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Service—

30015/30022 C4E

Read the separate safety manual before installing, operating, or servicing

PELLERIN MILNOR CORPORATION POST OFFICE BOX 400, KENNER, LOUISIANA 70063-0400, U.S.A.

Please Read

About the Manual Identifying Information on the Cover—The front cover displays pertinent identifying information for this manual. Most important, are the published manual number (part number) /ECN (date code). Generally, when a replacement manual is furnished, it will have the same published manual number, but the latest available ECN. This provides the user with the latest information applicable to his machine. Similarly all documents comprising the manual will be the latest available as of the date the manual was printed, even though older ECN dates for those documents may be listed in the table of contents.

When communicating with the Milnor factory regarding this manual, please also provide the other identifying information shown on the cover, including the publishing system, access date, and whether the document ECN's are the latest available or exact.

Best Available Information—This manual contains the most accurate and complete information available when Milnor shipped your machine/software. Products are occasionally released with the best available documentation, even though the device identification (model numbers, etc.) on the documentation does not explicitly include the delivered model. In such cases, use the documentation provided.

Although unlikely, incorrect manuals may have been shipped with your machine. If you believe you received the wrong manuals, or if you need specific information about any aspect of your machine not addressed in the provided documentation, contact the Milnor Customer Service group.

References to Yellow Troubleshooting Pages—This manual may contain references to "yellow pages." Although the pages containing trouble-shooting procedures are no longer printed on yellow paper, troubleshooting instructions, if any, will be contained in the easily located "Troubleshooting" section. See the table of contents.

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Table of Contents
for MAP30C4EAE/2011063A
30015/30022 C4E

Table of Contents, cont.

ABOUT THIS MANUAL

Scope—This instruction manual is intended to provide preventive maintenance procedures, service procedures, and mechanical parts identification for all Milnor® 30015, 30020, and 30022 model rigid mount washer-extractors. Measurements are in commonly used US and metric units unless otherwise noted.

See the appropriate programming, operating, and troubleshooting manual for information on the control system. See the schematic manual for electrical parts identification and electrical troubleshooting.

Manual Number/Date Code (When To Discard or Save)—The manual number/date code is located on the inside front cover, upper right corner just above the manual name. Whenever the manual is reprinted with new information, part of this number changes. **If the *date code* after the "/" changes, the new version applies to all machines covered by the old version, but is improved— thus the old version can be discarded. If the *manual number* before the "/" changes, the new manual covers only new machines.** Example: Discard MATMODELAE/8739**C**V when MATMODELAE/8739**D**V is received (minor improvements). Also, discard MATMODELAE/87**39D**V when MATMODELAE/87**46A**V is received (major improvements). But keep MATMODEL**A**E/8746FV when MATMODEL**B**E/8815AV is received, since the new manual no longer applies to machines originally shipped with the old manual.

Documents and Change Bars—The individual documents comprising this manual use the same revision criteria as the manual. Text documents also display change bars. Example: When sectionMSOP0599AE/9135**B**V becomes MSOP0599AE/9135**C**V, change bars with the letter "C" appear next to all changes for this revision. For a major rewrite (e.g., MSOP0599AE/92**26A**V), all change bars are deleted.

For Assistance—Please call:

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

Phone:(504) 467-9591
Fax:(504) 467-9777

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BIUUUD19 (Published) Book specs- Dates: 20081231 / 20081231 / 20081231 Lang: ENG01 Applic: UUU

How to Get the Necessary Repair Components

This document uses Simplified Technical English.
Learn more at http://www.asd-ste100.org.

You can get components to repair your machine from the approved supplier where you got this machine. Your supplier will usually have the necessary components in stock. You can also get components from the Milnor® factory.

Tell the supplier the machine model and serial number and this data for each necessary component:

- The component number from this manual
- The component name if known
- The necessary quantity
- The necessary transportation requirements
- If the component is an electrical component, give the schematic number if known.
- If the component is a motor or an electrical control, give the nameplate data from the used component.

To write to the Milnor factory:

Pellerin Milnor Corporation
Post Office Box 400
Kenner, LA 70063-0400
UNITED STATES

Telephone: 504-467-2787
Fax: 504-469-9777
Email: parts@milnor.com

— End of BIUUUD19 —

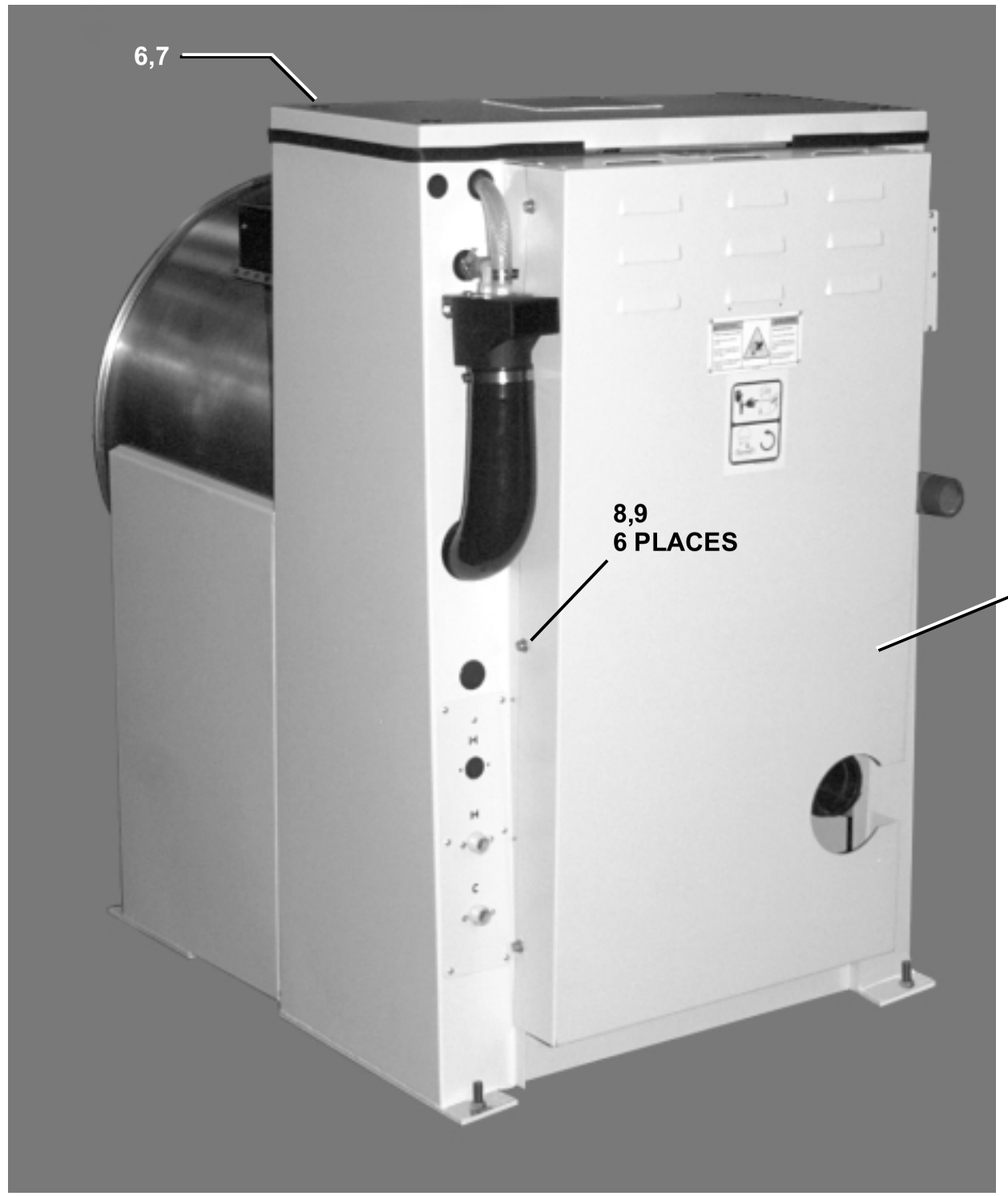
Guards & Covers

30015 & 30022C4E

BMP020067/2002512V
(Sheet 1 of 2)

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

Litho in U.S.A.



Guards & Covers

30015 & 30022C4E

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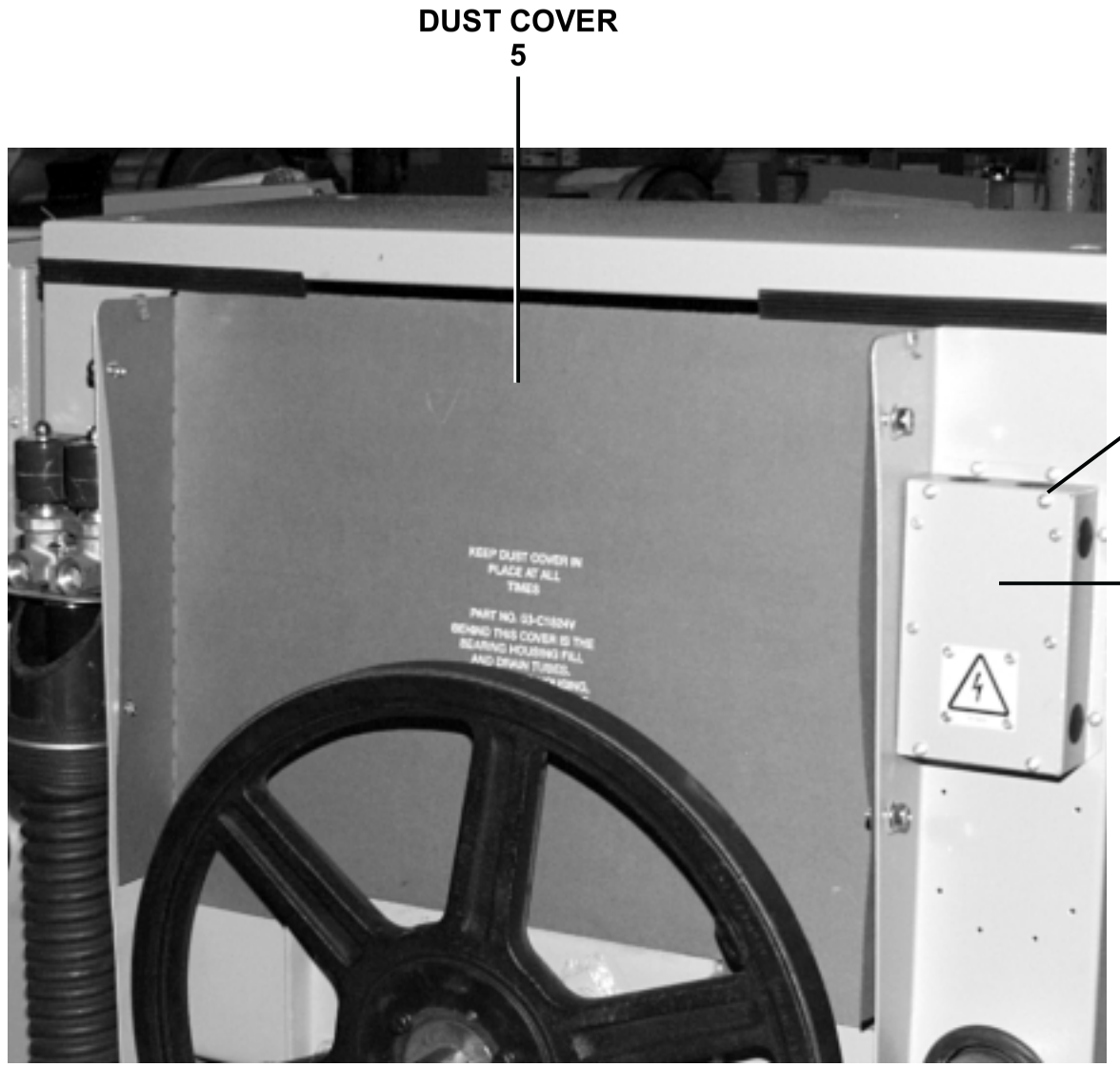
Litho in U.S.A.

NOTE: KEEP DUST COVER IN PLACE AT ALL TIMES. REMOVE FOR SERVICING. BEHIND THIS COVER ARE THE BEARING HOUSING FILL AND DRAIN TUBES.



Parts List- Guards & Covers

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	GGC30001	GUARDS/COVERS INSTALL	
	B	ASC30001	3022C4E FRONT/REAR CONSOLE ASY	
----------COMPONENTS----------				
all	1	02 03497B	GUARD REAR BELT FULL	
all	2	W2 03699A	*CONSOLE TOP WELDMENT	
all	3	02 03344	TRIM=REAR CONSOLE TOP 7FT/PC	
all	4	03 C4X7	COVER:SYSTEM 7 LIQUID SUPPLY	
all	5	03 C1824V	DUST COVER-30"V6J BELT	
all	6	15K120	HXCAPSCR 3/8-16UNC2AX2 GR5 ZIN	
all	7	17N070P	RETAIN NUT 3/8-16 #S10100-27	
all	8	15P200	TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	9	15U346	FLAWASH 7/8X3/8X.030 NATURAL N	
all	10	15P185	TRDCUT-F HXHD 1/4-20UNC2AX3/4	

About the Forces Transmitted by Milnor® Washer-extractors

During washing and extracting, all washer-extractors transmit both static and dynamic (cyclic) forces to the floor, foundation, or any other supporting structure. During washing, the impact of the goods as they drop imparts forces which are quite difficult to quantify. Size for size, both rigid and flexibly-mounted machines transmit approximately the same forces during washing. During extracting, rigid machines transmit forces up to 30 times greater than equivalent flexibly-mounted models. The actual magnitude of these forces vary according to several factors:

- machine size,
- final extraction speed,
- amount, condition, and type of goods being processed,
- the liquor level and chemical conditions in the bath preceding extraction, and
- other miscellaneous factors.

Estimates of the maximum force normally encountered are available for each Milnor® model and size upon request. Floor or foundation sizes shown on any Milnor® document are only for on-grade situations based only on previous experience without implying any warranty, obligation, or responsibility on our part.

1. Rigid Machines

Size for size, rigid washer-extractors naturally require a stronger, more rigid floor, foundation, or other supporting structure than flexibly-mounted models. If the supporting soil under the slab is itself strong and rigid enough and has not subsided to leave the floor slab suspended without support, on grade installations can often be made directly to an existing floor slab if it has enough strength and rigidity to safely withstand our published forces without transmitting undue vibration. If the subsoil has subsided, or if the floor slab itself has insufficient strength and rigidity, a deeper foundation, poured as to become monolithic with the floor slab, may be required. Support pilings may even be required if the subsoil itself is “springy” (i.e., if its resonant frequency is near the operating speed of the machine). Above-grade installations of rigid machines also require a sufficiently strong and rigid floor or other supporting structure as described below.

2. Flexibly-mounted Machines

Size for size, flexibly-mounted machines generally do not require as strong a floor, foundation, or other supporting structure as do rigid machines. However, a floor or other supporting structure having sufficient strength and rigidity, as described in Section 3, is nonetheless vitally important for these models as well.

3. How Strong and Rigid?

Many building codes in the U.S.A. specify that laundry floors must have a minimum live load capacity of 150 pounds per square foot (732 kilograms per square meter). However, even compliance with this or any other standard does not necessarily guarantee sufficient rigidity. In any event, it is the sole responsibility of the owner/user to assure that the floor and/or any other supporting structure exceeds not only all applicable building codes, but also that the floor and/or any other supporting structure for each washer-extractor or group of washer-extractors actually has sufficient strength and rigidity, plus a reasonable factor of safety for both, to support the weight of all the fully loaded machine(s) including the weight of the water and goods, and including the published 360º rotating sinusoidal RMS forces that are transmitted by the machine(s). Moreover, the floor, foundation, or other supporting structure must have sufficient

rigidity (i.e., a natural or resonant frequency many times greater than the machine speed with a reasonable factor of safety); otherwise, the mentioned 360º rotating sinusoidal RMS forces can be multiplied and magnified many times. It is especially important to consider all potential vibration problems that might occur due to all possible combinations of forcing frequencies (rotating speeds) of the machine(s) compared to the natural frequencies of the floor and/or any other supporting structure(s). A qualified soil and/or structural engineer must be engaged for this purpose.

Figure 1: How Rotating Forces Act on the Foundation

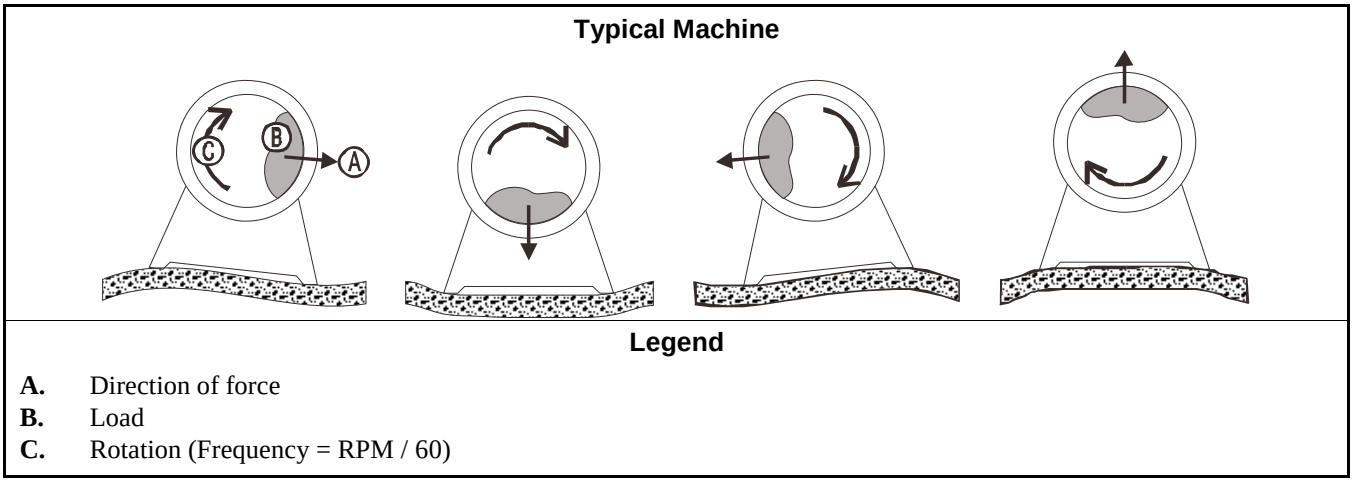


Figure 1 above is intended to depict both on-grade and above-grade installations and is equally applicable to flexibly-mounted washer-extractors, as well as to rigid models installed either directly on a floor slab or on a foundation poured integrally with the slab. Current machine data is available from Milnor® upon request. All data is subject to change without notice and may have changed since last printed. It is the sole responsibility of every potential owner to obtain written confirmation that any data furnished by Milnor® applies for the model(s) and serial number(s) of the specific machines.

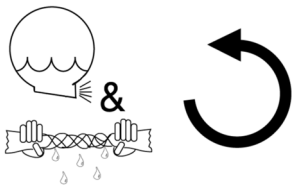
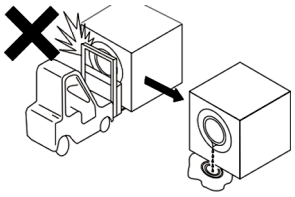
— End of BIWUUI02 —

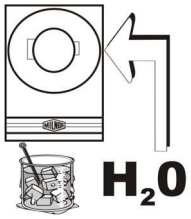
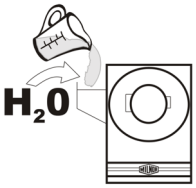
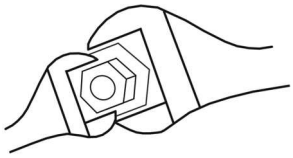
Understanding the Tag Guidelines for the Models Listed Below

30010CGE 30015C4A 30015C4E 30015C4T 30015CGE 30022C4A 30022C4E 30022C4T

Several installation guidelines and precautions are displayed symbolically, on tags placed at the appropriate locations on the machine. Some are tie-on and others are adhesive tags. Tie-on tags and white, adhesive tags may be removed after installation. Yellow adhesive tags must remain on the machine.

Most tags contain only symbols (no words). A few are worded. The explanations below, start with the tag part number (displayed on the tag). If a tag contains no words, the meaning of the tag is explained below. If the tag contains words, the explanation below simply repeats the wording.

Display or Action	Explanation
	Read the manual before proceeding. This symbol appears on most tags. The machine ships with a complete set of manuals. The safety, installation, and electrical schematic manuals are particularly important to installers.
	B2TAG88005: This carefully built product was tested and inspected to meet Milnor performance and quality standards by
	B2TAG93013: This bearing housing was lubricated at the Milnor factory before shipment.
	
	B2TAG94081: Motor must rotate in this direction. On single motor washer-extractors and centrifugal extractors, the drive motor must turn in this direction during draining and extraction. This tag is usually wrapped around a motor housing. If the motor turns in the opposite direction when the machine is first tested, the electrical hookup is incorrect and must be reversed as explained in the schematic manual.
	B2TAG94097: The cylinder must rotate **counterclockwise** during draining and extraction (spin) when viewed from here (rear of machine). Otherwise, reverse the electric power connections, as explained in the schematic manual.
	B2TAG94099: Do not strike the shell door when fork-lifting. This can cause the door to leak.
	B2T2001013: Hot water connection.

Display or Action	Explanation
	B2T2001014: Cold water connection.
	B2T2001016: Flushing water connection. This is the water that goes into the supply compartment or pumped chemical manifold to flush chemicals into the machine.
	B2T2003001: Hold the side of the connection stationary with a wrench as you tighten the connection with another wrench. Otherwise, you may twist components, such as valves, damaging them.
	B2T2003002: CAUTION: Equipment and Textile Damage Hazards—Chemicals leaked into the machine, particularly when it is idle, can destroy machine components and textiles left in the machine. Ensure the chemical system prevents dribbling, siphoning, or any other unintentional release of chemicals. Inspect regularly for proper operation and evidence of damage. Consult Milnor document BIWUUI03 “Avoiding Damage from Allied Remote Chemical Delivery Systems”.

— End of BIUUUI02 —

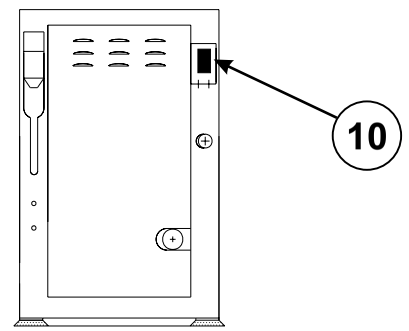
Safety Placard Use and Placement

30010, 30015 & 30022C4E

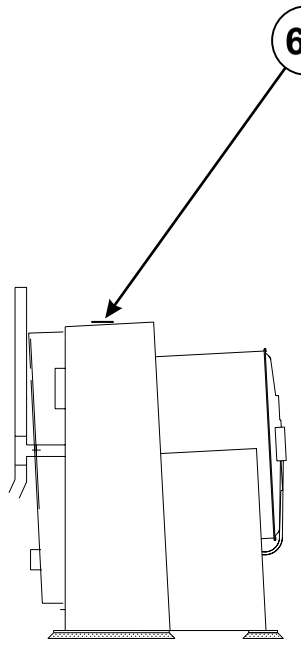
Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400

Litho in U.S.A.

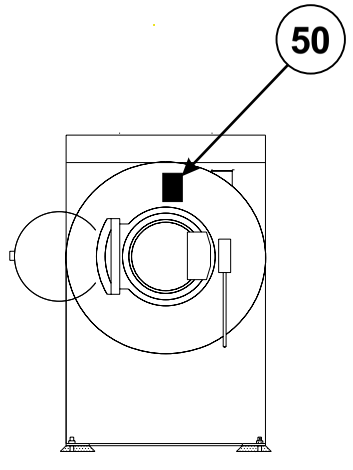
Notes:
1. **Replace placard immediately, if removed or unreadable.**
2. **Approximate locations of placards are shown. Mounting holes are provided on machine. If aluminum placard use #8 self-tapping screws.**



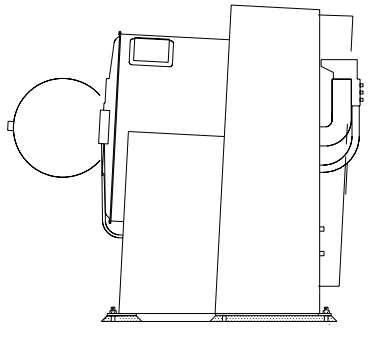
REAR VIEW



LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW

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Litho in U.S.A.

Parts List—Safety Placard Placement

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	10	01 10375C	2001262B NPLT:E-HAZARD SM VERTCL-TCATA	
all	50	01 10707A	2002344B NPLT:WARNING FRT SHELL COIN OP	
all	60	01 10708A	2002344C NPLT:REAR WARNINGS COIN OP	

Avoiding Damage From Allied Remote Chemical Delivery Systems

Milnor® does not manufacture or supply remote chemical delivery systems and this document is meant only to illustrate some of the possible problems that can be minimized during installation of such systems by the chemical supply company. Milnor washer-extractors and CBW® batch washers (tunnels) are available with convenient inlets for such systems (see Figure 1). Most common of the types of systems currently used in commercial laundering operations are pumped chemical systems. Other types, such as constant pressure, re-circulating ring main systems have also been, and may continue to be used with Milnor equipment.

This document warns about some of the possible hazards posed by chemical systems and lists certain requirements needed to minimize those hazards. The procedures for interfacing with allied chemical systems and information pertinent to chemical use in general are provided elsewhere in the product manuals (see Note 1).

Figure 1: Pumped Chemical Inlets on CBW Batch Washer

Note 1: Misuse of laundering chemicals (such as injecting excessive concentrations of chlorine bleach or permitting acid sours to react with hypo chlorite) due to incorrect formulation can also be hazardous. Information pertinent to chemical use is provided elsewhere in the product manuals.

1. How a Chemical System Can Damage the Machine It Serves

Milnor has manufactured washer-extractors and tunnel washers with the same stainless steel specification since its founding. Every batch of steel used is certified and documented by the steel mill. Testing of samples damaged by corrosion have, in every case, proven the steel to be well within the AISI 304 specification.

Chemical products commonly found in the laundry industry, when used in **established** dosages and proper operating parameters, under the auspices of an experienced chemical specialist, should produce satisfactory results, with no consequential detrimental effects. The industry has published standards in Riggs and Sherrill, “Textile Laundering Technology”. However, the stainless steel can be damaged and even destroyed by **abnormal** contact with chlorine bleach, hydrofluosilicic acid and other commonly used chemicals, as will occur if chemicals are unintentionally leaked into the machine, particularly when it is no longer in use and especially when machine surfaces are dry.

Some chemical systems have been found to permit chemicals to dribble from the supply lines, or worse, to siphon from the supply tank into the machine, during operation and long after the system is shut down—as after working hours and during weekends. If this occurs, **deterioration (rusting) of the stainless steel and damage to any textiles therein will inevitably result. If this condition goes undetected, machine damage is likely to be catastrophic.** No machine is immune to such damage.

CAUTION 1: Equipment and Textile Damage Hazards—Chemicals leaked into the machine, particularly when it is idle can destroy machine components and textiles left in the machine. **Pellerin Milnor Corporation accepts absolutely no responsibility for damage to its equipment or to textiles therein from abnormal contact with chemicals.**

- Ensure that the chemical system prevents unintentional release of chemicals.
- Inspect regularly for proper operation and evidence of damage.

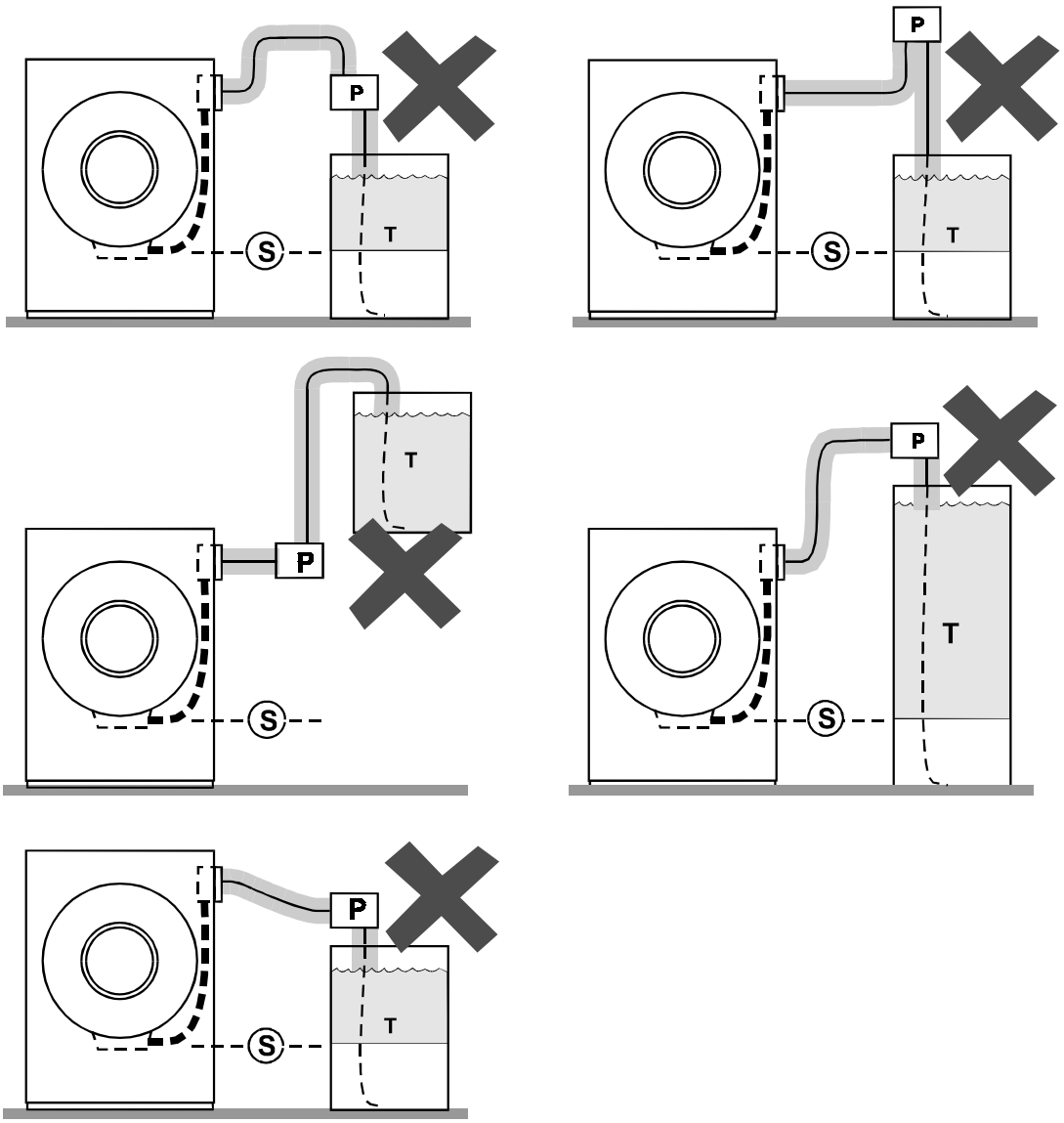
2. Requirements for Chemical Systems Used With Milnor Machines

It is the responsibility of the chemical system manufacturer and supplier to ensure that their system is safe for personnel and equipment. Some important points are described below.

2.1. Ensure the System Cannot Siphon.—The supply system must be designed to counteract any siphoning that could occur as a result of having a sealed supply line between the bottom of the chemical tank and the internal machine connection at the drain trough. As shown in the Figure 2 examples, if the pump (P) and/or the valving does not provide positive closure and there is no vacuum breaker protection, siphoning is likely to occur. In each of the Figure 2 illustrations, the volume of chemical in the tank above the siphon level (S), and indicated by shading, will flow into the machine.

Figure 2: Siphoning From the Chemical Tank into the Machine

Examples

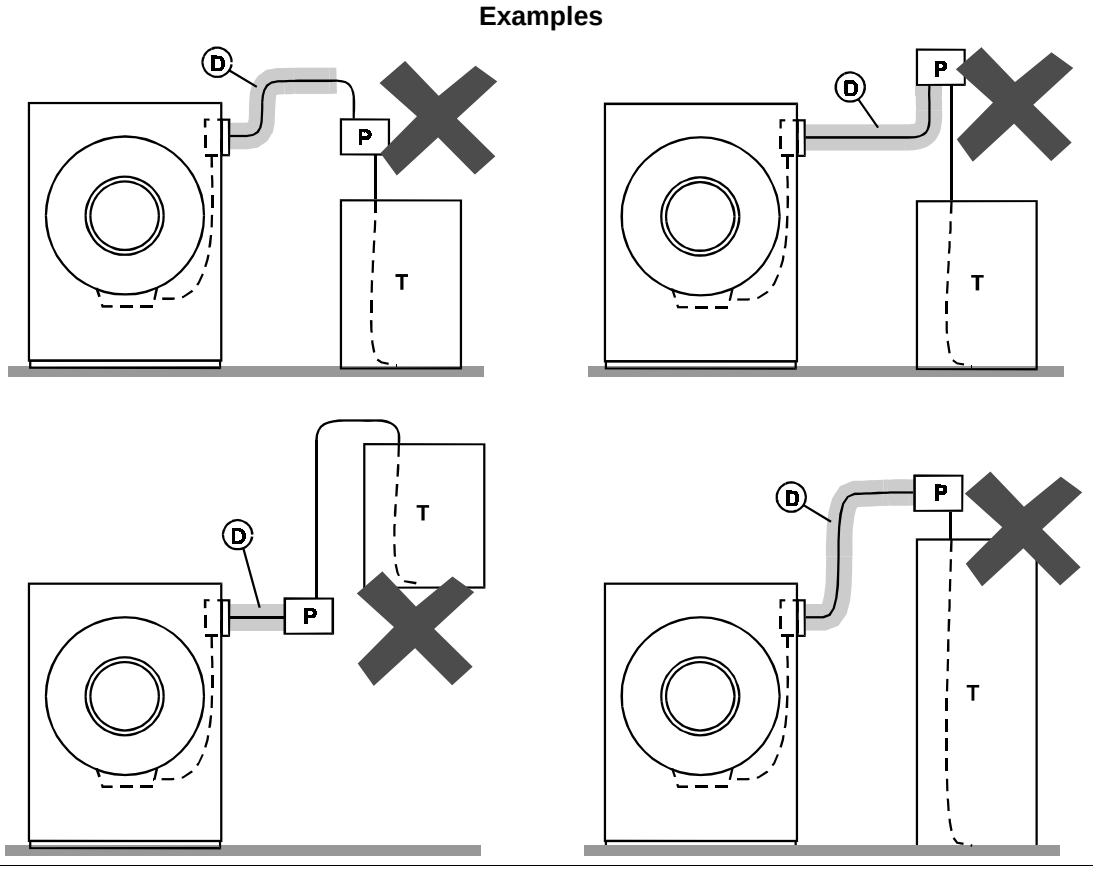


Legend

P. Pump
S. Siphon level. Shading indicates the chemical delivery line and tank content that can siphon into the machine.
T. Chemical tank

2.2. Ensure the Chemical Lines Cannot Dribble—The pumped chemical system may provide a means of positively closing the chemical line at the pump location, but not at the injection site. Hence, any concentrated chemical that remains in the injection line between the pump and the machine is free to flow into the machine. Some examples of this are shown in Figure 3.

Figure 3: Dribbling From Chemical Supply Line Into Machine (assumes positive closure at the pump)



Legend

D. Portion of supply line, the contents of which can dribble into the machine
P. Pump
T. Chemical tank

3. Design and Installation Recommendations

It is the responsibility of the chemical system manufacturer and supplier to use whatever measures are necessary to ensure that their system is safe for personnel and equipment. The following are some of the possible methods the manufacturer or supplier may wish to use, as appropriate.

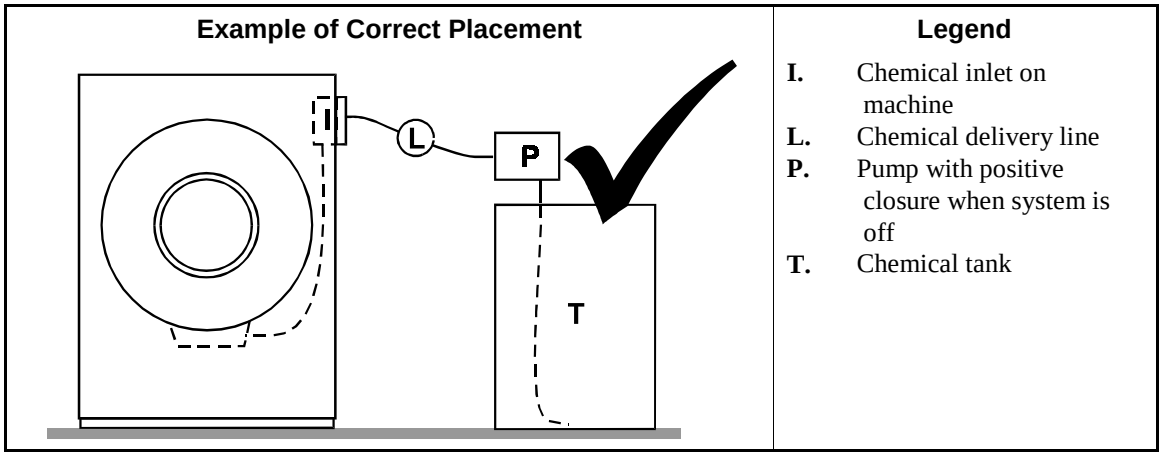
3.1. Siphoning: Positively close the line.—If the pump does not provide positive closure when the system is off, employ a shutoff valve in the line to serve this purpose.

3.2. Siphoning: Break the siphon.—Provide an air gap or vacuum breaker in the chemical delivery line. This must be located above the "full" line of the tank.

3.3. Dribbling: Flush the entire chemical delivery line.—If any concentrated chemical that remains in the injection line between the pump and the machine is free to flow into the machine, employ a system that flushes the entire line between the pump and the injection point with fresh water after each injection.

3.4. Dribbling: Locate the entire chemical line below the machine inlet.—Assuming the chemical system does not retain any line pressure and that the pump provides positive closure when the system is off, locate the entire chemical delivery line below the level of the chemical inlet. An example of this is shown in Figure 4.

Figure 4: Locating a Pumped Chemical System With Positive Closure To Protect Against Machine Damage



4. Guarding Against Leaks

All personnel who may work with the chemical system (e.g., chemical system manufacturer, chemical system supplier, chemical supplier, operator, maintenance personnel) should be vigilant in observing for leaks in the system. When connecting, or reconnecting chemical lines, whether at installation, after taking samples, or when replacing components, at a minimum ensure that:

1. the proper components are used,
2. all connections are the proper fit, and
3. all components are securely connected.

CAUTION 2: Injury and Damage Hazards—Chemicals leaking from a chemical system may be corrosive or toxic. Such chemicals can injure personnel and damage equipment.

- Use care when connecting chemical lines.
- Inspect regularly for leaks.

— End of BIWUUI03 —

Section 1

Service and Maintenance

BIRQUM01 (Published) Book specs- Dates: 20050302 / 20050302 / 20050302 Lang: ENG01 Applic: RQN

Preventive Maintenance

1. Lubrication Guidelines

As required by the warranty, to ensure safe operation, and to achieve optimum performance and service life from Milnor® washer-extractors, the schedules, instructions, and precautions herein must be strictly followed.

WARNING 1: Entangle and Crush Hazard—Belts and pulleys can entangle and crush body parts.

- Lock OFF and tag out power at the wall disconnect before servicing, except where specifically instructed otherwise in this section.
- Insure belt and pulley guards are in place during service procedures.
- Permit only qualified maintenance personnel to perform these procedures.

2. 36021C4E Main Bearing Maintenance

36021C4E main bearing housings are oil-filled and require periodic draining and refilling (see below).

See the appropriate “MAIN BEARING ASSEMBLY” (see Table of Contents) during this procedure.

1. Remove the drain plug on the bottom of the main bearing housing and allow the bearing housing to drain completely (Figure 1). Inspect the leak-off, drained oil, and magnetic drain plug for water and/or metal particles. Install the drain plug. Water and/or metal particles can indicate worn or damaged seals and bearings.
2. Locate the two 1/2" plastic tubes secured to the electrical control chassis (Figure 2). Clean the surrounding area and remove the cork stoppers from each.
3. Strictly following lubrication specifications, refill the bearing housing. After refilling the bearing housing, re-install the cork stoppers and clean any excess lubricant from the machine.

3. Preventive Maintenance Schedule

Table 1: Preventive Maintenance Checklist

Component		Action	Frequency	Specifications/Figure
Bearing Housing	Oil	Remove fill, vent and drain stoppers. Refill 22 ounces (634 grams)	Every four months	High quality SAE 30 to 50 (ISO 100 - 220) single weight heavy duty motor oil (non-detergent if available). See "Oil Drain and Water Leak-off" and also see "30022C4x,..Fill/Vent Hoses"
Drive Train	Belts and pulleys	Check for wear, replace as required	Monthly	See "Drive Train Pulleys and Belts"
	Motors (if equipped with grease fittings) (See Note 2)	See "Baldor Motor Maintenance...," in this manual (See Note 3)	Every three Months	See motor nameplate. If not specified, use Shell Alvania (or equivalent). See "Motor Grease Points"
Drive Inverter	Inverter	Verify fan operation. Vacuum out inverter vents.	Monthly	See "Inverter Maintenance Points"
Hoses, Clamps, and Connections	Inlet, drain, and chemical hoses and connections	Check for leaks, cracks and bulges	Monthly	
Bolts	Foundation	Check bolt tightness and wear	Monthly	See dimensional drawings
	Rear bearing reinforcement plate and throughout machine			See "30022C4x,...Rear Reinforcement Plate" for 36021C4E and 36026V5J machines, or "42026V6J Rear Reinforcement Plate" for 42026V6J machines.

Note 1: Monthly/200 hours = Once a month or once every 200 operating hours, whichever comes first.

Note 2: Do not over-lubricate motors. Over-lubrication of a motor can seriously damage it by forcing grease into motor windings.

Note 3: If motor manufacturer's instructions conflict with manual section MSSM0274AE, follow manufacturers instructions. Motors are warranted by the manufacturers, not by Milnor.

4. Maintenance Points

Figure 1: 30022C4x, 30022T5x, 36021C4E and 36026V5J Oil Drain and Water Leak-off

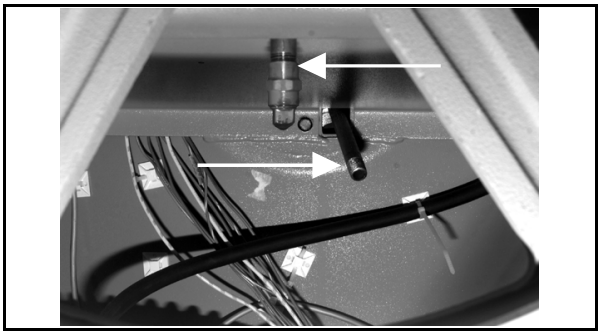


Figure 2: 30022C4x, 30022T5x, 36021C4E and 36026V5J Oil Fill/Vent Hoses (use either hose for filling)

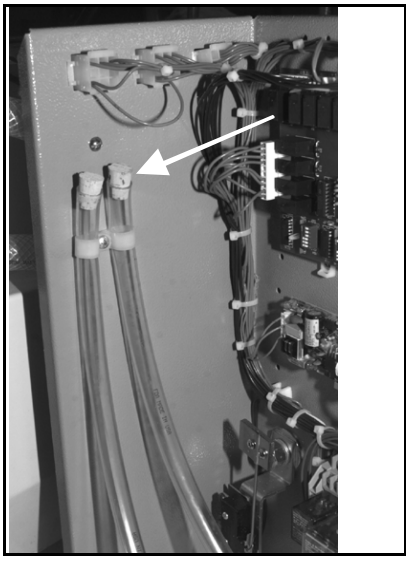


Figure 3: Drive Train Pulleys and Belts (30022V6J shown)

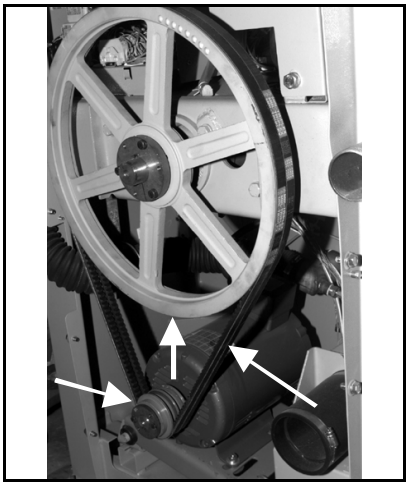


Figure 4: 30022C4x, 30022T5x, 30022V6J, 36021C4E and 36026V5J Rear Bearing Reinforcement Plate (30022VxJ shown)

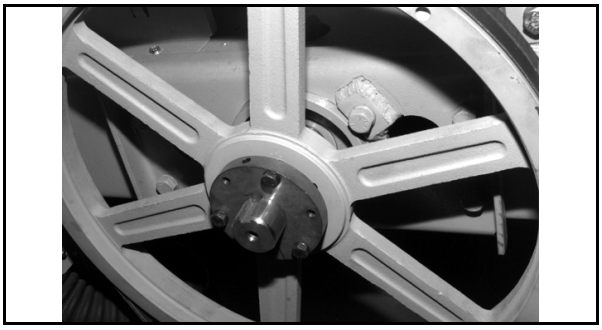
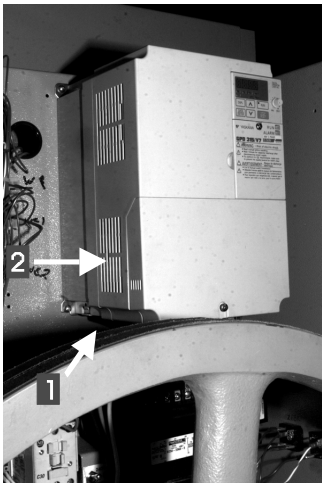


Figure 5: Inverter Maintenance Points

36021C4E Inverter



Legend

1. Fan
2. Vent

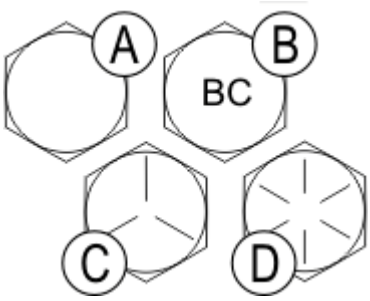
— End of BIRQUM01 —

BIUUUM04 (Published) Book specs- Dates: 20080506 / 20080506 / 20080506 Lang: ENG01 Applic: UUU

Fastener Torque Requirements

Torque requirements for other fasteners are specified in the specific document which describes the assembly. **If fastener torque specifications or threadlocking compound requirements in an assembly document vary from the specifications in this document, use the assembly document.**

Figure 1: Common Bolts Used in Milnor Equipment

Bolt Head Identifying Marks	Legend
	**A.** SAE Grades 1 and 2, ASTM A307, and stainless steel **B.** ASTM A354 Grade BC **C.** SAE Grade 5, ASTM A449 **D.** SAE Grade 8 and ASTM A354 BD

1. Torque Values

The tables below list the standard size, grade, threadlocking compound, and torque requirements for fasteners commonly used on Milnor® equipment.

Note 1: Data derived from Pellerin Milnor® Corporation "Bolt Torque Specification" (bolt_torque_milnor.xls/2002096).

1.1. Carbon Steel Fasteners

1.1.1. Without Threadlocking Compound

Table 1: Torque Values for Dry Fasteners 5/16-inch and Smaller

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	66	7	101	11	143	16	126	14
1/4 x 28	76	9	116	13	163	18	--	--
5/16 x 18	136	15	209	24	295	33	258	29
5/16 x 24	150	17	232	26	325	37	--	--

Table 2: Torque Values for Dry Fasteners Larger Than 5/16-inch

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/8 x 16	20	27	31	42	44	59	38	52
3/8 x 24	23	31	35	47	50	68	--	--
7/16 x 14	32	43	49	66	70	95	61	83
7/16 x 20	36	49	55	75	78	105	--	--
1/2 x 13	49	66	75	102	107	145	93	126
1/2 x 20	55	75	85	115	120	163	--	--
9/16 x 12	70	95	109	148	154	209	134	182
9/16 x 18	78	106	121	164	171	232	--	--
5/8 x 11	97	131	150	203	212	287	186	252
5/8 x 18	110	149	170	231	240	325	--	--
3/4 x 10	172	233	266	361	376	510	329	446
3/14 x 16	192	261	297	403	420	569	--	--
7/8 x 9	167	226	429	582	606	821	531	719
7/8 x 14	184	249	473	641	668	906	--	--
1 x 8	250	339	644	873	909	1232	796	1079
1 x 12	274	371	704	954	994	1348	--	--
1 x 14	281	381	723	980	1020	1383	--	--
1 1/8 x 7	354	480	794	1077	1287	1745	1126	1527
1 1/8 x 12	397	538	891	1208	1444	1958	--	--
1 1/4 x 7	500	678	1120	1519	1817	2464	1590	2155
1 1/4 x 12	553	750	1241	1682	2012	2728	--	--
1 3/8 x 6	655	888	1469	1992	2382	3230	2085	2827
1 3/8 x 12	746	1011	1672	2267	2712	3677	--	--
1 1/2 x 6	869	1178	1949	2642	3161	4286	2767	3751
1 1/2 x 12	979	1327	2194	2974	3557	4822	--	--

Table 3: Torque Values for Plated Fasteners 5/16-inch and Smaller

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	49	6	76	9	107	12	95	11
1/4 x 28	56	6	88	10	122	14	--	--
5/16 x 18	102	12	156	18	222	25	193	22
5/16 x 24	113	13	174	20	245	28	--	--

Table 4: Torque Values for Plated Fasteners Larger Than 5/16-inch

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/8 x 16	15	20	23	31	33	44	29	38
3/8 x 24	17	23	26	35	37	49	--	--
7/16 x 14	24	32	37	50	52	71	46	61
7/16 x 20	27	36	41	55	58	78	--	--
1/2 x 13	37	49	56	76	80	106	70	93
1/2 x 20	41	55	64	85	90	120	--	--
9/16 x 12	53	70	81	110	115	153	101	134
9/16 x 18	59	79	91	122	128	174	--	--
5/8 x 11	73	97	113	150	159	212	139	186
5/8 x 18	83	110	127	172	180	240	--	--
3/4 x 10	129	173	200	266	282	376	246	329
3/14 x 16	144	192	223	297	315	420	--	--
7/8 x 9	125	166	322	430	455	606	398	531
7/8 x 14	138	184	355	474	501	668	--	--
1 x 8	188	250	483	644	682	909	597	796
1 x 12	205	274	528	716	746	995	--	--
1 x 14	210	280	542	735	765	1037	--	--
1 1/8 x 7	266	354	595	807	966	1288	845	1126
1 1/8 x 12	298	404	668	890	1083	1444	--	--
1 1/4 x 7	375	500	840	1120	1363	1817	1192	1590
1 1/4 x 12	415	553	930	1261	1509	2013	--	--
1 3/8 x 6	491	655	1102	1470	1787	2382	1564	2085
1 3/8 x 12	559	758	1254	1672	2034	2712	--	--
1 1/2 x 6	652	870	1462	1982	2371	3161	2075	2767
1 1/2 x 12	733	994	1645	2194	2668	3557	--	--

1.1.2. With Threadlocking Compound

Table 5: Threadlocking Compound Selection by Bolt Size

	Bolt Size			
LocTite Product	1/4"	1/4" – 5/8"	5/8" – 7/8"	1" +
LocTite 222	OK			
LocTite 242		OK		
LocTite 262			OK	
LocTite 272			High temperature	
LocTite 277				OK

Table 6: Torque Values for Applications of LocTite 222

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-inches	N-m	Pound-inches	N-m	Pound-inches	N-m	Pound-inches	N-m
1/4 x 20	60	7	96	11	132	15	108	12
1/4 x 28	72	8	108	12	144	16	--	--

Table 7: Torque Values for Applications of LocTite 242

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
5/16 x 18	11	15	17	23	25	34	22	30
5/16 x 24	13	18	19	26	27	37	27	37
3/8 x 16	20	27	31	42	44	60	38	52
3/8 x 24	23	31	35	47	50	68	--	--
7/16 x 14	32	43	49	66	70	95	61	83
7/16 x 20	36	49	55	75	78	106	--	--
1/2 x 13	49	66	75	102	107	145	93	126
1/2 x 20	55	75	85	115	120	163	--	--
9/16 x 12	70	95	109	148	154	209	134	182
9/16 x 18	78	106	121	164	171	232	--	--
5/8 x 11	97	132	150	203	212	287	186	252
5/8 x 18	110	149	170	230	240	325	--	--

Table 8: Torque Values for Applications of LocTite 262

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/4 x 10	155	210	240	325	338	458	296	401
3/4 x 16	173	235	267	362	378	512	--	--
7/8 x 9	150	203	386	523	546	740	477	647
7/8 x 14	165	224	426	578	601	815	--	--

Table 9: Torque Values for Applications of LocTite 272 (High Temperature)

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
1 x 8	350	475	901	1222	1272	1725	1114	1510
1 x 12	383	519	986	1337	1392	1887	--	--
1 x 14	393	533	1012	1372	1428	1936	--	--
1-1/8 x 7	496	672	1111	1506	1802	2443	1577	2138
1-1/8 x 12	556	754	1247	1691	2022	2741	--	--
1-1/4 x 7	700	949	1568	2126	2544	3449	2226	3018
1-1/4 x 12	774	1049	1737	2355	2816	3818	--	--
1-3/8 x 6	917	1243	2056	2788	3335	4522	2919	3958
1-3/8 x 12	1044	1415	2341	3174	3797	5148	--	--
1-1/2 x 6	1217	1650	2729	3700	4426	6001	3873	5251
1-1/2 x 12	1369	1856	3071	4164	4980	6752	--	--

Table 10: Torque Values for Applications of LocTite 277

	Bolt Grade							
	Grade 2		Grade 5		Grade 8		Grade BC	
Bolt Size	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
1 x 8	325	441	837	1135	1181	1601	1034	1402
1 x 12	356	483	916	1242	1293	1753	--	--
1 x 14	365	495	939	1273	1326	1798	--	--
1-1/8 x 7	461	625	1032	1399	1674	2270	1464	1985
1-1/8 x 12	516	700	1158	1570	1877	2545	--	--
1-1/4 x 7	650	881	1456	1974	2362	3202	2067	2802
1-1/4 x 12	719	975	1613	2187	2615	3545	--	--
1-3/8 x 6	851	1154	1909	2588	3097	4199	2710	3674
1-3/8 x 12	970	1315	2174	2948	3526	4781	--	--
1-1/2 x 6	1130	1532	2534	3436	4110	5572	3597	4877
1-1/2 x 12	1271	1723	2852	3867	4624	6269	--	--

1.2. Stainless Steel Fasteners

Table 11: Torque Values for Stainless Steel Fasteners 5/16-inch and Smaller

	316 Stainless		18-8 Stainless		18-8 Stainless with Loctite 767	
Nominal Bolt Size	Pound-Inches	N-m	Pound-Inches	N-m	Pound-Inches	N-m
1/4 x 20	79	9	76	9	45	5
1/4 x 28	100	11	94	11	56	6
5/16 x 18	138	16	132	15	79	9
5/16 x 24	148	17	142	16	85	10

Table 12: Torque Values for Stainless Steel Fasteners Larger Than 5/16-inch

Bolt Size	316 Stainless		18-8 Stainless		18-8 Stainless with Loctite 767	
	Pound-feet	N-m	Pound-feet	N-m	Pound-feet	N-m
3/8 x 16	21	28	20	27	12	16
3/8 x 24	23	31	22	29	13	18
7/16 x 14	33	44	31	42	19	25
7/16 x 20	35	47	33	45	20	27
1/2 x 13	45	61	43	58	26	35
1/2 x 20	47	64	45	61	27	37
9/16 x 12	59	81	57	77	34	46
9/16 x 18	66	89	63	85	38	51
5/8 x 11	97	131	93	125	56	75
5/8 x 18	108	150	104	141	62	84
3/4 x 10	132	179	128	173	77	104
3/4 x 16	130	176	124	168	75	101
7/8 x 9	203	275	194	263	116	158
7/8 x 14	202	273	193	262	116	157
1 x 8	300	406	287	389	172	233
1 x 14	271	367	259	351	156	211
1-1/8 x 7	432	586	413	560	248	336
1-1/8 x 12	408	553	390	529	234	317
1-1/4 x 7	546	740	523	709	314	425
1-1/4 x 12	504	683	480	651	288	390
1-1/2 x 6	930	1261	888	1204	533	722
1-1/2 x 12	732	992	703	953	422	572

2. Preparation

WARNING 1: Fire Hazard—Some solvents and primer products are flammable.

- Use in a well ventilated area.
- Do not use flammable products near ignition sources.

1. Clean all threads with a wire brush, a tap, or a die.
2. Degrease the fasteners and the mating threads with a cleaning solvent. Wipe the parts dry.

   Note 2: LocTite 7649 Primer N™ will remove grease from parts, but it costs more than a standard organic or petroleum solvent.

3. Prime the fasteners and the mating threads with LocTite 7649 Primer N™ or equal. Allow the primer to dry for at least one minute.

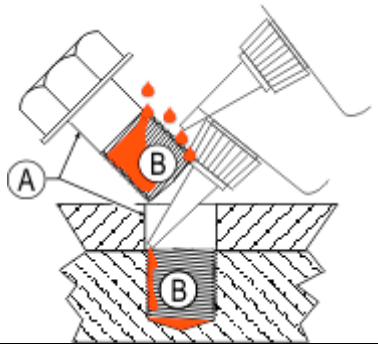
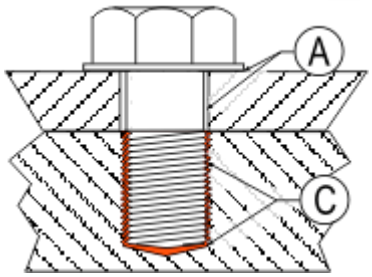
3. Application of Threadlocking Compound

CAUTION 2: Malfunction Hazard—Improper application of threadlocking compounds may result in fasteners becoming loose from impact, heat, or vibration. Loose fasteners can cause the equipment to malfunction.

- Read and follow the threadlocking compound manufacturer's instructions and warnings.

Apply threadlocking compound to the thread engagement areas of fasteners and mating threads only.

Figure 2: Blind Hole

Application	Coverage
	

Legend

A. No threadlocking compound here
B. Apply here
C. Fill all gaps with threadlocking compound

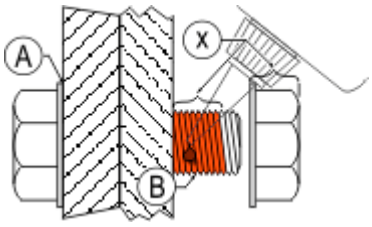
3.1. Blind Holes

1. Apply several drops of threadlocking compound down the female threads to the bottom of the hole.
2. Apply several drops of threadlocking compound to the bolt.
3. Tighten bolt to value shown in the appropriate table (Table 5 through Table 11).

3.2. Through Holes

1. Insert bolt through assembly.
2. Apply several drops of threadlocking compound to the bolt thread area that will engage the nut.
3. Tighten bolt to value shown in the appropriate table (Table 5 through Table 11).

Figure 3: Through Hole

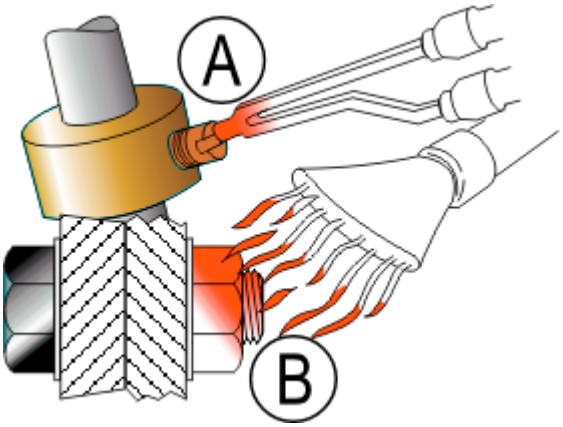
Application	Legend
	**A.** No threadlocking compound here **B.** Cover this area **x.** Nut depth

3.3. Disassembly—For low-strength and medium-strength products, disassemble with hand tools.

For high-strength products, apply localized heat for five minutes. Disassemble with hand tools while the parts are still hot.

Figure 4: Disassembly

Use Localized Heat



Legend

A. Soldering gun heating small fastener
B. Torch heating large fastener

— End of BIUUUM04 —

Section 2

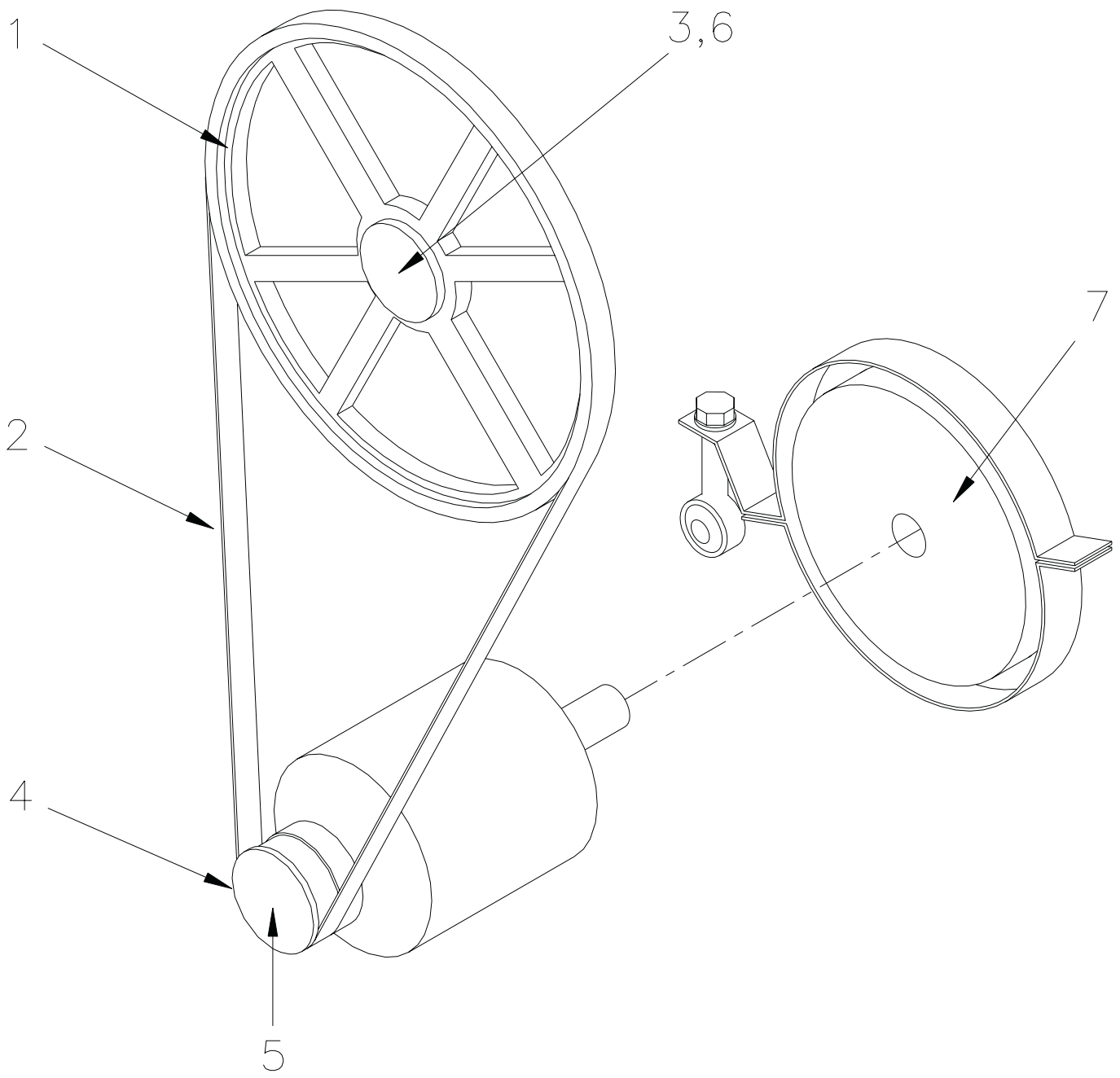
Drive Assemblies

Drive Chart

30015 & 30022C4E

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

Litho in U.S.A.



Parts List—Drive Chart

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	D33 03260	DRIVE CHART=3015/22V4 60CYC	
			----------COMPONENTS----------	
all	1	562240R3SF	VPUL 3G3V22.4 (SF) MTO SPECIAL	
all	2	56VR082XB3	VBAND 3R3VX820 EA = 1 BELT	
all	3	56Q1KSF	1+1/2" BUSH VPUL QD TYPE SF	
all	4	560260R3JA	VPUL 3G3V2.60 QD TYPE JA	
all	5	56Q0RJA	7/8" BUSHING VPUL QD TYPE "JA"	
all	6	15E230	STRMACHKEY 3/8SQX2+1/2 TOL.+0	
all	7	54H164A	CLUTCH 12VDC MAPM02	

Motor Mount

30015 & 30022C4E

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

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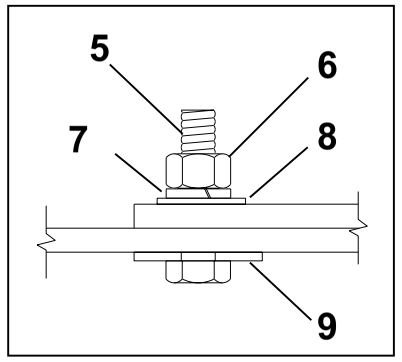
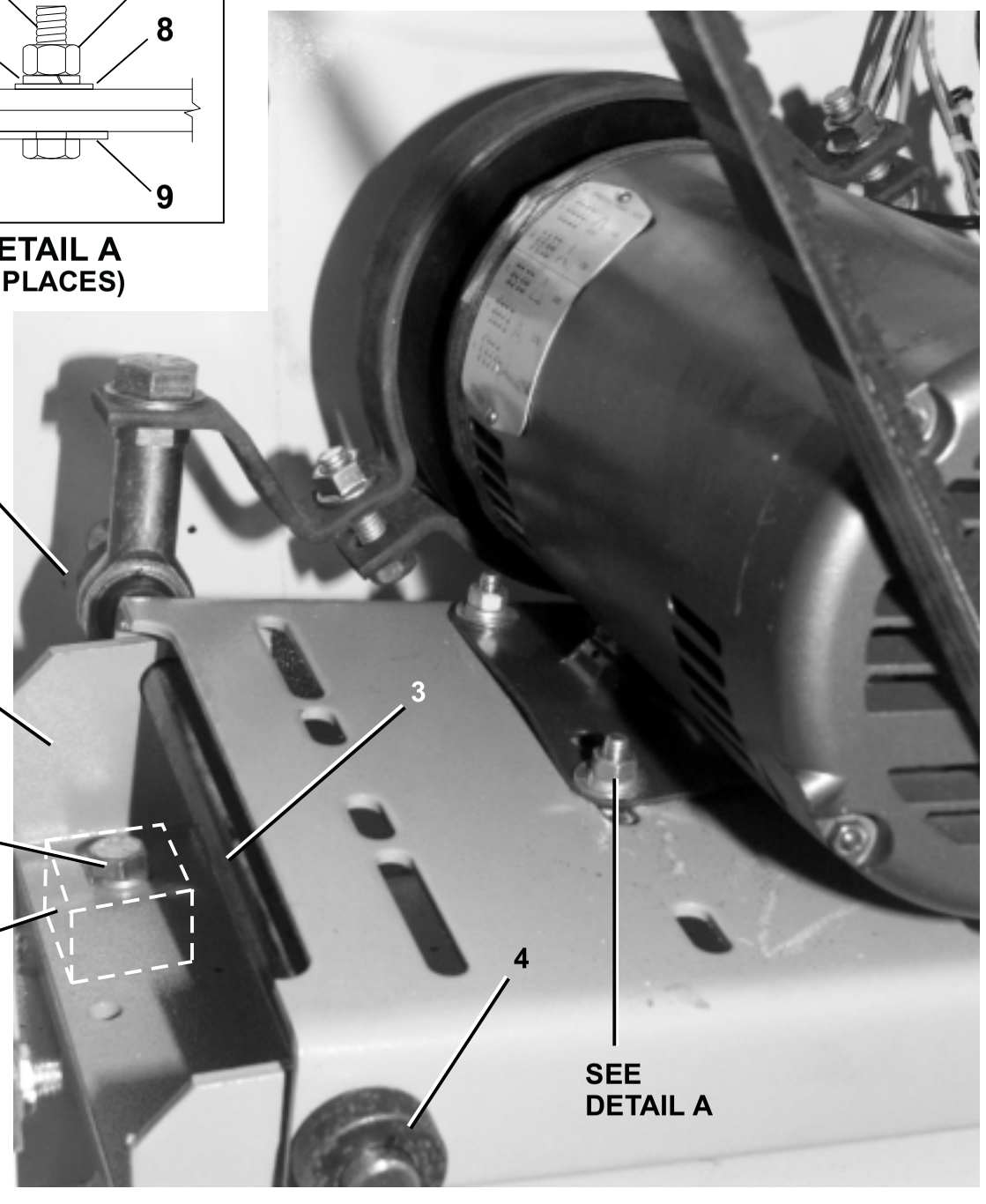
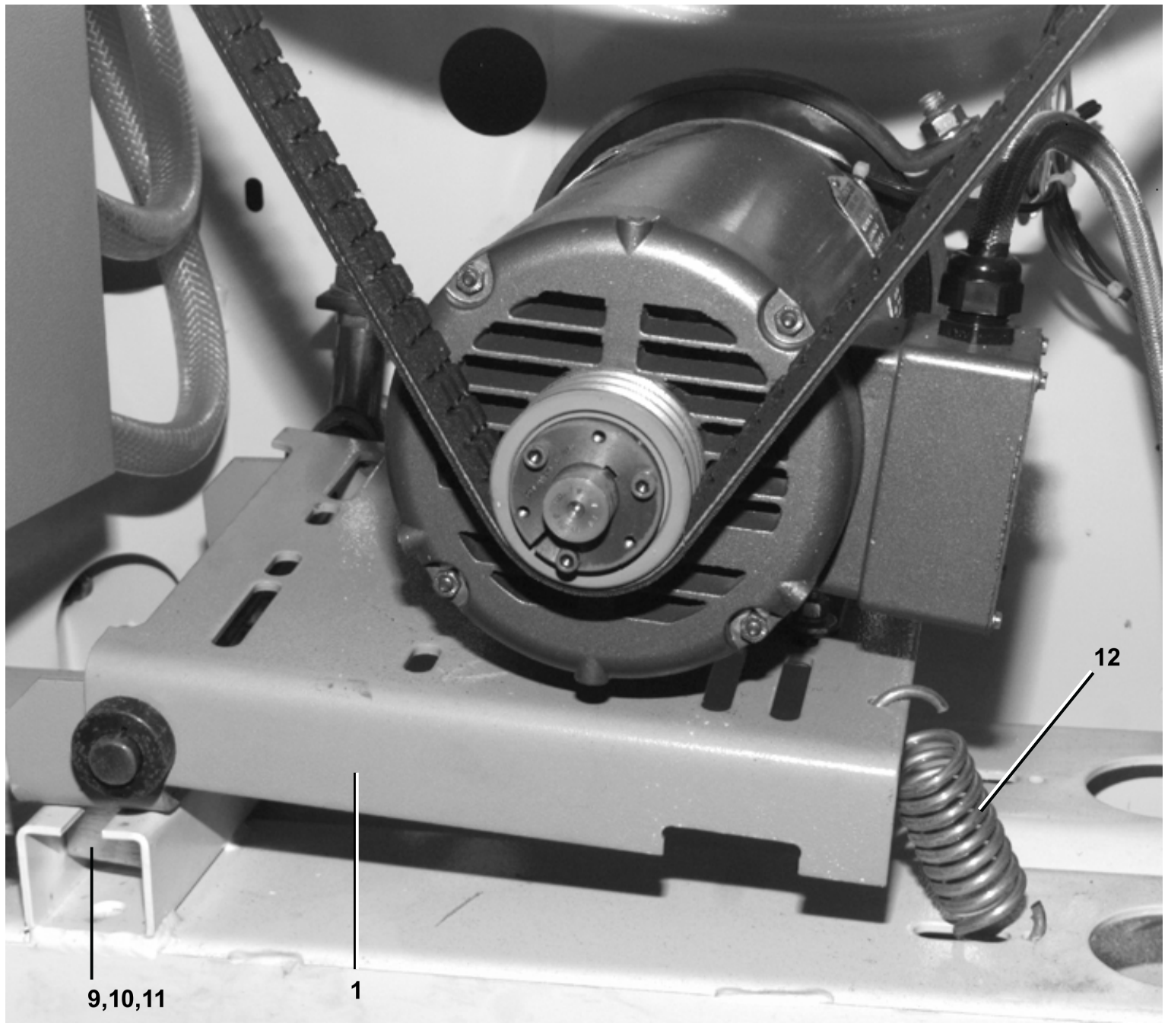


DETAIL A
(4 PLACES)





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Parts List—Motor Mount

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	GDB30001	30" DRIVE BASE SNGL MTR INSTAL	
			----------COMPONENTS----------	
all	1	02 04256	PLATE=MOTOR MNT, 3022S4	
all	2	02 04257A	BRKT=MOTOR MOUNT 30V	
all	3	02 04258	SHAFT=MOTOR MOUNT, 3022S4	
all	4	54JH10750C	SHFTCOLLAR 3/4" CLPTYP CFG#12S	
all	5	15K092Z	HEXFLGSCR 3/8-16X1 GR5 ZINC	
all	6	15G198	HXFLGNUT 3/8-16 ZINC	
all	7	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	8	15U240	FLATWASHER(USS STD) 3/8" ZNC P	
all	9	15U241	FLATWASHER 13/32IDX1+3/4ODX14G	
all	10	02 19283	NUT=1/2-13UNCX1+1/2SQ SPEC	
all	11	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 P	
all	12	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	13	02 04259	SPRNG/MOT MOUNT/3022S4#SPC2690	

Clutch Brake

3010, 3015CGE ; 30015, 30022C4E

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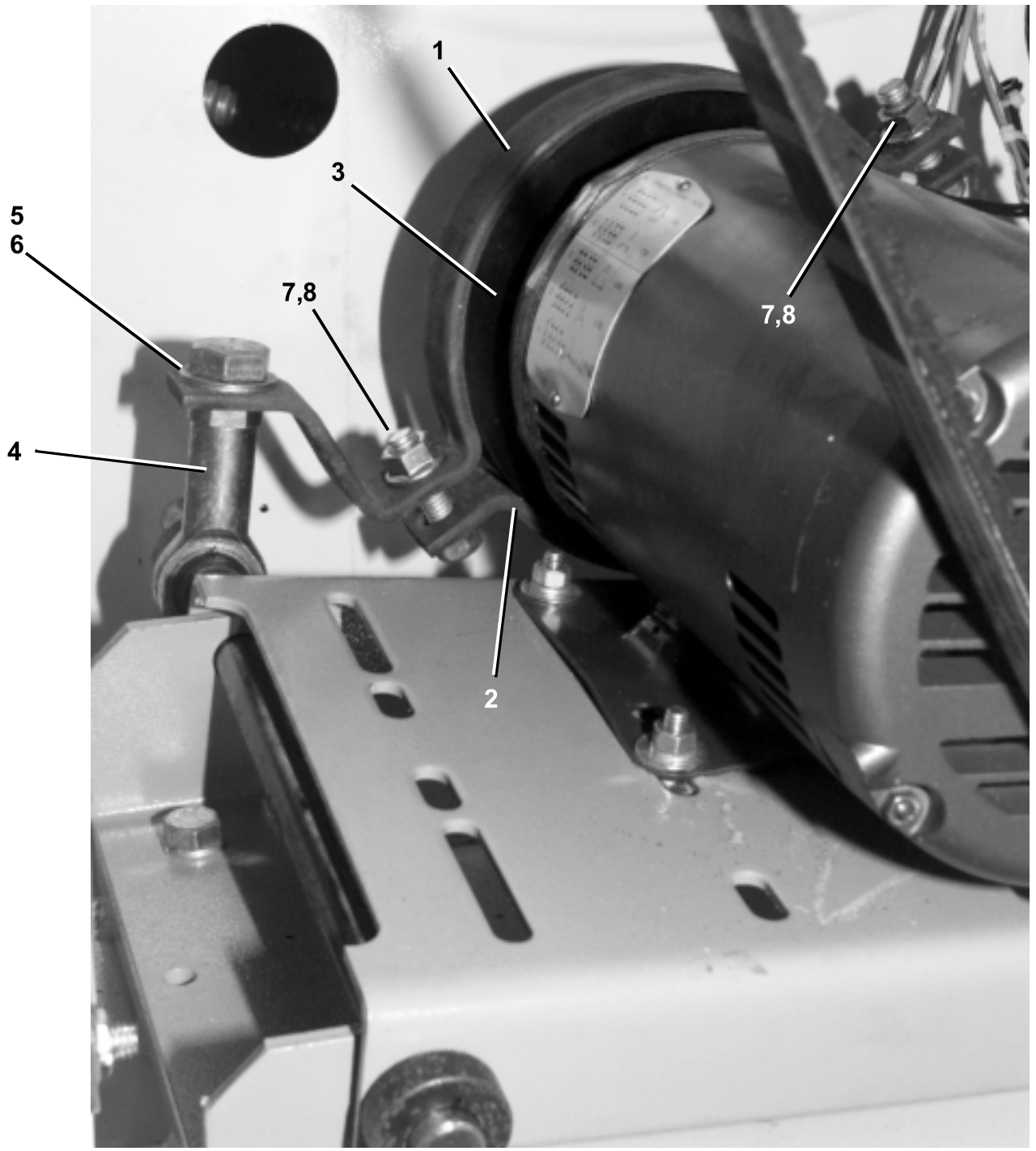


Parts List—Clutch Brake

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	GBR30001	3022C4E BRAKE INSTALL	
----------COMPONENTS----------				
all	1	04 20257	BRAKE SHOE-TOP -SHUTTLE	
all	2	04 20369A	BRAKE SHOE-BOTTOM 30XX COIN	
all	3	54H164A	CLUTCH 12VDC MAPM02	
all	4	54AA00PFRE	FEM ROD END ALIN#VF-12G 3/4"	
all	5	15K230	HXCPSC-3/4-16X1+3/4 GR8 ZINC	
all	6	15U321H	FLTWASH 3/4 HARD ASTM F436	
all	7	15K154H	INDHEXFLGSCR 1/2-13X1+3/4GR8ZN	
all	8	15G225H	HEXFLGNUT 1/2-13 SERRATED 18-8	

Section 3

Bearing Assemblies

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, 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).

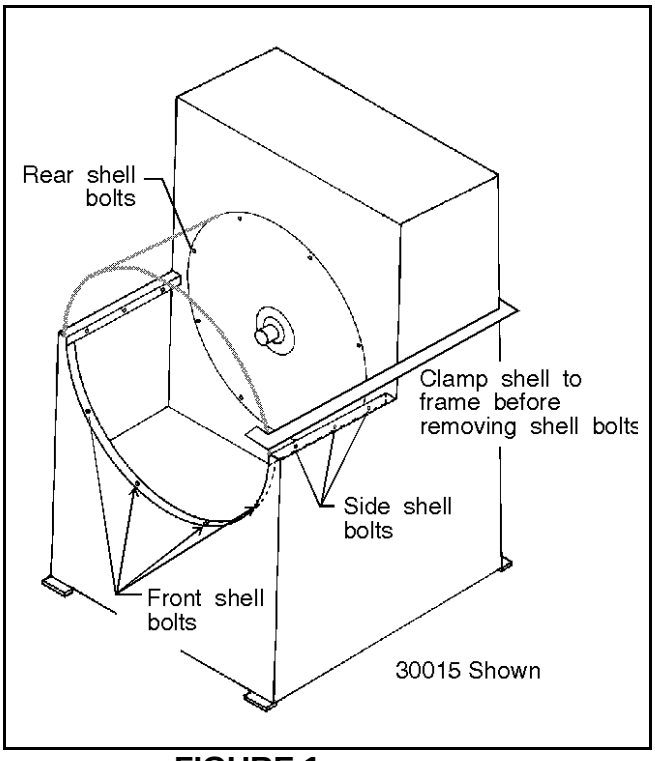


FIGURE 1 (MSSM0708BE)
Clamping the Shell

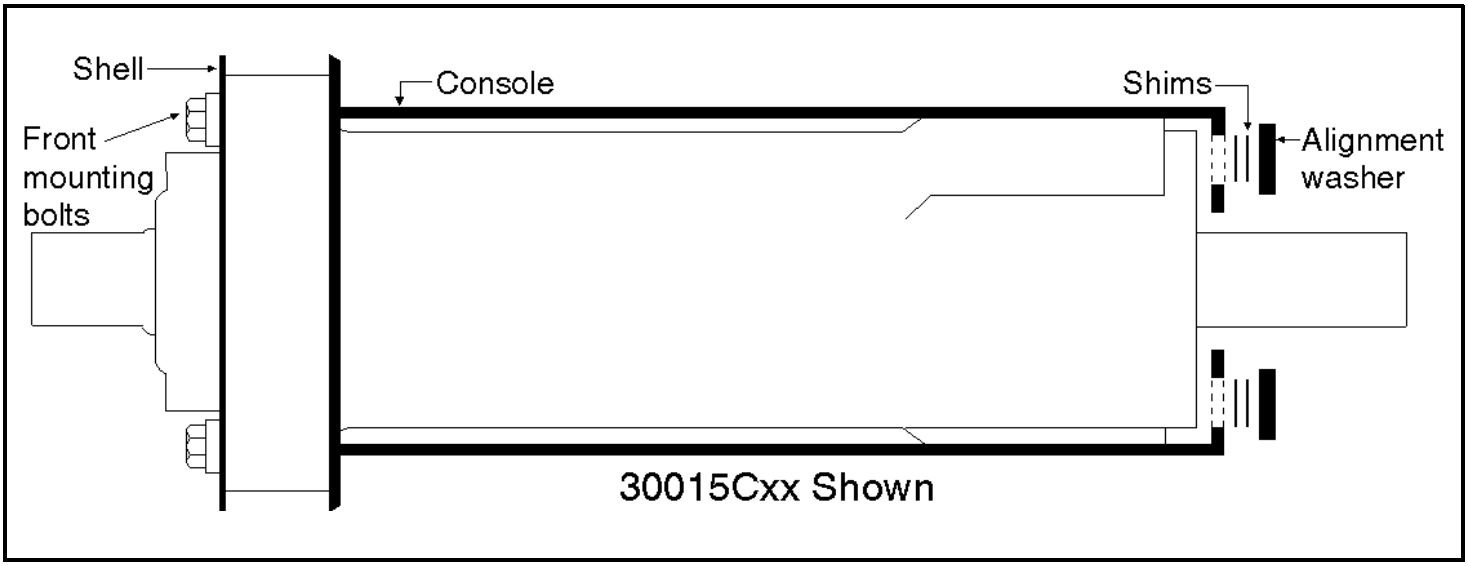


FIGURE 2 (MSSM0708BE)
Typical Main Bearing Mounting

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.

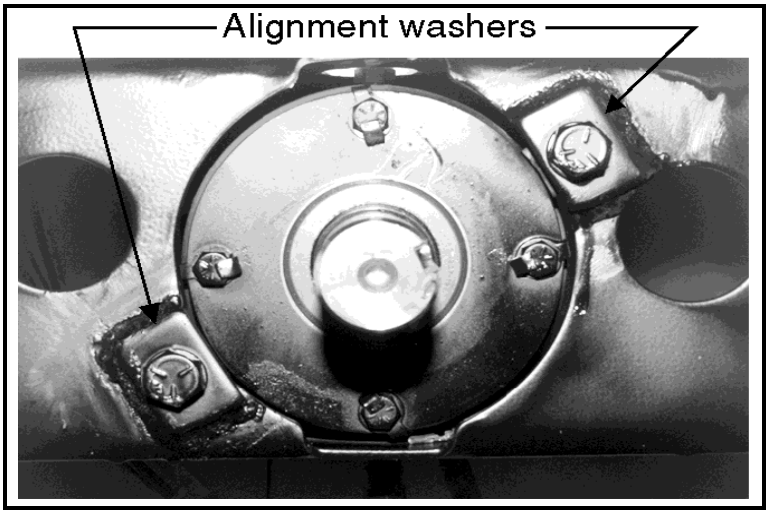


FIGURE 3 (MSSM0708BE)
Alignment Washers
30015 Models (see Note 2 above)

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.

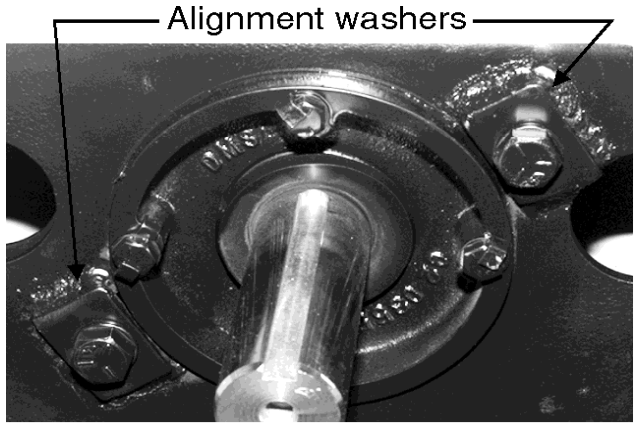


FIGURE 4 (MSSM0708BE)
Alignment Washers
30020 and 30022 Models

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.

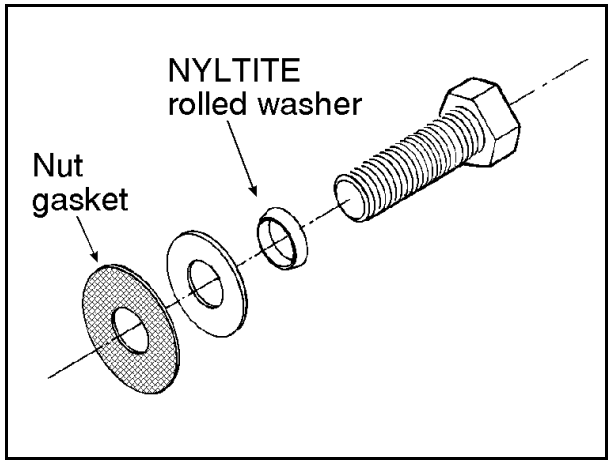


FIGURE 5 (MSSM0708BE)
Shell Bolt

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.

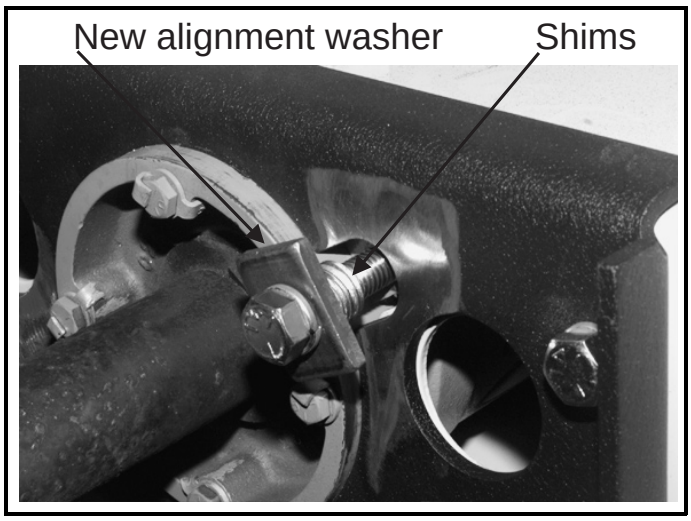


FIGURE 6 (MSSM0708BE)
Installing New Alignment Washers

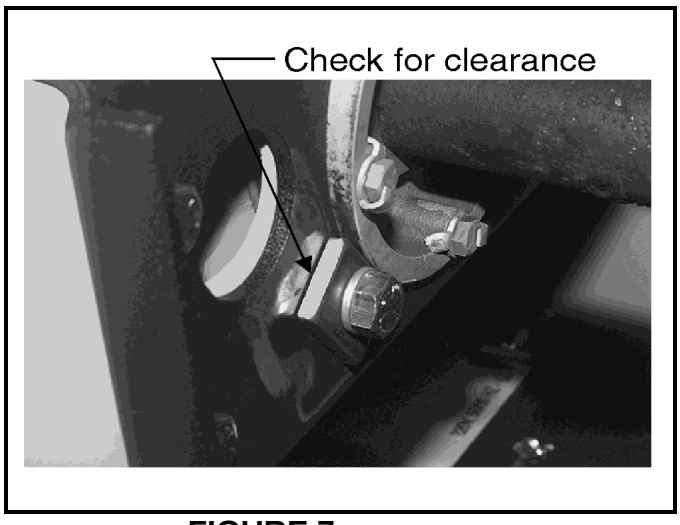


FIGURE 7 (MSSM0708BE)
Alignment Washer to Console

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.

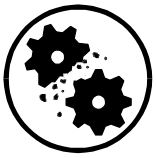
8. Install all of the original lubrication fittings and connections to the new bearing housing.

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.

⚠ CAUTION ⚠



Failure to properly install cylinder may cause it to loosen during machine operation. This will cause damage to the cylinder, shell, and main bearing shaft surfaces.

☞ **Carefully follow cylinder installation step below.**

3. Slide the cylinder onto the shaft, and install a new 3/4" inch long 3/4-10 grade 8 zinc plated bolt and washer. Carefully tighten this bolt, using it to pull the cylinder up the tapered main bearing shaft. After cylinder is in place, torque the bolt to 282 foot pounds (382 Newton meters).

   Remove the grade 8 bolt and replace with a new 3/4" inch 18-8 stainless steel retainer bolt and washer with the original cover and spacer. Torque the retainer bolt to 150 foot pounds.

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.

Cylinder, Shell, Bearing, and Console Installation

30015C4E, 30022C4E

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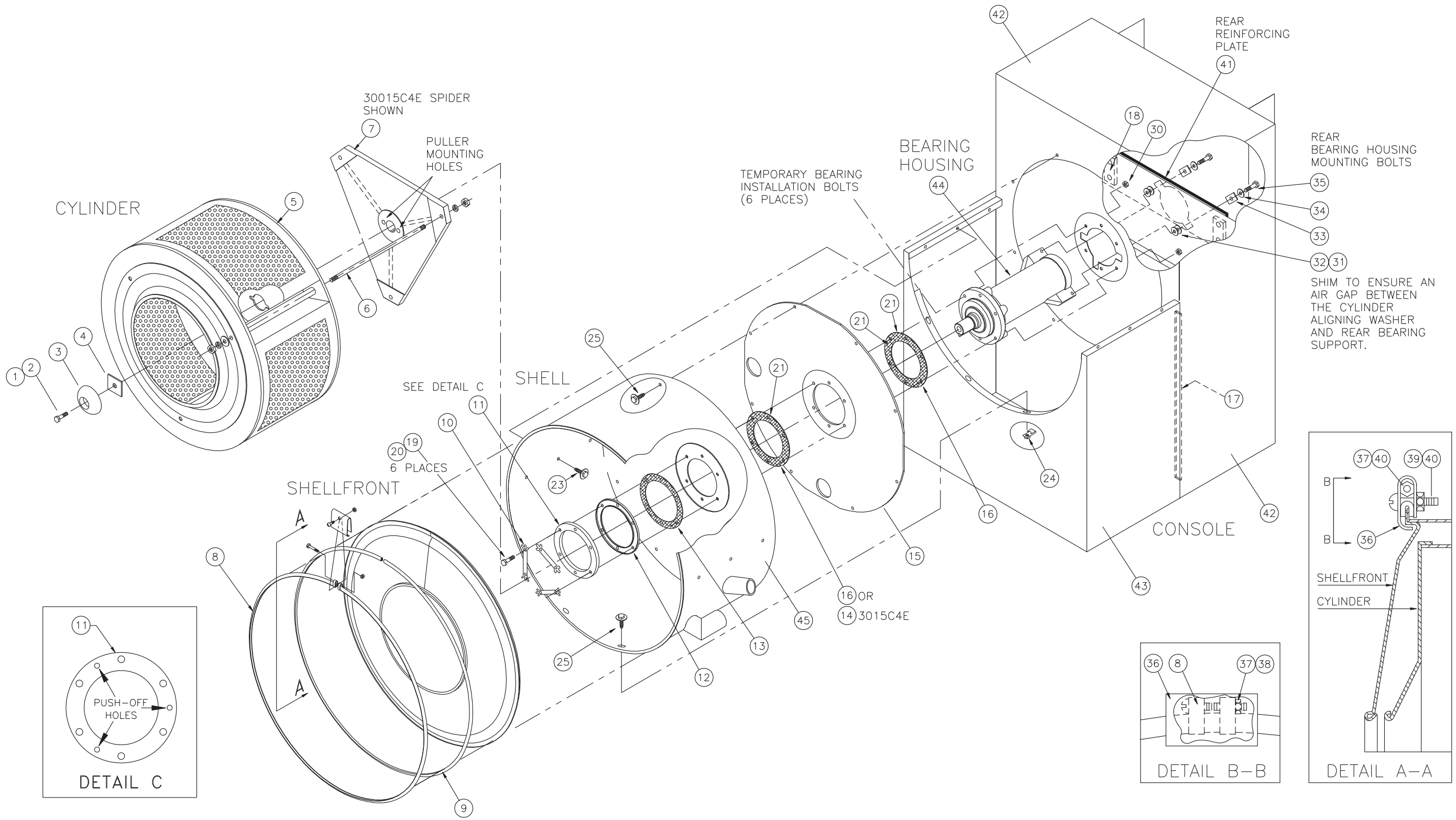

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Parts List—Cylinder,Shell,Bearing,Console Installation

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	ASC30002	3015C4E FRONT/REAR CONSOLE ASY	30015C4E
	B	ASC30001	3022C4E FRONT/REAR CONSOLE ASY	30022C4E
			----------COMPONENTS----------	
all	1	15B200	HEXCAPSCR 3/4-10X1+3/4 SS18-8	
all	2	15U350	LOCKWASHER 3/4 MED SS18-8	
all	3	02 11196	COVER=SHAFT RETAINER=304S/S	
all	4	02 14359A	SHAFT RETNR SPACER 2+3/4" SQ	
A	5	ACA02CWE	CYL ASSY=3015CWE/NMA/C4M/OE	
B	5	ACA3022M5	*CYL ASSY=3022 M5/C/K/S	
A	6	02 02138A	CYLTIEROD-3/3015W+CWU 18-8SS	PART OF 5A
B	6	02 03703J	CYLINDER TIE ROD 3022S5	PART OF 5B
A	7	X2 02758	SPIDER=1/CWU+25W	PART OF 5A
B	7	X2 03561A	SPIDER C5M	PART OF 5B
all	8	Y2 02059	*SHELL CLAMP RING=30" MACHINE	
all	9	02 02087C	EXTRUS*ION-SHELL=30"MACHINES	
B	10	02 03629	LOCKSTRAP=BEAR HOUS S/S	
all	11	X2 03576	RING=SHELL BACK CLAMP=1/C6M	
A	12	02 03444	RING=SHELL BACK CLAMP	
A	13	02 03446	1 GASKET=SHELBACK CLAMPRING	
B	13	02 03575	GASKET=SHELLBAKCLAMPRING=CWM	
A	14	02 03335	GASKET BEARING HOUSING CWE	
all	15	02 03568	PLATE-BG HOUSING REINFORCING	
all	16	02 03574	GASKET=MAIN BEARINGHOUSE=CWM	
A	17	02 03749	BAR=REINF STRIP 3015	
all	18	02 03560	TAPSTRIP=BEARING SUPPORT	
A	19	15K126	HEXCAPSCR 3/8-16NCX2+1/2SS18-8	
B	19	15K196	HEXCAPSCR 1/2-13UNC2X3 18-8SS	
All	20	20C013C	GSKT ELIM.250CC LCT#504-41	
all	21	20C036A	PERMATEX NO 2C IN 11 OZ TUBES	
ALL	23	15B101A	3/8-16UNC X 3/4 WPLASTISOL SS	
All	24	17N071	NUT J-TYP #C33896-3816-3B 3/8"	
ALL	25	15B102	3/8-16X1 UNSLTINDHEXTYF SS	
A	30	15G218	HXLOKNUT NYL 3/8-16 STL/ZNC	
all	31	15U245	FLTWASH 3/8 STD COMM 18-8 SS	
all	32	15U312	FLAWASHER 3/4ODX33/64IDX11GA Z	
all	33	02 03397	CYLINDER ALIGNING WASHER	
all	34	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	35	15K182	HEXTAPSCR 1/2-13X2ZINC GR5 FUL	
all	36	02 02181	GUARD=SHELL MOUNT RING CLIP	
all	37	15K046S	HEXCAPSCR 1/4-20UNC2A X 2.25 S	
all	38	15G168	SQNUT 1/4-20UNC2 SS18-8	
all	39	15N146	RDMACHSCR 10-24UNC2X1 SS18-8	
all	40	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
all	41	02 03559	SUPPORT=REAR BRG HOUSE	
A	42	W2 03769C	3015C4E REAR CONSOLE WELD	
B	42	W2 03771C	WLMT=3022C4E REAR CONSOLE	
A	43	W2 03707	3015C4E FRONT CONSOLE	
B	43	W2 03698Y	302C4E STD FRONT CONSOLE	
A	44	SA 33 030	MAIN BRG ASSY 3015CWE+NM	
B	44	A33 09901	MAIN BEARING ASSY=C5M+	
A	45	ASH30002	3015C4E SHELL/DRAIN ASSY	
B	45	ASH30001	3022C4E SHELL/DRAIN ASSY	

Main Bearing Assembly

30015C4E

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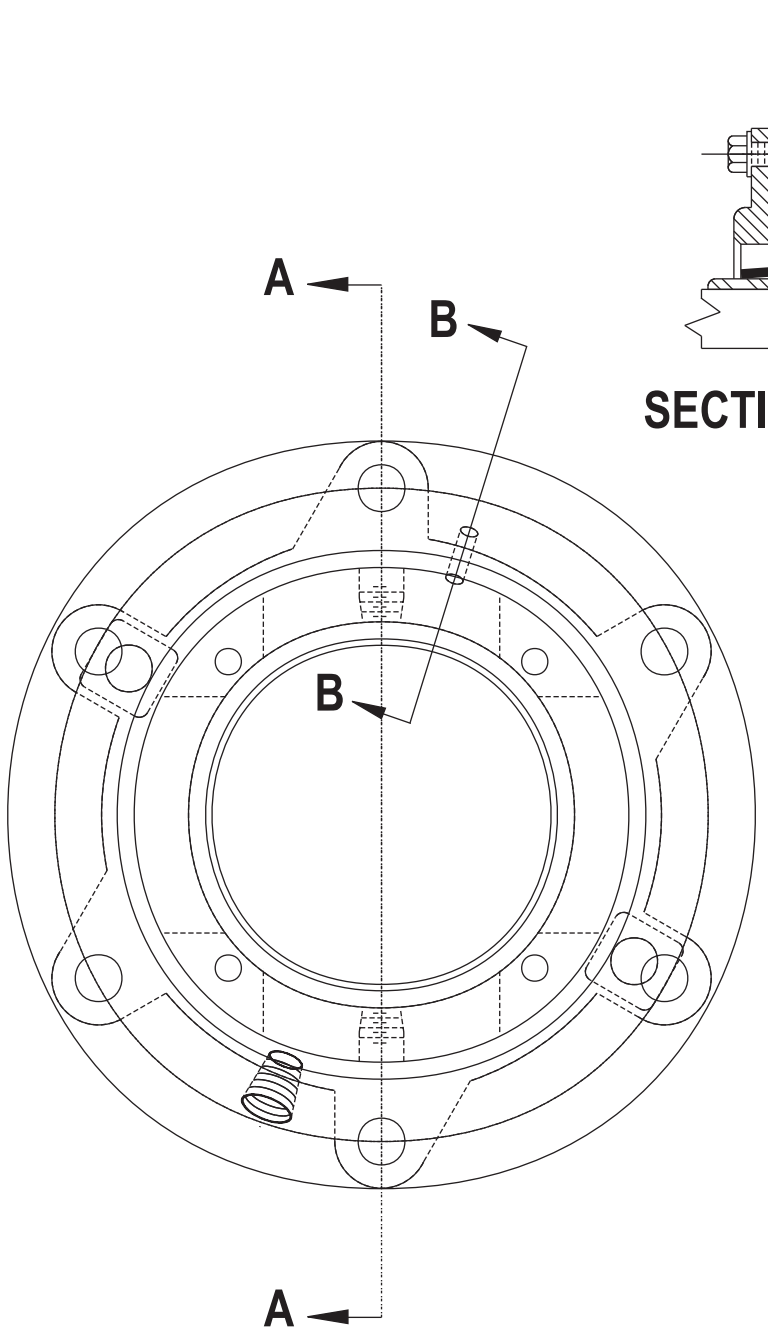
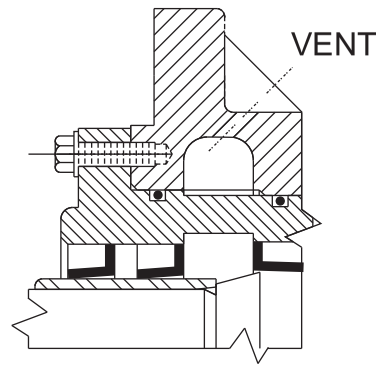
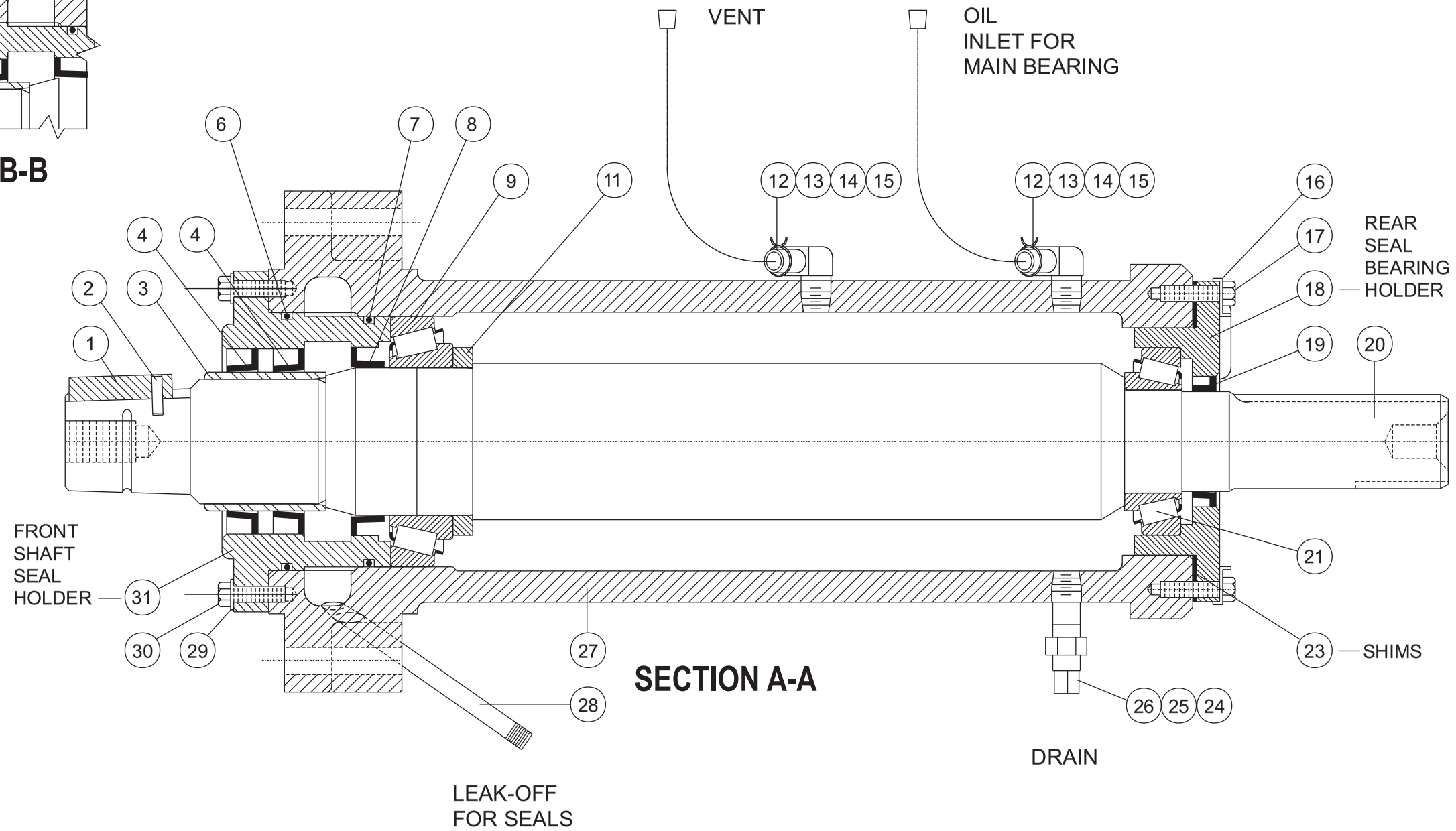




SECTION B-B



SECTION A-A

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Parts List—Main Bearing Assembly

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 33 030	* MAIN BEARASY 3015CWE+NMA+C4	
----------COMPONENTS----------				
all	1	02 02294A	SHAFT KEY 3/8 X 3/8	
all	2	15H089S	SPRINGPIN 1/8"DIA X 5/8" LONG	
all	3	02 03311	SEAL SLEEVE OUR MATL	
all	4	24S005	SEAL 2.25 X 3.0 X .375 SS BUNA	
all	5	24S005	SEAL 2.25 X 3.0 X .375 SS BUNA	
all	6	60C151	ORING 3+7/8ID1/8CS BUNA70#241	
all	7	60C150	ORING 3+3/4ID1/8CS BUNA70 #240	
all	8	24S015	SEAL 2.265X3.256X.433 CR#23678	
all	9	54A319320	TIM28920 2-24/28985 2-51=2.375	
All	11	02 03392	BEARING BACKUP WASR OILCOAT	
all	12	5SL0EBEC	NPTELB 90DEG STRT 1/4 BRASS125	
all	13	03 01142	NIPPLE 1/4X1+1/4 BRASS	
all	14	27A043A	HOSECLAMP.562"DIA.SPRG#HC9STZD	
all	15	60E005P	PVC TUBING 1/2"ID X 5/8"OD	
all	16	15U152A	FLTWSHR .680OD,.375ID,.0625T	
all	17	15K092	HEXFLGSCR 3/8-16X1 GR8 CS	
all	18	X2 03660	HOUSE=SEAL+BRG-24S048AAA CWU	
all	19	24S048AAA	SEAL 1.625X2.375X.375 CS/BUNA	
all	20	X2 03314	MAIN SHT=3015CWE NMA C4M C6M	
all	21	54A305306	24720TIM2-24/24780 2-51=1.625"	
all	23	02 03323	SHIM=.003 CRS GREEN	AS REQUIRED
all	23	02 03323A	SHIM=.005 CRS BLUE	AS REQUIRED
all	23	02 03323B	SHIM=.010 CRS RED	AS REQUIRED
all	23	02 03323C	SHIM=.0075 CRS BLACK	AS REQUIRED
all	23	02 03323D	SHIM=,020 CRS WHITE	
All	23	02 03323E	SHIM=.050 CRS CLEAR	
all	24	5SP0EFFSSM	NPT PLUG 1/4 SQSLDMAGNET BLKST	
all	25	5N0E01KBE2	NPT NIP 1/4X1.5TBE BRASS STD.	

Parts List, cont.—Document Name

Used In	Item	Part Number	Description	Comments
all	26	5SCC0EBE	NPT COUP 1/4 BRASS 125# W/HEX	
all	27	X2 03436	HOUSING-MAIN BEARING=1/CWU	
all	28	5N0E05AG42	NPT NIP 1/4X5 TBE GALSTL SK40	
all	29	02 03564	BOLT LOCKING TAB 1/4 BOLT	
all	30	15K062	HEXCAPSCR 5/16-18X1 18-8SS	
all	31	X2 03437	HOLDER=SHAFT SEAL=1/CWU	

Main Bearing Assembly

30022V6J,T5E,T5X,C4E

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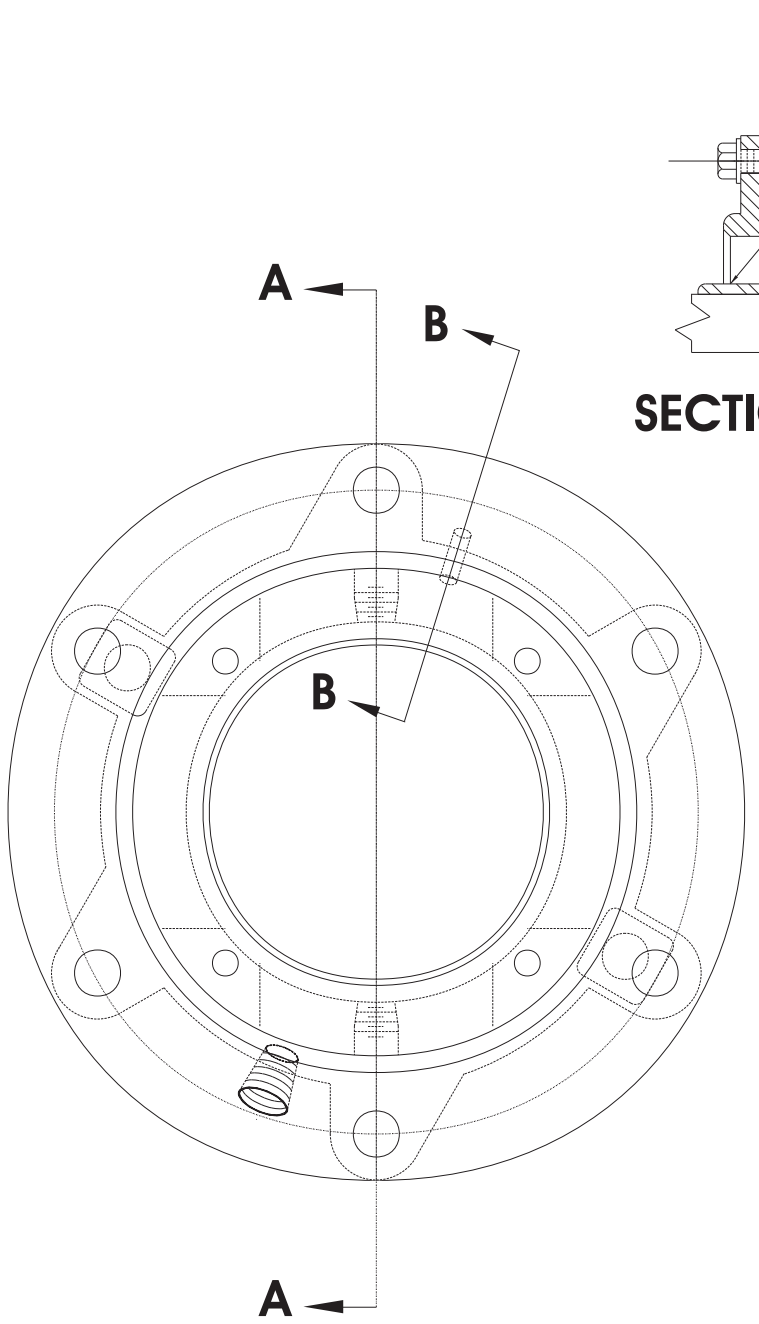
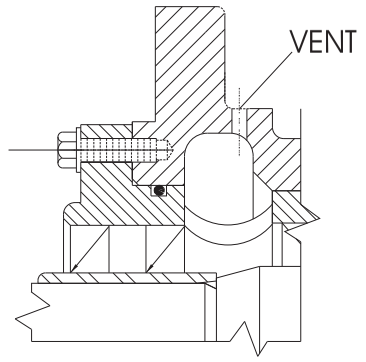
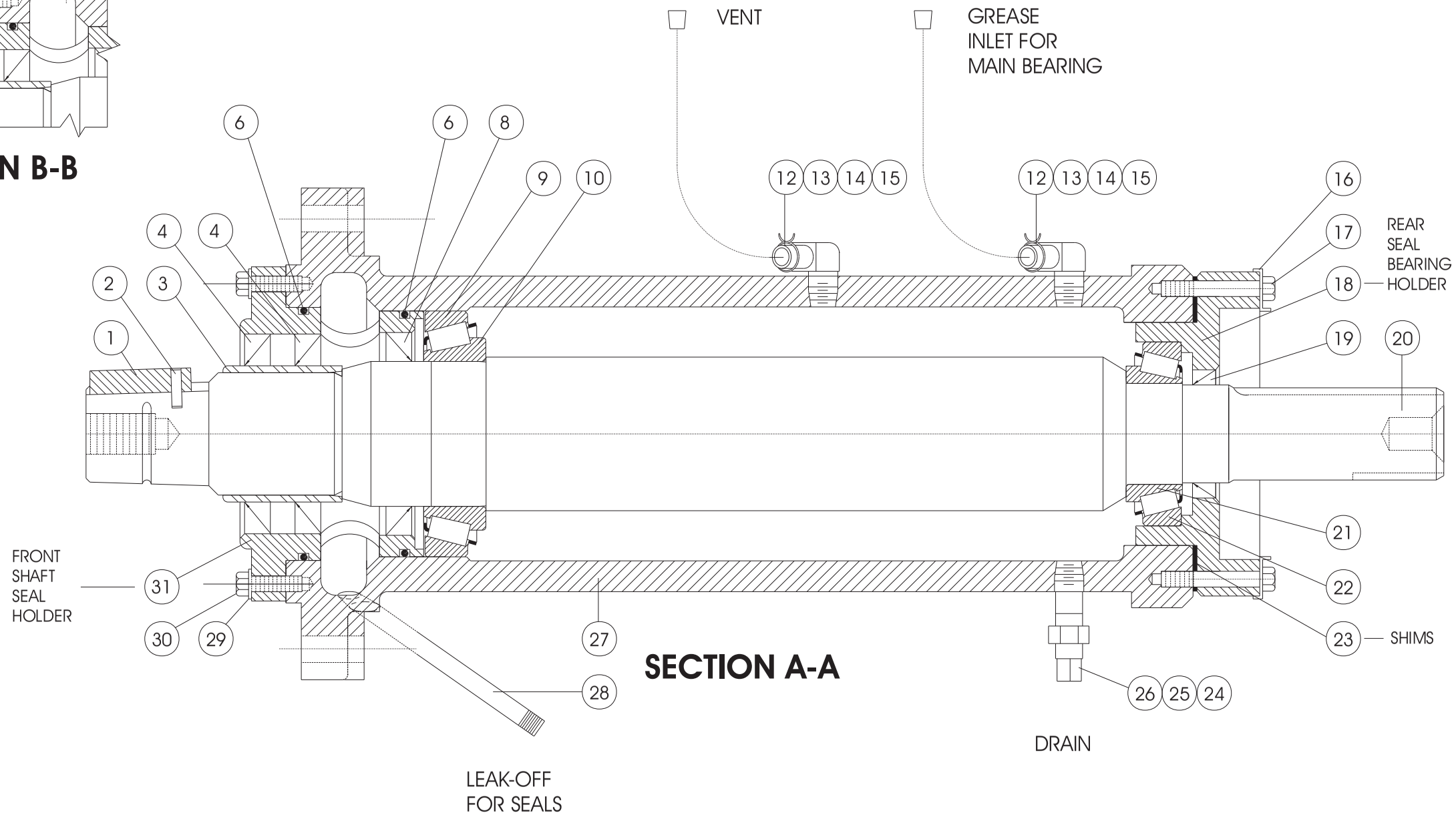




SECTION B-B



SECTION A-A

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Parts List—Main Bearing

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	A33 09901	* BEARING ASSY=C5M + N4M	3022V6J,T5E,T5X,C4E
			----------COMPONENTS----------	
all	1	15H089S	SPRINGPIN 1/8"DIA X 5/8" LONG	
all	2	02 02294A	SHAFT KEY 3/8 X 3/8	
all	3	02 13143	SEALSLEEVE=SWE-1/SWE	
all	4	24S053	SEAL 2.625X3.625X.437#10050LUP	
all	5	24S053	SEAL 2.625X3.625X.437#10050LUP	
all	6	60C151	ORING 3+7/8ID1/8CS BUNA70#241	
all	7	60C151	ORING 3+7/8ID1/8CS BUNA70#241	
all	8	24S052A	SEAL 2.559X3.55X.315 CR#25430	
all	9	54A916	CUP TIMKN#JLM710910 1/BX+PT#	
all	10	54A915	CONE TIMKN#JLM710949C 1/BX	
all	12	5SL0EBEC	NPTELB 90DEG STRT 1/4 BRASS125	
all	13	03 01142	NIPPLE 1/4X1+1/4 BRASS	
all	14	27A043A	HOSECLAMP.562"DIA.SPRG#HC9STZD	
all	15	60E005P	PVC TUBING 1/2"ID X 5/8"OD	
all	16	15U152A	FLTWSHR .680OD,.375ID,.0625T	
all	17	15K121A	HXCPSC 3/8-16X2 GR8 ZC	
all	18	X2 03659A	HOUSE=SEAL+BRG 30M,V7	
all	19	24S048AAA	SEAL 1.625X2.375X.375 CS/BUNA	
all	20	X2 13103A	SHAFT,MAIN FOR 3020C5M+N4M	
all	21	54A308	CONE M802048 TIM 2-24 1/BX+PT#	
all	22	54A307	CUP M802011 TIMK 2-24 1/BX+PT#	
all	23	02 03323	SHIM=.003 CRS GREEN	AS REQUIRED
all	23	02 03323A	SHIM=.005 CRS BLUE	AS REQUIRED
all	23	02 03323B	SHIM=.010 CRS RED	AS REQUIRED
all	23	02 03323C	SHIM=.0075 CRS BLACK	AS REQUIRED
All	23	02 03323D	SHIM=,020 CRS WHITE	AS REQUIRED
all	23	02 03323E	SHIM=.050 CRS CLEAR	AS REQUIRED
all	24	5SP0EFFSSM	NPT PLUG 1/4 SQSLDMAGNET BLKST	
all	25	5N0E01KBE2	NPT NIP 1/4X1.5TBE BRASS STD.	

Parts List, cont.—Main Bearing

Used In	Item	Part Number	Description	Comments
all	26	5SCC0EBE	NPT COUP 1/4 BRASS 125# W/HEX	
all	27	X2 03573A	HOUSING BEARING C5M	
all	28	5N0E05AG42	NPT NIP 1/4X5 TBE GALSTL SK40	
all	29	02 03564	BOLT LOCKING TAB 1/4 BOLT	
all	30	15K062	HEXCAPSCR 5/16-18X1 18-8SS	
all	31	X2 13144A	HOLDER=SHFT SEAL(05=24S052A)	

Section 4

Shell and Door Assemblies

Shellfront Assembly, Conduit, & Interlock

3010 / 3015 G5E,G5X,CGE

30015 V7J,T5J,C4A,C4E & 30022 V6J,T5J,C4A,C4E

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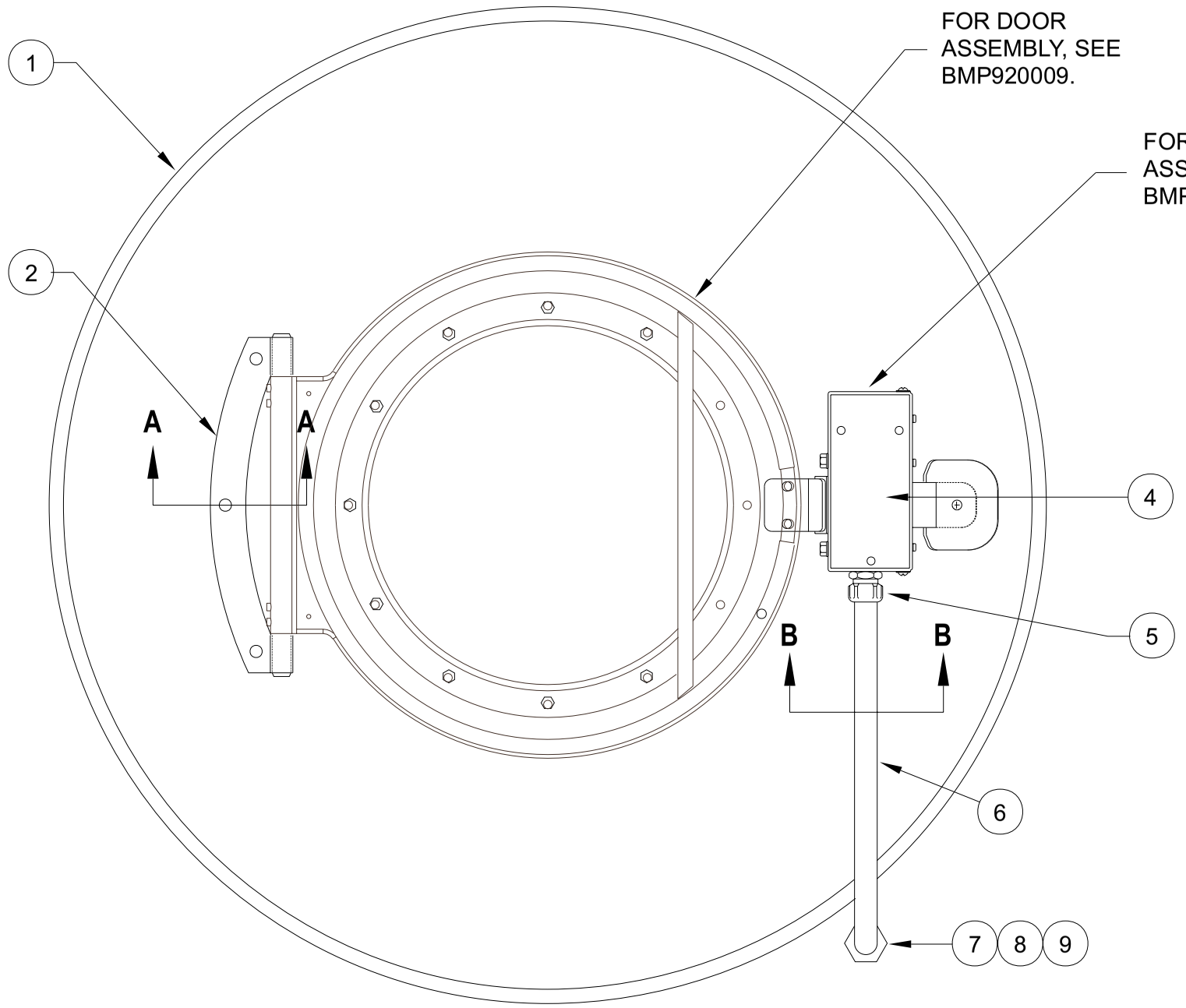
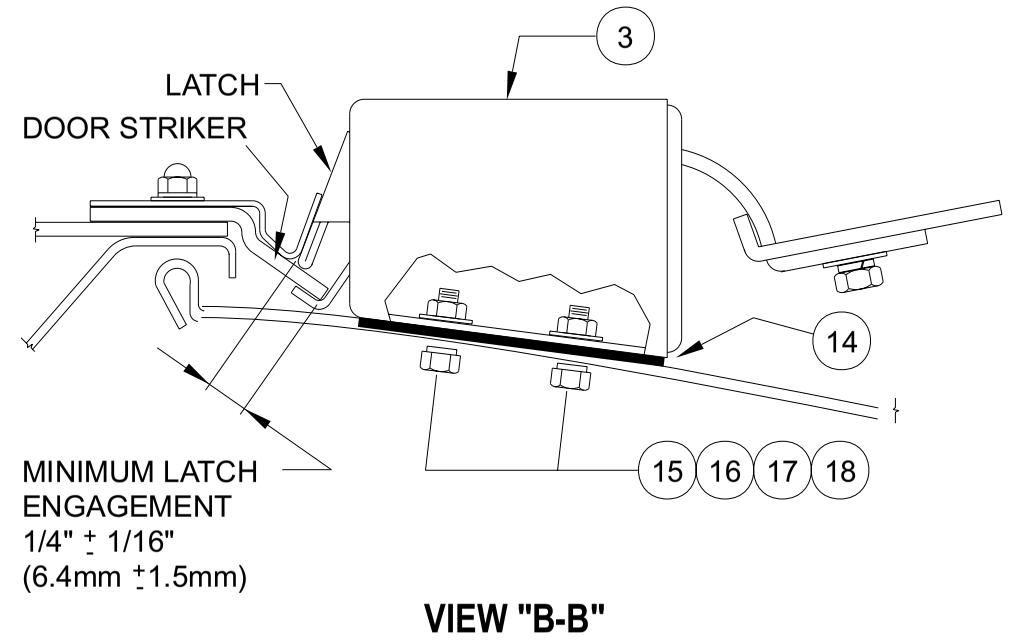
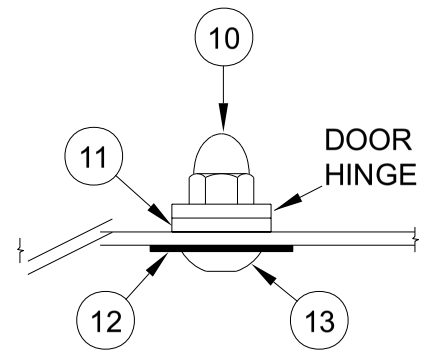




VIEW "B-B"



VIEW "A-A"

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).

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Parts List—Shellfront, Conduit & Interlock

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	A33 10100C	*SHLASSY (IDNT) UNLOK N4P	3015M4G/J/P, M6J,D4A 3022M5G/J
	B	A33 10100H	SHELL FRONT ASSY 3015/20M4A	3015M4A,C4T,M4T,M6A,M6T 3022M5T,3022C4T
	C	A33 10100M	SHLASSY N/LOCK 3015/22S#G/J	3022S4J,S4G,S5J 3015K4A,S4J,S5G,S5J
	D	A33 10100N	SHLASSY N/LOCK 3015/22V/T	**3010G5E,G5X** **3015G5E,G5X,V7J,T5E,T5J,T5X** **3022V6J,T5E,T5J,T5X**
	E	A33 10100F	*SHLASSY (IDNT) UNLOK C4A	**3015C4A, 3022C4A**
	F	A33 10100G	SHLFRTASY N/O ILOK W/PROX	**3010CGE,3015CGE,30015C4E** **30022C4E**
			----------COMPONENTS----------	
ABCDE	1	X2 02361B	SHELLFRONT,30",ELECTRIC LOCK	
F	1	X2 02361C	2002296D SHELLFRT=30" ILOC W/PROX	
A.C,D	2	A33 07100C	*DRASSY(INDNT)LK,LOGO N4,5,6P	
B	2	A33 07100H	95027 DOOR ASY 3015/3020M4A	
EF	2	A33 07100F	95027# DRASSY (INDNT)LK,LOGO C4A	
A,B	3	EDL00171	INTRLKHSG ASSY=N/UNLOCK 240V	
C	3	EDL00371	INTERLKHSG=N/LOCK+SWITCH240V	
D	3	EDL00271	INTRLKHSG ASSY=N/LOCK 220V	
F	3	EDL00171C	INTRLKHSG ASSY=N/O W/ PROX 240	
all	4	01 10422	NPLATE:DOOR ILOC->N4,5,6 P	
all	5	12K040	1/2"COND.EMT COND. PECO #260B	
All	6	03 01446	1/2 EMT CONDUIT 900D=DR INTR	
all	7	10Y71M4GEX	*M4G EXTERNAL CONNECTIONS	
all	8	12K040	1/2"COND.EMT COND. PECO #260B	
all	9	12P1ASSB	SNAPBUSH 7/8"MH X 11/16	
all	10	15G200C	HXCPNUT HI 3/8-16 BRASS NIK PL	
all	11	02 02819C	SPACER-SHELLFRONT/HINGE	
all	12	02 02293	DOOR HANDLE NUT GASKET	
all	13	15K084	TRUSS HXSOK 3/8-16 X 23/32SS	
ABCDE	14	02 03669	GASKET=INTRLK HOUSING	
F	14	02 03669C	GASKET=INTRLK HOUSING 8" LONG	
all	15	15N174	HXCAPSCR 1/4-20UNC2X5/8SS18-8	
all	16	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	17	24G020N	ROLLED WASH.252ID NYLTITE 25W	

Parts List, cont.—Shellfront, Conduit & Interlock

Used In	Item	Part Number	Description	Comments
All	18	15G168	SQNUT 1/4-20UNC2 SS18-8	

Door Assembly

3010 / 3015 G5E,G5X,CGE

30015 V7J,T5J,C4A,C4E & 30022 V6J,T5J,C4A,C4E

BMP020002/2008233B
(Sheet 1 of 2)

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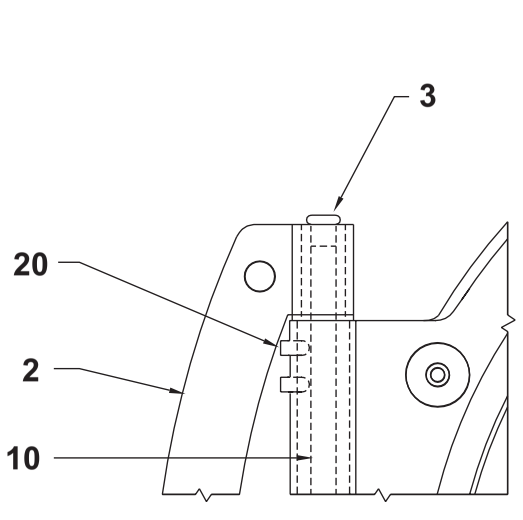
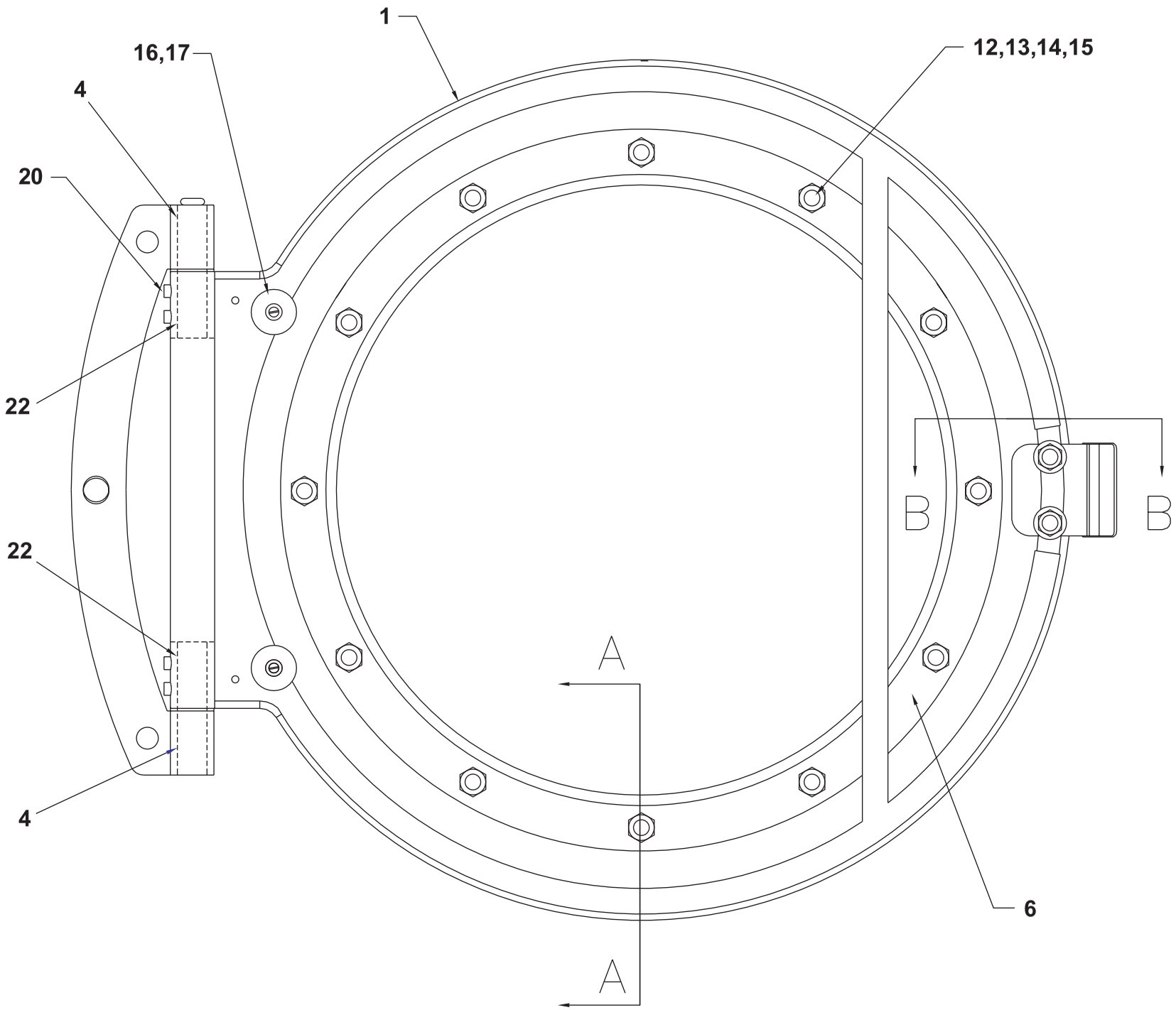
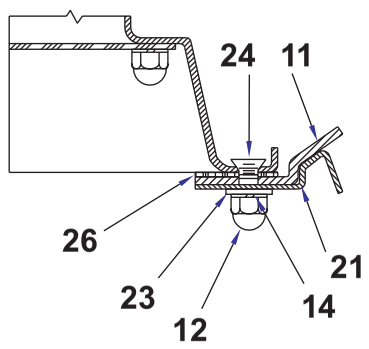
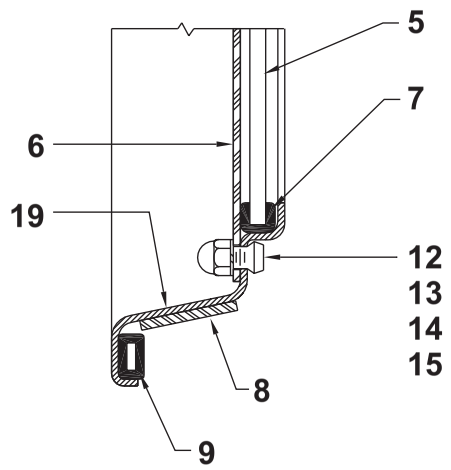


HINGE DETAIL





VIEW B–B



VIEW A–A

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Parts List—Door Assembly

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	A33 07100C	*DRASSY(INDNT)LK,LOGO N4,5,6P	3010/3015 G5E,G5X 3015T5E,T5J,T5X,V7J 3022T5E,T5J,T5X,V6J
	B	A33 07100F	DRASSY (INDNT)LK,LOGO C4A	3010CGE,3015CGE 3015C4T,C4E 3022C4T,C4E
			----------COMPONENTS----------	
all	1	X2 02814F	MACH=SHELLDOOR DRAWN, 30XX	
all	2	02 02819	HINGE=STAMPED DOOR 25#	
all	3	12P1AGHP1	HOLEPLUG 3/8"BLACK LPE	
all	4	02 02817	FLANGE BRG=DOOR HINGE-NYLON	
A	5	02 09215	DRGLASS 12 3/8DIA SS STAMPED	
B	5	02 09215D	DR GLASS=N4,5,6P W/MIL LOGO	
all	6	02 09021	RING=DOOR GLASS PRESSURE	
all	7	02 02366	GASKET DOORGLAS GTR52-5220-3	
all	8	02 10545	EXTR BAND-STAMPED SS CYLDOOR	
all	9	02 10342G	GASKET 15" DOOR-BLACK	
all	10	02 02764	HINGEPIN=SHELLDOOR L=10+5/8"	
all	11	03 01420	PLATE=DOOR STRIKER=ILOC	
all	12	15G140	HXCAPNT 1/4-20 #C250=20 NKLPLT	
all	13	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	
all	14	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
all	15	24G020N	ROLLED WASH.252ID NYLTITE 25W	
all	16	60C080	RECESS BUMPER RUBBERLAVELLE #7	
all	17	15P103	TRDCUT-F RDHDSLOT 8-32UNCX1/2	
all	18	15N173A	FLTMACSCR 1/4-20 UNCX5/8 UCUTS	
all	19	20C018	ADHESIVE-3M #1357-QT CN	
all	20	15Q077	SOKSETSCR 1/4-20X1/4 ZINC ALLE	
all	21	03 01423J	LATCH GUARD ILOC	
all	22	02 02815	PLAIN BRG=DOOR HINGE-NYLON	
all	23	15U188	FLTWASH 1/4 STD COMM SS18-8	
all	24	15N163A	FLTMACSCR 1/4-20UNCX 1/2 UCUTS	
all	26	02 11904K	SHIM=DOOR HANDLE=4226RWP	

Interlock Assembly

30015, 30022, 3621 C4E

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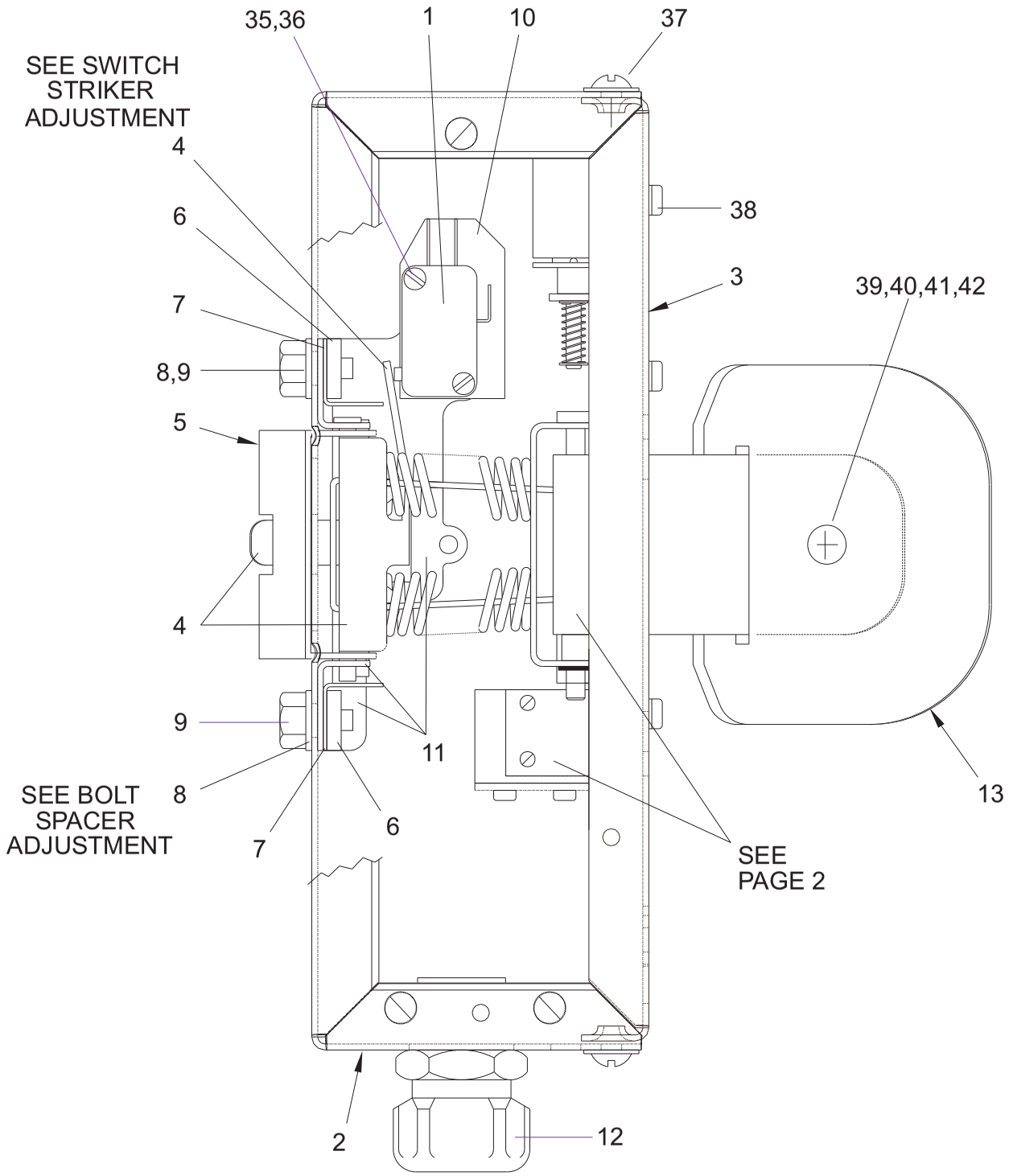

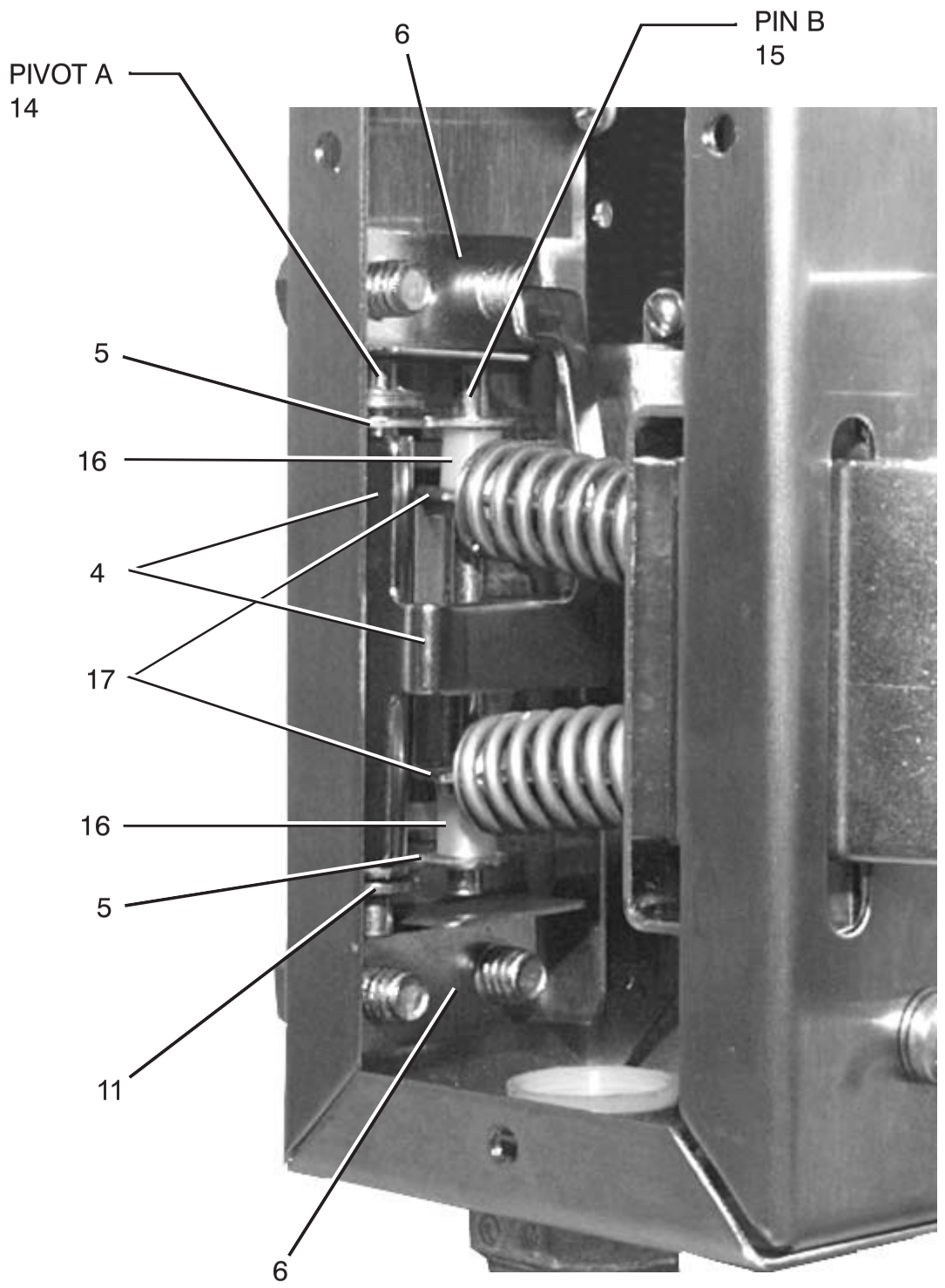

Interlock Assembly
30015, 30022, 3621 C4E

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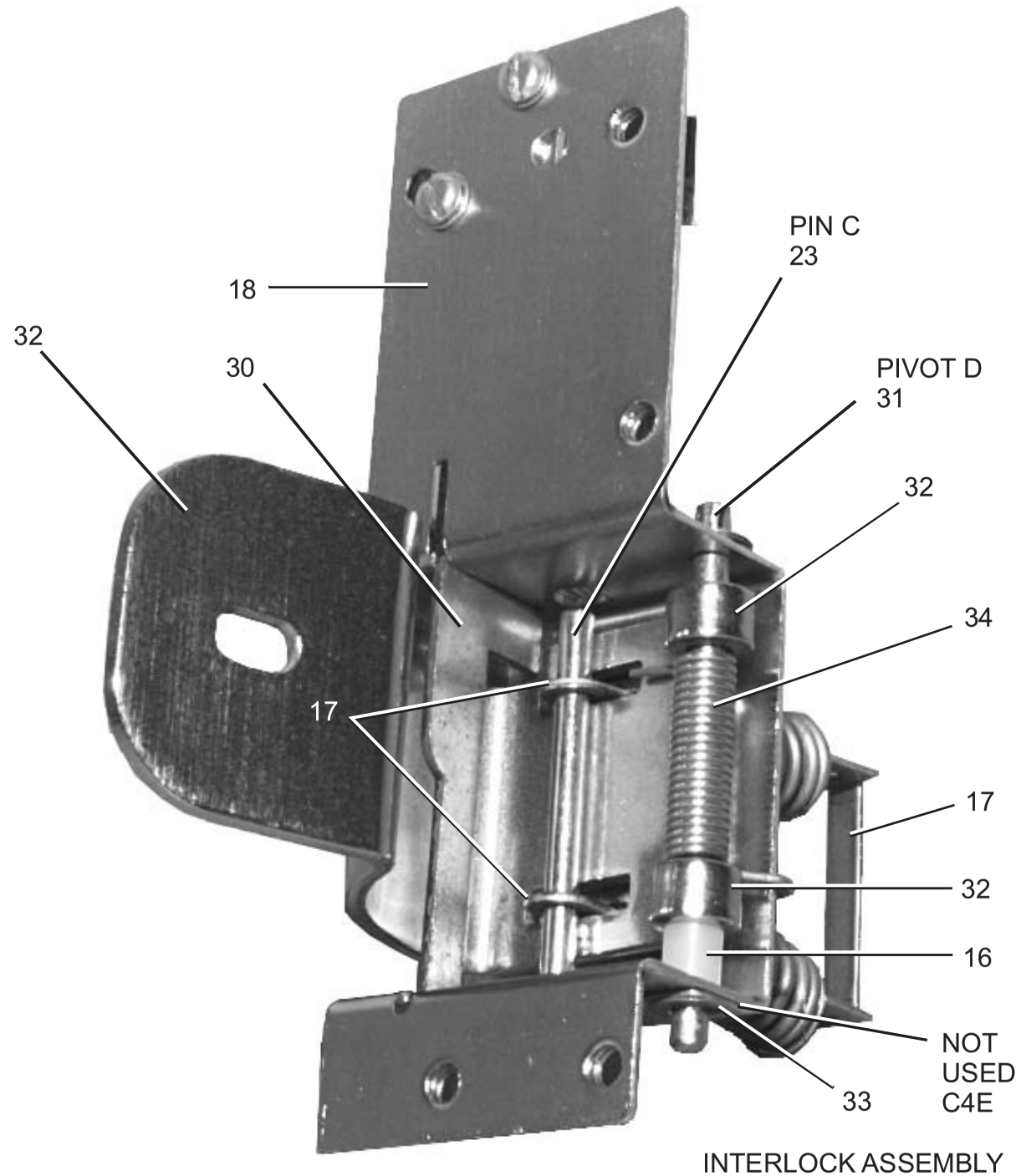
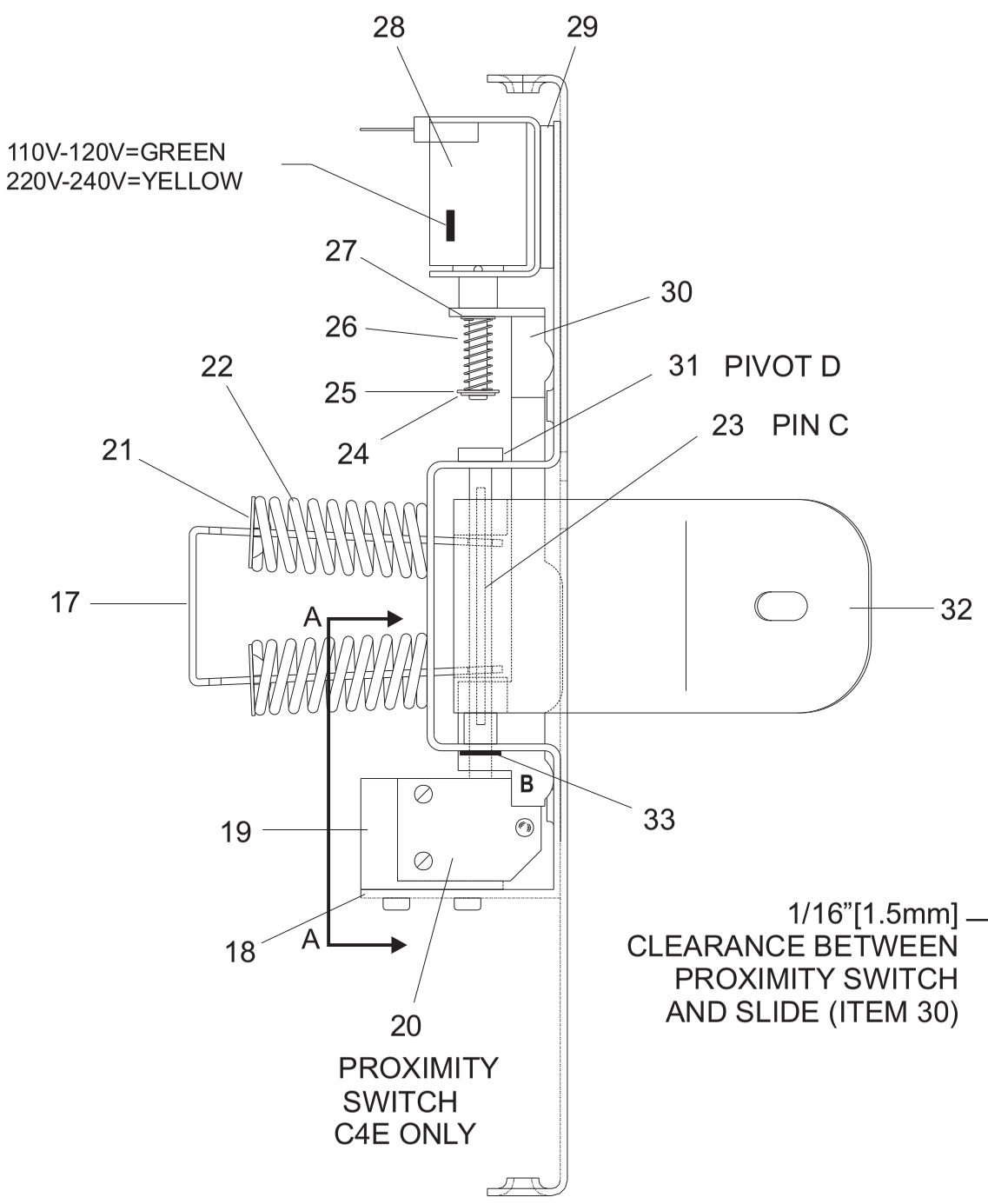


INTERLOCK ASSEMBLY
WITHOUT PROXIMITY
SWITCH SHOWN

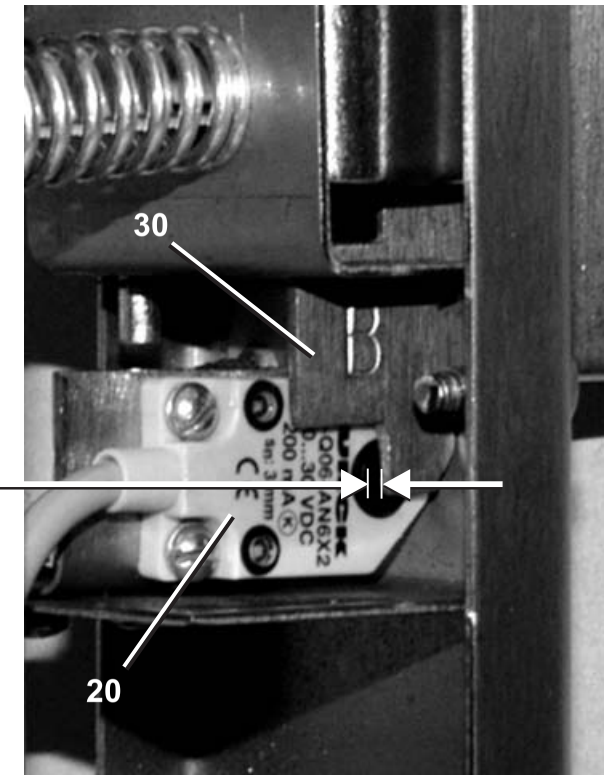


PROXIMITY
SWITCH
C4E ONLY

FRONT VIEW

PROXIMITY SWITCH
HAS TWO LED LAMPS:

GREEN = ON / ENERGIZED
ORANGE= CLOSED CIRCUIT



VIEW A-A

Interlock Assembly
30015, 30022, 3621 C4E

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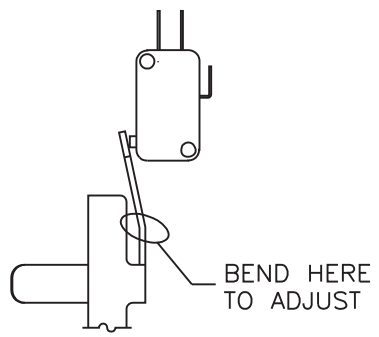
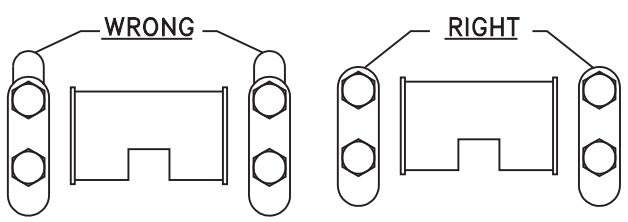
SWITCH STRIKER ADJUSTMENT



Adjust the switch striker arm by bending as shown so that :
1) The switch is activated when the 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 over travel and hit the switch housing when the door is closed and the switch is actuated.

BOLT SPACER ADJUSTMENT



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 shellfront

Parts List—Interlock Assembly

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	EDL00171C	INTRLKHSG ASSY=N/O W/ PROX 240	3015,3022C4E
	B	EDL00171B	ILOC PIVOT ASSY W/PROX 240V	PART OF A
	C	EDL00137C	INTRLKHSG ASSY=N/O W/PROX 120V	3621C4E
	D	EDL00137B	I-LOC PIVOT ASSY=W/PROX 120V	PART OF C
			COMPONENTS	
AC	1	09R014A	MINI-SW SPDT STAKON #V15G1C26K	
AC	2	03 01426B	HOUSE=REAR ILOC W/PROX	
AC	3	03 01427C	HOUSING=REAR ILOC W/PROX	
AC	4	03 01424A	STRIKER=SWITCH=LONG TAB	
AC	5	03 01423	LATCH = INTERLOCK	
AC	6	03 01418B	KEEPER=LATCH PIN/NOTCH	
AC	7	03 01418	TAP STRIP = ELEC INTER LOCK	
AC	8	03 01417	PLATE=SPACER=ILOC	
AC	9	15N158	HEXCAPSCR 1/4-20NCX1/2SS18-8	
AC	10	03 01335	INSULATOR=AIROP AUTOSPOT+$8S	
AC	11	03 01429	PLATE=FNT PIVOT = ILOC	
AC	12	12K040	1/2"COND.EMT COND. PECO #260B	
AC	13	03 01425A	DOOR HANDLE EXTENSION	
AC	14	03 01443	FLATHDRIVET 5/32X2+5/16 ZINC	
AC	15	15H091	STRGHTPIN 5/32"X2.25 LG ZINC	
BD	16	27B205080Z	SPCRROLL.177ID.218L.027T STLZC	
BD	17	03 01422	KEEPER=SPRING=ILOC	
BD	18	03 01428C	PLT=RR PIVOT ILOC+PROX 220V	
BD	19	03 01428B	XROX BKT=REAR PIVOT ILOC N/O	
BD	20	09RPS03RDS	3MM SENSING RECTANGULAR SHLD	
BD	21	03 01444A	SPRING CUP = ILOC	
BD	22	03 01444	SPRING .51/1.69/46+CADPL	
BD	23	15H090I	STPIN 5/32 X DIA 1.75"LG ZN.	
BD	24	17B171	EXTRETRING IND#6100-9-ST-ZD ZI	
BD	25	15U063	FLATWASH STD #6 EXCEPT.010THK	
BD	26	03 01445	SPRING .2/.625/.319+CADPL	

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Parts List, cont.—Interlock Assembly

Used In	Item	Part Number	Description	Comments
BD	27	15U060	FLAT WASHER#6 ANSI TYPEB BRASS	
B	28	09K062B71	SOLENOID 240/60--220/50 = ILOC	
D	28	09K062B37	SOLENOID(C-7)120/60--110/50	
BD	29	03 S1X1	SHIM:DOOR INTLK SOLENOID N4P	
BD	30	03 01421B	SLIDE=NORMALLY OPEN(C7 SOL)	
BD	31	03 01443	FLATHDRIVET 5/32X2+5/16 ZINC	
BD	32	03 01425	HANDLE=ILOC	
BD	33	17B170	EXTRETRING IND#6100-15-ST-ZD Z	
BD	34	03 01445B	TORQUE SPRING (.53 IN-#)	
BD	35	15N019	RDMACSCR 4-40UNC2AX5/8 ZINC GR	
BD	36	15U040	LOCKWASHER MEDIUM #4 ZINCPL	
BD	37	15N080S	PANHDPHILMACSCRSEMS8-32X1/4SS	
BD	38	15P010S	TRDCUTPNHD SEMS 10-24X1/2 SS41	
BD	39	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
BD	40	15N123C	FLATMACHSCR 10-24X7/16 U-CUT S	
BD	41	15U160	LOCKWASHER MEDIUM #10 SS18-8	
BD	42	15U135	FLATWASH#10 .4370DX.203IDX.04T	
BD	43	03 01442	SOLENOID INSULATION=DR INTRK	

Section 5

Control and Sensing

Switch Panel Assembly

3010 & 3015GCE; 30015, 30022 & 3621C4E

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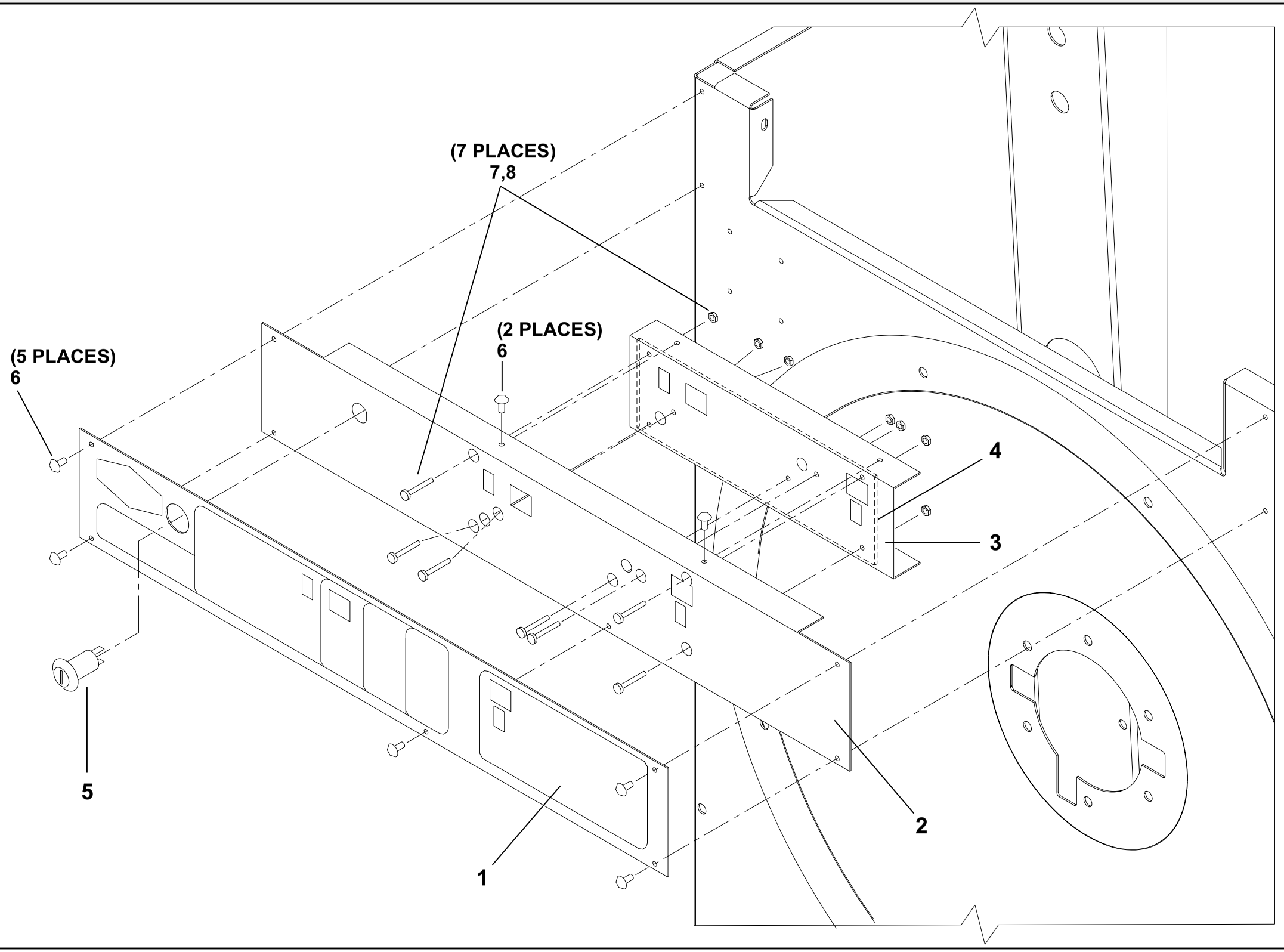

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Parts List—Switch Panel Assembly

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	ESP71CEA	SWPNL 3022C4E	
			----------COMPONENTS----------	
all	1	01 10705	GRAPHIC PANEL=C4E SW PNL	
all	2	03 CF529V	PANEL:SWPNL 3022C4E CONTROLS	
all	3	03 CF513V	BRKT:C4E BOARD MOUNTING	
all	4	08BTCSTAT	BD:C4E COIN STATUS->TEST	
all	5	09N127C	KEYSW SPST 7A120VAC SCREW TERM	
all	6	15P101B	TRDCUT-FPANHD8-32 X3/8	
all	7	15N069A	PANMACHSCR 6-32UNC X 1.500"LG	
all	8	15G073	HEXMACHSCRNUT 6-32UNC.NYLON	

Coin Acceptor and Vault

30015, 30022 & 3621C4E

BMP020061/2003276V
(Sheet 1 of 2)

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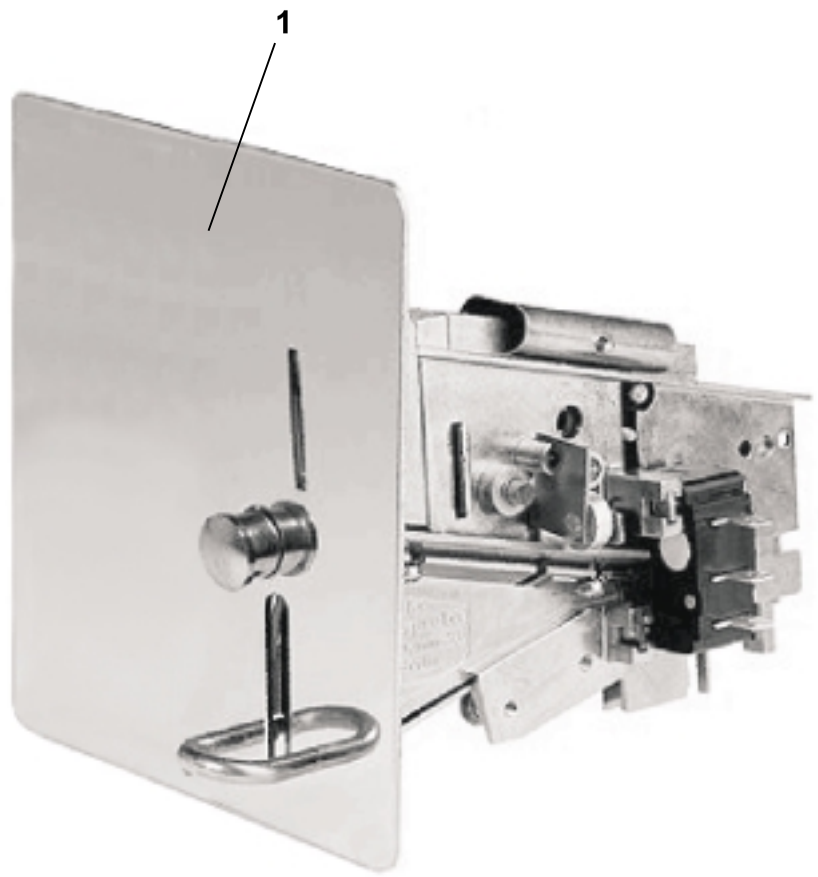

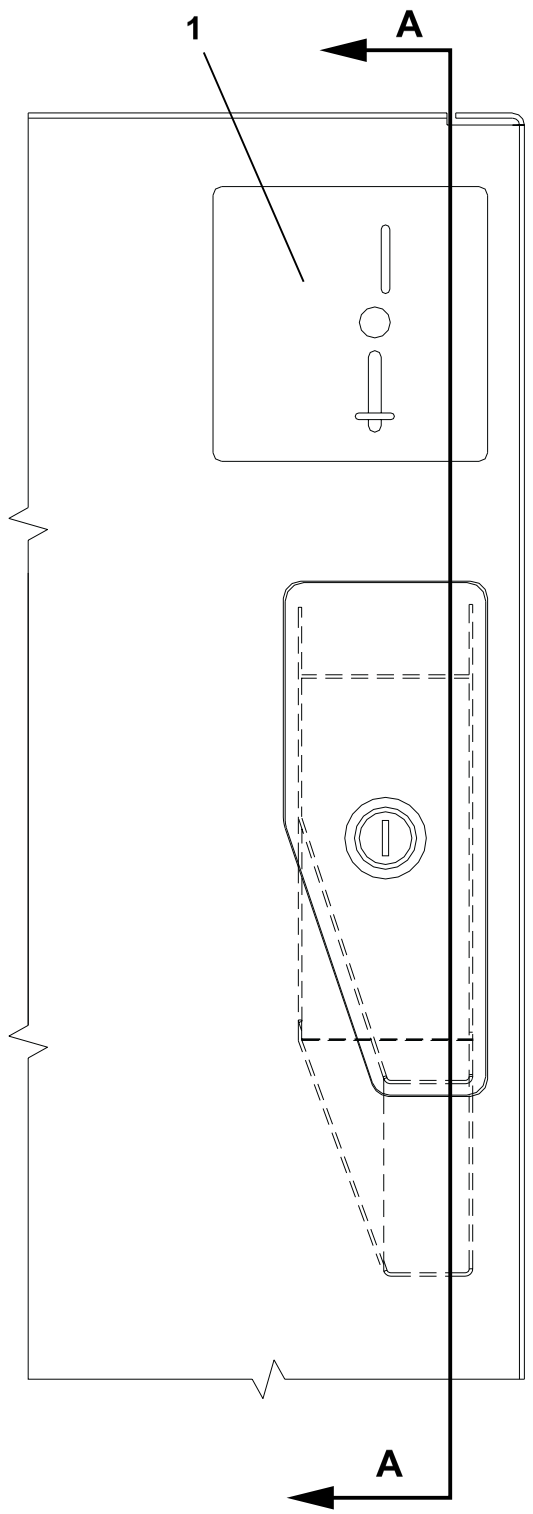

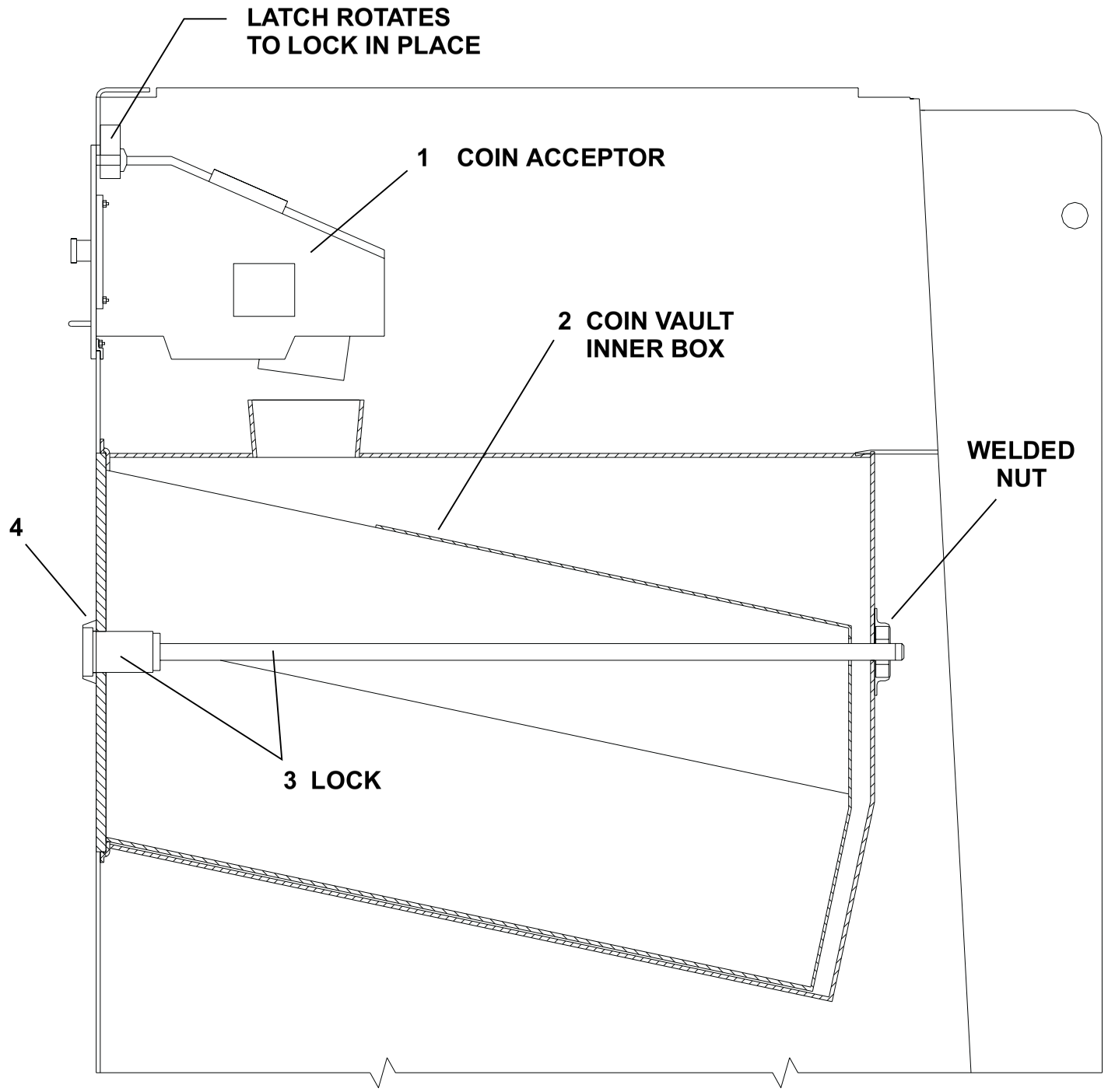

VIEW A-A

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Parts List—Coin Acceptor and Vault

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	A33 08500A	COIN VAULT 13.5X7 ASSY	
----------	----------	----------	----------COMPONENTS----------	----------
all	1	38C080	REJECTOR F77.1-W2004-I4	
all	2	W2 03690C	COIN VAULT INNER BOX WELD	
all	3	38C152A	LOCK+2KEY CONSEC NO.15+1/8"LG	
all	4	02 03426	WASHER-LOCK PROTECT-CHROME	

VIBRATION SAFETY SWITCH ADJUSTMENTS

What the Vibration Safety Switch Does

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* actuation.

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®, 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 eccentricweight 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 microswitch clicks when the arm is **slowly** released, thus indicating

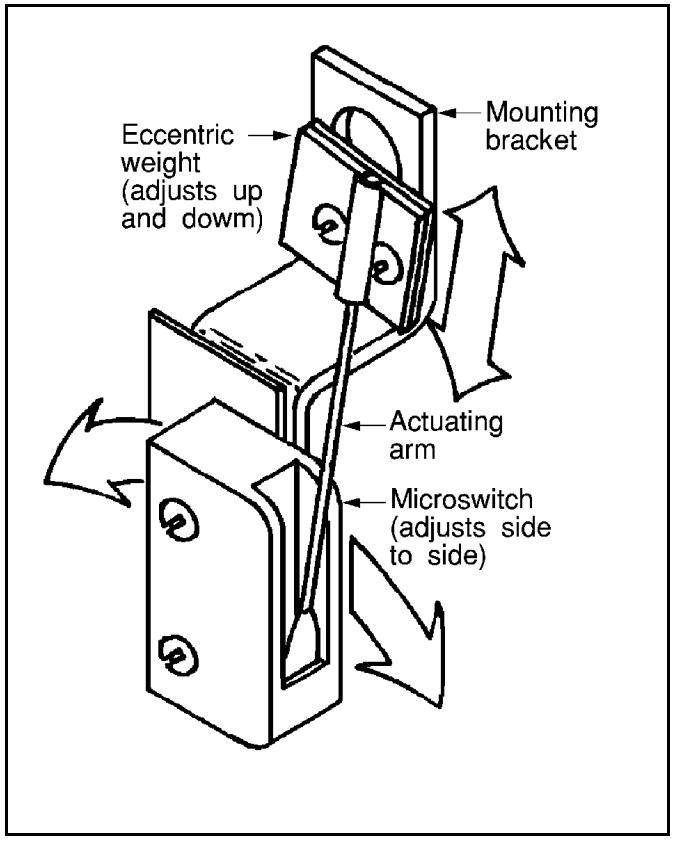

FIGURE 1 (MSSMA408BE)
Vibration Switch

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.

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.

Vibration Safety Switch

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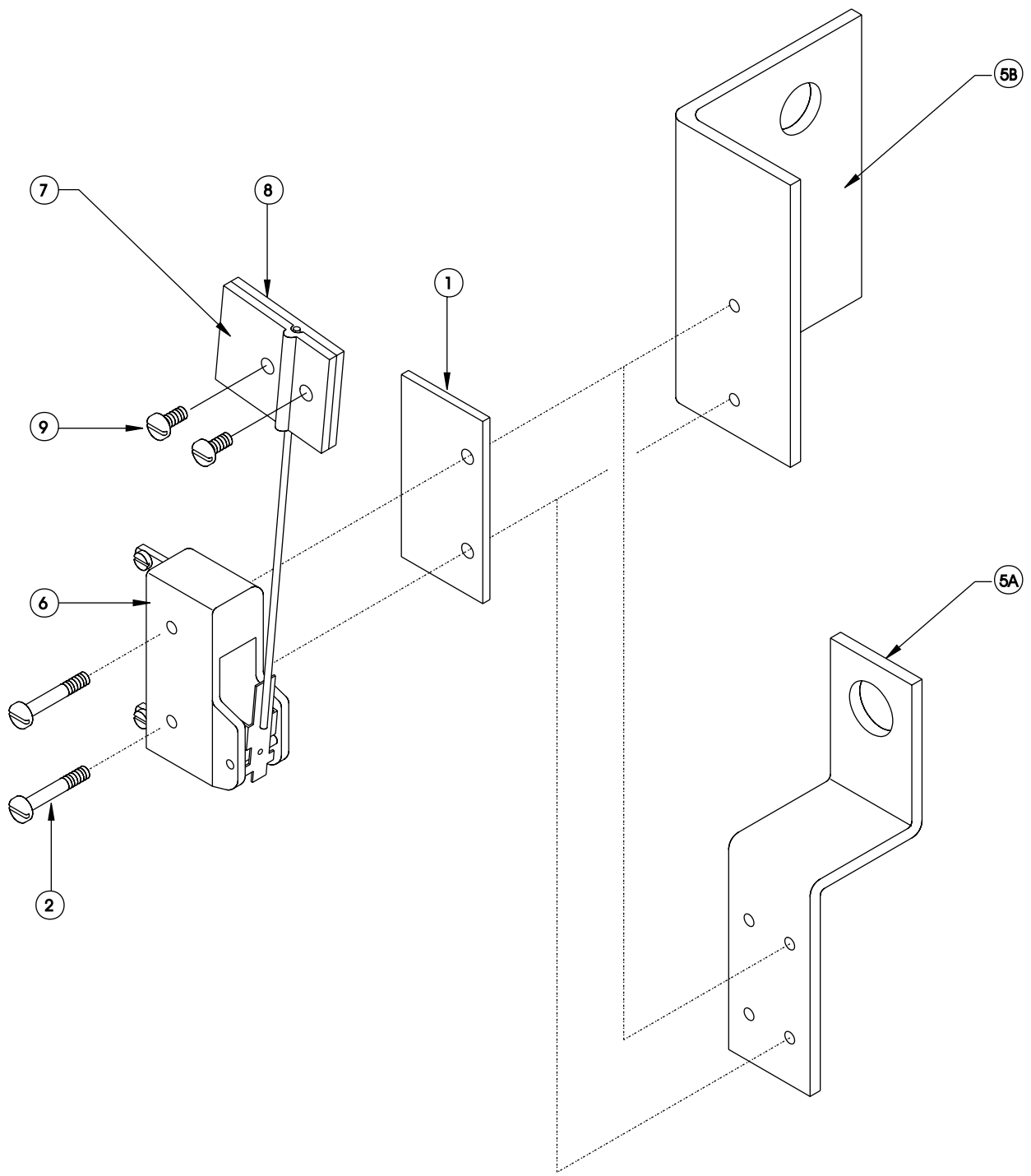

Parts List—Vibration Safety Switch

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	SAE03 151	* ASSY-VIBRATION SWT=LG CONTR	(ALL MODELS EXCEPT BWP,CPE) 3015/22 V/T/G/F 3022F,362F, 4232F 3626,4226, 4230VXX 3022X,3626X,4226X,4232X 4244, 6044,7244WP/SP CONTAINS 001,002, 005A-009
	B	SAE03 151A	*ASSY-VIBRATION SWT=BALCOM	(MODELS 3621BWP,CPE ONLY) CONTAINS 001,002, 005B-009
			----------COMPONENTS----------	
all	1	02 02038	PLATE INSULATING SMALL9NOV51	
all	2	15P008	TRDCUT PANHD 6-32X1 NIKSTL +WA	
A	5	02 15119	BRACKET=VIBSW CAD	
B	5	02 10264	BRACKET=SAFESW CAD	
all	6	09R020	SWITCH NC VIBR#WZ-2RW84429-P52	
all	7	03 01059	VIBSWITCH CLAMP CADSTL	
all	8	03 01058	VIBSWITCH WEIGHT-CADSTL	
all	9	15P101	TRDCUT-F PANHD 8-32X3/8 NIKSTL	

Section 6

Chemical Supply

Soap Chute Installation

3010 & 3015 G5E,G5X 3010 & 3015CGE

30015V7J,T5J,T5E,C4A,C4T,C4E 30022V6J,V8Z,T5J,T5E,C4A,C4T,C4E

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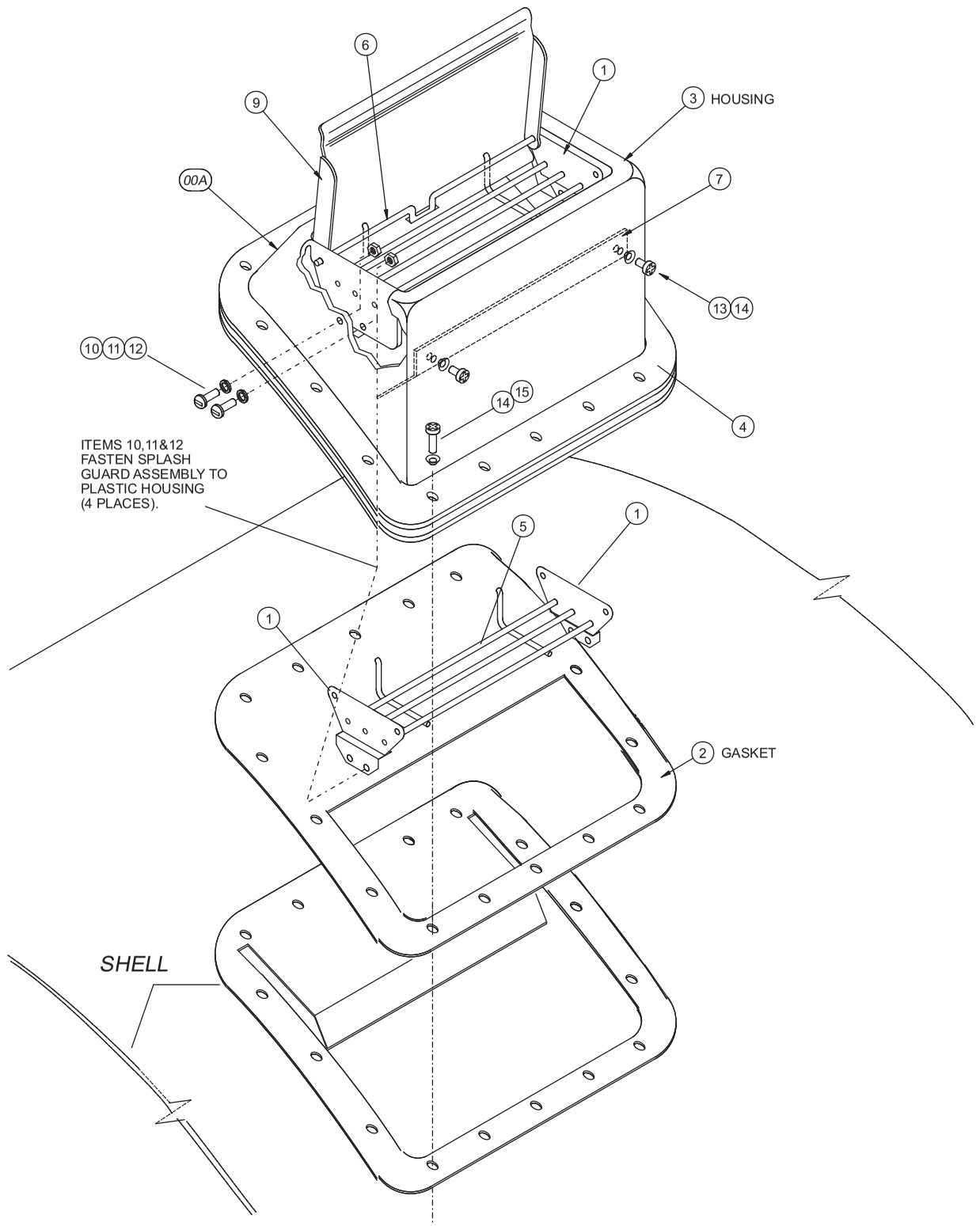

Parts List—Soap Chute Installation

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 33 058M	94000Z ASSY=PLSTC SOAP INLET	
			----------COMPONENTS----------	
all	1	02 03130	BRACKET=PLASTIC SOAP INLET	
all	2	02 03304D	GASKET=SOAPCHUTE 1/8"EPDM BL	
all	3	02 03589I	PLASTIC SHELLSIDE SOAP INLET	
all	4	02 03589T	BACKING RING=PLSTC CHEM INLT	
all	5	02 03594	GUARD SOAP CHUTE=CWU	
all	6	02 03595	PIN SOAP CHUTE HINGE=CWU	
all	7	02 03630A	SPLASH GUARD= SOAP CHUTE	
All	9	02 03593	89432B LID-SOAPCHUTE CWE TY304 SS	
all	10	15N133	RDMACSCR 10-24UNCZA X5/8" SS18	
all	11	15U160	LOCKWASHER MEDIUM #10 SS18-8	
all	12	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
all	13	15P050	PHDCUT-F PANHD 10-32X3/4 SS410	
all	14	24G018N	ROLLED WASH.194ID NYLTITE 10W	
all	15	15P051	TRDFRM AB HOLTHD 10-16X3/4SS41	

Section 7

Water and Drain

Schematic Symbols Key

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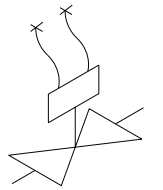
ISOMETRIC SYMBOLS



REGULATOR

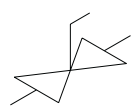
GAS COCK

2-WAY VALVE

PRESSURE SWITCH

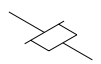
ON/OFF MODULATING VALVE

PIPE PLUG



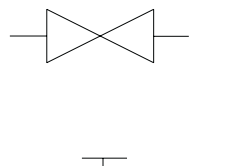
GAS STOP VALVE

REDUCER

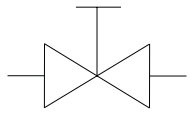


MALE CONNECTOR

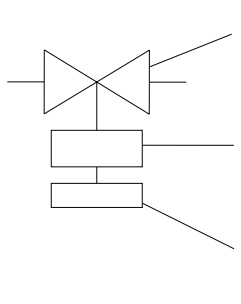
STANDARD SYMBOLS



INLINE VALVE NON-SPECIFIC



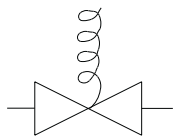
MANUAL BALLVALVE



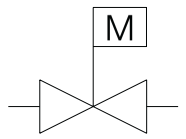
BALLVALVE (THERMAL)

PNEUMATIC ACTUATOR

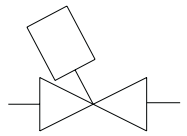
ELECTRIC VALVE POSITIONER



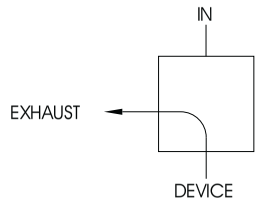
ELECTRICALLY OPERATED 2-WAY VALVE



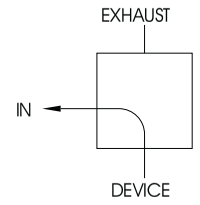
MOTOR OPERATED VALVE



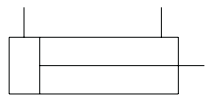
STEAM VALVE



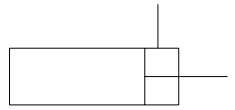
3-WAY N/C AIR PILOT VALVE



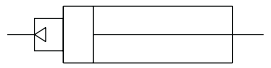
3-WAY N/O AIR PILOT VALVE



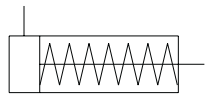
CYLINDER (DOUBLE ACTING)



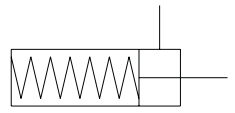
CYLINDER (SINGLE ACTING)



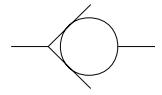
CYLINDER W/QUICK EXHAUST VALVE



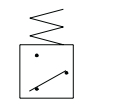
CYLINDER AIR EXTEND SPRING RETRACT



CYLINDER AIR RETRACT SPRING EXTEND

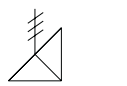


CHECK VALVE



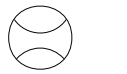
PRESSURE SWITCH

PRESSURE REGULATOR

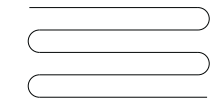


RELIEF VALVE

GAUGE

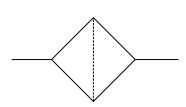


FLOW SENSOR

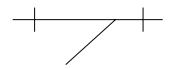


COIL

AIR LINE FILTER-AUTO

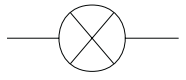


SPECIAL PURPOSE FILTER/STRAINER



Y-STRAINER

VACUUM BREAKER



STEAMTRAP

Water Schematic

30015 & 30022C4E

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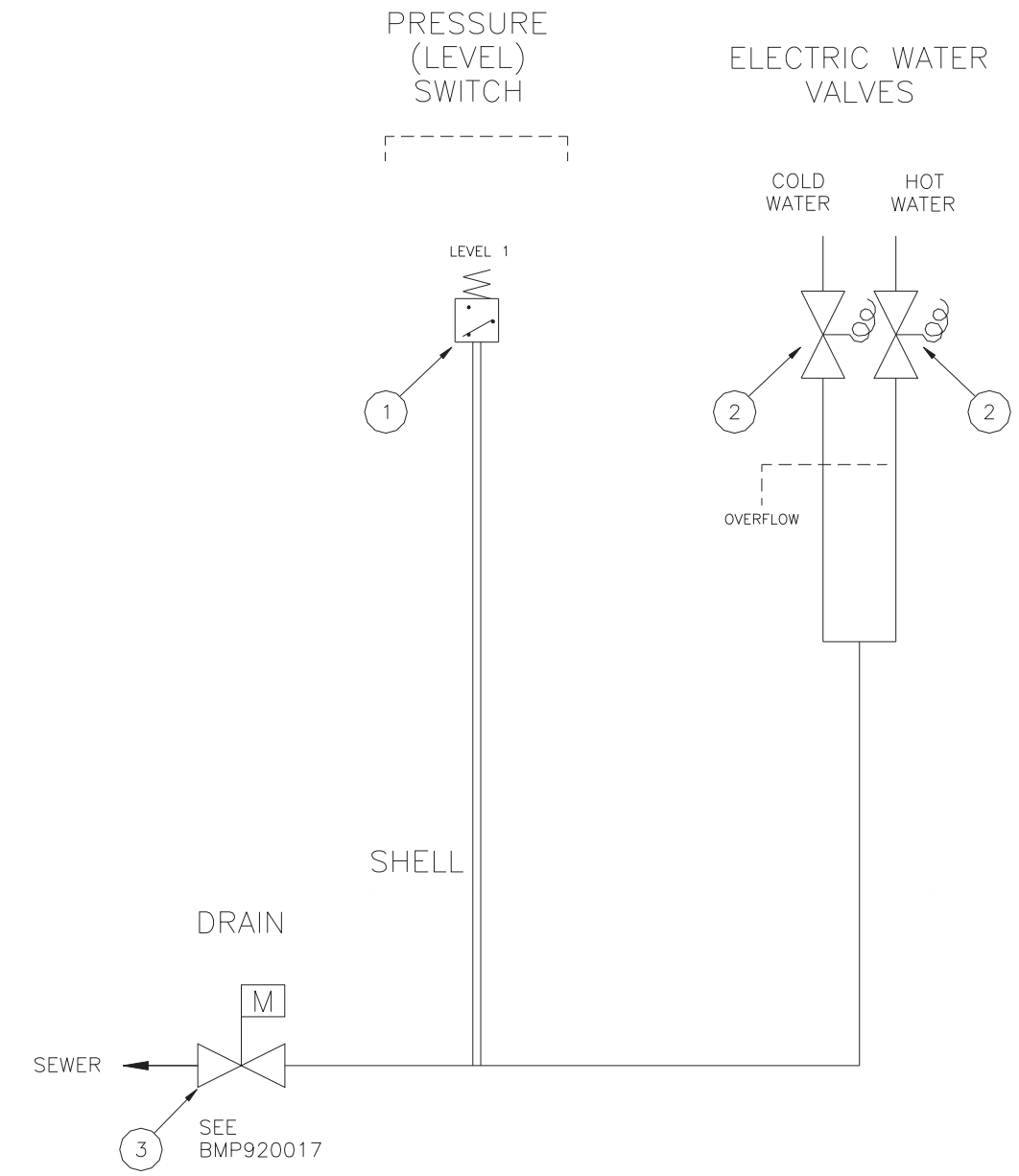

Parts List—Water Schematic

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 33 058U	3015/22 COIN BRSS H20 VLVE ASY	
	B	GPS30002	C4 PRESSURE SWITCH/CHMBER INST	
			----------COMPONENTS----------	
All	1	09N086A	PRESS SW INVENSYS #738-761	
all	2	96P057A71	1/2"NPT X 1/2"ORIFICE 240V 5/6	
all	3	96D350A71	DRINVAL 3"N/O MTRDR240V 50/60C DEPENDO	

Water Inlet

30015& 30022 C4E

BMP020056/2003215V
(Sheet 1 of 2)

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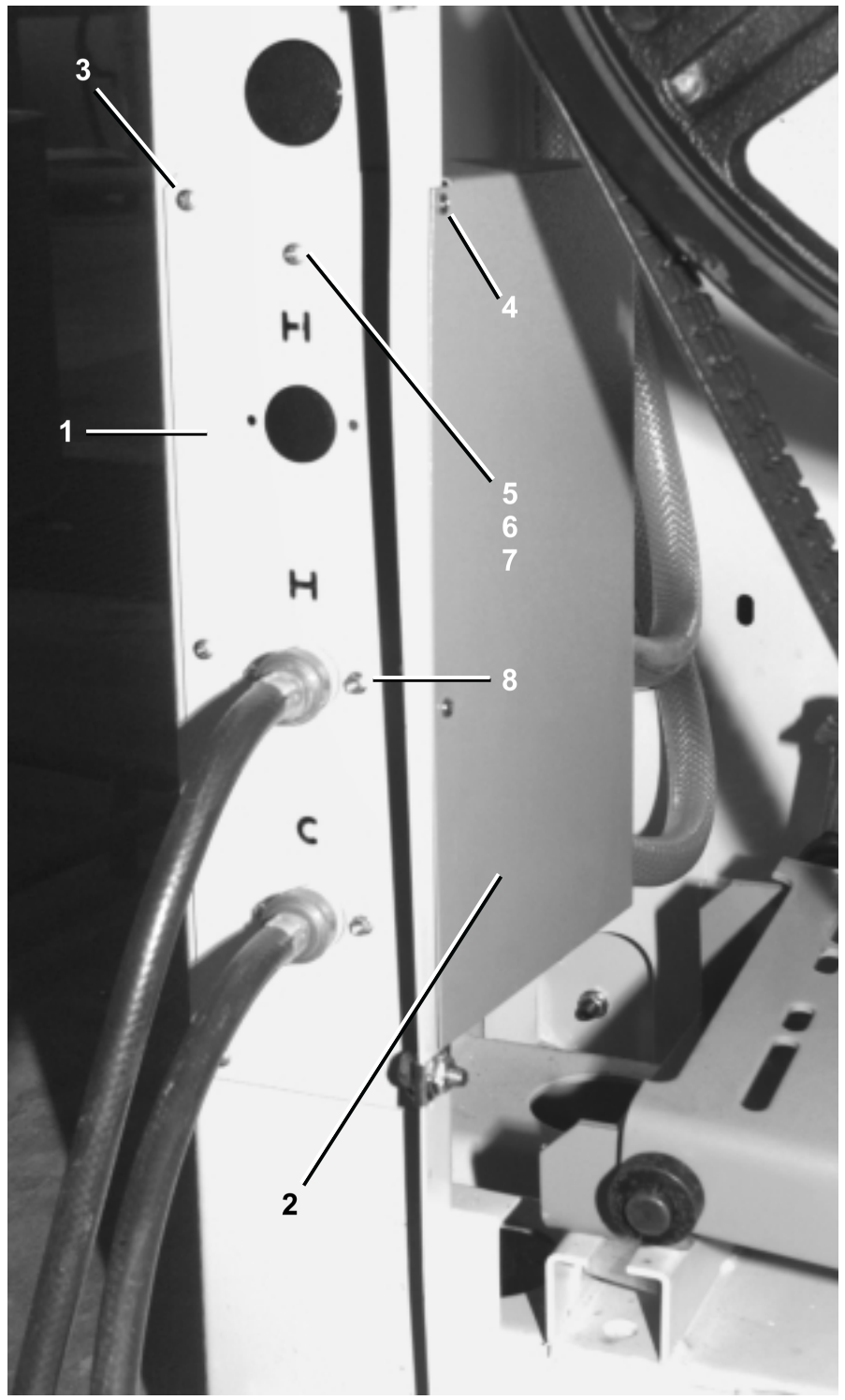

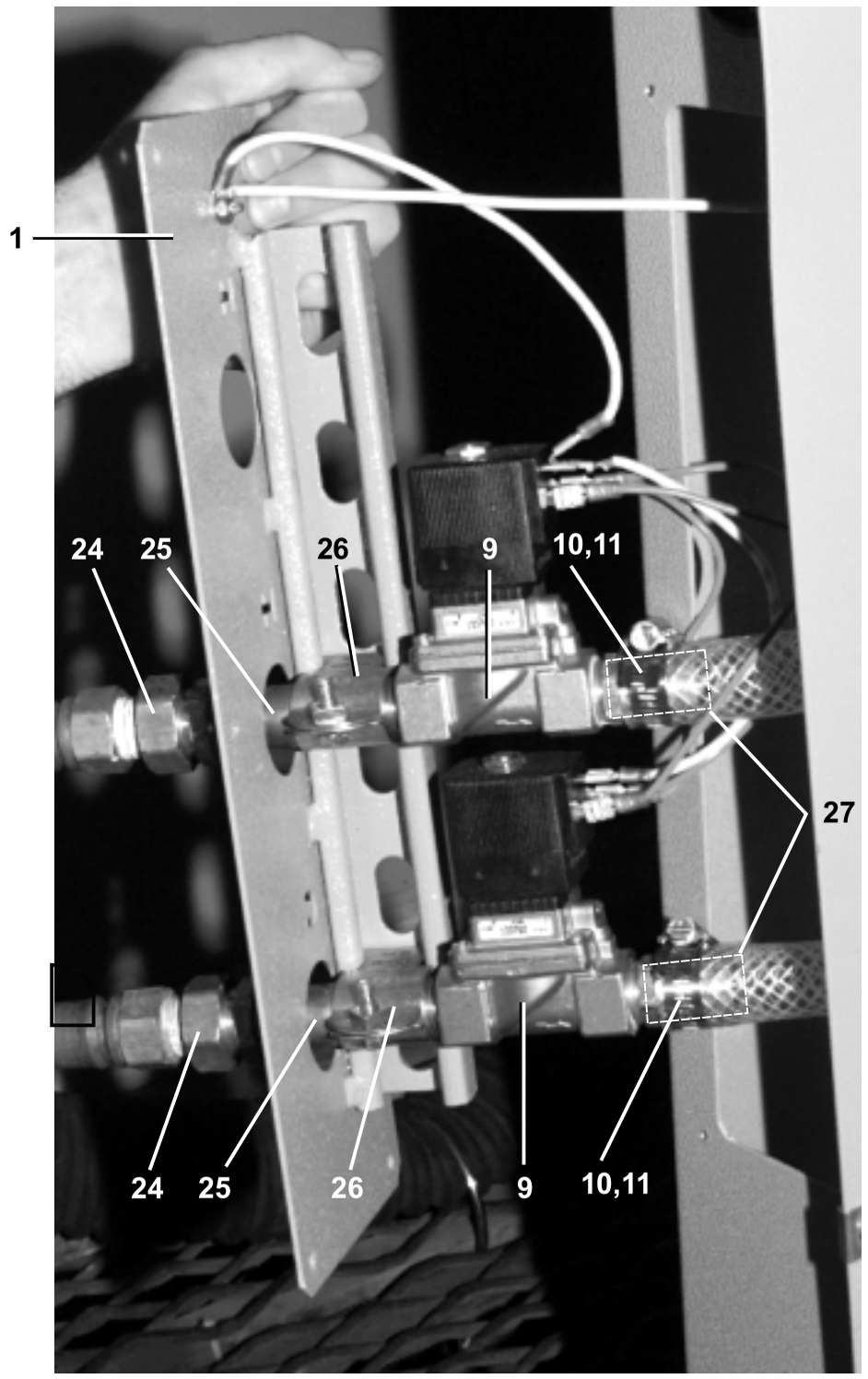

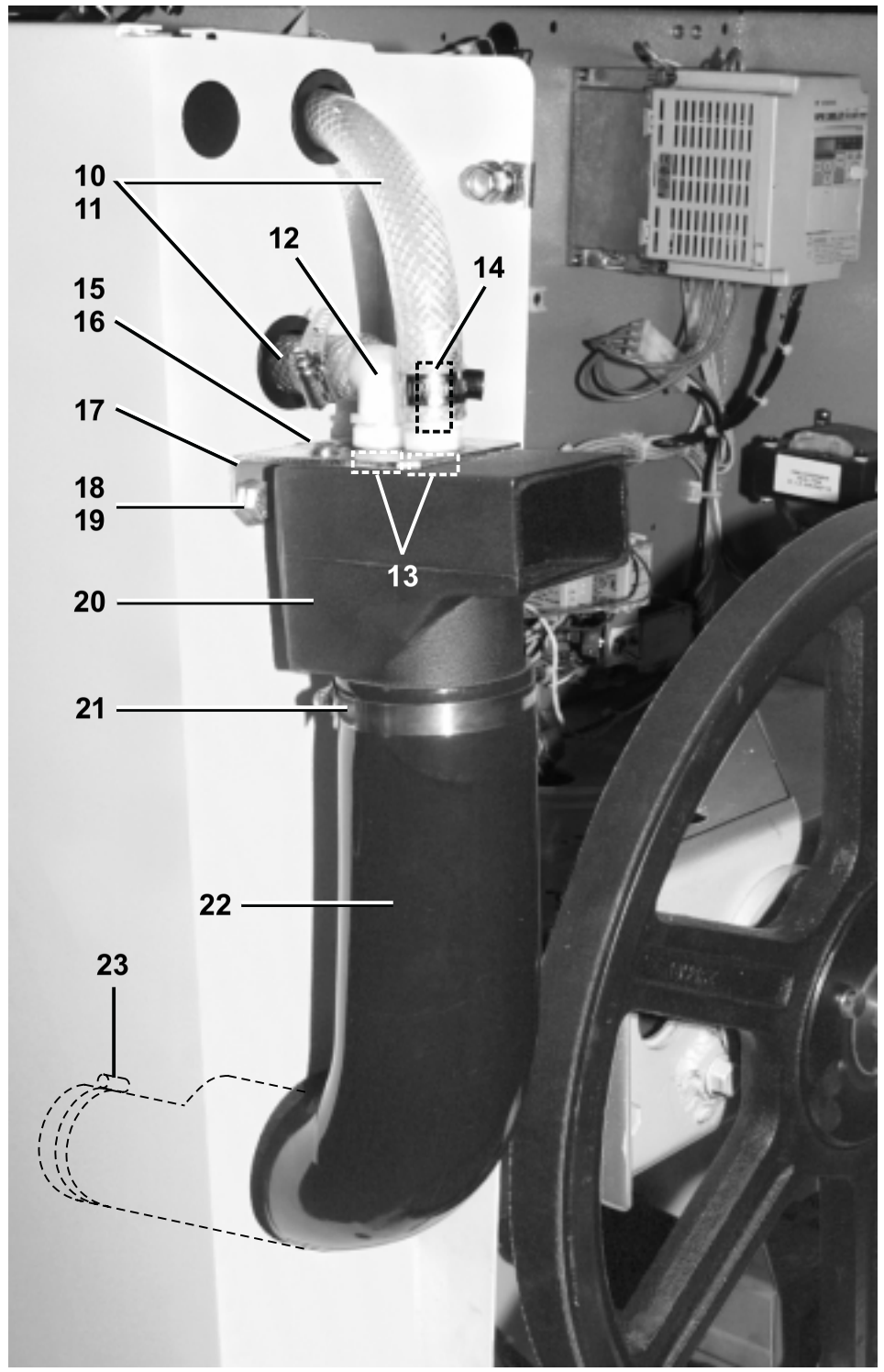

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Parts List, cont.—Water Inlet

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	GWV30001	INST=COIN H20+PERSTALTIC INLET	
	B	AWV30001	PERSITALIC/H2O INLET BOX ASSY	
	C	SA 33 058U	3015/22 COIN BRSS H20 VLVE ASY	
			----------COMPONENTS----------	
all	1	W2 03588S	3015/22 BRASS H20 MNT WLMT	
all	2	02 03588N	WATER VALVE COVER	
all	3	15P010	PHILPAN TRDCUTSCRTYP10-24X1/2S	
all	4	15P101	TRDCUT-F PANHD 8-32X3/8 NIKSTL	
all	5	15N130	RDMACHSCR 10-24UNC2A X 1/2 SS1	
all	6	15U154	LOKWAS EXTOOTH #10 (US STD) ZI	
all	7	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
all	8	15N004	FLGHDMACHSCR M4X.7X 9MM ZINC	
all	9	96P057A71	1/2"NPT X 1/2"ORIFICE 240V 5/6	
all	10	60E008A	TUBINGNYLREINF.75"IDX1.025"OD	
all	11	27A044S	HOSECLAMP 11/16-1.25SSCR#64012	
all	12	51E513EBN	3/4" 90DEG. ELBOW W/NUT	
all	13	51E513NU	NUT 11/16 THRD.#64138 US PLAST	
all	14	51E513N	HOSEADPT3/4"HX11/16 W/NUT=NYL.	
all	15	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	
all	16	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
all	17	02 03588R	3015/22 COIN PERST BOX BRKT	
all	18	15K085	HEXCAPSCR 3/8-16UNC2AX3/4 GR5	
all	19	15G198	HXFLGNUT 3/8-16 ZINC	
all	20	02 03588P	PERISTALTIC/WATER INLET COIN	
all	21	27A082S	HOSECLAMP 2+9/16-3.5SS305SCR	
all	22	02 03588B	PARISTALTIC/WATER INLET HOSE	
all	23	27A074S	HOSECLAMP 2+1/16-3"SSSCR#64040	
all	24	51E510	HOSESTEM BRASS 1/2MPX3/4HOSEID	
all	25	5N0K03KB42	NPT NIP 1/2X3.5 TBE BRASS STD	
all	26	27A0050	CLP-RGDSTL COND #PS1100-1/2	
all	27	51E513B	3/4"MHX1/2"FP PARKER#80GH-12-8	

Level Switches

30015 & 30022C4E

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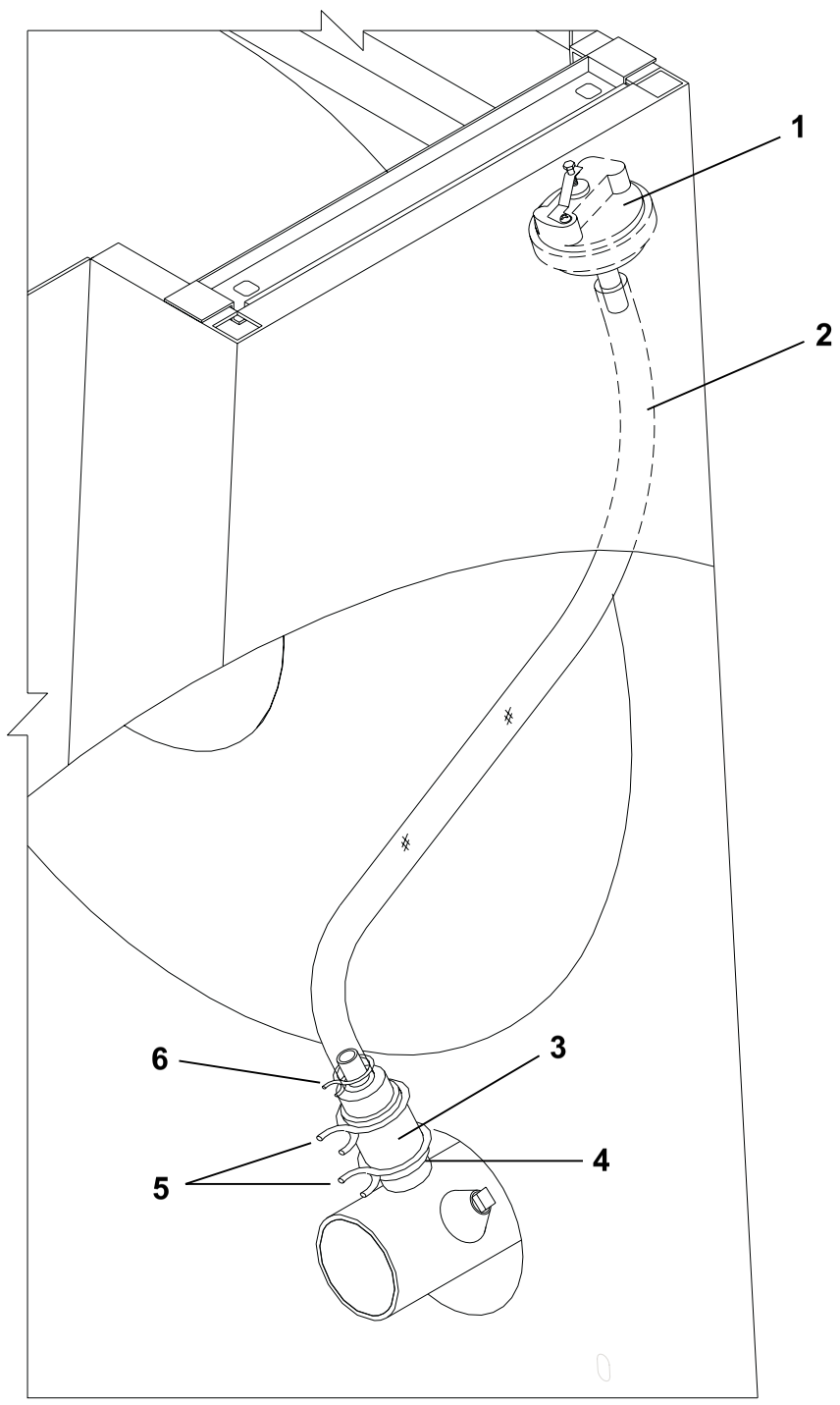

Parts List—Level Switches

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	GPS30001	PRESS SWITCH/CHAMBER INSTALL	
	B	A33 12000J	PRES TUBE "T" ASSY MXJ	
			----------COMPONENTS----------	
all	1	09N086A	PRESS SWITCH EATON #738-761	
all	2	60E005P	PVC TUBING 1/2"ID X 5/8"OD	
all	3	02 03332C	AIRCHAMBER=PRESSWITH-CWU	
all	4	51AB1EN1A	INSERT REDUCER PVC 1+1/4"X 1"	
all	5	27A052	HOSECLAMP 1.5"DIA.SPRING#R24HC	
all	6	27A044A	HOSECLAMP.687"ID ROTOR#HC11STR	

Drain Sump Installation

3010 G5E,G5X,CGE; 3015G5E,G5X,CGE

30015, 30022Vxx, Txx, C4A, C4T, C4E; 30015, 30020, 30022Qxx

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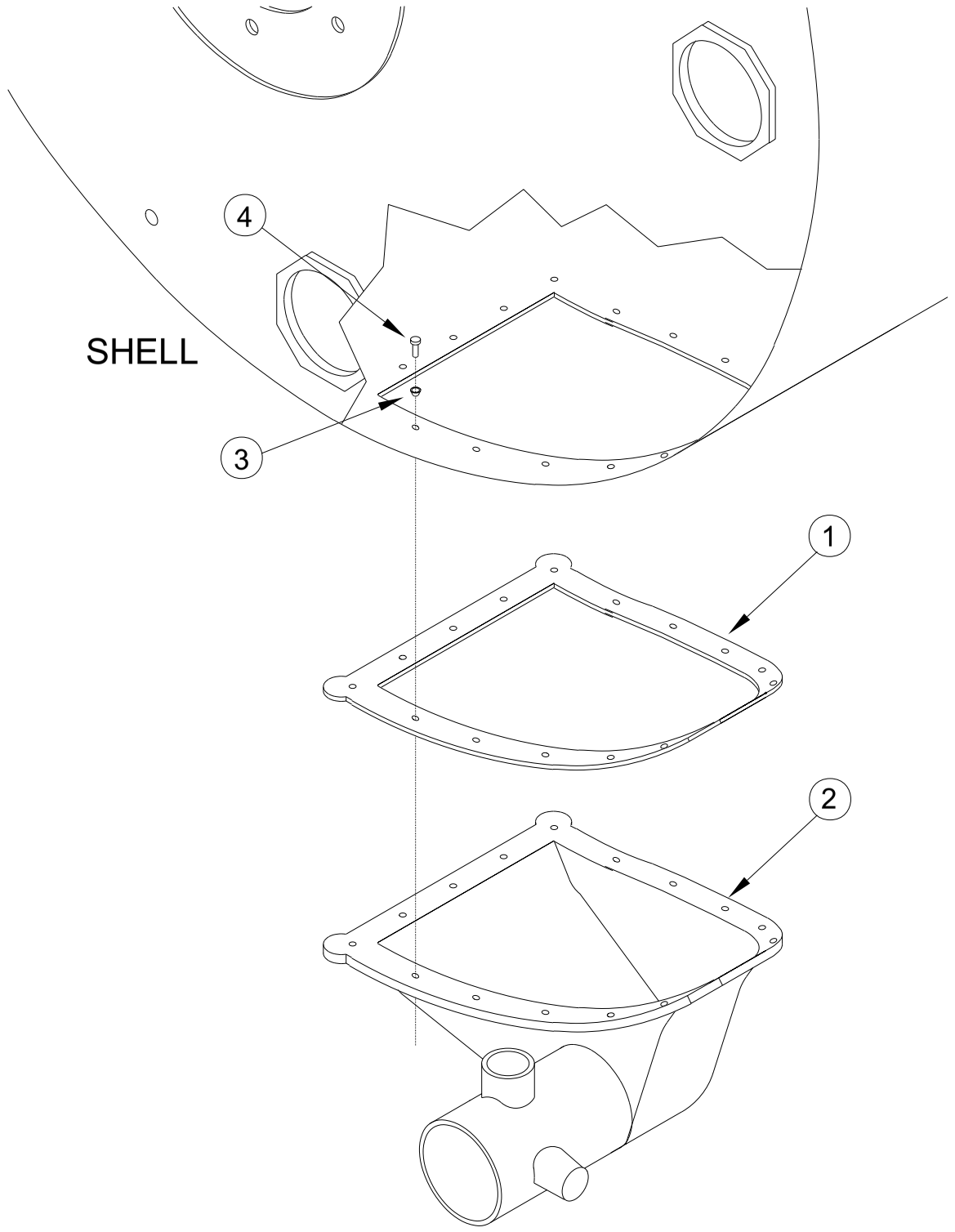

Parts List—Drain Sump Installation

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
			----------COMPONENTS----------	
all	1	02 03366A	DRAIN SUMP GASKET 1/8"EPDM	
all	2	02 03332A	BODY=SUMP-1608 GLASTIC	
all	3	24G018N	ROLLED WASH.194ID NYLTITE 10W	
all	4	15P050	PHDCUT-F PANHD 10-32X3/4 SS410	

Drain Valve Installation

3010 & 3015 G5E, G5X, CGE

30015 & 30022 C4E

BMP020057/2004055V
(Sheet 1 of 2)

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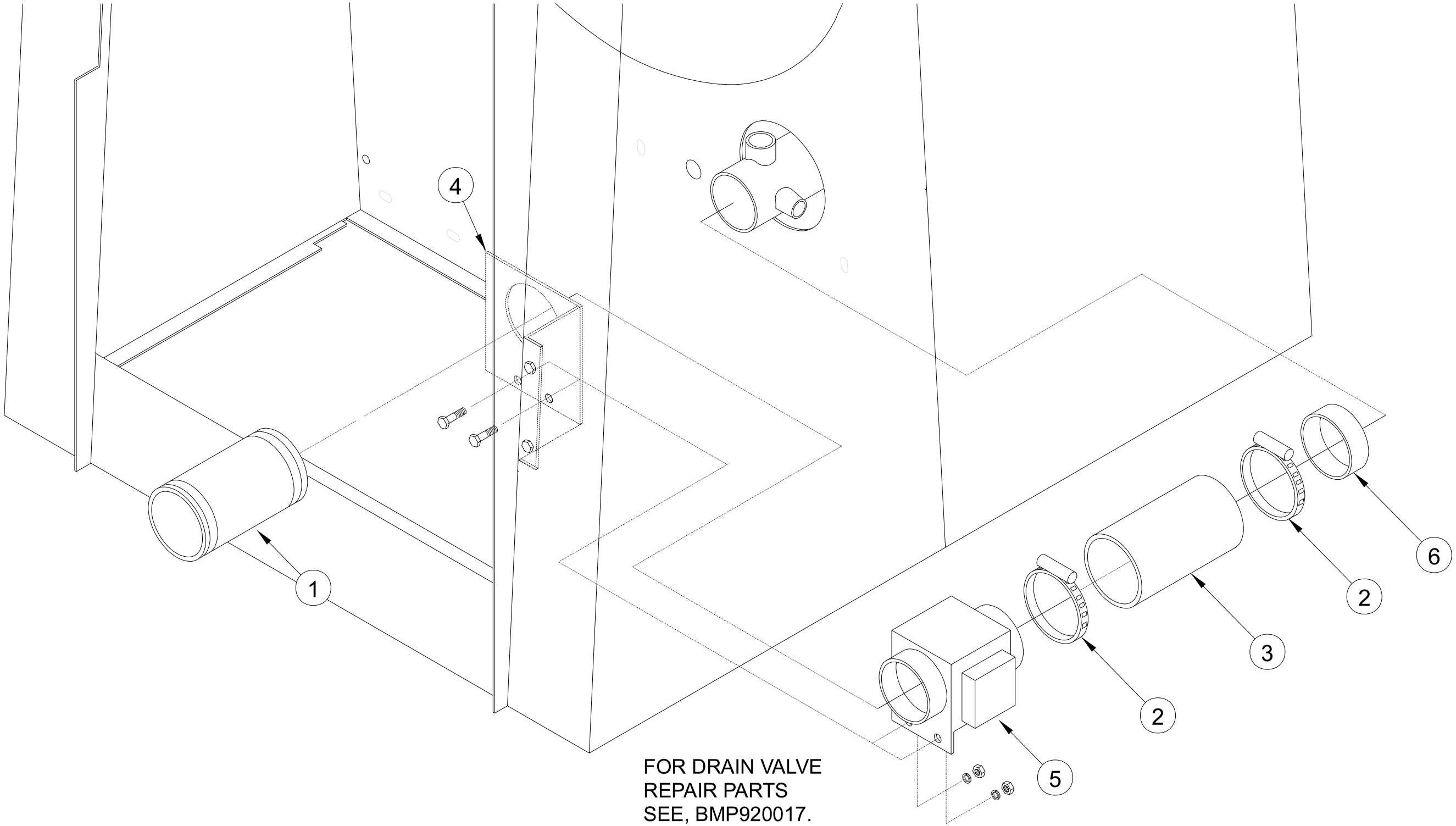

FOR DRAIN VALVE
REPAIR PARTS
SEE, BMP920017.

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Parts List—Drain Valve Installation

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	GDV30001	30" DRAINVALVE INSTALL	3015,3022C4E
	B	GDV30003	3010 SINGLE DRAIN TO REAR INST	3010,3015G5E,G5X,CGE
			----------COMPONENTS----------	
all	1	60B075	DFW56-33PMSP RUBB CONN.	
all	2	27A082	HOSECLAMP 2.5625-3.5CADSC#HS48	
all	3	60E303A07A	HOSE=3"ID X 7" LG.	
A	4	02 03412E	3015/22 DRAIN VALVE BRKT	
B	4	02 03412J	3010 DRAIN VALVE BRKT	
all	5	96D350A71	DRINVAL 3"N/O MTRDR240V 50/60C	
all	6	02 03412S	SLEEVE=DUMPVALVE HOSE	

3” Electric Drain Valve

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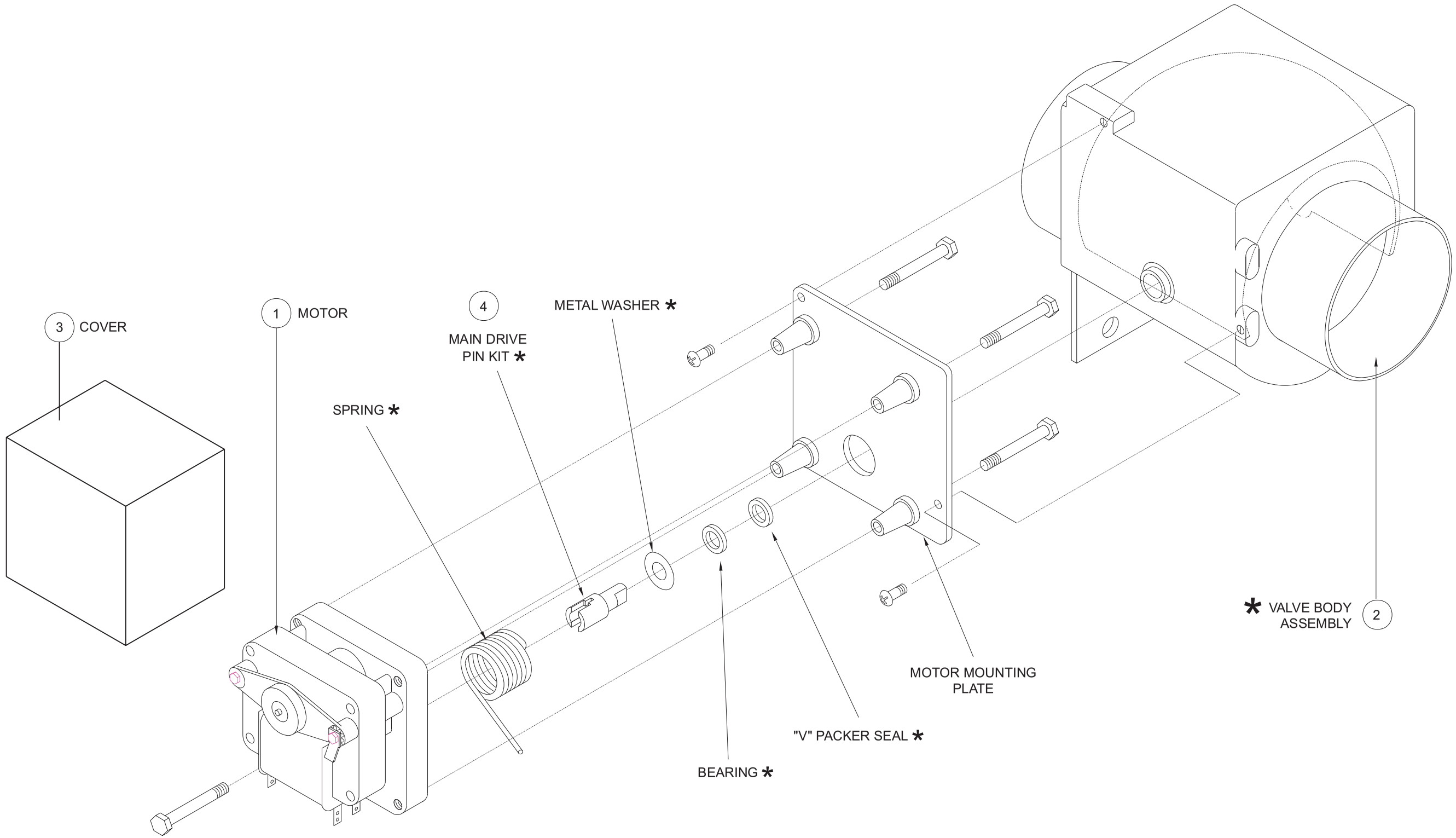

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Parts List—3" Electric Drain Valve

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	96D350A37	DRINVAL 3"N/O MTRDR120V 50/60C	
	B	96D350A71	DRINVAL 3"N/O MTRDR240V 50/60C	
	C	96D350B71	DRINVAL 3"N/C MTRDR240V 50/60	
			----------COMPONENTS----------	
A	1	96D35MTR37	120V 50/60CMTR FOR 3"DRAINVAL	
B	1	96D35MTR71	240V 50/60CMTR FOR 3"DRAINVAL	
all	2	96D35B0D	B0DY & BALL FOR 3" DRAIN VALVE	
all	3	96D35C0V	MTRCOVER 2-PCFOR 3"DRAINVAL	
A,B	4	96D35PIN	DRIVE PIN KIT FOR 3" DRAIN VAL	