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Service & Mechanical Parts—

36021BWP, CPE, NSP

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.

References to Yellow Troubleshooting Pages

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

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Comments and Suggestions

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Kenner, LA 70063-0400

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36021BWP, CPE, NSP

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PELLERIN MILNOR CORPORATION

LIMITED STANDARD WARRANTY

We warrant to the original purchaser that MILNOR machines including electronic hardware/software (hereafter referred to as “equipment”), will be free from defects in material and workmanship for a period of one year from the date of shipment from our factory with no operating hour limitation. This warranty is contingent upon the equipment being installed, operated and serviced as specified in the operating manual supplied with the equipment, and operated under normal conditions by competent operators.

Providing we receive written notification of a warranted defect within 30 days of its discovery, we will – at our option – repair or replace the defective part or parts, FOB our factory. We retain the right to require inspection of the parts claimed defective in our factory prior to repairing or replacing same. We will not be responsible, or in any way liable, for unauthorized repairs or service to our equipment, and this warranty shall be void if the equipment is repaired or altered in any way without MILNOR’s written consent.

Parts which require routine replacement due to normal wear – such as gaskets, contact points, brake and clutch linings and similar parts – are not covered by this warranty, nor are parts damaged by exposure to weather or to chemicals.

We reserve the right to make changes in the design and/or construction of our equipment (including purchased components) without obligation to change any equipment previously supplied.

ANY SALE OR FURNISHING OF ANY EQUIPMENT BY MILNOR IS MADE ONLY UPON THE EXPRESS UNDERSTANDING THAT MILNOR MAKES NO EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE OR PURPOSE. MILNOR WILL NOT BE RESPONSIBLE FOR ANY COSTS OR DAMAGES ACTUALLY INCURRED OR REQUIRED AS A RESULT OF: THE FAILURE OF ANY OTHER PERSON OR ENTITY TO PERFORM ITS RESPONSIBILITIES, FIRE OR OTHER HAZARD, ACCIDENT, IMPROPER STORAGE, MISUSE, NEGLECT, POWER OR ENVIRONMENTAL CONTROL MALFUNCTIONS, DAMAGE FROM LIQUIDS, OR ANY OTHER CAUSE BEYOND THE NORMAL RANGE OF USE. REGARDLESS OF HOW CAUSED, IN NO EVENT SHALL MILNOR BE LIABLE FOR SPECIAL, INDIRECT, PUNITIVE, LIQUIDATED, OR CONSEQUENTIAL COSTS OR DAMAGES, OR ANY COSTS OR DAMAGES WHATSOEVER WHICH EXCEED THE PRICE PAID TO MILNOR FOR THE EQUIPMENT IT SELLS OR FURNISHES.

WE NEITHER ASSUME, NOR AUTHORIZE ANY EMPLOYEE OR OTHER PERSON TO ASSUME FOR US, ANY OTHER RESPONSIBILITY AND/OR LIABILITY IN CONNECTION WITH THE SALE OR FURNISHING OF OUR EQUIPMENT TO ANY BUYER.

BMP720097
92732A

How to order repair parts

Repair parts may be ordered either from the authorized dealer who sold you this machine, or directly from the MILNOR factory. In most cases, your dealer will have these parts in stock.

When ordering parts, please be sure to give us the following information:

1. Model and serial number of the machine for which the parts are required
2. Part number
3. Name of the part
4. Quantity needed
5. Method of shipment desired
6. In correspondence regarding motors or electrical controls, please include all nameplate data, including wiring diagram number and the make or manufacturer of the motor or controls.

All parts will be shipped C.O.D. transportation charges collect only.

Please read this manual

It is strongly recommended that you read the installation and operating manual before attempting to install or operate your machine. We suggest that this manual be kept in your business office so that it will not become lost.

PELLERIN MILNOR CORPORATION
P.O. BOX 400, KENNER, LA., 70063-0400, U.S.A.
FAX: Administration 504/468-9307, Engineering 504/469-1849, Service 504/469-9777

BMP720097R
72332A

BIUUUS27 (Published) Book specs- Dates: 20051111 / 20051111 / 20060322 Lang: ENG01 Applic: RUU

Safety—Rigid Washer Extractors

1. General Safety Requirements—Vital Information for Management Personnel [Document BIUUUS04]

Incorrect installation, neglected preventive maintenance, abuse, and/or improper repairs, or changes to the machine can cause unsafe operation and personal injuries, such as multiple fractures, amputations, or death. The owner or his selected representative (owner/user) is responsible for understanding and ensuring the proper operation and maintenance of the machine. The owner/user must familiarize himself with the contents of all machine instruction manuals. The owner/user should direct any questions about these instructions to a Milnor® dealer or the Milnor® Service department.

Most regulatory authorities (including OSHA in the USA and CE in Europe) hold the owner/user ultimately responsible for maintaining a safe working environment. Therefore, the owner/user must do or ensure the following:

- recognize all foreseeable safety hazards within his facility and take actions to protect his personnel, equipment, and facility;
- work equipment is suitable, properly adapted, can be used without risks to health or safety, and is adequately maintained;
- where specific hazards are likely to be involved, access to the equipment is restricted to those employees given the task of using it;
- only specifically designated workers carry out repairs, modifications, maintenance, or servicing;
- information, instruction, and training is provided;
- workers and/or their representatives are consulted.

Work equipment must comply with the requirements listed below. The owner/user must verify that installation and maintenance of equipment is performed in such a way as to support these requirements:

- control devices must be visible, identifiable, and marked; be located outside dangerous zones; and not give rise to a hazard due to unintentional operation;
- control systems must be safe and breakdown/damage must not result in danger;
- work equipment is to be stabilized;
- protection against rupture or disintegration of work equipment;
- guarding, to prevent access to danger zones or to stop movements of dangerous parts before the danger zones are reached. Guards to be robust; not give rise to any additional hazards; not be easily removed or rendered inoperative; situated at a sufficient distance from the danger zone; not restrict view of operating cycle; allow fitting, replacing, or maintenance by restricting access to relevant area and without removal of guard/protection device;
- suitable lighting for working and maintenance areas;
- maintenance to be possible when work equipment is shut down. If not possible, then protection measures to be carried out outside danger zones;
- work equipment must be appropriate for preventing the risk of fire or overheating; discharges of gas, dust, liquid, vapor, other substances; explosion of the equipment or substances in it.

1.1. **Laundry Facility**—Provide a supporting floor that is strong and rigid enough to support–with a reasonable safety factor and without undue or objectionable deflection–the weight of the fully loaded machine and the forces transmitted by it during operation. Provide sufficient clearance for machine movement. Provide any safety guards, fences, restraints, devices, and verbal and/or posted restrictions necessary to prevent personnel, machines, or other moving machinery from accessing the machine or its path. Provide adequate ventilation to carry away heat and vapors. Ensure service connections to installed machines meet local and national safety standards, especially regarding the electrical disconnect (see the National Electric Code). Prominently post safety information, including signs showing the source of electrical disconnect.

1.2. **Personnel**—Inform personnel about hazard avoidance and the importance of care and common sense. Provide personnel with the safety and operating instructions that apply to them. Verify that personnel use proper safety and operating procedures. Verify that personnel understand and abide by the warnings on the machine and precautions in the instruction manuals.

1.3. **Safety Devices**—Ensure that no one eliminates or disables any safety device on the machine or in the facility. Do not allow machine to be used with any missing guard, cover, panel or door. Service any failing or malfunctioning device before operating the machine.

1.4. **Hazard Information**—Important information on hazards is provided on the machine safety placards, in the Safety Guide, and throughout the other machine manuals. **Placards must be kept clean so that the information is not obscured. They must be replaced immediately if lost or damaged. The Safety Guide and other machine manuals must be available at all times to the appropriate personnel.** See the machine service manual for safety placard part numbers. Contact the Milnor Parts department for replacement placards or manuals.

1.5. **Maintenance**—Ensure the machine is inspected and serviced in accordance with the norms of good practice and with the preventive maintenance schedule. Replace belts, pulleys, brake shoes/disks, clutch plates/tires, rollers, seals, alignment guides, etc. before they are severely worn. Immediately investigate any evidence of impending failure and make needed repairs (e.g., cylinder, shell, or frame cracks; drive components such as motors, gear boxes, bearings, etc., whining, grinding, smoking, or becoming abnormally hot; bending or cracking of cylinder, shell, frame, etc.; leaking seals, hoses, valves, etc.) Do not permit service or maintenance by unqualified personnel.

2. Safety Alert Messages—Internal Electrical and Mechanical Hazards [Document BIUUUS11]

The following are instructions about hazards inside the machine and in electrical enclosures.

WARNING 1: Electrocution and Electrical Burn Hazards—Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not unlock or open electric box doors.
- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.

WARNING 2: Entangle and Crush Hazards—Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.
- Keep yourself and others off of machine.
- Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.

3. Safety Alert Messages—Cylinder and Processing Hazards

[Document BIUUUS13]

The following are instructions about hazards related to the cylinder and laundering process.

DANGER 3: Entangle and Sever Hazards—Contact with goods being processed can cause the goods to wrap around your body or limbs and dismember you. The goods are normally isolated by the locked cylinder door.

- Do not attempt to open the door or reach into the cylinder until the cylinder is stopped.
- Do not touch goods inside or hanging partially outside the turning cylinder.
- Do not operate the machine with a malfunctioning door interlock.
- Know the location of all emergency stop switches, pull cords, and/or kick plates and use them in an emergency to stop machine motion.
- Know the location of the main machine disconnect and use it in an emergency to remove all electric power from the machine.

WARNING 4: Crush Hazards—Contact with the turning cylinder can crush your limbs. The cylinder will repel any object you try to stop it with, possibly causing the object to strike or stab you. The turning cylinder is normally isolated by the locked cylinder door.

- Do not attempt to open the door or reach into the cylinder until the cylinder is stopped.
- Do not place any object in the turning cylinder.
- Do not operate the machine with a malfunctioning door interlock.

WARNING 5: Confined Space Hazards—Confinement in the cylinder can kill or injure you. Hazards include but are not limited to panic, burns, poisoning, suffocation, heat prostration, biological contamination, electrocution, and crushing.

- Do not attempt unauthorized servicing, repairs, or modification.

WARNING 6: Explosion and Fire Hazards—Flammable substances can explode or ignite in the cylinder, drain trough, or sewer. The machine is designed for washing with water, not any other solvent. Processing can cause solvent-containing goods to give off flammable vapors.

- Do not use flammable solvents in processing.
- Do not process goods containing flammable substances. Consult with your local fire department/public safety office and all insurance providers.

4. Safety Alert Messages—Unsafe Conditions [Document BIUUUS14]

4.1. Damage and Malfunction Hazards

4.1.1. Hazards Resulting from Inoperative Safety Devices

DANGER 7: Entangle and Sever Hazards—Cylinder door interlock—Operating the machine with a malfunctioning door interlock can permit opening the door when the cylinder is turning and/or starting the cycle with the door open, exposing the turning cylinder.

- Do not operate the machine with any evidence of damage or malfunction.

WARNING 8: Multiple Hazards—Operating the machine with an inoperative safety device can kill or injure personnel, damage or destroy the machine, damage property, and/or void the warranty.

- Do not tamper with or disable any safety device or operate the machine with a malfunctioning safety device. Request authorized service.

WARNING 9: Electrocution and Electrical Burn Hazards—Electric box doors—Operating the machine with any electric box door unlocked can expose high voltage conductors inside the box.

- Do not unlock or open electric box doors.

WARNING 10: Entangle and Crush Hazards—Guards, covers, and panels—Operating the machine with any guard, cover, or panel removed exposes moving components.

- Do not remove guards, covers, or panels.

4.1.2. Hazards Resulting from Damaged Mechanical Devices

WARNING 11: Multiple Hazards—Operating a damaged machine can kill or injure personnel, further damage or destroy the machine, damage property, and/or void the warranty.

- Do not operate a damaged or malfunctioning machine. Request authorized service.

WARNING 12: Explosion Hazards—Cylinder—A damaged cylinder can rip apart during extraction, puncturing the shell and discharging metal fragments at high speed.

- Do not operate the machine with any evidence of damage or malfunction.

WARNING 13: Explosion Hazards—Clutch and speed switch (multiple motor machines)—A damaged clutch or speed switch can permit the low speed motor to engage during extract. This will over-speed the motor and pulleys and can cause them to rip apart, discharging metal fragments at high speed.

- Stop the machine immediately if any of these conditions occur: • abnormal whining sound during extract • skidding sound as extract ends • clutches remain engaged or re-engage during extract

4.2. Careless Use Hazards

4.2.1. Careless Operation Hazards—Vital Information for Operator Personnel (see also operator hazards throughout manual)

WARNING 14: Multiple Hazards—Careless operator actions can kill or injure personnel, damage or destroy the machine, damage property, and/or void the warranty.

- Do not tamper with or disable any safety device or operate the machine with a malfunctioning safety device. Request authorized service.
- Do not operate a damaged or malfunctioning machine. Request authorized service.
- Do not attempt unauthorized servicing, repairs, or modification.
- Do not use the machine in any manner contrary to the factory instructions.
- Use the machine only for its customary and intended purpose.
- Understand the consequences of operating manually.

4.2.2. Careless Servicing Hazards—Vital Information for Service Personnel (see also service hazards throughout manuals)

WARNING 15: Electrocution and Electrical Burn Hazards—Contact with electric power can kill or seriously injure you. Electric power is present inside the cabinetry unless the main machine power disconnect is off.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard.

WARNING 16: Entangle and Crush Hazards—Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- Do not service the machine unless qualified and authorized. You must clearly understand the hazards and how to avoid them.
- Abide by the current OSHA lockout/tagout standard when lockout/tagout is called for in the service instructions. Outside the USA, abide by the OSHA standard in the absence of any other overriding standard.

WARNING 17: Confined Space Hazards—Confinement in the cylinder can kill or injure you. Hazards include but are not limited to panic, burns, poisoning, suffocation, heat prostration, biological contamination, electrocution, and crushing.

- Do not enter the cylinder until it has been thoroughly purged, flushed, drained, cooled, and immobilized.

— End of BIUUUS27 —

About the Forces Transmitted by Milnor® Washer-extractors

Document BIWUUI02
Specified Date 20001108
As-of Date 20001108
Access Date 20001108

Applicability ..... WUU

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

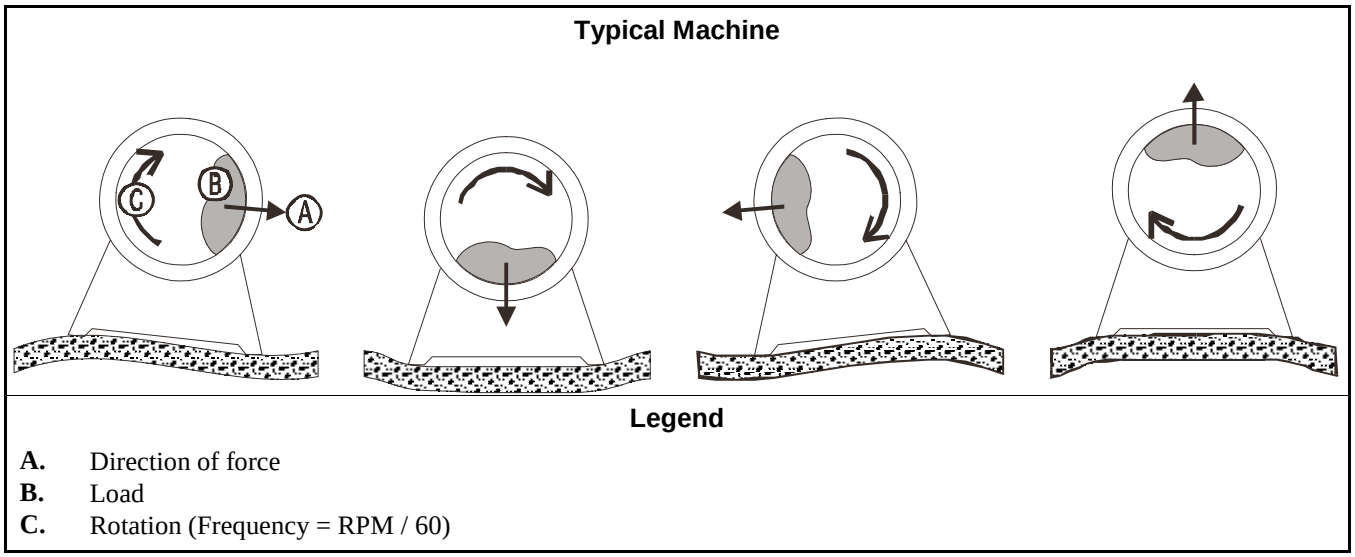


Figure 1 above is intended to depict both on-grade and above-grade installations and is equally applicable to flexibly-mounted washer-extractors, as well as to rigid models installed either directly on a floor slab or on a foundation poured integrally with the slab. Current machine data is available 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 —

Glossary of Tag Illustrations— F-Style, Q-Style, 36" & 42" V-Style, and X-Style Washer-Extractors

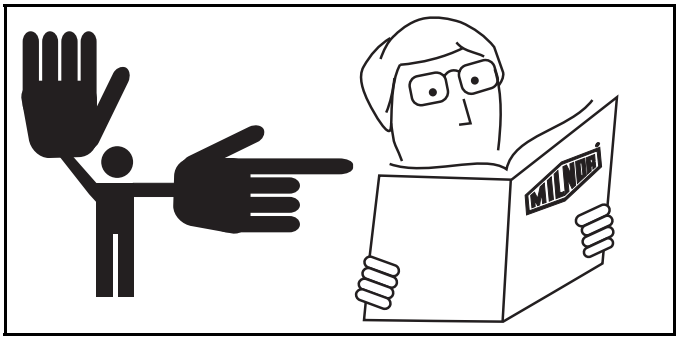
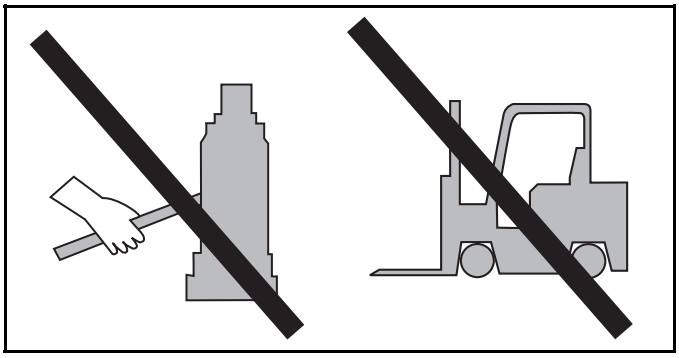
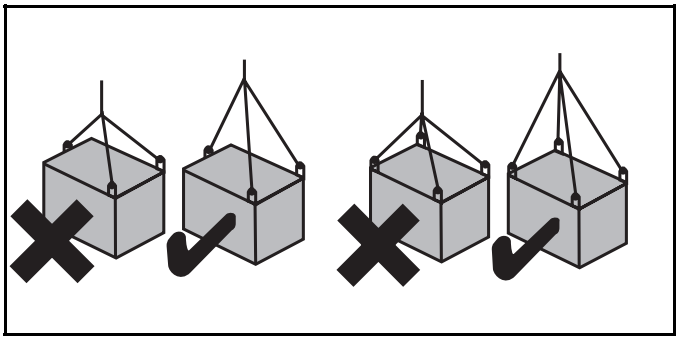
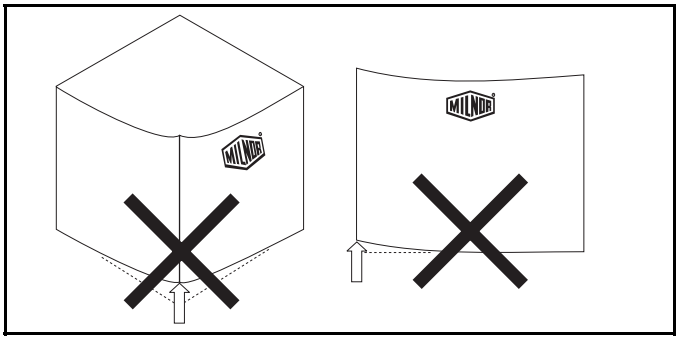
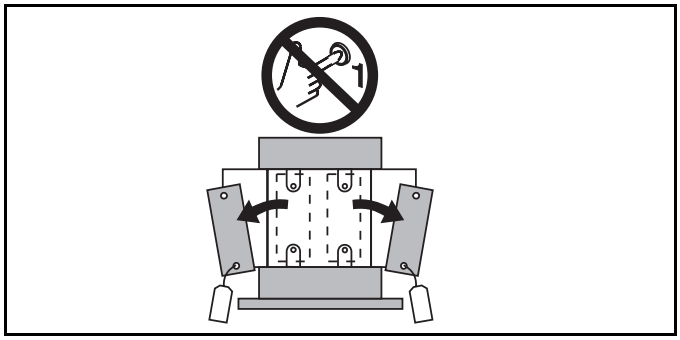
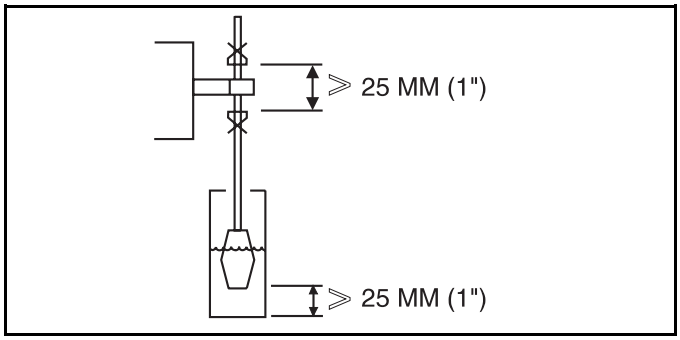
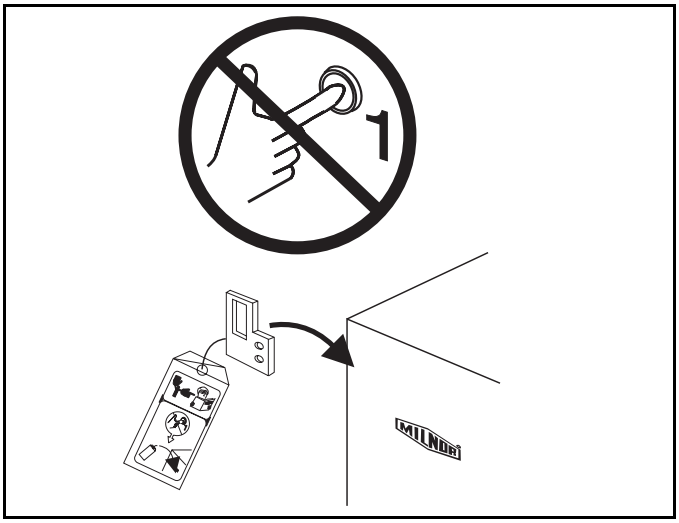
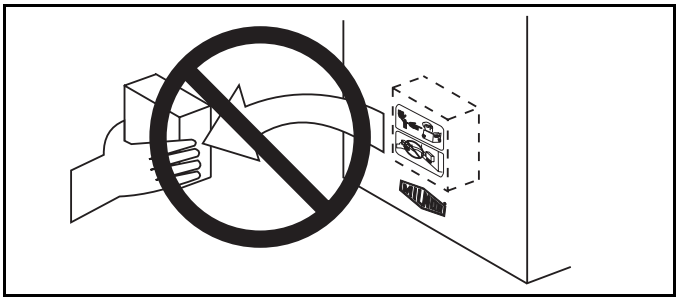
Illustration	Explanation
	Stop! Read the manual first for complete instructions before continuing.
	Do not jack the machine here. Do not lift the machine here.
	Use three point or four point lifting as determined by the lifting eyes furnished. Rig the load using lifting cables of sufficient size and length to ensure cables are not over-stressed.
	Do not lift the machine from one corner or one side edge.

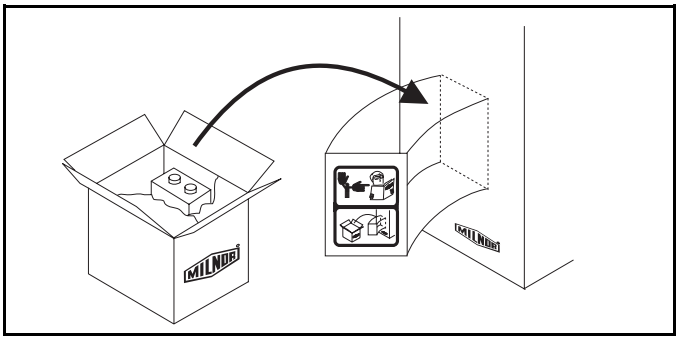
Illustration	Explanation
	Do not start this machine until the packing materials, lifting brackets, etc. with this tag attached or behind this panel are removed. These materials are painted red. Safety stands or brackets (also painted red) may be provided with this machine. Do not discard safety stands or brackets
	Do not step or stand on this machine part.
	Maintain a 25 mm. (1") minimum clearance between float clips. Set "low level" so that the bottom of the float is always at least 25mm (1") above the bottom of the float tube.
	This motor or pump should rotate in the direction of the arrow.



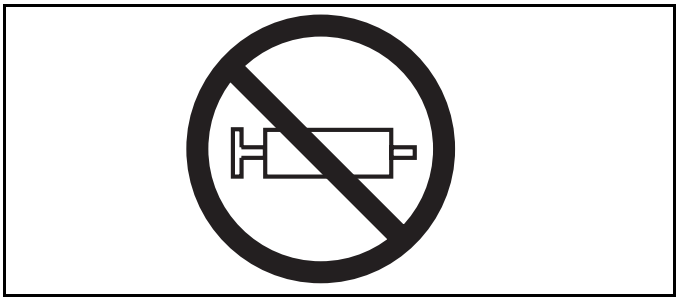
Do not start this machine until the part with this tag is installed on the machine.



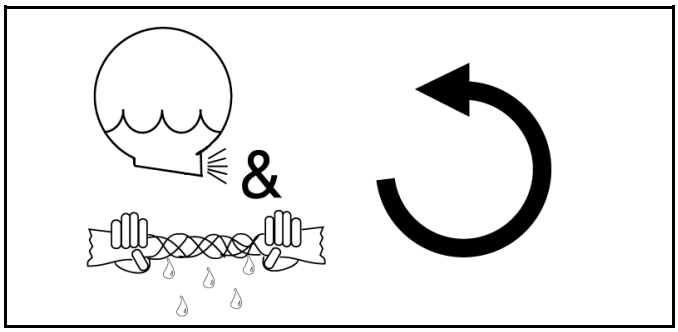
Do not remove this component from the machine.



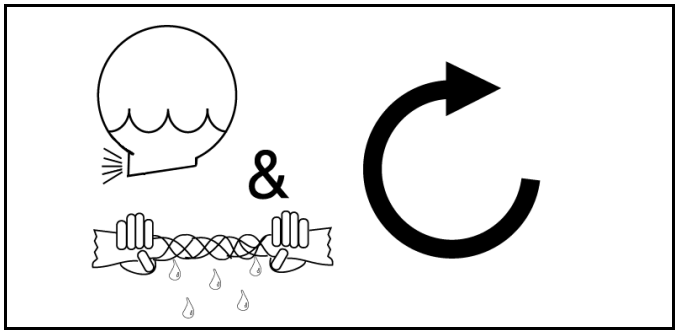
Install the appropriate part here before operating the machine.



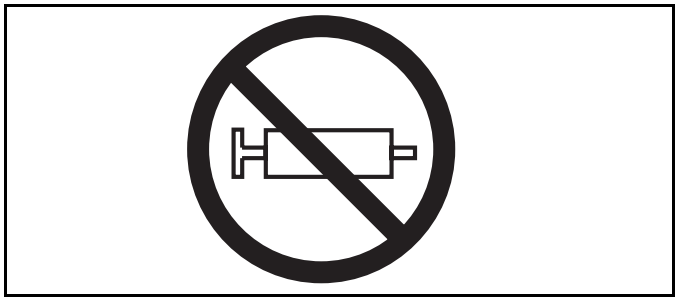
Do not pump grease here.



During drain and extract, the cylinder must rotate counterclockwise when viewed from here (rear of machine).

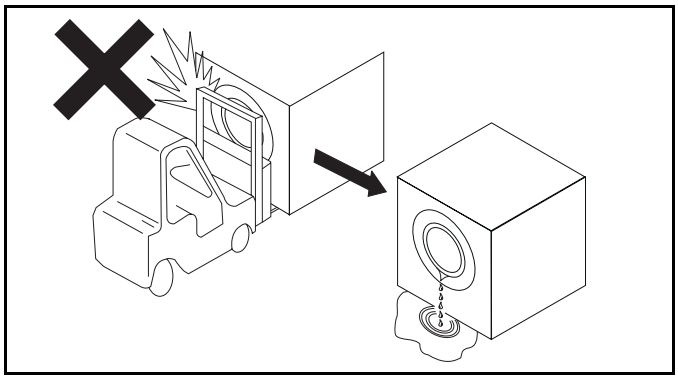


During drain and extract, the cylinder must rotate clockwise when viewed from here (front of machine).

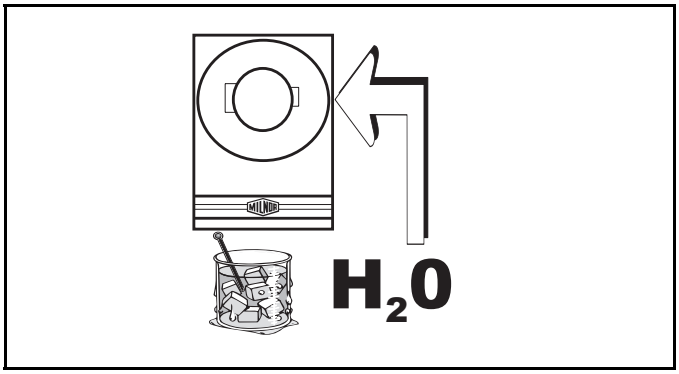


Do not pump grease here.

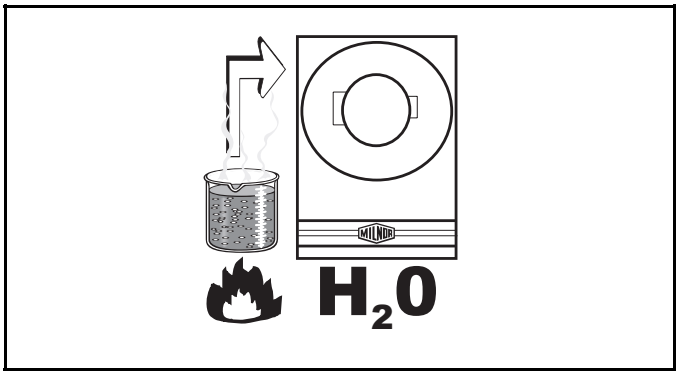
.



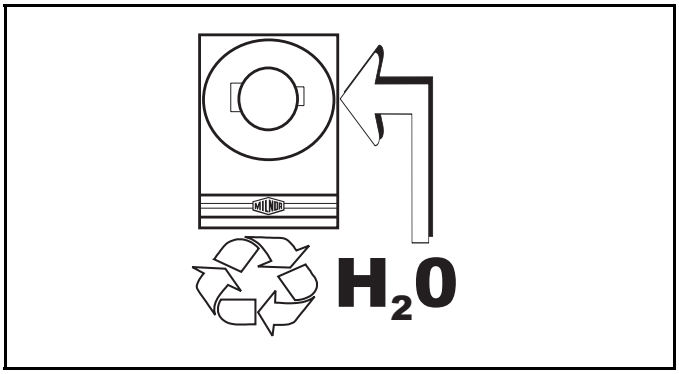
Do not strike shell front of washer-extractors during fork lifting. Striking shell front will cause door to leak.



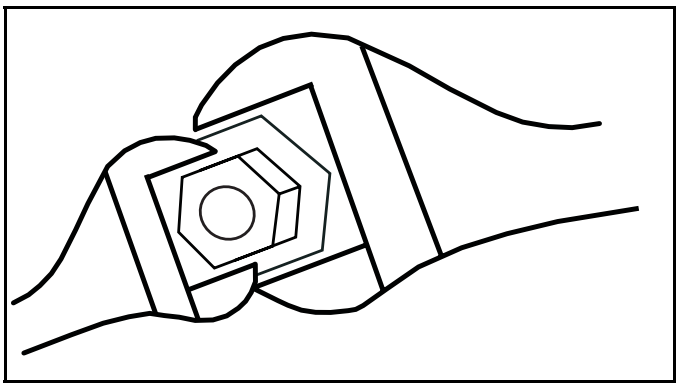
Make cold water connection here.



Make hot water connection here.



Make third (reuse) water connection here.



Hold the connection side of the valve with a wrench when connecting plumbing.

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.

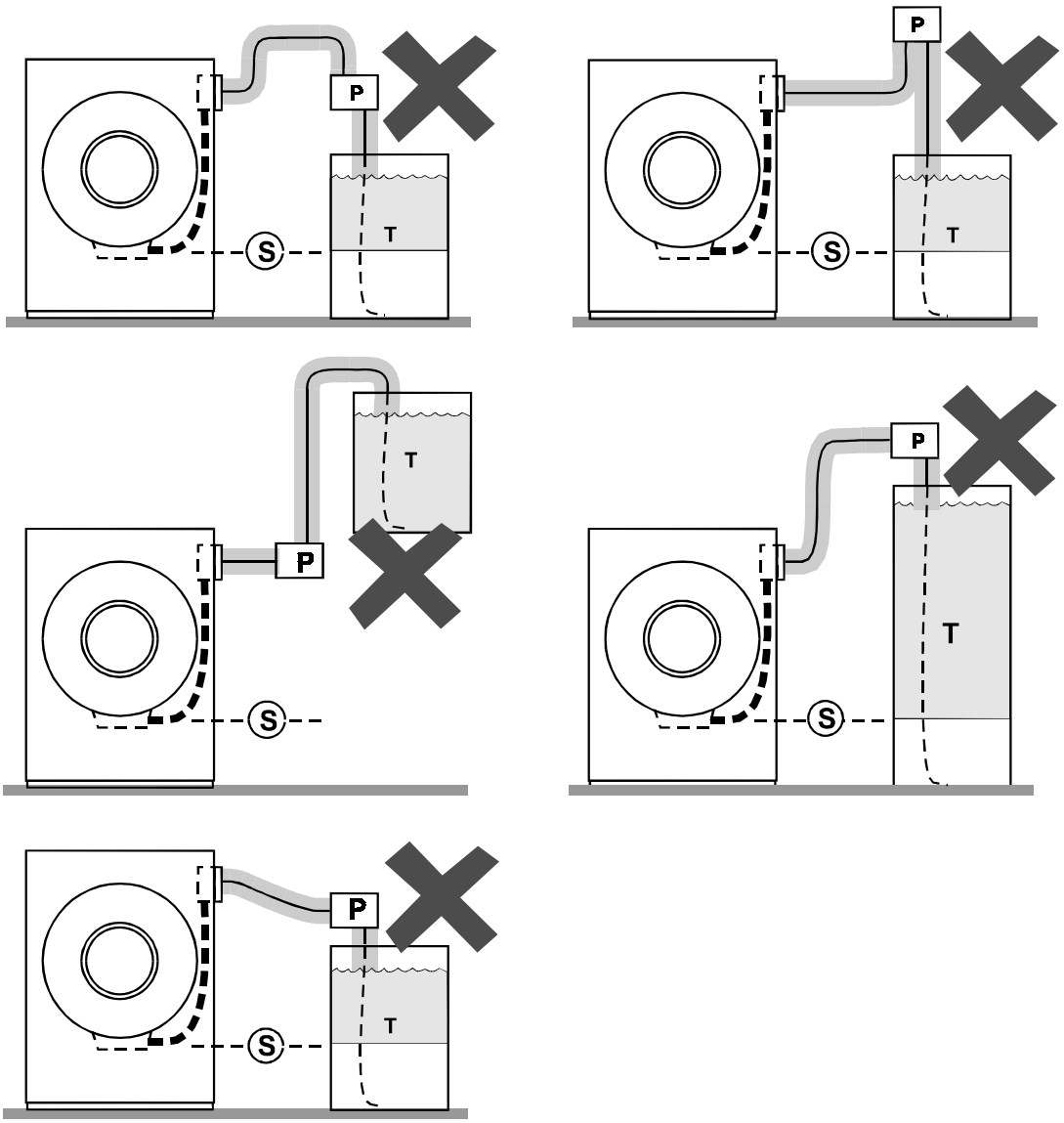
2. Requirements for Chemical Systems Used With Milnor Machines

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

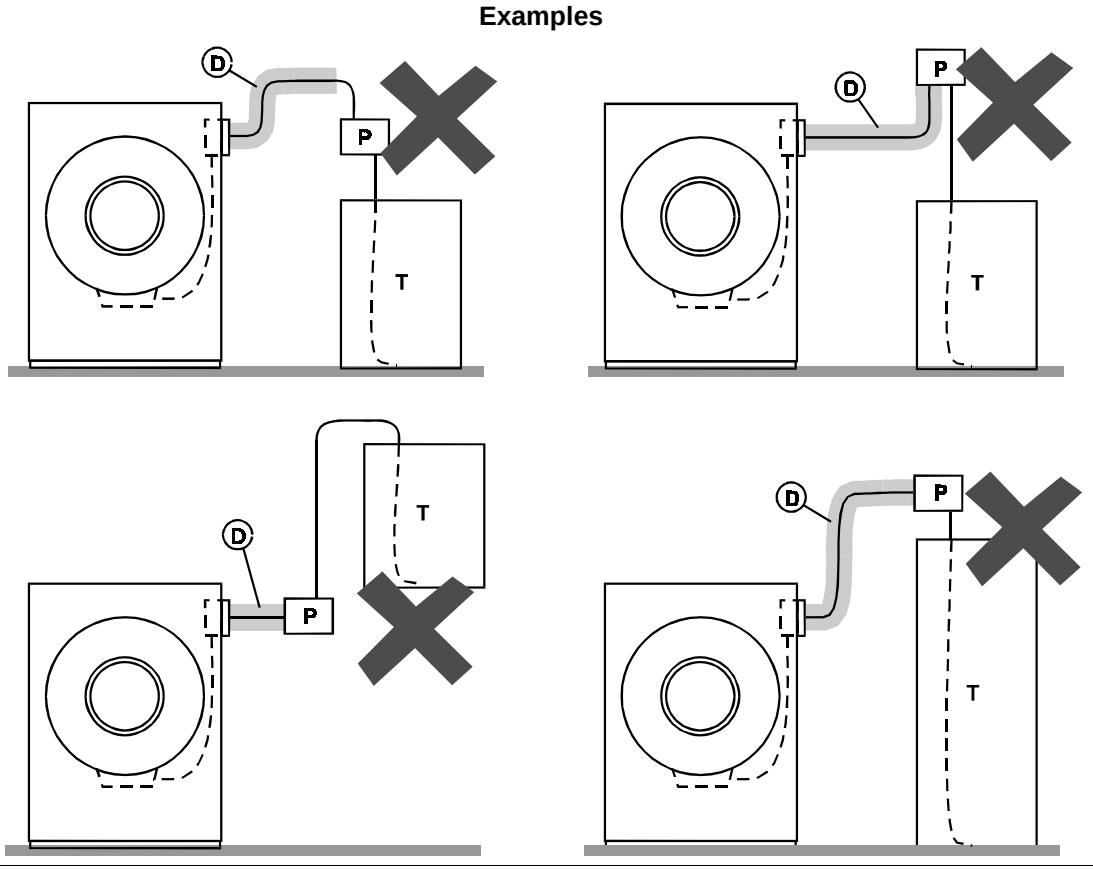


Legend

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.

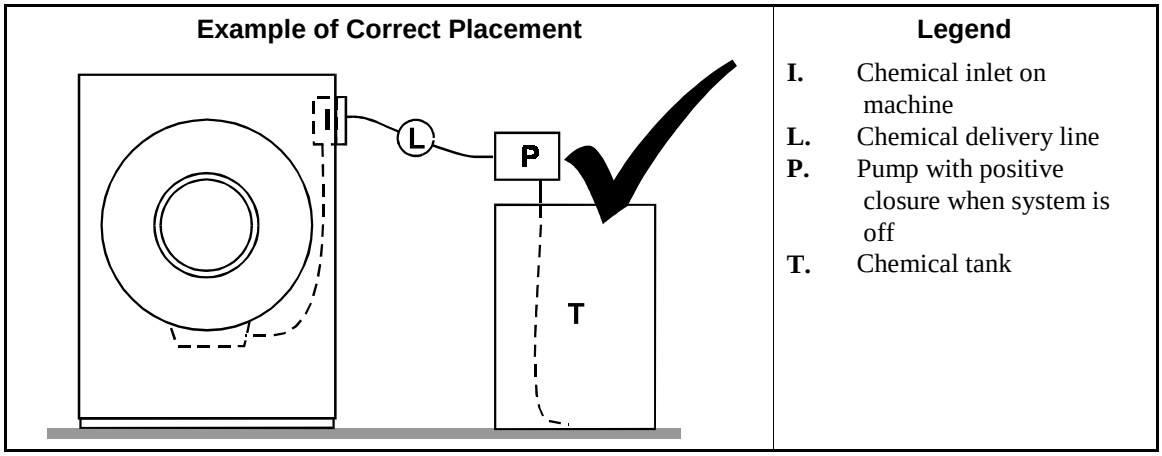
3.1. Siphoning: Positively close the line.—If the pump does not provide positive closure when the system is off, employ a shutoff valve in the line to serve this purpose.

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 —

Safety Placard Use and Placement

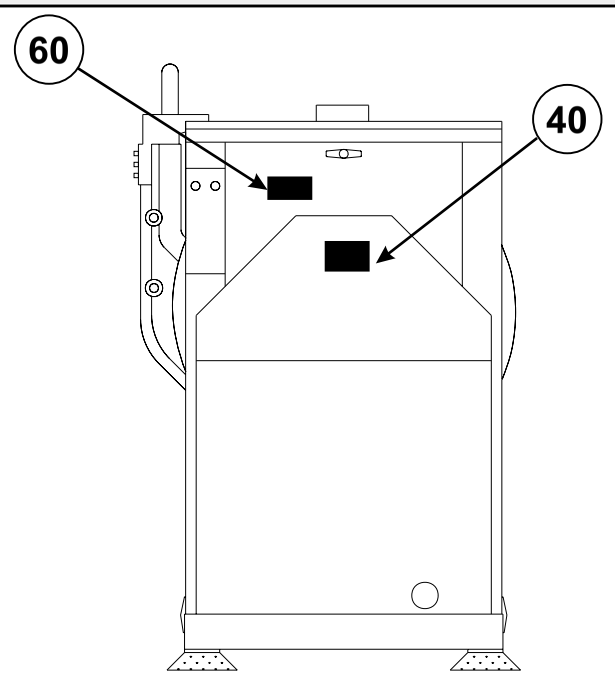
36026V5J, 36021CPE, NSP & V5J

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

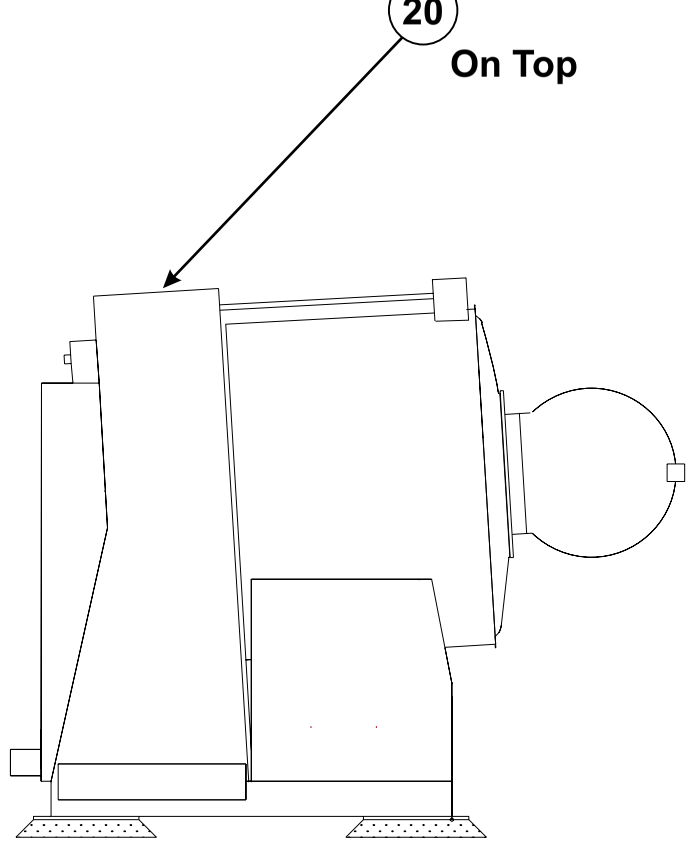
Litho in U.S.A.

Notes:

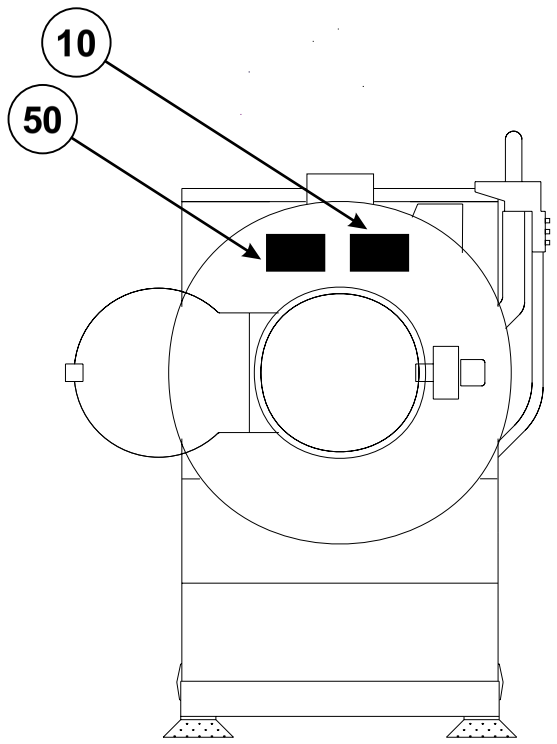
1. **Replace placard immediately, if removed or unreadable.**
2. **Approximate locations of placards are shown. Mounting holes are provided on machine. If aluminum placard use #8 self-tapping screws.**



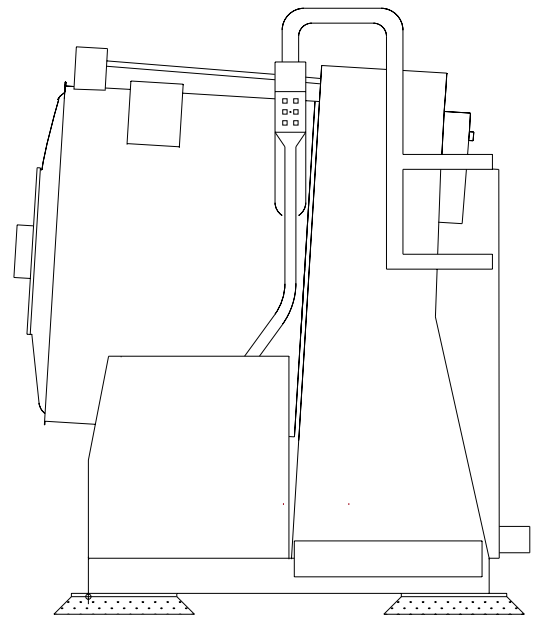
REAR VIEW



LEFT VIEW



FRONT VIEW



RIGHT VIEW

Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400
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 10635A	NPLT:SHELL FRONT RIDGID-TCATA	
all	20	01 10375B	NPLT:ELEC HAZARD SMALL-TCATA	
all	40	01 10689A	NPLT:BELT HAZARD SM TCATA	
all	50	01 10699A	NPLT:SERV HZRD-PLYEST-TCATA	
all	60	01 10377A	NPLT:ELEC HAZARD LG-TCATA	

Safety Placard Use and Placement ISO

36026V5J, 36021CPE, NSP & V5J

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

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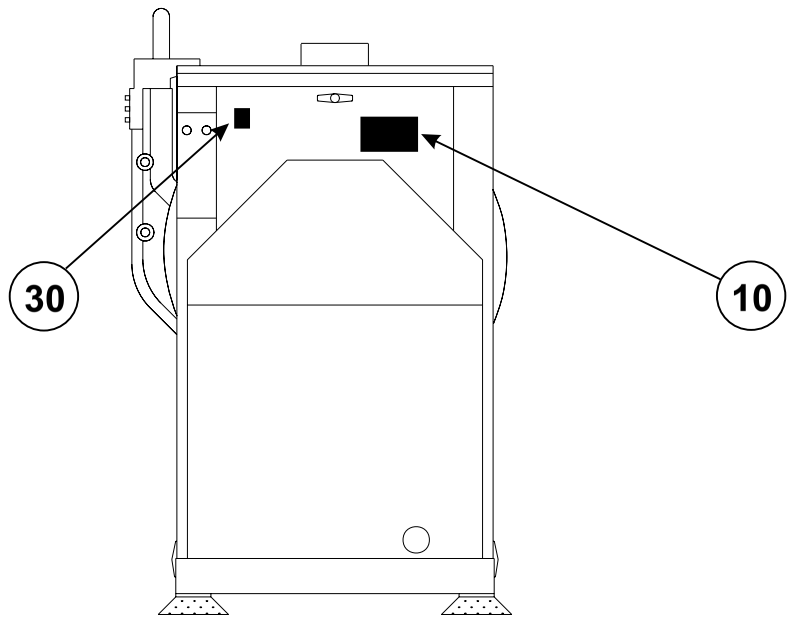
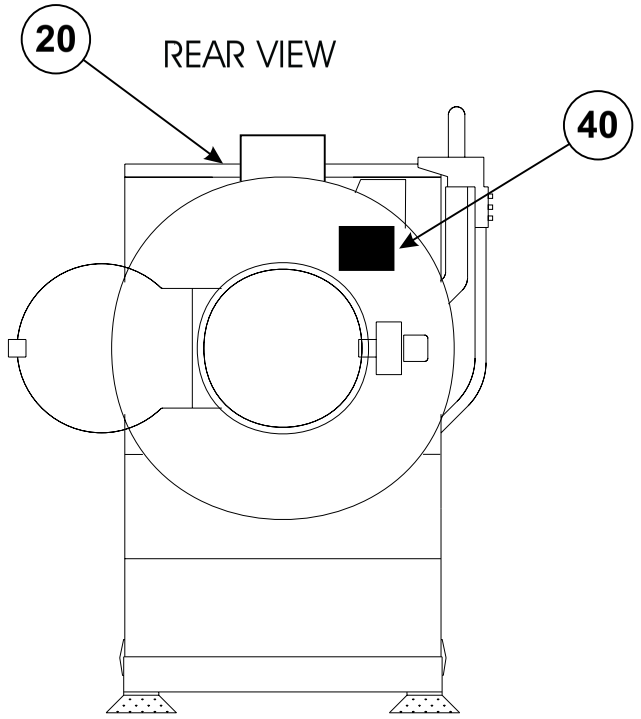
ISO Placards shown on this page

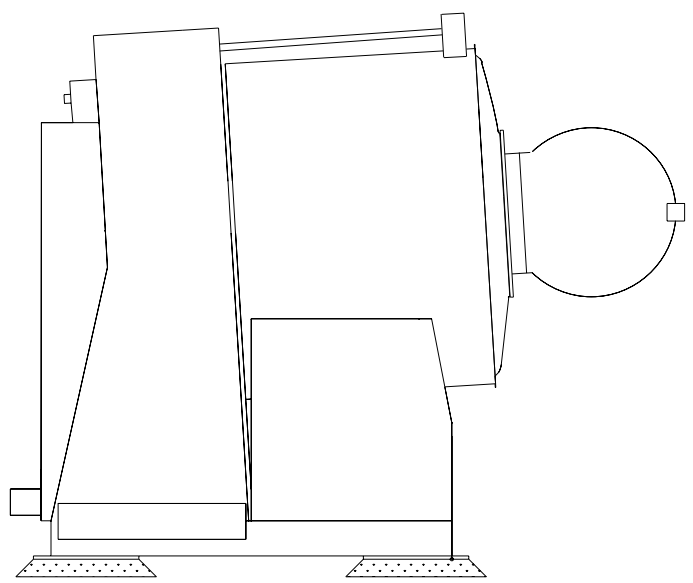
Notes:

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.**



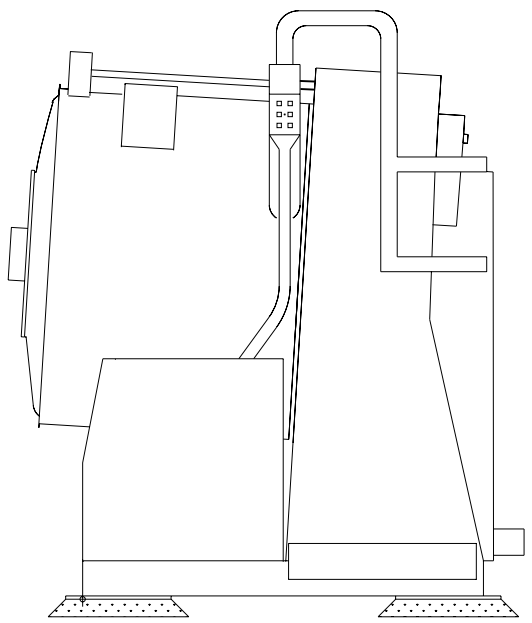
REAR VIEW





LEFT VIEW

FRONT VIEW



RIGHT VIEW

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

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 10632X	NPLT:WE1 RIGID WARNINGS FR	
all	20	01 10375	NPLTE:"WARNING" 2X2	
all	30	01 10377	NPLTE:"WARNING" 4X4	
all	40	01 10632Y	NPLT:WE1 RIGID WARNINGS POLY	

Section 1

Service and Maintenance

PREVENTIVE MAINTENANCE AND LUBRICATION

Lubrication Precautions

To achieve maximum performance and service life from your Milnor® washer-extractor and as a warranty requirement, your machine must be lubricated in strict accordance with the preventive maintenance checklist herein and the following precautions:

1. **Except where noted otherwise, perform all lubrication with power to the machine OFF and locked off at the external disconnect.**
2. Whenever applying grease, especially when greasing bearings and seals, **pump grease slowly** (not faster than 5 strokes per minute). Work grease gun lever slowly, **taking 10 to 12 seconds per stroke.** A grease gun can build up extremely high pressures which may force the seals out of position and cause them to leak, even though both seal and bearing cavities are equipped with spring loaded relief plugs.
3. Apply the quantity of grease called for in the checklist. Overlubrication can be as damaging as underlubrication. Where quantities are stated in strokes, one stroke of the grease gun is assumed to provide 0.0624 fluid ounces (by volume) of grease. Therefore, one fluid ounce of grease would be provided by 16 strokes of the grease gun. Determine the flow rate of your grease gun by pumping one ounce into a calibrated container. If fewer than 16 strokes are required, all quantities in strokes in the chart should be reduced accordingly and if more than 16 strokes are required, the number of strokes should be increased. Before starting lubrication, **make sure your grease gun is working and that you get a full charge of grease with every stroke.** Never pump the grease gun quickly, even if it is air-bound. Damaging excessive pressures can easily build up if this is done.
4. Main bearing and seal grease cavities are equipped with spring-loaded relief plugs to automatically bleed out excess grease and prevent abnormal pressures from building up in the housing. It is normal for some grease to ooze out when the machine is first commissioned, and after each lubrication; **however, when relubricating, do not pump grease in until it oozes out. Instead, apply the number of strokes specified herein.** Generally, the excess grease will not ooze out until the machine has run in extraction for some time.
5. Never mix petroleum grease and silicon grease.

Lubrication Points

Various lubrication points are shown in the figures which follow. The locations of these points vary from one machine model to another and not all models are shown. Where lubrication points for your specific machine model are not shown, similar conditions on other models are shown. Remember also to refer to the preventive maintenance checklist to determine what components require lubrication on you specific machine model.

Lubricant Specifications

Lubricants used on the machines covered by this section must adhere to the following specifications. See the preventive maintenance checklist herein to determine which components apply to your machine:

Table A—Lubricant Specification

Machine Components	Specified Lubricant
Main bearings	Shell Alvania EP#2 (also known as Shell MP) or equivalent lithium base grease
Bearing seals	Shell Alvania EP#2 or equivalent lithium base grease
All other components requiring grease (refer to preventive maintenance checklist	High quality pressure cup grease
Gear reducer	Non-detergent motor oil, above 32^{o}F use SAE 40 or SAE 50: below 32^{o}F use SAE 30
All other components that require light lubrication	Light machine oil
Motor bearings	Lubricant specified on motor nameplate. If specified, use Shell Dolium R grease or equivalent.
Hydraulic sensing device	Shell Rotella SAE 20-40 or equivalent

NOTE: The hydraulic sensing device sight glass indicates the level of oil in the device. Never albw oil level to drop more than 1/4 inch below the lowest edge of the sight glass. It is not necessary to change the oil in this unit unless the present oil becomes contamimated. If the oil level drops more than 1/2 inc h below the lowest edge of the sight glass, see MSSMA401AE for air bleeding procedure.

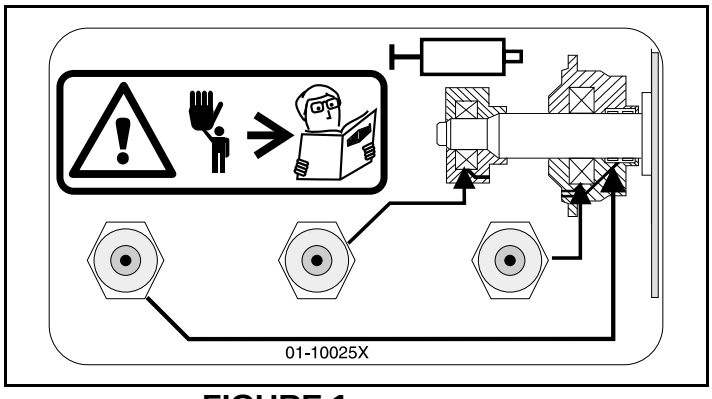


FIGURE 1 (MSSM0216AE)
New Style Main Bearing and Seals Lubrication Plate

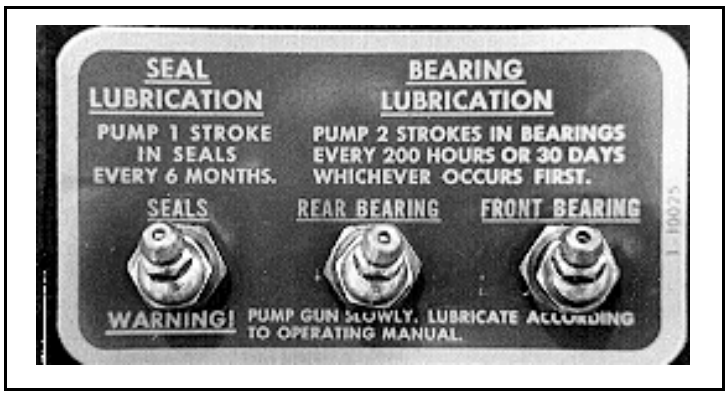


FIGURE 2 (MSSM0216AE)
Old Style Main Bearing and Seals Lubrication Plate (Used before 94491)

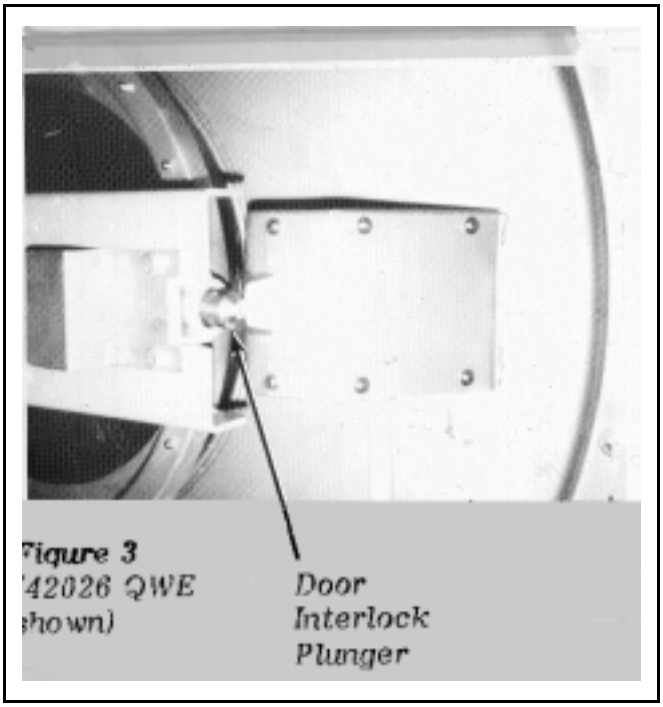


FIGURE 3 (MSSM0216AE)
Door Plunger

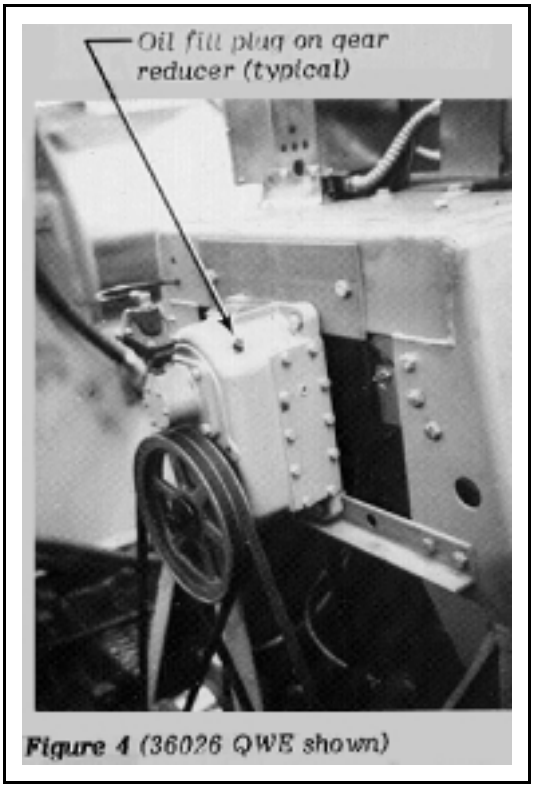


FIGURE 4 (MSSM0216AE)
Gear Reducer

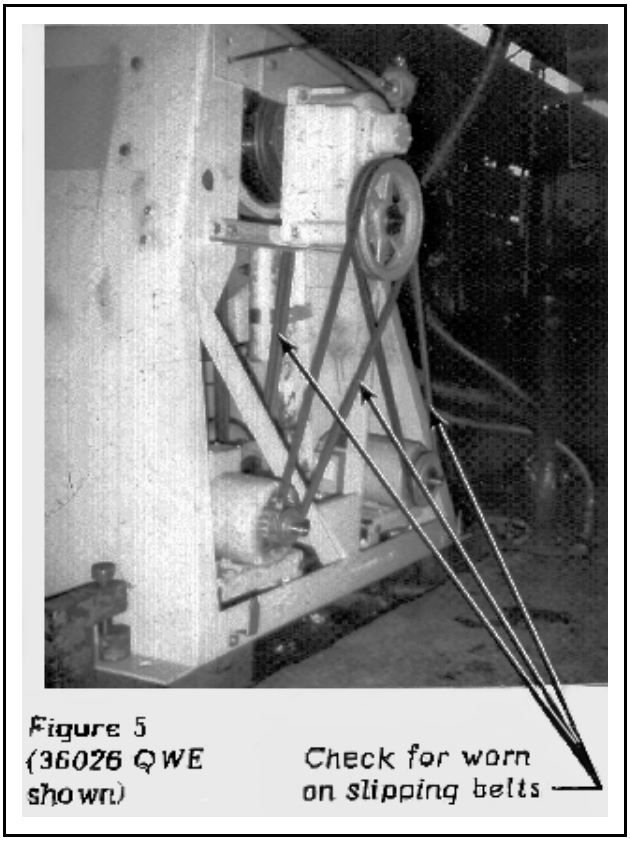


FIGURE 5 (MSSM0216AE)
Drive Belts

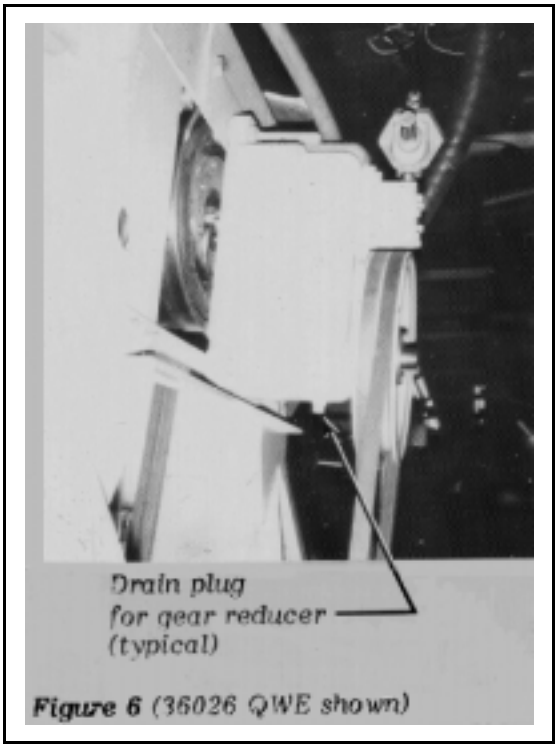


FIGURE 6 (MSSM0216AE)
Gear Reducer Drain

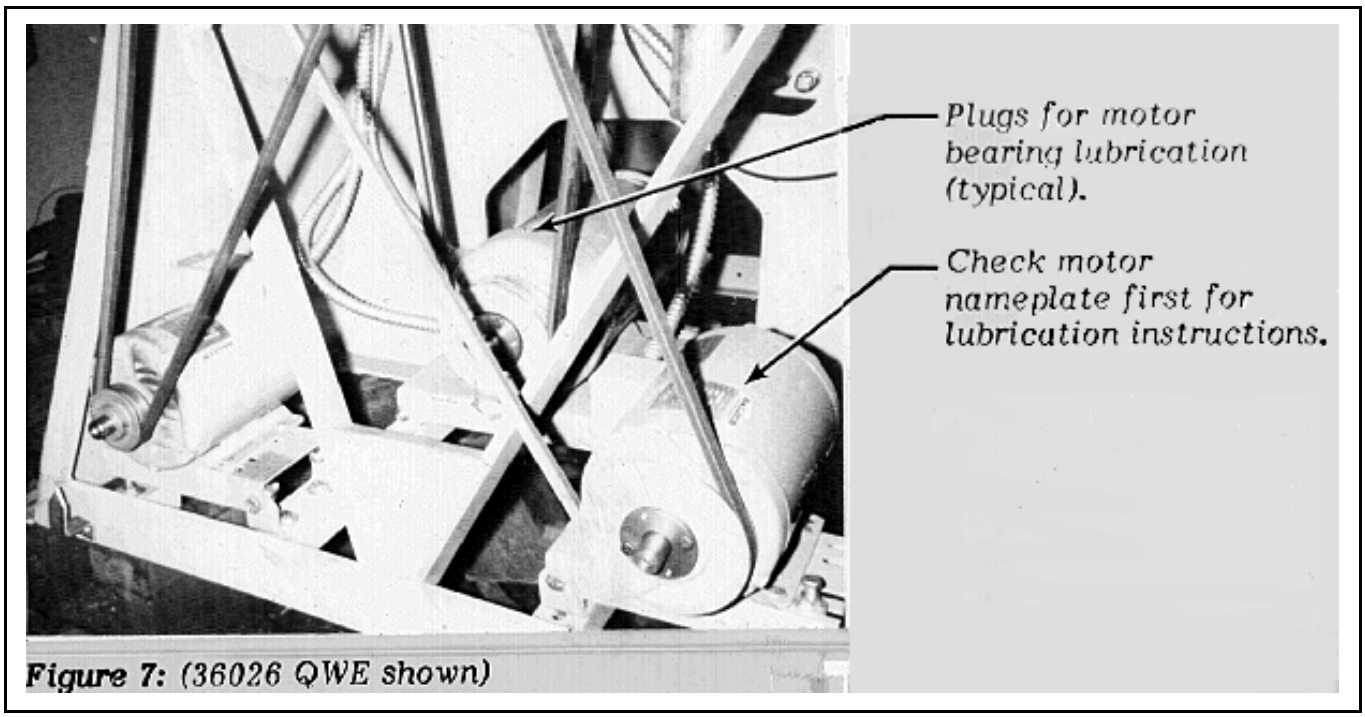


FIGURE 7 (MSSM0216AE)
Motor Lubrication

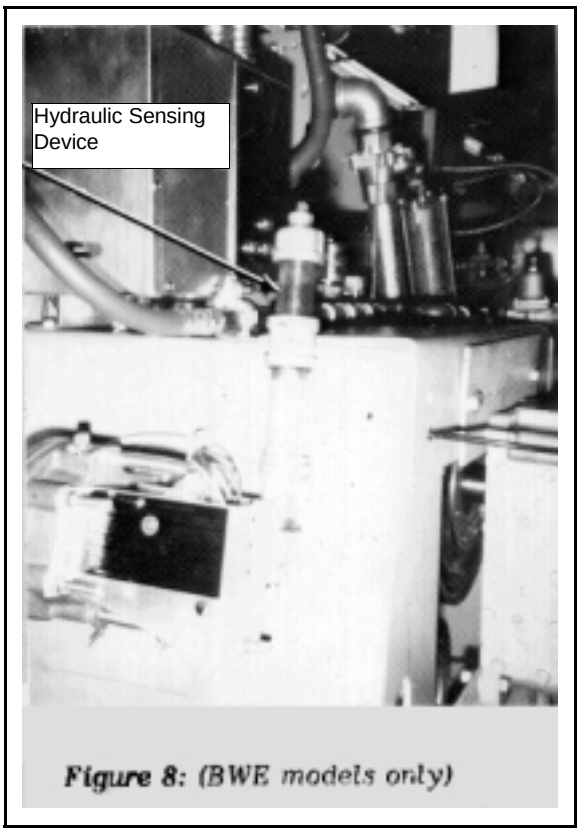


FIGURE 8 (MSSM0216AE)
Hydraulic Sensing Device

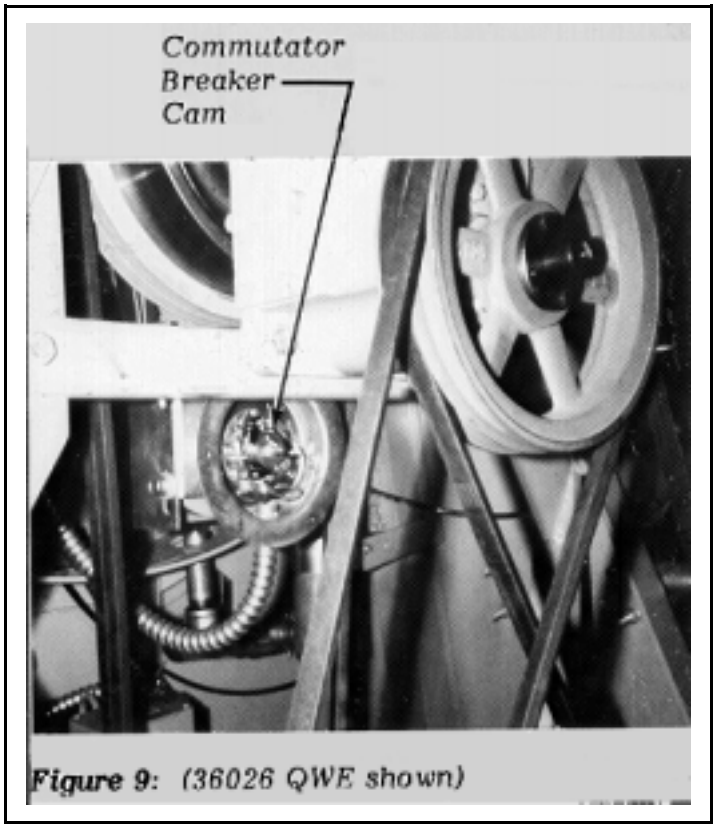


FIGURE 9 (MSSM0216AE)
Commutator Lubrication

Preventive Maintenance and Lubrication for BWP, CPE, and NSP

Components	Action	Related Information	Frequency (See NOTES 1 and 2)
BEARING HOUSING	Add grease (Pump SLOWLY with cylinder turning at wash or drain speed while greasing and for 1 minute after.)		
• Front bearing grease fitting	.12 oz. (3.54 grams) (2 strokes) at one location	FIGURES 1 and 2	Monthly/200 hours
• Rear bearing grease fitting	.12 oz. (3.54 grams) (2 strokes) at one location		
• Seals	.06 oz. (1.77 grams) (1 stroke) at one location		Every 6 months
GEAR REDUCERS & MOTOR BEARINGS			
• Gear Reducers	Check oil level and refill if required.	FIGURES 4, 6	Every 6 months
	Drain and replenish to level of side plug.		Yearly
	Clean mag. drain plug before replacing.		
• Motor Bearings (Motors with grease fittings)	See “BALDOR MOTOR MAINTENANCE...,” MSSM0274AE, in this manual. Pump grease slowly. If motor has drain plug, remove plug and run motor for 20 minutes then replace plug. See NOTE 3 below.	FIGURE 7	Quarterly/500 hours
HYDRAULIC SENSING DEVICE			
• Hydraulic Sensing Device (Balancing Mechanism)	Verify that the oil level is approximately halfway up the sight glass. Refill as needed. Turn Master Switch **OFF** before filling reservoir. (If the oil level drops far enough to expose the balance sensing device to air, refer to MSSMA401AE for bleeding and refilling instructions.	FIGURE 8	Check daily. Refill when level drops to 1/4 of sight glass.
COMMUTATOR			
• Cam	Check and readjust breaker point clearance	MSSMA401AE	After 160 hours of operation
	Relubricate with Wells CL200A cam lubricant—only insert a small amount as excess may interfere with operation.		After 160 hours of operation
	Check breaker point clearance and relubricate commutator		Every 6 months
DRIVE COMPONENTS			
• Belts	Check for worn or slipping belts.	FIGURE 5	Every 6 months
		MSSM0204AE	
		MSSM0501AE	
		MSSM0215AE	
DOOR INTERLOCK			
• Door interlock	Lubricate plunger with a few drops of oil.	FIGURE 3	Weekly
BELTS			
• Belts	Ensure hose in in good repair and the clamps are tight		Yearly
	Replace hoses		Every 2 to 3 years
CHEMICALS			
• Supply injector	Inspect inside for rust. If rusting, carefully clean away rust.		Every 6 months
COOLDOWN VALVE			
• Direct cooldown vernier valve	Ensure proper operation. Adjust if needed.		Every 6 months

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

NOTE 2: Quarterly/500 Hours = Once every three months, or every 500 operating hours, whichever comes first.

NOTE 3: If motor manufacturer’s instructions conflict with manual section MSSM0274AE, follow manufacturer’s instructions. Motors are warrantied by the manufacturer, not by Milnor®.

BALDOR MOTOR MAINTENANCE

MSSM0274AE/9731AV

Most of the information in this document is taken from the *Baldor Electric Company Instruction, Operation, and Maintenance Manual,* and provides a means of more accurately determining motor lubrication requirements based on local conditions.

General Maintenance

Inspect, clean, and test motors at regular intervals— approximately every 500 operating hours or every three months, whichever comes first. Lubricate motors at the intervals determined herein. Keep accurate maintenance records.

⚠ DANGER: Electrocution and Electrical Burn Hazards

Contact with high voltage will electrocute or burn you. Power switches on the machine and the control box do not eliminate these hazards. High voltage is present at the machine unless the main power is off. Electrical power can cause death or severe injury.

- ☞ **Do not service machine unless qualified and authorized.**
- ☞ **Lock OFF and tag out power at the wall disconnect before servicing, or in accordance with factory service procedures.**

⚠ DANGER: Entangle and Crush Hazard

Contact with moving components normally isolated by guards, covers, and panels, can entangle and crush your limbs. These components move automatically.

- ☞ **Do not service machine unless qualified and authorized.**
- ☞ **Lock OFF and tag out power at the wall disconnect before servicing, or in accordance with factory service procedures.**

Clean—Keep the exterior of the motor free of dirt, oil, grease, water, etc. Keep ventilation openings clear. Oily vapor, paper pulp, textile lint, etc., can accumulate and block ventilation, causing overheating and early motor failure.

Test—Periodically, check the motor and winding insulation integrity using a "megger." Record the megger readings and immediately investigate any significant drop in insulation resistance. Check all electrical connectors to be sure they are tight.

Lubricate—Determine the proper lubrication interval for your motor as explained in "How to Determine Lubrication Interval" in this section, and lubricate accordingly.

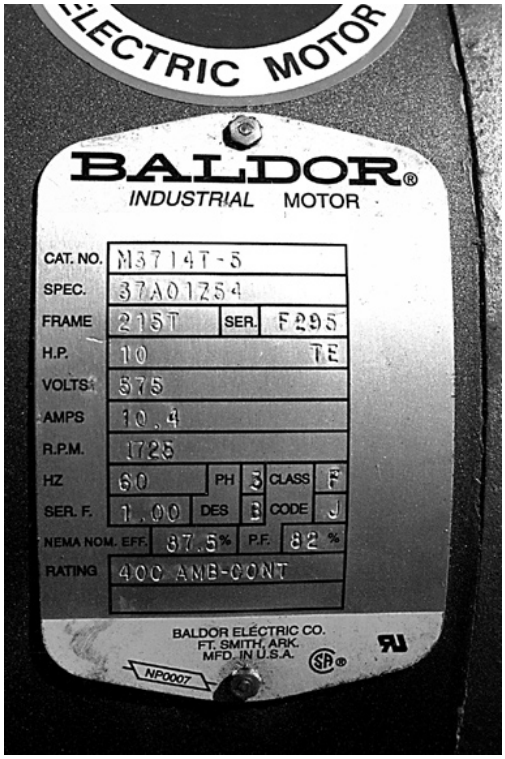


FIGURE 1 (MSSM0274AE)
Typical Motor Data Plate

How to Determine Lubrication Interval—The useful life of antifriction bearing grease can be estimated, based on service conditions, frame type, and motor rpm. An example of determining the correct lubrication interval is provided below.

Ex: A fan motor, operating at an ambient temperature of 109°F (43°C) in a moderately corrosive atmosphere. The motor has a NEMA 286T/(IEC 180) frame and is rated at 1750 rpm.

1. Table 1 classifies the service condition as "severe."
2. Table 2 specifies a 0.5 service condition multiplier value for "severe" service condition.
3. Table 3 specifies 9500 hours as the recommended lubrication interval for frame sizes 254 to 286 (see nameplate), given standard service conditions.
4. Multiply .5 *(service condition multiplier value)* by 9500 hours *(recommended lubrication interval)* = 4750 hours *(calculated lubrication interval)*.
5. Table 4 shows that the amount of grease to be added is 0.32 ounces (9.1 grams).

Table 1 — Determining the Service Condition

Severity of Service	Maximum Ambient Temperature	Atmospheric Contamination	Type of Bearing
Standard	104°F (40°C)	Clean, little corrosion	Deep groove ball bearing
Severe	122°F (50°C)	Moderate dirt, corrosion	Ball thrust, Roller
Extreme	>122°F (>50°C) or Class H Insulation (**Note 1**)	Severe dirt, abrasive dust, corrosion	All bearings
Low Temperature	-22°F (-30°C) (**Note 2**)		

Note 1: Special high temperature grease is recommended.

Note 2: Special low temperature grease is recommended.

Table 2 — Service Condition Multiplier Value

Operating Condition	Multiplier
Standard	1.0
Severe	0.5
Extreme	0.1

Table 3 — Recommended Lubrication Intervals at Standard Service Conditions

NEMA (IEC) Frame Size	Rated Speed - RPM			
	3600	1800	1200	900
Up to 215 (132)	5500 Hrs.	12000 Hrs.	18000 Hrs.	22000 Hrs.
254 to 286 (160 - 180)	3600 Hrs.	9500 Hrs.	15000 Hrs.	18000 Hrs.
324 to 365 (200 - 225)	2200 Hrs.(**Note 3**)	7400 Hrs.	12000 Hrs.	15000 Hrs.
404 to 5000 (280 - 315)	2200 Hrs.(Note 3)	3500 Hrs.	7400 Hrs.	10500 Hrs.

Note 3: Bearings in 404 through 5000 frame, 2 pole motors are either 6313 or 6314 bearings and the lubrication interval is shown in the table. **If roller bearings are used, the bearings must be lubricated more frequently. Divide the listed lubrication interval by two.**

Table 4 — Lubrication Amounts per Frame

NEMA (IEC) Frame Size	Bearing Description These are the "Large" bearings (Shaft End) in each frame size (Note 4)					
	Largest bearing in size category	OD D mm	Width B mm	Grease gun strokes (Note 5)	Volume of grease to be added	
					ounces	grams
Up to 215 (132)	6307	80	21	2.5	0.16	4.7
254 to 286 (160 - 180)	6311	120	29	5.0	0.32	9.1
324 to 365 (200 - 225)	6313	140	33	7.0	0.43	12.2
404 to 5000 (280 - 315)	NU322	240	50	18.0	1.11	31.5

Note 4: Smaller bearings in size category may require reduced amounts of grease.

Note 5: See "Correct Grease Gun Procedures" for information on estimating the output of hand-operated grease guns.

Lubrication Recommendations

Type of Grease—Use Shell Dolium R (factory installed) or Chevron SRI greases for standard service conditions. The extreme and low temperature conditions are not normally encountered in the laundry. However, for extreme conditions, use Darmex 707 and for low temperature conditions, use Arrowshell 7. Contact Baldor for equivalents, if necessary.

Correct Grease Gun Procedures

1. Use hand-operated grease gun, not a pneumatic grease gun. Pump grease slowly, taking 10 to 12 seconds to complete each stroke.
2. Apply quantity of grease called for. Over-lubrication can be as damaging as under-lubrication. Where quantities are stated in strokes, one stroke of the grease gun is assumed to provide .0624 fluid oz. (1.77 grams) (by volume) of grease. Therefore, one fluid ounce (28.3 grams) of grease would be provided by 16 strokes of the grease gun. Determine the flow rate of your grease gun by pumping one ounce into a calibrated container. If fewer than 16 strokes are required, all quantities in strokes in the chart should be reduced accordingly. If more than 16 strokes are required, the number of strokes should be increased. **Before starting lubrication, make sure your grease gun is working and that you get a full charge of grease with every stroke.**
3. Do not over-lubricate motors. Over-lubrication of a motor can seriously damage it by forcing grease into motor windings. Over-lubrication of the extract motor can force grease into the centrifugal switch causing it to malfunction.
4. Do not allow grease to drip on the brake disk or clutch tire/drum during lubrication. This will reduce the braking action considerably, and may permit the cylinder to creep while loading and unloading.

Lubrication Procedure

NOTICE: Motor Damage

To avoid damage to motor bearings, grease must be kept free of dirt. For an extremely dirty environment, contact your Baldor distributor or an authorized Baldor Service Center for additional information.

1. Clean grease fittings.
2. Remove grease outlet plug.
3. Add recommended amount of grease. Be sure grease to be added is compatible with the grease already in motor. Consult your Baldor distributor or an authorized Baldor Service Center if grease other than recommended is to be used. Stop when new grease appears at shaft hole in the endplate or grease outlet plug.
4. Replace grease outlet plug.

FASTENER TORQUE REQUIREMENTS

The specifications in this section apply to 1/4 inch and larger Unified National fine and coarse fasteners used on Milnor® machines. This information is to be used only when torque specifications are not stated in the installation or service instructions.

When tightening applicable fastener, abide by the following precautions:

1. Always use new fasteners. Replace bolts, nuts, flat washers, and lock washers in the order shown on the parts drawing.

2. Unless otherwise specified, use:

- Loctite® 271 threadlocker or equivalent for bearing housing mounting bolts from one half to one inch in diameter.
- Loctite® 277 threadlocker or equivalent for bearing housing mounting bolts of one inch diameter or larger.
- Loctite® 242 threadlocker for all other fasteners requiring thread locking compound.

3. Use a torque wrench to assure proper tightness.

4. Never lubricate fasteners. The values specified herein are maximum recommended torques and are calculated from published ASTM and SAE data. Actual allowable torques are application dependent and can vary for many reasons, (joint types, gaskets, etc.). Use these values as a guide.

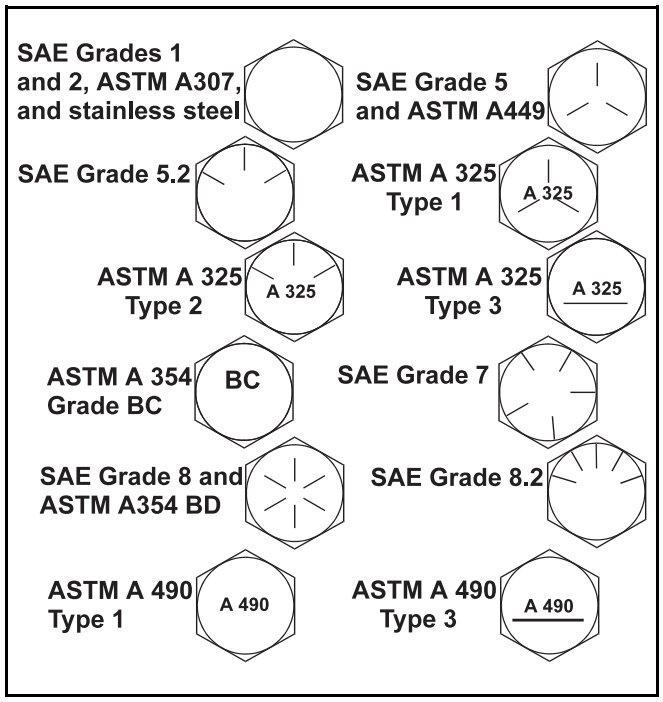


FIGURE 1 (MSSM0101CE)
Fastener Grade Markings

5. Although FIGURE 1 depicts hex head bolts, the table applies to all head types.

Fasteners and Threadlocker

How Fasteners Loosen—Standard threaded fasteners are manufactured with a clearance fit for easy assembly. With the fastener at the proper torque, 85% of the tightening torque is absorbed in the threads and under the fastener head. The remaining 15% provides the friction that prevents the thread from slipping. When this friction is overcome (by bending, thermal expansion, internal pressures, functional loads, or impact) the thread slips and loosens. Although higher torques reduce the likelihood of thread slippage, if slippage occurs, the threads unwind and the fastener loosens. Once thread slippage begins, vibration increases the rate of loosening.

Preventing Loosening—The most effective way to prevent loosening of threaded parts is by proper application of a threadlocking compound. Threadlocker provides lubrication during assembly, then hardens to seal the threads against corrosion and provide resistance to thread slippage.

Applying Threadlocker

NOTE: The following threadlocker information and illustrations are excerpts from the Loctite® User's Guide and are used with permission.

For maximum strength, threadlocker must fill the thread voids completely, as shown in FIGURE 2. Organic or petroleum solvent will remove excess uncured adhesive from joints. Consult information below for the specific fastener application.

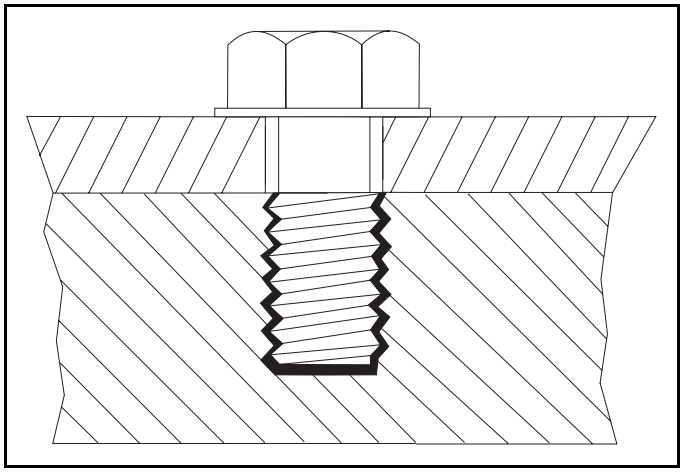


FIGURE 2 (MSSM0101CE)
Correct Threadlocker Use

Bolts and Nuts—See FIGURE 3.

1. Clean all threads (bolt and nut) with cleaning solvent.
2. Spray all threads with Loctite® Primer N. Allow to dry.
3. Insert bolt into through hole assembly.
4. Apply several drops of threadlocker onto bolt engagement area.
5. Assemble and tighten nut to correct torque for the threadlocker.

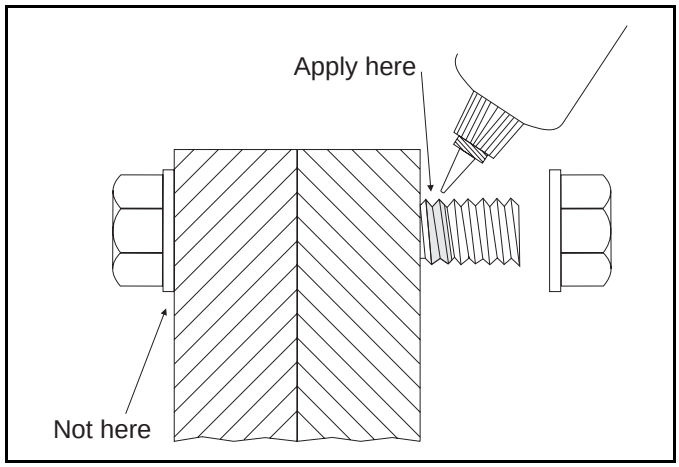


FIGURE 3 (MSSM0101CE)
Applying Threadlocker to Through Hole

Blind Holes—See FIGURE 4.

1. Clean all threads (bolt and nut) with cleaning solvent.
2. Spray all threads with Loctite® Primer N. Allow to dry.
3. Squirt several drops down female threads into bottom of hole.
4. Apply several drops to bolt.
5. Tighten to correct torque for the threadlocker.

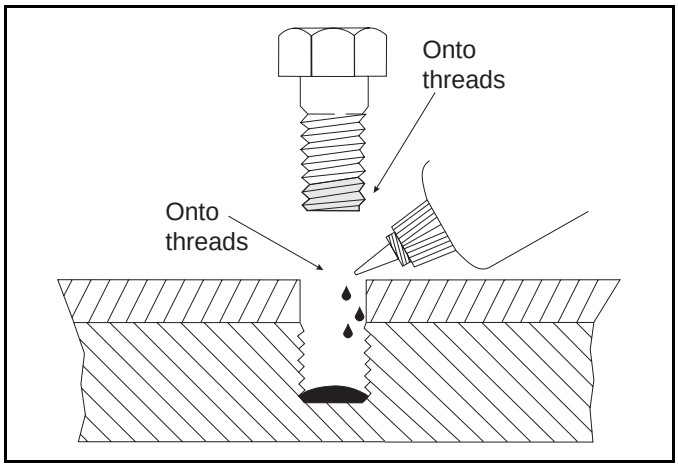


FIGURE 4 (MSSM0101CE)
Applying Threadlocker to Blind Holes

Removing Fasteners

High strength threadlockers like Loctite® 271 (or equivalent) may be weakened by heating to at least 500° F (260° C) as follows.

1. Apply localized heat to fastener as shown in FIGURE 5.
2. Disassemble while hot. Once disassembled, the cured adhesive can be removed with Loctite® Gasket Remover #790 (or equivalent).

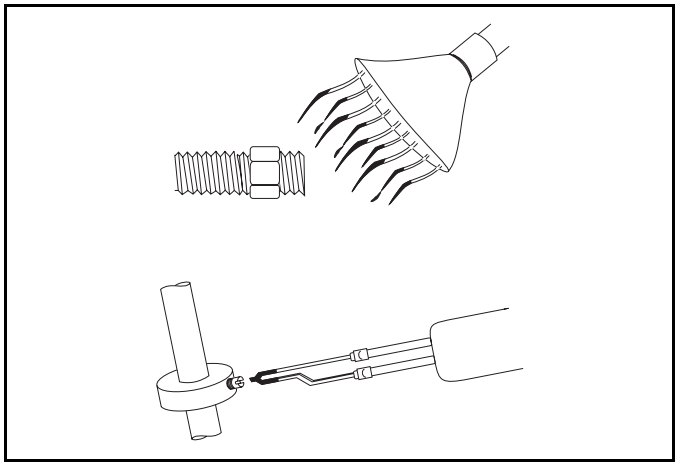


FIGURE 5 (MSSM0101CE)
Removing High Strength Threadlocker

Carbon Steel Fasteners

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1/4 - 20	SAE Grade 1 ASTM A307	2.5 (3.39)	3.0 (4.06)	3.3 (4.47)	3.6 (4.88)	4.6 (6.23)	4.3 (5.83)	3.3 (4.47)
	SAE Grade 2	4.1 (5.56)	4.9 (6.64)	5.5 (7.45)	6.0 (8.13)	7.7 (10.44)	7.1 (9.63)	5.5 (7.46)
	SAE Grade 4	4.8 (6.50)	5.8 (7.86)	6.4 (8.67)	7.0 (9.49)	9.0 (12.20)	8.3 (11.25)	6.4 (8.67)
	SAE Grade 5 ASTM A449	6.3 (8.54)	7.6 (10.3)	8.4 (11.38)	9.3 (12.60)	11.8 (15.99)	11.0 (14.91)	8.4 (11.39)
	SAE Grade 7	7.9 (10.7)	9.4 (12.7)	10.5 (14.23)	11.5 (15.59)	14.7 (19.93)	13.6 (18.44)	10.5 (14.23)
	SAE Grade 8 ASTM A354 Grade BD	8.9 (12.0)	10.7 (14.5)	11.9 (16.13)	13.1 (17.76)	16.6 (22.50)	15.4 (20.88)	11.9 (16.13)
	ASTM A354 Grade BC	7.9 (10.7)	9.4 (12.7)	10.5 (14.23)	11.5 (15.59)	14.7 (19.93)	13.6 (18.44)	10.5 (14.23)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1/4 - 28	SAE Grade 1 ASTM A307	2.8 (3.80)	3.4 (4.61)	3.8 (5.15)	4.1 (5.56)	5.3 (7.18)	4.9 (6.64)	3.8 (5.15)
	SAE Grade 2	4.7 (6.37)	5.6 (7.60)	6.3 (8.54)	6.9 (9.36)	8.8 (11.93)	8.1 (10.98)	6.3 (8.54)
	SAE Grade 4	5.5 (7.46)	6.6 (8.95)	7.3 (9.90)	8.1 (10.98)	10.3 (13.96)	9.5 (12.88)	7.3 (9.90)
	SAE Grade 5 ASTM A449	7.3 (9.90)	8.7 (11.80)	9.7 (13.15)	10.7 (14.50)	13.6 (18.44)	12.6 (17.08)	9.7 (13.15)
	SAE Grade 7	8.9 (12.07)	10.7 (14.50)	11.9 (16.13)	13.1 (17.76)	16.6 (22.51)	15.4 (20.88)	11.9 (16.13)
	SAE Grade 8 ASTM A354 Grade BD	10.2 (13.83)	12.2 (16.54)	13.6 (18.44)	15.0 (20.34)	19.0 (25.76)	17.7 (23.99)	13.6 (18.44)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
5/16 - 18	SAE Grade 1 ASTM A307	5.1 (6.91)	6.2 (8.40)	6.8 (9.22)	7.5 (10.17)	9.6 (13.02)	8.9 (12.07)	6.8 (9.22)
	SAE Grade 2	8.5 (11.52)	10.2 (13.83)	11.3 (15.32)	12.5 (16.95)	15.9 (21.56)	14.7 (19.93)	11.3 (15.32)
	SAE Grade 4	10.0 (13.56)	12.0 (16.27)	13.3 (18.03)	14.6 (19.79)	18.6 (25.22)	17.3 (23.46)	13.3 (18.03)
	SAE Grade 5 ASTM A449	13.0 (17.63)	15.6 (21.15)	17.4 (23.60)	19.1 (25.90)	24.3 (32.95)	22.6 (30.64)	17.4 (23.60)
	SAE Grade 7	16.1 (21.83)	19.3 (26.17)	21.5 (29.15)	23.6 (31.99)	30.1 (40.81)	27.9 (37.83)	21.5 (29.15)
	SAE Grade 8 ASTM A354 Grade BD	18.5 (25.08)	22.1 (29.96)	24.6 (33.35)	27.1 (36.74)	34.5 (46.78)	32.0 (43.39)	24.6 (33.35)
	ASTM A354 Grade BC	16.1 (21.83)	19.3 (26.17)	21.5 (29.15)	23.6 (31.99)	30.1 (40.81)	27.9 (37.83)	21.5 (29.15)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc orCadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
5/16 - 24	SAE Grade 1 ASTM A307	5.6 (7.59)	6.7 (9.08)	7.4 (10.03)	8.2 (11.12)	10.4 (14.10)	9.6 (13.01)	7.4 (10.03)
	SAE Grade 2	9.4 (12.74)	11.3 (15.32)	12.5 (16.94)	13.8 (18.71)	17.5 (23.73)	16.3 (22.09)	12.5 (16.94)
	SAE Grade 4	11.0 (14.91)	13.2 (17.90)	14.6 (19.79)	16.1 (21.83)	20.5 (27.79)	19.0 (25.76)	14.6 (19.79)
	SAE Grade 5 ASTM A449	14.4 (19.52)	17.2 (23.32)	19.1 (25.90)	21.1 (28.60)	26.8 (36.35)	24.9 (33.76)	19.1 (25.90)
	SAE Grade 7	17.9 (24.27)	21.4 (29.01)	23.8 (32.27)	26.2 (35.52)	33.4 (45.28)	31.0 (42.03)	23.8 (32.27)
	SAE Grade 8 ASTM A354 Grade BD	20.4 (27.66)	24.4 (33.08)	27.1 (36.74)	29.9 (40.54)	38.0 (51.52)	35.3 (47.86)	27.1 (36.74)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
3/8 - 16	SAE Grade 1 ASTM A307	9.0 (12.20)	10.8 (14.64)	12.0 (16.27)	13.1 (17.76)	16.7 (22.64)	15.5 (21.01)	12.0 (16.27)
	SAE Grade 2	14.9 (20.20)	17.9 (24.27)	19.9 (26.98)	21.9 (29.69)	27.9 (37.83)	25.9 (35.11)	19.9 (26.98)
	SAE Grade 4	17.8 (24.13)	21.3 (28.88)	23.7 (32.13)	26.0 (35.25)	33.1 (44.87)	30.8 (41.76)	23.7 (32.13)
	SAE Grade 5 ASTM A449	23.2 (31.45)	27.8 (37.69)	30.9 (41.89)	34.0 (46.09)	43.3 (58.70)	40.2 (54.50)	30.9 (41.89)
	SAE Grade 7	28.7 (38.91)	34.4 (46.64)	38.2 (51.79)	42.0 (56.94)	53.5 (72.54)	49.7 (67.39)	38.2 (51.79)
	SAE Grade 8 ASTM A354 Grade BD	32.7 (44.33)	39.2 (53.15)	43.6 (59.11)	48.0 (65.08)	61.0 (82.70)	56.7 (76.87)	43.6 (59.11)
	ASTM A354 Grade BC	28.7 (38.91)	34.4 (46.64)	38.2 (51.79)	42.0 (56.94)	53.5 (72.54)	49.7 (67.39)	38.2 (51.79)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	**Loctite 242**	**Loctite 271**	**Loctite 272**	**Loctite 277**	**Bare**
3/8 - 24	SAE Grade 1 ASTM A307	10.2 (13.83)	12.2 (16.54)	13.6 (18.44)	15.0 (20.33)	19.0 (25.76)	17.7 (24.00)	13.6 (18.44)
	SAE Grade 2	16.9 (22.91)	20.3 (27.52)	22.5 (30.52)	24.8 (33.62)	31.5 (42.70)	29.3 (39.73)	22.5 (30.50)
	SAE Grade 4	20.0 (27.11)	24.0 (32.54)	26.7 (36.20)	29.4 (39.86)	37.4 (50.70)	34.7 (47.04)	26.7 (36.20)
	SAE Grade 5 ASTM A449	26.2 (35.52)	31.4 (42.57)	34.9 (47.32)	38.4 (52.06)	48.9 (66.30)	45.4 (61.55)	34.9 (47.32)
	SAE Grade 7	32.3 (43.79)	38.8 (52.60)	43.1 (58.44)	47.4 (64.26)	60.4 (81.89)	56.1 (76.06)	43.1 (58.43)
	SAE Grade 8 ASTM A354 Grade BD	36.9 (50.02)	44.3 (60.06)	49.2 (66.70)	54.1 (73.35)	68.9 (93.41)	64.0 (86.77)	49.2 (66.70)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium-Plated	If instructions call for :					
			Loctite 222 or 262	**Loctite 242**	**Loctite 271**	**Loctite 272**	**Loctite 277**	**Bare**
7/16 - 14	SAE Grade 1 ASTM A307	14.0 (18.98)	17.0 (23.04)	19.14 (25.95)	21.0 (28.47)	27.0 (36.60)	25.0 (33.89)	19.0 (25.76)
	SAE Grade 2	24.0 (32.54)	28.8 (39.05)	32.0 (43.39)	35.2 (47.72)	44.8 (60.74)	41.6 (56.40)	32.0 (43.39)
	SAE Grade 4	28.3 (38.37)	34.0 (46.10)	37.7 (51.11)	41.5 (56.27)	52.8 (71.59)	49.1 (66.57)	37.7 (51.11)
	SAE Grade 5 ASTM A449	37.1 (50.30)	44.5 (60.33)	49.5 (67.11)	54.4 (73.76)	69.3 (93.96)	64.3 (87.18)	49.5 (67.11)
	SAE Grade 7	45.9 (62.23)	55.1 (74.70)	61.3 (83.11)	67.4 (91.38)	85.8 (116.33)	79.6 (107.92)	61.3 (83.11)
	SAE Grade 8 ASTM A354 Grade BD	52.5 (71.18)	63.0 (85.41)	70.0 (94.90)	77.0 (104.40)	98.0 (132.87)	91.0 (123.38)	70.0 (94.90)
	ASTM A354 Grade BC	45.7 (61.96)	54.9 (74.43)	61.0 (82.70)	67.1 (90.97)	85.4 (115.79)	79.3 (107.52)	61.0 (82.70)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
7/16 - 20	SAE Grade 1 ASTM A307	16.0 (21.70)	19.2 (26.03)	21.3 (28.88)	23.5 (31.86)	29.9 (40.54)	27.7 (37.56)	21.3 (28.88)
	SAE Grade 2	26.9 (36.48)	32.2 (43.66)	35.8 (48.54)	39.4 (53.42)	50.1 (67.93)	46.6 (63.18)	35.8 (48.54)
	SAE Grade 4	31.6 (42.84)	37.9 (51.39)	42.1 (57.08)	46.3 (62.77)	59.0 (79.99)	54.7 (74.16)	42.1 (57.08)
	SAE Grade 5 ASTM A449	41.4 (56.13)	49.7 (67.38)	55.2 (74.84)	60.8 (82.43)	77.3 (104.80)	71.8 (97.35)	55.2 (74.84)
	SAE Grade 7	51.3 (69.55)	61.5 (83.38)	68.4 (92.74)	75.2 (101.96)	95.7 (129.75)	88.9 (120.53)	68.4 (92.74)
	SAE Grade 8 ASTM A354 Grade BD	58.2 (78.90)	69.9 (94.77)	77.7 (105.35)	85.4 (115.78)	108.7 (147.37)	101.0 (136.94)	77.7 (105.35)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1/2 - 13	SAE Grade 1 ASTM A307	22.0 (29.83)	26.0 (35.25)	29.38 (39.83)	32.0 (43.39)	41.0 (55.59)	38.0 (51.52)	29.0 (39.32)
	SAE Grade 2	36.6 (49.62)	43.9 (59.52)	48.8 (66.16)	53.6 (72.67)	68.3 (92.60)	63.4 (85.96)	48.8 (66.16)
	SAE Grade 4	43.1 (58.44)	51.8 (70.23)	57.5 (77.96)	63.3 (85.82)	80.5 (109.14)	74.8 (101.42)	57.5 (77.96)
	SAE Grade 5 ASTM A449	56.7 (76.87)	68.1 (92.33)	75.6 (102.5)	83.2 (112.80)	105.9 (143.58)	98.3 (133.27)	75.6 (102.50)
	SAE Grade 7	69.8 (94.64)	83.8 (113.62)	93.1 (126.23)	102.4 (138.84)	130.4 (176.80)	121.1 (164.19)	93.1 (126.23)
	SAE Grade 8 ASTM A354 Grade BD	79.7 (108.05)	95.6 (129.62)	106.3 (144.12)	116.9 (158.50)	148.8 (201.75)	138.1 (187.24)	106.3 (144.12)
	ASTM A354 Grade BC	69.8 (94.64)	83.8 (113.62)	93.1 (126.23)	102.4 (138.84)	130.4 (176.80)	121.1 (164.19)	93.1 (126.23)

All values in foot pounds and (Newton meters)

Nominal bolt size	Standard and Grade Designation	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1/2 - 20	SAE Grade 1 ASTM A307	24.8 (33.62)	29.8 (40.40)	33.1 (44.88)	36.4 (49.35)	46.4 (62.91)	43.1 (58.44)	33.1 (44.88)
	SAE Grade 2	41.3 (56.00)	49.5 (67.11)	55.0 (74.57)	60.5 (82.02)	77.0 (104.40)	71.5 (96.94)	55.0 (74.57)
	SAE Grade 4	48.8 (66.16)	58.5 (79.32)	65.0 (88.13)	71.5 (96.94)	91.0 (123.38)	84.5 (114.57)	65.0 (88.13)
	SAE Grade 5 ASTM A449	63.8 (86.50)	76.5 (103.72)	85.0 (115.24)	93.5 (126.77)	119.0 (161.34)	110.5 (149.82)	85.0 (115.24)
	SAE Grade 7	78.8 (106.84)	94.5 (128.12)	105.0 (142.36)	115.5 (156.60)	147.0 (199.30)	136.5 (185.07)	105.0 (142.36)
	SAE Grade 8 ASTM A354 Grade BD	90.0 (122.02)	108.0 (146.43)	120.0 (162.70)	132.0 (179.00)	168.0 (277.78)	156.0 (211.51)	120.0 (162.70)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
9/16 - 12	SAE Grade 1 ASTM A307	32.0 (43.39)	38.0 (51.52)	42.19 (57.20)	46.0 (62.37)	59.0 (80.00)	55.0 (74.57)	42 (56.94)
	SAE Grade 2	52.7 (71.45)	63.3 (85.82)	70.3 (95.31)	77.3 (104.80)	98.4 (133.41)	91.4 (123.92)	70.3 (95.31)
	SAE Grade 4	62.2 (84.33)	74.7 (101.28)	83.0 (112.53)	91.3 (123.79)	116.2 (157.55)	107.9 (146.30)	83.0 (112.53)
	SAE Grade 5 ASTM A449	81.7 (110.77)	98.1 (133.00)	109.0 (147.78)	119.9 (162.56)	152.6 (206.90)	141.7 (192.17)	109.0 (147.78)
	SAE Grade 7	100.7 (136.53)	120.9 (163.92)	134.3 (182.09)	147.7 (200.25)	188.0 (254.89)	174.6 (236.73)	134.3 (182.09)
	SAE Grade 8 ASTM A354 Grade BD	115.0 (155.92)	138.0 (187.10)	153.3 (207.85)	168.6 (228.59)	214.6 (290.96)	199.3 (270.21)	153.3 (207.85)
	ASTM A354 Grade BC	100.7 (136.53)	120.9 (163.92)	134.3 (182.09)	147.7 (200.25)	188.0 (254.89)	174.6 (236.73)	134.3 (182.09)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
9/16 - 18	SAE Grade 1 ASTM A307	35.3 (47.86)	42.4 (57.49)	47.1 (63.86)	51.8 (70.23)	66.0 (89.48)	61.2 (82.98)	47.1 (63.86)
	SAE Grade 2	59.1 (80.13)	70.9 (96.13)	78.8 (106.84)	86.6 (117.41)	110.3 (149.55)	102.4 (138.84)	78.8 (106.84)
	SAE Grade 4	69.6 (94.36)	83.5 (113.21)	92.8 (125.82)	102.1 (138.43)	129.9 (176.12)	120.7 (163.65)	92.8 (125.85)
	SAE Grade 5 ASTM A449	91.2 (123.65)	109.5 (148.46)	121.6 (164.87)	133.8 (181.40)	170.3 (230.90)	158.1 (214.36)	121.6 (164.87)
	SAE Grade 7	112.3 (152.26)	134.8 (182.76)	149.8 (203.10)	164.7 (223.30)	209.7 (284.32)	194.7 (263.98)	149.8 (203.10)
	SAE Grade 8 ASTM A354 Grade BD	128.7 (174.61)	154.4 (209.34)	171.6 (232.66)	188.7 (255.84)	240.2 (325.67)	223.0 (302.35)	171.6 (232.66)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
5/8 - 11	SAE Grade 1 ASTM A307	44 (59.66)	52 (70.50)	58.2 (78.90)	64 (86.77)	81 (109.82)	76 (103.04)	58 (78.64)
	SAE Grade 2	72.7 (98.57)	87.2 (118.23)	96.9 (131.38)	106.6 (144.53)	135.6 (183.85)	125.9 (170.70)	96.9 (131.38)
	SAE Grade 4	86.1 (116.74)	103.4 (140.19)	114.8 (155.65)	126.3 (171.24)	160.8 (218.02)	149.3 (202.42)	114.8 (155.65)
	SAE Grade 5 ASTM A449	112.5 (152.53)	135.0 (183.04)	150.0 (203.37)	165.0 (223.71)	210.0 (284.72)	195.0 (264.38)	150.0 (203.37)
	SAE Grade 7	138.9 (188.32)	166.6 (225.88)	185.2 (251.10)	203.7 (276.18)	259.2 (351.43)	240.7 (326.35)	185.2 (251.10)
	SAE Grade 8 ASTM A354 Grade BD	158.8 (215.30)	190.5 (258.28)	211.7 (287.03)	232.9 (315.77)	296.4 (401.86)	275.2 (373.12)	211.7 (287.03)
	ASTM A354 Grade BC	139.2 (188.73)	167.0 (226.42)	185.5 (251.50)	204.1 (276.72)	259.8 (352.24)	241.2 (327.02)	185.5 (251.50)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
5/8 - 18	SAE Grade 1 ASTM A307	49.5 (67.11)	59.4 (80.54)	66.0 (89.48)	72.6 (98.43)	92.4 (125.27)	85.8 (116.33)	66.0 (89.48)
	SAE Grade 2	82.6 (112.00)	99.1 (134.36)	110.2 (149.41)	121.2 (164.33)	154.2 (209.07)	143.2 (194.15)	110.2 (149.41)
	SAE Grade 4	97.3 (131.92)	116.7 (158.22)	129.7 (175.85)	142.7 (193.48)	181.6 (246.22)	168.6 (228.59)	129.7 (175.85)
	SAE Grade 5 ASTM A449	127.7 (173.14)	153.3 (207.85)	170.3 (230.90)	187.3 (253.95)	238.4 (323.23)	221.4 (300.18)	170.3 (230.90)
	SAE Grade 7	157.6 (213.68)	189.1 (256.39)	210.2 (285.00)	231.2 (313.47)	294.2 (398.88)	273.2 (370.41)	210.2 (285.00)
	SAE Grade 8 ASTM A354 Grade BD	179.9 (243.91)	215.9 (292.72)	239.8 (325.13)	263.8 (357.66)	335.8 (455.28)	311.8 (422.74)	239.8 (325.13)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
3/4 - 10	SAE Grade 1 ASTM A307	77 (104.40)	93 (126.09)	103.1 (139.78)	113 (153.20)	144 (195.24)	134 (181.68)	103 (139.65)
	SAE Grade 2	129.4 (175.44)	155.3 (210.55)	172.5 (233.88)	189.8 (257.33)	241.5 (327.43)	224.3 (304.11)	172.5 (233.88)
	SAE Grade 4	152.6 (206.90)	183.1 (248.25)	203.4 (275.77)	223.8 (303.43)	284.8 (386.14)	264.5 (358.61)	203.4 (275.77)
	SAE Grade 5 ASTM A449	199.7 (270.76)	239.6 (324.85)	266.3 (361.05)	292.9 (397.12)	372.8 (505.45)	346.1 (469.25)	266.3 (361.05)
	SAE Grade 7	246.8 (334.62)	296.2 (401.60)	329.1 (446.20)	362.0 (355.22)	460.7 (624.63)	427.8 (580.02)	329.1 (446.20)
	SAE Grade 8 ASTM A354 Grade BD	282.0 (382.34)	338.3 (458.67)	375.9 (509.65)	413.5 (560.63)	526.3 (713.57)	488.7 (662.59)	375.9 (509.65)
	ASTM A354 Grade BC	246.4 (334.07)	295.7 (400.92)	328.6 (445.53)	361.5 (490.13)	460.0 (623.67)	427.2 (579.20)	328.6 (445.53)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
3/4 - 16	SAE Grade 1 ASTM A307	86.5 (117.28)	103.8 (140.73)	115.3 (156.33)	126.8 (171.92)	161.4 (218.83)	149.9 (203.24)	115.3 (156.33)
	SAE Grade 2	144.1 (195.37)	173.0 (234.56)	192.2 (260.59)	211.4 (286.62)	269.1 (364.85)	249.8 (338.68)	192.2 (260.59)
	SAE Grade 4	170.2 (230.76)	204.2 (276.86)	226.9 (307.64)	249.6 (338.41)	317.6 (430.61)	294.9 (399.15)	226.9 (307.64)
	SAE Grade 5 ASTM A449	222.9 (302.21)	267.5 (362.68)	297.2 (402.95)	326.9 (443.22)	416.1 (564.16)	386.3 (523.75)	297.2 (402.95)
	SAE Grade 7	275.6 (373.66)	330.8 (448.50)	367.5 (498.26)	404.3 (548.16)	514.5 (697.57)	477.8 (647.81)	367.5 (498.26)
	SAE Grade 8 ASTM A354 Grade BD	315.0 (427.08)	378.0 (512.50)	420.0 (569.44)	462.0 (626.39)	588.0 (797.22)	546.0 (740.28)	420.0 (569.44)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
7/8 - 9	SAE Grade 1 ASTM A307	124.7 (169.07)	149.6 (202.83)	166.3 (225.47)	182.9 (247.98)	232.8 (315.63)	216.1 (293.0)	166.3 (225.47)
	SAE Grade 2	124.7 (169.07)	149.6 (202.83)	166.3 (225.47)	182.9 (247.98)	232.8 (315.63)	216.1 (293.00)	166.3 (255.47)
	SAE Grade 4	246.1 (333.67)	295.3 (400.37)	328.1 (444.84)	360.9 (489.32)	459.4 (622.86)	426.6 (578.40)	328.1 (444.84)
	SAE Grade 5 ASTM A449	322.4 (437.11)	386.9 (524.57)	429.8 (582.73)	472.8 (641.03)	601.8 (815.93)	558.8 (757.63)	429.8 (582.73)
	SAE Grade 7	397.9 (539.48)	477.4 (647.27)	530.5 (719.26)	583.5 (791.12)	742.7 (1007.00)	689.6 (935.00)	530.5 (719.26)
	SAE Grade 8 ASTM A354 Grade BD	454.5 (616.22)	545.3 (739.33)	605.9 (821.49)	666.5 (903.65)	848.3 (1150.14)	787.7 (1067.98)	605.9 (821.49)
	ASTM A354 Grade BC	397.9 (539.48)	477.4 (647.27)	530.5 (719.26)	583.5 (791.12)	742.7 (1007.00)	689.6 (935.00)	530.5 (719.26)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
7/8 - 14	SAE Grade 1 ASTM A307	137.8 (186.83)	165.4 (224.25)	183.8 (249.20)	202.1 (274.01)	257.3 (348.85)	238.9 (323.90)	183.8 (249.20)
	SAE Grade 2	137.8 (186.83)	165.4 (224.25)	183.8 (249.20)	202.1 (274.01)	257.3 (348.85)	238.9 (323.90)	183.8 (249.20)
	SAE Grade 4	271.5 (368.11)	325.8 (441.73)	362.0 (490.80)	398.2 (539.89)	506.8 (687.13)	470.6 (638.05)	362.0 (490.80)
	SAE Grade 5 ASTM A449	355.2 (481.59)	426.2 (577.85)	473.6 (642.12)	521.0 (706.38)	663.0 (898.91)	615.7 (834.78)	473.6 (642.12)
	SAE Grade 7	438.0 (593.85)	525.7 (712.75)	584.1 (791.93)	642.5 (871.11)	817.7 (1108.65)	759.3 (1029.47)	584.1 (791.93)
	SAE Grade 8 ASTM A354 Grade BD	501.2 (679.54)	601.5 (815.53)	668.3 (906.09)	735.1 (996.66)	935.6 (1268.50)	868.8 (1177.94)	668.3 (906.09)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for:					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1 - 8	SAE Grade 1 ASTM A307	187.5 (254.22)	225.0 (305.06)	250.0 (338.95)	275.0 (372.85)	350.0 (474.54)	325.0 (440.64)	250.0 (338.95)
	SAE Grade 2	187.5 (254.22)	225.0 (305.06)	250.0 (338.95)	275.0 (372.85)	350.0 (474.54)	325.0 (440.64)	250.0 (338.95)
	SAE Grade 4	369.4 (500.84)	443.3 (601.03)	492.5 (667.74)	541.8 (734.58)	689.5 (934.84)	640.3 (868.13)	492.5 (667.74)
	SAE Grade 5 ASTM A449	482.8 (654.59)	579.4 (785.56)	643.8 (872.88)	708.1 (960.05)	901.3 (1222.00)	836.9 (1134.69)	643.8 (872.88)
	SAE Grade 7	596.3 (808.47)	715.5 (970.09)	795.0 (1077.88)	874.5 (1185.66)	1113.0 (1509.03)	1033.5 (1401.24)	795.0 (1077.88)
	SAE Grade 8 ASTM A354 Grade BD	681.6 (924.13)	817.9 (1108.92)	908.8 (1232.17)	999.6 (1355.28)	1272.3 (1725.00)	1181.4 (1601.77)	908.8 (1232.17)
	ASTM A354 Grade BC	596.7 (809.01)	716.1 (970.90)	795.6 (1078.69)	875.2 (1186.61)	1113.9 (1510.25)	1034.3 (1402.32)	795.6 (1078.69)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1 - 12	SAE Grade 1 ASTM A307	205.3 278.35	246.4 (334.07)	273.8 (371.22)	301.1 (408.24)	383.3 (519.69)	355.9 (482.54)	273.8 (371.22)
	SAE Grade 2	205.3 (278.35)	246.4 (334.07)	273.8 (371.22)	301.1 (408.24)	383.3 (519.69)	355.9 (482.54)	273.8 (371.22)
	SAE Grade 4	404.1 (547.88)	484.9 (657.44)	538.8 (730.52)	592.6 (803.46)	754.3 (1022.70)	700.4 (949.62)	538.8 (730.52)
	SAE Grade 5 ASTM A449	528.8 (716.96)	634.5 (860.27)	705.0 (955.85)	775.5 (1051.44)	987.0 (1338.19)	916.5 (1242.61)	705.0 (955.85)
	SAE Grade 7	652.5 (884.67)	783.0 (1061.60)	870.0 (1179.56)	957.0 (1297.52)	1218.0 (1651.39)	1131.0 (1533.42)	870.0 (1179.56)
	SAE Grade 8 ASTM A354 Grade BD	746.3 (1011.85)	895.5 (1214.14)	995.0 (1349.04)	1094.5 (1483.49)	1393.0 (1888.66)	1293.5 (1753.73)	995.0 (1349.04)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1 - 14	SAE Grade 1 ASTM A307	210.0 (284.72)	252.0 (341.66)	280.0 (379.63)	308.0 (417.60)	392.0 (531.48)	364.0 (493.52)	280.0 (379.63)
	SAE Grade 2	210.0 (284.72)	252.0 (341.66)	280.0 (379.63)	308.0 (417.60)	392.0 (531.48)	364.0 (493.52)	280.0 (379.63)
	SAE Grade 4	413.4 (560.50)	496.1 (672.62)	551.3 (747.46)	606.4 (822.17)	771.8 (1046.42)	716.6 (971.58)	551.3 (747.46)
	SAE Grade 5 ASTM A449	540.9 (733.36)	649.1 (880.06)	721.3 (977.95)	793.4 (1075.70)	1009.8 (1369.10)	937.6 (1271.22)	721.3 (977.95)
	SAE Grade 7	668.4 (906.23)	802.1 (1087.50)	891.3 (1208.44)	980.4 (1329.25)	1247.8 (1691.79)	1158.6 (1570.85)	891.3 (1208.44)
	SAE Grade 8 ASTM A354 Grade BD	764.1 (1035.98)	916.9 (1243.15)	1018.8 (1381.31)	1120.6 (1519.33)	1426.3 (1933.80)	1324.4 (1795.65)	1018.8 (1381.30)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-1/8 • 7	SAE Grade 1 ASTM A307	265.8 (360.37)	318.9 (432.37)	354.4 (480.50)	389.8 (528.50)	496.1 (672.62)	460.7 (624.63)	354.4 (480.50)
	SAE Grade 2	265.8 (360.37)	318.9 (432.37)	354.4 (480.50)	389.8 (528.50)	496.1 (672.62)	460.7 (624.63)	354.4 (480.50)
	SAE Grade 4	523.1 (709.23)	627.8 (851.18)	697.5 (945.68)	767.3 (1040.32)	976.5 (1323.96)	906.8 (1229.46)	697.5 (945.68)
	SAE Grade 5 ASTM A449	595.9 (807.93)	715.1 (969.55)	794.5 (1077.20)	874.0 (1184.99)	1112.3 (1508.07)	1032.9 (1400.43)	794.5 (1077.20)
	SAE Grade 7	844.8 (1145.40)	1013.8 (1374.53)	1126.4 (1527.20)	1239.0 (1679.86)	1577.0 (2138.13)	1464.3 (1985.33)	1126.4 (1527.20)
	SAE Grade 8 ASTM A354 Grade BD	966.1 (1309.86)	1159.3 (1571.80)	1288.1 (1746.43)	1416.9 (1921.06)	1803.4 (2445.08)	1674.6 (2270.46)	1288.1 (1746.43)
	ASTM A354 Grade BC	844.8 (1145.40)	1013.8 (1374.53)	1126.4 (1527.20)	1239.0 (1679.86)	1577.0 (2138.13)	1464.3 (1985.33)	1126.4 (1527.20)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-1/8 • 12	SAE Grade 1 ASTM A307	297.4 (403.22)	356.9 (483.89)	396.6 (537.72)	436.2 (591.40)	555.2 (752.75)	515.5 (698.93)	396.6 (537.72)
	SAE Grade 2	297.4 (403.22)	356.9 (483.89)	396.6 (537.72)	436.2 (591.40)	555.2 (752.75)	515.5 (698.93)	396.6 (537.72)
	SAE Grade 4	586.4 (795.05)	703.7 (954.09)	781.9 (1060.12)	860.1 (1166.14)	1094.6 (1484.08)	1016.4 (1378.06)	781.9 (1060.12)
	SAE Grade 5 ASTM A449	667.6 (905.14)	801.1 (1086.15)	890.2 (1206.95)	979.2 (1327.62)	1246.2 (1689.62)	1157.2 (1568.95)	890.2 (1206.95)
	SAE Grade 7	948.2 (1285.58)	1137.8 (1542.65)	1264.2 (1714.02)	1390.6 (1855.40)	1769.9 (2399.66)	1643.5 (2228.30)	1264.2 (1714.02)
	SAE Grade 8 ASTM A354 Grade BD	1083.2 (1468.62)	1299.8 (1762.30)	1444.2 (1958.07)	1588.6 (2153.85)	2021.9 (2741.33)	1877.5 (2545.55)	1444.2 (1958.07)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-1/4 • 7	SAE Grade 1 ASTM A307	375.0 (508.43)	450.0 (610.11)	500.0 (677.91)	550.0 (745.70)	700.0 (949.07)	650.0 (881.28)	500.0 (677.91)
	SAE Grade 2	375.0 (508.43)	450.0 (610.11)	500.0 (677.91)	550.0 (745.70)	700.0 (949.07)	650.0 (881.28)	500.0 (677.91)
	SAE Grade 4	738.3 (1001.00)	885.9 (1201.12)	984.4 (1334.67)	1082.8 (1468.08)	1378.1 (1868.45)	1279.7 (1735.04)	984.4 (1334.67)
	SAE Grade 5 ASTM A449	840.2 (1139.16)	1008.3 (1367.07)	1120.3 (1518.93)	1232.3 (1670.78)	1568.4 (2126.47)	1456.4 (1974.62)	1120.3 (1518.93)
	SAE Grade 7	1191.8 (1615.87)	1430.2 (1939.09)	1589.1 (2154.53)	1748.0 (2369.97)	2224.7 (3016.30)	2065.8 (2800.85)	1589.1 (2154.53)
	SAE Grade 8 ASTM A354 Grade BD	1362.9 (1847.85)	1635.5 (2217.44)	1817.2 (2463.80)	1998.9 (2710.15)	2544.1 (3449.34)	2362.3 (3202.85)	1817.2 (2463.80)
	ASTM A354 Grade BC	1192.4 (1616.68)	1430.9 (1940.04)	1589.8 (2155.48)	1748.8 (2371.05)	2225.8 (3017.78)	2066.8 (2802.20)	1589.8 (2155.48)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-1/4 • 12	SAE Grade 1 ASTM A307	414.8 (562.40)	497.8 (674.93)	553.1 (749.90)	608.4 (824.88)	774.4 (1049.95)	719.1 (974.97)	553.1 (749.90)
	SAE Grade 2	414.8 (562.40)	497.8 (674.93)	553.1 (749.90)	608.4 (824.88)	774.4 (1049.95)	719.1 (974.97)	553.1 (749.90)
	SAE Grade 4	816.8 (1107.43)	980.2 (1328.97)	1089.1 (1476.62)	1198.0 (1624.27)	1524.7 (2067.22)	1415.8 (1919.57)	1089.1 (1476.62)
	SAE Grade 5 ASTM A449	930.5 (1261.60)	1116.6 (1513.90)	1240.6 (1682.03)	1364.7 (1850.29)	1736.9 (2354.92)	1612.8 (2186.66)	1240.6 (1682.03)
	SAE Grade 7	1320.7 (1790.63)	1584.8 (2148.70)	1760.9 (2387.46)	1937.0 (2626.22)	2465.3 (3342.50)	2289.2 (3103.74)	1760.9 (2387.46)
	SAE Grade 8 ASTM A354 Grade BD	1509.4 (2046.47)	1811.3 (2455.80)	2012.5 (2728.59)	2213.8 (3001.51)	2817.5 (3820.02)	2616.3 (3547.23)	2012.5 (2728.58)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-3/8 • 6	SAE Grade 1 ASTM A307	491.1 (665.84)	589.4 (799.12)	654.8 (887.79)	720.3 (976.60)	916.8 (1243.00)	851.3 (1154.21)	654.8 (887.80)
	SAE Grade 2	491.1 (665.84)	589.4 (799.12)	654.8 (887.79)	720.3 (976.60)	916.8 (1243.00)	851.3 (1154.21)	654.8 (887.80)
	SAE Grade 4	968.1 (1312.57)	1161.7 (1575.06)	1290.8 (1750.10)	1419.9 (1925.13)	1807.1 (2450.10)	1678.0 (2275.07)	1290.8 (1750.09)
	SAE Grade 5 ASTM A449	1102.1 (1494.25)	1322.6 (1793.20)	1469.5 (1992.38)	1616.5 (2191.68)	2057.3 (2789.33)	1910.4 (2590.16)	1469.5 (1992.38)
	SAE Grade 7	1563.6 (2119.96)	1876.4 (2544.06)	2084.8 (2826.61)	2293.3 (3109.30)	2918.8 (3957.37)	2710.3 (3674.68)	2084.8 (2826.61)
	SAE Grade 8 ASTM A354 Grade BD	1786.6 (2422.30)	2144.0 (2906.88)	2382.2 (3229.83)	2620.4 (3552.79)	3335.1 (4521.80)	3096.8 (4198.70)	2382.2 (3229.83)
	ASTM A354 Grade BC	1563.6 (2119.96)	1876.4 (2544.06)	2084.8 (2826.61)	2293.3 (3109.30)	2918.8 (3957.37)	2710.3 (3674.68)	2084.8 (2826.61)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-3/8 • 12	SAE Grade 1 ASTM A307	559.5 (758.58)	671.3 (910.16)	745.9 (1011.30)	820.5 (1112.45)	1044.3 (1415.88)	969.7 (1314.74)	745.9 (1011.30)
	SAE Grade 2	559.5 (758.58)	671.3 (910.16)	745.9 (1011.30)	820.5 (1112.45)	1044.3 (1415.88)	969.7 (1314.74)	745.9 (1011.30)
	SAE Grade 4	1102.1 (1494.25)	1322.6 (1793.21)	1469.5 (1992.38)	1616.5 (2191.68)	2057.3 (2789.33)	1910.4 (2590.16)	1469.5 (1992.38)
	SAE Grade 5 ASTM A449	1254.3 (1700.60)	1505.1 (2040.64)	1672.3 (2267.34)	1839.6 (2494.16)	2341.3 (3174.38)	2174.0 (2947.55)	1672.3 (2267.34)
	SAE Grade 7	1780.2 (2413.63)	2136.2 (2896.30)	2373.6 (3218.17)	2611.0 (3540.04)	3323.0 (4505.39)	3085.7 (4183.65)	2373.6 (3218.17)
	SAE Grade 8 ASTM A354 Grade BD	2034.1 (2757.87)	2441.0 (3309.56)	2712.2 (3677.25)	2983.4 (4044.95)	3797.1 (5148.18)	3525.8 (4780.35)	2712.2 (3677.25)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-1/2 • 6	SAE Grade 1 ASTM A307	652.5 (884.67)	783.0 (1061.60)	870.0 (1179.56)	957.0 (1297.52)	1218.0 (1651.39)	1131.0 (1533.43)	870.0 (1179.56)
	SAE Grade 2	652.5 (884.67)	783.0 (1061.60)	870.0 (1179.56)	957.0 (1297.52)	1218.0 (1651.39)	1131.0 (1533.43)	870.0 (1179.56)
	SAE Grade 4	1283.9 (1740.74)	1540.7 (2088.91)	1711.9 (2321.03)	1883.1 (2553.14)	2396.6 (3249.36)	2225.4 (3017.24)	1711.9 (2321.03)
	SAE Grade 5 ASTM A449	1462.5 (1982.88)	1755.0 (2379.46)	1950.0 (2643.85)	2145.0 (2908.23)	2730.0 (3701.39)	2535.0 (3437.00)	1950.0 (2643.85)
	SAE Grade 7	2074.2 (2812.24)	2489.1 (3374.77)	2765.6 (3749.66)	3042.2 (4124.67)	3871.9 (5249.60)	3595.3 (4874.58)	2765.6 (3749.66)
	SAE Grade 8 ASTM A354 Grade BD	2370.9 (3214.51)	2845.1 (3857.44)	3161.3 (4286.15)	3477.4 (4714.73)	4425.8 (6000.58)	4109.6 (5571.88)	3161.3 (4286.15)
	ASTM A354 Grade BC	2074.9 (2813.20)	2489.9 (3375.85)	2766.6 (3751.01)	3043.2 (4126.03)	3873.2 (5251.36)	3596.5 (4876.20)	2766.6 (3751.01)

All values in foot pounds and (Newton meters)

Nominal bolt size	Grade Designation and Standard	Zinc or Cadmium Plated	If instructions call for :					
			Loctite 222 or 262	Loctite 242	Loctite 271	Loctite 272	Loctite 277	Bare
1-1/2 • 12	SAE Grade 1 ASTM A307	734.1 (995.30)	880.9 (1194.34)	978.8 (1327.07)	1076.6 (1459.67)	1370.3 (1857.88)	1272.4 (1725.14)	978.8 (1327.07)
	SAE Grade 2	734.1 (995.30)	880.9 (1194.34)	978.8 (1327.07)	1076.6 (1459.67)	1370.3 (1857.88)	1272.4 (1725.14)	978.8 (1327.07)
	SAE Grade 4	1445.6 (1959.97)	1734.8 (2352.07)	1927.5 (2613.34)	2120.3 (2874.33)	2698.5 (3658.68)	2505.8 (3397.41)	1927.5 (2613.34)
	SAE Grade 5 ASTM A449	1645.3 (2230.73)	1974.4 (2676.93)	2193.8 (2974.40)	2413.1 (3271.73)	3071.3 (4164.13)	2851.9 (3866.66)	2193.8 (2974.40)
	SAE Grade 7	2334.4 (3165.02)	2801.3 (3798.06)	3112.5 (4219.99)	3423.8 (4642.05)	4357.5 (5907.98)	4046.3 (5486.05)	3112.5 (4219.99)
	SAE Grade 8 ASTM A354 Grade BD	2667.7 (3616.92)	3201.2 (4340.25)	3556.9 (4822.51)	3912.6 (5304.78)	4979.6 (6751.44)	4623.9 (6269.17)	3556.9 (4822.51)
	ASTM A354 Grade BC	—	—	—	—	—	—	—

Other Fastener Torque Specifications

All values in foot-pounds and (Newton-meters)

Nominal bolt size	18 - 8 Stainless Steel	316 Stainless Steel	Brass	Aluminum 2024 - T4
1/4 - 20	6.3 (8.54)	6.6 (8.95)	5.1 (6.91)	3.8 (5.15)
1/4 - 28	7.8 (10.57)	8.3 (11.25)	6.4 (8.67)	4.8 (6.50)
5/16 - 18	11.0 (14.90)	11.5 (15.60)	8.9 (12.06)	6.7 (9.08)
5/16 - 24	11.8 (16.00)	12.3 (16.67)	9.7 (13.15)	7.2 (9.76)
3/8 - 16	19.7 (26.71)	20.6 (27.93)	16.0 (21.70)	11.9 (16.13)
3/8 - 24	21.6 (29.28)	22.6 (30.64)	17.7 (24.00)	13.1 (17.76)
7/16 - 14	31.3 (42.44)	32.8 (44.47)	26.4 (35.80)	19.0 (25.76)
7/16 - 20	33.3 (45.15)	34.8 (47.18)	27.3 (37.00)	20.2 (27.38)
1/2 - 13	43.1 (58.43)	45.2 (61.28)	35.2 (47.72)	26.1 (35.38)
1/2 - 20	45.1 (61.14)	47.1 (63.86)	36.9 (50.00)	27.3 (37.00)
9/16 - 12	56.8 (77.00)	59.4 (80.53)	46.5 (63.04)	34.4 (46.64)
9/16 - 18	62.7 (85.00)	65.6 (88.94)	51.3 (69.55)	38.0 (51.52)
5/8 - 11	92.5 (125.41)	96.7 (131.10)	75.6 (102.50)	59.6 (80.80)
5/8 - 18	103.7 (140.60)	108.4 (146.97)	84.7 (114.84)	66.5 (90.16)
3/4 - 10	127.5 (172.86)	131.8 (178.70)	104.1 (141.14)	81.7 (110.77)
3/4 - 16	124.2 (168.39)	129.8 (175.98)	101.7 (137.88)	79.8 (108.19)

Other Fastener Torque Specifications

All values in foot-pounds and (Newton-meters)

Nominal bolt size	18 - 8 Stainless Steel	316 Stainless Steel	Brass	Aluminum 2024 - T4
7/8 - 9	194.0 (263.03)	202.5 (274.55)	158.8 (215.30)	124.6 (168.93)
7/8 - 14	193.2 (261.94)	201.7 (273.47)	157.9 (214.08)	124.2 (168.40)
1 - 8	286.7 (388.71)	299.6 (406.20)	234.6 (318.07)	183.8 (249.20)
1 - 14	259.2 (351.43)	270.8 (367.16)	212.1 (287.57)	166.3 (225.47)
1-1/8 • 7	413.0 (559.95)	432.0 (585.71)	337.0 (456.91)	265.0 (359.29)
1-1/8 • 12	390.0 (528.77)	408.0 (553.17)	318.0 (431.15)	251.0 (340.31)
1-1/4 • 7	523.0 (709.09)	546.0 (740.28)	428.0 (580.30)	336.0 (455.55)
1-1/4 • 12	480.0 (650.80)	504.0 (683.33)	394.0 (534.19)	308.0 (417.60)
1-1/2 • 6	888.0 (1203.97)	930.0 (1260.91)	727.0 (985.68)	570.0 (772.82)
1-1/2 • 12	703.0 (953.14)	732.0 (992.46)	575.0 (779.60)	450.0 (610.12)

Section 2

Structural & Drive Components

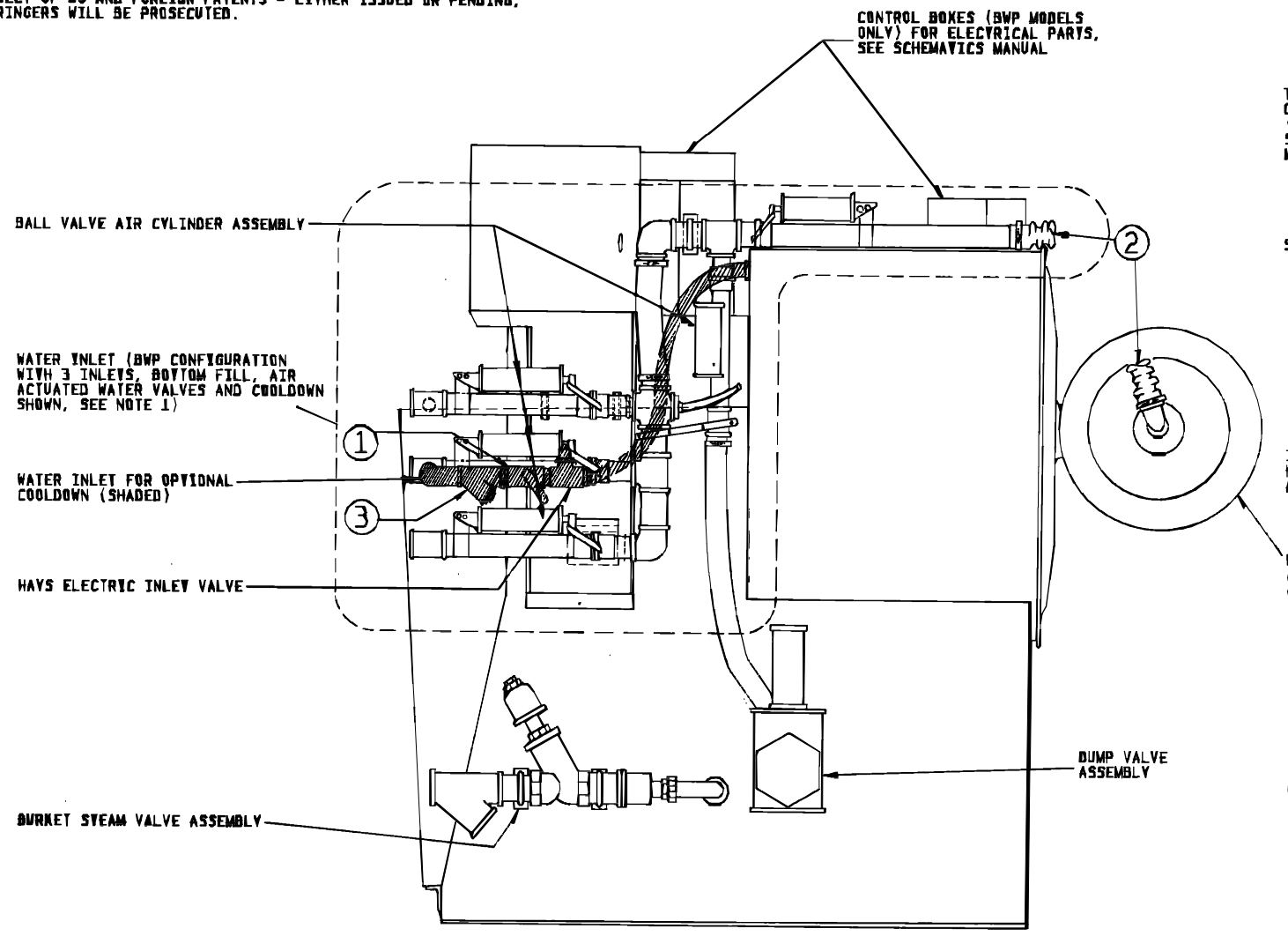
GENERAL ASSEMBLY - 30016 AND 36021 BWE AND BWP

BMP880026
92022D

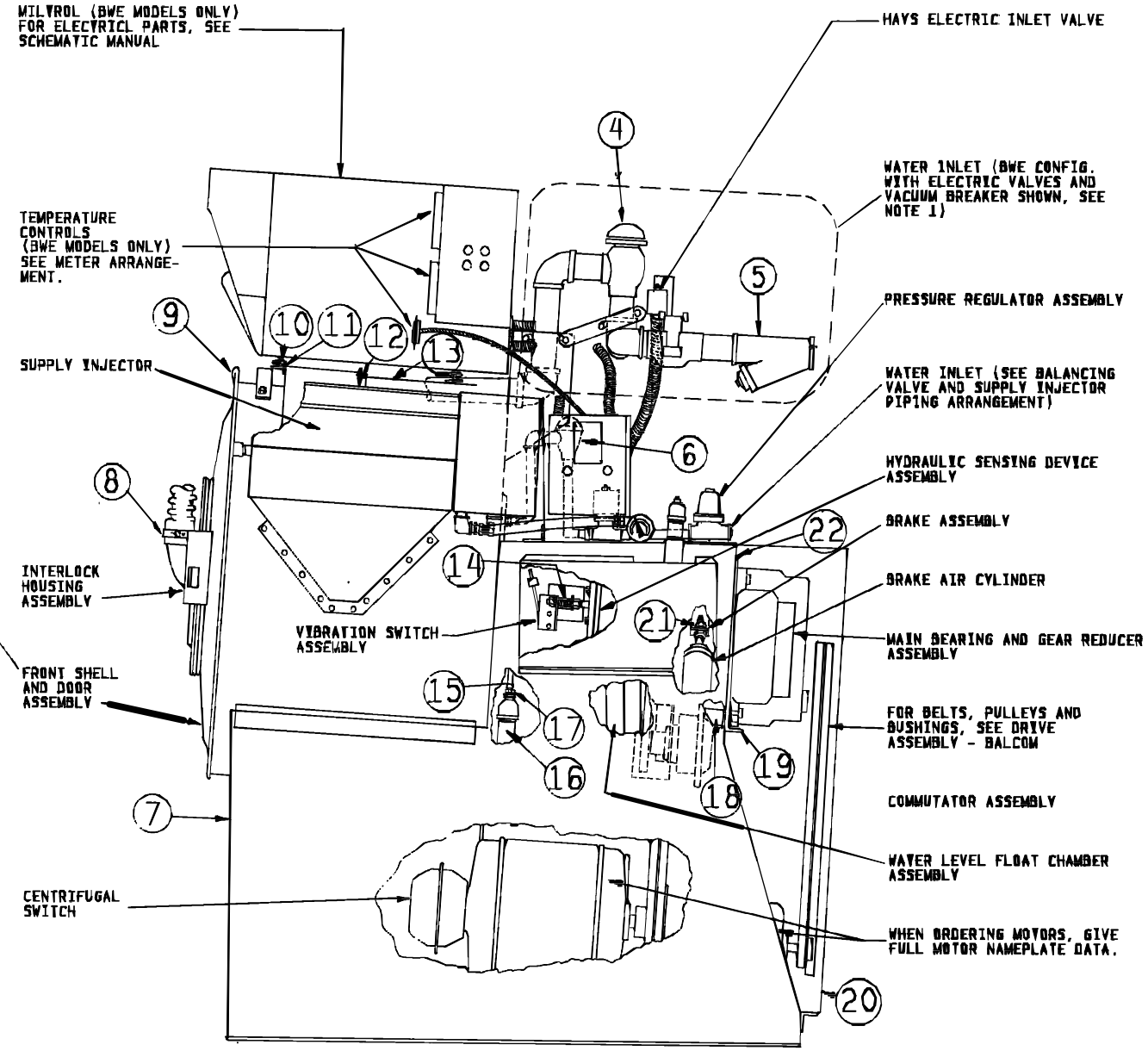
NOTE 1. WATER INLET CONFIGURATION WILL VARY WITH MACHINE MODEL, (BWE OR BWP), TYPE OF VALVE ACTUATORS (ELECTRIC OR AIR), NUMBER OF INLETS (COLD, HOT, 3RD) AND SELECTION OF OTHER OPTIONS SUCH AS VACUUM BREAKERS AND BOTTOM FILL. COMMON PIPE COMPONENTS ARE AVAILABLE LOCALLY AND MAY NOT BE SHOWN HERE. PART NUMBERS FOR SPECIALTY ITEMS SUCH AS VALVE ACTUAORS, VACUUM BREAKERS, ETC., SHOWN ON THE EXAMPLES HEREIN, APPLY TO ANY INLET CONFIGURATION WHERE THESE TYPES OF COMPONENTS ARE USED.

NOTE 2. FOR DETAILED PARTS INFORMATION ON ASSEMBLIES CALLED OUT ON THIS DRAWING, SEE SEPARATE DRAWING OF THAT NAME ELSEWHERE.

NOTE 3. CERTAIN FEATURES DISCUSSED ON THIS DRAWING ARE THE SUBJECT OF US AND FOREIGN PATENTS - EITHER ISSUED OR PENDING. INFRINGERS WILL BE PROSECUTED.



LEFT SIDE VIEW (BWP SHOWN)



RIGHT SIDE VIEW (BWE SHOWN)

Litho in U.S.A.

General Assembly

BWE/BWP

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

Litho in U.S.A.

Parts List—General 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----------	
			none	
			----------COMPONENTS----------	
all	1	96D050A	01Z 3/4"BALLVALVE BRZ WATTS#B6100	
all	2	PK10 0012	05K KIT FILL HOSE = WE35 + WE60	
all	3	51T030	01Z Y-STRAINER 3/4" CAST IRON	
all	4	SA 03 009	78272J 1.5"SIPHONBRKR+SCUPPER ASSY	
all	5	51T060	01Z Y-STRAINER 1+1/4" CAST IRON	
all	6	96M020	3/8" VACBREAK	
all	7	02 10185	90102B PLATE-BASE FRONT	
all	7	02 14095	84432C PLATE=BASE FRONT	
all	8	27A074	HOSECLAMP 2+1/16-3"CADSCR+1/25 BAND	
all	9	02 02181	85332B GUARD=SHELL MOUNT RING CLIP	
all	10	02 02739	SOAPCHUTECOVER-NO HINGE	
all	11	60C001	RUBBER BUMPER BLK W/WASHER ONLY#698	
all	12	02 02706	87456A HINGE=SOAP CHUTE	
all	13	02 10532	82041C MILTMOUNT=23F-3016WE BND@PRT	
all	13	02 10523	89031C MILTMOUNT 36BWET BEND @PRINT	
all	14	SA 10 055	87151D*COVER ASSY: SENSING DEVICE	
all	15	60E005	TUBING 5/16"OD POLY-FLOW#55P-FOOT	
all	16	AD 14 026	78432R AIRCHAMBER=PRESSWITCH=BALCOM	
all	17	53A047H	MALECONN.5/16X18 POLYFLO-PH#68P-5-2	
all	18	02 10158	68205A PIVOTPIN=BRAKEARM (1/BALCOM)	
all	19	02 10176P	77497B ANGL=LO RDUCER 22.25LG BD@PT	
all	19	02 14094M	87482# ANGL=LO RDUCER 25.25 LGBD@PT	
all	20	SA 10 054	70330C BELTGUARD ASSY	
all	20	SA 14 040	72177C BELT GUARD ASSY. 3621WE	
all	21	AD 10 007N	84522A*BRAKEBAND(NON-ASB)3016BWE	
all	21	SA 14 044B	83102B*BRKSH.ASY(NON-ASB)36,42Q+D+H	
all	22	02 10447	87516C MOUNT=SENSDEVSWITCH CADPLATE	
all	22	02 14349	82127C PLATE=UPPER REDUCER MTG	

FRONT SHELL & DOOR ASSEMBLY

BMP760068
86112B

Shell and Door Assembly

BWE

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

Litho in U.S.A.

Parts List—Shell and 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----------	
			none	
			----------COMPONENTS----------	
all	1	X2 14195A	89506D SHELLFRONT ALL 36" W/ILOCK	(3621 BWE)
all	1	X2 02361B	92567D SHELLFRONT,30",ELECTRIC LOCK	(3016 BWE)
all	2	X2 09220C	94131D SHELL DOOR DRWN-QWE ILOC	(3621 BWE)
all	2	X2 02814C	94267D DOOR=SHELL W/1LOK-3020	(3016 BWE)
all	3	02 02815	71108A PLAIN BRG=DOOR HINGE-NYLON	
all	4	15Q077	SOKSETSCR 1/4-20X1/4 ZINC ALLENONLY	
all	5	02 02817	71108A FLANGE BRG=DOOR HINGE-NYLON	
all	6	02 12144	92391A PIN-HINGE=20+18" DOORS	(3621 BWE)
all	6	02 02764	77482A HINGEPIN=SHELLDOOR L=10+5/8"	(3016 BWE)
all	8	02 09224	91392B DOUBLER=LOWER S/S DOOR HINGE	(3621 BWE ONLY)
all	9	02 09223	91392B DOUBLER=UPPER S/S DOOR HINGE	(3621 BWE ONLY)
all	10	15U245A	01Z FLAWASH 25/64IDX1.25ODX3/32 S/S	(3621 BWE ONLY)
all	11	15G200	01Z HXCPNUT 3/8-16 UNC2A 5/8X1/2	(3621 BWE ONLY)
all	12	02 09221	86302C HINGE=SHELL DOOR 18" DRAWN S	(3621 BWE)
all	13	02 09221G	93362C SPACER GASKET=HINGE	(3621 BWE)
all	14	15G200	01Z HXCPNUT 3/8-16 UNC2A 5/8X1/2	
all	15	15U260	LOCKWASHER MEDIUM 3/8 SS18-8	
all	16	02 02293	93402A DOOR HANDLE NUT GASKET	
all	17	15U245	01Z FLTWASH 3/8 STD COMM 18-8 SS	
all	19	15K086	HXCAPSCR 3/8-16NCX3/4 SS18-8	
all	20	24G030N	ROLLED WASHER .379"ID NYLTITE #37W	
all	21	60C080	RECESS BUMPER RUBBERLAVELLE #718-R	
all	22	15N097	RDMACSCR 8-32UNC2AX1 ZINC GR2	(3621 BWE)
all	22	15P103	TRDCUT-F RDHDSLOT 8-32UNCX1/2 SS410	(3016 BWE)
all	23	W2 10583	93347C* SPRAY RINSE NOZZLE S/S	
all	24	02 10580	80483B NOZZLE=SPRAY INLET STAMP-W/H	
all	25	02 10204	80127A GASKET-SPRAYNOZ GTR52-5220-5	
all	26	15A010	67346A CARRSCR 3/8-16UNC2X1 SPECIAL	
all	27	24G030N	ROLLED WASHER .379"ID NYLTITE #37W	
all	28	02 10543	93123A GASKET=WASHER SPRAY NOZZLE	
all	29	15G200	01Z HXCPNUT 3/8-16 UNC2A 5/8X1/2	
all	30	02 14430	96167B DOORGLASS=3621BWE DRAWN DOOR	(3621 BWE)
all	30	02 10544	83096A DOORGLASS=DRAWN DOOR=3016WE	(3016 BWE)
all	31	02 09141	94273AA GASKET-DORGLAS GTR52-5220-1	(3621 BWE)
all	31	02 02366	93516A GASKET DOORGLAS GTR52-5220-3	(3016 BWE)
all	32	02 09129	84471B RING=DOOR GLASS PRESS-18"OPG	(3621 BWE)

Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400
Litho in U.S.A.

Parts List, cont.—Shell and Door Assembly

Used In	Item	Part Number	Description	Comments
all	32	02 09021	79436A RING=DOOR GLASS PRESSURE	(3016 BWE)
all	33	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8	
all	34	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
all	35	24G020N	ROLLED WASHER .252"ID NYLTITE #25W	
all	36	15G140	03Z HXCPNT 1/4-20 #C250=20 NKLPLT	
all	39	02 14431	72161B EXTR BAND STAMPED SS CYLDOOR	(3621BWE)
all	39	02 14168	DOOR GASKET = 36WE W/ BRASS DOORS	(3621BWE)
all	39	02 10545	81116B EXTR BAND-STAMPED SS CYLDOOR	(3016BWE)
all	39	02 10342A	93000ZGASKET=15" DOOR	(3016BWE)
all	40	EDL00337	88093#*INTRLKHSG ASSY=N/LOCK 120V	
all	41	03 01420B	86507C DOOR HANDLE=ILOC	(3621 BWE ONLY)
all	42	15N176	FLATMACSCR 1/4-20NCX3/4SS18-8	(3621 BWE ONLY)
all	43	15G140	03Z HXCPNT 1/4-20 #C250=20 NKLPLT	
all	44	15U181	LOCKWASHER MEDIUM 1/4 SS18-8	
all	45	15U188	01Z FLTWASH 1/4 STD COMM SS18-8	(3621 BWE ONLY)
all	46	15N191	FLATMACHSCR 1/4-20X7/8 SS18-8 U/CUT	(3621 BWE)
all	46	15N173A	FLTMACSCR 1/4-20 UNCX5/8 UCUTSS18-8	(3016 BWE)
all	47	03 01420A	91062B DOOR STRIKER=ILOC	(3621 BWE)
all	47	03 01420C	91062B DOOR STRIKER=ILOC	(3016 BWE)
all	48	03 01423A	76245B LATCH GUARD=ILOC	
all	49	15N158	HEXCAPSCR 1/4-20NCX1/2SS18-8	
all	50	24G030N	ROLLED WASHER .379"ID NYLTITE #37W	(3621 BWE)
all	50	24G020N	ROLLED WASHER .252"ID NYLTITE #25W	(3016 BWE)
all	52	02 03669	93123A GASKET=INTRLK HOUSING	
all	53	15G168	SQNUT 1/4-20UNC2 SS18-8	
all	54	03 01441A	81187B COVER="PUSH"=ILOC	
all	55	12P014GG	CABLE CLAMP NON-METAL,3/8ID,3/8WIDE	
all	56	15N117	RDMACSCR 10-24UNC2X3/8SS18-8	
all	57	15U154	LOKWAS EXTOOTH #10 (US STD) ZINC PL	
all	58	15P100	07Z THDCUT-F PANHD 8-32 X 3/8 SS410	
all	59	15P090	TRDCUT-F PHILPANHD 8-32X1/4 S/S410	
all	60	12K040	1/2" COND.EMT CONDUIT PECO #260B	
all	61	G14 06000T	78686J CONDUIT ASSY	(3621 BWE)
all	61	G10 07500T	76686U CONDUIT ASSY	(3016 BWE)
all	62	12K077	STRAP 1/2"HVYCONDUIT 2HOLE VICTR23S	
all	63	15P010	12Z PHILPAN TRDCUTSCRTYP10-24X1/2SS	
all	64	15G200C	01Z HXCPNUT HI 3/8-16 BRASS NIK PLT	
all	65	02 02819B	84383C SPACER HINGE S/S	
all	66	15K084	85196B TRUSS HXSOK 3/8-16 X 23/32SS	
lall	67	03 01420B	86507C DOOR HANDLE=ILOC	

Interlock Assembly

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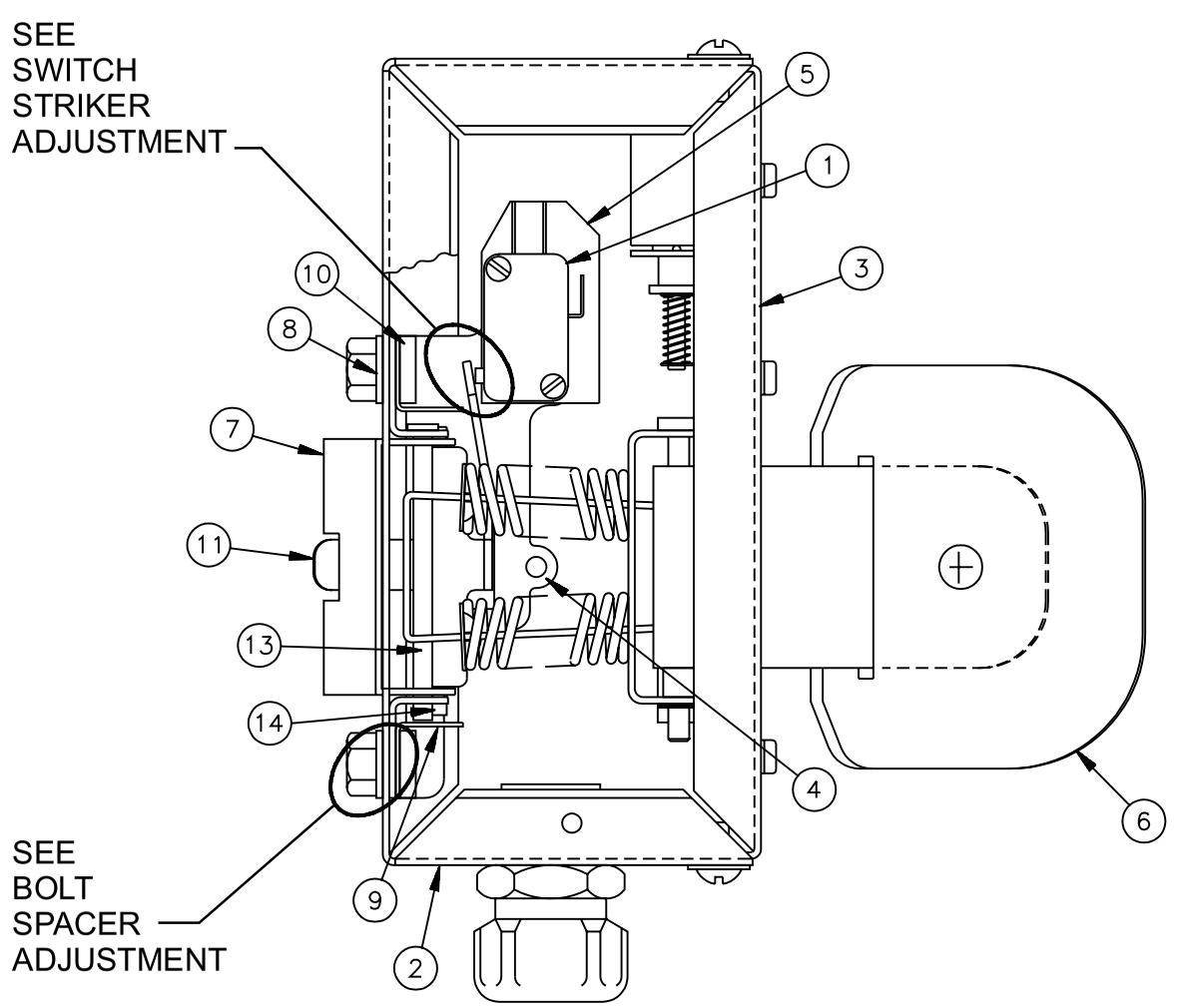
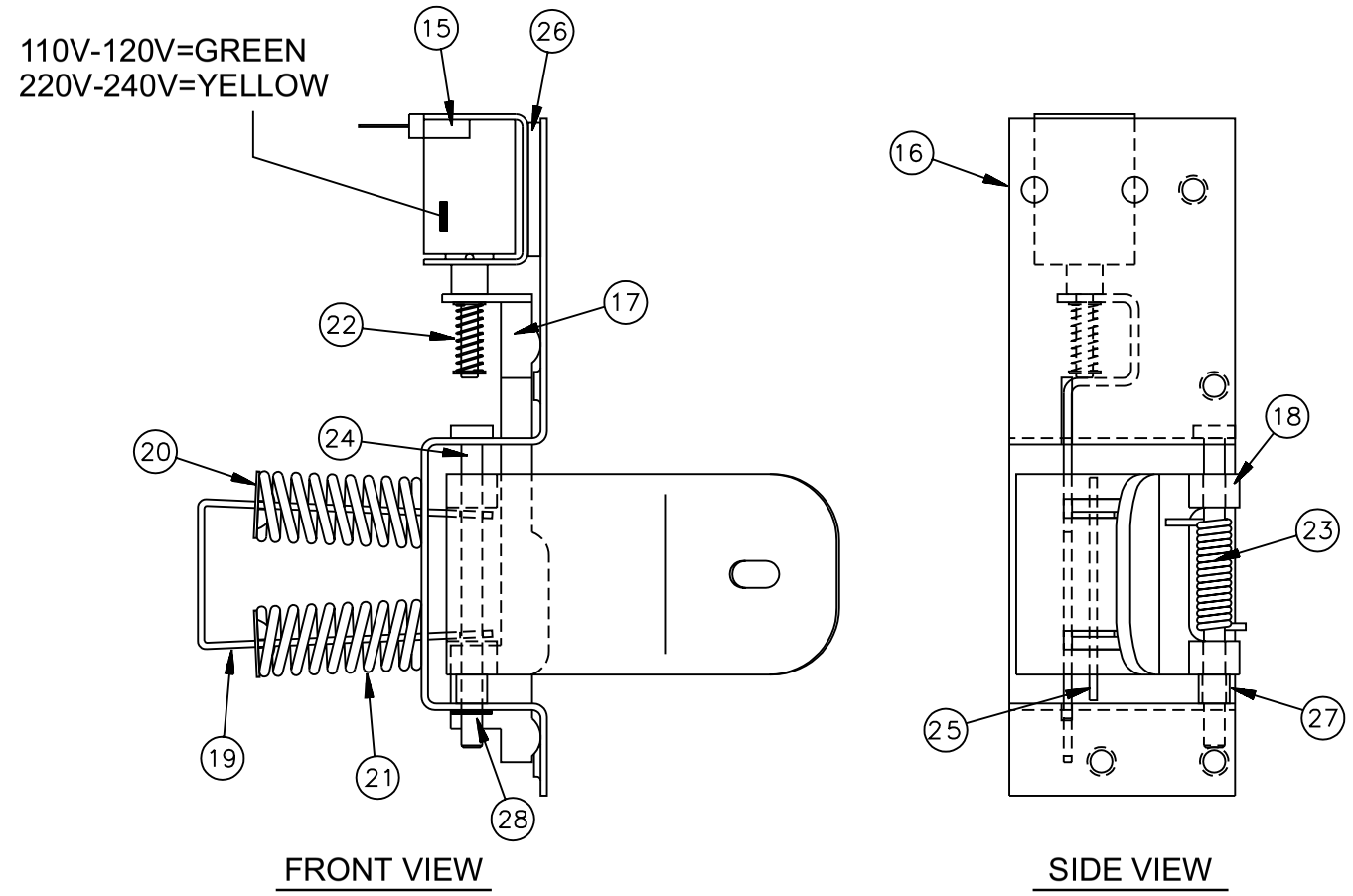
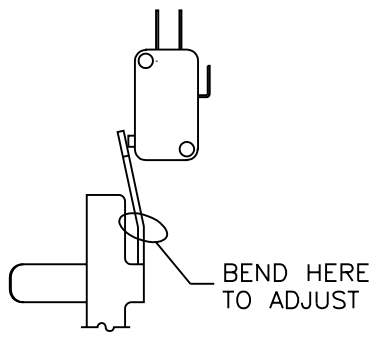




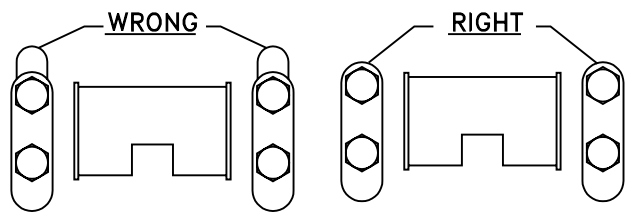
ASSEMBLIES 00AA,00BB,00CC,00DD

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

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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	EDL00171	88093# INTRLKHSG ASSY=N/UNLOCK 240V	**30015V7J,T5J,T5E** 3015/20/22 Mxx,Cxx,Vxx
	AA	EDL00171A	93207@ RR PIVOT PL ASSY=N/UNLOK240V	USED ON 00A (CONTAINS ITEMS 15-28)
	B	EDL00221	96411 INTRLKHSG ASSY=N/LOCK 220V	3022F8J/P/W 3630F8J/P/W/S
	BB	EDL00271A	93207#*RR PIVOT PL ASSY=N/LOCK 220V	USED ON 00B (CONTAINS ITEMS 15-28)
	C	EDL00337	88093#*INTRLKHSG ASSY=N/LOCK 120V	36&42QXX,BWP 3015D4A **36021V6J, 36026V5J** **36026V7J, 42026V6J**
	CC	EDL00337A	93207# RR PIVOT PL ASSY=N/LOCK 120V	USED ON 00C (CONTAINS ITEMS 15-28)
	D	EDL00371	94000Z INTERLKHSG=N/LOCK+SWITCH240V	**3022V6J,T5J** 3022S4J,S4G,S5J 3015K4A,S4J,S5G,S5J
	DD	EDL00271A	93207#*RR PIVOT PL ASSY=N/LOCK 220V	USED ON 00D & 00E (CONTAINS ITEMS 15-28)
	E	EDL00271	88093#INTRLKHSG ASSY=N/LOCK 220V	**30022T5E**
			----------COMPONENTS----------	
all	1	09R014A	05ZMIMI-SW SPDT STAKON #V15G1C26K	
all D only	2 2	03 01426 03 01426A	77201D HOUSING=FRONT=ILOC 94186D HOUSING=FRONT= ILOC W/UNLATC	
all D only	3 3	03 01427A 03 01427B	77181C HOUSING=REAR=ILOC (C-7) 94186D HOUSING=REAR=ILOC W/UNLATCH	
all	4	03 01429	75479C PLATE=FNT PIVOT=ILOC	
all	5	03 01335	INSULATOR=AUTOSPOT	
all	6	03 01425A	92683C DOOR HANDLE EXTENSION	
all	7	03 01423	75736B LATCH = INTERLOCK	
all	8	03 01417	75100B PLATE=SPACER=ILOC	
all	9	03 01418B	75194B KEEPER=LATCH PIN/NOTCH	
all	10	03 01418	75100B TAP STRIP=ILOC	

Parts List, cont.—Interlock Assembly

Used In	Item	Part Number	Description	Comments
all	11	03 01424A	90501B STRIKER=SWITCH=LONG TAB	
all	12	03 01442	92697B SOLENOID INSULATION=DR INTRK	(NOT SHOWN)
all	13	03 01443	84251AFLATHDRIVET 5/32X2+5/16 ZINC	
all	14	15H091	01Z STRGHTPIN 5/32"X2.25 LG ZINC	
AA,BB,DD CC	15 15	09K062B71 09K062B37	04Z SOLENOID 240/60--220/50 = ILOC 03Z SOLENOID(C-7)120/60--110/50	
all	16	03 01428A	93207C PLATE=REAR PIVOT=ILOC (C-7)	
AA BB,DD CC	17 17 17	03 01421B 03 01421A 03 01421D	93207B SLIDE=NORMALLY OPEN(C7 SOL) 75736B SLIDE=NORMALLY LOCKED=ILOC 77341B SLIDE=NORMALLY LOCKED(C7-S)	
all	18	03 01425	75479B HANDLE=ILOC	
all	19	03 01422	94256C KEEPER=SPRING=ILOC	
all	20	03 01444A	77503B SPRING CUP = ILOC	
all	21	03 01444	82293ASPRING .51/1.69/46+CADPL	
all	22	03 01445	88481ASPRING .2/.625/.319+CADPL	
all	23	03 01445B	75935B TORQUE SPRING (.53 IN-#)CDPL	
all	24	03 01443	84251AFLATHDRIVET 5/32X2+5/16 ZINC	
all	25	15H090I	STRAIGHT PIN 5/32"DIAX1.75"LG ZINC	
AA only	26	03 S1X1	88172B SHIM:DOOR INTLK SOLENOID N4P	
all B	27 27	27B205080Z 27B205080E	SPCRROLL.177ID.218L.027T STLZC 01ZSPCRROLL.177ID.25L.027TK CSZNC	
BB,CC,DD	28	03 01418C	75736B KEEPER=NORMLOCKED SLIDE=ILOC	

REPLACING MAIN BEARING HOUSING

APPLICABILITY: 36026, and 36021 BWP/BWE model Washer-Extractors.

A hydraulic puller kit is available from MILNOR on a rental basis that will aid the removal of the basket and the installation of the clutch drum. The basket hub and clutch drum must be checked for wear and replaced if necessary.

DANGER: BEFORE PROCEEDING, CLOSE ALL SERVICE CONNECTION SHUTOFF VALVES (AIR, WATER, STEAM, ETC.) AND SWITCH MACHINE OFF AND LOCK POWER OFF AT EXTERNAL DISCONNECT SWITCH TO AVOID POSSIBLE BODILY INJURY DUE TO ELECTRIC SHOCK OR ACTUATION OF MACHINE MECHANISMS.

REMOVING THE SHELL FRONT AND BASKET

1. Disconnect water hose from door. Remove door interlock housing cover. Mark terminal position of wires and disconnect wires. Remove conduit connection from the interlock and loosen the other end of the conduit (toward the rear of the machine).

2. Remove ring bolt cover located at the top of the shell front ring. Mark position of the shell front with respect to the shell.

3. Support the shell front, then remove ring bolt. Remove ring and gasket, then allow shell front to separate from shell.

4. Tie a wire or string to the inspection plate eye bolt shown in figure 1. This wire will prevent accidental loss of inspection plate into shell. Remove inspection plate bolt and bracket, then remove inspection plate.

5. Note the position of the hoses attached to the balancing nozzles and remove hoses (fig. 1). Loosen nozzle clamps and using the inspection hole, **turn all three nozzle ends downward and pull nozzle tubes back until all nozzles contact the shell**.

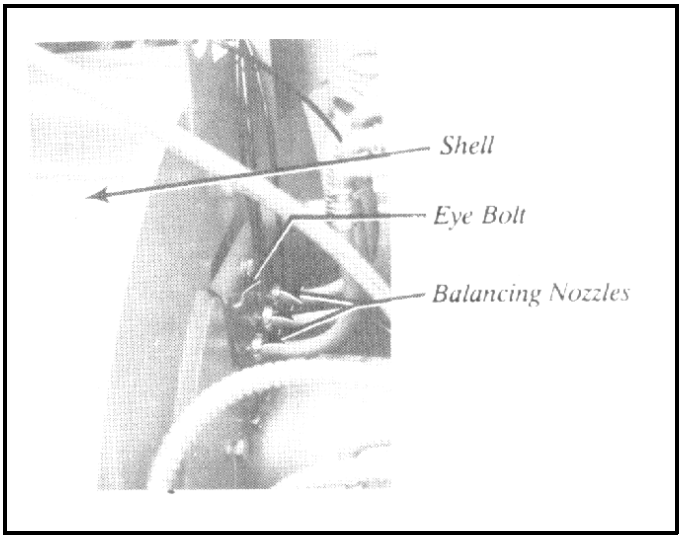


Figure 1 (MSSM0231AE)
Rear of Shell (side view)

6. Remove basket mounting bolt. Remove (by unscrewing) the 2 plastic inserts which were covered by the basket mounting bolt washer. Referring to drawing BMP700729 supplied in puller kit, mount the basket puller tool and remove the basket.

REMOVING THE GEAR REDUCER, BRAKE ASSEMBLY, AND CLUTCH DRUM

1. Disconnect the air line from the rear of the gear reducer and remove all belts from the gear reducer pulley.
2. Remove the gear reducer with the top mounting bracket. Allow the lower bracket to remain attached to the frame.
3. Remove the brake assembly as follows:
   a. Disconnect the air line from the brake air cylinder and connect an auxiliary air line to the cylinder and apply pressure to the cylinder. With the cylinder shaft now extended, secure a piece of wood between the washer on the shaft and the cylinder to keep the shaft extended.
   b. Release the air pressure from the cylinder, disconnect the air line, then remove the air cylinder mounting bolts from the frame.
   c. Mark the position of the brake air cylinder clevis on the cylinder shaft (fig 2). Loosen clevis lock nut and remove clevis from air cylinder by rotating cylinder. Remove brake shoe stop, pivot bracket and spring. **Note position of any shims**.
4. Loosen and remove commutator and extraction belts.

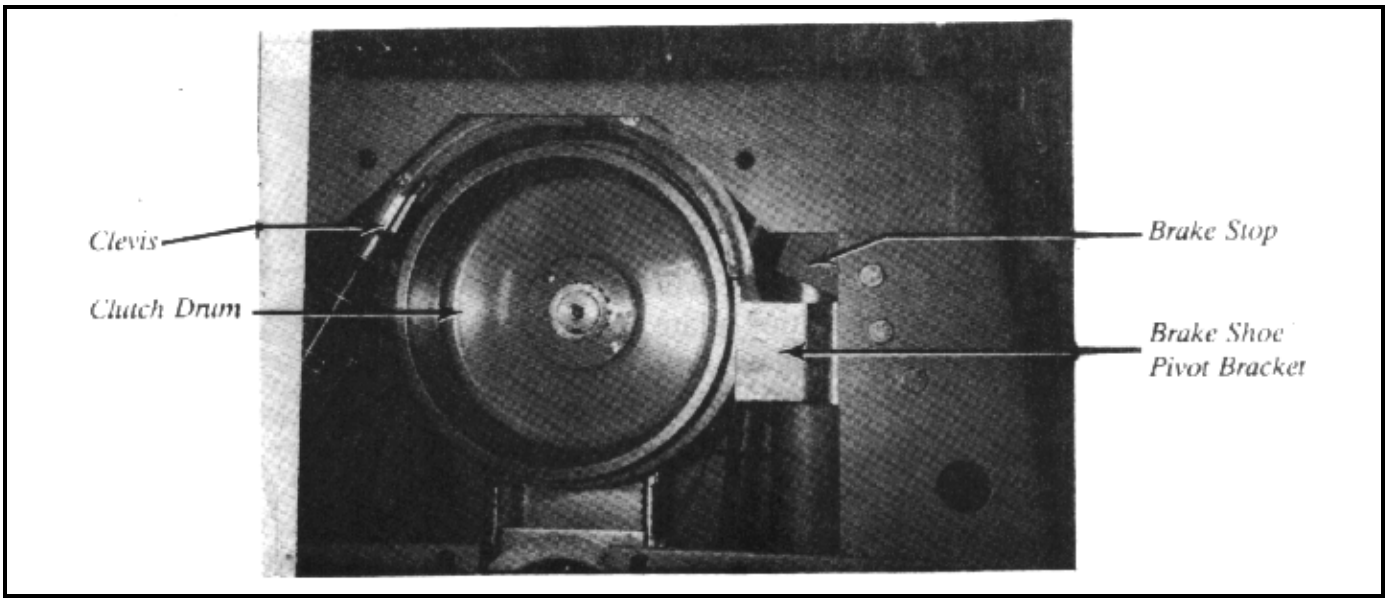


Figure 2 (MSSM0231AE)
Clutch Drum

5. Bend lock ring tabs away from clutch drum nut and remove nut. Refer to drawing BMP 700729 to mount puller and remove clutch drum.

REMOVING THE BEARING HOUSING

The bearing housing is removed and installed through the front of the machine. Bearing housing mounting bolts are accessed from the rear of the machine.

1. Remove the commutator bracket from bearing housing.
2. Locate the balance sensing switch mounted on the outside of the machine on the right hand side *when facing the front of the machine.* Loosen the switch actuating arm on the switch. Remove actuating arm from bearing housing. **Note position of any shims.**
3. Mark the positions of the black plastic lubrication lines and disconnect them from the bearing housing. Remove all lubrication coupling fittings and metal plugs from housing. **Note position of fittings and plugs**.
4. Bend locking tabs away from main bearing housing bolts. Remove bolts and note the position of the shorter bolts.
5. Remove (by unscrewing) the 3 plastic inserts located in the bearing housing (from within the shell). Screw 3 bolts into these holes and tighten them evenly to separate bearing housing from the machine.

A helpful hint to facilitate removal of bearing housing is to place a pipe over each exposed shaft end and "walk" the bearing housing out.

INSTALLING THE BEARING HOUSING

1. Thoroughly clean bearing housing seating surfaces on the inside of the shell. Determine that the seating surface on the new bearing housing is dry and free from any dirt.
2. Clean all bolts thoroughly and determine that they screw freely into the new bearing housing.
3. Apply a fuel resistant coating (such as 3M EC-776) to the surface shown in figure 3. Mount gasket and apply additional coating on top of gasket. Apply coating to bearing housing seating surface within shell.
4. Install bearing housing into the machine frame with the large plastic plug to the bottom.
5. Install **new locking tabs** onto the mounting bolts and apply a hard setting gasket sealant (such as Permatex 1C) onto bolt threads. Install bolts and tighten them gradually in an alternating pattern. Tighten bolts to **200 ft/lbs** following the tightening sequence in figure 3.
6. Remove any excess compounds and adhesives from machine.

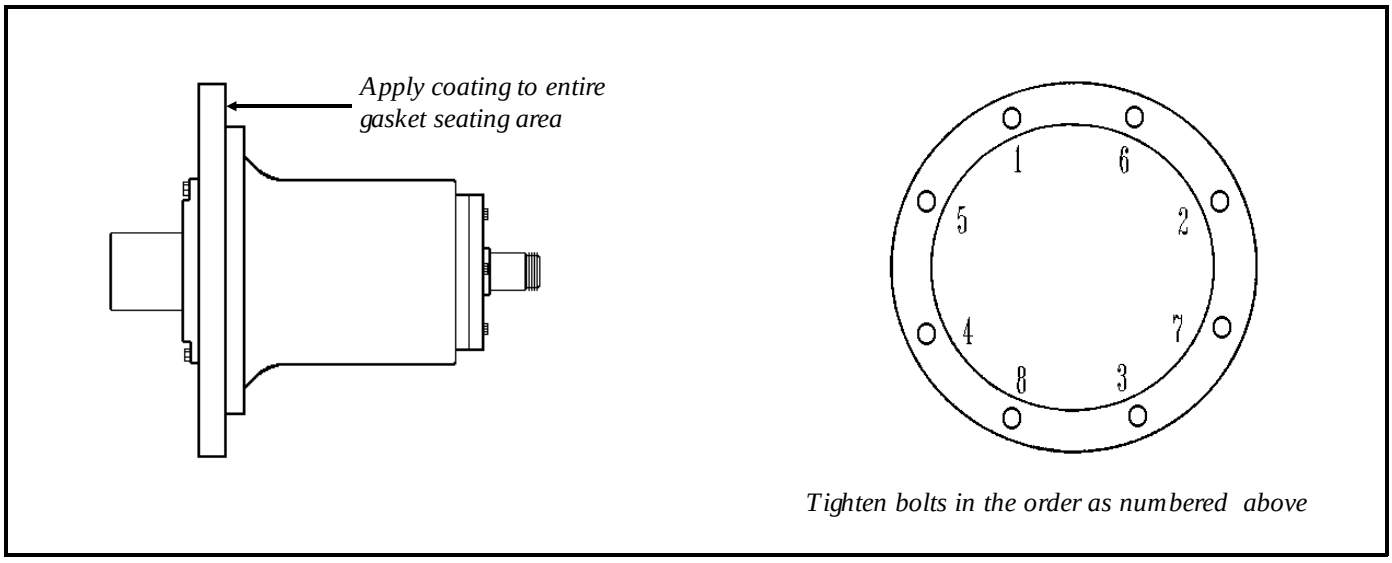


Figure 3 (MSSM0231AE)
Main Bearing Housing

7. Install the fittings and metal plugs from the old bearing housing (step 3 page 3) in the same position on the new housing. Connect lubrication lines to the bearing housing.

If a new style commutator bracket had been previously installed, remount commutator bracket to new bearing housing and go to step 11.

8. Discard old commutator brackets and install new commutator bracket assembly using the existing screws from the new bearing housing. Use flat washers under the lock washers on the two slotted holes on the new bracket.

9. Mount commutator onto the new bracket as shown in figure 4.

10. Install commutator belt and tighten as described elsewhere.

11. Position balance switch actuator on switch stem, then attach actuator to bearing housing **using any shims that may have been originally installed**. Adjust balance switch as described elsewhere.

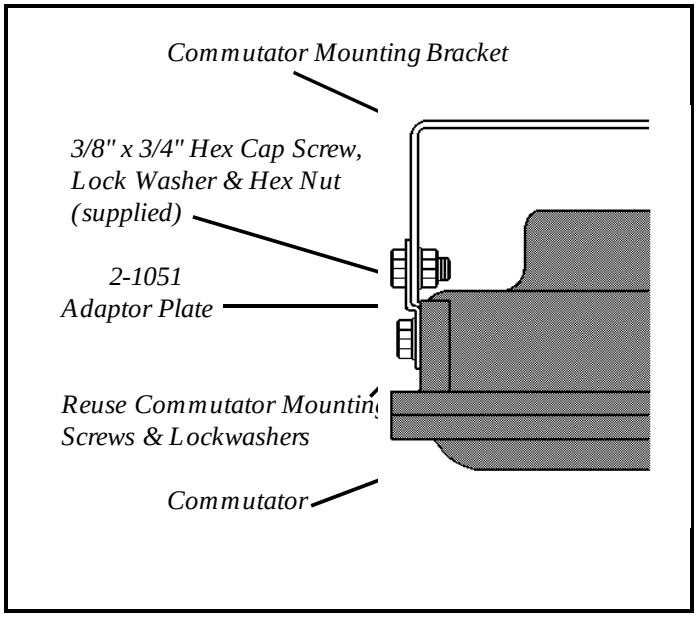


Figure 4 (MSSM0231AE)
Commutator Mounting Bracket Assembly

INSTALLING THE CLUTCH DRUM AND BRAKE ASSEMBLY

1. Determine that the main shaft is clean and smooth and that the key is properly seated. Determine that the clutch bore is clean and free from any foreign material.

2. Slide clutch drum onto main shaft.

3. Mount puller onto clutch drum and press drum onto main shaft. A gap of 1/16" to 1/8" must exist between the clutch drum and the rear bearing housing seal. **The clutch drum must not be allowed to contact the bearing housing seal.**

CAUTION: The clutch drum must be pressed on. Other methods (such as beating drum on) could damage bearing housing components and clutch drum.

4. Install clutch drum nut with new lock washer (beveled side of nut contacts washer). Tighten nut and bend lock washer tabs to secure the nut from turning. Never loosen nut to align it with a locking tab, always tighten nut until a slot on the nut aligns with a locking tab.

5. Install commutator belt and tighten as described elsewhere.

6. Position brake shoes onto clutch drum and connect brake spring. Mount brake shoe pivot bracket onto frame (re-install shims if any) and tighten the bolts so that the bracket can be moved by striking it with a hammer.

7. Clamp the brake shoe (the one attached to the pivot bracket) to the clutch drum. Adjust the brake shoe pivot bracket by tapping it with a hammer until the bottom or top edge of the bracket is horizontal (parallel with a frame member), then tighten bracket.

8. Screw the air cylinder shaft (by rotating the air cylinder) into the clevis until the original position of clevis on the cylinder shaft is achieved. Tighten clevis lock nut and remove clamp.

9. Mount air cylinder onto frame and tighten mounting bolts. Determine that the edges of the brake shoes do not contact the pulley on the clutch drum. An even gap must exist between the brake shoes and the pulley as shown in figure 5. If necessary, loosen air cylinder mounting bolts and adjust the angle of the cylinder bracket to achieve an even gap. Remove wooden spacer used to hold the cylinder shaft extended.

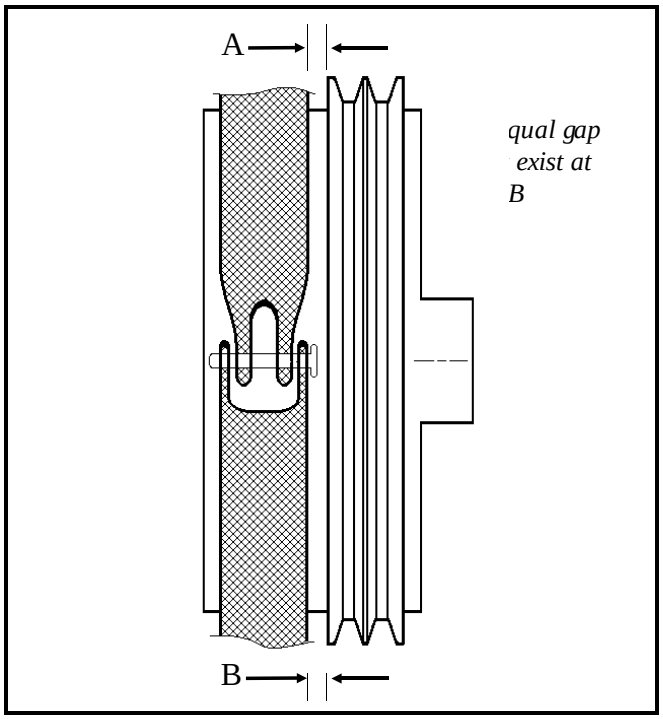


Figure 5 (MSSM0231AE)
Clutch Drum

10. Mount the brake stop onto the frame using original shims (if any). Position brake stop so it contacts brake shoe. Tighten brake stop bolt so that it can be moved by striking it with a hammer.

11. Connect an auxiliary air line to the air cylinder and pressurize the cylinder. Tap the brake stop with a hammer until an even gap exists all around between the two brake shoes and the clutch drum. Tighten brake stop bolt.

INSTALLING AND ALIGNING THE GEAR REDUCER

1. Mount the gear reducer (leave bolts loose) to the bottom bracket that remained attached to the frame.

2. Connect an auxiliary air line to the gear reducer and apply air pressure to the clutch. Tighten gear reducer mounting bolts and install and tighten top bracket. Release air pressure.

3. Determine that an even gap exists **all around between the drive wheel and the clutch drum** as shown in figure 6. To achieve proper alignment, loosen the bolts and adjust the position of the gear reducer. If necessary, enlarge the bolt holes with a round file.

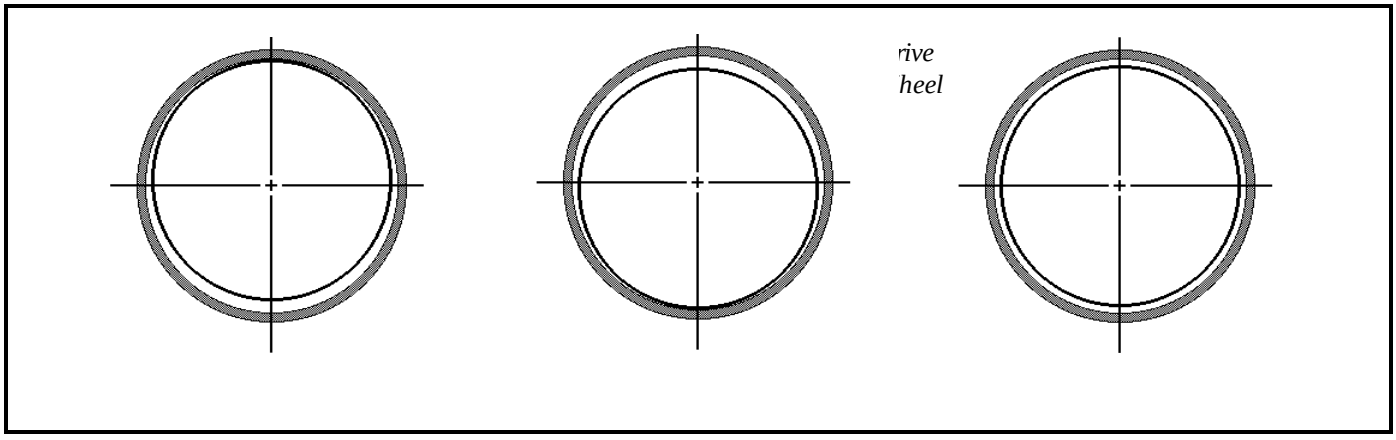


Figure 6 (MSSM0231AE)
Drive Wheel And Clutch Drum Alignment

INSTALLING THE BASKET AND SHELL FRONT

1. Re-install the 2 plastic inserts into the basket just enough so they do not obstruct the seating area of the basket bolt washer.

2. Determine that the three balancing nozzles are pointing directly downward.

3. Determine that the key is properly seated on the main shaft.

4. Clean basket mounting bolt and apply pipe sealant for stainless pipe (such as Loctite PST) onto the threads. Slide basket onto shaft and install basket bolt, washer, and retainer. Torque bolt to **200 ft/lbs**.

5. Determine that the shell front and the shell flange (front lip) is clean and free from burs, sharp edges, and any sealants.

6. 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 on the shell front to help seat the shell front onto the shell. After shell front is seated onto the shell, check the gap between the shell front lip and the shell lip. If necessary, use a rubber or rawhide maul on the shell lip to close the gap.

CAUTION: Never use a metal hammer when striking the shell or shell front. The use of a metal hammer can crack these components.

7. Pack a small amount of industrial grade silicone into the top center gap of the shell front and shell, to an area covering 3 inches on both sides of the shell weld.

8. Install the new gasket starting at the 10 O'clock position. Trim off any excess gasket material after installing gasket.

9. Install ring onto the shell front with the ring gap at the top center of the shell front. Tap around the ring (bottom to top) with a rubber maul until a clamp can be installed on the ring bolt guides. Repeat this procedure and tighten clamp until ring bolt can be installed. Tap around ring again (to remove any slack) and tighten bolt. Install ring bolt cover.

10. Reconnect door interlock conduit and wires.

11. Install water hose on door and tighten clamp.

INJECTOR NOZZLE ADJUSTMENT

After the basket is installed, each of the three injector nozzles must be adjusted within a particular pick-up ring. The pick-up rings are three grooves attached to the back of the basket which direct water from the injector nozzle into a particular basket rib to offset an unbalnced load. The pick-up rings are numbered 2 - 1 - 3 from the **rear to the front** of the machine. Viewing the rear of the machine, the nozzles are numbered 2 - 1 - 3 **left to right**.

1. Adjust the position of each of the three injector nozzles as follows:

   a. Use the inspection plate access to help position the nozzle within the proper pick-up ring. Push tube forward until it stops, then mark tube with a pencil at the edge of the nozzle tube clamp fitting as shown in figure 7.

   b. Pull tube out until it stops, then push tube in half of the distance to the mark on the tube. Tighten clamp screw enough to prevent nozzle position from being accidentally disturbed.

c. Use the inspection plate access hole to adjust the direction of the nozzle. The bottom of each nozzle must be 3/8" within a pick-up ring as shown in figure 8. Tighten nozzle clamps.

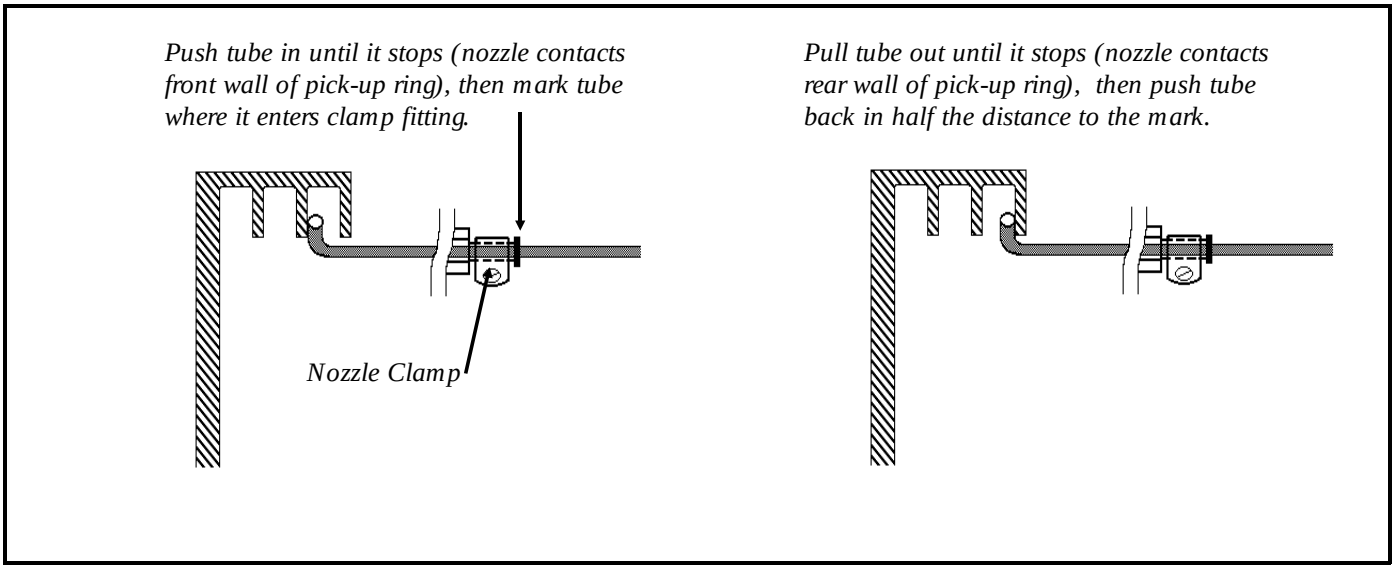


Figure 7 (MSSM0231AE)
Balancing Nozzle Within Pick-Up Ring (Side View)

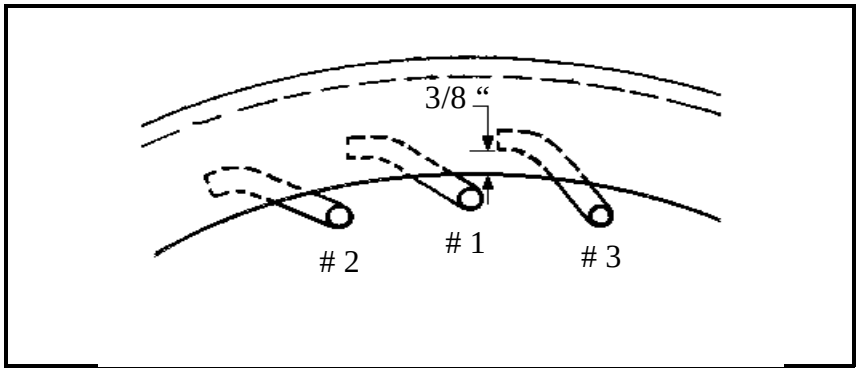


Figure 8 (MSSM0231AE)
Balance Nozzles Within Pick-up Ring (Rear View)

2. Remove the old gasket from the inspection plate and clean the gasket seating surface. Apply a gasket adhesive to the inspection plate and install the new gasket (supplied with kit).

3. With a wire or string attached to the inspection plate eye bolt, install the plate, bracket and bolt, then tighten bolt.

4. Install the balance nozzle tube hoses and tighten hose clamps.

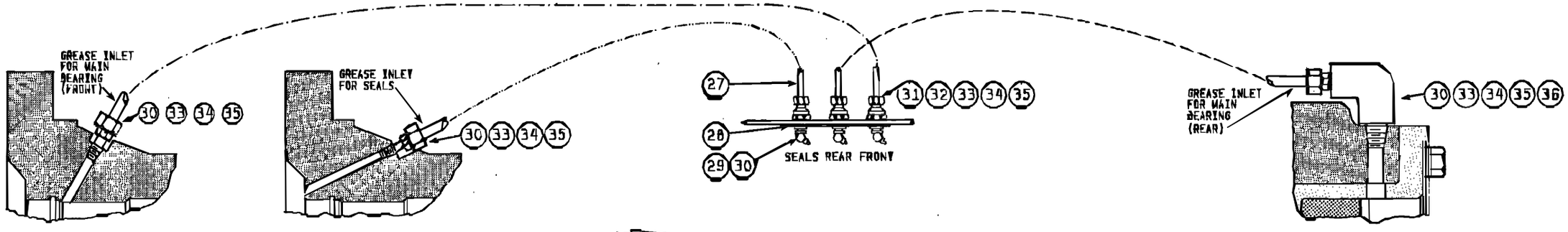
ADJUSTING THE BRAKE

After the Washer-Extractor has been completely assembled, the commutator must be re-timed and the brake adjustment must be checked before the machine is put into regular service. The brake adjustment can only be checked with the machine running. With the basket rotating at high extract speed, determine how many seconds it takes for the basket to come to a complete stop after the motor is switched off (the electric motor contact will actuate and emit a loud "click"). The basket must stop rotating within 10 seconds. If the basket takes longer than 10 seconds to stop rotating, the brake must be adjusted. To adjust the brake, proceed as follows:

1. Remove the air brake cylinder from the frame as described in "REMOVING THE GEAR REDUCER, BRAKE ASSEMBLY AND CLUTCH DRUM" section elsewhere herein.
2. Loosen the clevis lock nut on the cylinder shaft. Rotate the air cylinder to screw the clevis further onto the air cylinder shaft, the tighten clevis lock nut.
3. Connect the auxiliary air line and pressurize the cylinder. Remount the air cylinder as described in step 9 in "INSTALLING THE CLUTCH DRUM AND BRAKE " section elsewhere herein.
4. If the proper stopping time cannot be achieved by adjusting the clevis position on the air cylinder shaft, the brake shoes and/or air cylinder may have to be replaced.
5. Lubricate machine as described elsewhere.

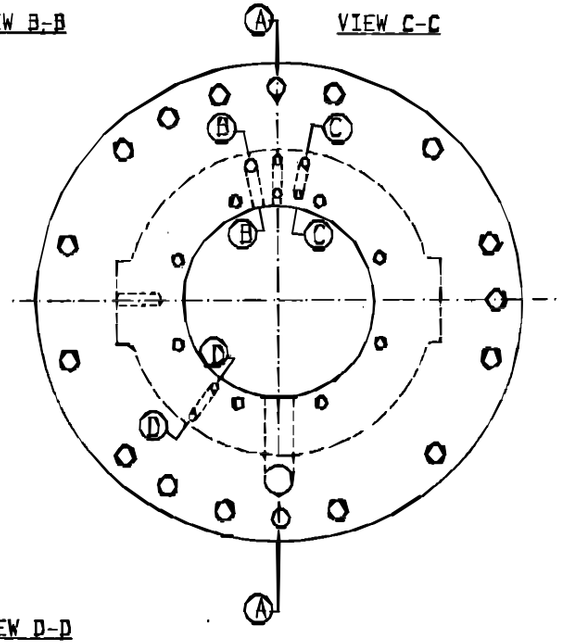
4226QWE, QHE, DYE, DYP, 3621BWE MAIN BEARING ASSEMBLY
LARGE STYLE FLUSHING OUTLET USED AFTER SEPTEMBER 1987

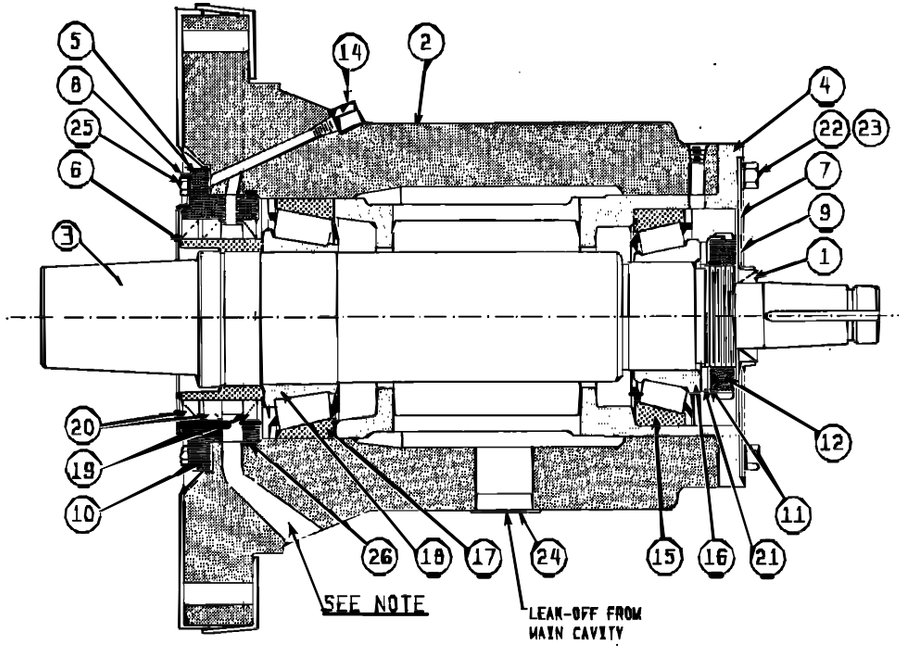
BMP890009
90271C



VIEW B-B

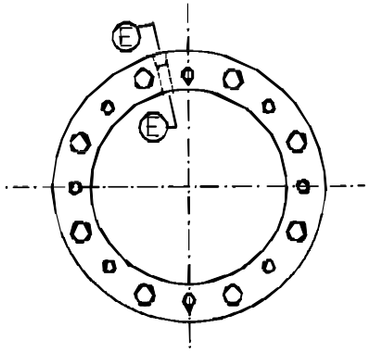
VIEW C-C



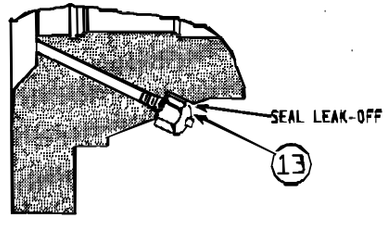


VIEW A-A

VIEW E-E



VIEW D-D



NOTE: FOR CONFIGURATION OF MAIN BEARING HOUSING WITH SMALL STYLE FLUSHING OUTLET USED PRIOR TO SEPTEMBER 1987, REFER TO BMP770162.

Main Bearing Assembly

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

Litho in U.S.A.

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----------	----------
	P	ABM11004	881131*MAIN BEARASSY 4226QWE	4226 QWP
	R	ABM11006	88113J*MAIN BEARASSY 4226QHE	4226 QTL/N/G/H,QHP/E,SP1
	S	ABM11006S	90032#*MAIN BEARASY 4226QHE S/S	4226 QHE SS
	T	ABM11006V	89463N*BEARASY 4226QHE SEALS=VITON	4226 SUBST VITON SEALS
	U	ABM11005	90032D*MAIN BEARASY 4226 DYE ONLY	4226 ATMOS DYE, DAS/QWE SS
	V	ABM11005K	90032#*BEARASY 4226DYE SHFT=C450S/S	4226 DYA SUBST 50/60CYCLE
	W	ABM11005P	90032#*MAIN BEARASY 4226 DYP ONLY	4226 PRESS DYE,DPS SS
	X	ABM14004A	88113$*MAIN BEARASSY 3621 BWE	3621 CPE,CME,NSP/E, BWP/E
	Y	ABM14004V	90032N*BEARASY 3621BWE SEALS=VITON	3621 SUBST VITON SEALS
	Z	ABM14006	90032#*MAIN BEARASY 3621 DYE	3621 BWE SS
----------	----------	----------	----------COMPONENTS----------	----------
all	1	24S104	01Z SEAL 1.75X2.378X.312 CS/BUNA	
(P,R,T,X,Y)	2	X2 14219A	88261# MAIN BEARHOUSE 36BWE 42QWE	
(S,U,V,W,Z)	2	Y2 14219D	91046D*BEARHOUSE W/SS COVER 36/42DY	
(P onlY)	3	X2 11185	93423D MAINSHAFT=4226 QWE	
(R,S,T) onlY	3	X2 11185A	94191D MAINSHAFT= 4226 QHE	
(U,W onlY)	3	X2 11185D	93423# MAINSHAFT-SS=4226DYE	
(V onlY)	3	X2 11185K	93423# MAINSHAFT 4226QWE CAR450	
(X,Y,Z only)	3	02 14209	92236D MAINSHAFT 3621WE INCL .75BOX	
all	4	X2 14227A	90256D CARRIER=REAR BRG+SPCR-3621	
(P,R,T,X,Y)	5	X2 14229L	93512C MACH=SEAL HOLDER 4226RWP	
(S,U,V,W,Z)	5	X2 14229D	93512# MACH=S/S SEAL HOLDER	
all	6	02 14228A	93357C SEALSLEEVE+SPACER=2.90LG	
all	7	02 14213	SEALHOLDER-REAR	
all	8	02 14214L	87377C WASHER=SEAL RETAIN &LOCKING	
(P,R,T onlY	9	X2 11158A	81381B SPACER=SEALHOLDER-REAR SUPT	)
(P,R,S,T,X,Y)	10	02 14216L	93362C GASKET=SEAL HOLDER 1/16 THK	

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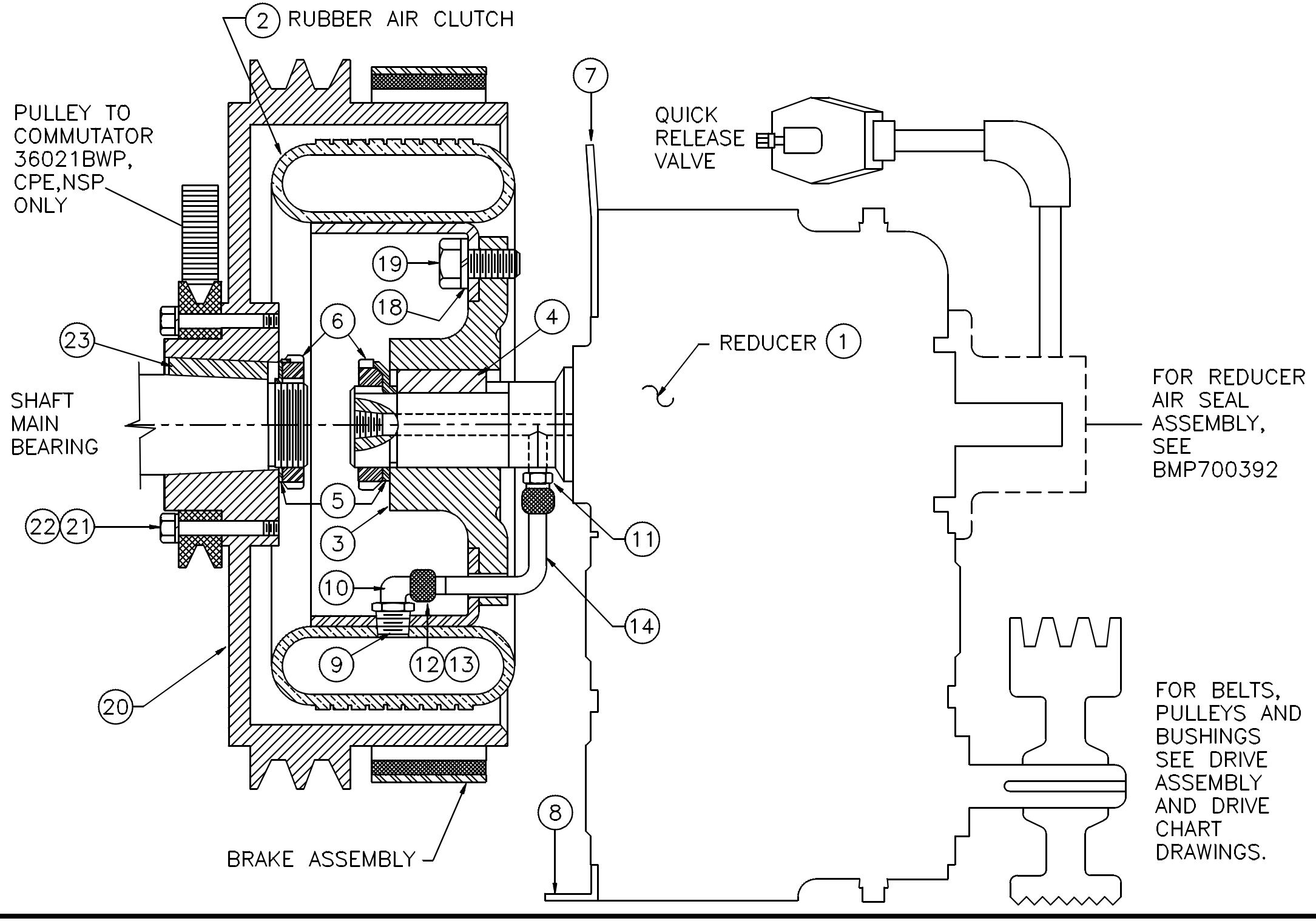
Parts List, cont.—Main Bearing Assembly

Used In	Item	Part Number	Description	Comments
(U,V,W,Z)	10	02 14216D	93362# GASKET=SEAL HOLDER .03 DYE	
all	11	56AHW13	W13 BEARING LOCKWASHER	
all	12	56AHN13	N13 BEARING LOCKNUT	
all	13	54M029	RELIEFFIT 1/8"STR ALEMITE#47200	
all	14	5SP0CFESSV	NPT PLUG 1/8SQSOLIDBLKSTL LVENT125#	
all	15	54A335	CUP H414210 TIMKEN 2-24 1/BOX+PT#	
all	16	54A465	CONE H414249 TIMKEN 2-51 1/BOX+PT#	
all	17	54A325	CUP NTN #4T-742 1/BOX+MARK PT#	
all	18	54A426	CONE NTN #4T-749 1/BOX+MARK PT#	
(P,R,T,W,X, Y)	19	24S125	09Z SEAL 4X5X.4 JM#19583 NITRILE	
(S,U,V,Z)	19	24S125V	08Z SEAL 4X5X.4 JM#19583 VITON	
(P,R,X)	20	24S125	09Z SEAL 4X5X.4 JM#19583 NITRILE	
(S,T,U,V,Y, Z)	20	24S125V	08Z SEAL 4X5X.4 JM#19583 VITON	
(S,T,U,V,Y, Z)	20	24S125V	08Z SEAL 4X5X.4 JM#19583 VITON	
(W onlY	20	24S125PJS	03Z SEAL 4X5X.438 TYPE PJSTFE200PSI	)
(W onlY	20	24S125PJSW	03Z SEAL4X5X.438 TYPE PJSWTFE200PSI	)
all	21	56ATW13S	79202B TONGUEWASHER SPECIAL FOR N13	
all	22	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	23	15K113	04Z HXCPSC 3/8 16X1+1/2 GR8 Z	
all	24	51P046	PLUGCAPTAPERED NOTHD PLAS.ALLIAN#54	
all	25	15K112	HXCAPSCR 3/8-16X1+1/2 SS18-8	
all	26	60C160E	O-RING 5.984IDX6.262OD #258 BUNAN70	
all	27	60E004TE	04Z 1/4"OD X.170"ID NYLON TUBING *	
all	28	01 10025	78113B LUBRICATIONPLATE= BEAR+SEAL	
all	29	54M025	HYDRAULICFIT 1/8"-90 ALEMITE#1613-B	
all	30	54A101	BALLBEAR #6208C3	
all	31	53A007B	BODY=FEMCONN 1/4X1/4 COMP W#B66X4X4	
all	32	5SL0EBEC	NPT ELBOW 90DEG STRT 1/4" BRASS 125	
all	33	53A059A	NUT 1/4"COMP.HOLYOKE ANDERSON#61A-4	
all	34	53A500	1/4" SLEEVE-DELRIN	
all	35	53A501	TUBEINSERT .170"OD	
all	36	53A031B	BODY-MAL90ELL1/4X1/8COMPPH#269C-42B	

PELLERIN MILNOR CORPORATION
700 JACKSON STREET/POST OFFICE BOX 400
KENNER, LOUISIANA 70063-0400 USA

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

GEAR REDUCER & AIR CLUTCH ASSY
36021, 36026 & 42026Q6x 36021BWP,CPE,NSP 42026DA1



LITHO IN USA

PELLERIN MILNOR CORPORATION
700 JACKSON STREET/POST OFFICE BOX 400
KENNER, LOUISIANA 70063-0400 USA

PARTS LIST
(See other page for drawing.)

GEAR REDUCER & AIR CLUTCH ASSY
36021, 36026 & 42026Q6x 36021BWP,CPE,NSP 42026DA1

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	ADG11002	83363D*REDCR+CLU & MTG BRACKETS 42Q	42026DA1
00B	ADG11002A	89000ZREDCR+CLU&BRKTS INST 42	36021/26+42026Q6G/J/P
00C	A14 09900	80296$*GEAR REDUCE+CL+MTG BKT 36021	36021BWP,CPE,NSP
001A	54S015	REDUCER 19.6 DORRIS 3220-60C OURBOX	00A
001B	54S014HC	REDUCER 15.4 DORRIS#1115-60HC OURBX	00B,00C
002	54H148A	REPLACED BY KIT PK14-0001	(SOLD AS PK14 0001)
003	X2 14076	91477# DRIVEFLANGE=AIRCLUTCH	PART OF KIT PK14 0001
004	15E225	SQMACHKEY 3/8X1+1/2 NOTAPER-NOHEAD	
005	56AHW108	TW108 BEARING LOCKWASHER	
006	56AHN08	N08 BEARING LOCKNUT	
007	02 14383	87372B PLATE=GEAR REDUCER ADAPTOR	00C
008	02 14094M	87482# ANGL=LO RDUCER 25.25 LGBD@PT	00C
009	51A025	HEXPIPBUSH 3/8X1/4GAL 125#CI	PART OF KIT PK14 0001
010	53A040B	BODY=MAL90EL 5/16X1/4COMP W#B69X5X4	PART OF KIT PK14 0001
011	53A019B	BODY=BRMALCON 5/16X1/8COMP W#B68X5	PART OF KIT PK14 0001
012	53A060A	NUT BRASS 5/16 COMP W#61X5	PART OF KIT PK14 0001
013	53A060	SLEEVE 5/16 COMP IMP#60-F	PART OF KIT PK14 0001
014	90A020A18A	COPPER*TUBING 5/16"OD X.032 X 18"L	PART OF KIT PK14 0001
015	15U280	FLATWASHER(USS STD) 1/2" ZNC PLT	
016A	15K180	HXCAPSCR 1/2-13UNCAX2 GR5 ZINC/CAD	00A
016B	15K175	HXCAPSCR 1/2-20 UNF2A X1.75 GR5 ZNC	00B,00C
017	15G235	HEXNUT 1/2-20UNF2B SAE ZINC GR2	
018	15U300	LOKWASHER MEDIUM 1/2 ZINCPL	
019	15K145	HXCAPSCR 1/2-13UNC2AX3/4 GR5 PLATED	
020	X2 14075	82431# CLUTCHDRUM=3621WE	
021	15K043	HXCAPSCR 1/4-20UNC2AX1.5 GR5 STL/ZN	
022	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
023	15E225	SQMACHKEY 3/8X1+1/2 NOTAPER-NOHEAD	
		******** END OF PARTS LIST ********	

How to Read Parts List

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

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

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

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

LITHO IN USA

Reducer Air Seal

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

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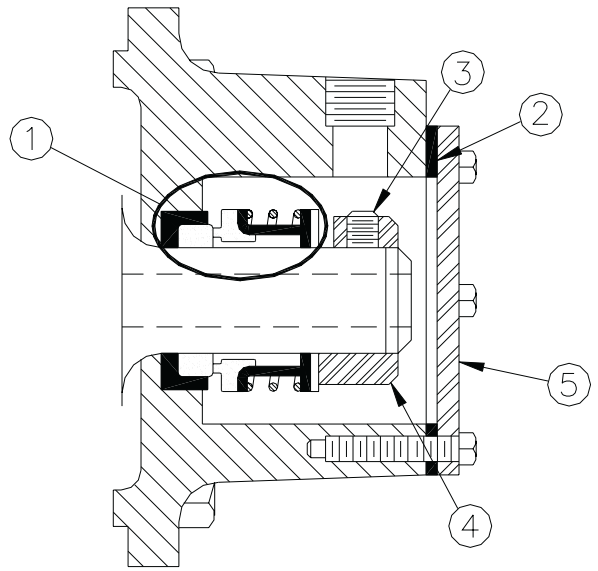
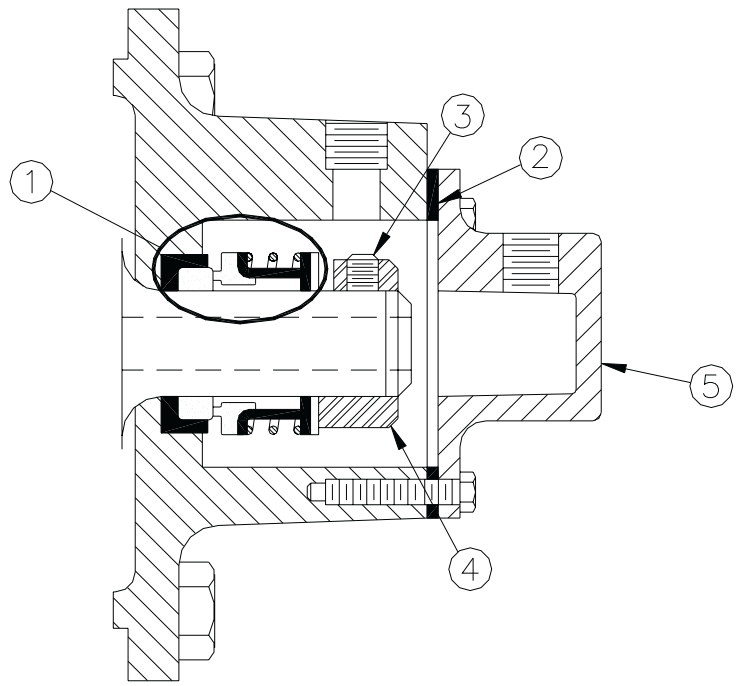


00A–00C



00D–00F

Parts List—Reducer Air Seal

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	54S014HC	REDUCER 15.4 DORRIS#1115-60HC	3621,3626,4226,4832, 4836
	B	54S012HC	REDUCER 15.4 DORRIS #1115-25HC	SHUTL36/40/48R+L
	C	54S015	REDUCER 19.6 SKK/DOR 3220-60C	4226DYE
	D	54S022A	REDUCR 19.59:1 3220-300EC1	4231,4244,5238
	E	54S023B	REDUCR 10.16:1 3210-375EC2	6044
	F	54S025A	REDUCR 10.16:1 3210-600EC2	6442,6446,7244 6440/50
			----------COMPONENTS----------	
B-F	1	K10 0002	KIT=ROTARY AIR SEAL	
B-F	2	02 15111	GASKET AIRSEALHOUSING COVER	
B-F	3	15Q077	SOKSETSCR 1/4-20X1/4 ZINC ALLE	
all	4	02 10380	Z SHAFT COLLAR FOR AIR SEAL	
A-C	5	02 15108	COVER=ROTARY AIRSEAL HOUSING	
D-F	5	02 15108A	AIRINLET=CLUTCH DIECAST+TAP	

Drive Assembly

3621BWP,CPE,NSP

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

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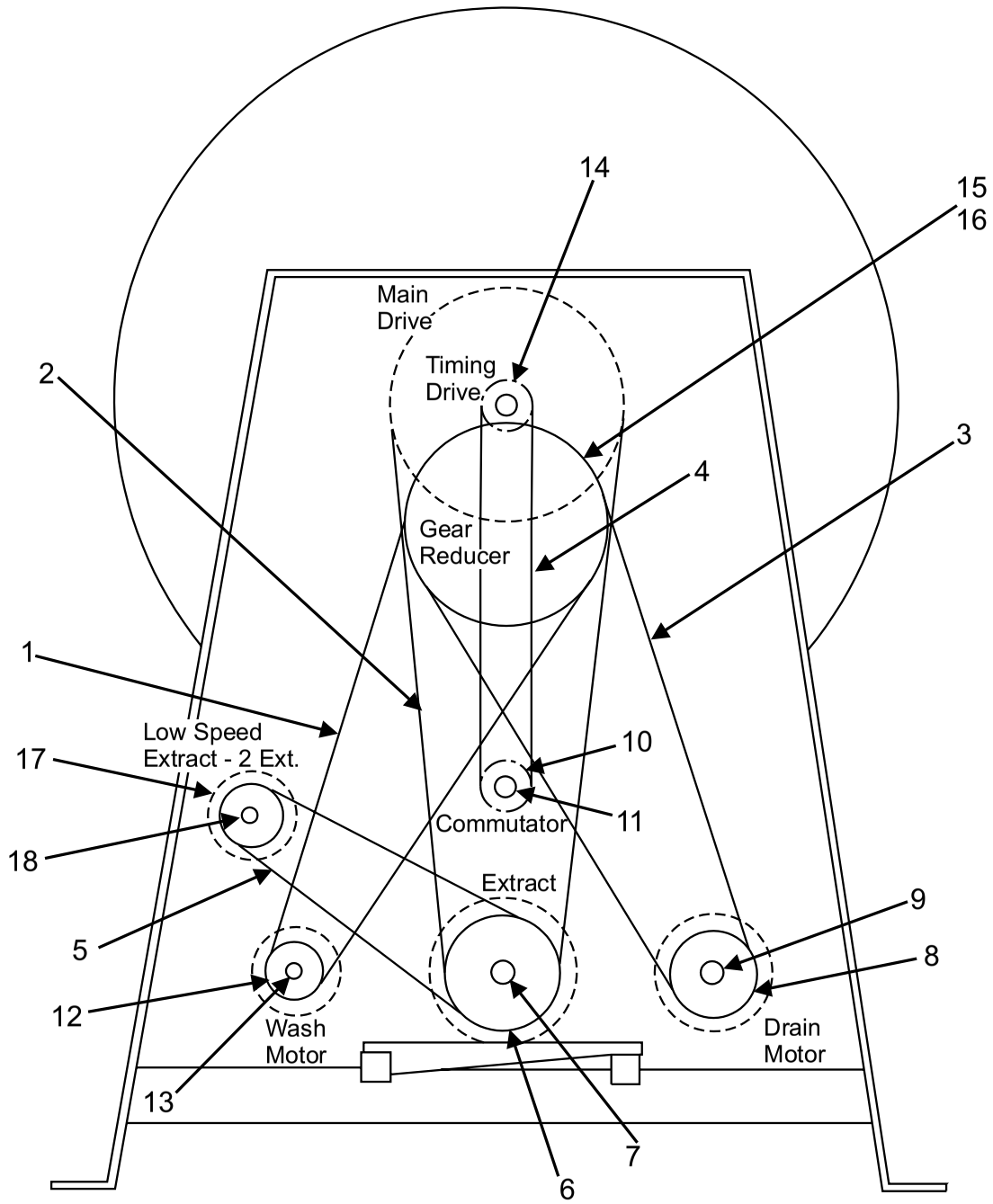
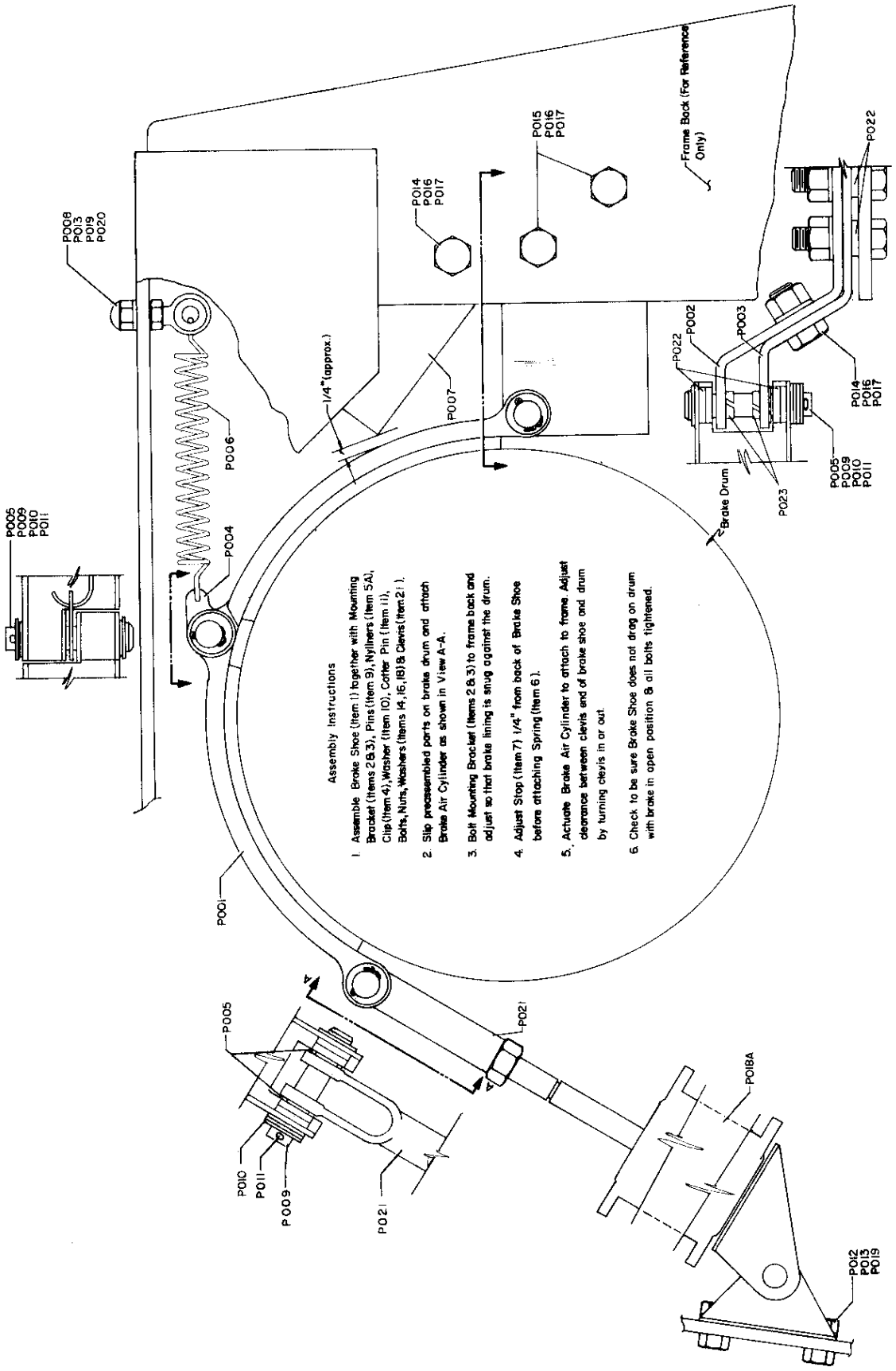


Parts List—DRIVE ASSEMBLY

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	D14 00160	73107R DRIVECHART=3621WE 60CYC	BWP - 60 CYCLE
	B	D14 00250	81052Q DRIVECHART=3621WE 50CYC	BWP - 50 CYCLE
	C	D14 00360	DRIVECHART=3621WE-2EXT 60C	BWP,CPE,NSP 60 CYCLE, 2 SPEED EXTRACT
	D	D14 00450	81052P DRIVECHART=3621WE-2EXT 50C	BWP 50 CYCLE, 2 SPEED EXTRACT
			----------COMPONENTS----------	
	1	56V50730S	FHP VBELT 5L730 B-SECTION	
A,C	2	56VB085SM2	VBELT B85 MATCHSET= 2 "EA"=1 BELT	
B,D	2	56VB087SM2	VBELT B87 MATCHSET=2 "EA"=1 BELT	
A,C	3	56V50760S	FHP VBELT 5L760 B-SECTION	
B,D	3	56VB075S	VBELT B75 RAWEDGE COG	
	4	54C050	GEARBELT BROWN 367L050	
D	5	56VB042S	VBELT DAYCO BP42MATCHSET=2EA=1BELT	
C	5	56VB040S	VBELT DAYCO#PB40 (EA=1 BELT)	
A	6	56066B2SDS	VPUL 2B6.6/A6.2 (SDS) TYPE QD	
B	6	56080B2SK	VPUL 2B8.0/A7.6 (SK) TYPE QD	
C	6	56066B3SD	VPUL 3B6.6/A6.2 (SD) TYPE QD	
D	6	56080B3SK	VPUL 3B8.0/A7.6 (SK) TYPE QD	
A	7	56Q1GSDS	1+3/8" BUSH VPUL QD TYPE SDS	
B,D	7	56Q1GSK	1+3/8" BUSH VPUL QD TYPE SK	
C	7	56Q1GSD	1+3/8" BUSH VPUL QD TYPE SD	
A,C	8	56051B1H	VPUL 1B5.1/A4.7 BK57H R EQUAL	
B,D	8	56061B1H	VPUL 1B6.1/A5.7 H B#BK67H	
	9	56Q0RH	7/8" BUSH VPUL TYPE H,D, OR QT	
	10	54X020	PUL TIMEBLT LH ELECT#40L050D	
	11	56Q0MHS	05Z.627" BUSH VPUL TYPE H,D,OR QT	
A,C	12	56026B10R	VPUL 1B2.6/A2.2 7/8ID BK28	
B,D	12	56032B1H	VPUL 1B3.2/A2.8 BK34H OR EQUAL	
B,D	13	56Q0RH	7/8" BUSH VPUL TYPE H,D, OR QT	
	14	02 10191	69219B PULLEY-TIMING-DRIVER	
	15	56094B2H	VPUL 2B9.4/A9.0 2BK100H R EQUAL	
	16	56Q1AH	1.0" BUSH VPUL TYPE H,D, OR QT	
C	17	56039B1H	VPUL 1B3.9/A3.5 BK45H OR EQUAL	
D	17	56046B1H	VPUL 1B4.6/A4.2 BK52H OR EQUAL	
C,D	18	56Q0RH	7/8" BUSH VPUL TYPE H,D, OR QT	



Litho. in U.S.A.

BMP710015
7751ID

Brake Assembly
36021BWP,CPE,NSP

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

Litho in U.S.A.

Parts List—Brake 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	AD 14 055	86231D BRAKE ASSY=3621-STAMPED	
			----------COMPONENTS----------	
All	1	SA 14 044B	83102B*BRKSH,ASY(NON-ASB)36,42Q+D+H	
All	2	02 14401A	84193C INNER BRACKET=BRAKE 3621WE	
All	3	02 14402A	84193C OUTER BRAKET=BRAKE 3621WE	
All	4	02 14403	70200A CLIP = BRAKE TNSN SPRING	
All	5	54E220	NYLINER 8L2FF BUSHING 1/2X9/16X.140	
All	6	00 06102	SPRING BRAKE PRESSURE 5”LONG	
All	7	02 14350A	85441B STOP=BRAKE SHOE	
All	8	17A061	01Z EYEEND 3/8-16X1.5 ZINC	
All	9	17A037	CLEVISPIN 1/2”X2+1/2” DRILLED	
All	10	15U243	FLAWASHER 7/8ODX33/64IDX16GA ZINCPL	
All	11	15H040	STDCOTTERPIN 1/8X3/4 ZINCPL	
All	12	15K095	HXCPSCR 3/8-16UNC2AX1 Gr5 ZINC/CAD	
All	13	15G205	HXNUT 3/8-16UNC2B ZINC Gr2	
All	14	15K151	HXCAPSCR 1/2-13UNC24X1.25 Gr5 PLATE	
All	15	15K162	HXCAPSCR 1/2-13UNC2AX1.5 Gr5 PLATED	
All	16	15G230	HXNUT 1/2-13UNC2B SAE ZINC Gr2	
All	17	15U300	LOKWASHER REGULAR ½ ZINC PLT	
All	18	SA 10 019	89497U BRAKE AIRCYL=BALCOM+DIVCYL	
All	19	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
All	20	15G200	01Z HXCPNUT 3/8-16 UNC2A 5/8X1/2	
All	21	17A020	ADJ CLEVIS MACHINES 1/2=13 ZINCPLT	
All	22	15U312	FLAWASHER 3/4ODX33/64IDX11GA ZINCPL	
All	23	54E221	NYLINER 8L5+1/2-F BUSH .5X9/16X.406	

Section 3

Water & Steam Assemblies

Water & Steam Schematic

36021BWP,CPE,NSP

BMP940122/98191V
(Sheet 1 of 2)

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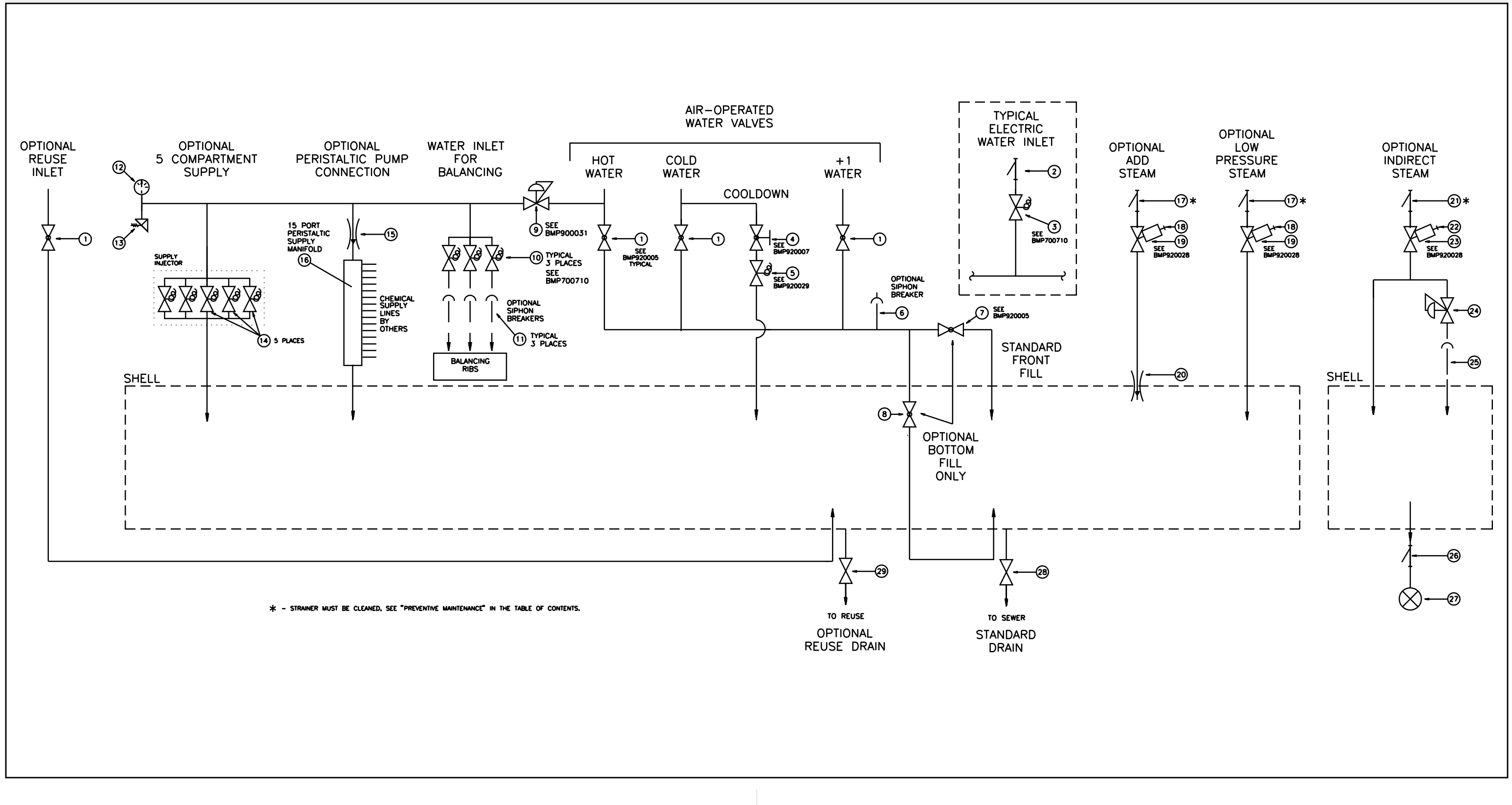


Water & Steam Schematic

36021BWP,CPE,NSP

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

Litho in U.S.A.

Parts List—Water & Steam 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	AD 14 039	91362#* BALVALVE+SUPINJ INLET ASSY	
	B	AD 14 038	91362@* BAL VALVC + SUPINJ INLETASS	
	C	AVW10006	79423S*BWE SIPHON BREAKER PARTS	
	D	AVW14813	88263P*VALVEASSY=HOT&COLD+AIROP BWP	
	E	AVW14814	97456B*FRONTFILL PIPING ASSY 36BWP	
	F	AVW13001	89317S*VALVEASSY 1+1/4 AIROP COLD	
	G	AVW13002	89317S$VALVEASSY 1+1/4 AIROP HOT/3D	
	J	AVW10001	78373S$VALVEASSY 1+1/4 ELEC COLD	
	K	AWS119001A	91000Z SUPPLY INJ ASSY 3621Q	
	L	AWL64004	92362C ASSY=PARISTAL PUMP CONECT 36	
	M	G14 09200	81392M*REUSE H20=DUALDUMP-4"CASTIR	
	N	GVS10001	82171C INLET=1+1/4STEAM ASSY=BALCOM	
	P	A14 05500	80057Q*LOW PRESSURE STEAM ASSY	
	Q	A10 09700	86161P*ASSY-STEAM INLET=35+60INDSTM	
	R	A10 09800	83192C*ASSY-STEAM TRAP=INSTM 35&60#	
	S	AVW14817S	89251T VALVE ASSY=H&C ELECT NSP	
			----------COMPONENTS----------	
alL	1	96D086BCSR	93513S 1.25WAT BVAL+ACT/BR/NC/ST/RH	
alL	2	51T060	01Z Y-STRAINER 1+1/4" CAST IRON	
alL	2	51T060A	Y-STRAINBRASS 1.25"W/BRASS PLG	
alL	3	96P151	09Z 1.25VAL 24V HAYS#2110-6421IS	
alL	3	96P151A37	05Z 1.25VAL 110V HAYS#2110-6021IS	
alL	4	96D034	04Z BALLVALVE 1/2" WATTS #6400-SS	
alL	5	96TDC2AA24	04Z 1/2" N/C 2WAY 24V50/60C VALVE	
alL	6	96M031	REPLACED BY SA 03 009	
alL	7	96D087BOSR	93513S 1.50WAT BVAL+ACT/BR/NO/ST/RH	
alL	8	96D087BCSR	93513S 1.50WAT BVAL+ACT/BR/NC/ST/RH	
alL	9	96J030D	01Z 1/2"PRESSREG SET28# FEMXUN	
alL	10	96P014	02Z 3/8" VALVE 120V HAYS 2195-0055	
alL	11	96M020	3/8" VACBREAK	
alL	12	30N100	08ZPRESSGAUGE 1/8"BACKCN.0-30PSI	
alL	13	96M001	02Z 1/2X3/8" RELIEF VALVE SET31#	
alL	14	96P013G37	05Z 3/4" 2WAYPLASTCVAL 120V60C	
alL	15	27A002	NOZZLE BRASS 3/8" SPRAYSYSTEMS	
alL	17	51T060	01Z Y-STRAINER 1+1/4" CAST IRON	

Parts List, cont.—Water & Steam Schematic

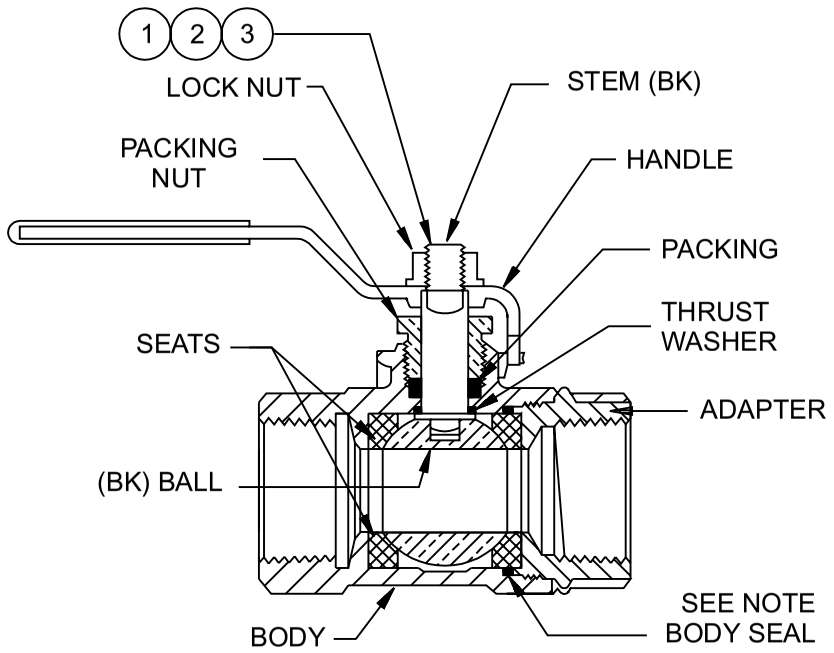
Used In	Item	Part Number	Description	Comments
alL	18	96H018	NEEDLE VALVE	
alL	19	96D0011E	16Z 1.25"NPTBRZ N/C STEAMVALANGBD	
alL	20	W2 02555	93366B NOZZLE=STEAM INJECTION	
alL	21	51T060	01Z Y-STRAINER 1+1/4" CAST IRON	
alL	22	96D0011E	16Z 1.25"NPTBRZ N/C STEAMVALANGBD	
alL	23	96H018	NEEDLE VALVE	
alL	24	96D095	06Z VAL SAFETY 1"X1.25 SET 125#	
alL	25	96M021SA	02Z 1/2" VACUUM BREAKER (STEAM)	
alL	26	51T030	01Z Y-STRAINER 3/4" CAST IRON	
alL	27	51T60A00QA	08Z3/4"STMTRP SARCO#212/10BTM.IN	
alL	28	SA 14 023	4" DUMPVALVE,N.O.AIROP SCREWED CONN	
alL	29	SA 14 023	4" DUMPVALVE,N.O.AIROP SCREWED CONN	

Watts Ball Valves and Repair Kits

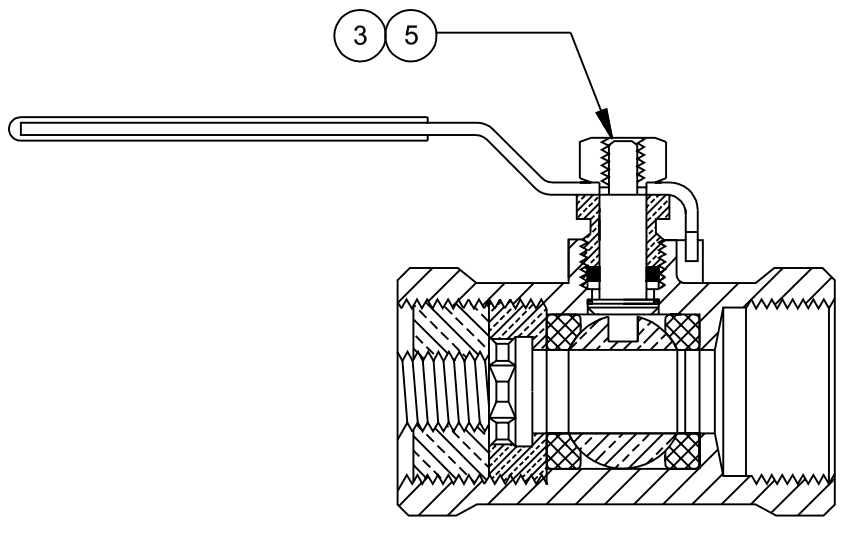
Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400

Litho in U.S.A.

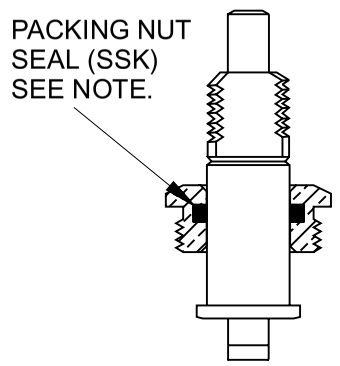
BALL VALVES WITHOUT ACTUATOR PADS FOR MANUAL OPERATION



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

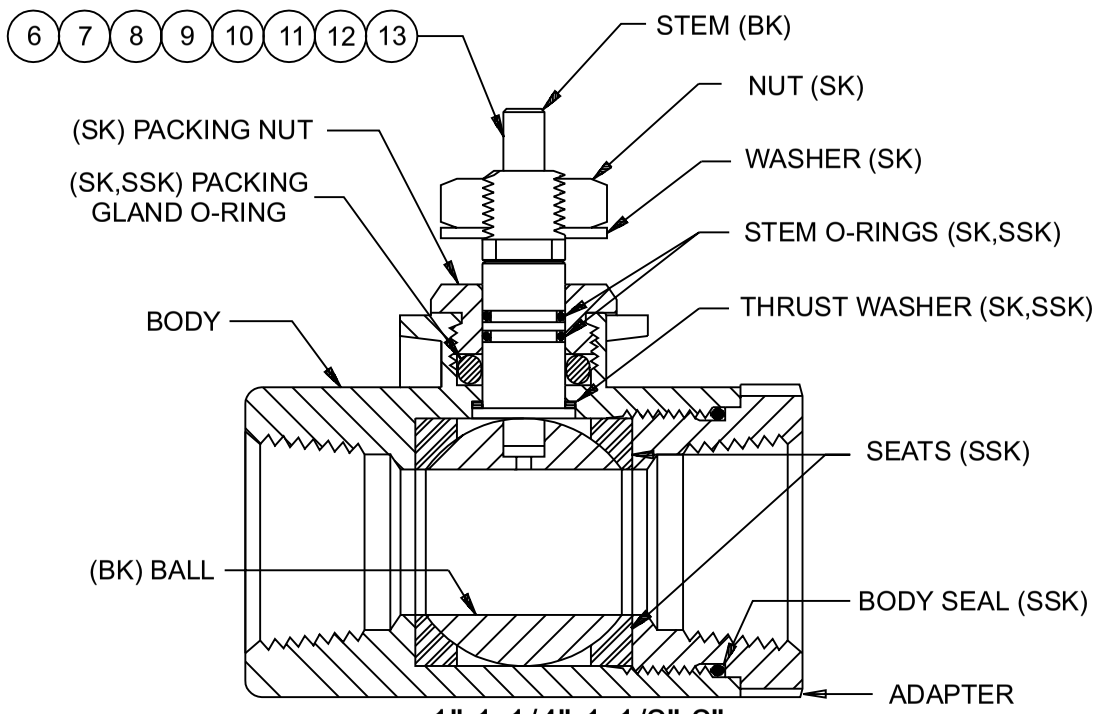


3/4",1"
BRONZE
NO REPAIR KITS



DETAIL
OLD STYLE STEM

AIR OPERATED BALL VALVES



1",1-1/4",1-1/2",2"
BRONZE & STAINLESS

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

HOW TO USE THIS DRAWING:

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

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

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

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

Litho in U.S.A.

Parts List—Watts Ball Valves and Repair Kits

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

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

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

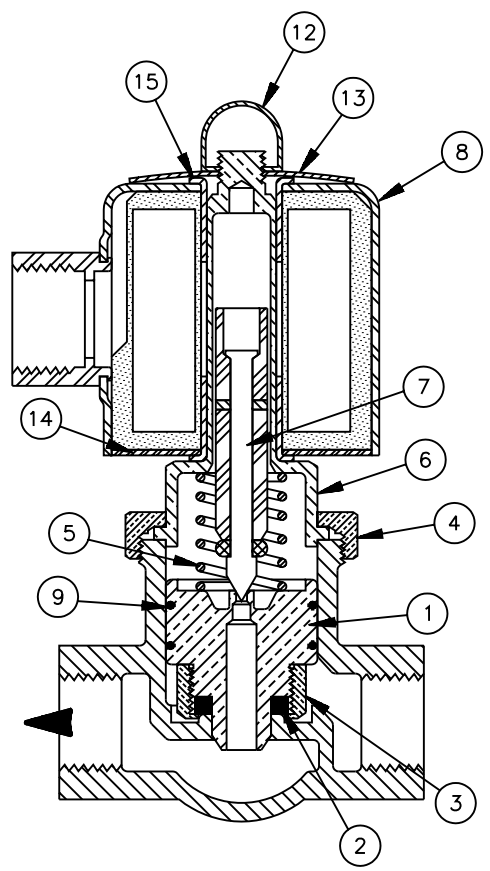
Used In	Item	Part Number	Description	Comments
all	008SSK	96V086SSK	02Z REPKIT 1.25BALVALSSK-02-RK-Z107	
all	9	96D086WSS	08Z BAVAL 1+1/4"SS WATTS S8000-Z107	1-1/4"STAINLESS-AIR OPER.
all	009BK	96V086BK	BALL KIT WATTS #1.25-BALL-RK-Z107	
all	009SK	96V086A7SK	02Z STEMKIT 1.25-1.5-ST-RK-Z107	
all	009SSK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

Hays Electric Inlet Valves

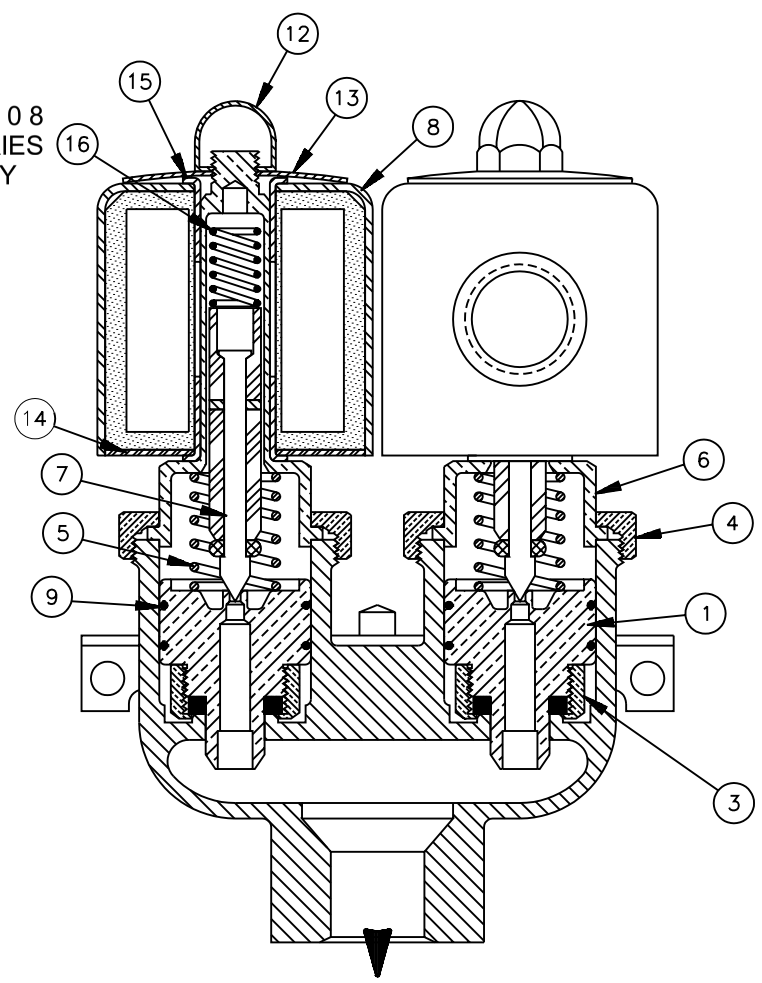
Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400

Litho in U.S.A.

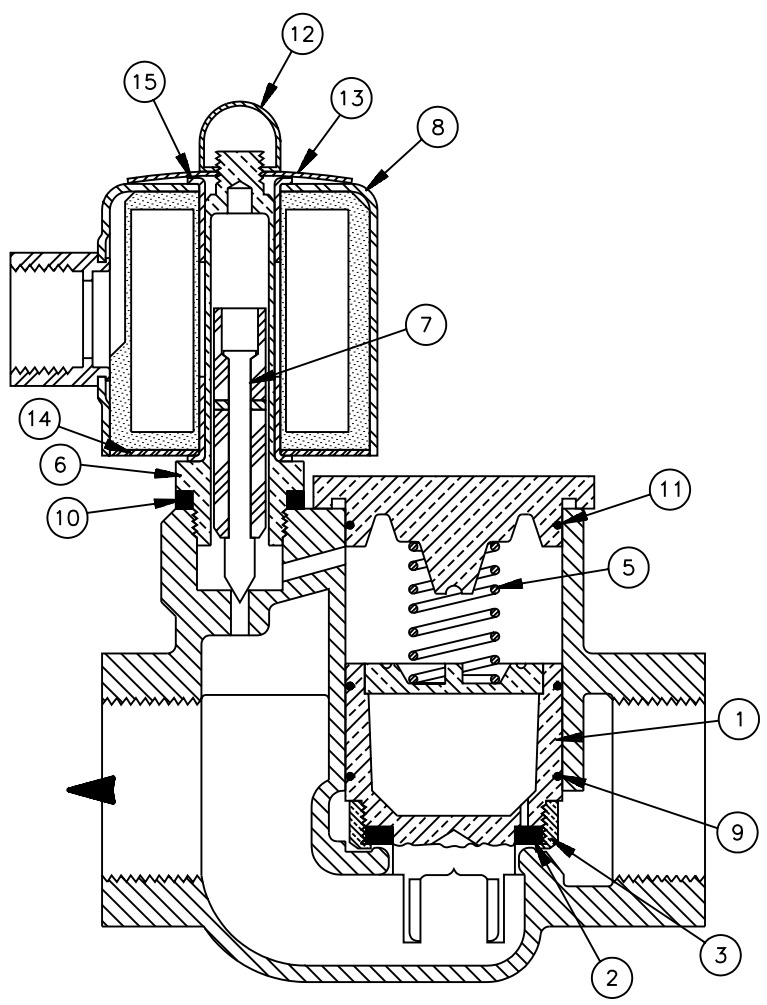
NOTE:
HAYS 4108 SERIES DUOVALVE IS REPLACED BY THE 3108 SERIES(SHOWN). IF REPLACEMENT PARTS ARE NEEDED FOR THE OBSOLETE 4108 SERIES SEE PARTS LIST ON REVERSE SIDE.



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



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



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

GENERAL MAINTENANCE:

1) THOSE VALVES WITH COUPLING NUTS MUSTY NOT BE EXCESSIVELY TIGHTENED. USE A STEADY PULL WITH A 14" OR SMALLER WRENCH. DO NOT HAMMER ON NUT OR WRENCH. LIMIT MAXIMUM TORQUE ON COUPLING NUT TO 600LB/INCH. EXCESSIVE THIGHTENING OF COUPLING NUT WILL DISTORT VALVE BODY CAUSING THE PISTON BODY TO JAM AND THE VALVE WILL NOT SHUT OFF.

2) IF THE VALVE LEAKS BETWEEN THE BODY AND BONNET, LOOSEN THE COUPLING NUT AND TURN THE BODY SLIGHTLY, THEN TIGHTEN THE COUPLING NUT. IF THE VALVE STILL LEAKS, REPEAT THE OPERATION. IN NO CASE MUST THE NUT BE TIGHTENED EXCESSIVELY.

Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400
BMP700710/96081V (2 of 2)
Litho in U.S.A.

Parts List—Hays Electric Inlet Valves

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

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

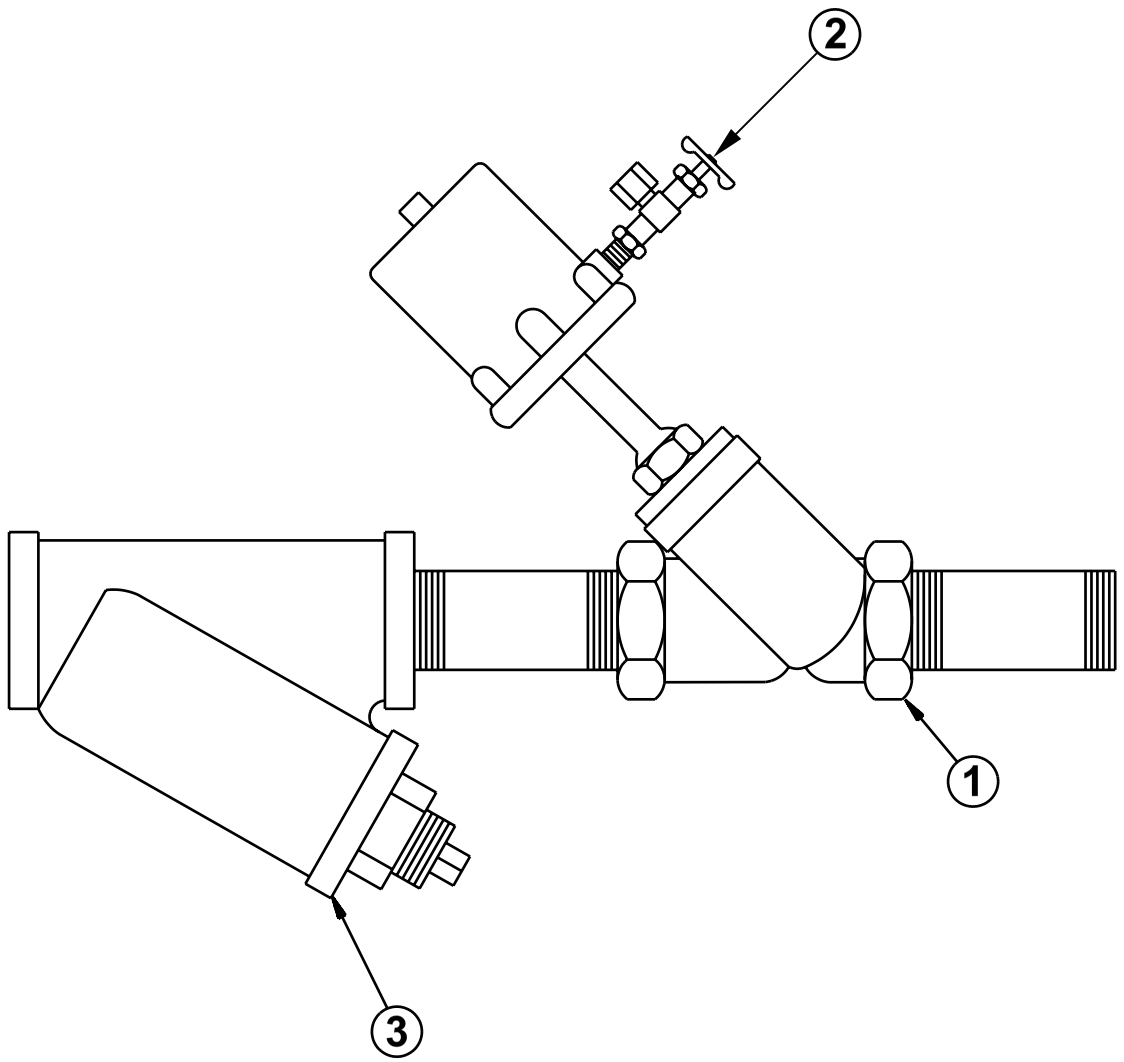
Parts List, cont.—Hays Electric Inlet Valves

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

Burket Steam Valve

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

Litho in U.S.A.



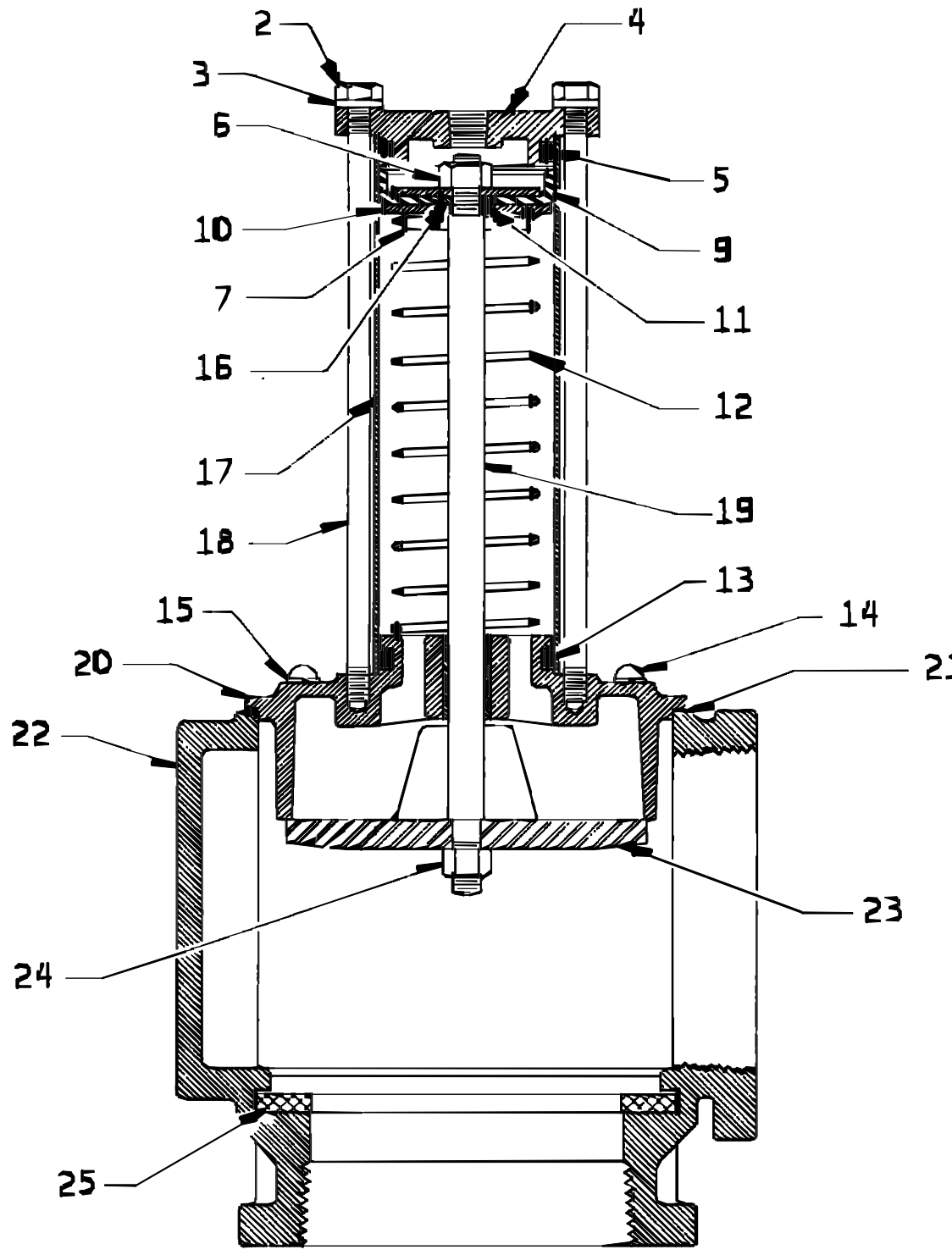
Parts List—Burket Steam Valve

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----------	
	W	96D0009ER1	02Z REPAIRKIT 3/4" STEAM VALVE	KIT FOR 001A
	X	96D0011ER1	02Z REPAIR KIT 1.25" STEAM VALVE	KIT FOR 001B
	Y	96D0011ER2	ACTUATOR HOUSING FOR BURKET #251	KIT FOR 001B
	Z	96D0011ER3	REPAIR KIT MULLER 1.25 VALVE #554	KIT FOR 001B
			----------COMPONENTS----------	
all	1	96D0009E	03Z 3/4"NPT N/C STEAMVAL ANGLE BODY	3/4"
all	1	96D0011E	08Z 1/25"NPT N/C STEAMVAL ANGLEBODY	1-1/4"
all	2	96H018	NEEDLE VALVE	
all	3	51T030	01Z Y-STRAINER 3/4" CAST IRON	USED WITH 001A
all	3	51T060	01Z Y-STRAINER 1+1/4" CAST IRON	USED WITH 001B

DUMP VALVE 3&4 INCH

BMP760078
78302B



3" & 4" Dump Valve Assembly

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

Litho in U.S.A.

Parts List—3" & 4" Dump Valve 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----------	----------
			none	
----------			----------COMPONENTS----------	----------
all	1	SA 09 038	3" DUMPVALVE,N.O.AIROP SCREWED CONN	(COMPLETE ASSEMBLY)
all	1	SA 14 023	4" DUMPVALVE,N.O.AIROP SCREWED CONN	(COMPLETE ASSEMBLY)
all	2	02 10585D	91142# TIE BOLT=5/16-18X7.875 PLTD	
all	3	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
all	4	02 02101	71334A CYLHEAD W/TAPPED HOLE	
all	5	60C132	ORING 2"ID 3/16CS BUNA 70 DURO #329	
all	6	15G220	02Z LTHX THIN LOKNUT 3/8-24 SSNTE	
all	7	02 18651	73171A WASHER=2WAY BRAKECYL	(3-INCH VALVE ONLY)
all	8	02 02085	75161A UP WASHER=2"OD=PISTONCUP	
all	9	02 02194	93217B PISTONCUP=DUMPVALVE 2+3/8"	
all	10	02 02105	91522A PISTON CUP WASHER STNLS STL	
all	11	60C106	ORING 5/16ID 1/16CS BN 70 DURO #011	
all	12	02 17023	83392B SPRING-SS=DUMP 1.5OD8FL21#/"	(3-INCH VALVE)
all	12	02 02110A	82367B SPRING=DUMPVAL=20P/IN=STRONG	
all	13	60C132	ORING 2"ID 3/16CS BUNA 70 DURO #329	
all	14	15N190	RDMACHSCR 1/4-20UNC2X1 SS18-8	(3-INCH VALVE)
all	14	15N186	HXCAPSCR 1/4-20UNC2X3/4SS18-8	(4-INCH VALVE)
all	15	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	16	02 02185	79237A WASHER=PISTON CUP COMP LIMIT	
all	17	02 02068	94266A AIRCYL-STAINLESS=DUMPVALVE	
all	18	02 10585D	91142# TIE BOLT=5/16-18X7.875 PLTD	
all	19	02 09108	94191A STEM=3"DUMPVALVE-8+3/4"LONG	(3-INCH VALVE)
all	19	02 16021	94191A STEM=DUMPVALVE 1/2"X10"LONG	(4-INCH VALVE)
all	20	X2 09107	87387B BONNET=3"DUMP VALVE	(3-INCH VALVE)
all	20	X2 14015	87326C BONNET=4"DUMPVALVE-CASTIRON	(4-INCH VALVE)
all	21	02 09111	83097A5 GASKET=3"DUMPVALVE BONNET	(3-INCH VALVE)

Pellerin Milnor Corporation
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Litho in U.S.A.

Parts List, cont.—3" & 4" Dump Valve Assembly

Used In	Item	Part Number	Description	Comments
all	21	02 14017	GASKET=4"DUMPVLV BONNET	(4-INCH VALVE)
all	22	X2 09160	87387D BODY=3"DUMP VALVE	(3-INCH VALVE)
all	22	X2 14164	87387D BODY=4"DUMP VALVE SCR CONN	(4-INCH VALVE)
all	23	02 09110	3"VALVEDISC CAD PLATED	(3-INCH VALVE)
all	23	02 14165	77441A DISC=4"RESILIENT DUMP-CAD PL	(4-INCH VALVE)
all	24	15G220	02Z LTHX THIN LOKNUT 3/8-24 SSNTE	
all	25	02 09161	77131A9 SEAT=3"DUMP VALVE	(3-INCH VALVE)
all	25	02 14166	77131A SEAT 4" DUMP VALVE BUNA-N	(4-INCH VALVE)

Section 4

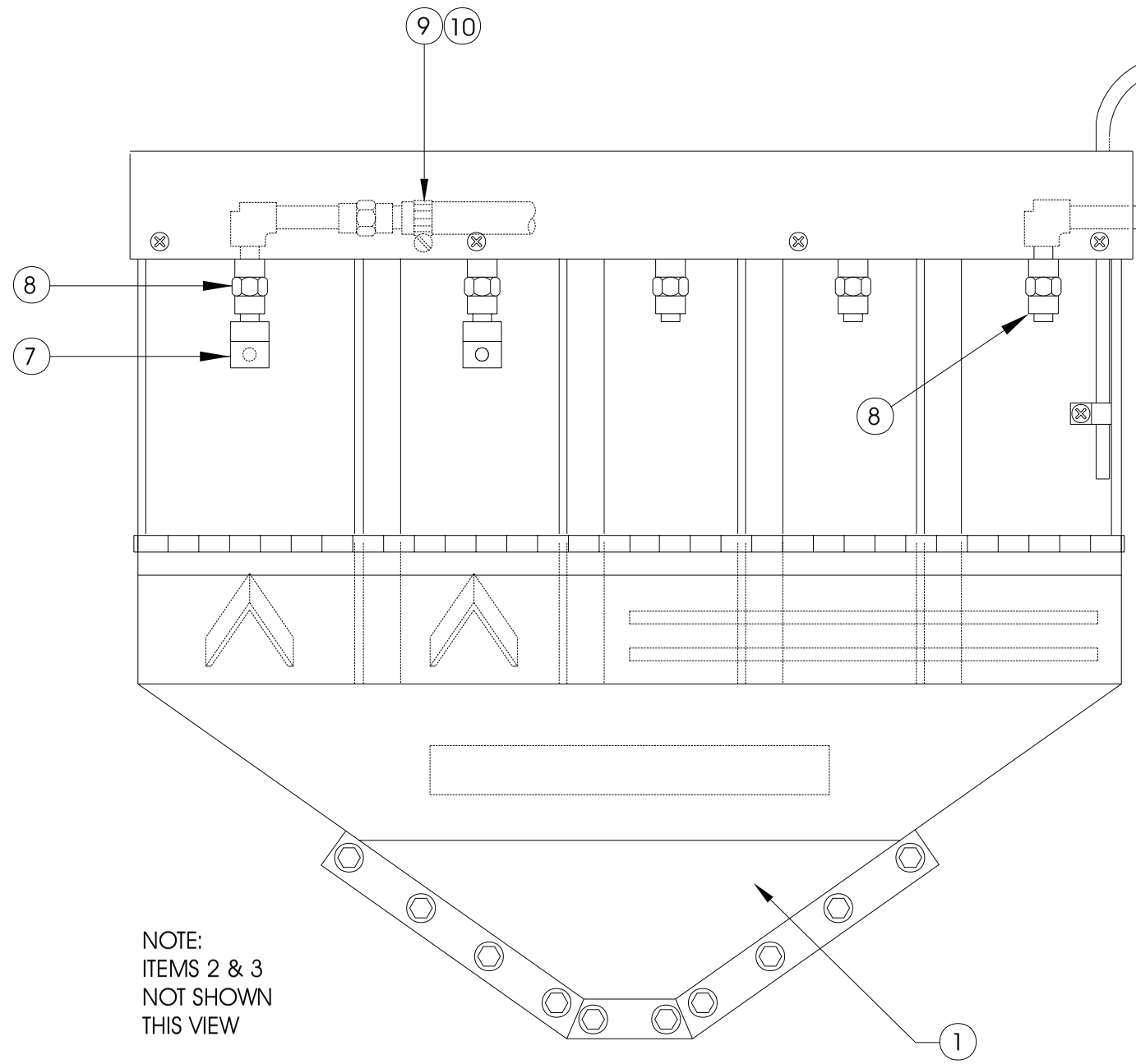
Chemical Supply Assemblies

5 Compartment Supply

36021BWP, 36021/36026/42026Qxx, 36026/42026Vxx

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

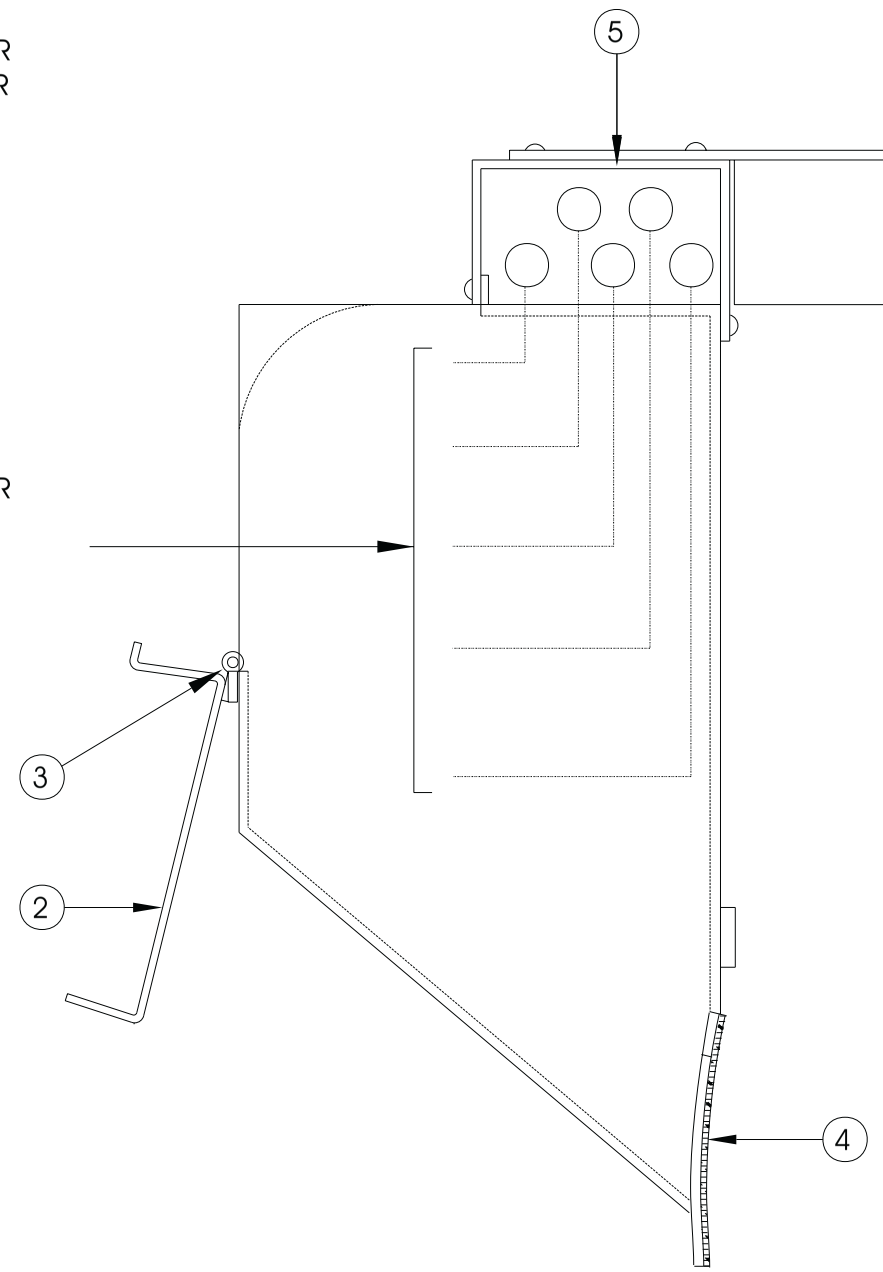
Litho in U.S.A.



FROM SUPPLY INJECTOR
WATER INLET, SEE WATER
SCHEMATIC.

9 10

FROM SUPPLY INJECTOR
FLUSHING MANIFOLD
ASSEMBLY
SEE BMP900019



Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400
Litho in U.S.A.

Parts List—5 Compartment Supply

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----------	
	V	GWS119002	INSTAL=SUPPLY INV ASSY RWP	42026Qxx, 42026V6J
	W	GWS14802	INSTAL=SUPPLY INJ ASSY 36RWP	3602136026Qxx 36026V5J,V7J
	X	AWS119001A	SUPPLY INJ ASSY 3621Q	V-W , 36021BWP
	Y	AWI11007A	MANIFOLD=5 FLUSH 36/42Q'S	X
	Z	SA 09 047	COVER=SUPPLY INJECTOR	X (CONTAINS ITEMS 2-3)
			----------COMPONENTS----------	
X	1	Y2 09096R	*SUP-CHOTE 5FLUSH RWP+	
Z	2	02 09182	LID=SUPPLY INJECTOR	
Z	3	02 09105	HINGE=VALVE ENCLOSURE STNSTL	
V,W	4	02 09113	SUPPLY CHUTE SHELL GASKET	
X	5	W2 11953	*WLDMT=INJECTOR TUBE ENCL RWP	
V	6	02 10266B	BRACE SUPPLY INJECTOR 42RWPE	
W	6	02 10266C	BRACE-SUPPLY INJECTOR 36RWPE	
	7	5SL0GBEL	NPTELB 45DEG STRT 3/8 BRASS125	
	8	5SCC0GBE	NPT COUP 3/8 BRASS 125# 103A-C	
	9	27A040	H0SE CLAMP 5/16-7/8 SS SCR	
	10	51E505	HOSESTEM BRASS 3/8H XMPT	

Flushing Manifold - 5 Compartmant Supply

36021F8P, 36021BWP, 36021/36026/42026Qxx, 36026V5J,V7J 42026V6J

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

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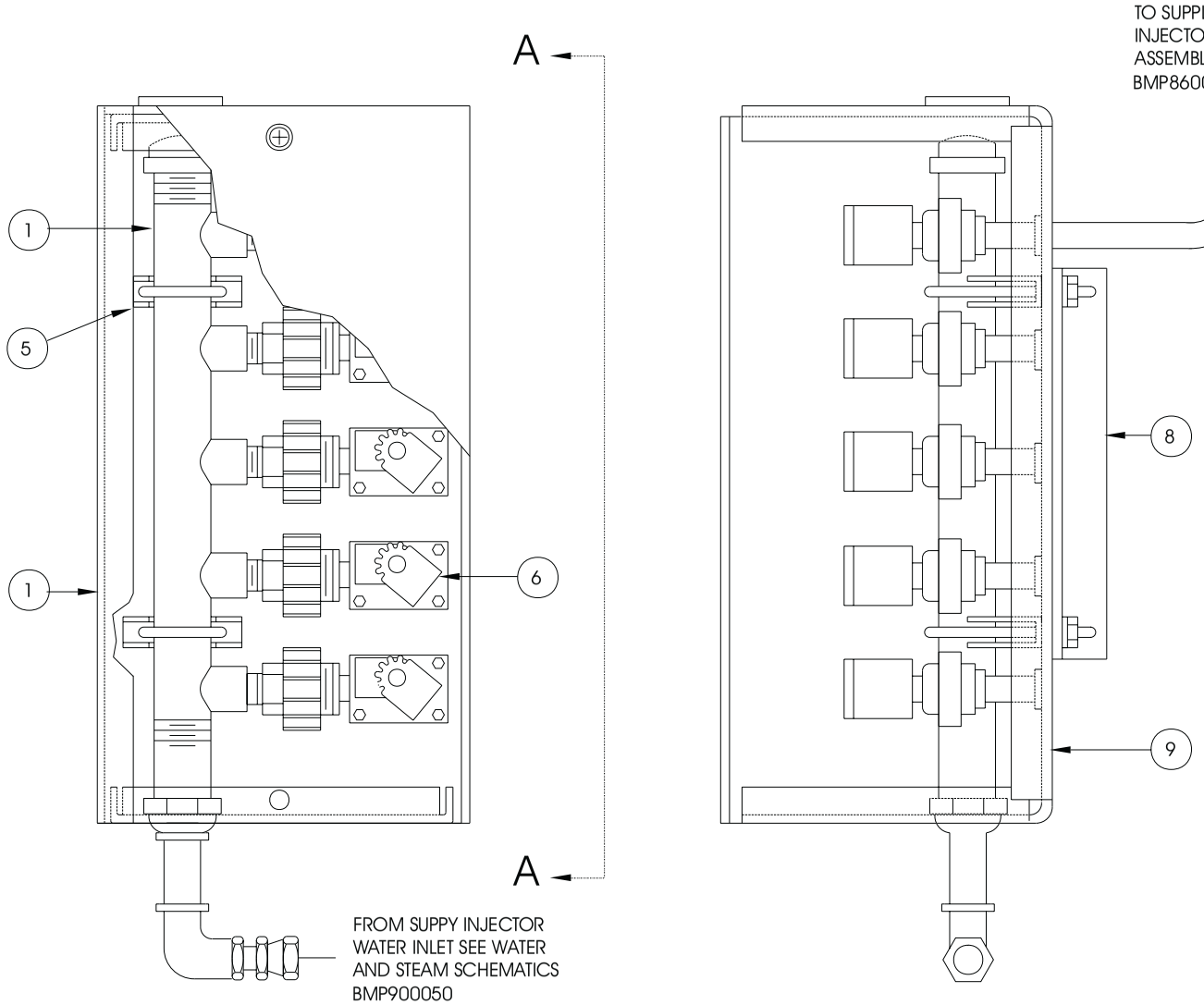
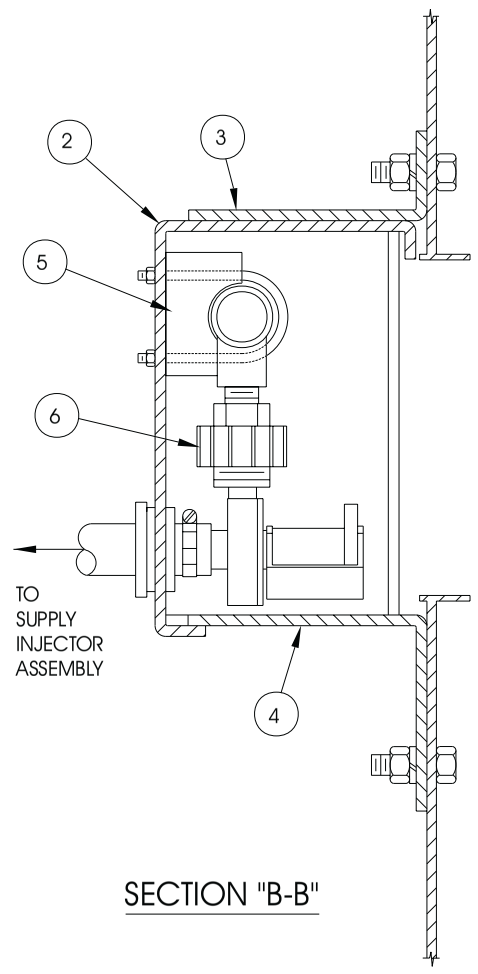


SECTION "A-A"



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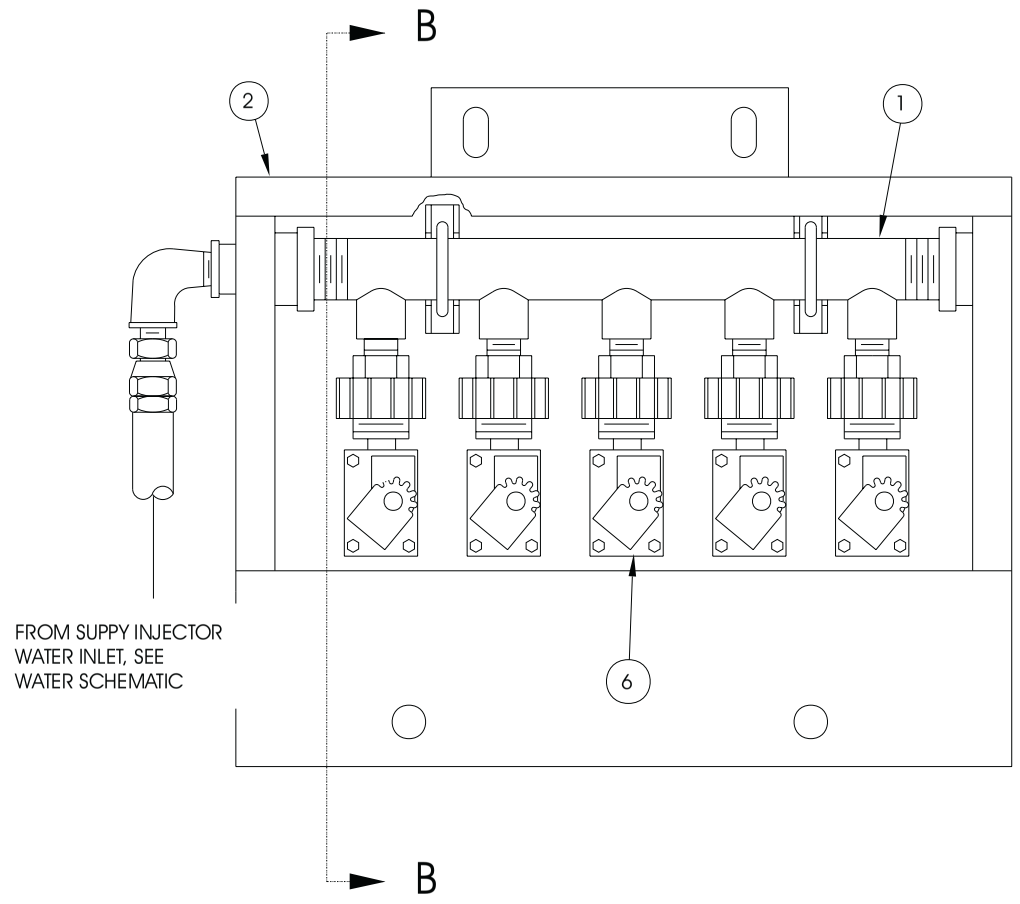

36021/36026/42026 Qxx
36026V5J, 42026V6J
36021BWP

36021F8P

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Parts List—Flushing Manifold

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----------	
	Y	AWI14001	ASSY=FLUSH MAN 5SUP F8P 120V	36021F8P
	Z	AWI11007A	MANIFOLD=5 FLUSH 36/42Q'S	36021/36026/42026QXX 36026V5J,V7J,42026V6J 3621BWP
			----------COMPONENTS----------	
	1	W2 11950S	*WLDMT=MAINFOLD-SUPPLY INJ SS	
Y	2	02 11952	HOUSING-SUPPLY VALVES	
Y	3	02 14730	+FLUSH MNT BRKT TOP	
Y	4	02 14730A	+FLUSH MNT BRKT BOTTOM	
	5	02 11954	BKT-3/4" PIPE SUPPORT	
	6	96P013G37	3/4" 2WAYPLASTCVAL 120V60C	
Z	7	02 11952	HOUSING-SUPPLY VALVES	
Z	8	02 14833	SUPPLY BRACE 3621 RWP	
Z	9	02 11955	REAR PL.-SUPPLY VALVE HSNG	

Section 5

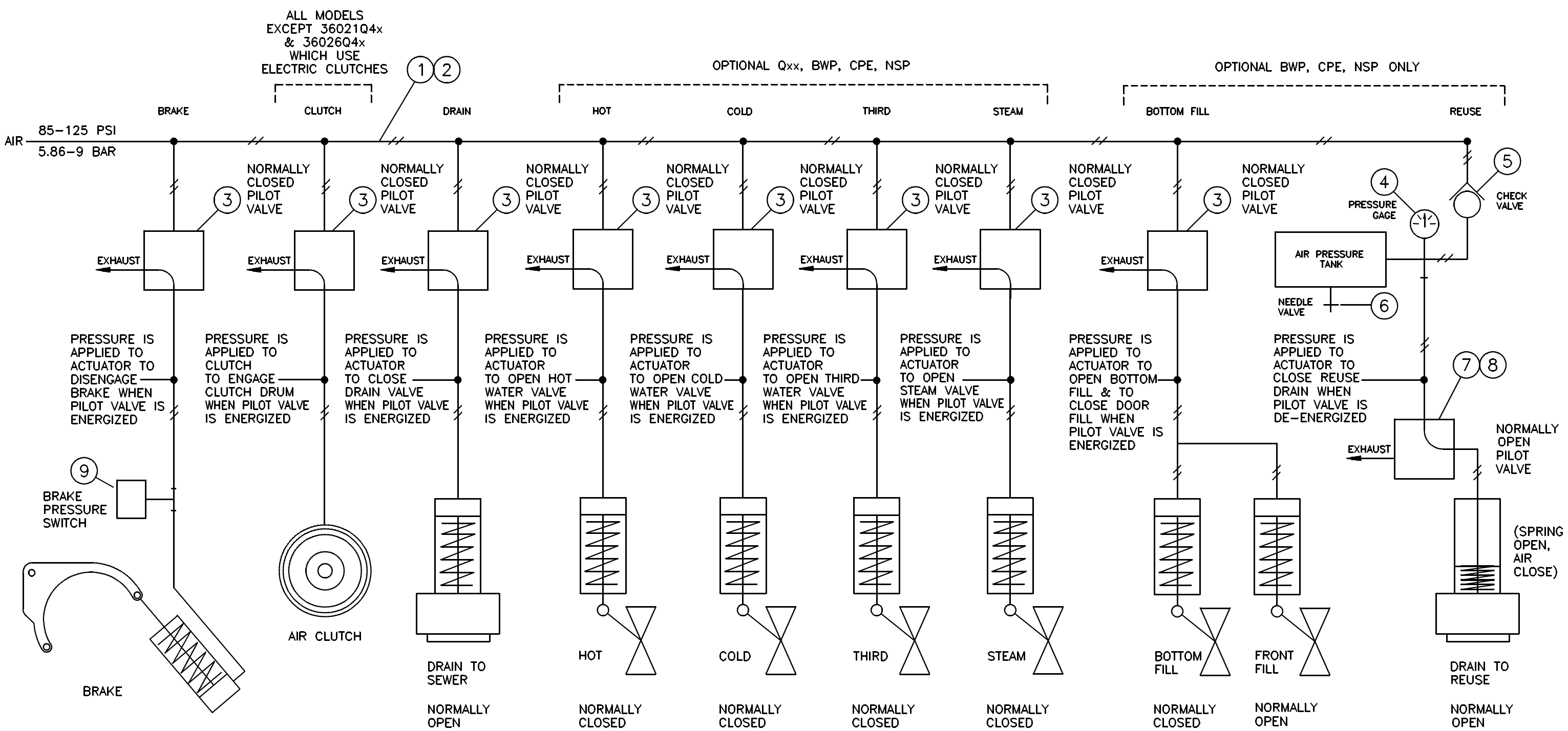
Pneumatic Assemblies

PELLERIN MILNOR CORPORATION
700 JACKSON STREET/POST OFFICE BOX 400
KENNER, LOUISIANA 70063-0400 USA

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

PNEUMATIC SCHEMATICS 36021Qxx,BWP,CPE,NSP 36026Qxx 42026Qxx

BMP900052/94491V (Page 1)



LITHO IN USA

PELLERIN MILNOR CORPORATION
700 JACKSON STREET/POST OFFICE BOX 400
KENNER, LOUISIANA 70063-0400 USA

PARTS LIST
(See other page for drawing.)

PNEUMATIC SCHEMATICS 36021Qxx,BWP,CPE,NSP 36026Qxx 42026Qxx

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00Z	AVA61BWP	90191N VALVE SET ASSY BWP/QUP	(REFERENCE)
001	X3 01507H	87231C MANIFOLD BLOCK MACH 10 PORT	
002	03 LF1X5K	88303C LOCK BAR=VALVE SET 10 STAT	
003	96R301A37	04Z 1/8" PILOT 3W-NC 110/50 120/60	
004	30N102	07Z PRESSGUAGE 1/4"BOTCONN 0-160PSI	
005	96D047AAK	06Z CHECK VALVE 1/4"DELT#CMMQ20B	
006	96H018	NEEDLE VALVE	
007	96R300ABM	78183@*NO VALVEBODY+HARDWARE	
008	96T1003A37	COIL 120V50/60C ASCO #162-919-1	
009	09N082A	12Z PRESSW NASON CLOSE @ 62 LB.	
		******** END OF PARTS LIST ********	

LITHO IN USA

SERVICING AIR CYLINDERS

This is the general procedure for rebuilding an air cylinder using a Milnor® furnished repair kit, once the air cylinder has been removed from the machine. See the specific air cylinder and major assembly parts drawing(s) for component identification and removal/replacement information.

Maintenance procedures require:

- Two threaded rods and nuts, twice the length of the tie bolts.
- The appropriate repair kit.

⚠ CAUTION ⚠

EXPLOSION HAZARD—Spring tension can cause air cylinder to burst apart with great force during dissassembly. You can be struck by air cylinder parts.

☞ **Follow maintenance instructions carefully.**

☞ **Wear eye protection.**

NOTE: Use a new locknut when re-assembling air cylinder (see the appropriate parts drawing).

1. Replace two diagonally opposite tie bolts with threaded rods and nuts as shown in FIGURE 1.

2. Tighten nuts on the threaded rods until they contact the air cylinder.

3. Remove the other two tie bolts and the nuts, washers, clips, and actuators from the external end of piston stem.

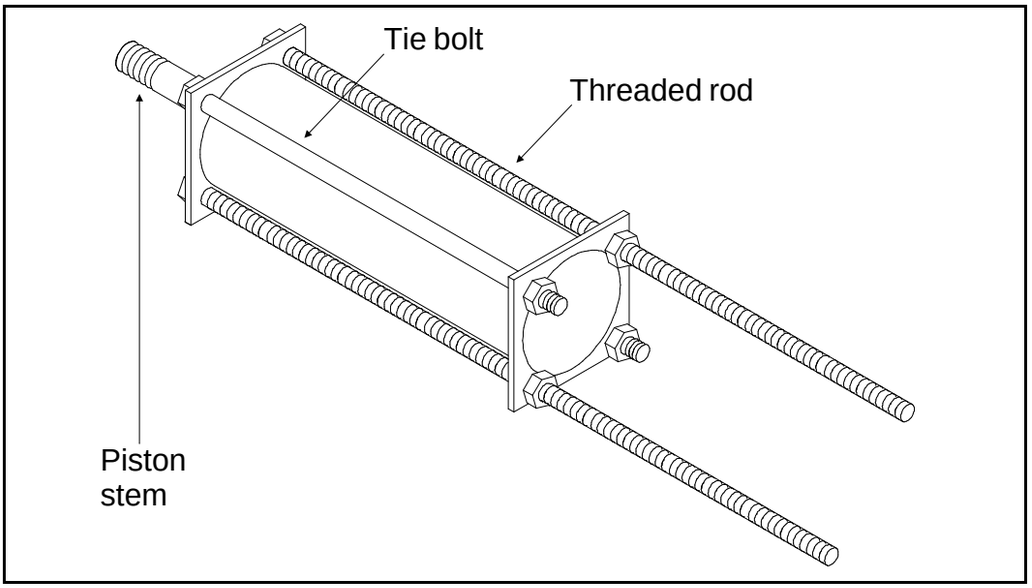


FIGURE 1 (MSSM0130AE)
Using Threaded Rods

4. Loosen nuts on threaded rods evenly, permitting cylinder heads to separate. Use only a few turns on one nut before moving to the other one. Continue until springs have no tension.

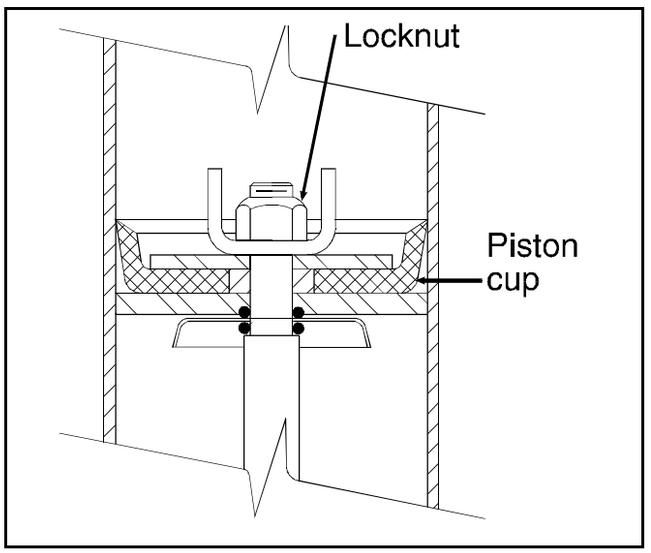


FIGURE 2 (MSSM0130AE)
Correct Piston Cup Shape

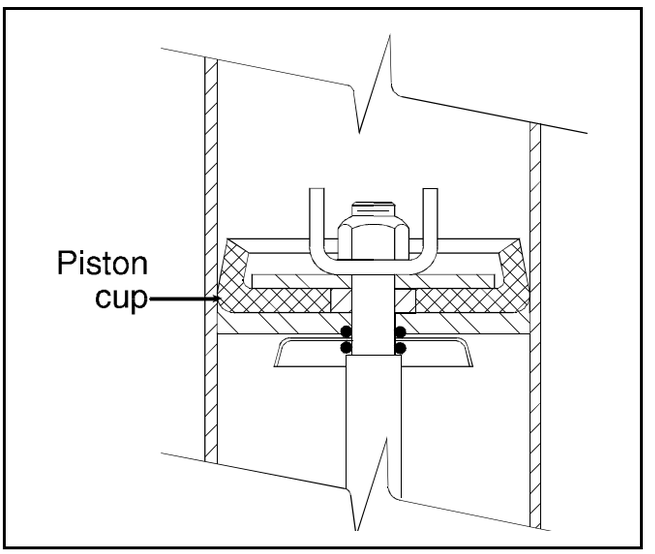


FIGURE 3 (MSSM0130AE)
Distorted Piston Cup Shape

5. Note position and orientation of piston cup(s), washers, and springs. Replace worn parts, then reassemble in reverse order. Tighten locknut until it is just barely possible to turn the piston cup and washer assembly on the stem. Correct piston cup shape is shown in FIGURE 2. **DO NOT** overtighten, as this causes the piston cup to deform to the shape shown in FIGURE 3 and may cause piston to bind in cylinder.

Air Cylinder Assemblies

Pellerin Milnor Corporation
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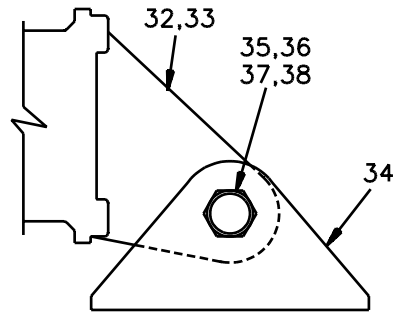
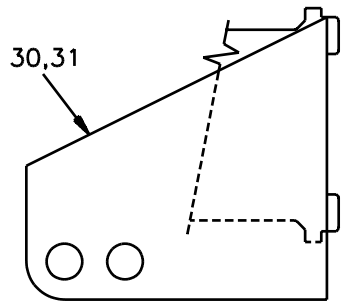
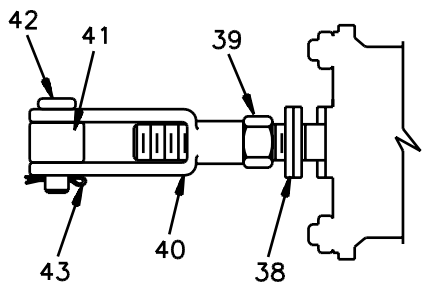
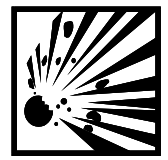




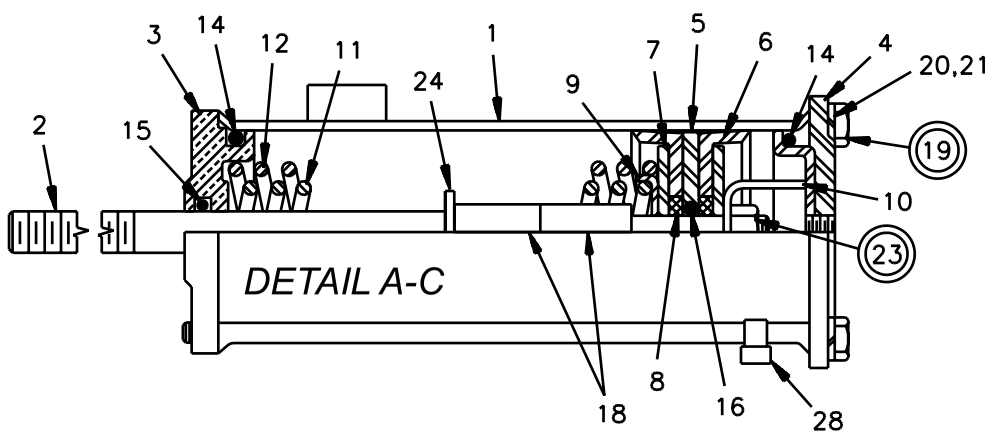


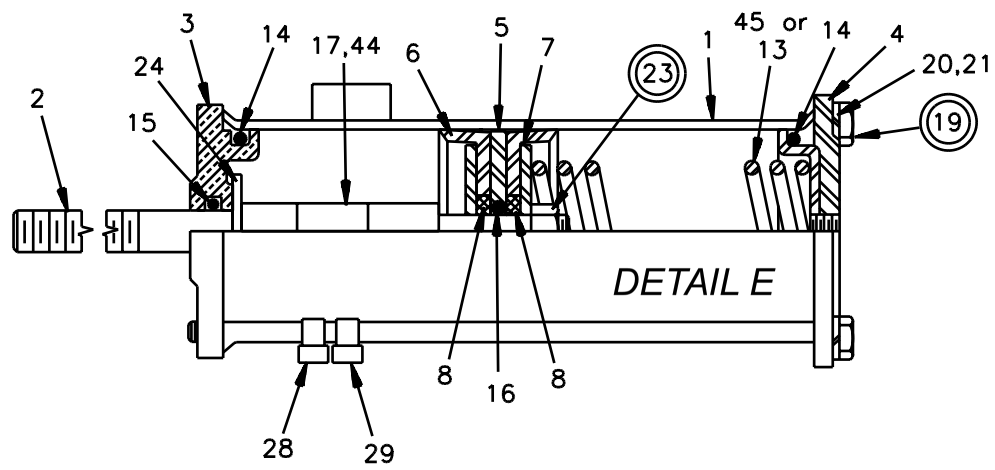
AIR CYLINDER MOUNTING HARDWARE

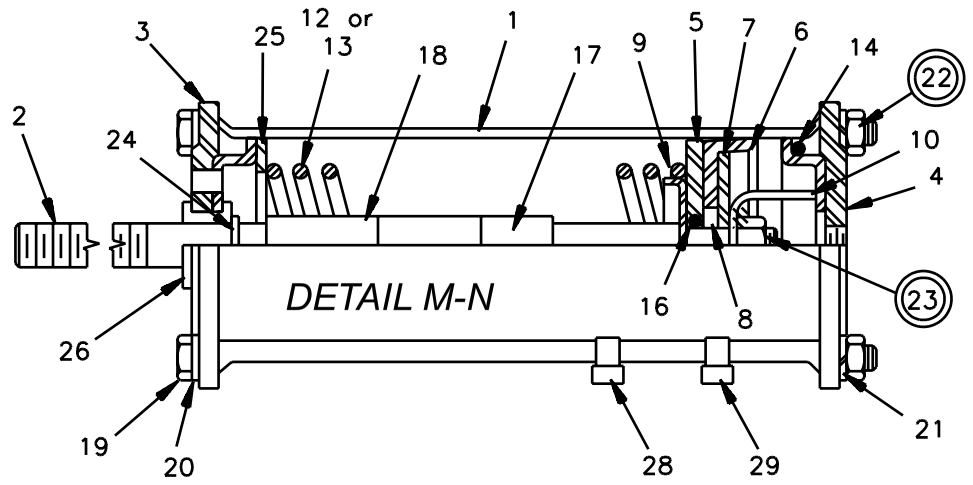
⚠ WARNING ⚠

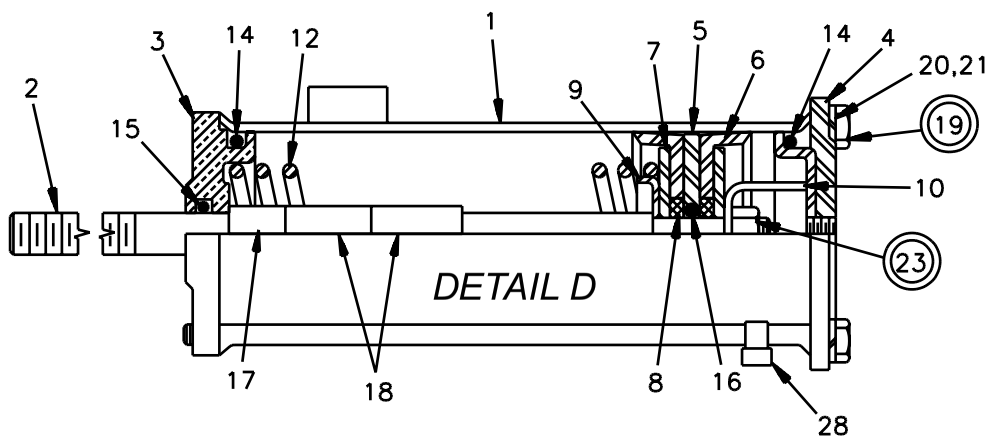


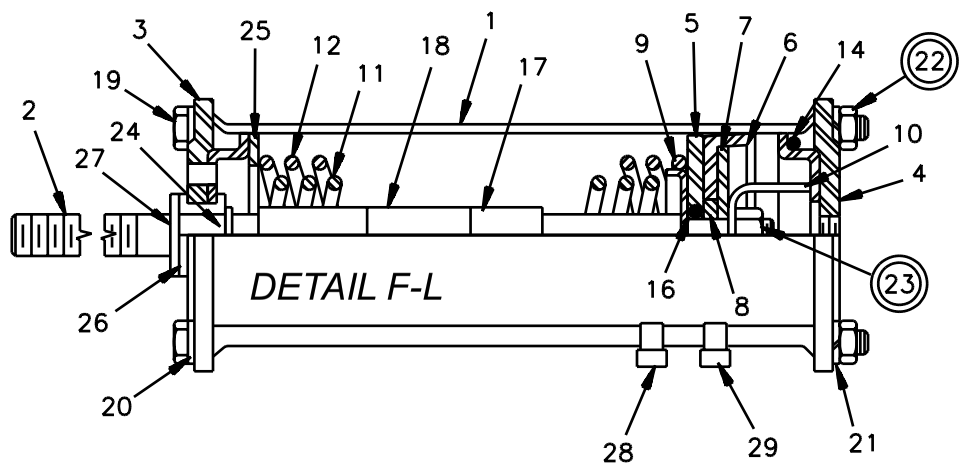
EXPLOSION HAZARD - Air cylinder can burst apart with great force.
Circled items are under high spring tension.
Follow maintenance instructions MSSM0130AE carefully.

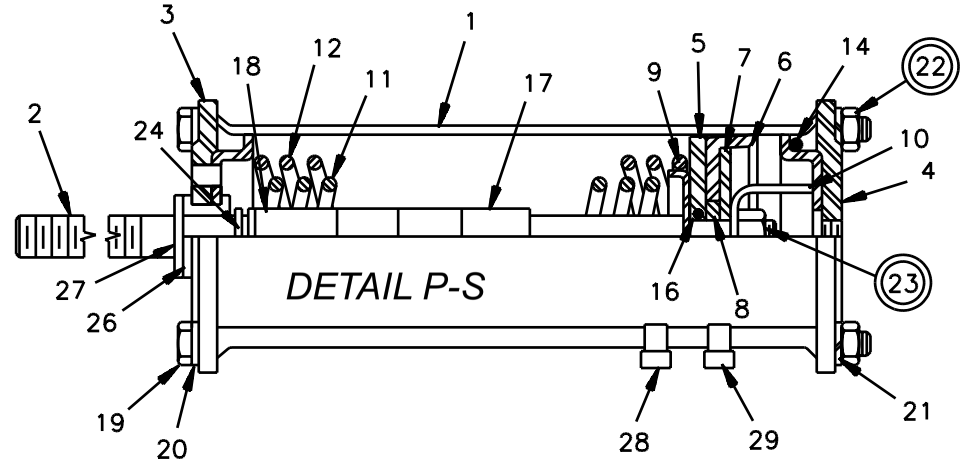












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Parts List—Air Cylinder Assemblies

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 36 035	89483V* AIRCYL=BRAKE ASSY	72WP2,WP3,WE3
	B	SA 28 128	89483T* BRAKE AIRCYL 2-WAY 60+72SGU	60+72SP2,SP3
	C	SA 28 152	89483V* BRAKE AIRCYL 2-WAY 60WE2+3	60WP2,WP3,D3A,DA3
	D	SA 10 019A	89483U* BRAKE AIRCYL,2-WAY=42WE+DAU	4231/4244 WP2/WP3 CP2/CP3 NP2/NP3 SP2/SP3
	F	A52 00200	89463U* BRAKE AIRCYL=7244 TILT ONLY	72DA1/L/N,DBN, WTL/N,WP1
	G	SA 10 019Q	89483T*BRAKE CYL ASSY=4226QWE+DYA	4226DP1,DA1,DYP,D5P
	H	AAC14001A	90000Z AIRCYL-LONG= 42S6PSG	3621+26Q6X 4226Q4X,Q6X
	I	A76AC001A	89463T AIR CYL.2-3/8 BORE 2"STROKE	5840TG2,TS1,TT1
	J	A76AC001B	89463@ AIR CYL.2-3/8 BORE 3"STROKE	5840TG2,TS1,TT1
	K	A75 01200	89463T*AIR CYL. DAMPER = 3"STROKE	5858+80TG1/2,TS1,TT1
	L	A75 01300	89463U*AIR CYL. DAMPER = 2"STROKE	5858+80TG1/2,TS1,TT1
	M	SA 10 019	89497U* BRAKE AIRCYL=BALCOM+DIVCYL	
	N	AAC14001	90041U*AIRCYL=RATE 50-91 STRK 2.09	3621F8P
	P	A25 00600	89457V* BRAKE AIRCYL=52WE1 +52TILT	52LWN/H,WTL/N,WP/E1,DYA
	Q	AAC64001	894613*AIRCYL=BRAKE ASSY 6442	64BTL,BTN,BHP, DA1,DAL,DAN
	R	AAC65001	93481B AIRCYL=BRAKE ASSY 6446E6N	6446,7246,7258,M7E 4244SP2 SM
	S	AAC58001	95000Z AIRCYL=BRAKE ASSY 7258J2N	7258J2N
			----------COMPONENTS----------	
A-D	1	W2 18646	93344L*CYLINDER-AIR=DOUBLEACT BRAKE	
F-S	1	02 02068	94266A AIRCYL-STAINLESS=DUMPVALVE	
A-D,F-G,S, I-K,M-Q	2	02 18650	96431B STEM=2 WAY AIRCYLINDER BRAKE	
H	2	03 06313A	96431# STEM=AIR CYL 304SS	
L	2	02 18650A	96417B STEM-AIRCYL.UPLOCK PRESS	
R	2	02 18650B	97362B STEM=2WAY AIRCYL BRAKE 7.88L	
A-D	3	02 18660	CYLHEAD-BRASS=2WAY AIRCYL	
F-Q	3	02 02546	CYLHEAD=SLIDESTEM	
R	3	06 20702E	91227B FLOW NOT ACTUATOR CYL HEAD	
S	4	02 02101	71334A CYLHEAD W/TAPPED HOLE	
ALL	5	02 02105	91522A PISTON CUP WASHER STNLS STL	
S	5	02 02105B	92253B 2.38"ACYL BRASS PISCUP WASHR	
ALL	6	02 02194	93217B PISTONCUP=DUMPVALVE 2+3/8"	
ALL	7	02 02085	75161A UP WASHER=2"OD=PISTONCUP	

Parts List, cont.—Air Cylinder Assemblies

Used In	Item	Part Number	Description	Comments
ALL	8	02 02185	79237A WASHER=PISTON CUP COMP LIMIT	
A-D,F-Q,S	9	02 18651	73171A WASHER=2WAY BRAKECYL	
A-D,F-Q,S	10	03 01313	70219A STOP=AIR CYL W/2+11/16STROKE	
A-C,F-L,P-Q S	11	02 15880	96471B SPRING=BRAKE1.5OD10.3FL17#/"	
A,D,F-M,Q,S	12	02 15881	96471# SPRING=BRAKE2.1OD11FL15.5#/"	
N	13	02 17023	83392B SPRING-SS=DUMP 1.5OD8FL21#/"	
ALL	14	60C132	ORING 2"IDX3/16CS BUNA70 #329	
A-D	15	60C110	ORING 1/2IDX3/32CS BUNA70 #112	
ALL	16	60C106	ORING 5/16ID 1/16CS BUNA70#011	
D,G-J,L-N Q,S	17	27B240	SPCRROLL.5ID.813L.062T STLZNC	
A,C-D,F-Q,L S	18	27B250	SPCRROLL.5ID1.5L.062T STLZNC	
S	19	02 10585E	91142# TIE BOLT=5/16-18X8.25LG PLTD	
ALL	19	02 10585E	91142# TIE BOLT=5/16-18X8.25LG PLTD	
R ONLY	19	W6 20702F	90293B*FLOW NOT VLV=AIR-CYL ROD WLD	
ALL	20	15U200	FLATWASHER(USS STD) 5/16"ZNC PLT	
ALL	21	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
F-Q	22	15G185	HXNUT 5/16-18UNC2B SAE ZINC GR2	
ALL	23	15G220	02Z LTHX THIN LOKNUT 3/8-24 SSNTE	
A,C,F-G,I-J L,Q,S	24	15U243	FLAWASHER 7/8ODX33/64IDX16GA ZINCPL	
F-N	25	15U520	FLAT WASHER 2+3/8X1+41/64X12GA ZINC	
F-Q,S	26	54E220	NYLNR 8L2FF BUSH 1/2X9/16X.140	
F,K,I-J,Q,S	27	17B012	EXTRETRING IND#1000-50-ST-ZD ZINC	
A	28	20L601R	ID TAG NAT'L #1614 ALUM EMB LET "R"	
B	28	20L601U	ID TAG NAT'L #1614 ALUM EMB LET "U"	
C	28	20L601P	ID TAG NAT'L #1614 ALUM EMB LET "P"	
D	28	20L601X	ID TAG NAT'L #1614 ALUM EMB LET "X"	
S	28	20L601J	ID TAG NAT'L #1614 ALUM EMB LET "J"	
F,H,Q,S	28	20L601A	ID TAG NAT'L #1614 ALUM EMB LET "A"	
G	28	20L601Q	ID TAG NAT'L #1614 ALUM EMB LET "Q"	
M	28	20L601F	ID TAG NAT'L #1614 ALUM EMB LET "F"	
N	28	20L601D	ID TAG NAT'L #1614 ALUM EMB LET "D"	
P	28	20L601V	ID TAG NAT'L #1614 ALUM EMB LET "V"	
K	28	20L601V	ID TAG NAT'L #1614 ALUM EMB LET "V"	
I-J,L	28	20L601E	ID TAG NAT'L #1614 ALUM EMB LET "E"	
F,I-L	29	20L601A	ID TAG NAT'L #1614 ALUM EMB LET "A"	
G-H	29	20L601F	ID TAG NAT'L #1614 ALUM EMB LET "F"	

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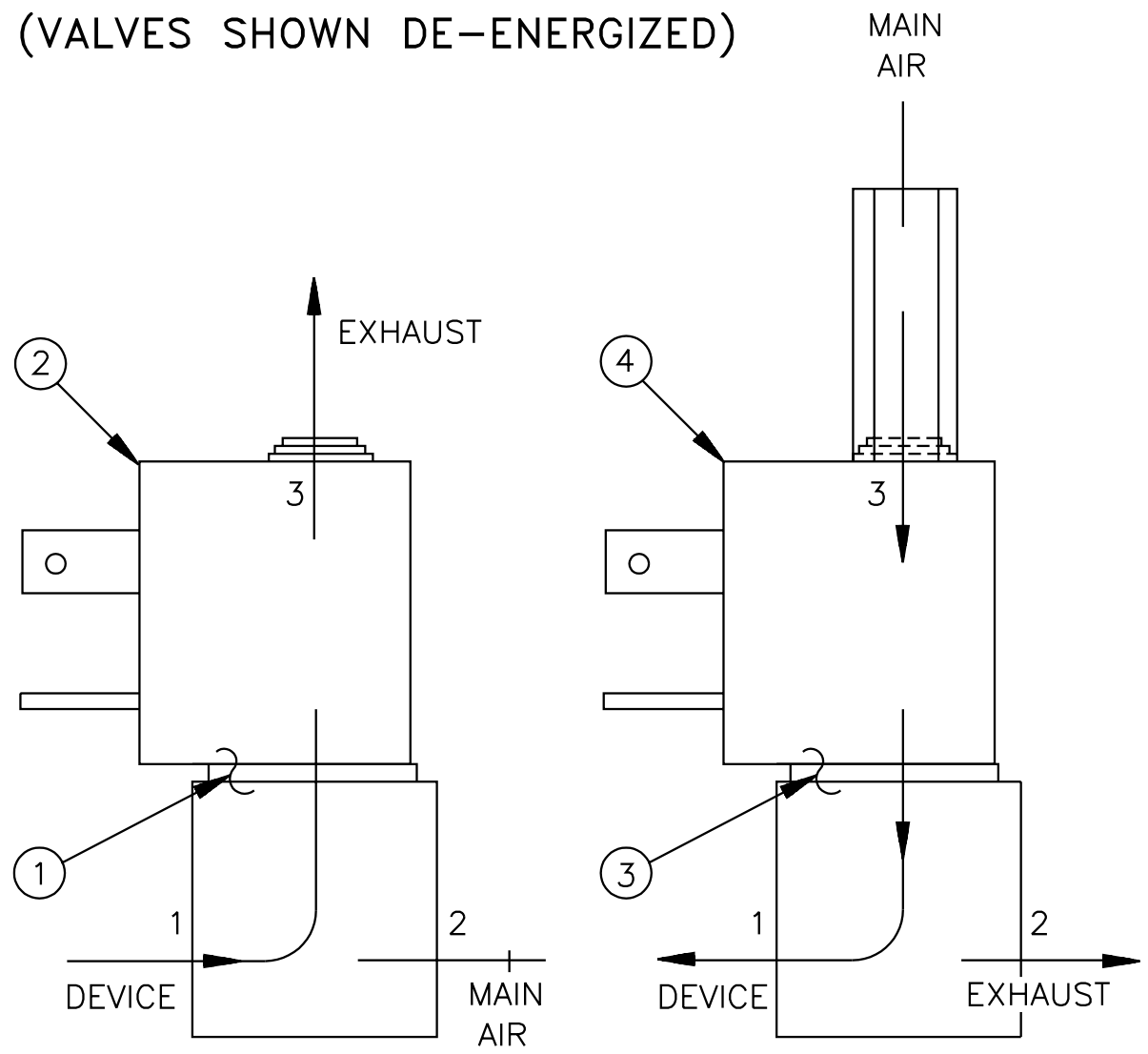
Parts List, cont.—Air Cylinder Assemblies

Used In	Item	Part Number	Description	Comments
N	29	20L601C	ID TAG NAT'L #1614 ALUM EMB LET "C"	
Q	29	20L601D	ID TAG NAT'L #1614 ALUM EMB LET "D"	
ALL	30	03 06309	70310C RIGHTMOUNT=BRAKE CYL ZNC	RIGHT
ALL	31	03 06308	70310C LEFTMOUNT=BRAKE CYL ZINC	LEFT
ALL	32	02 02550	97437ABRKT=AIRCYL-RIGHT ZINC/CAD	RIGHT
ALL	33	02 02547	LT BRACKET=AIRCYL CAD	LEFT
ALL	34	02 02556	SUPPORT=AIRCYL CADSTL	
ALL	35	27B2750L0T	01Z SPC RROLL.562ID.937L.048T ZNK	
ALL	36	15K206	HEXCAPSCR M5-.8X40MM 18-8SS	
ALL	37	15G235F	HXFNJAMNUT 9/16-12UNC2B ZINC GR2	
ALL	38	15U280	01Z FL+WASHER(USS STD)1/2 ZNC PL+D	
ALL	39	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
ALL	40	17A020	ADJ CLEVIS MACHINED 1/2-13 ZINC PLT	
ALL	41	17A065	01Z EYEEND 1/2-13 X2.25 ZINC	
ALL	42	17A040	CLEVISPIN 1/2"X1+3/8" DRILLED	
ALL	43	15H030	STDCOTTERPIN 3/32X3/4 ZINCPL	
ALL	44	27B34010SZ	SPCRROLL.512ID.625L.062T STLZC	
ALL	45	02 17024	94302B SPRING-SS=DUMP 1.5OD4FL40#/"	

3-Way Pilot Valves

Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400
BMP900032/91182V (1 of 1)
Litho in U.S.A.



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

Parts List—3-Way Pilot Valves

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
			none	
			----------COMPONENTS----------	
all	1	96R301A37	05Z 1/8" AIRPILOT 3W NC 120V50/60	
all	1	96R301A24	06Z 1/8" AIRPILOT 3W NC 24V50/60	
all	3	96R302A37	06Z 1/8" AIRPILOT 3W NO 120V50/60	
all	3	96R302A24	07Z 1/8" AIRPILOT 3W NO 24V50/60	

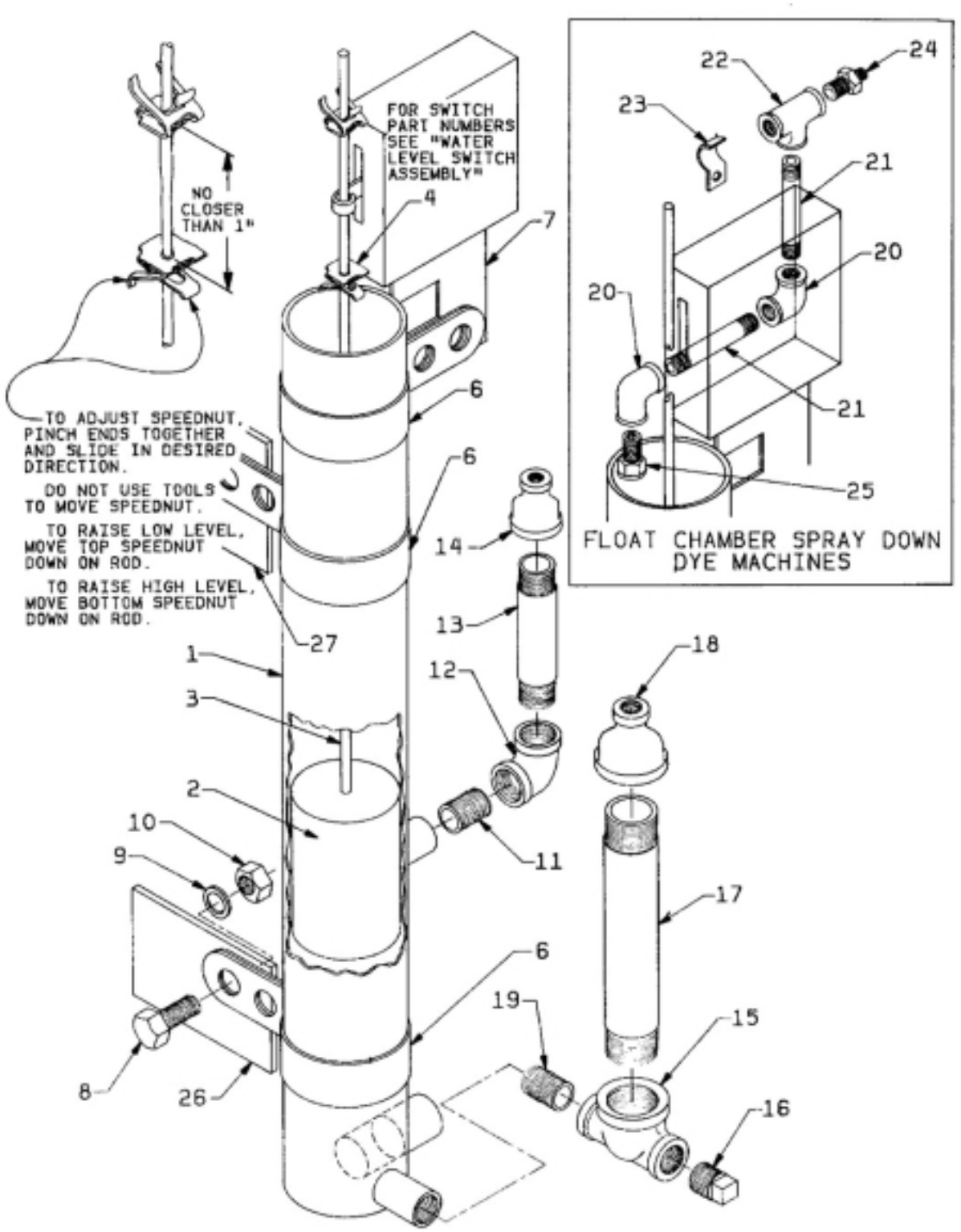
Section 6

Control and Sensing Assemblies

Water Level Float Chamber

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

Litho in U.S.A.



Parts List—Water Level Float Chamber

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	A03 03100	FLOAT CHMBR ASSY=8.25"CLDCON	
	B	ALL11001	*FLOAT CHAMBER INSTAL=4226QHE	
	C	A14 07200C	$ ASSY=FLOAT SPRAY 42DAZ	DYE TANKS
	D	ALL48001	*FLOAT CHAMBER ASSY 4832-36	4832,4836
	E	AD 14 046	*FLOAT CHMBR INSTAL=35#+60#W	3621CPE,BWP
	F	AD 15 047	FLOAT CHMBR 25.25ASY=42+72WE	4231,4244
	G	ALL11000	*FLOAT CHMBR 33.25ASSY=4226Q	4226Q
	H	G28 18700A	FLOAT CHAMBER 25.25 INST=60"	6044
	I	G36 07500A	FLOAT CHAMBER 25.25 INST=72"	7244
	J	G25 02600A	FLOAT CHAMBER INSTAL=5238	5238
	K	GLL64002	FLOAT CHAMB=FRAME INSTL 64NP	6446
	L	ALL64002	FLT CHAMBR ASSY64NP W/90D 1N	6446
			----------COMPONENTS----------	
alL	1	W2 14432	* FLOAT-TUBE L=25.25"	
alL	1	X2 14432K	FLOAT CHAMBER 96"LG REUSE	FOR USE WITH REUSE SUMP
alL	1	W2 14432M	*FLOAT CHAMBER-33.25"W/90DIN	
AlL	2	X2 02239	FLOAT=PLAST LVL CONT(SANDED)	TO ORDER SEE ITEMS 30+31
alL	3	02 02146	LEVEL CONTROL FLOAT ROD=25"L	TO ORDER SEE ITEM 30
alL	3	02 02146E	LEVEL CONTROL FLOAT ROD=66"L	TO ORDER SEE ITEM 31
alL	3	02 02146B	COUPLING=FLOAT ROD	FOR USE WITH REUSE SUMP
alL	4	17N050	10-24 SPEDNUT #C10733-1024-373	TO ORDER SEE ITEMS 30+31
alL	6	02 15642A	CLAMP-3"FLOAT CHAMBERED	
alL	7	02 15097C	BRACKET LEVCONT PER PRINT	
alL	8	15K039	HXCAPSCR 1/4-20UNC2AX3/4 GR5 Z	
alL	9	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
alL	10	15G165	HXNUT 1/4-20UNC2BSAE ZC GR2	
alL	11	5N0KCLSG42	NPT NIP 1/2XCLS TBE GALSTLSK40	
alL	12	5SL0KNFA	NPTELB 90DEG 1/2 GALMAL 150#	COOLDOWN OPT.
alL	13	5N0K04AG42	NPT NIP 1/2X4 TBE GALSTL SK40	COOLDOWN OPT
alL	14	5SR0K0CNF	NPT RED 1/2X1/8 GALMAL 150#	COOLDOWN OPT.
alL	15	5S0KNFA1A	NPT TEE 1/2X1/2X1" GALMAL 150#	4226,4832,4836,6442
alL	16	5SP0KGFSS	NPT PLUG 1/2 SOSOLID GALSTL	4226,4832,4836,6442

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Parts List, cont.—Water Level Float Chamber

Used In	Item	Part Number	Description	Comments
alL	17	5N1A07AG42	NPT NIP 1X7 TBE GALSTL SK40	4226,4832,4836,6442
alL	18	5SR1A0ENF	NPT RED 1X1/4 GALMAL 150#	4226,4832,4836,6442
alL	19	5N0KCLSG42	NPT NIP 1/2XCLS TBE GALSTLSK40	4226,4832,4836,6442
alL	20	5SL0EBEA	NPTELB 90DEG 1/4 BRASS 125#	SPRAY-DOWN /DYE MACHINES
alL	21	5N0E03KBE2	NPT NIP 1/4X3.5 TBE BRASS STD	SPRAY-DOWN /DYE MACHINES
alL	22	51V015	TEE 1/4 FGDBRASS 101T7-444	SPRAY-DOWN /DYE MACHINES
alL	23	12P014KK	CABLE CLMP NONMTL 1/2IDX1/2WID	SPRAY-DOWN /DYE MACHINES
alL	24	53A008B	BODYMALECON.25X.25COMP#B68A-4B	SPRAY-DOWN /DYE MACHINES
alL	25	27A003	NOZZLE 1/4" BRASS SQUARE PATTE	SPRAY-DOWN /DYE MACHINES
alL	26	02 10506	BRACKET-BOTTOM FLOAT=CHAMBER	3016,3621
alL	26	02 15663	BRKT=FLOAT CHAMBER MTG	4231,4241,7244
alL	26	02 15649	BRKT=FLOAT CHAMBER MTG	6036,6044
alL	26	03 25298A	FLOAT CHAMBER BRACK	4832,4836,6442
AlL	27	02 10505	BRACKET=TOP FLOATCHMBR+$8 SU	3016,3621
alL	27	02 15649	BRKT=FLOAT CHAMBER MTG	4231,4241,6036, 6044,7244
alL	27	08 01065	BRACKET=LEVEL CNTRL MT 90DEG	4226DYA
alL	27	03 25298A	FLOAT CHAMBER BRACK	4832,4836,6442
alL	30	SA 02 011	*FLOAT ASSY L=25"-STD LEVEL	ITEMS 002,003A,004
alL	31	SA 02 011B	*FLOAT ASSY L=66" 42DA+52DYA	ITEMS 002,003B,004

Used In	Item	Part Number	Description	Comments

Water Level Switch Assembly

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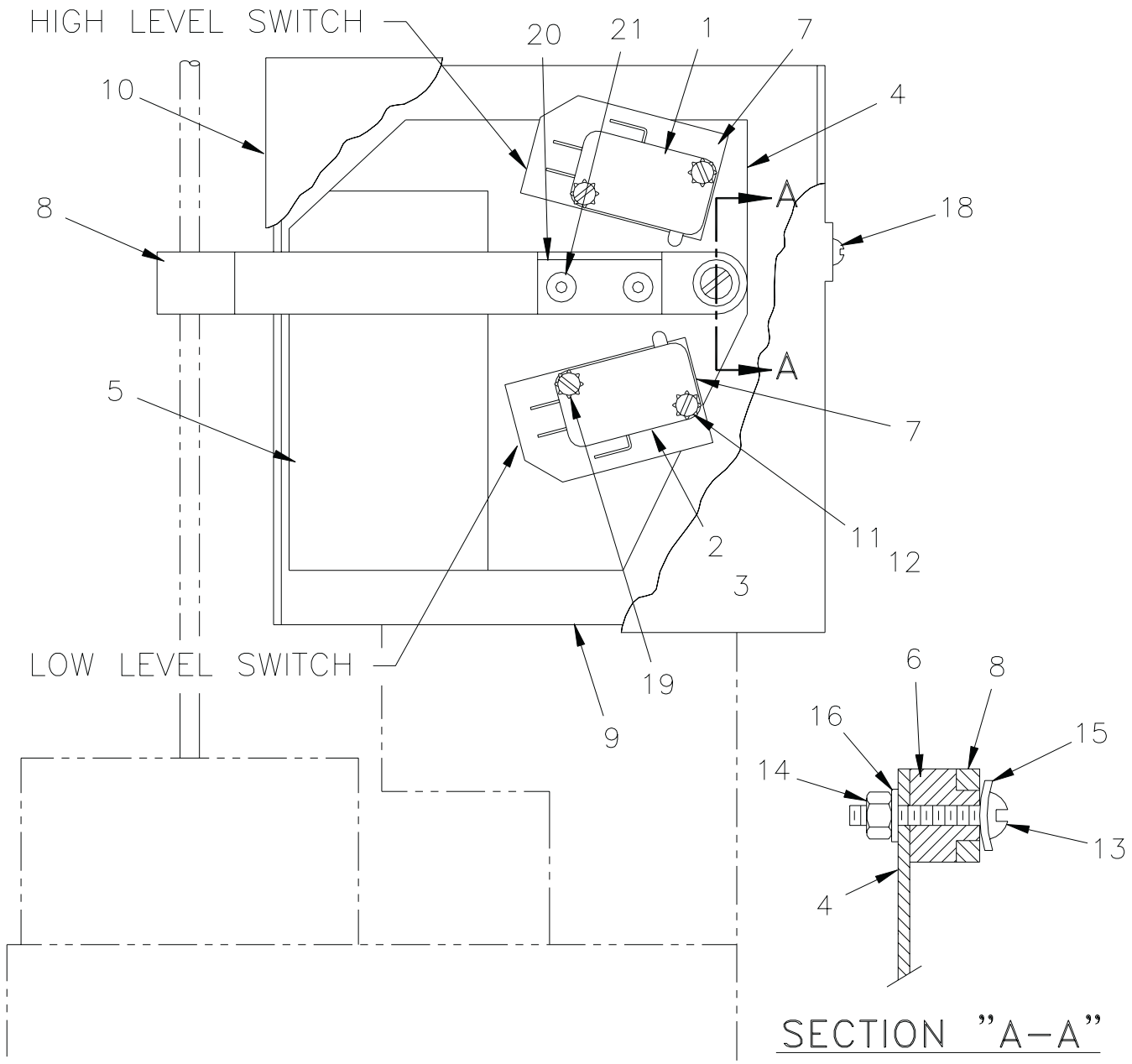
Notes:
1. Disconnect power at main switch before operating this enclosure.
2. Wiring must not interfere with movement of item 8.
3. To order complete water level switch assembly, see items A-G.
4. When item 20 is used in assembly G, flange will be on top (shown). When item 20 is used in assembly F, flange will be on bottom.



Parts List—Water Level Switch 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	ELL000MK1	*LIQUOR LEVEL SW ASSY CBW	1 UP + 0 LO
	B	ELL000MK2	*WATER LEV SW ASSY: 1 UP+ 1LO	1 UP + 1 LO
	C	ELL000MK2A	*CONVEYOR E-STOP ASSY 1UP-1DN	1 UP + 1 LO
	D	ELL000MK2S	*MK2 WATER LEVE SWITCH ASSYSS	1 UP + 1 LO SS
	E	ELL000MK3	WATER LEV SW ASSY:0 UP +1 LO	0 UP + 1 LO
	F	ELL000MK4	*WATER LEV SW ASSY:1 UP +2 LO	1 UP +2 LO
	G	ELL000MK5	$WATER LEV SW:2UP +1LO	2 UP + 1 LO
			COMPONENTS	
A-D,F-G	1	09R014A	MINI-SW SPDT STAKON #V15G1C26K	
B-G	2	09R014A	MINI-SW SPDT STAKON #V15G1C26K	
F-G	3	09R014WS	MICROSW SPDT STAKON V3-2101-D8	
004-C,E-G	4	02 02150M	SW MOUNTPLATE=LEVCONT ZINCPL	
D only	4	02 02150S	PLATE=SWITCH MNT LEVEL S/S	
all	5	01 10227	LABEL=WATER LEVEL SWITCH ASMB	
all	6	02 02152	BUSHING=FLOAT LEVER	
all	7	02 02164	INSULATION=V3-1 MICROSWITCH	
all	8	02 02190	FLOATLEVER=LEVEL SW	
A-C-E-G	9	02 02553	BASE=LEVEL CONTROL	
D only	9	02 02553S	BASE=LEVEL CONTROL ENCL S/S	
A-B-E-G	10	02 02554	COVER=LEVEL CONTROL-PLTD	
C only	10	02 02554A	COVER=CONVEYOR E-STOP-PLATED	
D only	10	02 02554S	WATER LEVEL CONTROL ENCL S/S	
all	11	15N019	RDMACSCR 4-40UNC2AX5/8 ZINC GR	
all	12	15U021	LOKWASH EXTOOTH #4 (US STD) ZI	
A-C,E-G	13	15N055	RDMACHSCR 6-32UNC2AX5/8 ZINC G	
A-C,E-G	14	15G070	HXMACHSCRNUT 6-32UNC2B ZINC GR	
D	14	15G075	HEX MACH SCREW NUT 6-32UNC2 S	
all	15	15U060	FLAT WASHER#6 ANSI TYPEB BRASS	
A-C,E-G	16	15U100	LOKWASHER MEDIUM #6 ZINCPL	
D only	16	15U102	LOCKWASHER MEDIUM #6 SS18-8	
A-C,E-G	17	15P105	TRDCUT-F PANHD 8-32X5/8 NIKSTL	
D only	17	15P103	TRDCUT-F RDHDSLOT 8-32UNCX1/2	
all	18	15P100	#8 X 3/8 PHILPANHD TYPE B SMS	
F-G only	19	15N021	RDMACSCR 4-40 UNC2X1 ZINC PLT	
F-G only	20	03 01462C	ANGLE=H20 LEVEL ACTUATOR	
F-G only	21	15J051	POPRIVET 1/8DIAX.265 LONG S/S	

Pressure Regulators

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BMP900031/96081V (1 of 2)
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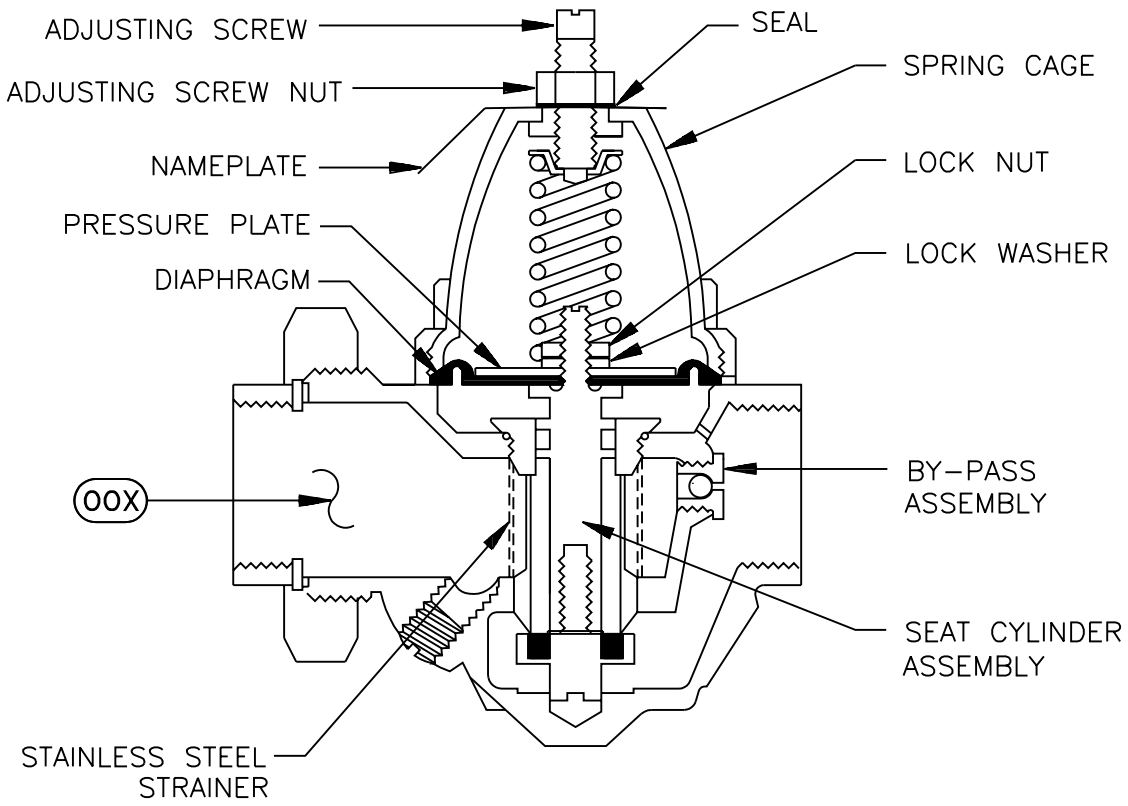


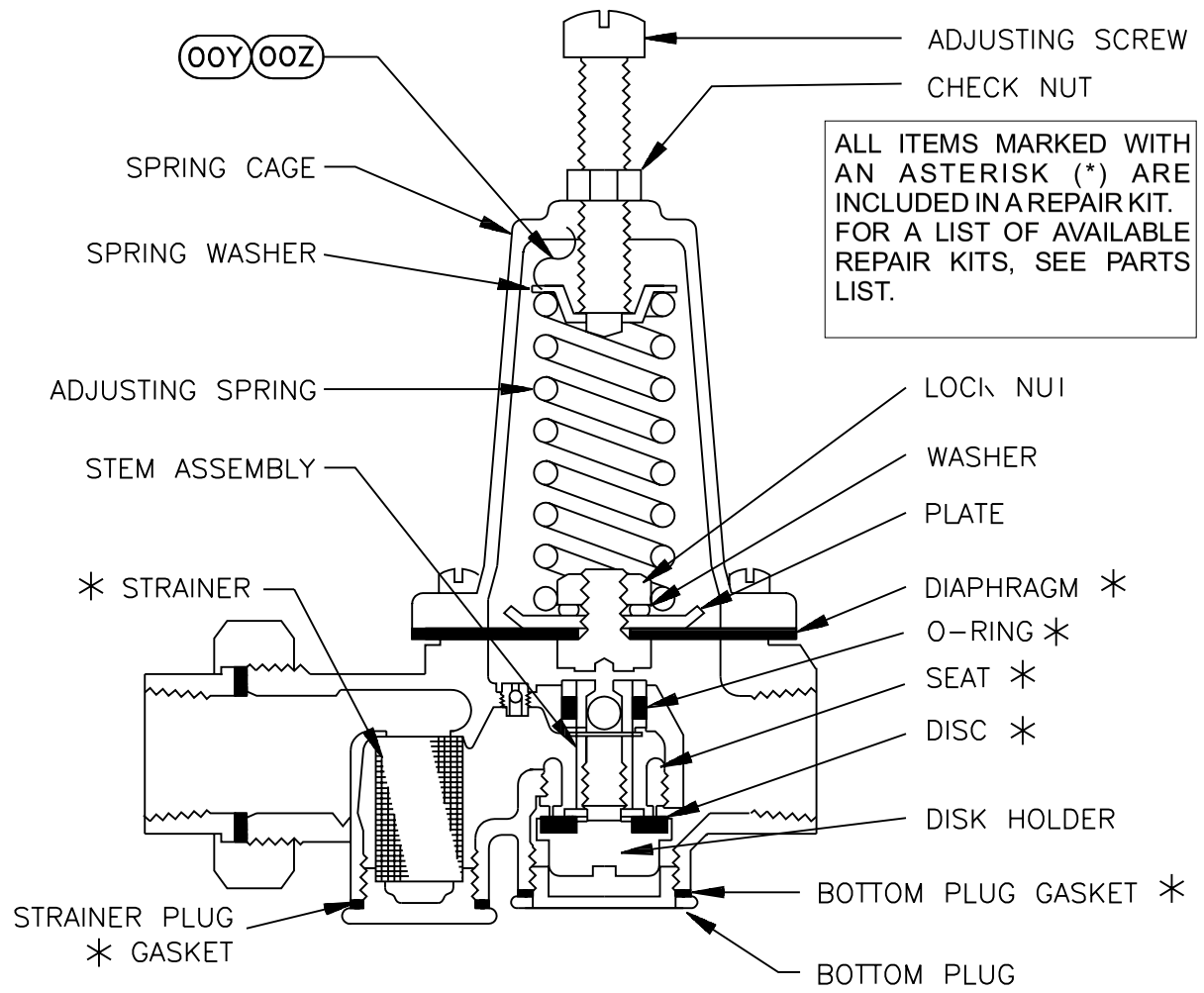
TO CLEAN OR REPLACE PARTS:

1.Remove spring cage and all parts above diaphragm.

2. Loosen and remove diaphragm lock nut, lock washer, pressure plate, and diaphragm from valve stem.

3. Unscrew seat cylinder from body and remove entire assembly.

4. While disassembled open gate valve to flush out collected sediment.



ALL ITEMS MARKED WITH AN ASTERISK (*) ARE INCLUDED IN A REPAIR KIT. FOR A LIST OF AVAILABLE REPAIR KITS, SEE PARTS LIST.

TO CLEAN OR REPLACE PARTS:

1. Remove bottom plug and gasket.

2. Loosen disc holder with screwdriver or socket wrench.

3. Inspect disc and clean or replace.

4. Seat can be removed, if necessary, with an allen wrench or socket wrench.

5. Unscrew and remove adjusting screw, check nut, and spring cage screws. Lift off spring cage, spring washer and adjusting spring.

6. Loosen and remove lock nut, washer, plate, and diaphragm.

7. Lift stem assembly upwards to remove from body.

8. To reassemble valve follow above instructions in reverse. Tighten or loosen adjusting screw for the required pressure of 28 P.S.I.

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Parts List—Pressure Regulators

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----------	
	X	96J030FF	01Z 1/2"PRESS REG SET 28# FEM X FEM	(NO REPAIR KIT)
	Y	96J030D	01Z 1/2" PRESREGULTR SET 28# FEM-UN	(FOR KIT, SEE BELOW)
	Z	96J031D	01Z 3/4" PRESREGULTR SET 28# FEM-UN	(FOR KIT, SEE BELOW)
			----------COMPONENTS----------	
all	1	96V158B	REPAIRKIT #14510=1/2 PRESSREG EB86	(KIT/DISCONT.VLV1/2 EB72)
all	2	96V158C	REPAIRKIT #10341 FOR E24U (96J030C)	(KIT/DISCONT.VLV1/2 E24U)
Y	3	96V158D	REP.KIT #14649FOR 1/2"E72U& E86U	
all	4	96V159B	REPAIRKIT C/A#14511=3/4PRESREG EB72	(KIT/DISCONT.VLV3/4 EB72)
Z	5	96V159D	REP KIT #14648 FOR 3/4"E72U +E86U	

VIBRATION SAFETY SWITCH ADJUSTMENTS

B 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 B 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 B 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

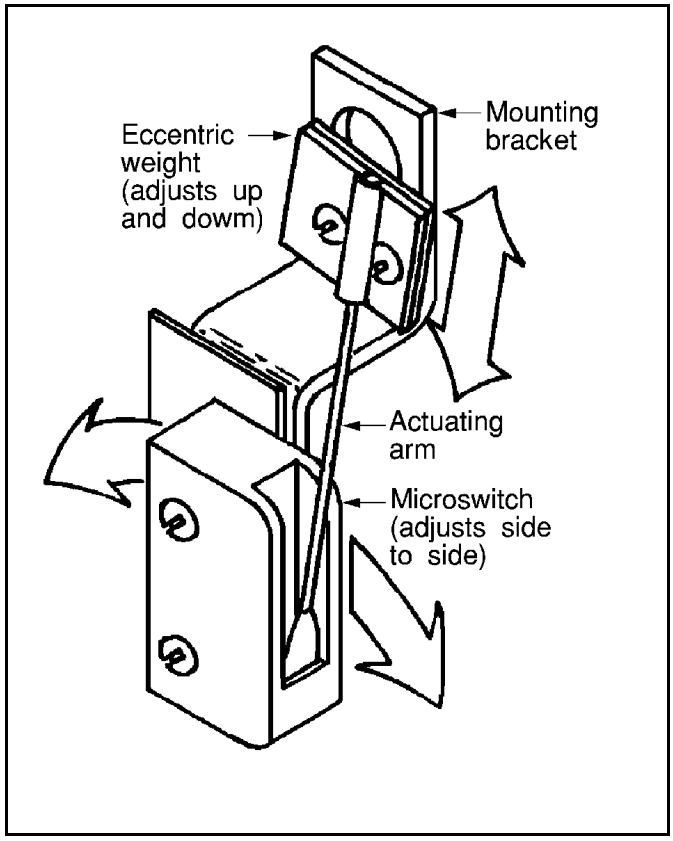


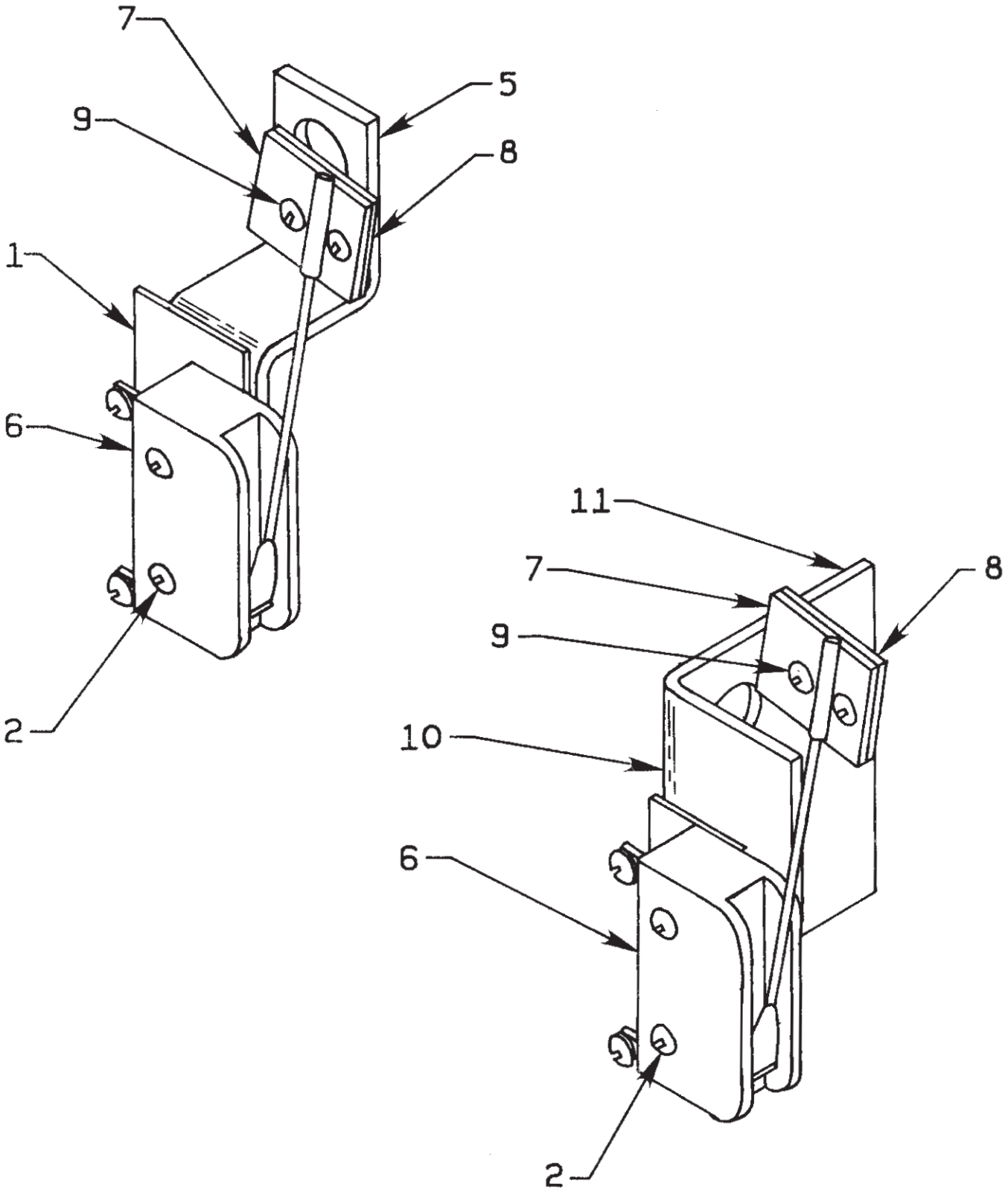
FIGURE 1 (MSSMA408BE)
Vibration Switch

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 SWITCH ASSEMBLY

BMP700613
83211A



Vibration Switch Assembly

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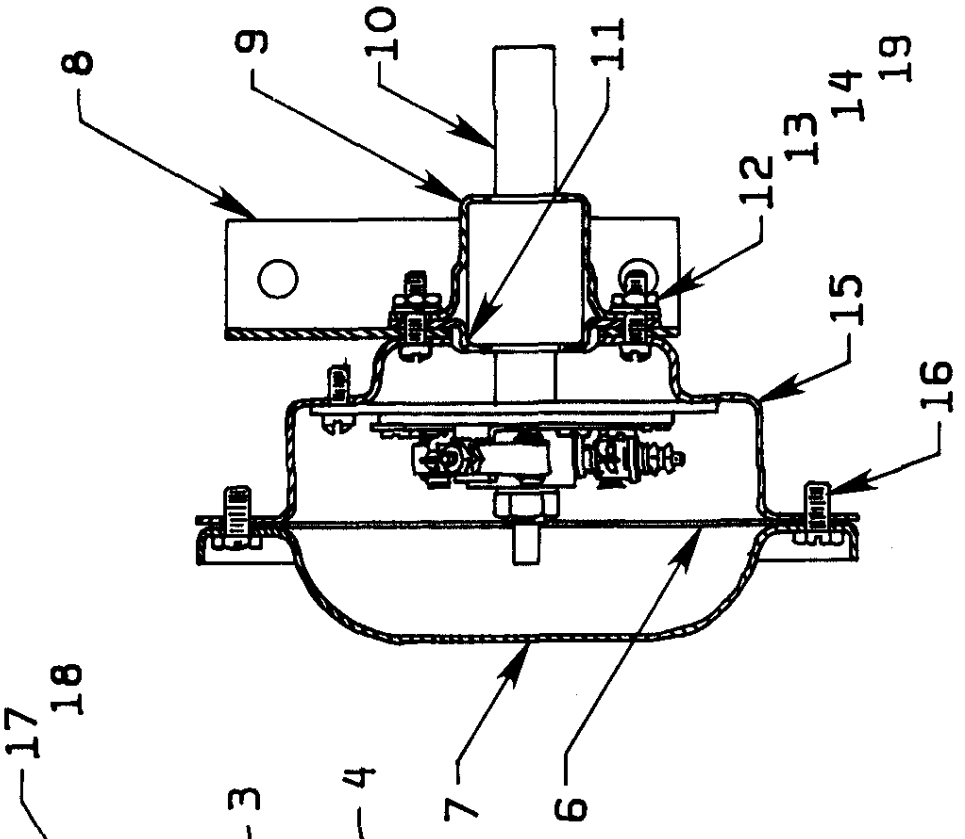
Parts List—Vibration Switch Assy.

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.

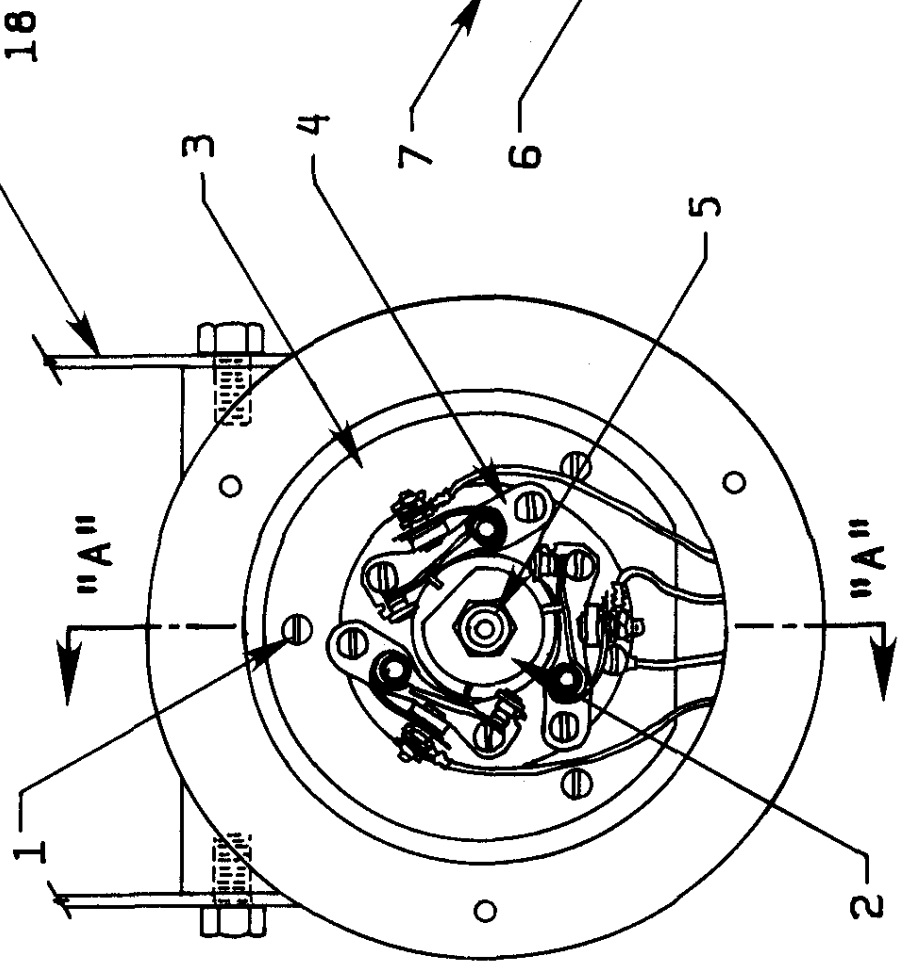
Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	SAE03 151	80142B* ASSY-VIBRATION SWT=LG CONTR	CONTAINS 001,002, 005-009
			----------COMPONENTS----------	
all	1	02 02038	85482A PLATE INSULATING SMALL9NOV51	
all	2	15P008	02Z TRDCUT PANHD 6-32X1 NIKSTL +WAX	
all	5	02 15119	BRACKET = VIBRATION SWITCH	
all	6	09R020	04Z SWITCH NC VIBR #WZ-2RW84429-P52	
all	7	03 01059	91046A VIBSWITCH CLAMP CADSTL	
all	8	03 01058	89417A VIBSWITCH WEIGHT-CADSTL	
all	9	15P101	04Z TRDCUT-F PANHD 8-32X3/8 NIKSTL	
all	10	02 02038	85482A PLATE INSULATING SMALL9NOV51	
all	11	02 10264	BRACKET=SAFESW CAD	

COMMUTATOR ASSEMBLY

BMP701253
89296A



SECTION "A"-"A"



COVER NOT SHOWN IN THIS VIEW FOR CLARITY.

NOTE: SEE INSTRUCTION MANUAL FOR SETTING POINT GAP.

Commutator Assembly

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Parts List—Commutator 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----------	
	V	GDC48001	84137Y COMMUTATOR INSTL ASSY 4832	CONTAINS 00Y
	W	GDC64001	86227@ COMMUTATOR INSTL ASSY 6442	CONTAINS 00Y
	X	G52 00600	84137U COMMUTATOR INSTL ASSY	CONTAINS 00Z
	Y	SAE10 022R	86193D* COMUTASSY(3,2,1)W/DRAWN HUB	4832, 4836, 6442
	Z	SAE10 022S	86193D*COMMUTATOR ASSY=W/DRWN HUB	7244
			----------COMPONENTS----------	
All	1	15P010	12Z PHILPAN TRDCUTSCRTYP10-24X1/2SS	
Y	2	02 10228A	84137B COMMUTATOR CAM 4832BHE 55 DEG	
Z	2	M2 10228	CAM=COMMUTATOR-POLISHED	
Y	3	02 10406R	84347C*INSULATOR-COMMUTATOR CCW ABC	
Z	3	02 10406	INSULPLATE=BREAKPT	
All	4	09A051	86503B POINT SET WELLS #JW1108A	
All	5	15G219NTE	HXTHINLOKNUT 3/87-24NF NYL STL/ZNC	
All	6	02 10346	GASKET=COMMUTATOR COVER	
All	7	02 10062	COVER-COMMUTHOUSE	
All	8	02 10487	BRACKET=COMMUTATOR CAD	
All	9	02 10507	BEARHOUSE-CUP	
All	10	02 10114	COMMUTATOR SHAFT	
All	11	02 10508	BEARHOUS-PLATE	
All	12	15N135	RDMACSCR 10-24UNC2AX5/8 ZINC Gr8	
All	13	15U150	LOCKWASHER MEDIUM #10 ZINCPL	
All	14	15G125	HXMACHSCRNUT 10-24UNC2B ZINC Gr8	
All	15	02 10486	66086C HOUSING COMMUTATOR ZINC PLATE	
All	16	15P175	04Z TRDCUT-F HXHD 1/4-20UNC2AX1/2 N	
V ONLY	17	03 48161	84067T COMMUTATOR SUPPORT 4832	
V ONLY	18	03 48162	89292D COMMUTATOR MT BKT 4832	
All	19	15U154	LOKWAS EXTOOTH#10 (US STD) ZINC PL	

BALANCING SYSTEM DETAILS FOR ALL WATER BALANCED OPEN POCKET RIGID AND HYDRO-CUSHION WASHER-EXTRACTORS

- **Basic concept**
- **Balancing System Safety Features for Both Rigid and HYDRO-CUSHION Machines**
- **Monitoring the Balancing System**
- **Balancing System Adjustments and Maintenance**

Basic Concept

The water balancing system consists of means to sense the location and magnitude of the imbalance in the cylinder and to inject water into the cylinder rib or ribs opposite the imbalance, thus re-balancing the cylinder. The basic components of the system include (1) the BALANCE SENSING SWITCH which senses when, where, and how much imbalance exists, (2) the COMMUTATOR which sends the BALANCE SENSING SWITCH signals to the correct water valves, and (3) the three BALANCING WATER VALVES each of which adds water to its cylinder rib via three individual pickup rings located on the back of the rotating cylinder.

Why the Balancing System Works (FIGURES 1A & 1B)—In a rigid washer-extractor, an unbalanced cylinder will rotate about a center 180^{o} away from the unbalance - thus "heavy side out" as depicted in FIGURE 1A.

In a flexibly supported (HYDRO-CUSHION) washer-extractor, after the initial excursion at the onset of extraction, the unbalanced cylinder will rotate about a center near the site of the unbalance, with the "light side out" and the "heavy side in", as shown in FIGURE 1B.

The balancing system uses these phenomena to know where (and how much) counterbalancing water to add.

Balance Sensing Switch (SMEBS)—SMEBS is attached to a rigid and non-rotating part of the machine which does not itself move in response to an imbalance in the cylinder during extraction.

In a rigidly supported machine, the centrifugal force generated by the imbalance will actually bend the machine frame sufficiently to actuate SMEBS each time the cylinder rotates, while in a flexibly mounted machine, the outer shell of the machine will move outwardly sufficiently to operate SMEBS each time the cylinder rotates. Hence SMEBS closes momentarily with each revolution, producing a pulsing signal timed exactly to the location of the imbalance. A large imbalance will cause the pulsing signal to be almost a half revolution long starting when the imbalance passes bottom dead center, and extinguishing when the imbalance approaches top dead center. Smaller imbalances will cause shorter pulsing signals, but the center of the signal always points to the center of the imbalance. Because SMEBS pulses, it is normal for the balance valves to make a repeated clicking sound, especially at lower speeds, but the water is actually delivered to the ribs in a steady stream at all but the lowest cylinder speeds.

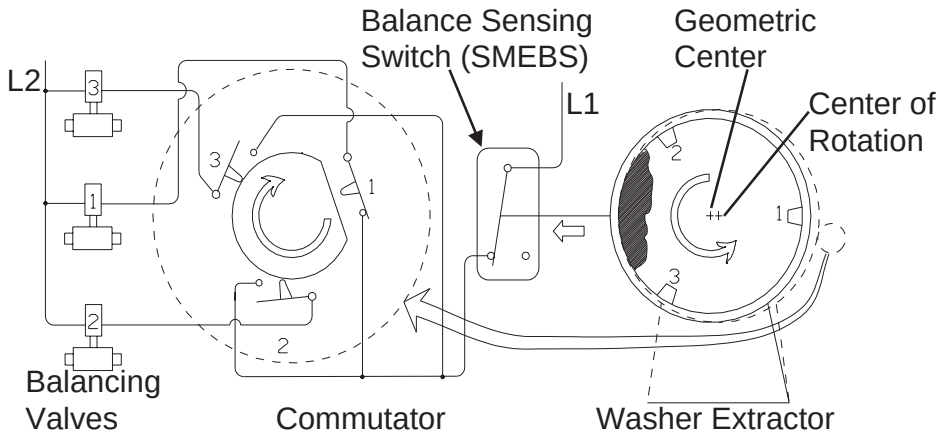


FIGURE 1A Rigid Mount Models

Both commutator and cylinder are as if viewed from REAR of machine.

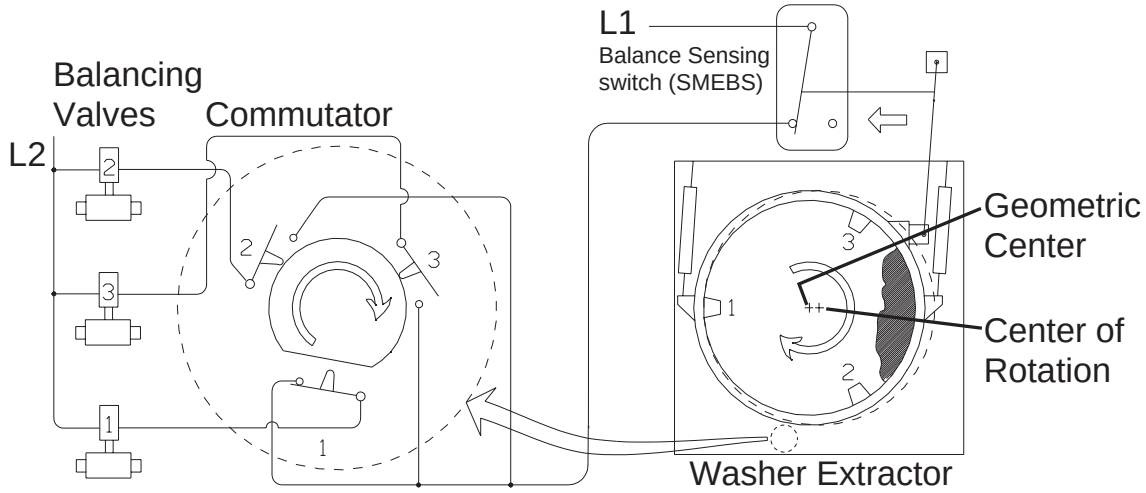


FIGURE 1B Flexibly Supported Models

Both commutator and cylinder are as if viewed from front of machine. Shown is commutator for 72044 models which faces forward. Other commutators face rearward. See "Orientation of Balancing System Components" herein.

FIGURE 1 (MSSMA401AE)
Concepts of Operation of Balancing System

NOTE: THE ABOVE DRAWINGS ARE CONCEPTUAL ONLY. SEE SPECIFIC INSTRUCTIONS FOR SPECIFIC MODELS ELSEWHERE IN THIS MANUAL SECTION.

When the weight of the balancing water in the ribs equals the imbalance, the cylinder again rotates about its geometric center, SMEBS no longer pulses, and the balancing valve(s) thus shut off. The ribs will retain their water during the entire extraction cycle (except for perhaps a slight leakage from the ribs which will be automatically replenished).

What the Commutator Does (FIGURE 2)—The pulsing SMEBS signal is sent through a "commutator" (shown in FIGURE 1) which has a separate cam operated switch for each of the three balancing water valves. Each valve can add water to one of the three cylinder ribs. The cam turns at the same speed and direction as the washer cylinder and thus always sends the SMEBS signal to the correct valve(s).

FIGURES 1A and 1B depict the imbalance exactly opposite rib #1 so the nearly half- revolution SMEBS signal persists only while commutator switch #1 is closed - thus sending balancing water only to rib #1. If the imbalance falls closer to one rib, (for example, closer to rib #1 as depicted in FIGURE 2) at first both ribs #2 and #3 will receive water at the same rate. However, the added water in the rib nearest the imbalance, together with the original imbalance itself, will cause the resultant center of mass of the imbalance to shift opposite rib #2 - shutting off the water to rib #3 valve first, and permitting additional water to be added only into the farthest rib (rib #2 in FIGURE 2) until complete balance is achieved.

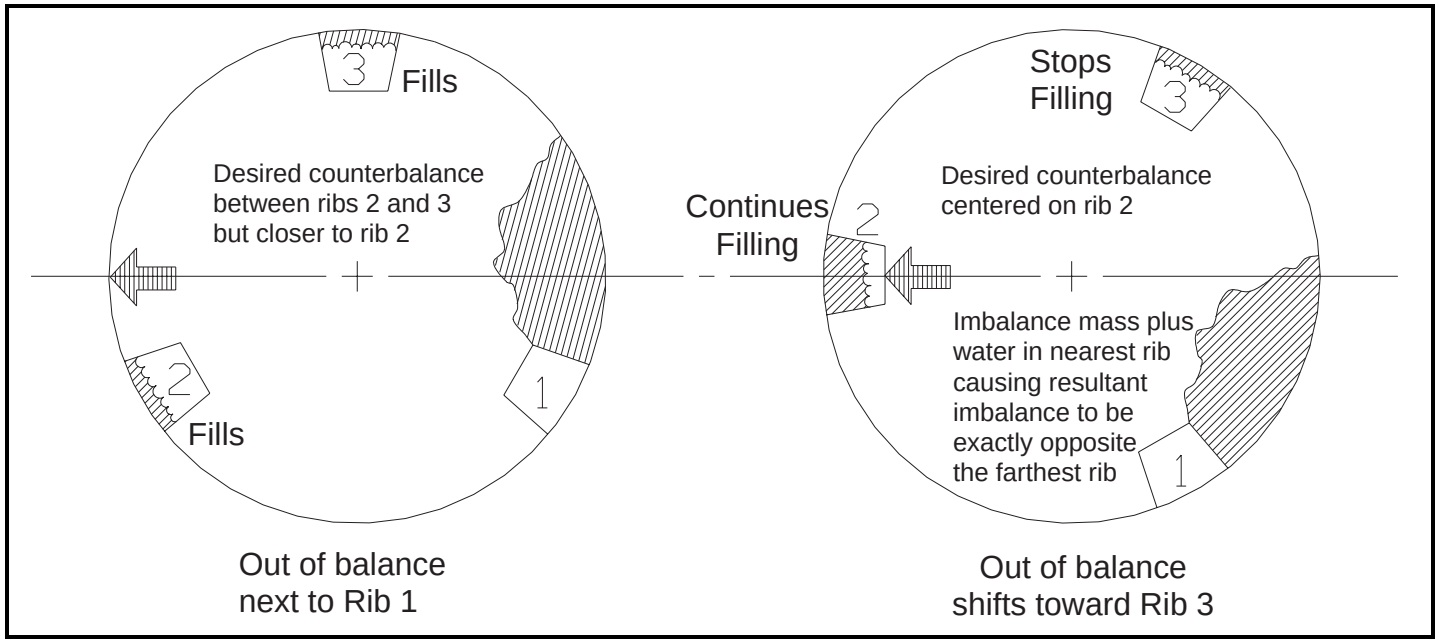


FIGURE 2 (MSSMA401AE)
How Water is Used to Counter an Imbalance

How the Water Enters the Ribs—The water from each balancing valve enters its respective rib via an injection nozzle which is aimed into its respective pickup ring on the back of the cylinder. See FIGURE 12, "Orientation of Balance System Components" and FIGURE 13, "Aiming the Balancing Nozzles" elsewhere herein for further information.

Aiming the Balancing Water Nozzles (FIGURE 13)—When properly aimed and adjusted, the water nozzles correctly deliver the balancing water from each balancing water valve to its respective pickup ring which admits the water to the appropriate rib. If not aimed and adjusted correctly, the water may splash (or fall) into the wrong pickup ring and thus enter the wrong rib, rendering the system unworkable. See FIGURE 13 for how the nozzles should be aimed and adjusted in each model.

How the Balance Sensing Device Works (FIGURES 3 & 8)—The Balance Sensing Switch (SMEBS) is not actually actuated directly by the shell of the washer-extractor as depicted in diagrammatic FIGURES 1A and 1B. Instead, a Balance Sensing Device (FIGURES 3 & 8) is interposed between the shell and SMEBS. Its purpose is to amplify the extraction deflections or excursions caused by an imbalance. The Balance Sensing Device also actuates a second switch which is called a Coast Sensing Switch (SMERC) in rigid machines and a Coarse Balance Switch (SMERC) in flexibly supported (HYDRO-CUSHION) machines.

The Balance Sensing Device also has an adjustable bypass needle valve which permits the oil between the diaphragms to flow back and forth from the oil reservoir when the driving diaphragm is moved slowly, as under the influence of temperature-caused dimension changes, while the spring-biased driven diaphragm remains stationary against its stop. Thus the switches are not actuated by small, or slow, movements. The sensitivity of the Balance Sensing Device is affected by 1)the viscosity of the oil and 2) how much the bypass valve is open.

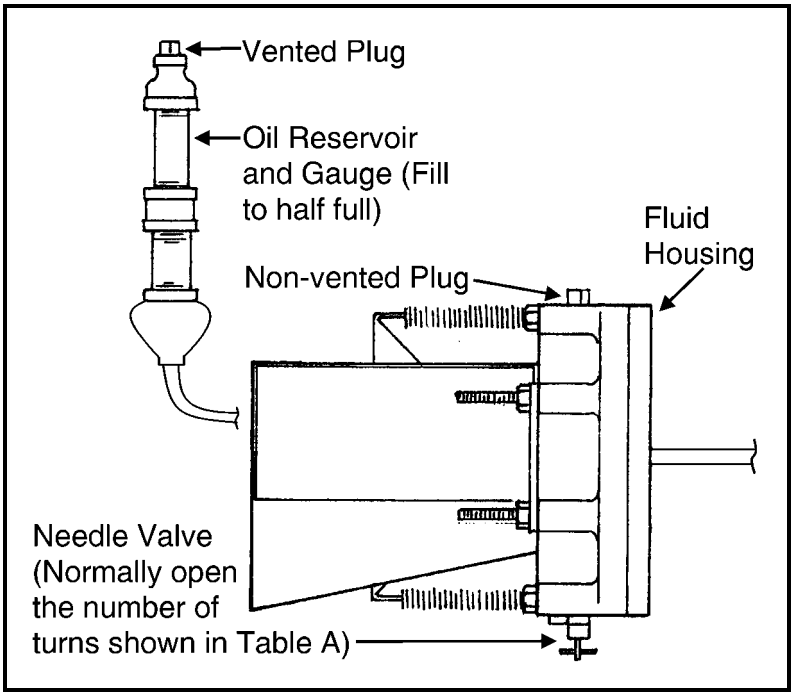


FIGURE 3 (MSSMA401AE)
Checking Balance Sensing Device Oil Levels

Balancing System Safety Features for Both Rigid and HYDRO-CUSHION Machines

Various safety features are incorporated into the balancing system to protect against damage and unsafe operation resulting from severe out of balance loads.

For Rigid Models 30016 & 36021 Only

Coast Safety Switch (FIGURE 8)—If the imbalance is more than the balance system can counteract, this coarser set switch will be actuated as the cylinder accelerates. Each time it is actuated, the cylinder will coast for 7.5 seconds - thus reducing the maximum extraction speed commensurate with a safe unbalance force. (The entire extraction may thus continue at a lower speed if the balancing system never catches up with the imbalance.)

For Microprocessor HYDRO-CUSHION Models 48032, 64042, and 72044 Only

Recycle Circuit—The recycle circuit automatically redistributes an excessively out of balance load. It becomes operational when extract commences and may be actuated by the Excursion Switch (SMERB, FIGURE 4) or the Coarse Balance Switch (SMERC, see FIGURE 8). Although the Excursion Switch will initiate recycle any time it is actuated during extraction, the primary purpose of this switch is to sense an excessive imbalance during the onset of extraction. The Coarse Switch initiates recycle only if an imbalance exceeds a certain permissible level a few seconds after the onset of high extract speed.

⚠ CAUTION ⚠

The Excursion switch actuator, FIGURE 4, must be exactly in the center of the slotted hole - both when the machine is pushed down and when it is hanging free. If not, the switch will actuate prematurely, during the initial excursion, at the onset of extraction, causing unnecessary recycles. See "HOW THE EXCURSION SWITCH WORKS" elsewhere.

When recycle is initiated, the cylinder comes to a full stop, it then rotates 16 seconds CCW in wash speed, 7.5 seconds in CW wash speed, 7.5 seconds in drain speed, and then re-enters extract. During recycle, program timing stops, and starts again 7.5 seconds after high extract has again been allowed. Microprocessor controlled models will recycle 5 times, then repeat the final bath (without chemicals) and re-enter extraction.

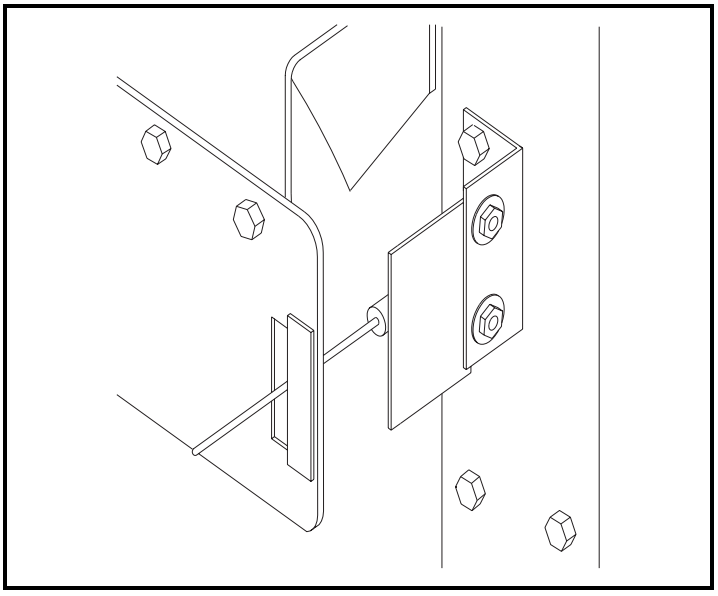


FIGURE 4 (MSSMA401AE)
Excursion Switch

For MARK 4 MILTROL HYDRO-CUSHION Model 72044 Only

Recycle Circuit—The recycle circuit automatically redistributes an excessively out of balance load. It becomes operational when extract commences and may be actuated by the Excursion Switch (SMERB). Although the Excursion Switch will initiate recycle any time it is actuated during extraction, the primary purpose of this switch is to sense an excessive imbalance during the onset of ex-

traction. When recycle is initiated, the cylinder comes to a full stop, it then rotates 16 seconds CCW in wash speed, 7.5 seconds in CW wash speed, 7.5 seconds in drain speed, and then re-enters extract. During recycle, program timing stops, and starts again 7.5 seconds after high extract has again been allowed.

In these MILTROL controlled models, the machine will stop (3-wire relay is disabled) should the Coarse Balance Switch be actuated after E2 (high extract speed) has commenced.

For Both Rigid and HYDRO-CUSHION Models

Vibration Circuit—The Vibration Safety Switch (FIGURE 5) reacts to excessive vibration which is not contained by the balancing system, actuating a switch which de-energizes the 3 wire relay, shutting off power to the machine. When this occurs, the cause of the vibration should be determined and corrected. The start switch must be depressed to resume operation. See "VIBRATION SAFETY SWITCH ADJUSTMENTS" elsewhere.

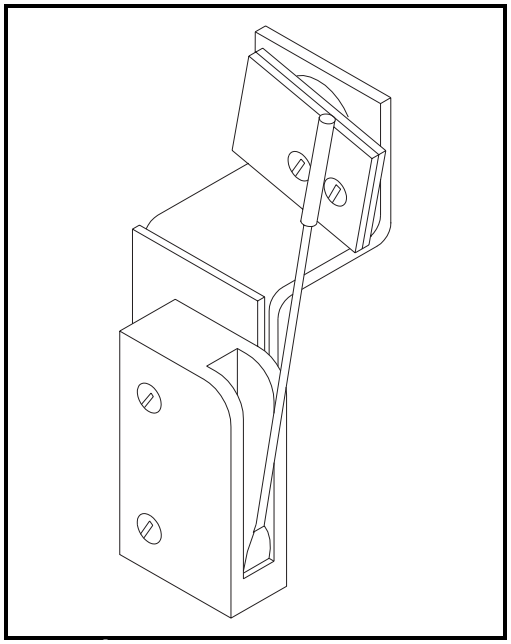


FIGURE 5 (MSSMA401AE)
Vibration Safety Switch

Monitoring the Balancing System

A panel of status lights is provided to monitor the functioning of the balancing system. This light panel is located on the front of HYDRO-CUSHION models and on a junction box on the rear or side of rigid mount models.

Balance Sensing Switch Light—Remains ON so long as the Balance Sensing Switch is **not** actuated and should never stay OFF while the machine is extracting. This light will normally flicker during extraction, both before and after balancing is achieved.

A continuous flashing during an occasional extraction indicates that the imbalance exceeds the machine's counter-balancing capacity.

A continuous flashing over repeated extractions may indicate 1) inadequate water supply or 2) need to service the balancing system.

Balancing Valve Lights—These three lights go ON and OFF with their respective balancing valves. Lights should be OFF once balancing is completed, except for intermittent valve operation as the balancing system compensates for changing imbalance (caused by varying load thicknesses, different absorption rates, etc.). A continuous flashing over repeated extractions may indicate 1) inadequate water supply or 2) need to service the balancing system. If water is required in two of the three ribs, two of these lights may flash sequentially, but never in unison (i.e., the lights must always turn on or off one after the other, and must never turn on or off simultaneously). Moreover, all three lights must never flash either sequentially or in unison, except for a brief moment at the onset of low speed extraction, and again at the onset of high speed extraction. At all other times, only one or two of the three lights should flash until balance is achieved, never all three.

Balance Excursion Light (Microprocessor, Rigid Mount Models Only) and Extract Motor Light (MILTROL, Rigid Mount Models Only)—This light goes ON and OFF with the extract motor and is used to monitor the Coast circuit. Up to six coasts are normal at the beginning of an extract, but ordinarily, the machine should not coast after it has been extracting for two minutes unless the imbalance exceeds the machine's counter-balancing capacity. In this event, the machine will coast throughout the entire extraction. Frequent or repetitive coasting throughout most extractions may indicate inadequate water supply or need to service the balancing system.

Balance Excursion Light (Microprocessor, HYDRO-CUSHION Models Only)— This light is located on the balance sensing device (and thus not visible on the machine exterior). It illuminates when extract is desired and extinguishes whenever the Coarse Balance Switch actuates. Actuation of the Coarse Balance Switch will cause a recycle if it occurs within 8 seconds after high extract is called for or between 16 seconds and 2 minutes after high extract is called for.

High Speed Extract Light (MILTROL, HYDRO-CUSHION Models Only)—Illuminates at the end of low speed extract, indicating that high extract is desired. The light will flash if an imbalance exceeds the machine counter-balancing capacity and extinguish while recycle is in progress. If the light remains steady ON indicating that high extract is allowed, the machine will begin to accelerate to high extract speed approximately 8.5 seconds after the light illuminates steadily.

Balancing System Adjustments and Maintenance

All components of the balancing system are properly set and tested at the factory and should not need readjustment when the equipment is installed. If however, as a result of improper handling in shipment or installation and when as a normal consequence of use it becomes necessary to readjust this system, the following procedures should be observed. Before proceeding, review the published safety precautions for this machine. **The following procedures apply to all machine models except where noted otherwise.**

⚠ WARNING ⚠

ELECTRIC SHOCK HAZARD—Except where noted otherwise, the following adjustments should be done with power locked OFF and tagged out at the machine disconnect switch (on the wall).

Balance Sensing Device Oil Level (FIGURE 3)—The oil level in this device should be visually checked daily and replenished if it drops below the recommended level. The Balance Mechanism will not function if the oil level drops where air enters the fluid housing. If this is suspected, proceed as follows:

1. To check for air in the fluid housing, remove the plug on top of the housing. Oil should immediately begin flowing out of the hole if there is no trapped air in the unit. If oil does not flow out, make sure the bypass valve is open, and then add oil through the oil reservoir until it does flow out. Quickly replace the plug once oil begins to flow out.
2. The reservoir should be filled approximately half full. Use a good grade of 15W-40 motor oil. Note that 1) oil must always be added to the reservoir, never directly through the plug on top of the mechanism housing, 2) the reservoir must not be filled completely, to allow space for oil flowing out of the fluid housing during slow movement of the driving diaphragm, 3) the oil reservoir plug must be a vented plug and the plug on the mechanism housing must be non-vented, and 4) there must be no entrapped air in between the two diaphragms.
3. Check the needle valve setting per Table A below. The more it is open, the less sensitive the unit will be. It is possible to open the needle valve so wide as to render the unit completely insensitive to vibration. The plunger attached to the driven (small) diaphragm should not move while the machine is operating at wash or drain speed, but a rise and fall of the oil in the gauge during washing and draining may be observed.

TABLE A
Bypass Needle Valve Settings by Model Number

30016	36021	**48032**	**64042**	**72044**
1-1/2	1-1/2	1-1/2	1-1/2	4

Data shown is number of turns open

⚠ WARNING ⚠

ELECTRIC SHOCK HAZARD—When the machine power is on, the exposed terminals on the switches in the Balance Sensing Device may be energized up to 250 VAC. You can be killed or severely injured by contact with these energized conductors.

- ☞ **Make certain power is locked OFF and tagged out at the external disconnect switch (on the wall) before servicing the Balance Sensing Device.**
- ☞ **Do not touch the switch terminals or the wires going to them when servicing the Balance Sensing Device.**
- ☞ **When adjusting the Balancing Sensing Device on a HYDRO-CUSHION Machine, it is important to have machine power off because the cylinder must be hanging free, not pushed down.**

Outer (Driving) Diaphragm Adjustment (FIGURE 6)—This diaphragm must be centered as shown in FIGURE 6A. Note that the total length of travel of the input shaft is approximately 1/32" (0.8mm) in rigid models and about 1/8" (3.2mm) in HYDRO-CUSHION models. If adjustment is necessary, loosen the nuts on each side of the arm to which the shaft is attached and extend or retract the shaft as required to reposition it at the center of travel. There must never be a ripple or wavy condition in the driving diaphragm as this will seriously lessen the sensitivity of the unit.

On HYDRO-CUSHION models, the conditions shown in FIGURE 6B and 6C are prevented by properly aligning the Balance Sensing Device actuator bar and properly setting the bar springs. See instructions and Caution on next page.

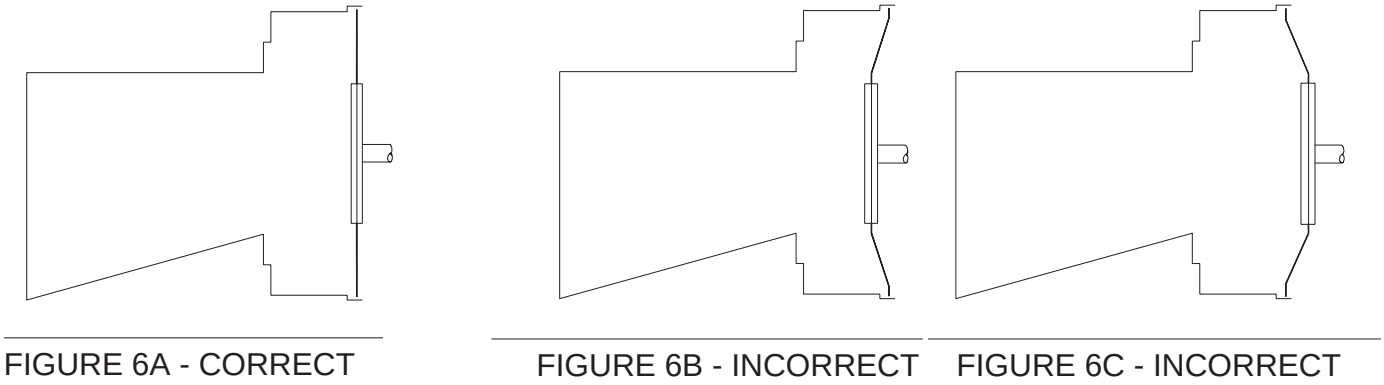


FIGURE 6 (MSSMA401AE)
Driving Diaphragm Alignment

(FOR HYDRO-CUSHION Models Only) Aligning the Balance Sensing Device Actuator Bars and Setting the Horizontal Bar Springs (FIGURE 7)

1. Align vertical bar perpendicular to Sensing Device.

2. Align vertical bar lower ball joint, apply Loctite and tighten.

3. Set horizontal bar springs as per Table B below.

⚠ CAUTION ⚠

With the machine hanging free, the compressed height of both springs must be equal and the diaphragm must be centered as depicted in FIGURE 6A, not pulled to one side as in FIGURE 6B or 6C.

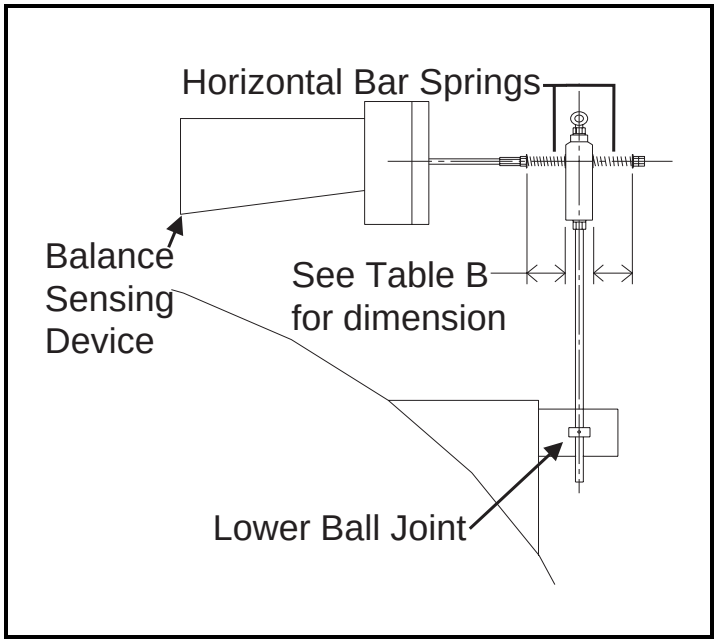


FIGURE 7 (MSSMA401AE)
Adjusting the Actuator Bar Assembly

TABLE B
Horizontal Bar Springs Setting

30016	36021	48032	64042	72044
N/A	N/A	15/16" (24mm)	2" (51mm)	3-7/8" (98mm)

Inner (Drive) Diaphragm Replacement—Although the driven diaphragm is available as a repair part, its installation is not very simple because there must never be a ripple or wavy condition in the driving diaphragm as this will seriously lessen the sensitivity of the unit. The mating dished surfaces of the plunger and the washer serve to stretch the diaphragm for this purpose. Should a new driven diaphragm be field-installed, be sure that this condition does not occur. (Since the driven diaphragm rarely fails as long as the balancing system is retained in proper working order, it is usually better to install a new assembly should the need ever arise.)

Adjusting the Switches on the Balance Sensing Device (FIGURE 8)—This device must be adjusted so that the Balance Sensing Switch (SMEBS) and the Coast Sensing Switch or Coarse Balance Switch (SMERC) will actuate when the driven diaphragm plunger has travelled a certain distance. These adjustments are as follows.

Setting the Balance Sensing Switch (SMEBS)

1. Connect an ohm meter across the common and the normally open terminals on the Balance Sensing Switch SMEBS. See FIGURE 9 to identify the common and the normally open terminals on this switch. The ohm meter should read a finite resistance (a resistance significantly greater than zero) - or turn the balance sensing screw CCW until a finite resistance is read. Now actuate the SMEBS by hand and observe that the resistance goes to substantially zero, (thus indicating that the normally open contacts have closed and only the resistance of the closed contacts themselves is being read by the meter).

NOTE: If the plunger on SMEBS is free (not depressed) and a finite resistance cannot be read, the switch is shorted closed and must be replaced.

2. Next, slowly turn the balance sensing screw CW until the ohm meter resistance reads zero. (This will happen when the common and normally open contacts on SMEBS close.)

3. Now slowly turn the balance sensing screw CCW until the ohm meter again reads a finite resistance. (This point is where the normally open contact on SMEBS has just opened.)

4. Now turn the balance sensing screw CCW the additional number of turns mentioned in TABLE C below.

TABLE C
Adjusting the Balance Sensing Switch
(number of additional CCW turns of Balance Sensing Screw after the normally open contact on SMEBS has just opened)

30016	36021	48032	64042	72044
1/4	1/4	1-3/4	1-1/2	4-3/4

5. While holding the balance sensing screw in position, tighten the lock nut, verify that this does not cause the screw to turn otherwise the adjustment will be lost.

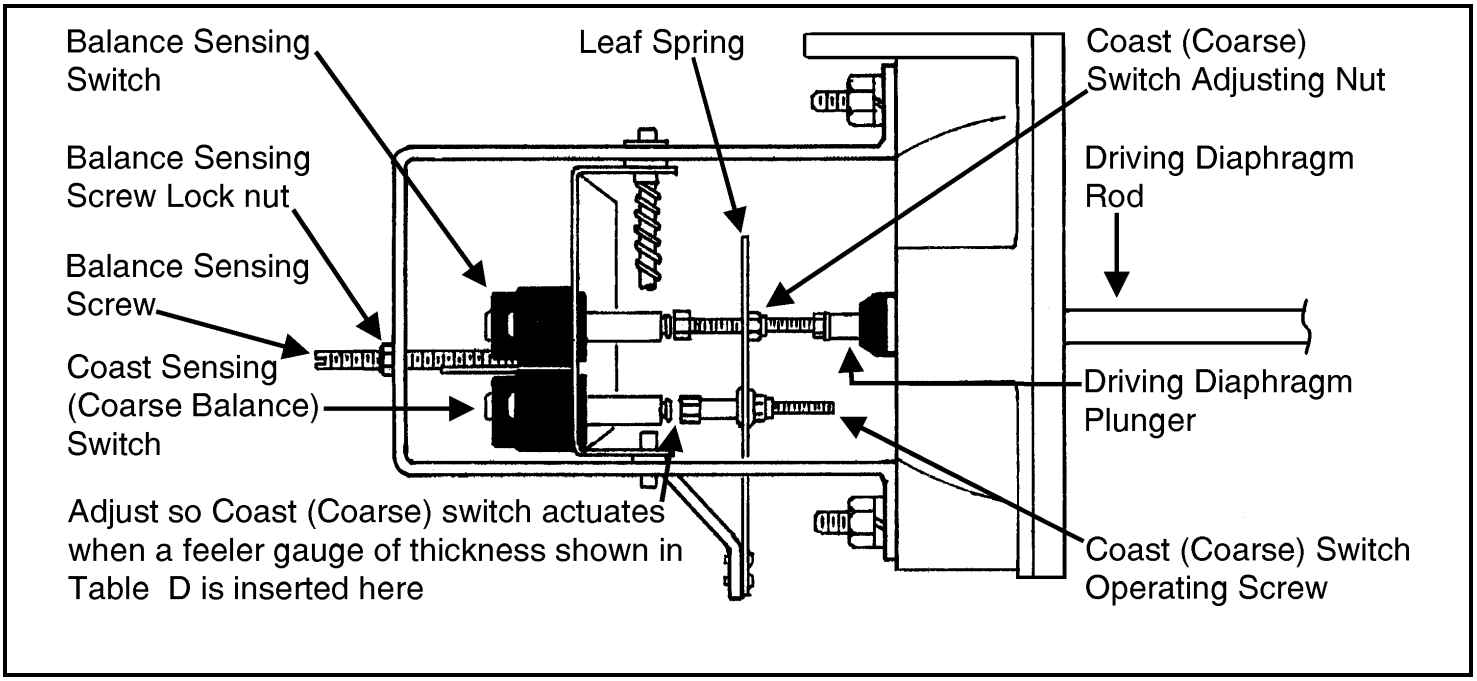


FIGURE 8 (MSSMA401AE)
Adjusting the Balance Sensing Device

Setting The Coast Sensing Switch (SMERC if a Rigid Machine) or the Coarse Balance Switch (SMERC if a HYDRO-CUSHION Machine)

—Connect an ohm meter across the normally open terminals on the Coast Sensing Switch or the Coarse Balance Switch. The ohm meter should read a finite resistance (a resistance significantly greater than zero). Now adjust the Coast (Coarse) Switch by turning the adjusting nut which is located on the driven diaphragm plunger as shown in FIGURE 8 - so that when a feeler gauge of the thickness mentioned in Table D below is inserted where shown on FIGURE 8, the ohm meter resistance becomes substantially zero, thus indicating that the normally open contacts have closed and only the resistance of the closed contacts themselves is being read by the meter.

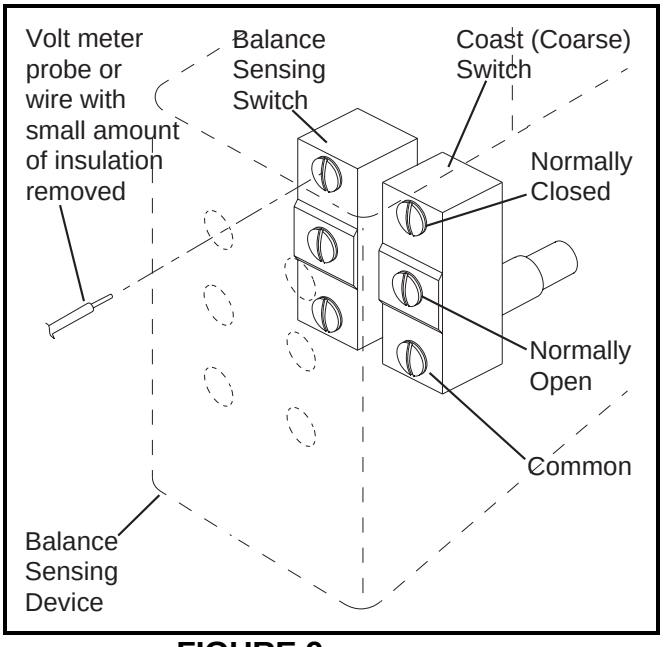


FIGURE 9 (MSSMA401AE)
Accessing Terminals on Micro Switches

TABLE D
Feeler Gauge Thickness Required when Setting Coast (Coarse) Switch

30016	36021	48032	64042	72044
.010" (0.254mm)	.010" (0.254mm)	.015" (0.381mm)	.015" (0.381mm)	.027" (0.686mm)

Adjusting the Commutator

NOTE: The following adjustment procedure is equally applicable to both rigidly mounted and flexibly supported (HYDRO-CUSHION) models.

⚠ WARNING ⚠

ELECTRIC SHOCK HAZARD—Except where noted otherwise, the following adjustments should be made only with power locked OFF and tagged out at the external disconnect switch (on the wall).

Setting the Gap in the Commutator Switch Breaker Points (FIGURE 10)

Each breaker point gap must be .015" (0.38mm) when the plastic cam follower on the switch is riding on the high portion of the cam. Precise breaker point gaps are necessary both to insure the proper current interruption when the switch is open, and also to adjust the switch so that it remains closed the exact portion of one complete cylinder revolution that is necessary for proper operation of the balancing device. Both adjustments are simultaneously achieved when the breaker points are set at .015" (0.38mm) open, as described below.

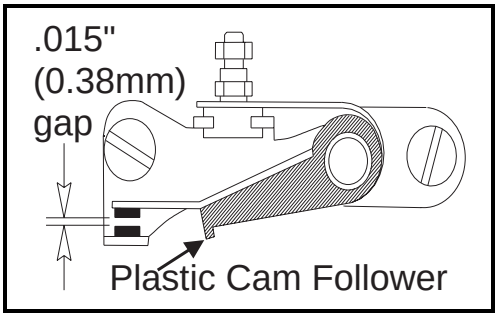


FIGURE 10 (MSSMA401AE)
Breaker Point Switch Setting

⚠ WARNING ⚠

ELECTRIC SHOCK HAZARD—Since it is necessary to use power to rotate the cylinder, station a safety lookout behind the machine to guard against someone accidentally touching the high voltage in commutator while power is ON.
Be sure electric power to the machine is OFF at the wall disconnect before removing or replacing the commutator cover, and before touching anything inside the commutator.

1. Rotate cylinder until cam follower is riding on large diameter of cam.
2. Loosen the breaker point mounting screws and insert a .015" (0.38mm) feeler gauge between the contacts (FIGURE 10).
3. Tighten the mounting screws, checking to insure that the gap clearance does not change while the screws are being tightened. (Readjust if necessary. Breaker point clearance must be .015" (0.38mm).
4. Repeat this procedure for each of the three breaker point switches.

Timing the Commutator (FIGURES 11A & 11B)—The Commutator must be timed so that the flat on the cam is in the proper relationship to the ribs in the cylinder. For example, (FIGURE 11A) **when the #1 rib is in the 9 o'clock position as viewed from the front (through the door), the flat on the cam must be exactly centered under the cam follower for the #1 switch** as shown in FIGURE 11B.

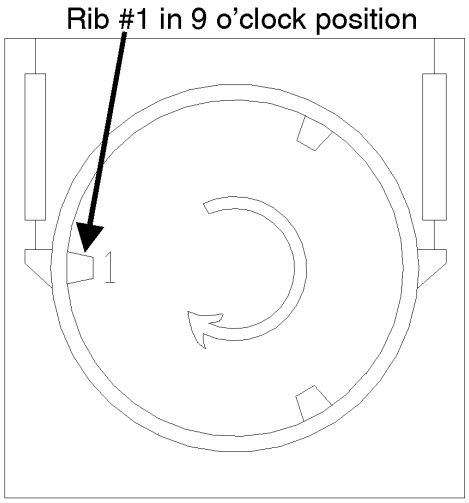


FIGURE 11A
Looking at FRONT of machine

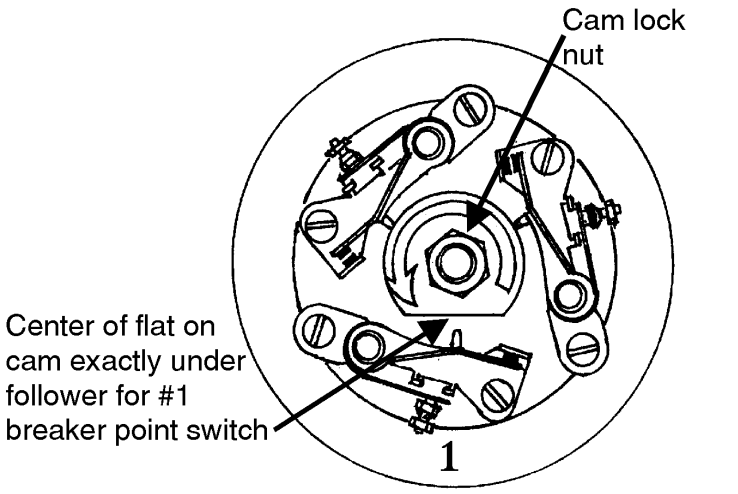


FIGURE 11B
Commutator (72044 orientation shown)
Looking at FRONT of machine

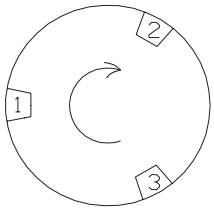
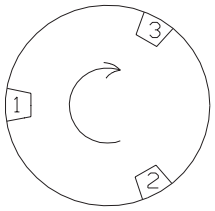
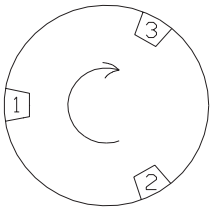
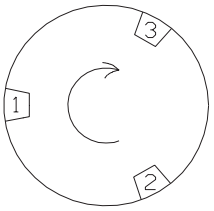
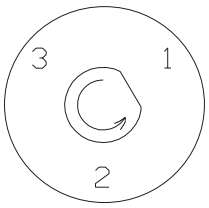
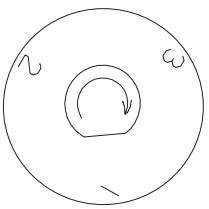
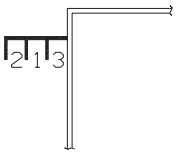
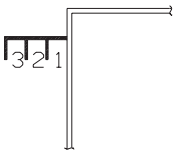
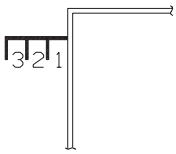
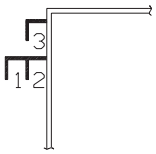
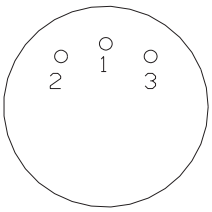
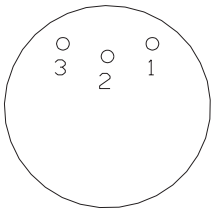
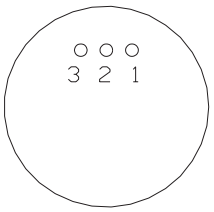
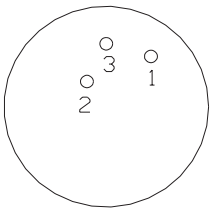
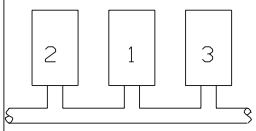
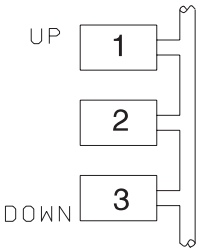
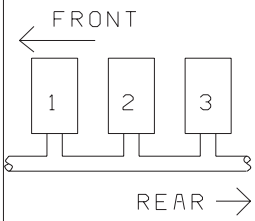
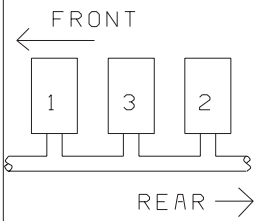
FIGURE 11 (MSSMA401AE)
Timing the Commutator

Refer to FIGURE 12 "Orientation of Balancing System Components" (elsewhere herein), before reading paragraphs A & B following.

A. Rib numbers are identified by punch marks (1, 2 or 3) on top of each rib, near the front of the basket.

If the rib number marks have worn away, one can still readily determine the rib number by determining its pickup ring. To do this, remove the hand holes on the rear of the machine to gain access to the pickup ring. Now use a bent coat hanger to find the radial hole in the pickup ring that communicates with one of the ribs, and identify the rib number by referring to the appropriate chart in FIGURE 12 "Orientation of Balancing System Components." This is necessary because the location of the pickup rings is not the same for all models.

B. Depending on the machine model, the commutator switches will be numbered either 1, 2, and 3 or A1, B2, and C3. On some models the commutator faces rearward and thus is seen to rotate counter-clockwise in extraction when viewed from the rear while the cylinder is seen to rotate clockwise in extraction when viewed from the front. On other models, the commutator faces forward and is thus seen to rotate clockwise in extraction, the same as the cylinder. (The cylinder always rotates clockwise in extract when viewed from front.)

	RIGID MODELS 30016 36021	HYDRO - CUSHION MODELS 48032	64042	72044
Cylinder rib numbering scheme looking at front of machine (viewed through the loading door). All cylinders rotate clockwise when viewed through the load door.				
Position of commutator switches as mounted in machine. Arrow depicts cam rotation direction in extraction, when looking at switches. Rearward facing commutators are seen to rotate counter clockwise while forward facing commutators are seen to rotate clockwise. (See **NOTE** below.)	 faces rearward P/N 02 - 10406	 faces rearward P/N 02 - 10406R	 faces rearward P/N 02 - 10406R	 faces rearward P/N 02 - 10406
Cylinder pickup ring location				
Balancing water nozzle location when viewing rear of machine.				
Balancing water valve locations.	 When viewed from rear of machine	 When viewing accessible side	 When viewing accessible side	 When viewing accessible side

NOTE: The cam flat faces switch 1 when rib 1 is at the 9 o'clock position (as viewed through the loading door).

FIGURE 12 (MSSMA401AE)
Orientation of Balancing System Components

When the commutator is properly timed, each time a rib passes the 9 o'clock position as viewed through the door, the exact center of the flat on the cam will be passing under the center of the switch follower for that rib. If not, the cam must be repositioned by rotating it about its shaft. To do this, proceed as follows:

1. Make sure that the timing belt drive is properly adjusted without excessive slack (but not "banjo string" tight). Excessive slack in the timing belt will permit the belt cogs to slip over the ridges on the pulleys and put the unit "out-of-time".
2. Rotate the empty cylinder until any rib is exactly in the 9 o'clock position. In other words, the rib should be to the left when facing the **front of the machine** and an imaginary line drawn from the center of the rib to the center of the cylinder should exactly parallel the floor. (FIGURE 11A shows rib #1 at the 9 o'clock position but any rib will do as long as the rib number is known.)

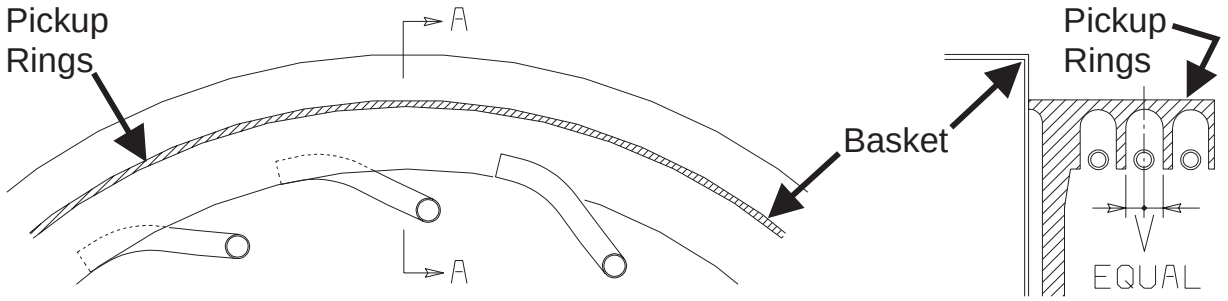
⚠ WARNING ⚠

ELECTRIC SHOCK HAZARD—Since it is necessary to use power to rotate the cylinder, station a safety lookout behind the machine to guard against someone accidentally touching the high voltage in the commutator while the power is ON.
Be sure electric power to the machine is OFF at the wall disconnect before removing or replacing the commutator cover, and before touching anything inside the commutator.

3. Loosen the commutator cam lock nut and rotate the cam so its flat is exactly centered under the follower for that rib switch. (FIGURE 11B shows the flat exactly under the switch for rib #1 - thus corresponding to the illustration in FIGURE 11A.)
4. While holding the cam, re-tighten the lock nut making sure the cam does not turn as the lock nut is tightened.
5. Recheck cam alignment before replacing the commutator cover. Re-adjust the cam if necessary.

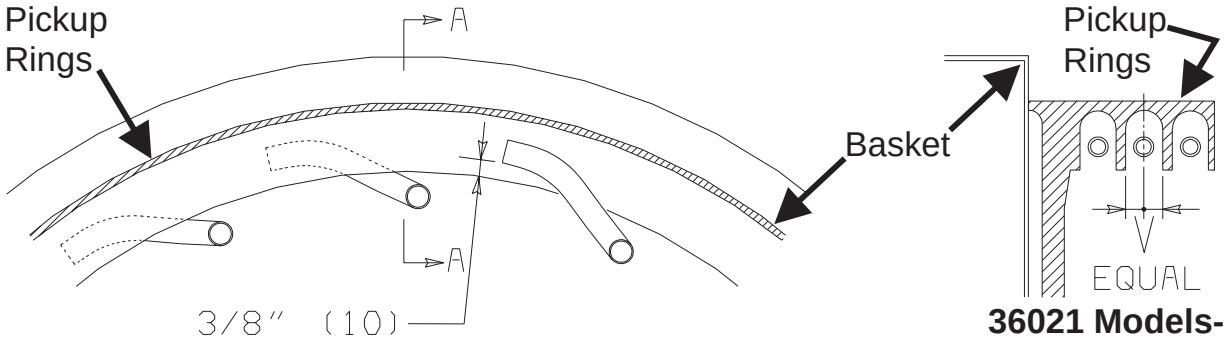
Lubricating the Commutator Cam and Breaker Points—The commutator switches are actually special automobile breaker points and, as in automobiles, must be lubricated, otherwise the surface of both the cam and the plastic cam follower will wear, closing the switch gaps and rendering the balancing system inoperative. Use enough lubricant to coat the cam surface and to build up a small deposit of the lubricant on each plastic cam follower. A tube of cam lubricant (MILNOR P/N 20H016) was supplied with the machine, and should last many years.

Aiming the Balancing Nozzles (FIGURE 13)—When properly aimed, the balancing nozzles will fit into the pickup rings approximately as shown in FIGURE 13. Aim the nozzles so that the water streams gently into the intended ring. Make sure that they are exactly centered in the pickup ring, as shown in Section A-A. Any splashing will cause at least some water to enter the wrong ring, thus rendering the system inoperative.



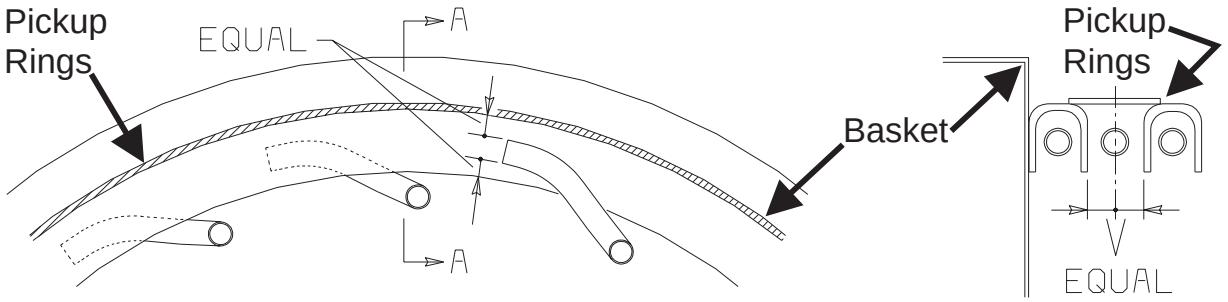
30016 Models - Rear view of balancing nozzles

30016 Models- Section A-A



36021 Models - Rear view of balancing nozzles

36021 Models- Section A-A



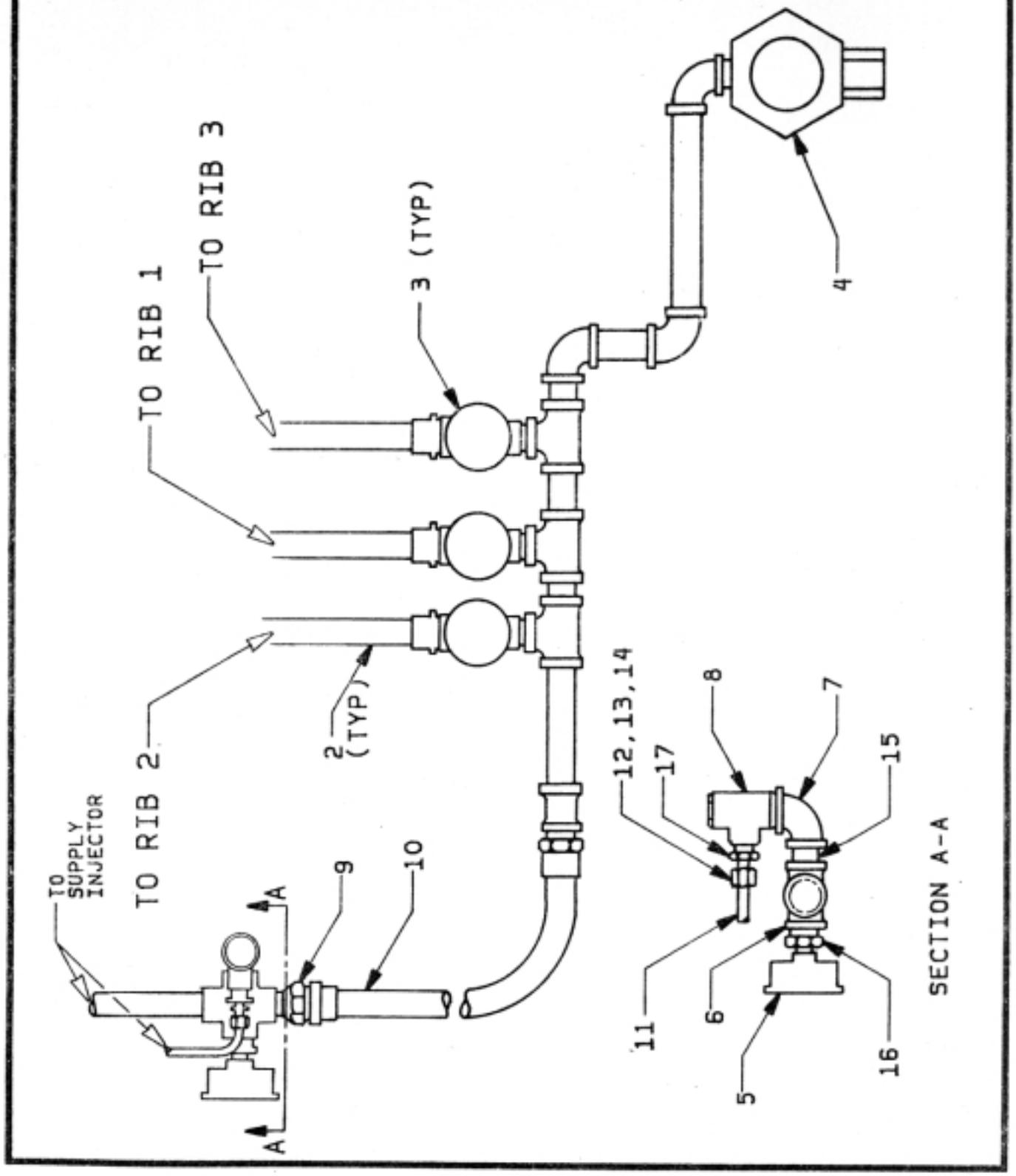
All Hydro-Cushion Models - Rear view of balancing nozzles (48032 shown)

All Hydro-cushion Models - Section A-A (48032 shown)

FIGURE 13 (MSSMA401AE)
Aiming the Balancing Nozzles

BALANCING VALVES & SUPPLY INJ PIPING ARRANGEMENT

BMP701256
86287B



Litho in U.S.A.

PELLERIN MILNOR CORPORATION

Balance & Supply Injector Piping

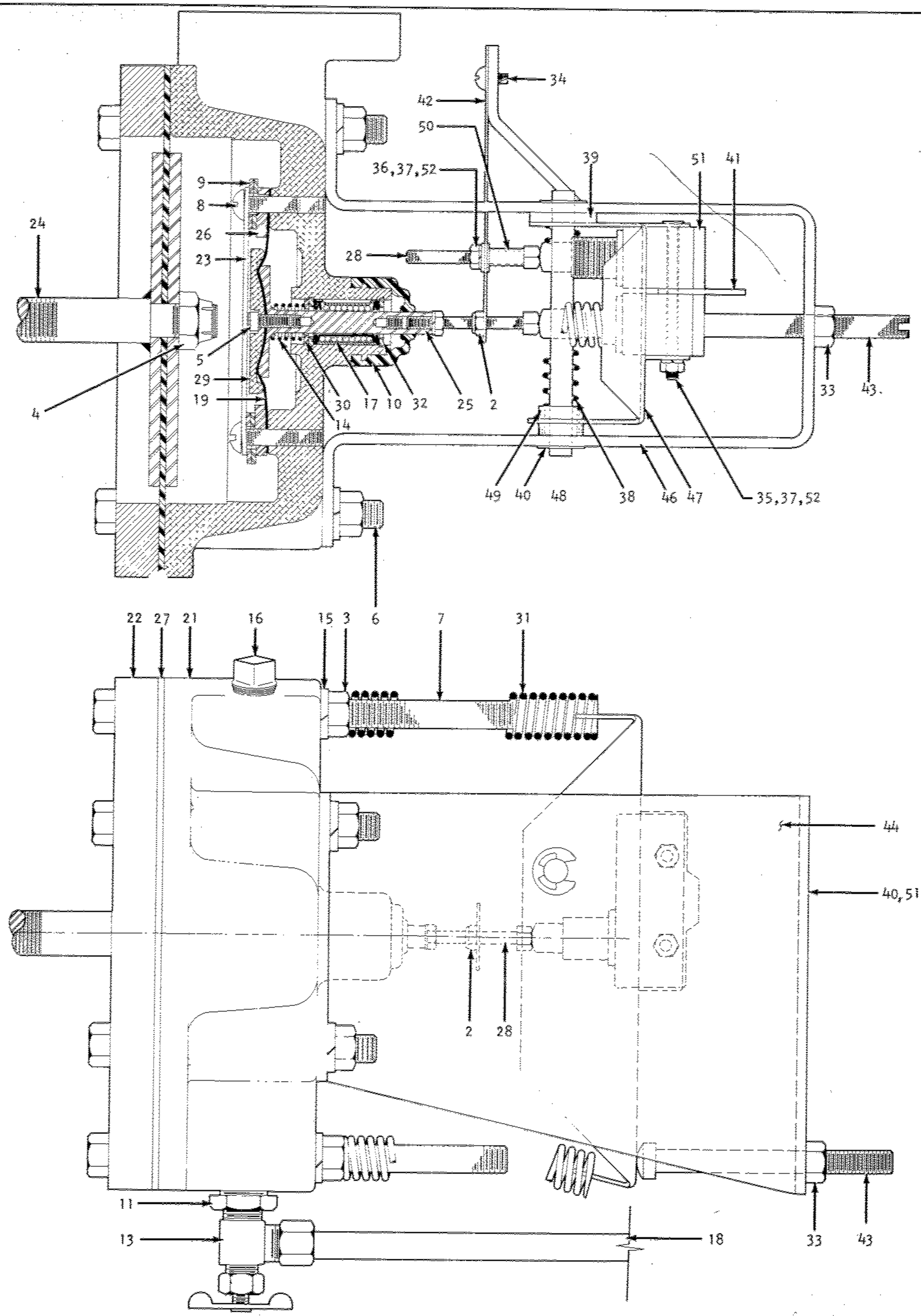
Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400

Litho in U.S.A.

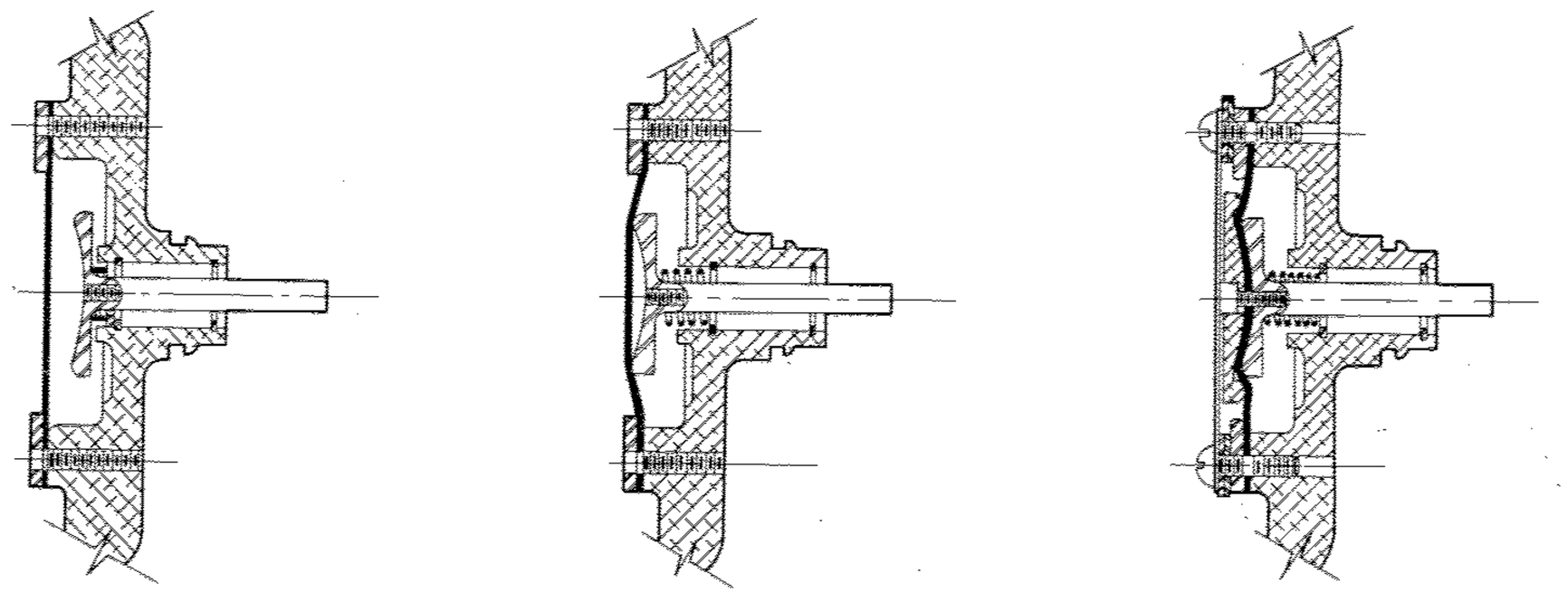
Parts List—Balance & Supply Injector Piping

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----------	
	Z	AD 14 039	91362#* BALVALVE+SUPINJ INLET ASSY	
			----------COMPONENTS----------	
all	2	60E077B07K	79292N* HOSE ASSY=3/8"X 7+1/2"LG	
all	3	96P014	02Z 3/8" VALVE 120V HAYS 2195-0055	
all	4	96J030D	01Z 1/2" PRESREGULTR SET 28# FEM-UN	
all	5	30N100	07Z PRESSGUAGE 1/8"BACKCONN 0-30PSI	
all	6	5SX0KBE	NPT CROSS 1/2" BRASS 125#	
all	7	5SL0KBEA	NPT ELBOW 90DEG 1/2" BRASS 125#	
all	8	96M001	02Z 1/2" X 3/8" RELIEF VAL. SET 31#	
all	9	51X017	UNION STRADAPT 1/2" PH#0107-8-8	
all	10	5N0K11AB42	NPT NIPPLE 1/2X11 TBE BRASS STD	
all	11	60E004TE	04Z 1/4"OD X.170"ID NYLON TUBING *	
all	12	53A500	1/4" SLEEVE-DELRIN	
all	13	53A501	TUBEINSERT .170"OD	
all	14	53A059A	NUT 1/4"COMP.HOLYOKE ANDERSON#61A-4	
all	15	5N0K10ABE2	NPT NIPPLE 1/2X10 TBE BRASS 125#	
all	16	5SB0K0CBEO	NPTHEXBUSH 1/2X1/8 BRASS 125#	
all	17	5SB0G0CBEO	NPTHEXBUSH 3/8X1/8 BRASS 125#	



FOR ADJUSTMENT PROCEEDURES, SEE MSSMA401AE.



STEP 1

RETRACT PLUNGER FULLY AND INSTALL DIAPHRAGM. DIAPHRAGM MUST BE FLAT AND FREE FROM WRINKLES BEFORE INSTALLING CLAMPING RING.

STEP 2

ADVANCE PLUNGER UNTIL DIAPHRAGM CENTER IS FLUSH WITH CLAMPING RING. CLAMP PLUNGER IN THIS POSITION.

STEP 3

INSTALL DIAPHRAGM CLAMPING WASHER. INSTALL DIAPHRAGM STOP WITH TWO # 10 FLAT WASHERS UNDER EACH SCREW AS SHOWN.

INNER DIAPHRAGM INSTALLATION

HYDRAULIC SENSING DEVICE ASSEMBLY

PELLERIN MILNOR CORPORATION

BMP700847
91523B

LITHO IN U.S.A.

Hydraulic Sensing Device Assembly

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

Litho in U.S.A.

Parts List—Hydraulic Sensing Device 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----------	
			none	
			----------COMPONENTS----------	
all	1	SAE10 017	84343E* SENSING DEVICE ASSY =BWE'S	(BWE+NSE+3621 DYE ONLY)
all	1	SAE10 017A	84343#* HYD SENSING DEVICE ASY	(72 TILTS ONLY)
all	2	15G071	HXLOKNUT 6-32UNC3B ESNA#22NM-62 G2	
all	3	15G185	HXNUT 5/16-18UNC2B SAE ZINC GR2	
all	4	15G219NTE	HXTHINLOKNUT 3/8-24NF NYL STL/ZNC	
all	5	15K005	04Z SKCPSCR 6-32X3/8 SELFOK	
all	6	15N203	HXTAPSCR 5/16-18X3+1/2 ZINC FLTHDG2	
all	7	15K082	HXTAPSCR 5/16-18X4+1/2 FULTHRD ZCG5	
all	8	15N140	RDMACSCR 10-24UNC2AX3/4 ZINC GR2	
all	9	15U130	FLAWAS#10 .031X7/16ODX.203ID ZINCPL	
all	10	60C300	BOOT MICRO SEAL MS#DD10000	
all	11	5SB0E0CBEO	HEXPIPBUSH 1/4 X 1/8 BRASS 125#	
all	12	SAE10 017S	84343D* SENSDEV SWITCHMOUNT SUBASSY	
all	13	96H018	NEEDLE VALVE	
all	14	02 10246	82426B SPRING=SENS DEV RTRN 36" BLK	
all	15	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
all	16	5SP0EGFSS	NPT PLUG 1/4 SQSOLID GALSTL	
all	17	54A700	01Z BALLBUSHING-LINEAR-IK0#LBB 4	
all	18	90A020	COPPERTUBE 5/16"X.032X50' EA=1 ROLL	
all	19	02 10197	92601A INNER DIAPHRAM=SENS DEVICE	
all	21	X2 10203	70236D CHAMBER=FLUID SENSING DEVICE	
all	22	02 10205	OUTCLAMPRING=SENDEV ZNC	
all	23	02 10233	76571A RING=INNER DIAPHRAM CLAMP	
all	24	AD 10 003	70246B* OUTER DIAPHRAM CLAMPPLATE	(001A ONLY)
all	24	W5 20077	79461B*OUTER DIAPHRAM PLATE MACH.	
all	25	02 10237	89011B PLUNGER=INDIAFRAM=SENDEV+OIL	

Hydraulic Sensing Device Assembly

Pellerin Milnor Corporation
P. O. Box 400, Kenner, LA 70063-0400
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Parts List, cont.—Hydraulic Sensing Device Assembly

Used In	Item	Part Number	Description	Comments
all	26	02 10247	65124ASTOP=INNERDIAPHRAM	
all	27	02 10282	85482A6 OUTER DIAFRAM=SENSDEVICE	
all	28	02 10320	76571A SCREW=SENSDEVICE ADJ#6-32	
all	29	02 10410	80253B CLAMPWASHER=INDIFRAM=SENSDEV	
all	30	02 10416	83293A WASHER=SENSDEV RETURNSPRING	
all	31	02 10454	71325A SPRING=SENSDEV CADSTL	
all	32	17B013	INTRETRING IND#3000-X50-ST-ZD-ZINC	
all	33	15G177	HXNUT 1/4-28UNF2B SAE ZINC GR2	
all	34	15P002	TRDCUT-F PAN HD 6-32UNC2AX1/4" PLTD	
all	35	15N070	FLATMACSCR 6-32UNC2AX1.75 ZINC GR2	
all	36	15U060	01Z FLAT WASHER#6 ANSI TYPEB BRASS	
all	37	15U100	LOKWASHER MEDIUM #6 ZINCPL	
all	38	02 10459	65105A SPRING-PIVOTPIN=SENSDEV CAD	
all	39	15U342	FLTWASH .255/.260IDX.750DX.125T SS	
all	40	17B006	EXTRETRING IND#1000-25-ST-ZD ZINC	
all	41	02 02038	85482A PLATE INSULATING SMALL9NOV51	
all	42	02 10198	76571A LEAF SPRING=SENSING DEVICE	
all	43	02 10455	65025A ADJSCREW=SENSDEV 1/4-28X2.75	
all	44	20L609	91213B LABEL=BALANCE.SENSING.SWITCH	
all	45	02 10320	76571A SCREW=SENSDEVICE ADJ#6-32	
all	46	02 10444	91032C BRACKET-FIXED=MICSW=SENSDEV	
all	47	02 10447	87516C MOUNT=SENSDEVSWITCH CADPLATE	
all	48	02 10448	65025A PIVOTPIN=SENSINGDEVICE S/S	
all	49	02 10456	65025A BUSHING=SENSDEV PIVOTPIN	
all	50	27B205	SPACER ROLL.178ID.313L.021T STL/ZNC	
all	51	09R021	02Z MICSW SPDT SENSING BZ-RQ-A2 (03	
all	52	15G070	HXMACHSCRNUT 6-32UNC2B ZINC GR2	

Centrifugal Switch Assembly

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

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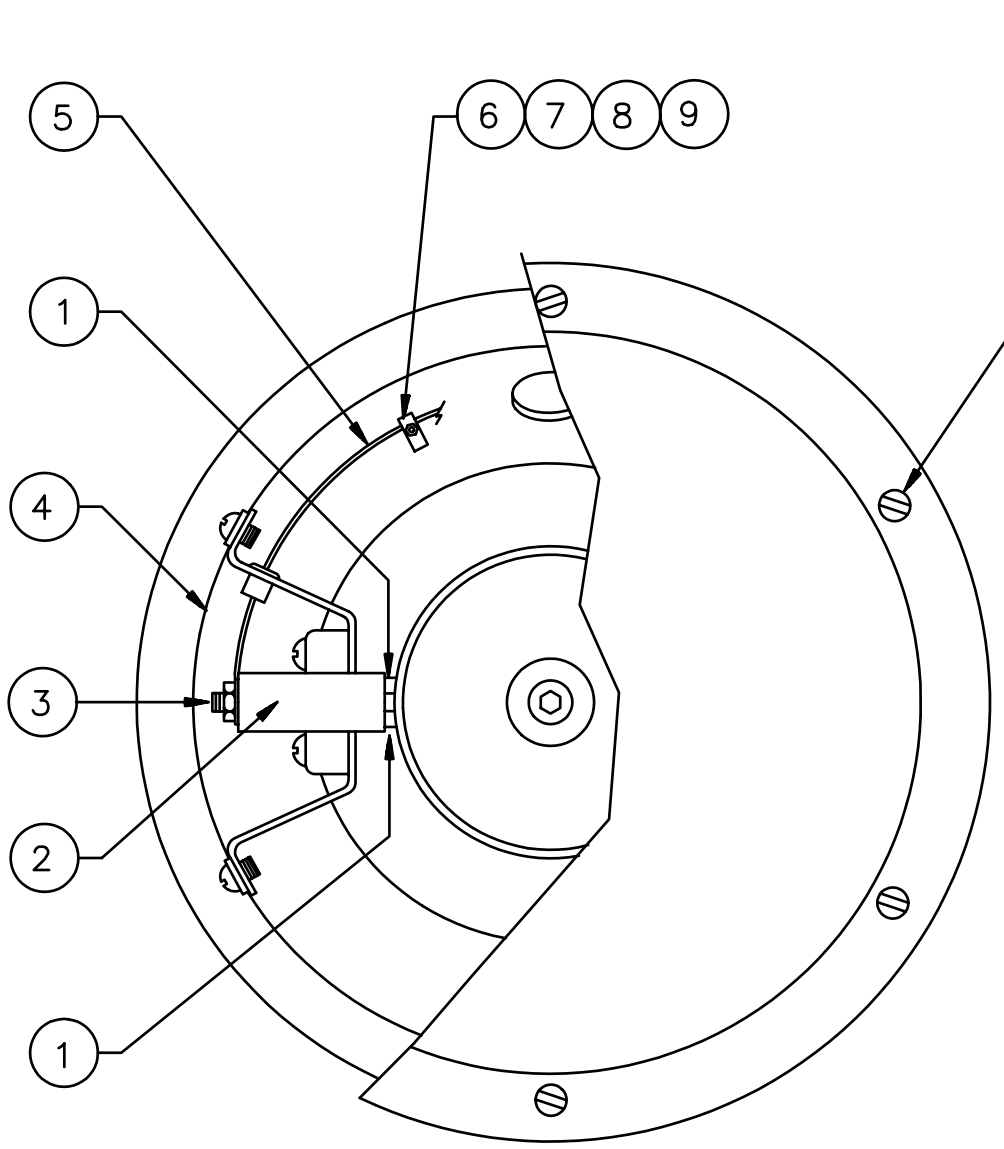

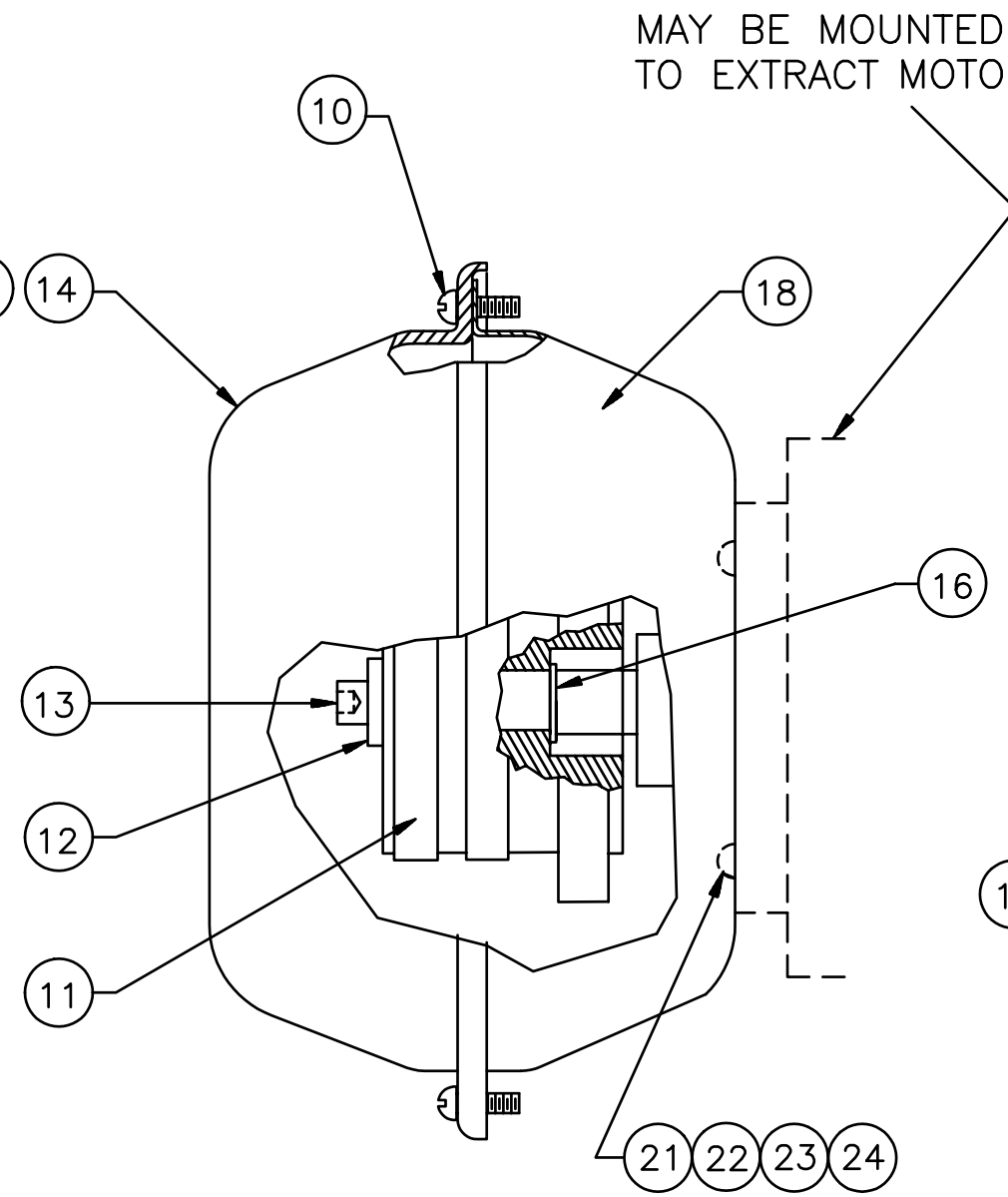

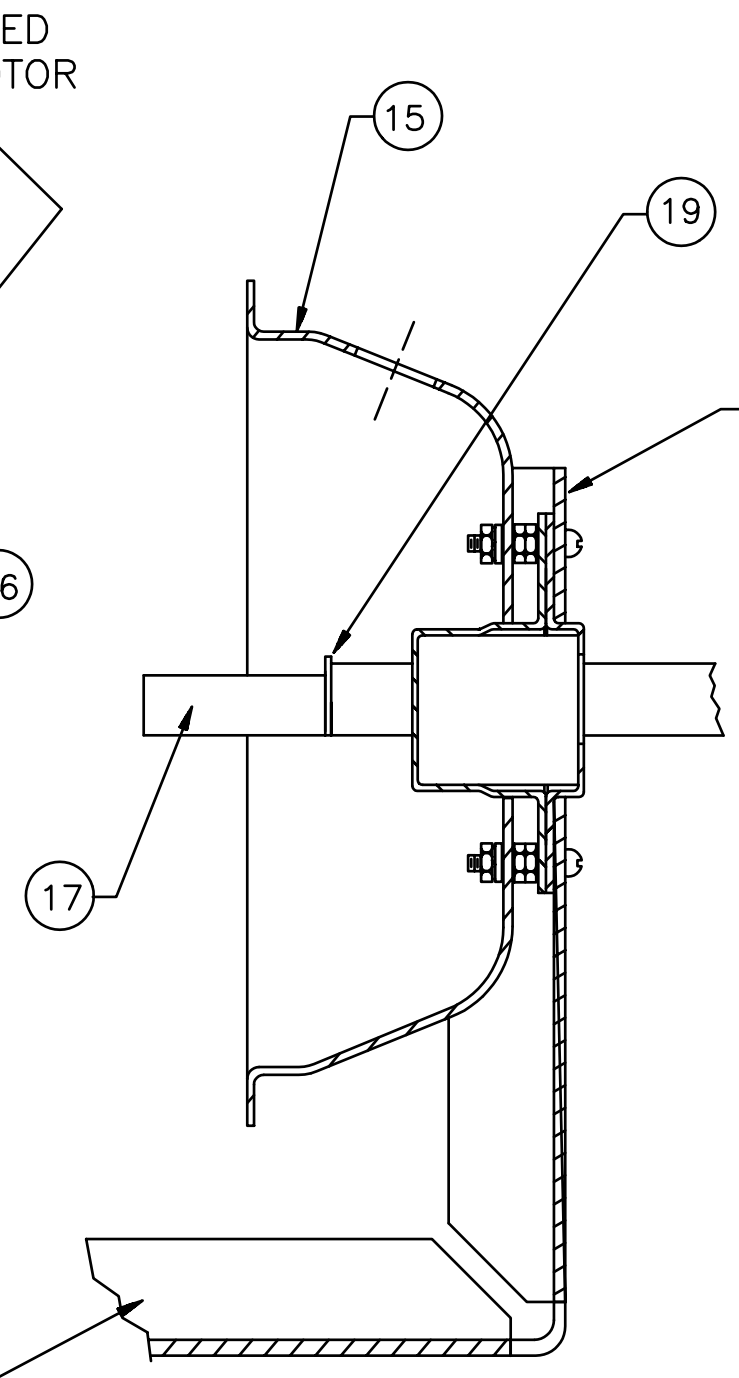

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P. O. Box 400, Kenner, LA 70063-0400

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Parts List—Centrifugal Switch 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----------	
	N	EDC14003	92000Z*CENTSW + MTG BRKT 3621/26F	3621Q'S MANUFACTURED AFTER JAN. 6,1993
	P	EDC14002	90000Z CENTSW+MTG BRKT 36/42QG/J/P	3621/26+4226Q4'S, Q6'S
	Q	G10 05000B	84412# CENTSW ASSY=FRAME NO-PLATE	3621CPE,BWP,NSP 4226DA1, 64040/64050E6N 64046E6N/J6N/D6N
	R	G03 04500A	84412C CENTSWITCH=MOTOR MT NO-PLATE	6044,6442,6446,7244
	T	SAE03 088	792571 ASSY=CENSW + MOUNTBKT 42	42031,42044,48032,48036
	U	SAE03 088A	83417J ASSY=CENSW + MOUNTBKT 42DYA	5238 DYE
	V	ADC11001	84122D ASSY=CENSW + MOUNTBKT4226QH	4226
	W	ADC14001	90351C CENT SWITCH ASSY 3621F8P	3621F8P
	X	EDC14801	86252C ASSY=CENSW+MTGBRKT RWP	3621/26,4226RWP/SYS 7
	Y	SAE13 001	83246I ASSY=CENSW + MOUNTBKT SWE	3626SWE
	Z	SAE13 001A	83417J CENTRIFUGAL SW ASSY 42QHE	4226,4832,4836
			----------COMPONENTS----------	
all	1	09X100	CARBON BRUSH 3/16"SQ=CENSW	
all	2	ESC0001	82281B* CENT SWITCH BRUSHOLDER ASSY	
all	3	15G071	MACHSCRLOKNUT 6-32 NM SER ZINC	
all	4	03 IF2X3	85046B INSUL.AUTOSPOT/CENTRIFUGL.SW	
all	5	60E005E	TUBING VINYL 3/8IDX.025"W #HT105C *	
all	6	12P015C	CABLECLAMP 5/16-1/2	
all	7	15G070	HXMACHSCRNUT 6-32UNC2B ZINC GR2	
all	8	15N045	RDMACHSCR 6-32UNC2AX3/8 ZINC GR2	
all	9	15U100	LOKWASHER MEDIUM #6 ZINCPL	
all	10	15P010	12Z PHILPAN TRDCUTSCRTYP10-24X1/2SS	
all	11	SAE03 012B	83407#*SLIPRING+CENT SW.ASSY(LORES)	
all	12	15U342	FLTWASH .255/.260IDX.750DX.125T SS	
all	13	15K036	05Z SKSELL0KCP SCR 1/4-20X5/8	

Parts List, cont.—Centrifugal Switch Assembly

Used In	Item	Part Number	Description	Comments
all	14	02 15582	COVER=CENTSW-CADSTL	
N-R	15	03 01147	HOUSING FOR CENTRIFUGAL SWITCH	
all	15	A33 11000	75675B$ HOUSE+BKT+SHAF=CENSW CWM	00S
T	15	A03 01300	75491C*HOUSE+BKT+SHAFT=CENSW 42+52U	
U	15	A03 01300A	75491#* HOUSE+BKT+SHAF=CENSW 42DYA	
V	15	A03 11000	82506T*CENTSWITCH=HOUSING+BRKT 42Q	
W	15	ADC14001A	93381C*C-SWITCH=MNT BRKT+HOUSING	
X	15	ADC14801	86246C*CENT SW HOUSING & BRKT ASSY	
Y	15	A13 02700	83246C$ HOUSE+BKT+SHAF=CENSW SWE	
Z	15	A13 02700A	83246# CENSW HSG+BRKT ASSY 2SPD WAS	
T-Z onlY	16	17B059W	RETAIN RING-ROTOR CLIP# SH-62-ST	
T-Z onlY	17	A03 01400	71103B SHAFT ASSY=CENTSWITCH	
T-Z onlY	18	03 01147	HOUSING FOR CENTRIFUGAL SWITCH	
T-Z onlY	19	17B059W	RETAIN RING-ROTOR CLIP# SH-62-ST	
T	20	02 15359	CENTSW MOUNTBRACKET	
U	20	03 25417	76154C BRKT=CENT SWITCH MT	
V	20	02 11452	94222D CENTRIFUGAL SWITCH BRKT-42Q	
W	20	02 14609	93381D+BRKT=CENTRIF SWITCH 3621F8P	
X	20	02 14836	89391C CENT=SW MTG BRKT	
Y	20	02 13111	77481C BRKT=CENT-SWITCH MT BND@PRNT	
Z	20	03 48170	83246C BRACKET=CENT.SW.MT.2SP WASH	
all	21	15N117	RDMACSCR 10-24UNC2X3/8SS18-8	
all	22	15U130	FLAWAS#10 .031X7/16ODX.203ID ZINCPL	
all	23	15U150	LOCKWASHER MEDIUM #10 ZINCPL	
all	24	15G201	01Z HXLOKNUT 3/8-16 NYL/SS TYPE NE	