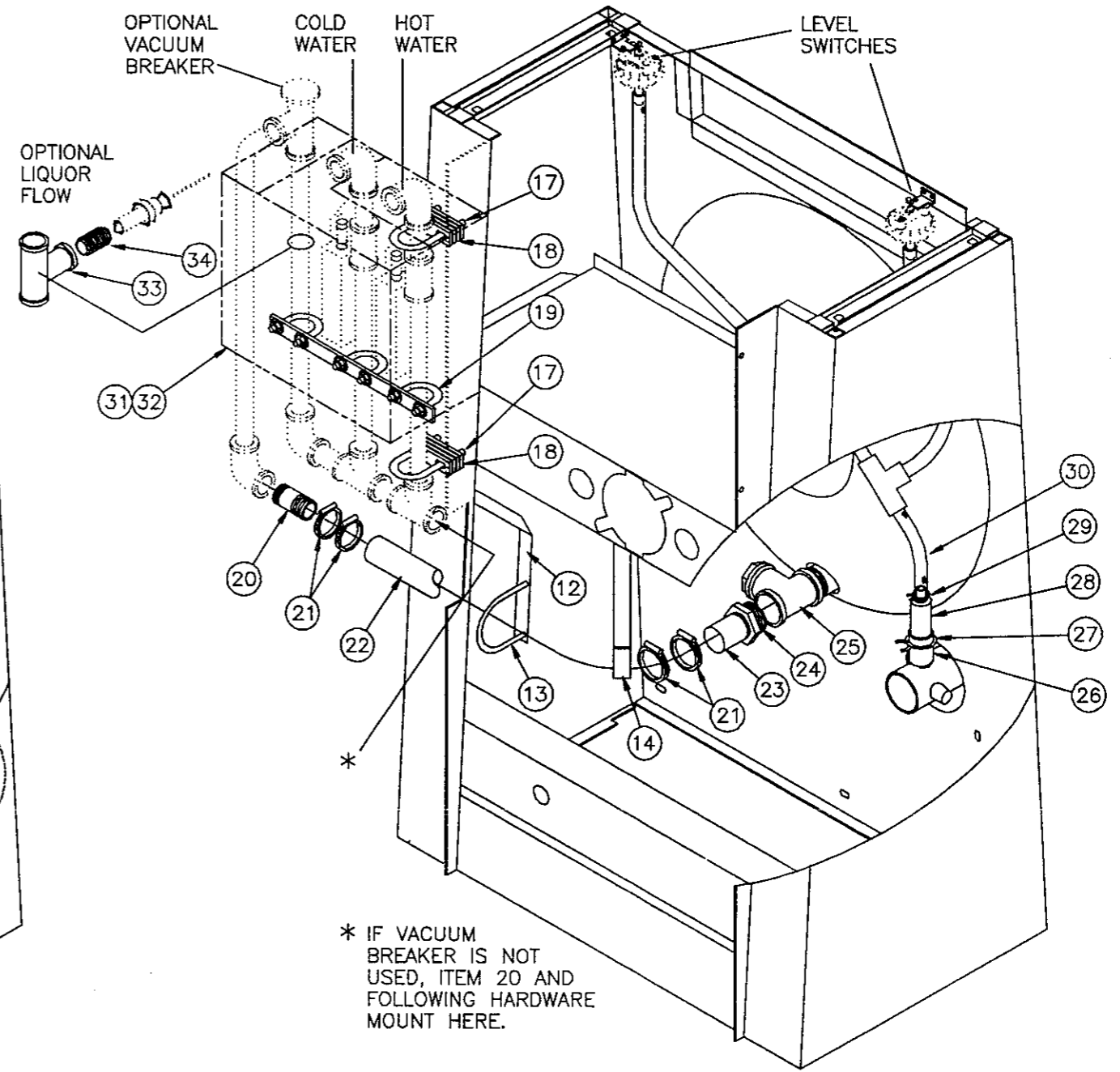
DRAWING  
(See other page for parts list,  
if applicable.)

**WATER INLET AND LEVEL SWITCH INSTALLATION & MOUNTING HARDWARE**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**



FOR VALVES AND CONTROLLING  
DEVICES (SHOWN DOTTED), SEE  
WATER/STEAM/DRAIN SCHEMATICS—  
BMP920015.

STANDARD ELECTRIC WATER VALVES &  
OPTIONAL COOLDOWN INSTALLATION



\* IF VACUUM  
BREAKER IS NOT  
USED, ITEM 20 AND  
FOLLOWING HARDWARE  
MOUNT HERE.

OPTIONAL AIR-OPERATED WATER VALVES, OPTIONAL LIQUOR FLOW, &  
STANDARD LEVEL SWITCH INSTALLATION

**PARTS LIST**

(See other page for drawing.)

**WATER INLET AND LEVEL SWITCH INSTALLATION & MOUNTING HARDWARE  
30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	AD 33 023A	91107C INSTL=COOLDN CWM M4567J/P	REFERENCE-COOLDOWN INSTL
00B	SA 33 054A	91107B*INLET ASSY=CLDN M4567J/P CWM	REFERENCE-COOLDOWN ASSY
00C	AD 33 011D	92426# FILL TUBE & DRAIN ASSY 240V	REFERENCE-ELECTRIC WATER
00D	G33 03800C	84512ZINST CWP MICRO H2O 1 1"BALVLV	REFERENCE-AIROP VLV INSTL
00E	A33 01200	91221C\$ ASSY WATERIN ONE 1" BALVALV	REFERENCE-AIROP VLV ASSY
00F	AVW33002	92126L ASSY=FLOWMETER 3015/3020MXP	REFERENCE-LIQUOR FLOW
001	02 03602	91131C+BKT=SUP TOP CLDN CWM M4567JP	00A
002	27A030A	U-BOLT 1/2 PIPE 1/4-20 THD	00A
003	12M035	3/8" SCREW IN CONN. PECO #939	00A
004	02 03606	91107B+BKT=SUP BOT CLDN CWM M4567JP	00A
005	51E507N	HOSESTEM NYLON 1/4MPTX1/2 HOSE I.D.	00B
006	27A057	HOSECLAMP, 7/16"-1" CADSCREW #HS-8	00A
007	60E085	07Z HOSE WATER 1/2" DAY 7192-50250*	00A
008	SA 33 008	71254B* FILL HOSE ASSY = CWU	00C
009	02 03723	76303C SPLASHSHIELD=CWU INLET	00C
010	02 03487	APR62B2 FILLPIPE SADDLE+CAD	00C
011	27A034	04Z UBOLT 3.625"BETWN LEGS ZINC PLT	00C
012	02 03475	70093A STRAP=FILL PIPE SUPPORT	00C
013	27A034	04Z UBOLT 3.625"BETWN LEGS ZINC PLT	00C
014	02 03478	87366A HANGER=FILL HOSE	00C
015	27A074	HOSECLAMP 2+1/16-3"CADSCR+1/25 BAND	00C
016	02 03447	91247B FILL TUBE NIPPLE (2X3TOE)GAL	00C
017	27A031A	02Z BOLT 1+1/4PIPE 3/8-16THD ZINC	00E
018	02 10539	71010A SPACER FOR PIPE	QUANTITY 4 PER BRACKET
019	27A031B	01Z UBOLT 1" PIPE 5/16-18 ZINC PLAT	00E
020	06 20468	87091B HOSE ADAPTER 1+1/4"H X 1"NPT	00E
021	27A060	HOSECLAMP,1+5/16-2.25"CADSCR HS-28	00E
022	60E096	STEAM HOSE 1.25"ID 2WIREBRAID BY FT	00E
023	51LQ1KH03A	NIPPLE PIPE 1+1/2 X 3 TOE GALSTL	
024	51A053	HEXPIPBUSH 2X1+1/2 GALV 125# CI	
025	A33 10600A	77427M*TEE ASSY-STEAM 3 MOTOMETER	
026	60E014A02A	79087N HOSE 1.25IDX2"LG PVC	00C
027	27A052	HOSECLAMP 1.5"DIA SPRINGTYPE #R24HC	00C
028	02 03332C	78361B AIRCHAMBER=PRESSWITH-CWU	00C
029	27A044A	HOSECLAMP .687D ROTORCLIP#HC-11ST-R	00C
030	A33 12000J	91466# PRES TUBE "T" ASSY MXJ	00C
031A	02 03725	81482B BALVAL COVER SIDE	COVER-AIROP HOT+COLD
031B	02 03726	92281C COVER=BALVAL SIDE 3020	COVER-AIROP W/VACUUM BRK
032	02 03725A	92302B BALVAL COVER TOP	
033	51V086C	TEE PIPE 1+1/2X1+1/2X1+1/4GALMA 150	00F

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# Hays Electric Inlet Valves

BMP700710/96081V  
(Sheet 1 of 2)

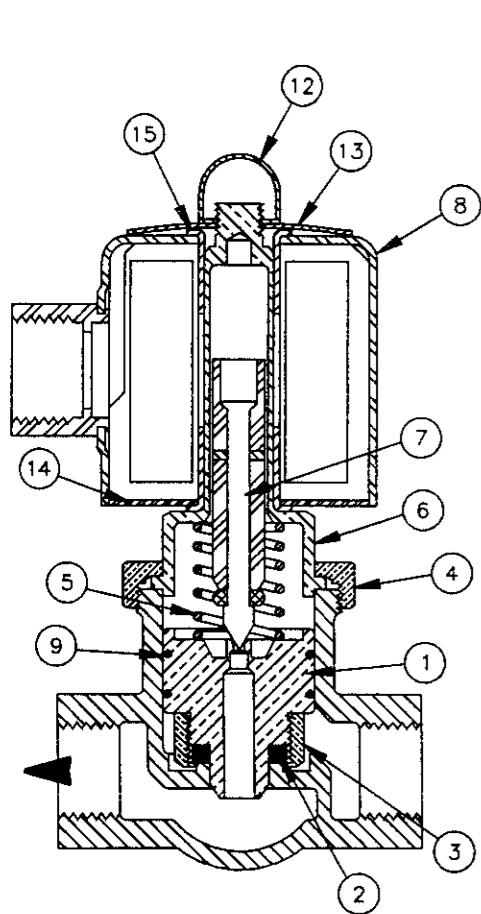


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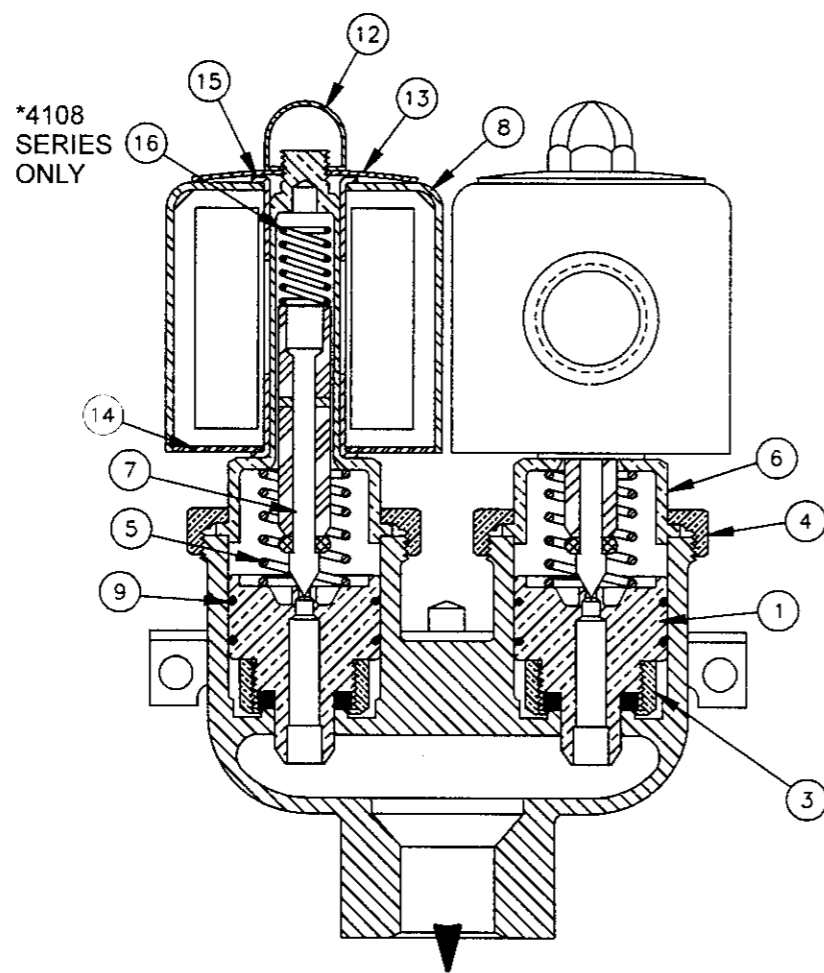
BMP700710/96081V (1 of 2)

Litho in U.S.A.

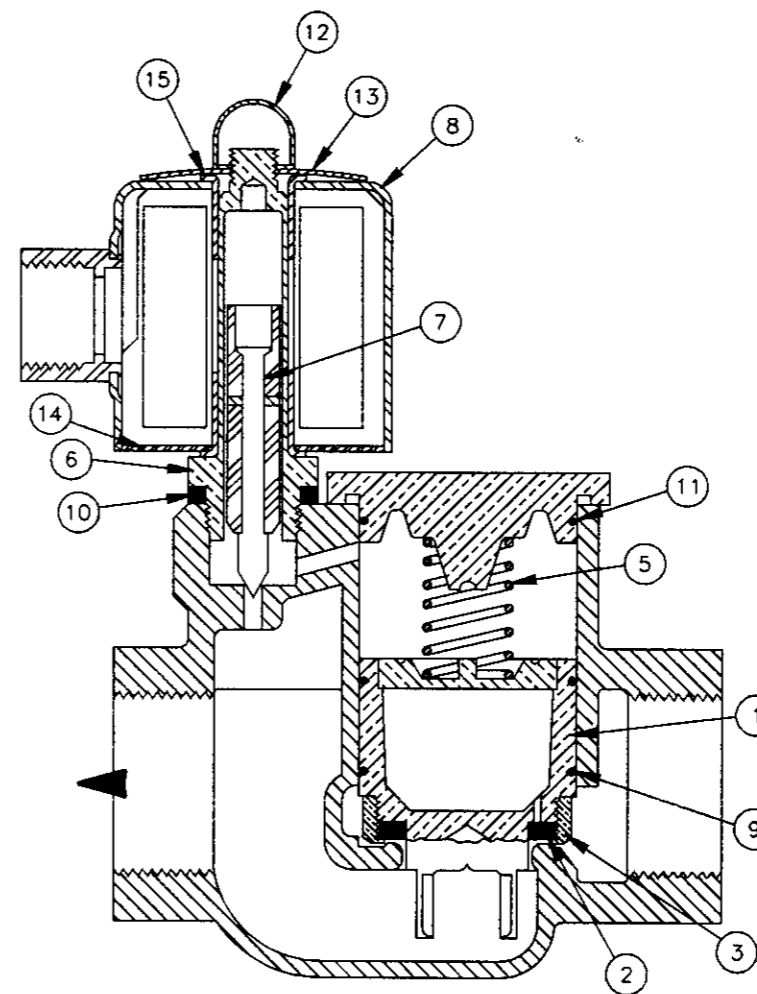
NOTE:  
HAYS 4108 SERIES DUOVALVE IS  
REPLACED BY THE 3108 SERIES(SHOWN).  
IF REPLACEMENT PARTS ARE NEEDED  
FOR THE OBSOLETE 4108 SERIES SEE  
PARTS LIST ON REVERSE SIDE.



00S,00W,00X,00XX  
3/8" BALANCING & 3/4" VALVES



00T,00U,00V  
1/2" DUO VALVES



00Y,00Z,00ZZ  
1-1/4" VALVES

### GENERAL MAINTENANCE:

- 1) THOSE VALVES WITH COUPLING NUTS MUSTY NOT BE EXCESSIVELY TIGHTENED. USE A STEADY PULL WITH A 14" OR SMALLER WRENCH. DO NOT HAMMER ON NUT OR WRENCH. LIMIT MAXIMUM TORQUE ON COUPLING NUT TO 600LB/INCH. EXCESSIVE THIGHTENING OF COUPLING NUT WILL DISTORT VALVE BODY CAUSING THE PISTON BODY TO JAM AND THE VALVE WILL NOT SHUT OFF.
- IF THE VALVE LEAKS BETWEEN THE BODY AND BONNET, LOOSEN THE COUPLING NUT AND TURN THE BODY SLIGHTLY, THEN TIGHTEN THE COUPLING NUT. IF THE VALVE STILL LEAKS, REPEAT THE OPERATION. IN NO CASE MUST THE NUT BE TIGHTENED EXCESSIVELY.



**Pellerin Milnor Corporation**  
P. O. Box 400, Kenner, LA 70063-0400

BMP700710/96081V (2 of 2)

Litho in U.S.A.

**Parts List—Hays Electric Inlet Valves**

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
ASSEMBLIES				
	S	96P014	02Z 3/8" VALVE 120V HAYS 2195-0055	
	T	96P016	10Z 1/2" DUOVAL 120V HAYS3108-6021	
	U	96P016A24	08Z 1/2" DUOVAL 24V HAYS3108-6421	
	V	96P016A71	05Z 1/2" DUOVAL 240V HAYS3108-6121	
	W	96P053	05Z 3/4"VAL 24V HAYS 2110-6421IS	
	X	96P053A37	06Z 3/4"VAL 110V HAYS #2110-6021IS	
	XX	96P053A71	3/4" HAYS VALVE 240V60/50C FACTMADE	
	Y	96P151	09Z 1+1/4" VAL 24V HAYS 2110-6421IS	
	Z	96P151A37	05Z 1+1/4" VAL 110V HAYS2110-6021IS	
	ZZ	96P151A71	1.25" HAYSVALVE 240V60/50C FACTMADE	
COMPONENTS				
S	1	96V245	PISTON ASSY HAYS #7735505	
T-V	1	96V216	PISTON-TEFLON FOR HAYS STYLE 3108	
W-XX	1	96V222	PISTON ASSY HAYS 7730004 FOR 96P053	
Y-ZZ	1	96V224B	PISTON ASSY HAYS #7643101=96P151	
all	1	96V216A	PISTON-TEFLON FOR HAYS STYLE 4108	OBSOLETE 4108 DUOVALVE
S-V,	2	96V247	SEATWASHER HAYS #8222301 96P014+16	OBSOLETE 4108 DUOVALVE ALSO
W-XX	2	96V225	SEAT WASHER HAYS #8249801	
Y-ZZ	2	96V225A	SEAT WASHER HAYS #84048 FOR 96P151	
S-V,	3	96V248	SEATWASHER NUT HAYS#82222 96P014+16	OBSOLETE 4108 DUOVALVE ALSO
W-Z	3	96V226	SEAT WASHER NUT HAYS #86030 =96P053	
S-V	4	96V246	COUPLING NUT HAYS #76303 96P014+16	
W-Z	4	96V254	COUPLING NUT HAYS #76028 = 96P053	
S-V,Y-ZZ	5	96V244	PISTON SPRING FOR HAYS STYLE 3108	
W-XX	5	96V222A	PISTON SPRING HAYS 82488	
all	5	96V244A	PISTON SPRING HAYS 4108 HAYS #88108	OBSOLETE 4108 DUOVALVE
S-V	6	96V242	BONNET FOR HAYS 3108 HAYS#83021	
W-XX	6	96V258	BONNET HAYS #73026 FOR 96P053	
Y-Z	6	96V260	BONNET HAYS #83192 FOR 96P151	
S only	7	96V243	PLUNGER ASSY TEFLON TIP HAYS #74327	
T-ZZ	7	96V223	PLUNGER HAYS #7319503	
all	7	96V223A	PLUNGER ASSY FOR HAYS STYLE 4108	OBSOLETE 4108 DUOVALVE

**Parts List, cont.—Hays Electric Inlet Valves**

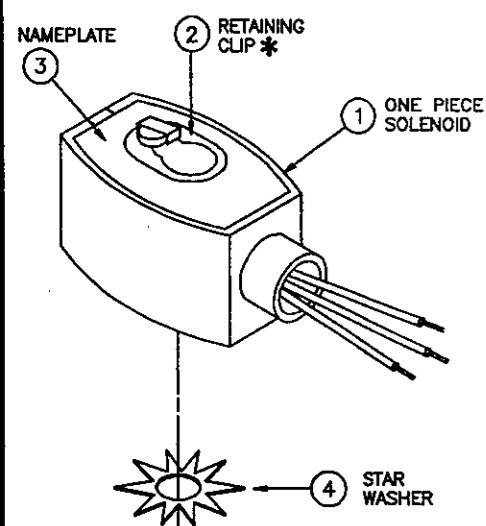
Used In	Item	Part Number	Description	Comments
S-T,X,Z	8	96V211	COIL 120V50/60C FOR HAYS STYLE 3108	
U,W,Y,ZZ	8	96V210	COIL 24V50/60C FOR HAYS STYLE 3108	
V,XX	8	96V212	COIL 240V50/60C FOR HAYS STYLE 3108	
S-V,	9	96V217	TEFLON SPLIT RING 1/2" HAYS#8502901	OBSOLETE 4108 DUOVALVE ALSO
W-XX	9	96V222T	TEFLON SPLIT RING HAYS #8503002	
Y-ZZ	9	96V224T	TEFLON SPLITRING 1 1/4"HAYS#8503102	
Y-ZZ only	10	96V229	BONNET GASKET HAYS #82224= 96P151	
Y-Z only	11	96V261	O-RING (SEAL CAP) HAYS#87407=96P151	
all	12	96V250	PALNUT HAYS #3069-PC	
all	13	96V251	SPRING WASHER HAYS #83600	
all	14	96V264	BOTTOM PLATE (COIL) HAYS#8223601	
all	15	96V262	FERRULE (COIL SLEEVE) HAYS #82239	
all	16	96V244PS	PLUNGER SPRING FOR HAYS STYLE 4108	OBSOLETE 4108 DUOVALVE ONLY
all	17	96V250A	COIL RETAINER HAYS4108 HAYS #82958	(NOT SHOWN) OBSOLETE 4108 DUOVALVE

**DRAWING**

(See other page for parts list, if applicable.)

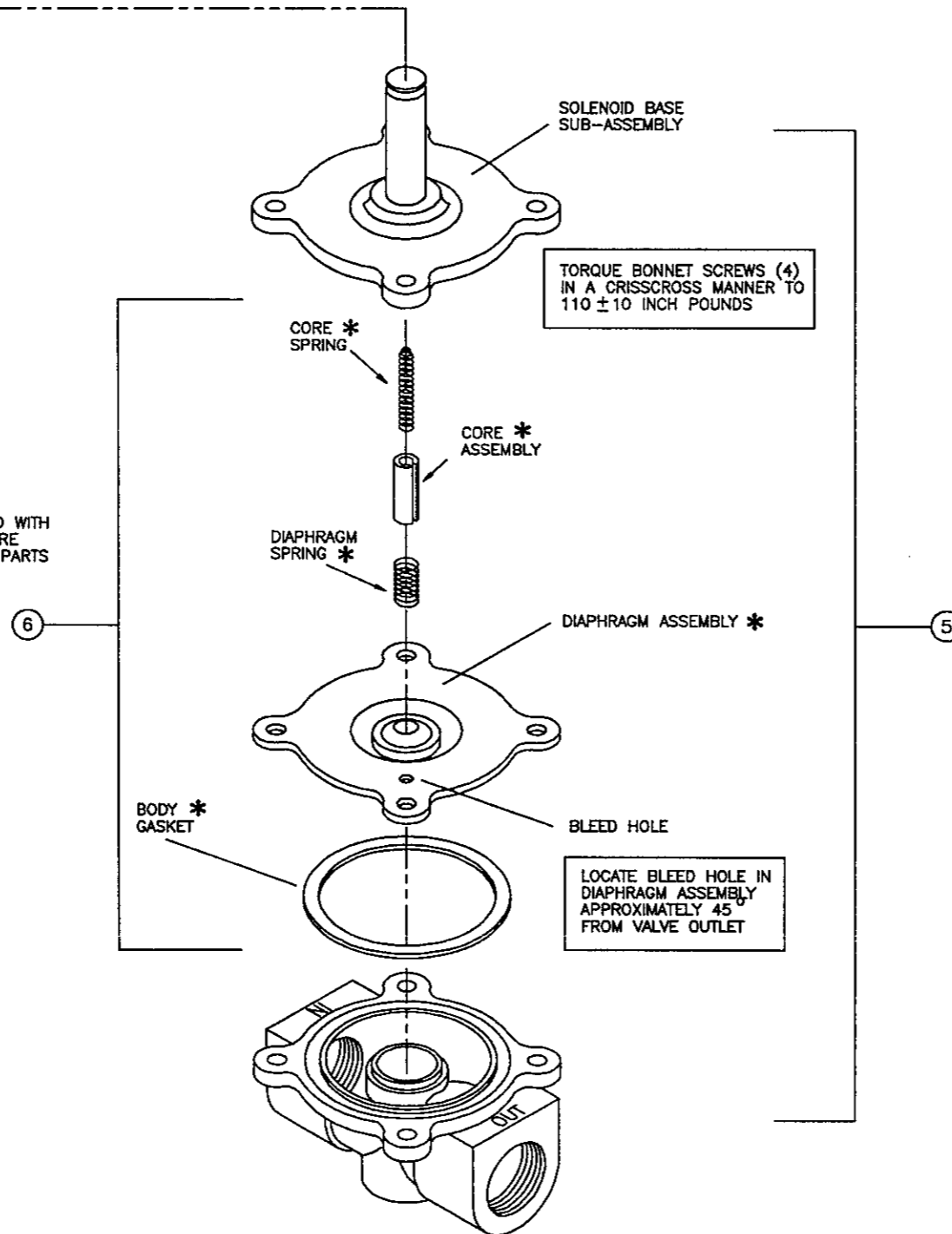
**2-WAY ELECTRIC WATER VALVE**

BMP920029/93027V (Page 9)



SOLENOID ASSEMBLY

NOTE:  
ONLY PARTS MARKED WITH AN ASTERICKS (\*) ARE INCLUDED IN VALVE PARTS KIT, ITEM 4.



VALVE ASSEMBLY

**Identification and Description**

Check nameplate for correct catalog number, pressure, voltage, and service.

**Safety Instructions**

**⚠ DANGER ⚠**

**SHOCK HAZARD**—will cause death or severe injury.  
 ⚡ Lock OFF and tag out power at wall disconnect before servicing. Power switches on machine and control box disable only control circuit power in electrical boxes.

**⚠ WARNING ⚠**

**EXPLOSION HAZARD**—may cause serious injury.  
 ⚡ Release pressure to valve before disassembly.

**⚠ CAUTION ⚠**

**BURN HAZARD**—Solenoid enclosures become too hot to touch when energized for a long period. This will not damage the solenoid, but may cause a painful burn.  
 ⚡ Allow solenoids to cool before servicing the valves.

**Maintenance**

**READ ALL SAFETY STATEMENTS ABOVE BEFORE PROCEEDING ANY FURTHER!**

**Coil Replacement**

1. Remove retaining clip. NOTE: When metal retaining clip disengages, it springs upwards.
2. Slip yoke containing coil and sleeves off solenoid base sub-assembly.
3. Replace coil.
4. Reassemble in reverse order.

**Valve Disassembly and Reassembly**

1. Remove retaining clip.
2. Slip entire solenoid enclosure off the solenoid base sub-assembly.
3. Remove solenoid base sub-assembly, core assembly and core spring.
4. Remove diaphragm spring, diaphragm assembly and gasket.
5. Replace all worn or damaged parts.
6. Reassemble in reverse order.

**Troubleshooting**

- Control circuit:** Listen for a metallic click when energizing the solenoid. Absence of the click indicates loss of power to the solenoid. Check for loose connections, blown fuses, open or grounded coil circuit, and broken lead wires.
- Faulty coil:** Check for open circuit in coil. Replace coil if necessary.
- Low voltage:** Voltage across coil leads must be at least 85% of nameplate rating for proper operation.
- Incorrect pressure:** Pressure to valve must be within range specified on nameplate.
- Excessive leakage:** Disassemble valve and clean all parts. Replace all worn parts for best results.

**PARTS LIST**

(See other page for drawing.)

**2-WAY ELECTRIC WATER VALVE**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
001A	96T1001A24	SOLENOID 24V50/60C ASCO#260283-001	USED WITH 005A
001B	96T1001A37	SOLENOID 120V50/60C ASCO#260283-002	USED WITH 005B
001C	96T1001A71	SOLENOID 240V50/60C ASCO#260283-003	USED WITH 005C
002	96R350AAE	METAL CLIP ASCO #176-759-1	
003	96V1001PLT	NAMPLATE,BLANK REDHAT II COIL M6	
004	96V1001WSH	STAR WASHER REDHAT II COIL M6	
005A	96TDC2AA24	03Z 1/2" N/C 2WAY 24V50/60C VALVE	VALVE ASSEMBLY
005B	96TDC2AA37	03Z 1/2" N/C 2WAY 120V50/60C VALVE	VALVE ASSEMBLY
005C	96TDC2AA71	03Z 1/2" N/C 2WAY 240V50/60C VALVE	VALVE ASSEMBLY
006	96V235B	PARTKIT ASCO #K258-120 FOR 8210D2 ***** END OF PARTS LIST *****	REPAIRS 005A,005B,005C

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

1. The part number for the entire assembly depicted in the drawing or a major sub-assembly thereof, and/or
2. The range of machine models this drawing applies to.

If more than one reference item appears, this usually means this drawing applies to more than one assembly (and thus to more than one range of machines).

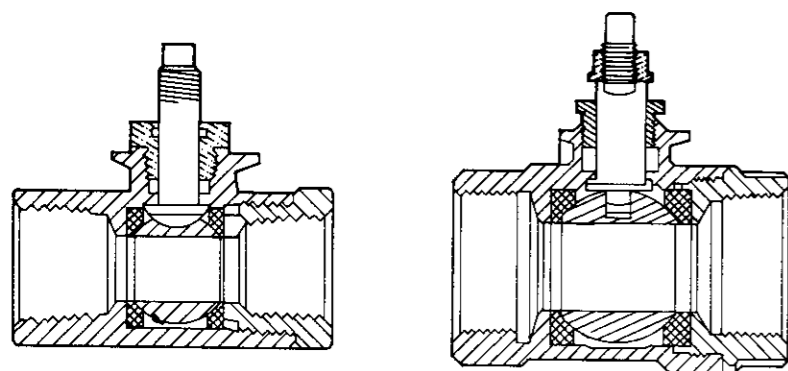
**Component Item Numbers**—For any item on the drawing (e.g., item Ⓞ), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.



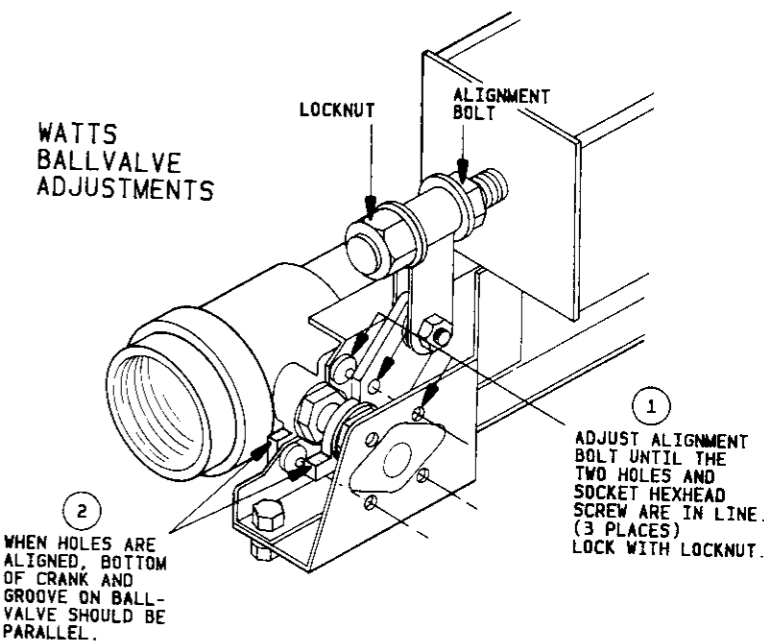
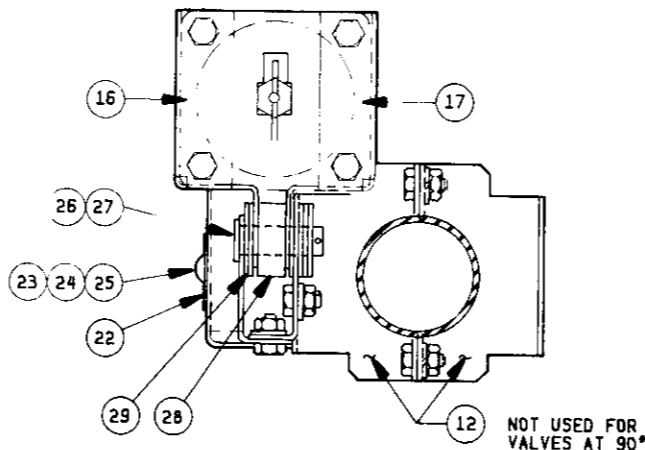
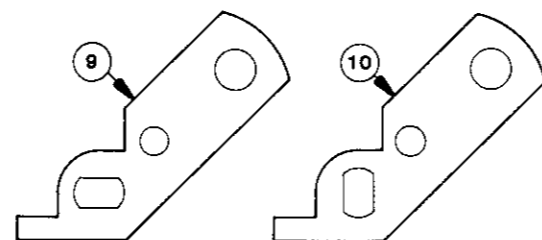
**DRAWING**  
 (See other page for parts list,  
 if applicable.)

**1" & 1-1/4" WATTS BALLVALVE AND ACTUATOR**

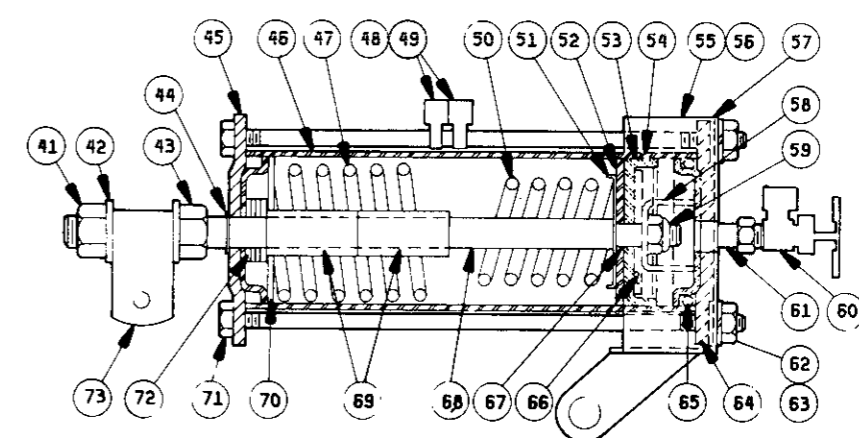
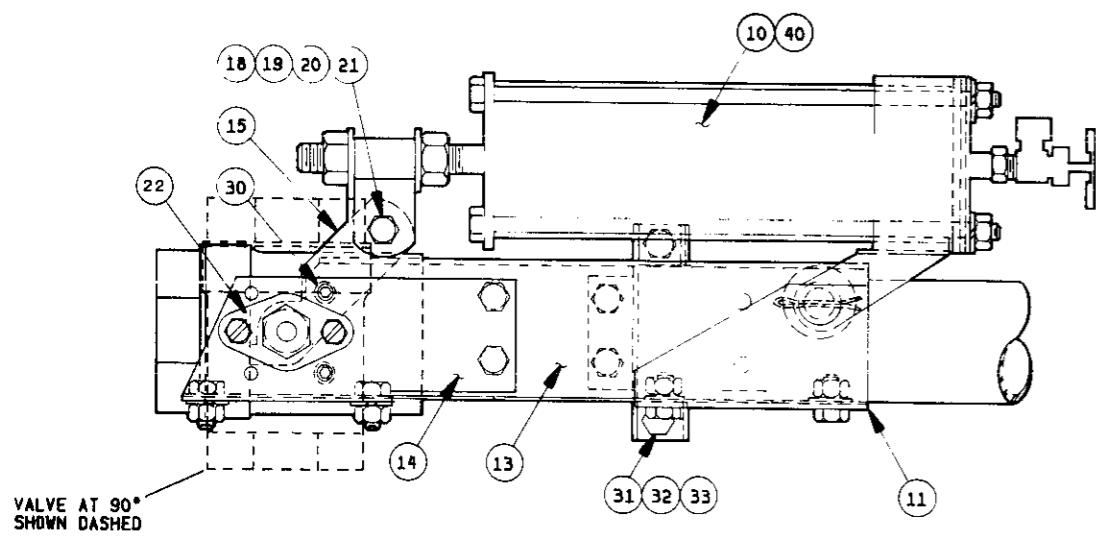
**BMP890006/92337V**



FOR BALL VALVES AND BALL VALVE  
 REPAIR KITS, SEE BMP920007.



FOR "NEW PIVOT" MOUNTING HARDWARE, SEE BMP920005.  
 FOR ACTUATORS USED WITH "NEW PIVOT" MOUNTING  
 HARDWARE, SEE BMP920006.





PARTS LIST  
(See other page for drawing.)

1" & 1-1/4" WATTS BALLVALVE AND ACTUATOR

BMP890006/92337V

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)	ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00P	96D086SMFW	89354# BALVAL 1.25+ACT+MH NO WATS/S	FOR REFERENCE ONLY	052	02 02105	91522A PISTON CUP WASHER STNLS STL	
00Q	96D086SMCW	89354# BALVAL 1.25+ACT+MH NC WATS/S	FOR REFERENCE ONLY	053	02 02194	89067B PISTONCUP=DUMPVALVE 2+3/8"	
00R	96D086MFWL	89354# BALVAL 1.25+ACT+MH NC WATS/L	FOR REFERENCE ONLY	054	02 02085	75161A UP WASHER=2"OD=PISTONCUP	
00S	96D086MCWL	89354# BALVAL 1.25+ACT+MH NC WATS/S	FOR REFERENCE ONLY	055	07 20701	88243B CYLINDER BRACKET LEFT HAND	
00T	96D086MFOV	89354# BALVAL 1.25+ACT+MH NO WATTS	FOR REFERENCE ONLY				
00U	96D086MCOW	89354D BALVAL 1.25+ACT+MH NC WATTS	FOR REFERENCE ONLY	056	07 20701A	88243# CYLINDER BRACKET RIGHT HAND	
00V	96D085SMCW	88393# BALVAL 1+ACT+MH NC WATTS-S/S	FOR REFERENCE ONLY	057	03 01209A	92061B STEMCLIP H=1.313 BALVAL S/S	
00W	96D085MFWL	88393# BALVAL 1+ACT+MH NO WATS-LEFT	FOR REFERENCE ONLY	058A	03 01313	70219A STOP=AIRCYL W/2+11/16STROKE	(040A)
00X	96D085MFOV	88393# BALVAL 1+ACT+MH NO WATTS	FOR REFERENCE ONLY	058B	03 01313S	85506B+STOP=AIRCYL W/2+11/16STR.SS	(040B)
00Y	96D085MCWL	88393# BALVAL 1+ACT+MH NC WATS LEFT	FOR REFERENCE ONLY	059	15G220	LTHX THIN LOCKNUT 3/8-24 SS NTE064	
				060	96H018	NEEDLE VALVE	
00Z	96D085MCOW	88393D BALVAL 1+ACT+MH NC WATTS	FOR REFERENCE ONLY	061	51A010	HEXPIPBUSH 1/4X1/8 BRASS	
009	03 01631A	88381B VALVE CRANK N.O.WATTS-1.0"		062	15G190	HEXFINJAMNUT 5/16-18NC2 SS18-8	
010	03 01631	91507B+VALVE CRANK N.C.WATTS 1.0"		063	15U205	LOCKWASHER MEDIUM 5/16" 18-8SS	
011A	07 20704	88381B TOP CLEVIS SUPPORT	(00Z,00X,00V,00U,T,Q,P)	064A	02 02101	71334A CYLHEAD W/TAPPED HOLE	(040A)
011B	07 20704A	88381# TOP CLEVIS SUPPORT-LEFT	(00Y,00W,00S,00R)				
012A	03 01633	88376C ACTUATOR SUPPORT BRKT 1.0"	(00Z,00Y,00X,00W,00V)				
012B	07 20771	88407C ACTUATOR SUPPORT BRKT 1.25"	(00U,00T,00Q,00P)	064B	02 02101S	88531B CYLINDER HEAD TAP.HOLE (SS)	(040B)
012C	07 20770	88243B ACTUATOR SUPPORT BKT 1+1/2	(00S,00R)	065A	60C132	ORING 2"ID 3/16CS BUNA 70 DURO #329	
013A	03 01634	91152C ACTUATOR CHANNL SUPPORT 1.0"	(00Z,00X,00V)	066	02 02185	79237A WASHER=PISTON CUP COMP LIMIT	
013B	03 01634A	91152# ACTUATOR CHANNL SUPPORT-LEFT	(00Y,00W)	067	60C106	ORING 5/16ID 1/16CS BN 70 DURO #011	
				068	02 18650	85142B STEM-2 WAY AIRCYLINDER BRAKE	
013C	07 20700	88512D ACTUATOR ZEE SUPPORT	(00U,00T,00Q,00P)	069	27B32024SS	SPACER ROLL .51DX.6250DX1.5L STN S	
013D	07 20700L	88512# ACTUATOR ZEE SUPPORT-LEFT	(00S,00R)	070	15U520S	FLAT WASHER 2+3/8X1+41/64X12GA SS	
014A	03 01632	90507C ACTUATOR BEARING SUPPORT-1"	(00Z,00X,00V)	071A	02 10585E	91142# TIE BOLT=5/16-18X8.25LG PLTD	(040A)
014B	03 01632A	90507# ACTUATOR BEARING SUPPRT-LEFT	(00Y,00W)	071B	02 10585A	91142# TIE ROD-5/16-18X8+1/4 (SS)	(040B)
014C	07 20702A	88512C ACTUATOR BEARING SUPPORT	(00U,00T,00Q,00P)	072	15U243S	FLAWASHER 7/8ODX33/64IDX16GA 18-8SS	
014D	07 20702L	88512# ACTUATOR BEARING SUPPORT-LFT	(00S,00R)				
015A	03 01631	91507B+VALVE CRANK N.C.WATTS 1.0"	(00Z,00Y,00V)				
015B	03 01631A	88381B VALVE CRANK N.O.WATTS-1.0"	(00X,00W)	073	03 01209A	92061B STEMCLIP H=1.313 BALVAL S/S	
015C	07 20703A	91507B VALVE CRANK N.C.WATTS 1.5"	(00U,00T,00S,00Q,00P)			***** END OF PARTS LIST *****	
015D	07 20703B	88153B VALVE CRANK N.O.WATTS 1.5"	(00R)				
016	07 20701	88243B CYLINDER BRACKET LEFT HAND					
017	07 20701A	88243# CYLINDER BRACKET RIGHT HAND					
018	15N186	HXCAPSCR 1/4-20UNC2X3/4SS18-8					
019	02 15893	92017B SPACER=BALL VALVE CRANK STEM					
020	15U188	FLATWASH 1/4 STD COMMERCIAL SS18-8					
021	15G164	HEXTHINLOKNUT NYL 1/4-20 SS NTE					
022A	54E001PABA	89281B ASSY=1/4"PRESSBEARING					
022B	54E002PABA	89281B ASSY=5/16"PRESSBEARING	(00U,00T,00S,00R,00Q,00P)				
023	15N130	RDMACHSCR 10-24UNC2A X 1/2 SS18-8					
024	15U135	FLATWASH#10.4370DX.2031DX.04TSS188					
025	15G126	HEXLOCKNUT NYLON 10-24UNC S.S NM					
026	17A040S	CLEVISPIN 1/2"X1+3/8"DRILLED S.S.					
027	15H031	STD COTTERPIN 3/32X3/4 SS18-8					
028	07 20701B	88307B CYLINDER BRACKET SPACER					
029	15U285	FLATWASHER 1/2 STD COMMER.18/8 S/ST					
030A	15N117	RDMACSCR 10-24UNC2X3/8SS18-8	(00Z ONLY)				
030B	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	(00Y,X,W,V,U,T,S,R,Q,P)				
031	15N159	HEXCAPSER 1/4-20UNC2AX7/16 SS18-8					
032	15U181	LOCKWASHER MEDIUM 1/4 SS18-8					
033	15G170	HEXNUT 1/4-20UNC2 SS18-8					
040A	SA 10 056D	89483T*AIRCYL=WATTS BALVAL 2.375"	FOR REFERENCE BELOW				
040B	SA 10 056A	89483T*AIRCYL=WATTS BALL VALVE	ALSO REFERENCE BELOW				
041	15G234NS	HXLOCKNUT NYL 1/2-13UNC2 SS18-8	(040A,040B)				
042	15U243S	FLAWASHER 7/8ODX33/64DX16GA 18-8SS	(040A,040B)				
043	15G231S	HXFINJAMNUT 1/2-13UNC2B SS18-8	(040A,040B)				
044	54E220	NYLINER 8L2FF BUSHING 1/2X9/16X.140					
045A	02 02546	CYLHEAD=SLIDESTEM	(040A)				
045B	02 02546S	87341# CYLINDER HEAD= SLIDE STEM SS	(040B)				
046	02 02068	79241A AIRCYL-STAINLESS=DUMPVALVE					
047A	02 15881	70337# SPRING=BRAKE2.1OD11FL15.5#"	(040A)				
047B	02 15881A	85504Z SPRING,02-15881 +HEAVY PAINT	(040B)				
048	20L601G	ID TAG NAT'L #1614 ALUM EMB LET "G"					
049	20L601V	ID TAG NAT'L #1614 ALUM EMB LET "V"	(040B ONLY)				
050A	02 15880	70337B SPRING=BRAKE1.5OD10.3FL17#"	(040A)				
050B	02 15880A	85504Z SPRING,02-15880 +HEAVY PAINT	(040B)				
051	02 18651	73171A WASHER=2WAY BRAKECYL					

How to Read Parts List

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

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**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.



# Universal Actuators & Mounting Hardware for Watts Ball Valves - New Pivot

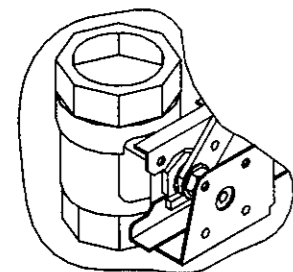
BMP920005/96067V  
(Sheet 1 of 3)



Pellerin Milnor Corporation  
P. O. Box 400, Kenner, LA 70063-0400

BMP920005/96067V (1 of 3)

Litho in U.S.A.



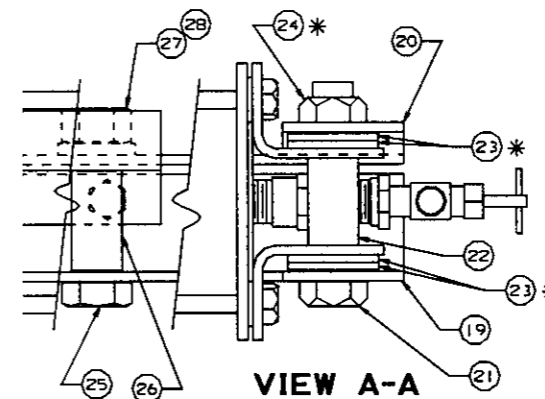
90° VALVE SET

FOR AIR CYLINDER  
REPAIR PARTS,  
SEE BMP920006.

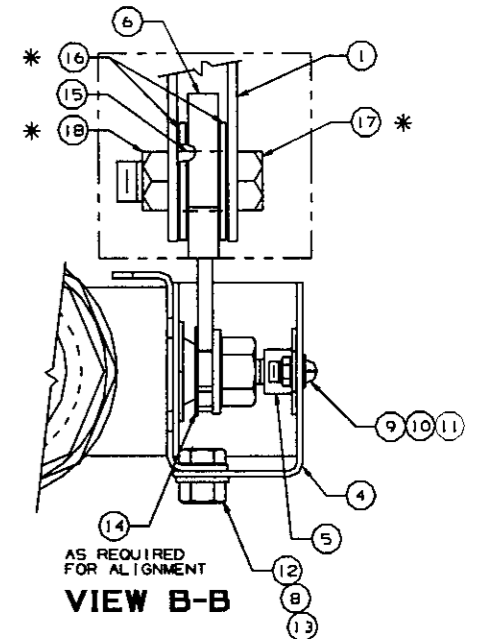
FOR PROPER ALIGNMENT OF ASSEMBLY:  
1. WITH THE BALL IN ITS FULLY CLOSED  
POSITION AND THE ACTUATOR IN ITS  
FULLY RETRACTED POSITION, ADJUST  
ALIGNMENT NUT UNTIL THE CRANK  
ALIGNMENT HOLE IS 100% IN LINE  
WITH THE BEARING SUPPORT ALIGN-  
MENT HOLE AND THE SOCKET HEXHEAD  
SCREW. THEN LOCK WITH LOCKNUT.  
THE ASSEMBLY MUST CLOSE 100%.

2. WHEN HOLES ARE  
ALIGNED, BOTTOM  
OF CRANK AND  
GROOVE ON BALL-  
VALVE SHOULD BE  
PARALLEL.

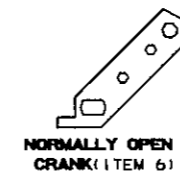
BEARING SUPPORT  
ALIGNMENT HOLE  
CRANK ALIGNMENT HOLE



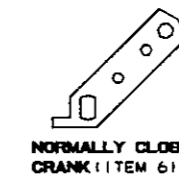
VIEW A-A



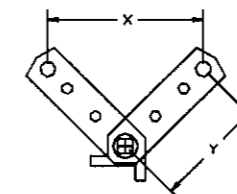
AS REQUIRED  
FOR ALIGNMENT  
VIEW B-B



NORMALLY OPEN  
CRANK (ITEM 6)



NORMALLY CLOSED  
CRANK (ITEM 6)



STROKE DIMENSIONS

SIZE	X	Y
2" VALVES	3.89	2.75

NOTES:

1) RIGHT HAND ASSEMBLY IS SHOWN, LEFT HAND ASSEMBLY IS OPPOSITE.

2) FOR 90 DEGREE VALVE SET, VALVE IS ROTATED 90 DEGREES.

3) ASSEMBLE SO THAT THE LINKAGE IS FREE TO MOVE IN THE SPACER, THIS MEANS THAT THERE SHOULD BE DAYLIGHT BETWEEN THE CRANK AND EACH ADJACENT WASHER WITHOUT EXCESSIVE CLEARANCE.



Pellerin Milnor Corporation  
P. O. Box 400, Kenner, LA 70063-0400

BMP920005/96067V (2 of 3)

Litho in U.S.A.

**Parts List—Actuators & Mounting Hardware for Watts Ball Valves**  
Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
ASSEMBLIES				
	AA	96D085BCSL	92000Z 1.00WAT BVAL+ACT/BR/NC/ST/LH	
	AB	96D085BCSR	93513S 1.00WAT BVAL+ACT/BR/NC/ST/RH	
	AC	96D085BOSL	93513S 1.00WAT BVAL+ACT/BR/NO/ST/LH	
	AD	96D085BOSR	93513S 1.00WAT BVAL+ACT/BR/NO/ST/RH	
	AE	96D085SOSR	92000Z 1.00WAT BVAL+ACT/SS/NO/ST/RH	
	AF	96D085SCSR	92000Z 1.00WAT BVAL+ACT/SS/NC/ST/RH	
	BA	96D086BCSL	93513S 1.25WAT BVAL+ACT/BR/NC/ST/LH	
	BB	96D086BCSR	93513S 1.25WAT BVAL+ACT/BR/NC/ST/RH	
	BC	96D086BOSL	93513S 1.25WAT BVAL+ACT/BR/NO/ST/LH	
	BD	96D086BOSR	93513S 1.25WAT BVAL+ACT/BR/NO/ST/RH	
	BE	96D086SCNR	92000Z 1.25WAT BVAL+ACT/SS/NC/90/RH	
	BF	96D086SCSL	92000Z 1.25WAT BVAL+ACT/SS/NC/ST/LH	
	BG	96D086SCSR	92000Z 1.25WAT BVAL+ACT/SS/NC/ST/RH	
	BH	96D086SOSL	92000Z 1.25WAT BVAL+ACT/SS/NO/ST/LH	
	BJ	96D086SOSR	92000Z 1.25WAT BVAL+ACT/SS/NO/ST/RH	
	CA	96D087BCSL	93513S 1.50WAT BVAL+ACT/BR/NC/ST/LH	
	CB	96D087BCSR	93513S 1.50WAT BVAL+ACT/BR/NC/ST/RH	
	CC	96D087BOSR	93513S 1.50WAT BVAL+ACT/BR/NO/ST/RH	
	CD	96D087SCNR	92000Z 1.50WAT BVAL+ACT/SS/NC/90/RH	
	CE	96D087SCSR	92000Z 1.50WAT BVAL+ACT/SS/NC/ST/RH	
	CF	96D087SOSR	92000Z 1.50WAT BVAL+ACT/SS/NO/ST/RH	
	DA	96D088BCSR	92177S 2.00WAT BVAL+ACT/BR/NC/ST/RH	
	DB	96D088BCNR	92177S 2.00WAT BVAL+ACT/BR/NC/90/RH	
	DC	96D088BCSL	92177S 2.00WAT BVAL+ACT/BR/NC/ST/LH	
	DD	96D088BOSR	92177S 2.00WAT BVAL+ACT/BR/NO/ST/RH	
	DE	96D088SCNR	92177S 2.00WAT BVAL+ACT/SS/NC/90/RH	
	DF	96D088SCSR	92177S 2.00WAT BVAL+ACT/SS/NC/ST/RH	
	DG	96D088SOSR	92177S 2.00WAT BVAL+ACT/SS/NO/ST/RH	
	DH	96D088BCNL	92177S 2.00WAT BVAL+ACT/BR/NC/90/LH	
	DJ	96D088BOSL	92177S 2.00WAT BVAL+ACT/BR/NO/ST/LH	
	DK	96D088SCSL	92177S 2.00WAT BVAL+ACT/SS/NC/ST/LH	
	DL	96D088SOSL	92177S 2.00WAT BVAL+ACT/SS/NO/ST/LH	
COMPONENTS				
AA-AD, BA-BD, CA-CC	1	SA 10 056F	92000Z AIRCYL=2.38ODX2.70STX20.5#CD	
AE-AF, BE-BJ, CD-CF	1	SA 10 056G	92000Z AIRCYL=2.38ODX2.70STX20.5#SS	
DA-DD, DH-DJ	1	SA 10 057C	95222D AIRCYL=3.00DX3.89ST171/176CD	
DE-DG, DK-DL	1	SA 10 057D	95222# AIRCYL=3.00DX3.89ST171/176SS	
AA-AE	2	96D085WEXS	07Z BALVAL 1" BRZ WATTS#B6400SSZ107	
AF	2	96D085WSS	07Z BALVAL 1" SS WATTS S8000-Z107	
BA-BD	2	96D086WEXS	08Z BAVAL 1+1/4BRZ WATTS#B6400SSZ107	
BE-BJ	2	96D086WSS	08Z BAVAL 1+1/4"SS WATTS S8000-Z107	
CA-CC	2	96D087WEXS	09Z BAVAL 1+1/2BRZ WATTS#B6400SSZ107	

**Parts List, cont.—Actuators & Mounting Hardware for Watts Ball Valves**

Used In	Item	Part Number	Description	Comments
CD-CF	2	96D087WSS	08Z BAVAL 1+1/2"SS WATTS S8000-Z107	
DA-DD, DH-DJ	2	96D088WEXS	09Z BALVAL 2" BRZ WATTS#B6400SSZ107	
DE-DG, DK-DL	2	96D088WSS	09Z BALVAL 2" SS WATTS S8000-Z107	
AA,AC	3	03 01634A	94053# ACTUATOR CHANNL SUPPORT-LEFT	
AB,AD,AE, AF	3	03 01634	94053C ACTUATOR CHANNL SUPPORT 1.0"	
BA,BC,BF, BH,CA	3	07 20700L	88512# ACTUATOR ZEE SUPPORT-LEFT	
BB,BD,BE, BG,BJ,CB, CC,CE, CF	3	07 20700	88512D ACTUATOR ZEE SUPPORT	
CD	3	03 01633	92651C ACTUATOR SUPPORT BRKT 1.0"	
DA,DB, DD-DG	3	03 01628	92126D ACTUATOR ZEE SUP 3"AIRCYL	
DC,DH-DL	3	03 01628L	92126# ACT ZEE SUP 3" AIRCYL-LEFT	
AA,AC	4	03 01632A	90507# ACTUATOR BEARING SUPPRT-LEFT	
AB,AD-AF, CD	4	03 01632	90507C ACTUATOR BEARING SUPPORT-1"	
BA,BC,BF, BH,CA	4	07 20702L	88512# ACTUATOR BEARING SUPPORT-LFT	
BB,BD,BE, BG,BJ,CB, CC,CE, CF	4	07 20702A	88512C ACTUATOR BEARING SUPPORT	
DA,DB, DD-DG	4	03 01629	92023C ACTUATOR BEARING SUPPORT 3	
DC,DH-DL	4	03 01629L	92023# ACT BEARING SUPPORT 3"-LEFT	
AA-AF,CD	5	54E001PABA	89281B ASSY=1/4"PRESSBEARING	
BA-BJ, CA-CC,CF, DA-DL	5	54E002PABA	89281B ASSY=5/16"PRESSBEARING	
AA,AB,AF, CD	6	03 01631	91507B+VALVE CRANK N.C.WATTS 1.0"	
AC-AE	6	03 01631A	88381B VALVE CRANK N.O.WATTS-1.0"	
BA,BB,BE, BF,BG,CA, CB,CE	6	07 20703A	91507B VALVE CRANK N.C.WATTS 1.5"	
BC,BD,BH, BJ	6	07 20703B	88153B VALVE CRANK N.O.WATTS 1.5"	
DA,DC,DF, DK	6	03 01624B	92061B CRANK=NC 2"BALVAL .626 STEM	
DB,DD,DE, DG,DH,DJ, DL	6	03 01624C	92061B CRANK=NO 2"BALVAL .626 STEM	
all except CC,CD	7	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	
CC,CD	7	15N117	RDMACSCR 10-24UNC2X3/8SS18-8	
all	8	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
all	9	15N130	RDMACHSCR 10-24UNC2A X 1/2 SS18-8	
all	10	15U135	FLATWASH#10 .4370DX.203IDX.04TSS188	



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**Parts List, cont.—Universal Actuators & Mounting Hardware for Watts Ball Valves**

Used In	Item	Part Number	Description	Comments
all	11	15G126	01Z HXLOCKNUT NYLON 10-24 UNC SS NM	
all	12	15N159	HEXCAPSCR 1/4-20UNC2AX7/16 18-8SS	
all	13	15G170	HEXNUT 1/4-20UNC2 SS18-8	
AA-AF, BE, CD, DA-DL	14	07 20703D	89354B WASHER=2.00"WATTS CRANK	
BA-BD, BF-BJ, CA-CC, CE, CF	14	07 20703C	89354B WASHER=1.25-1.50 WATTS CRANK	
all	15	02 15893	92683B SPACER=BALL VALVE CRANK STEM	
all	16	15U188	01Z FLTWASH 1/4 STD COMM SS18-8	
all	17	15N186	HXCAPSCR 1/4-20UNC2X3/4SS18-8	
all	18	15G164	01Z HX THIN LOCKNUT NYL1/4-20 SS	
BA, BB, BE, BJ, CE	19	03 01661A	92271B BRKT=RHT AIR CYL SUPT-S/S	
DA, DB, DD-DG	19	03 01625A	92271B 3" AIR-CYL SPT BRK R-SIDE RT	
DC, DH-DL	19	03 01625B	92271# 3" AIR-CYL SPT BRK R-SIDE LT	
BE, BG, BJ, CE-CF	20	03 01662A	92271B BRKT=LFT AIR CYL SUPT-S/S	
DA, DB, DD-DG	20	03 01625C	92271B 3" AIR-CYL SPT BRK L-SIDE RT	
DC, DH, DJ-DL	20	03 01625D	92271# RIGHT=3"AIR CYL SUPT BRKT	
all	21	15K190S	HXCAPSCR 1/2-13UNC2AX2.5 FLTHRD SS	
all	22	27B24S0K1P	SPACER ROLL.5ID1.75L.062T 304 SS	
all	23	15U318S	FLATWASH 1.12ODX.656IDX.09T 304 SS	
AB, DA-DL	24	15G234NS	HXLOCKNUT NYL 1/2-13UNC2 SS18-8	
all	25	15K180S	HXCAPSCR 1/2-13UNCAX2 18-8SS	
all	26	27B24SSK1F	SPACER ROLL.5ID1.25L.062T S/S	
all	27	15U310	LOKWASHER REGULAR 1/2 SS18-8	
all	28	15G231S	HXFJAMNUT 1/2-13UNC2B SS18-8	
AA-AF	29	03 01633	92651C ACTUATOR SUPPORT BRKT 1.0"	
BA-BJ	29	07 20771	88407C ACTUATOR SUPPORT BRKT 1.25"	
CA-CF	29	07 20770	88243B ACTUATOR SUPPORT BKT 1+1/2"	
DA-DL	29	03 01626	89473B ACTUATOR SUPPORT BRKT 2"VAL	

# Air Cylinders for 2" Watts Ball Valves

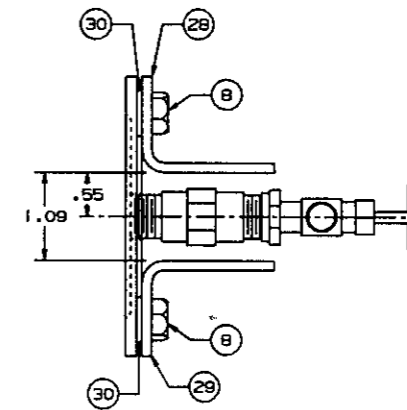
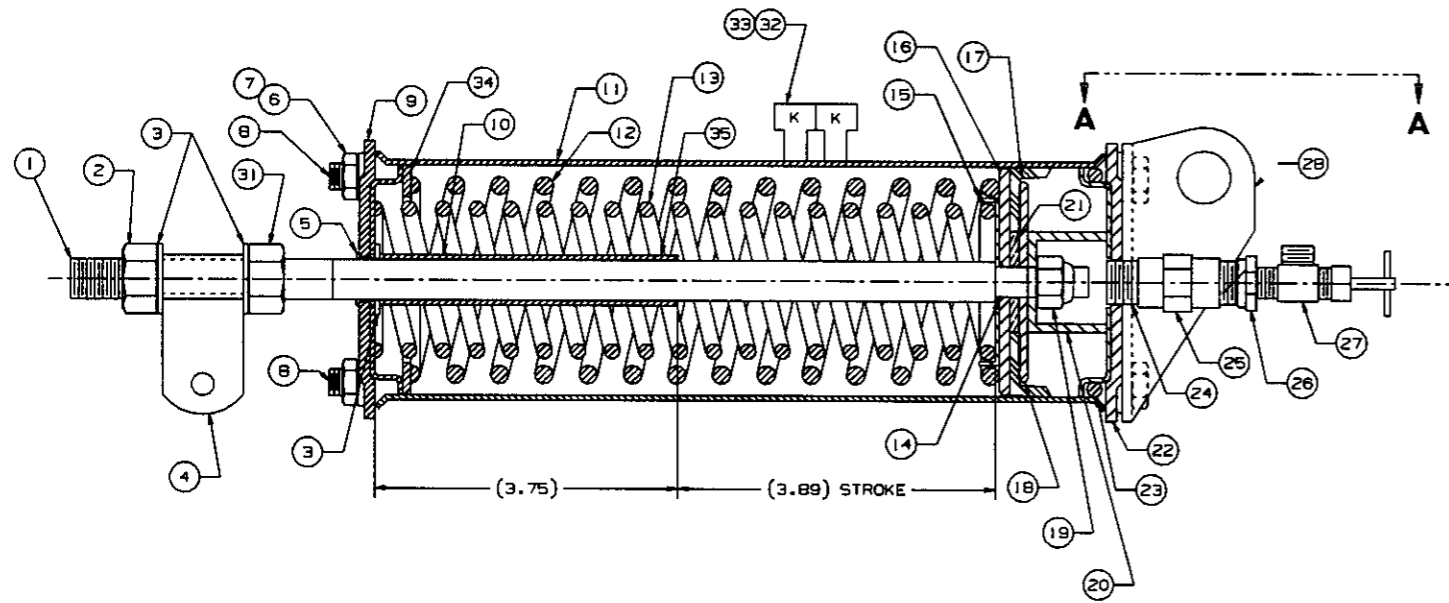
BMP920006/96067V  
(Sheet 1 of 2)



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BMP920006/96067V (1 of 2)

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VIEW A-A

## NOTES:

1. LUBRICATE SPRINGS WITH A LAYER OF GREASE BUT NOT SO MUCH AS TO CAUSE EXCESS TO LEAK OUT.
2. DO NOT GREASE THE CUP, ITEM 17! DOING SO WOULD BLOCK THE AIR LINES.



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BMP920006/96067V (2 of 2)

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**Parts List—Air Cylinders for 2" Watts Ball Valves**

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
ASSEMBLIES				
	A	SA 10 057C	95222D AIRCYL=3.0ODX3.89ST171/176CD	
	B	SA 10 057D	95222# AIRCYL=3.0ODX3.89ST171/176SS	
COMPONENTS				
all	1	03 01615	94191B PISTON STEM 3"AIRCYL	
all	2	15G234NS	HXLOCKNUT NYL 1/2-13UNC2 SS18-8	
all	3	15U243S	FLAWASHER 7/8ODX33/64IDX16GA 18-8SS	
all	4	03 01209A	92536B STEMCLIP H=1.313 BALVAL S/S	
all	5	54E220	NYLINER 8L2FF BUSHING 1/2X9/16X.140	
A	6	15G191	HXFINJAMNUT 5/16-24UNC2 ZINC GR2	
B	6	15G190	HEXFINJAMNUT 5/16-18NC2 SS18-8	
A	7	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
B	7	15U205	LOCKWASHER MEDIUM 5/16" 18-8SS	
A	8	02 10585H	91142# TIE BOLT=5/16-18X10LNG PLTD	
B	8	02 10585G	91142# TIE BOLT=5/16-18X10LG (SS)	
A	9	03 01623	90351C CYLINDER HEAD 3"AIRCYLINDER	
all	9	03 01623A	90351# CYLHEAD 3"AIRCYLINDER-S/S	
all	10	27B32024SS	SPACER ROLL .51IDX.6250DX1.5L STN S	
all	11	03 01621	94266BTUBE 2+7/8 AIR CYLINDER 9"	
all	12	03 01617C	92133B SPRING=FL11.5SR23.5#MD2.368	
all	13	03 01616C	92133B SPRING=FL11.35SR20.5MD1.811	
all	14	60C106	ORING 5/16ID 1/16CS BN 70 DURO #011	
all	15	03 01620A	92133B 3"AIR CYL=SPRING RETAINER	
all	16	X3 01619A	92066# MACH=3"ACYL BRASS PISCUP WSH	
all	17	02 19302	93356B PISTON CUP 2+7/81D CYLINDER	
all	18	03 01618	91522B PISTON CUP WASHER 3"AIRCYL	
all	19	15G220	02Z LTHX THIN LOKNUT 3/8-24 SSNTE	
all	20	03 01313S	85506B+STOP=AIRCYL W/2+11/16STR.SS	
all	21	03 01630	87506B 3"AIRCYL PSTN CUP COMPLMTWSH	
A	22	03 01622	88531# CYL HEAD TAPHOLE 3"AIRCYL SS	
B	22	03 01622A	88531# CYLHEAD TAPHOLE-3"ARCYL S/S	
all	23	60C134	ORING 2.5 ID 3/16CS BN 70 DURO #333	

**Parts List, cont.—Air Cylinders for 2" Watts Ball Valves**

Used In	Item	Part Number	Description	Comments
all	24	5N0ECLSBE2	NPT NIPPLE 1/4XCLS TBE BRASS 125#	
all	25	5SCC0EBE	NPT COUP 1/4 BRASS 125# #103	
all	26	5SB0E0CBEO	HEXPIP BUSH 1/4 X 1/8 BRASS 125#	
all	27	96H018	NEEDLE VALVE	
all	28	03 01627B	92023# LEFT=3"AIR CYL MNTG BRKT	
all	29	03 01627A	92023B RIGHT=3"AIR CYL MNTG BRKT	
all	30	15U200	FLATWASHER(USS STD) 5/16"ZNC PLT	
all	31	15G231S	HXFINJAMNUT 1/2-13UNC2B SS18-8	
all	32	20L601K	ID TAG NATL #1614 ALUM EMB LET "K"	
all	33	27B2400K0N	SPACER ROLL.5ID .687L .062T STL/ZNC	
all	34	03 01620E	92136B.WASHER=2.86ODX2.06IDX.105THK	

# Watts Ball Valves and Repair Kits

BMP920007/96066V  
(Sheet 1 of 2)

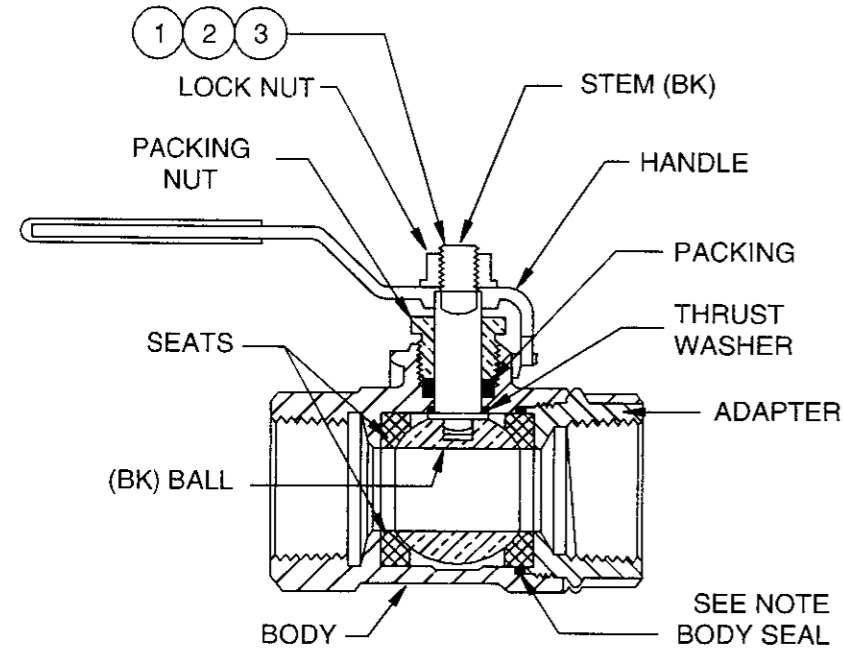


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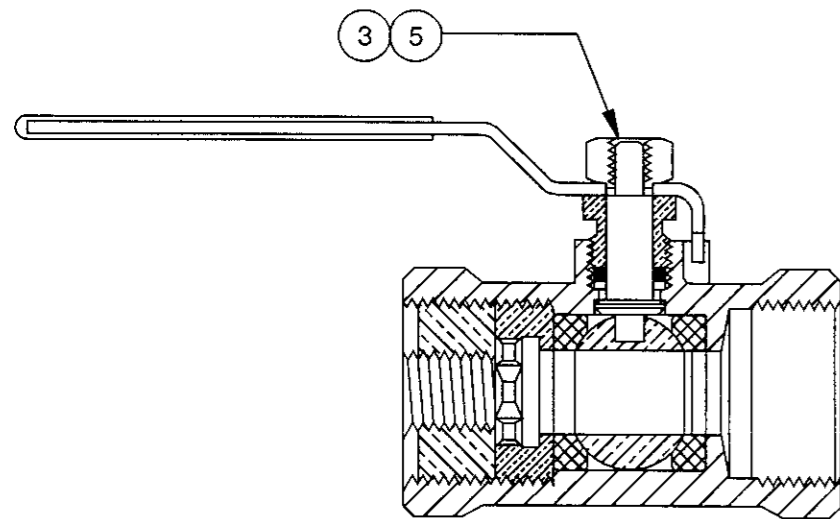
BMP920007/96066V (1 of 2)

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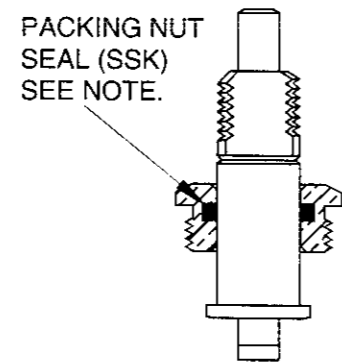
## BALL VALVES WITHOUT ACTUATOR PADS FOR MANUAL OPERATION



1/2" BRONZE OR 1/2", 3/4" STAINLESS  
NO REPAIR KITS

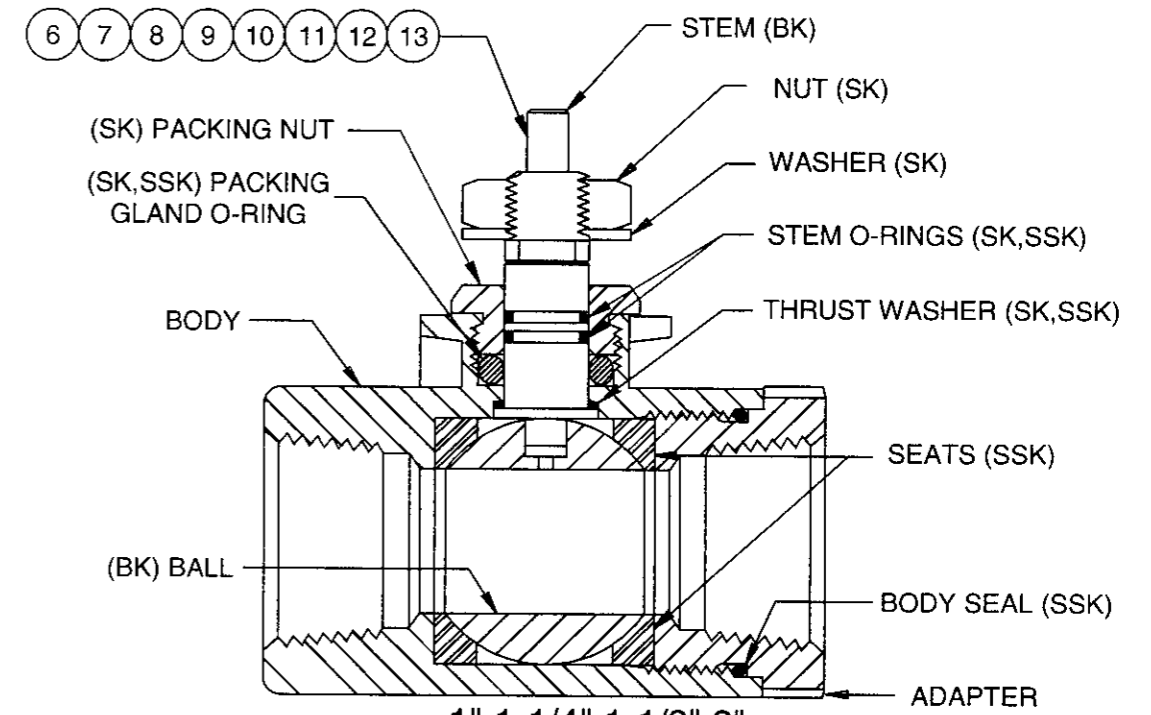


3/4", 1"  
BRONZE  
NO REPAIR KITS



DETAIL  
OLD STYLE STEM

## AIR OPERATED BALL VALVES



(For Bracketry and Mounting Hardware, See BMP920005. For Air Cylinders that Operate Watts Ball Valves, See BMP920006.)

### HOW TO USE THIS DRAWING:

The ball valves are separated by size, material, and type of operation. Find the cross section which shows your ball valve (example 1-1/2" bronze air operated). See the parts list for the item number which represents your ball valve (1-1/2" bronze air operated would be item 10 on the parts list). For valves that offer repair kits the internal parts are labeled and marked as to which kit they are found in:

- (BK) part of Ball Kit
- (SK) part of Stem Kit
- (SSK) part of Seat/Seal Kit

For the part number of the Seat/Seal Kit for item 10 (1-1/2" bronze air operated valve) see the parts list and look for item 10SSK, likewise the Stem Kit will be 10SK.

### NOTE:

AIR OPERATED VALVES: (SSK) kits for air operated ball valves include all parts required to repair either our old style or new style stems. A packing nut seal is provided to repair our old style stems which had a seal in the packing nut (see Detail). Our new style stem uses a double o-ring design.



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BMP920007/96066V (2 of 2)

Litho in U.S.A.

**Parts List—Watts Ball Valves and Repair Kits**

Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
ASSEMBLIES				
none				
COMPONENTS				
all	1	96D034	04Z BALLVALVE 1/2" WATTS #6400-SS	1/2"BRONZE-MANUAL, NO KITS
all	2	96D040WSS	01Z 1/2" BALLVALVE S/S WATTS#S-8000	1/2"STAINLESS-MANUAL
all	002BK	96V040BK	BALL KIT WATTS #BV4SSA6	
all	002SSK	96V040SSK	01Z REPKIT 1/2"VAL WATTS#3SSK-02-RK	
all	3	96D050A	01Z 3/4"BALLVALVE BRZ WATTS#B6100	3/4"BRONZE-MANUAL, NO KITS
all	4	96D055WSS	01Z 3/4"BALLVALVE S/S WATTS#S-8000	3/4"STAINLESS-MANUAL
all	004BK	96V055BK	BALL & STEM KIT WATTS #4BSK-SSRK	
all	004SSK	96V055SSK	01Z REPKIT 3/4"VAL WATTS#4SSK-02-RK	
all	5	96D084	01Z BALL VALVE 1" WATTS#B6100 BRZ	1" BRONZE-MANUAL , NO KITS
all	6	96D085WEXS	07Z BALVAL 1" BRZ WATTS#B6400SSZ107	1" BRONZE-AIR OPERATED
all	006BK	96V085BK	BALL KIT WATTS #1-BALL-RK-Z107	
all	006SK	96V085SK	02Z STEM KIT 1" WATTS#1-ST-RK-Z107	
all	006SSK	96V085SSK	02Z REPKIT 1"BALVAL#1SSK-02-KK-Z107	
all	7	96D085WSS	07Z BALVAL 1" SS WATTS S8000-Z107	1" STAINLESS-AIR OPERATED
all	007BK	96V085BK	BALL KIT WATTS #1-BALL-RK-Z107	
all	007SK	96V085SK	02Z STEM KIT 1" WATTS#1-ST-RK-Z107	
all	007SSK	96V085SSK	02Z REPKIT 1"BALVAL#1SSK-02-KK-Z107	
all	8	96D086WEXS	08Z BAVAL 1+1/4BRZ WATS#B6400SSZ107	1-1/4"BRONZE-AIR OPERATED
all	008BK	96V086BK	BALL KIT WATTS #1.25-BALL-RK-Z107	
all	008SK	96V086A7SK	02Z STEMKIT 1.25-1.5-ST-RK-Z107	

**Parts List, cont.—Watts Ball Valves and Repair Kits**

Used In	Item	Part Number	Description	Comments
all	008SSK	96V086SSK	02Z REPKIT 1.25BALVALSSK-02-RK-Z107	
all	9	96D086WSS	08Z BAVAL 1+1/4"SS WATTS S8000-Z107	1-1/4"STAINLESS-AIR OPER.
all	009BK	96V086BK	BALL KIT WATTS #1.25-BALL-RK-Z107	
all	009SK	96V086A7SK	02Z STEMKIT 1.25-1.5-ST-RK-Z107	
all	009SSK	96V086SSK	02Z REPKIT 1.25BALVALSSK-02-RK-Z107	
all	10	96D087WEXS	09Z BAVAL 1+1/2BRZ WATS#B6400SSZ107	1-1/2"BRONZE-AIR OPERATED
all	010BK	96V087BK	BALL KIT WATTS #1.5-BALL-RK-Z107	
all	010SK	96V086A7SK	02Z STEMKIT 1.25-1.5-ST-RK-Z107	
all	010SSK	96V087SSK	02Z REPAIR KIT 1.5" BALL VALVE	
all	11	96D087WSS	08Z BAVAL 1+1/2"SS WATTS S8000-Z107	1-1/2"STAINLESS-AIR/ OPER.
all	011BK	96V087BK	BALL KIT WATTS #1.5-BALL-RK-Z107	
all	011SK	96V086A7SK	02Z STEMKIT 1.25-1.5-ST-RK-Z107	
all	011SSK	96V087SSK	02Z REPAIR KIT 1.5" BALL VALVE	
all	12	96D088WEXS	09Z BALVAL 2" BRZ WATTS#B6400SSZ107	2"BRONZE-AIR OPERATED
all	012BK	96V088BK	BALL KIT WATTS #2-BALL-RK-Z28	
all	012SK	96V088SK	03Z STEM KIT 2" WATTS#2-ST-RK-Z107	
all	012SSK	96V088SSK	02Z REPKIT 2"VAL WAT2SSK-02-RK-Z107	
all	13	96D088WSS	09Z BALVAL 2" SS WATTS S8000-Z107	2"STAINLESS-AIR OPERATED
all	013BK	96V088BK	BALL KIT WATTS #2-BALL-RK-Z28	
all	013SK	96V088SK	03Z STEM KIT 2" WATTS#2-ST-RK-Z107	
all	013SSK	96V088SSK	02Z REPKIT 2"VAL WAT2SSK-02-RK-Z107	

**DRAWING**

(See other page for parts list, if applicable.)

**PADDLEWHEEL FLOW SENSOR**

**BMP920025/92662V (Page 19)**

**Identification and Description**

The flow sensor is installed in a pipe line to measure flow rate. The flow passing by the flow sensor paddlewheel rotates the paddlewheel, moving the magnets past a coil in the transducer body. An AC voltage is induced in the coil by the rotating magnets of the paddlewheel.

Both frequency and amplitude of the output of the coil are directly proportional to the velocity of the fluid flow in the pipe. A complete cycle occurs every time two of the paddlewheel blades go by the coil; therefore, two entire cycles are generated for each paddlewheel rotation.

**Safety Instructions**

**▲ DANGER ▲**

**SHOCK HAZARD** will cause death or severe injury.



☛ **Lock OFF** and tag out power to machine at wall disconnect. Power switches on machine and control box disable only control circuit power in electrical boxes.

**▲ CAUTION ▲**

Turn off fluids before removing flow sensor from pipe line.

**Maintenance**

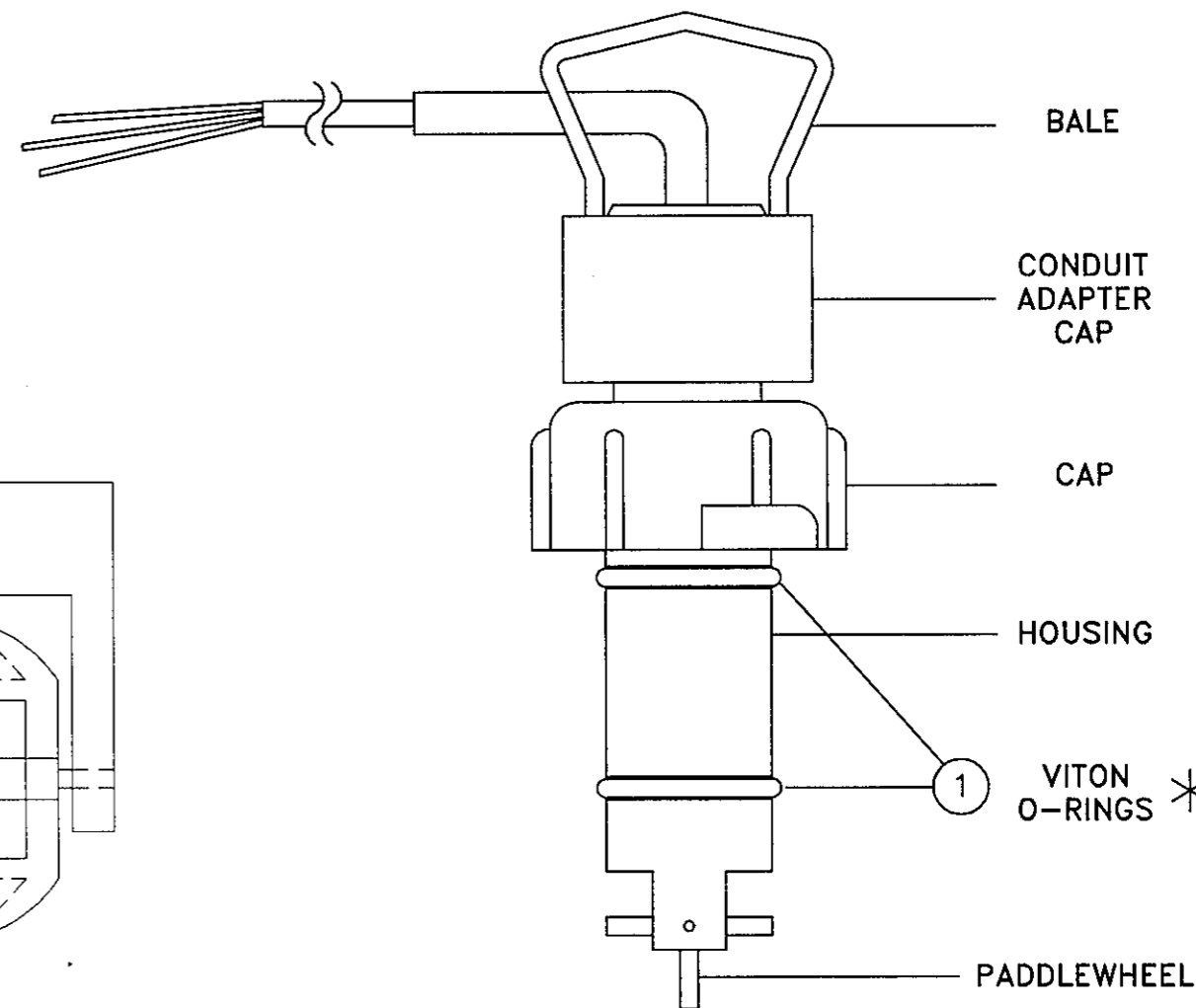
The flow sensor requires minimal care. Check your flow sensor every three months until actual maintenance intervals can be determined. After removing flow sensor:

1. Paddlewheel must turn freely, if not, see troubleshooting below.
2. Inspect flow sensor electrical connections and cable.
3. Check O-rings and lubricate with G.E. Silicone Compound G660 or similar. **Keep paddlewheel and pin free of lubrication** (replacement paddlewheels and other parts are available from manufacturer).

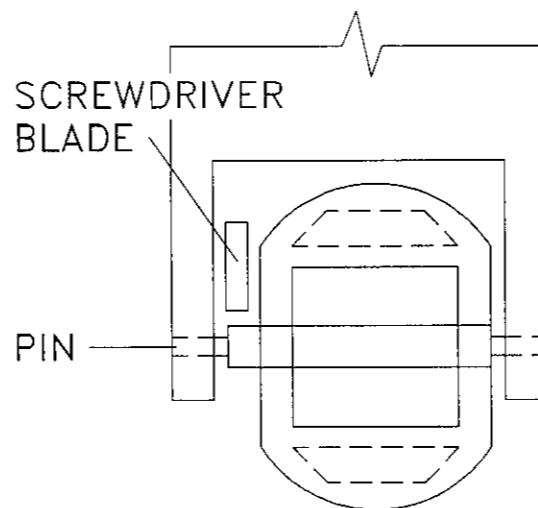
**Troubleshooting**

The paddlewheel is designed to rotate on the shaft; the shaft should not rotate with respect to the housing. The paddlewheel must turn freely. If it does not, clean the paddlewheel assembly as follows:

1. Remove the flow sensor from the pipe and insert the plug into the pipe fitting. Clean any external debris from the paddlewheel.
2. Using a small flat-bladed screwdriver, gently pry one of the paddlewheel mounting ears away from the pin (see FIGURE 2).
3. When one end of the pin is free, gently work the paddlewheel and pin out of the remaining mounting ear.
4. Thoroughly clean the pin, paddle, and pin holes with a wire brush and/or toothpick along with alcohol and/or soap and water.
5. To reinstall the paddlewheel and pin, reverse steps 1, 2, and 3.
6. After cleaning, the paddlewheel should spin freely without binding or sticking.



**FIGURE 1: FLOW SENSOR**



**FIGURE 2: REMOVAL OF PADDLEWHEEL PIN**



**PARTS LIST**

(See other page for drawing.)

**PADDLEWHEEL FLOW SENSOR**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A 001	30F515 30F515R01	FLOW SENSOR SIGNET #MK515-PO VITON O-RING FOR FLOW SENSOR SIGNET ***** END OF PARTS LIST *****	COMPLETE FLOW SENSOR REPAIR KIT O-RINGS(2 PER)

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

1. The part number for the entire assembly depicted in the drawing or a major sub-assembly thereof, and/or
2. The range of machine models this drawing applies to.

If more than one reference item appears, this usually means this drawing applies to more than one assembly (and thus to more than one range of machines).

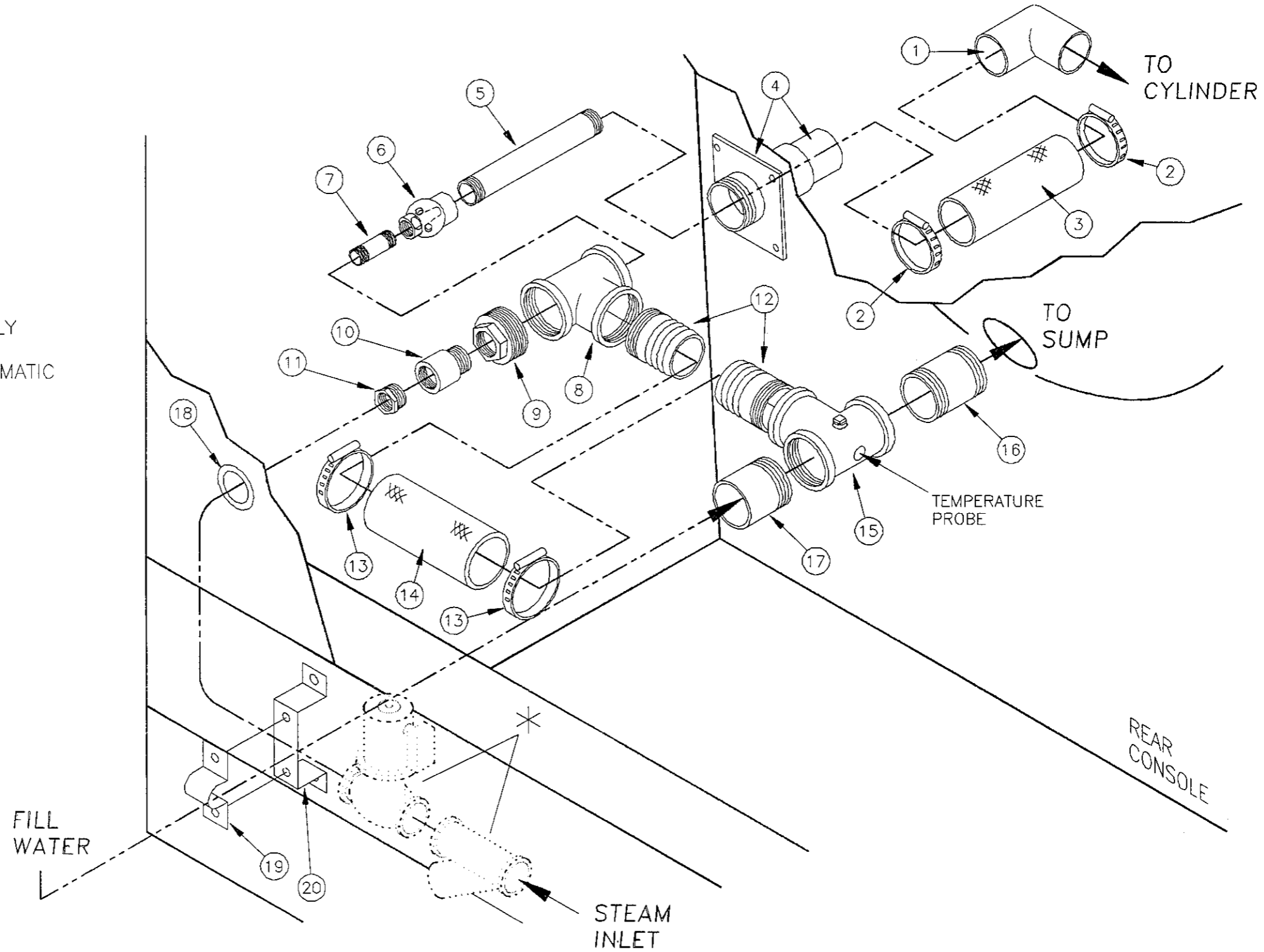
**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.

**DRAWING**

(See other page for parts list, if applicable.)

**STEAM INSTALLATION**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

\* FOR STEAM INLET ASSEMBLY REPAIR PARTS - SEE WATER/STEAM/DRAIN SCHEMATIC BMP920015.



**PARTS LIST**

(See other page for drawing.)

**STEAM INSTALLATION**

**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	AD 33 028B	90482@*STM INLET ASSY=N4S 3020 120V	REFERENCE 30020M5P/M7P
00B	AD 33 028C	90482@*STM INLET ASSY=N4S 3015 120V	REFERENCE 30015M4P/M6P
00C	AD 33 028D	90482@ STEAM INLET ASSY 3020 240V	REFERENCE 30020M5J/M7J
00D	AD 33 028E	90482@ STM INLET ASSY= 3015 240V	REFERENCE 30015M4J/M6J
00E	A33 10500	77427Q* STEAM INJECTOR ASSY C4/C6M	00B,00D(CONTAINS 004-012)
00F	A33 10500A	77427Q*STEAM INJECTOR ASSY C5M	00A,00C(CONTAINS 004-012)
00G	A33 10600	77427M*TEE ASSY-STEAM 2 MOTOMETER	00A-00D(CONTAINS 015-017)
00H	A33 10600A	77427M*TEE ASSY-STEAM 3 MOTOMETER	00A-00D(CONTAINS 015-017)
00J	A33 10700A	90482#\$STEAM INLET ASSY 120V60C+	00A,00B
00K	A33 10700B	90482# STEAM INLET ASSY 240V50/60	00C,00D
001	W2 03608	92042B* STEAM ELBOW=C4M+C6M ONLY	
002	27A075	T-BOLT HOSECLAMP 2.75"-3.06"	
003	60E301A10A	HOSE= *2.5"ID PE X10"	
004	W2 03609	74488B* STEAMPIPE WLMT=3015CWM L=9"	00E,00F
005	51LQ1AG07A	NIPPLE PIPE 1 X 7 GALSTL	00E,00F
006	27A500	STEAM HEATER 3/4" BRZ. PENB.#NWH	00E,00F
007	51LQ0PG03A	NIPPLE PIPE 3/4 X 3 GALSTL	00E,00F
008	51V108C	TEE PIPE 2+1/2X2+1/2X2 GALMAL 150#	00E,00F
009	51A059	HEXPIPBUSH 2+1/2X1 GAL 125#CI	00E,00F
010	51E037	01Z COUP 3/4"F W/1"M NPTONOD 304S	00E,00F
011	51A032	HEXPIPBUSH 3/4X1/2 GAL 150#	00E,00F
012	02 15847C	85426B ADAPTER,CARBSTL2-1/2HOSX2NPT	00E,00F
013	27A075	T-BOLT HOSECLAMP 2.75"-3.06"	
014	60E301A10A	HOSE= *2.5"ID PE X10"	
015A	02 03657	77406A SPECIAL-TEE=2HOLES=STEAM CWM	00G
015B	02 03657A	77406# SPECIAL-TEE=3HOLES=STEAM CWM	00H
016	51LQ2AD02M	05Z 2 X2+5/8" STD TOE NON-STD	00G,00H
017	02 03447	91247B FILL TUBE NIPPLE (2X3TOE)GAL	00G,00H
018	12P11ESB	SNAPBUSH 1.25MH X.94 T=1/8SB1250-15	00A-00D
019	12K077	STRAP 1/2"HVYCONDUIT 2HOLE VICTR23S	
020	02 14170	89526B SUPPORT=PIPE SUPPLEMNT STEAM ***** END OF PARTS LIST *****	

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

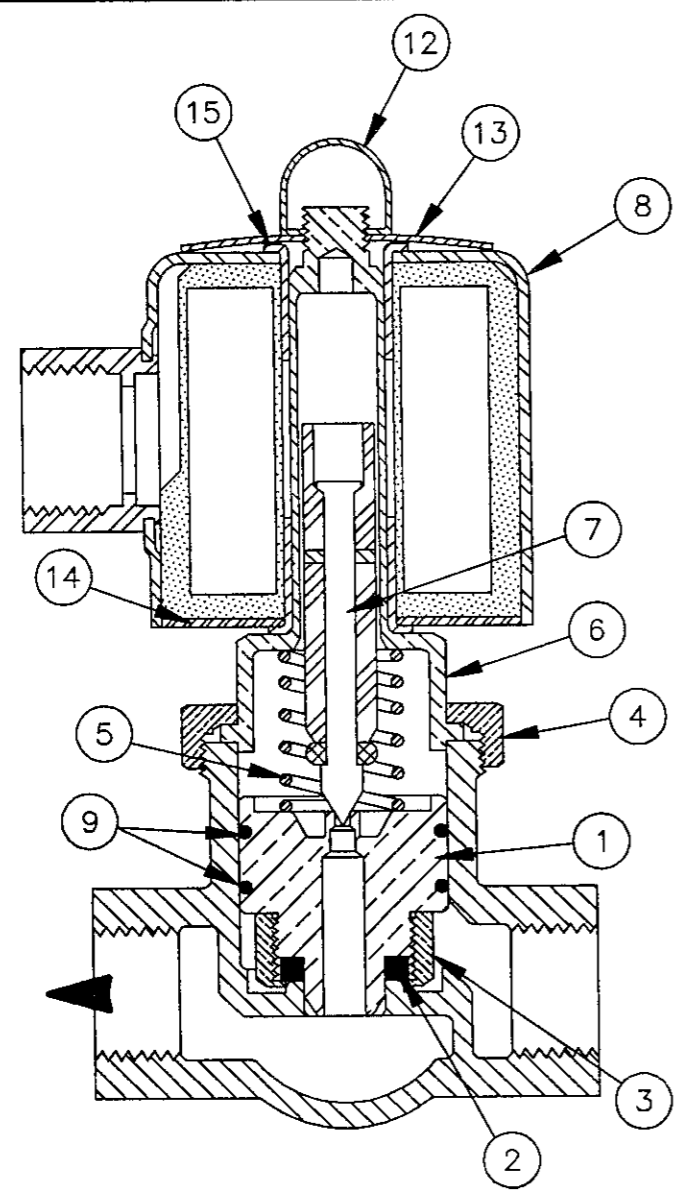
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2. The range of machine models this drawing applies to.

If more than one reference item appears, this usually means this drawing applies to more than one assembly (and thus to more than one range of machines).

**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.

**DRAWING AND PARTS LIST**  
 (See other page for more,  
 if applicable.)

**1/2" & 3/4" HAYES ELECTRIC STEAM VALVES**



**GENERAL MAINTENANCE:**

1. COUPLING NUTS MUST NOT BE TIGHTENED EXCESSIVELY. USE A STEADY PULL WITH A 14" OR SMALLER WRENCH. DO NOT HAMMER ON NUT OR WRENCH. LIMIT MAXIMUM TORQUE ON COUPLING NUT TO 600LB/INCH. EXCESSIVE TIGHTENING OF COUPLING NUT WILL DISTORT VALVE BODY CAUSING THE PISTON BODY TO JAM AND THE VALVE TO SHUT OFF.
2. IF THE VALVE LEAKS BETWEEN THE BODY AND BONNET, LOOSEN THE COUPLING NUT AND TURN THE BONNET SLIGHTLY, THEN TIGHTEN THE COUPLING NUT. IF THE VALVE STILL LEAKS, REPEAT THE OPERATION. IN NO CASE MUST THE COUPLING NUT BE TIGHTENED EXCESSIVELY.

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	96P039	01Z 1/2"STEAMVALVE 24V50/60C 150PSI	1/2" VALVE- 24 VOLT
00B	96P039A37	01Z 1/2"STEMVALVE 120V50/60C 150PSI	1/2" VALVE- 120 VOLT
00C	96P039A71	01Z 1/2" STEMVALVE 240V50/60 150PSI	1/2" VALVE- 240 VOLT
00D	96P040E	01Z 3/4"STEAMVALVE 24V50/60C 150PSI	3/4" VALVE- 24 VOLT
00E	96P040A37	01Z 3/4"STEMVALVE 120V50/60C 150PSI	3/4" VALVE- 120 VOLT
001A	96V224S	PISTON ASSY. STEAMVALE HAYS#6332-PC	00A,00B,00C
001B	96V224SA	PISTON ASSY. STEAMVALE HAYS#7798-PC	00D,00E
002A	96V225S	PISTON SEAT WASH HAYS #5553-PC	00A,00B,00C
002B	96V225SA	PISTON SEAT WASH HAYS #5567-PC	00D,00E
003A	96V248	SEATWASHERNUT#2222-PC=96P014+96P016	00A,00B,00C
003B	96V226	SEAT WASNUT HAYS#6030=96P053&220	00D,00E
004A	96V246	COUPLING NUT HAYS#6303-P=96P014+016	00A,00B,00C
004B	96V254	COUPLING NUT HAYS#6028-P FOR 96P053	00D,00E
005A	96V244	PISTON SPRING FOR HAYS STYLE 3108	00A,00B,00C
005B	96V222A	PISTON SPRING HAYS 2488-PC	00D,00E
006A	96V242	BONNET FOR HAYS STYLE 3108 #3021-PC	00A,00B,00C
006B	96V260	BONNET HAYS#3192-PC FOR 96P151	00D,00E
007	96V223	PLUNGER HAYS #3195-3PC	
008A	96P040V24	COIL 1/2"&3/4" STEAMVALVE 24V50/60C	00A,00D
008B	96P040V37	COIL 1/2"&3/4"STEAMVALVE 120V50/60C	00B,00E
008C	96P040V71	COIL 1/2"&3/4" STEAMVALVE 240V50/60	00C
009A	96V222TS	TEFLON SPLITRING STEMVAL HAY6334-PC	00A,00B,00C
009B	96V222TSA	TEFLON SPLITRING STEMVAL HAY6331-PC	00D,00E
012	96V250	PALNUT HAYS #3069-PC	
013	96V251	SPRING WASHER HAYS#3600-PC	
014	96V264	BOTTOMPLATE (COIL) #223601	
015	96V262	FERRULE (COIL SLEEVE) #2239PC	
***** END OF PARTS LIST *****			

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

1. The part number for the entire assembly depicted in the drawing or a major sub-assembly thereof, and/or
  2. The range of machine models this drawing applies to.
- If more than one reference item appears, this usually means this drawing applies to more than one assembly (and thus to more than one range of machines).

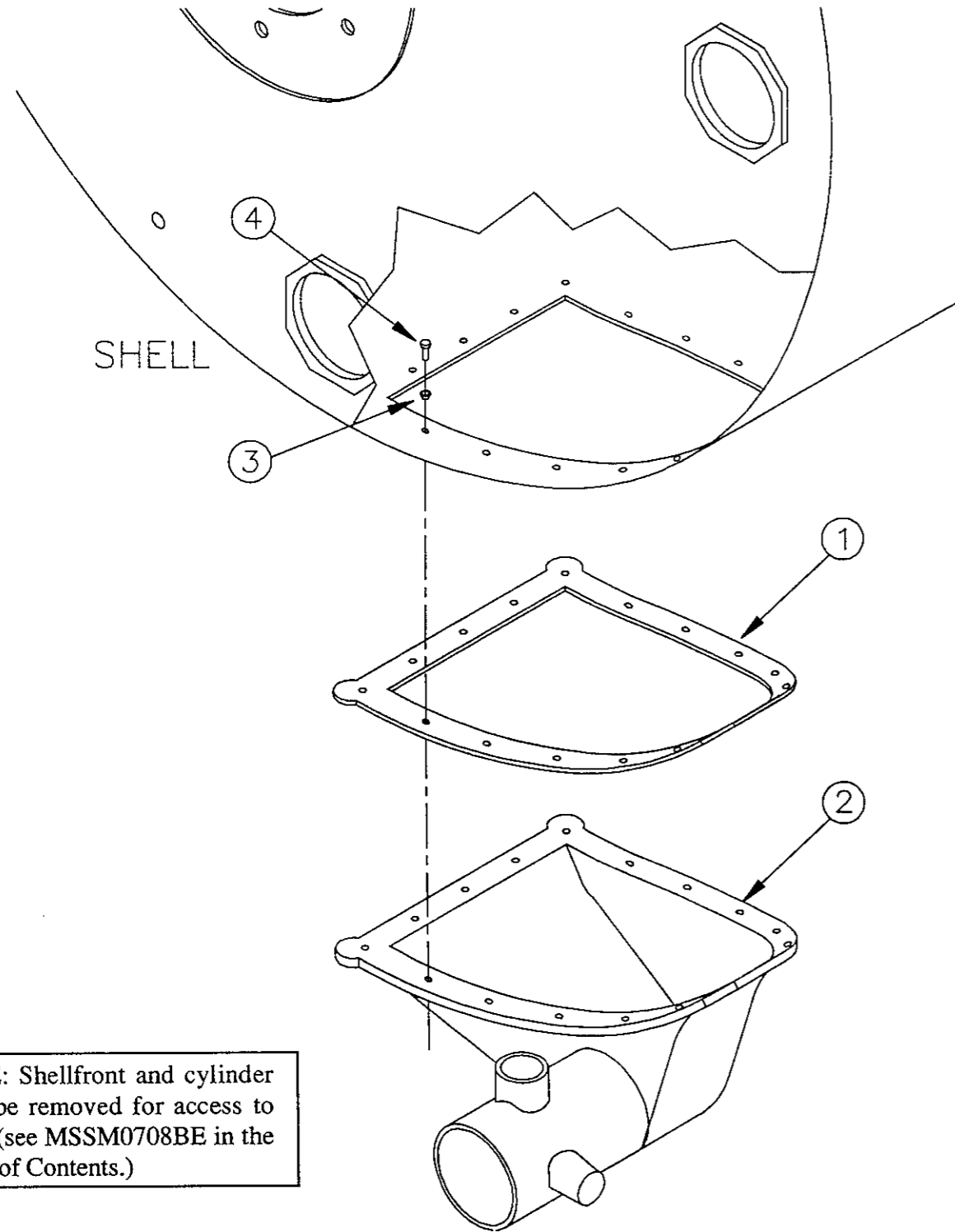
**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.

**DRAWING AND PARTS LIST**

(See other page for more, if applicable.)

**DRAIN SUMP INSTALLATION**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920014/93251V (Page 24)



NOTE: Shellfront and cylinder must be removed for access to sump (see MSSM0708BE in the Table of Contents.)

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
001	02 03366A	90493C DRAIN SUMP GASKET 1/8"EPDM	
002	02 03332A	79033D BODY=SUMP-1608 GLASTIC	
003	24G018N	ROLLED WASHER .194"ID NYLTITE #10W	
004	15P050AB	02Z TRDFRM-AB PANHD10-16X3/4 SS 410	
***** END OF PARTS LIST *****			

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

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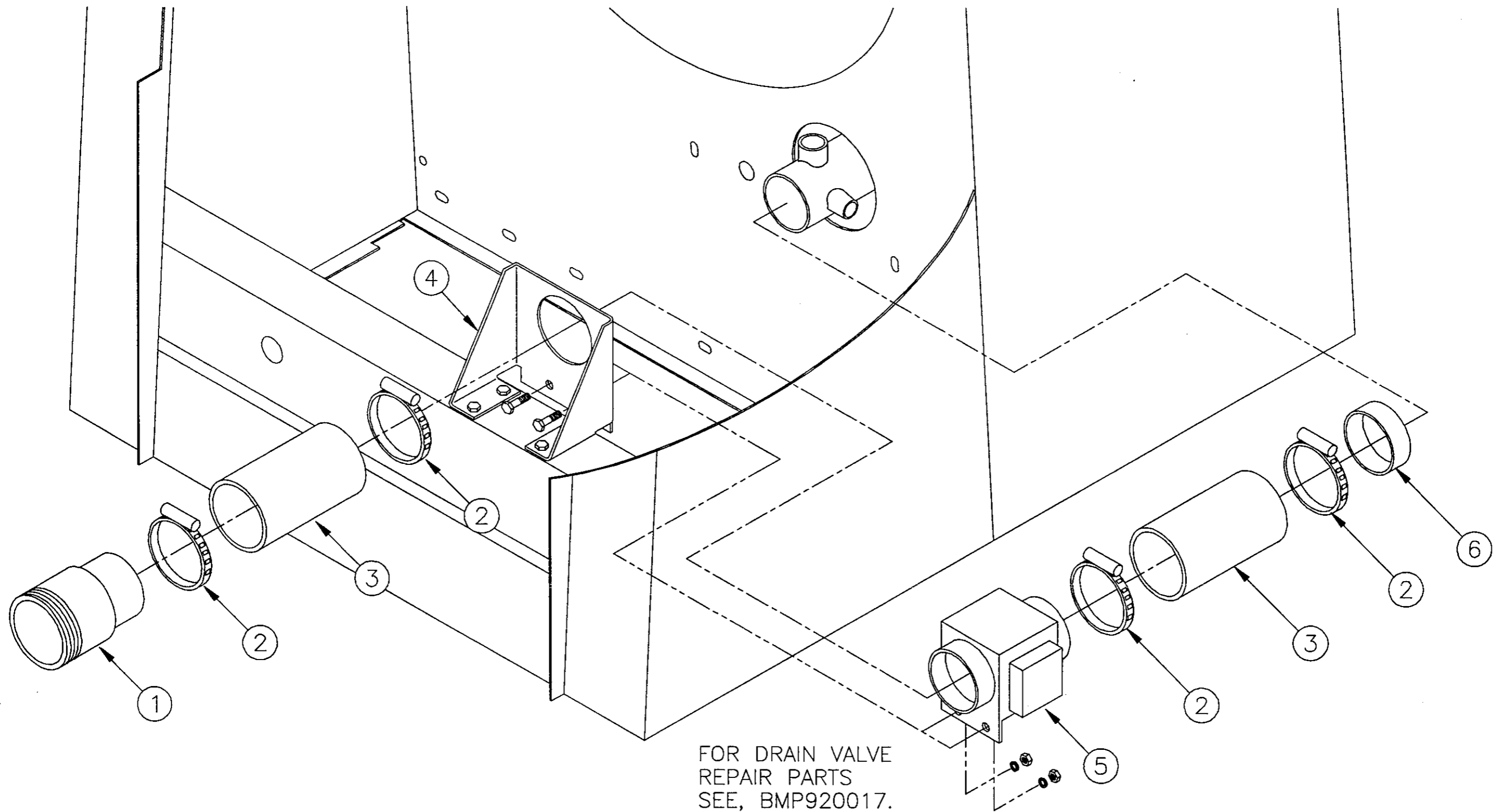
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**Component Item Numbers**—For any item on the drawing (e.g., item ①), there may be several corresponding items on the parts list (e.g., 001A, 001B, 001C, etc.) which are similar components on different assemblies. "How Part Is Used In Assembly" identifies which components apply to your machine, by listing either the machine model, or the reference item number from the top of the parts list (e.g., 00A, 00B, 00C, etc.), or a particular characteristic (e.g., bronze or stainless steel), or special ordering information, such as a repair kit number.

DRAWING  
(See other page for parts list,  
if applicable.)

**DRAIN VALVE INSTALLATION**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920020/93251V (Page 25)



FOR DRAIN VALVE  
REPAIR PARTS  
SEE, BMP920017.

**PARTS LIST**

(See other page for drawing.)

**DRAIN VALVE INSTALLATION  
30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	AD 33 011D	92426# FILL TUBE & DRAIN ASSY 240V	REFERENCE
00B	AD 33 011C	92426D FILL TUBE & DRAIN ASSY 120V	REFERENCE
001	W2 03329	92486B*DRAIN PIPE 3"NPT X 3"TUBE	
002	27A088S	HOSECLAMP 3+1/16-4.0 SS SCR HSS-56	
003	60E303A07A	92597N HOSE=3"ID X 7" LG.	
004	02 03412	92346C BRKT=DEPEND-O DUMPVAL MTG	
005A	96D350A71	04Z DRAINVAL 3"MTRDRIVE 240V 50/60C	00A
005B	96D350A37	04Z DRAINVAL 3"MTRDRIVE 120V 50/60C	00B
006	02 03412S	92346B SLEEVE=DUMPVALVE HOSE	
		***** END OF PARTS LIST *****	

**How to Read Parts List**

**Reference Item Numbers**—Items 00A, 00B, 00C, etc., or 00X, 00Y, 00Z, etc., appearing at the top of some parts lists, are for reference and provide:

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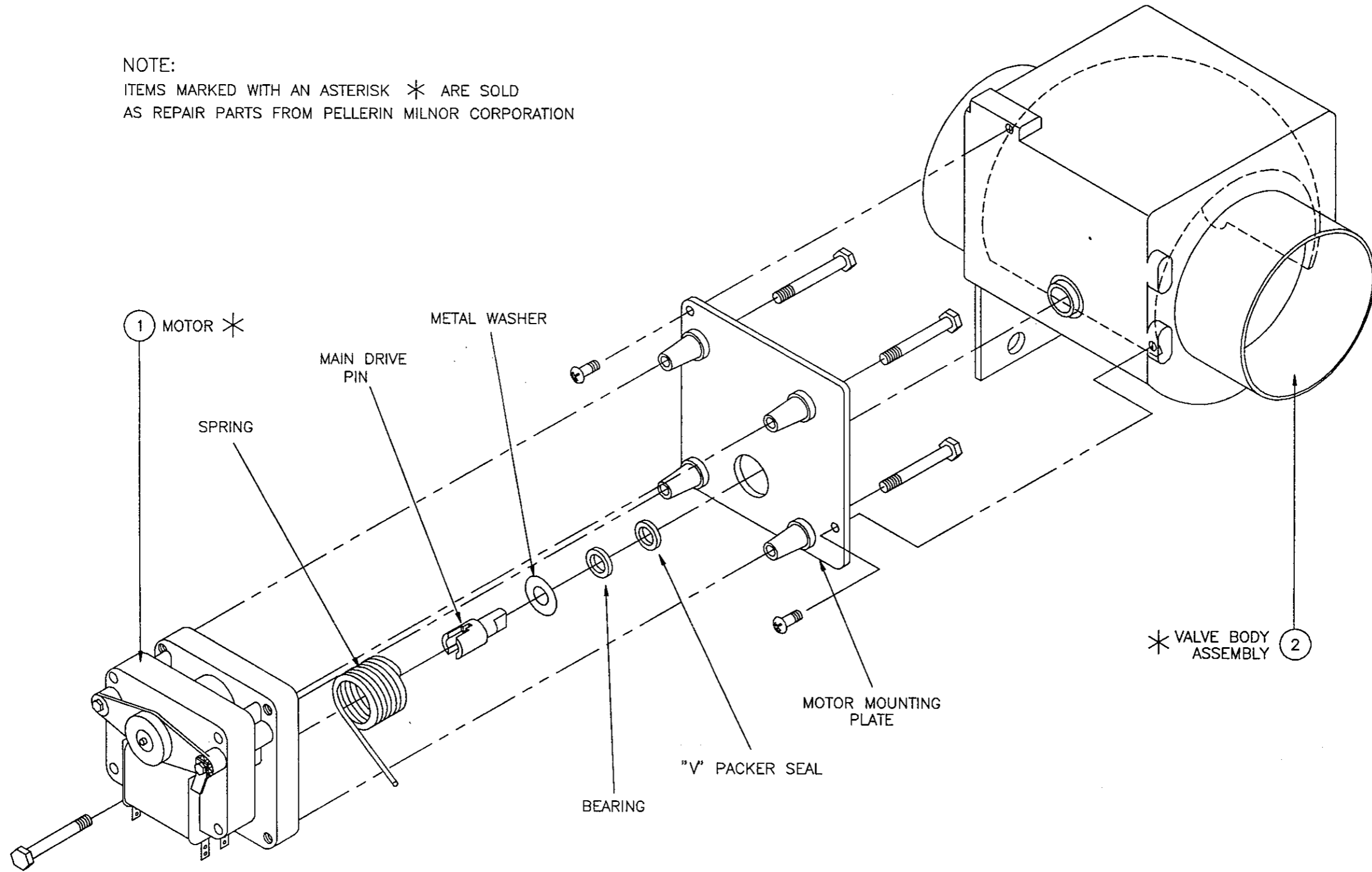
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**DRAWING**  
(See other page for parts list,  
if applicable.)

**ELECTRIC DRAIN VALVE**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

BMP920017/93251V (Page 27)

NOTE:  
ITEMS MARKED WITH AN ASTERISK \* ARE SOLD  
AS REPAIR PARTS FROM PELLERIN MILNOR CORPORATION





**PARTS LIST**

(See other page for drawing.)

**ELECTRIC DRAIN VALVE**

**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	96D350A37	04Z DRAINVAL 3"MTRDRIVE 120V 50/60C	REFERENCE ASSY.
00B	96D350A71	04Z DRAINVAL 3"MTRDRIVE 240V 50/60C	REFERENCE ASSY.
001A	96D35MTR37	01Z 120V 50/60C MTR FOR 3"DRAIN VAL	00A
001B	96D35MTR71	01Z 240V 50/60C MTR FOR 3"DRAIN VAL	00B
002	96D35B0D	01Z BODY & BALL FOR 3" DRAIN VALVE	00A+00B
		***** END OF PARTS LIST *****	

**How to Read Parts List**

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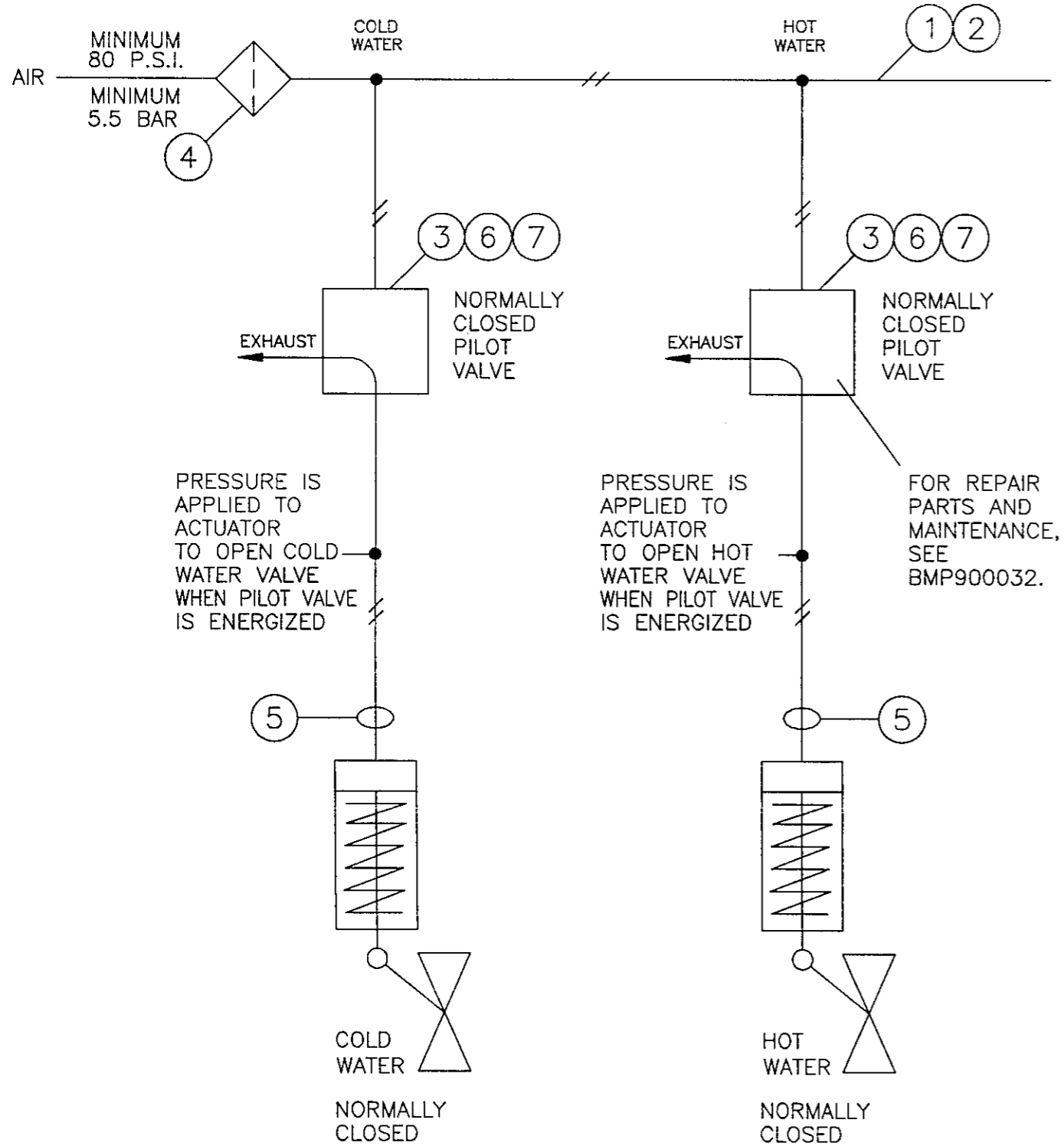
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**DRAWING AND PARTS LIST**

(See other page for more, if applicable.)

**PNEUMATIC SCHEMATIC**  
**30015, 30020 & 30022 RIGID MOUNT WASHER-EXTRACTORS**



ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
001	X3 01507H	87231C MANIFOLD BLOCK MACH 10 PORT	
002	03 LF1X5K	88303C LOCK BAR=VALVE SET 10 STAT	
003	96R301A71	02Z 1/8" PILOT 3W-N/C 220/50 240/60	
004	51T020	STRAINER-T 1/4"ANCHOR #101ST-4	
005	60E004TE	04Z 1/4"OD X.170"ID NYLON TUBING *	
006	03 01508	77362A FITTING-SCREW 7/16 HEX	
007	60C105	ORING 1/4 ID 1/16CS BN 70 DURO #010	
***** END OF PARTS LIST *****			

**How to Read Parts List**

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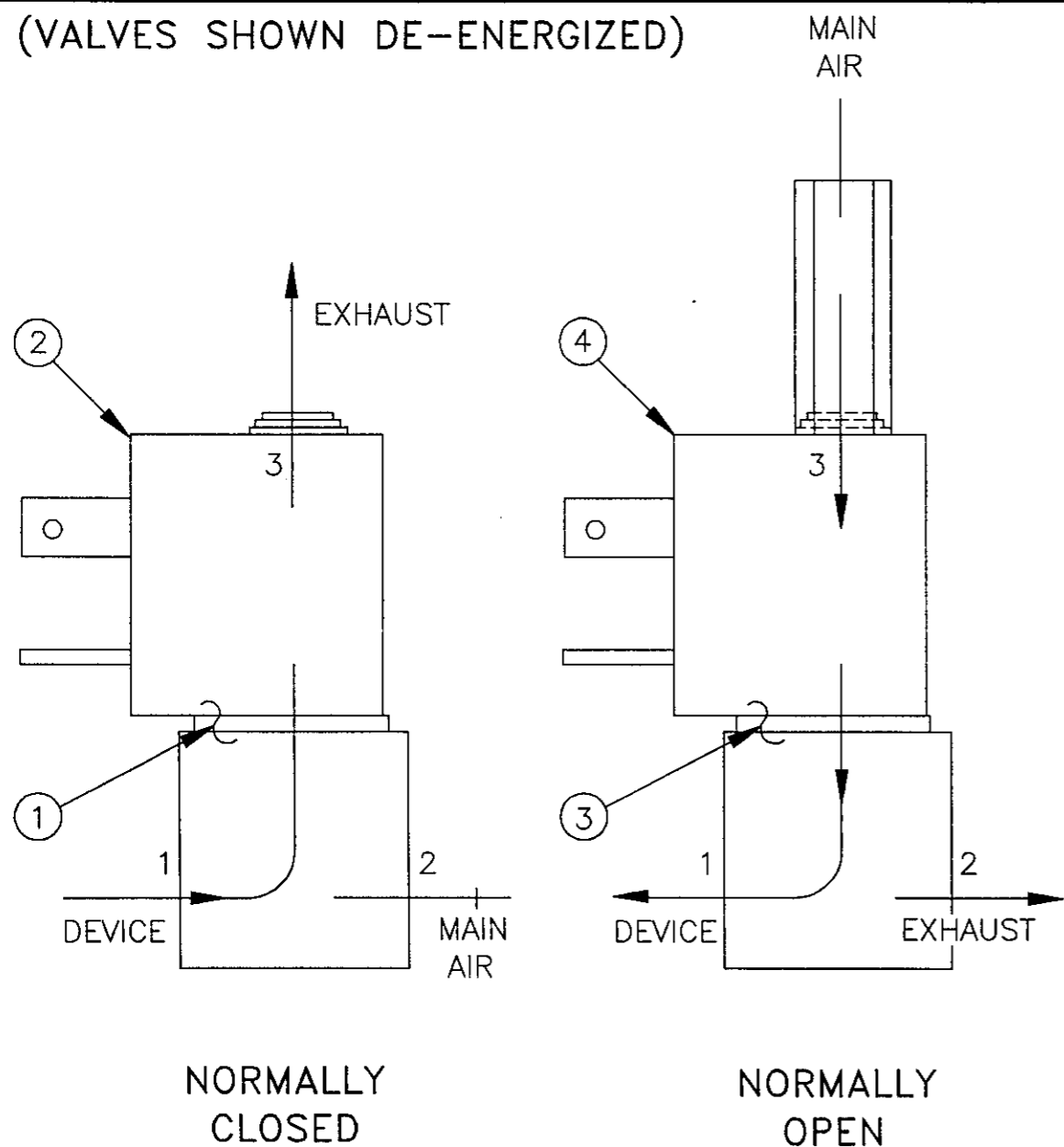
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**DRAWING AND PARTS LIST**

(See other page for more, if applicable.)

**3-WAY PILOT VALVES**

**BMP900032/91182V (Page 3)**



FOR REPAIR OR REPLACEMENT PARTS FOR PILOT VALVES USED ON WASHER EXTRACTORS GENERALLY PRIOR TO JUNE 1, 1985, SEE BMP701359.

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
001A	96R301A37	04Z 1/8" PILOT 3W-NC 110/50 120/60	FOR 001B
001B	96R301A24	04Z 1/8" AIR PILOT 3WAY NC 24V50/60	
002A	96R301C02	COIL ASCO 110/50 120/60 #400-229-3	FOR 003A
002B	96R301C01	COIL ASCO 24V50/60 #400-229-4	
003A	96R302A37	05Z 1/8" AIR PILOT 3WANO 120V50/60C	FOR 003B
003B	96R302A24	05Z 1/8" AIR PILOT 3WAY N/O 24V50/60	
004A	96R301C02	COIL ASCO 110/50 120/60 #400-229-3	
004B	96R301C01	COIL ASCO 24V50/60 #400-229-4	
***** END OF PARTS LIST *****			

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