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Service—

52038 WP1/WTL/WTN Washer Extractors

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

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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**.

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Table of Contents
for MPP52WE1AE/2006154A
52038 WP1/WTL/WTN Washer Extractors

Table of Contents, cont.

Table of Contents, cont.

ABOUT THIS MANUAL

Scope—This instruction manual is intended to provide preventive maintenance, service procedures, and mechanical parts identification for your machine. See the safety manual for safety instructions before installing, servicing, or operating this machine. See the installation guide for facility requirements, installation instructions, and assembly instructions. See the operator guide for operator instructions. See the reference manual for programming, operating, and troubleshooting instructions. See the schematic manual for electrical parts identification and electrical troubleshooting.

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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.

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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.
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Safety—Tilting 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.

WARNING 3: Crush Hazards—Tilting machines only—The machine housing will crush your body or limbs if it descends or falls while you are under it. Housing can descend with power off or on. Manual operation of tilting valves overrides safety interlocks. Improper operation of manual tilting valves may cause the housing to descend.

- Do not remove guards, covers, or panels.
- Do not reach into the machine housing or frame.

3. Safety Alert Messages—External Mechanical Hazards [Document BIUUUS12]

The following are instructions about hazards around the front, sides, rear or top of the machine.

WARNING 4: Strike and Crush Hazards—Machines with power operated door—The moving door can strike you or crush or pinch your limbs if caught between the door and machine. Some doors move automatically.

- Keep yourself and others clear of movement areas and paths.
- Keep both hands on the controls while operating.
- Do not operate the machine with malfunctioning two-hand manual controls.

WARNING 5: Crush Hazards—Tilting machines only—The machine can crush your body or limbs if you are caught between the tilting housing and a stationary object. Some machines tilt automatically.

- Keep yourself and others clear of movement areas and paths.
- Keep both hands on the controls while operating.
- Do not operate the machine with malfunctioning two-hand manual controls.

WARNING 6: Crush Hazards—Suspended machines only—Spaces between the shell and housing can close and crush or pinch your limbs. The shell moves within the housing during operation.

- Do not reach into the machine housing or frame.
- Keep yourself and others clear of movement areas and paths.

4. Safety Alert Messages—Cylinder and Processing Hazards

[Document BIUUUS13]

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

DANGER 7: 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.
- Open pocket machines only—Do not jog the cylinder and pull the goods at the same time.
- Open pocket machines only—Keep yourself and others clear of cylinder and goods during jogging operation.
- Do not operate the machine with malfunctioning two-hand manual controls.
- 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 8: 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.
- Open pocket machines only—Keep yourself and others clear of cylinder and goods during jogging operation.
- Do not operate the machine with malfunctioning two-hand manual controls.

WARNING 9: 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 10: 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.

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

5.1. Damage and Malfunction Hazards

5.1.1. Hazards Resulting from Inoperative Safety Devices

DANGER 11: 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 12: 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 13: 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 14: 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.

WARNING 15: Crush Hazards—Down limit switches (machines with front and rear tilt cylinders)—Failure of both front or both rear limit switches allows the seated tilt wheels on a tilted machine to lift from their cradles. The housing will fall and lunge forward or rearward.

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

5.1.2. Hazards Resulting from Damaged Mechanical Devices

WARNING 16: 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 17: 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 18: 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

5.2. Careless Use Hazards

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

WARNING 19: 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.

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

WARNING 20: 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 21: 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 22: Crush Hazards—Tilting machines only—The machine housing will crush your body or limbs if it descends or falls while you are under it. Housing can descend with power off or on. Manual operation of tilting valves overrides safety interlocks. Improper operation of manual tilting valves may cause the housing to descend.

- Secure both red safety supports in accordance with the instructions furnished, then lock out and tag out power at the main machine disconnect before working under the tilted machine.
- Do not operate the manual tilt valves with anyone under the machine.
- Do not operate the tilt controls with anyone under the machine.

WARNING 23: Crush Hazards—Tilting machines with front and rear tilt cylinders—The housing will fall and lunge forward or rearward if the tilt wheels on the non-tilted end lift out of their cradles, even with safety supports in place.

- Understand the consequences of operating manually.

WARNING 24: 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 —

How To Use the Safety Stands on 52038WTx Washer-extractors

These machines are provided with two safety stands (painted red) for maintenance. After the housing is tilted up, the stands are placed under the raised tilt wheels (front or rear). Use the safety stands to perform maintenance on the machine while it is tilted. A location is provided on the machine for stowing the safety stands when not in use.

WARNING 1: Crush Hazard—The safety stands provide protection against the un-powered drifting down of the housing during maintenance in the event of a leak in the hydraulic system.

- Never work **under** the raised housing unless both safety stands are installed and power is locked out/tagged out. Do not work **near** the raised housing with power on unless both safety stands are installed.
- Install these safety components using the procedure prescribed in this document.
- Maintain these safety components in good condition.
- When not in use, stow these safety components in the location provided on the machine.

Figure 1: Safety Stands for 52038WTx Models (machine shown tilted rearward)

Install the safety stands as follows:

1. At the controls, tilt the machine as in normal operation. Tilt up only as far as needed to insert the stands securely.
2. Referring to the figure, place the safety stands under the tilt wheels. Always use both stands.
3. See caution statement 2 below. At the controls, carefully lower the housing just until it is resting on the stands.

CAUTION 2: Machine Damage Hazard—Damage can occur if hydraulic power is applied to the safety stands for an extended time.

- Release the controls as soon as the housing is resting on the stands.

4. Lock out/tag out power to the machine.

— End of BIUUUS06 —

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

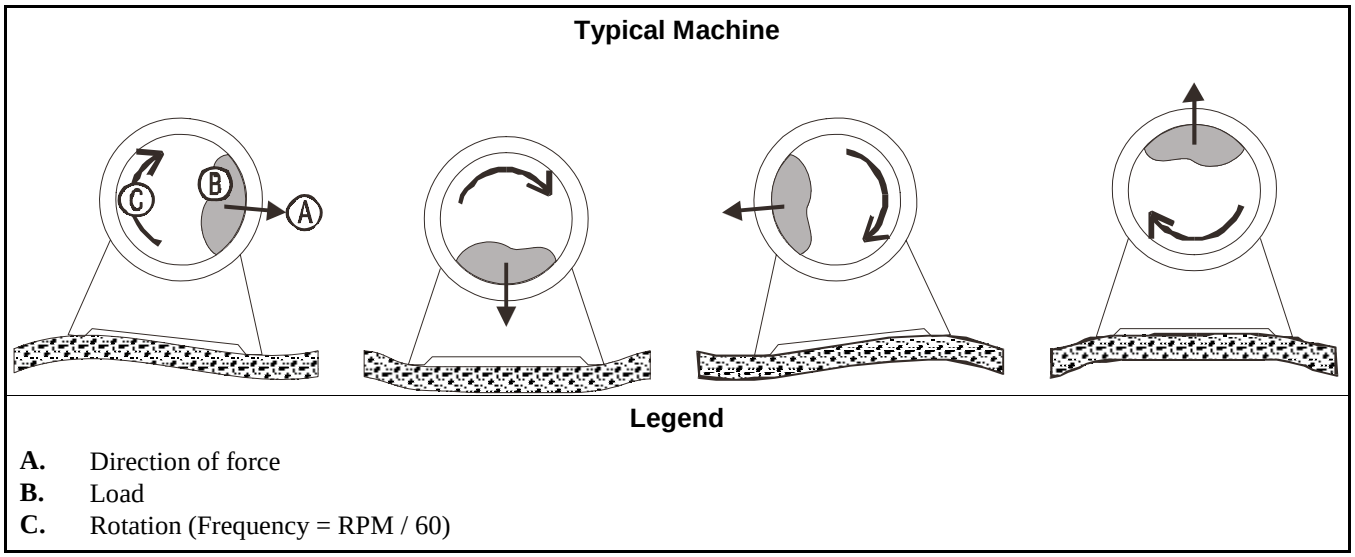


Figure 1 above is intended to depict both on-grade and above-grade installations and is equally applicable to flexibly-mounted washer-extractors, as well as to rigid models installed either directly on a floor slab or on a foundation poured integrally with the slab. Current machine data is available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

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.**

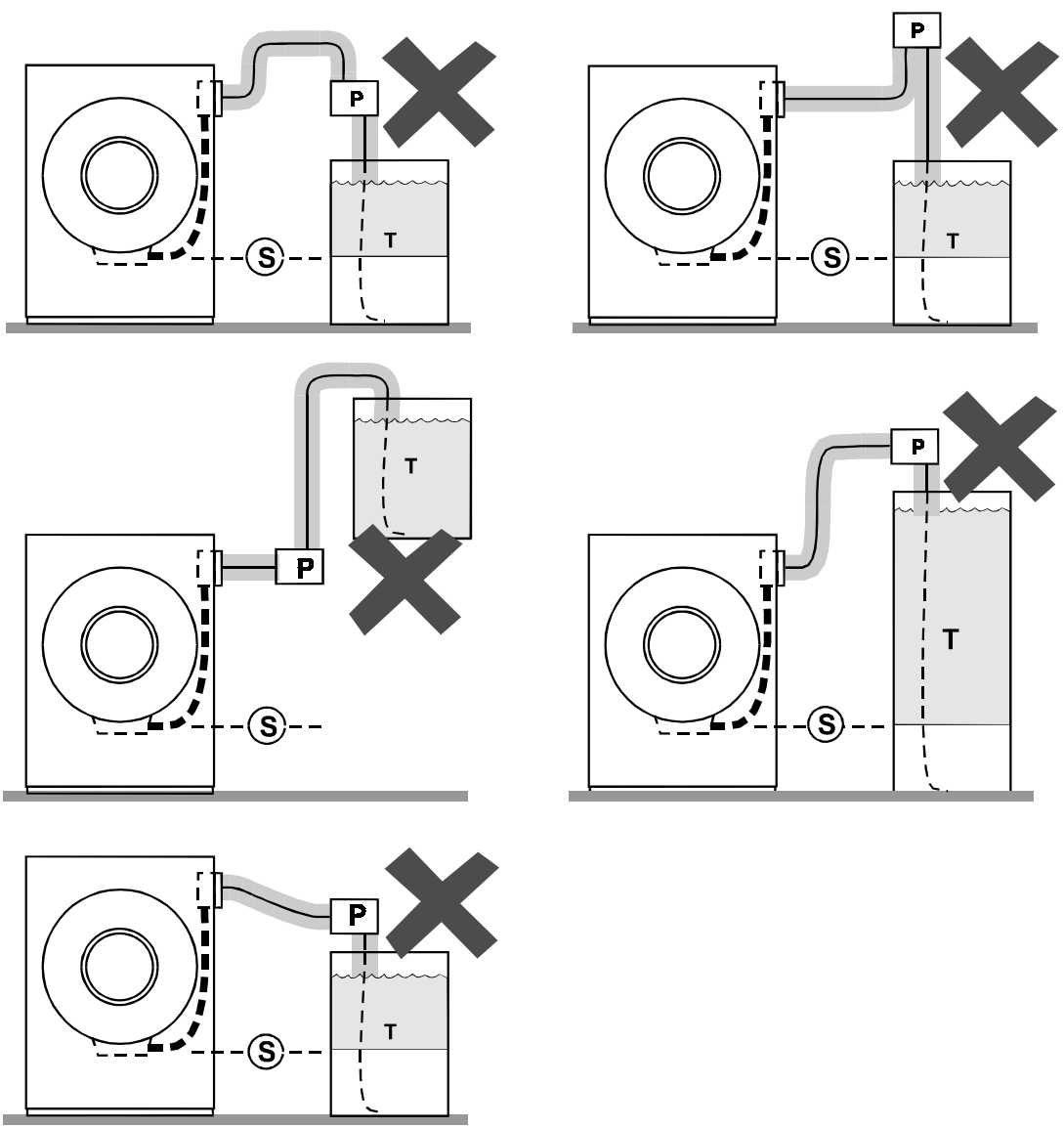
- Ensure that the chemical system prevents unintentional release of chemicals.
- Inspect regularly for proper operation and evidence of damage.

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

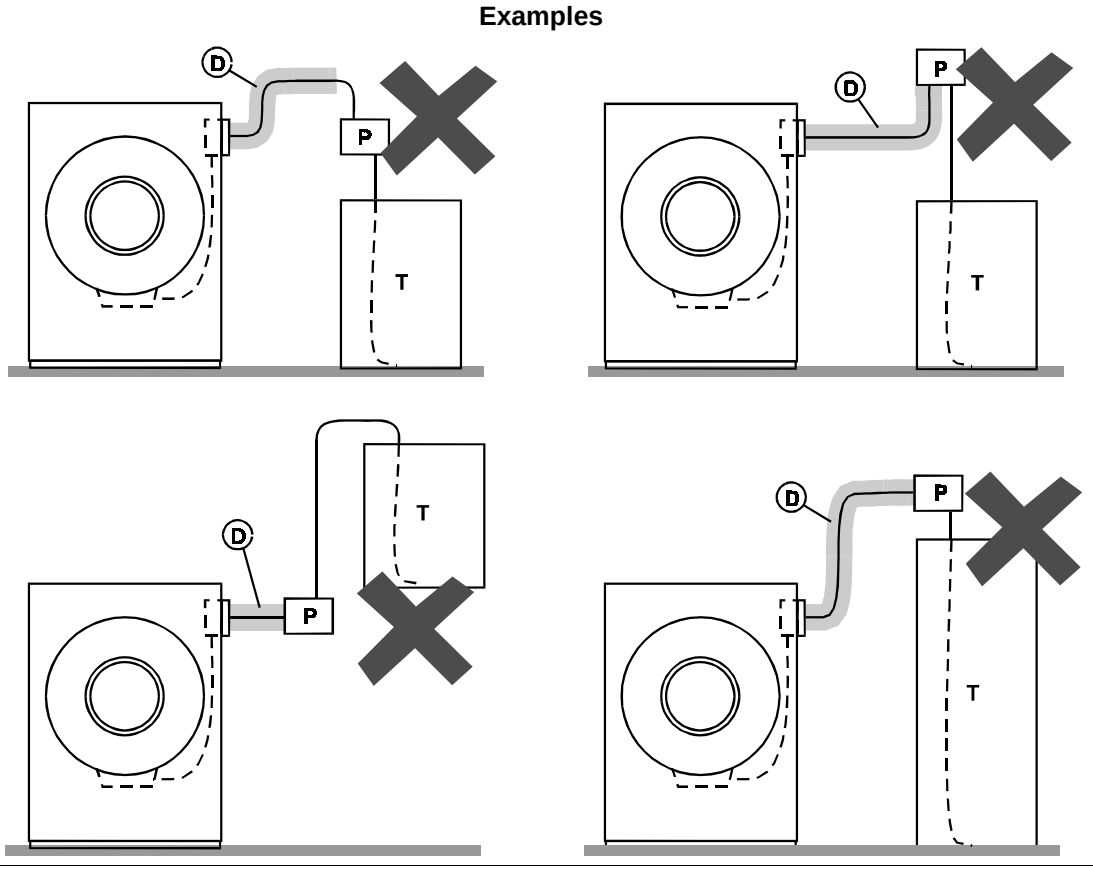


Legend

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.

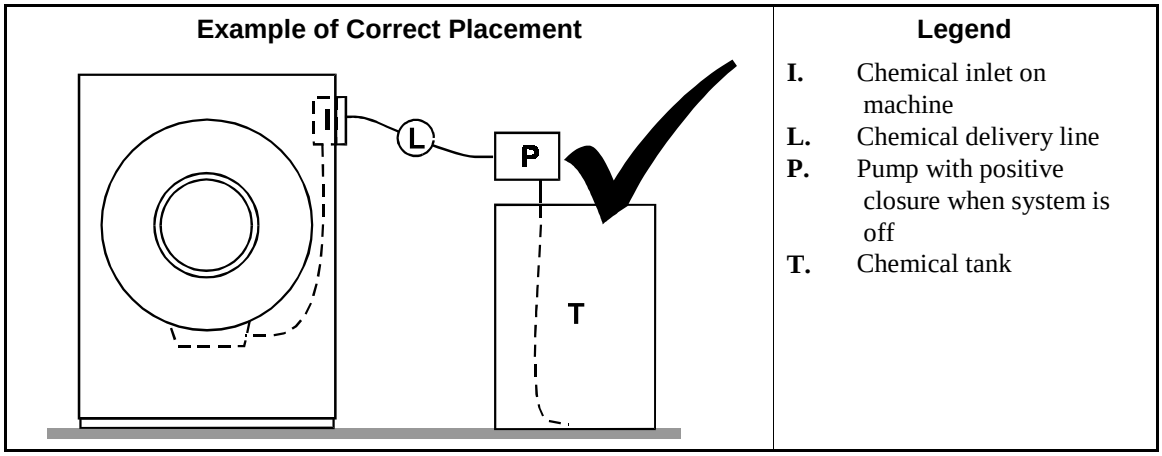
3.1. Siphoning: Positively close the line.—If the pump does not provide positive closure when the system is off, employ a shutoff valve in the line to serve this purpose.

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 —

Glossary of Tag Illustrations— Suspended Washer-Extractors

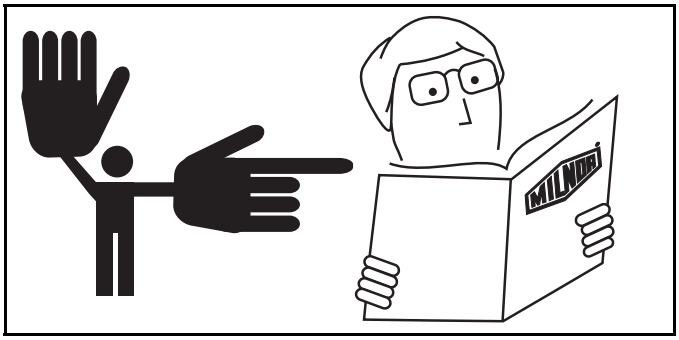
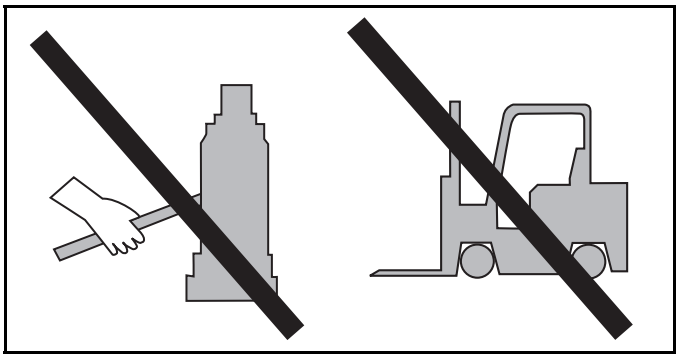
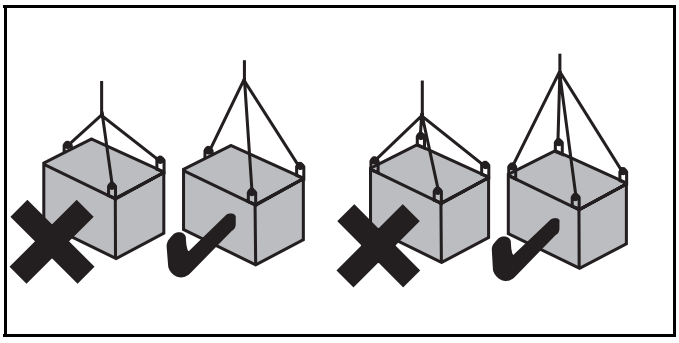
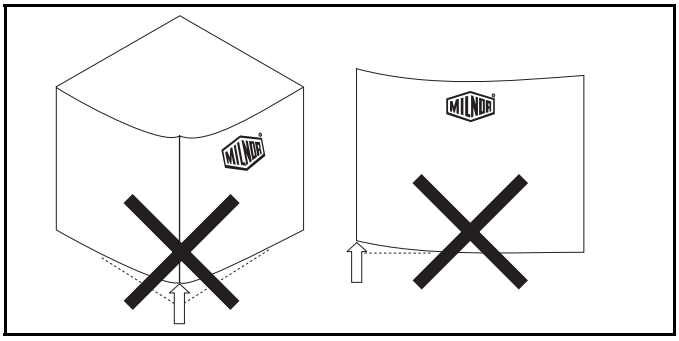
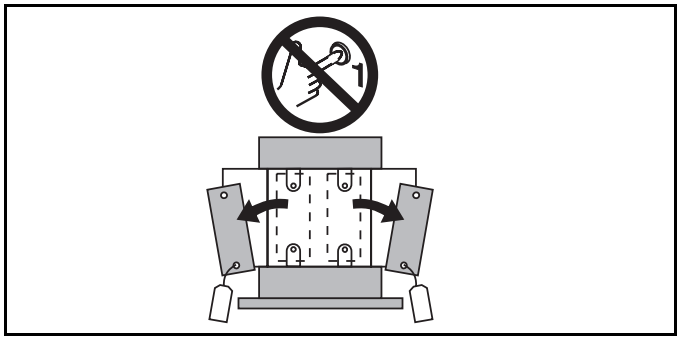
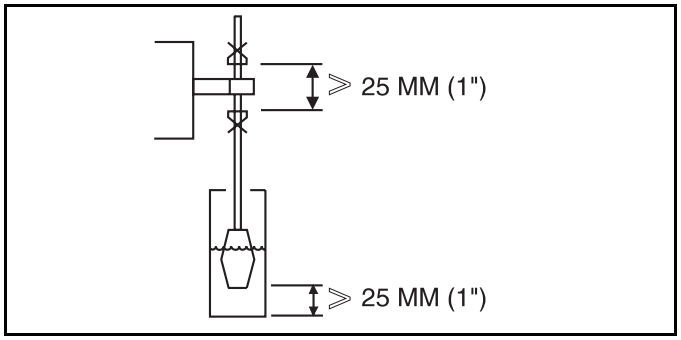
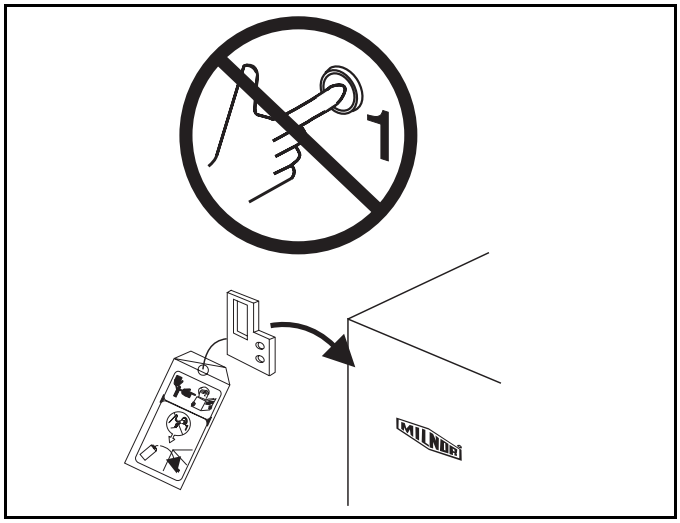
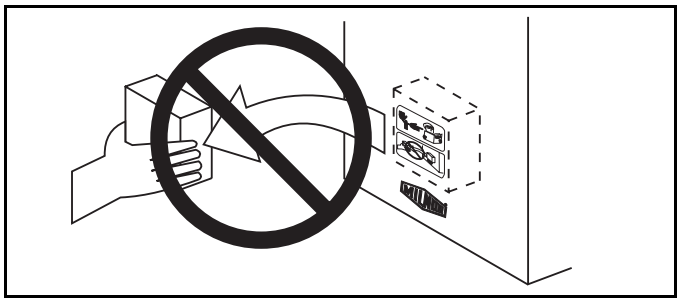
Illustration	Explanation
	Stop! Read the manual first for complete instructions before continuing.
	Do not jack the machine here. Do not lift the machine here.
	Use three point or four point lifting as determined by the lifting eyes furnished. Rig the load using lifting cables of sufficient size and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

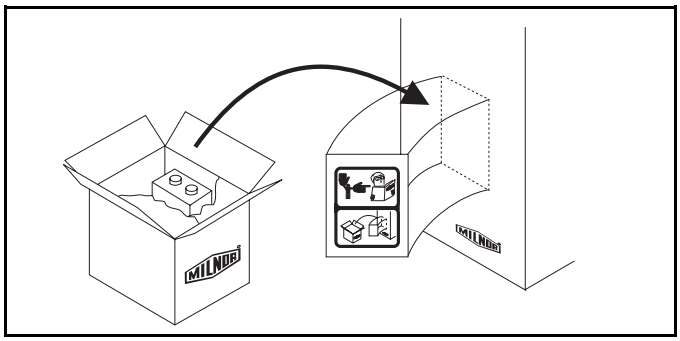
Illustration	Explanation
	Do not start this machine until the packing materials, lifting brackets, etc. with this tag attached or behind this panel are removed. These materials are painted red. Safety stands or brackets (also painted red) may be provided with this machine. Do not discard safety stands 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.



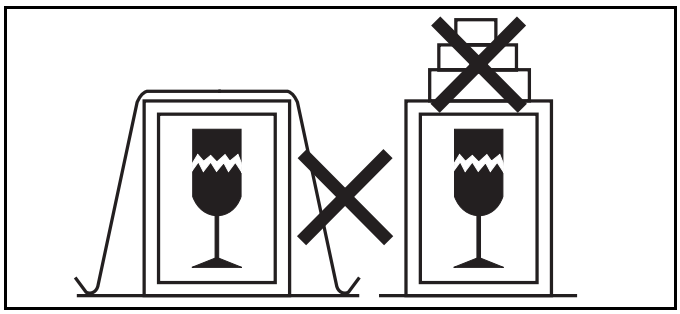
Do not start this machine until the part with this tag is installed on the machine.



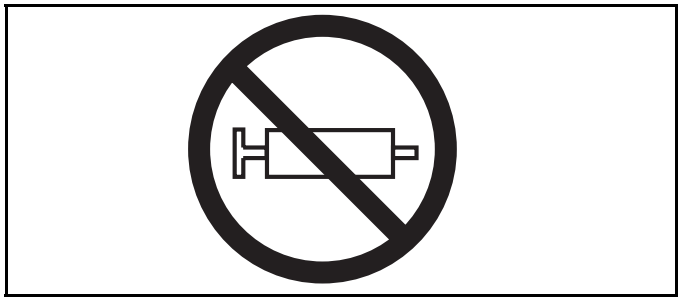
Do not remove this component from the machine.



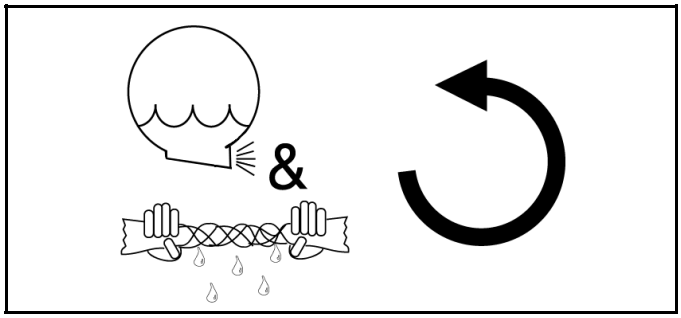
Install the appropriate part here before operating the machine.



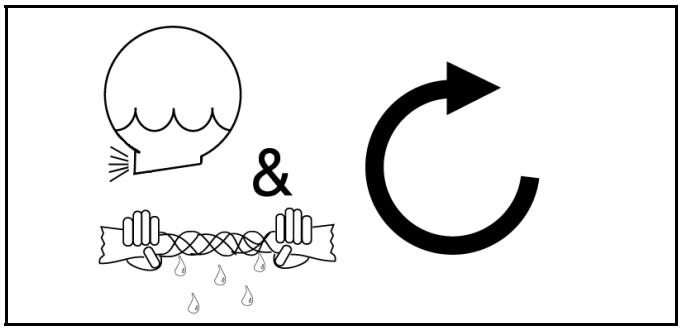
Do not strap or chain over box



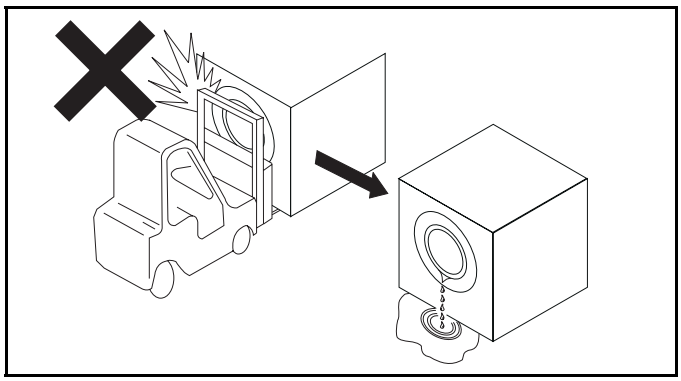
Do not pump grease here.



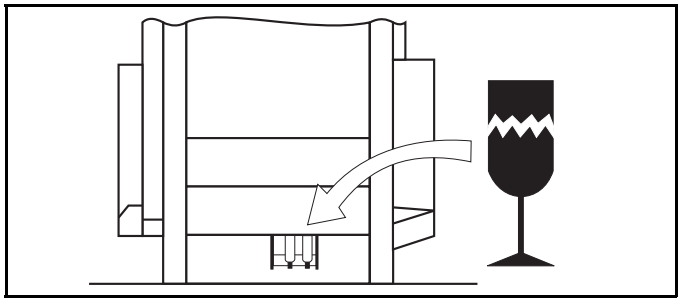
During drain and extract, the cylinder must rotate counterclockwise when viewed from here (rear of machine).



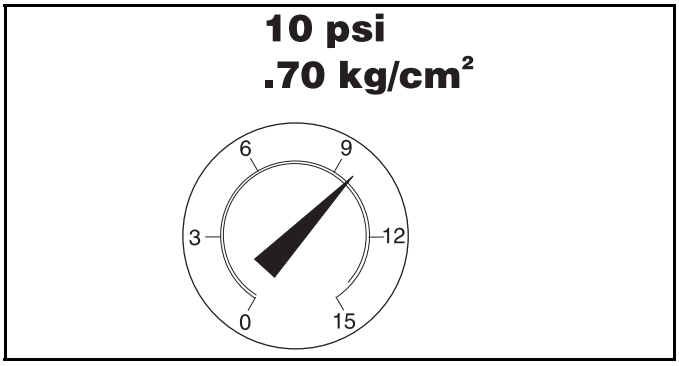
During drain and extract, the cylinder must rotate clockwise when viewed from here (front of machine).



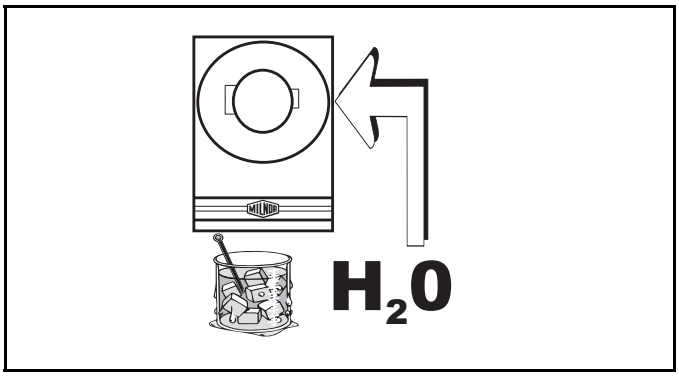
Do not strike shell front of washer-extractors during fork lifting. Striking shell front will cause door to leak.



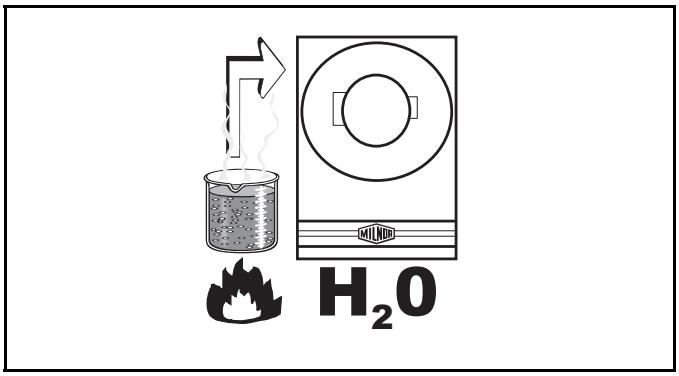
Brake assembly under machine is fragile. Forklift blades should only be placed under main structural beams



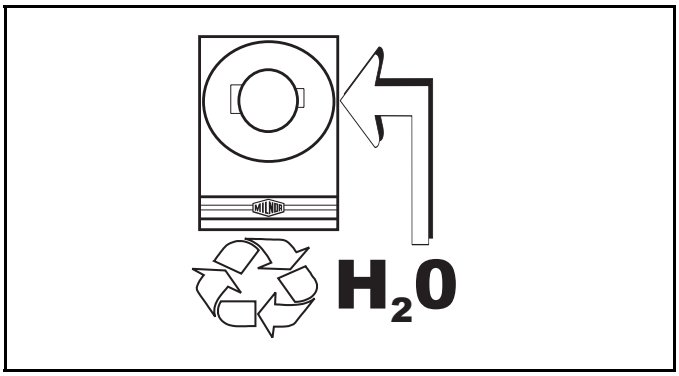
Set main bearing air pad gauge at 10 psi (.70 kg/cm^2), 64" and 72" ExN and JxN models only.
Set disc brake air gauge at 10 psi (.70 kg/cm^2), 64" and 72" ExN and JxN models only.



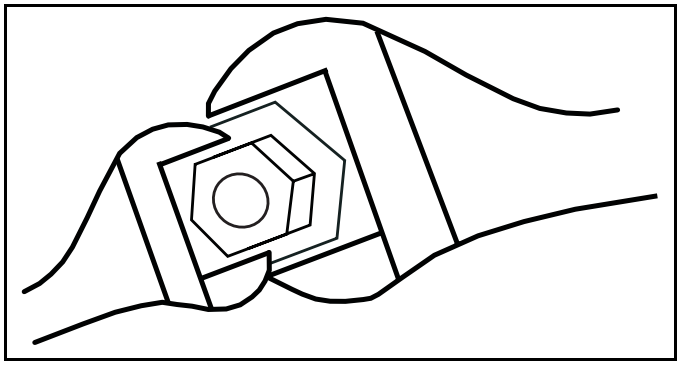
Make cold water connection here.



Make hot water connection here.



Make third (reuse) water connection here.



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

Section 1

Service and Maintenance

LUBRICATION AND PREVENTIVE MAINTENANCE FOR HYDRO-CUSHION® MACHINES

General Requirements

Maintenance procedures require:

- A hand operated grease gun.
- The correct lubricants (see "LUBRICANTS FOR MILNOR MACHINES," in the Table of Contents).

Lubricant Requirements

To achieve the optimum performance and service life from the Milnor® machine and as a warranty requirement, the machine must be lubricated in strict accordance with the instructions in this section.

⚠ DANGER ⚠

ENTANGLE AND CRUSH HAZARD—Belts and pulleys can entangle and crush body parts.

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

⚠ DANGER ⚠

CRUSH/SEVER HAZARD—Tilting mechanism can crush or sever parts of your body caught in them.

- ☞ **Install the safety stands before performing maintenance under a tilted machine.**
- ☞ **NEVER test or operate (manually or automatically) any machine function with any portion of a person's body under the tilted machine—even if the safety stands are installed.**

⚠ DANGER ⚠

CRUSH/SEVER HAZARD—Tilting machines with tilt wheels/cradles may lunge forward or rearward and even fall over if the tilt wheels at the non-tilted end are raised out of their cradles—killing/injuring personnel and/or damaging property.

- ☞ **NEVER manually tilt (lift) both ends of the machine at the same time. One end must always be seated in its cradle.**
- ☞ **ALWAYS visually inspect the tilt wheels to be sure they are all fully seated in their cradles before each manual tilt up.**
- ☞ **Hydraulic valve manual operation must be done by trained competent maintenance personnel who thoroughly understand the system and all the consequences of manual operations.**
- ☞ **ALWAYS understand beforehand all the consequences of manually operating hydraulic valves.**
- ☞ **Never permit operation with malfunctioning tilt limit switches.**

Correct Grease Gun Procedures

1. **Do not use a pneumatic grease gun.** Pump grease slowly, taking 10-15 seconds to complete each stroke. A grease gun can build up extremely high pressure which will force seals out of position and cause them to leak, even though both the seal and the bearing housing are equipped with spring loaded relief plugs.
2. **Apply quantity of grease called for in the checklist**. 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 ounces (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, 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.**
3. **Do not pump grease in until it oozes out of the spring loaded relief plugs.** Plugs bleed out excess grease and help prevent abnormal pressures from building up in the housing during operation (especially when the machine is first commissioned and after each lubrication). **Plugs will not protect against over-lubrication.**
4. **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.
5. **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.

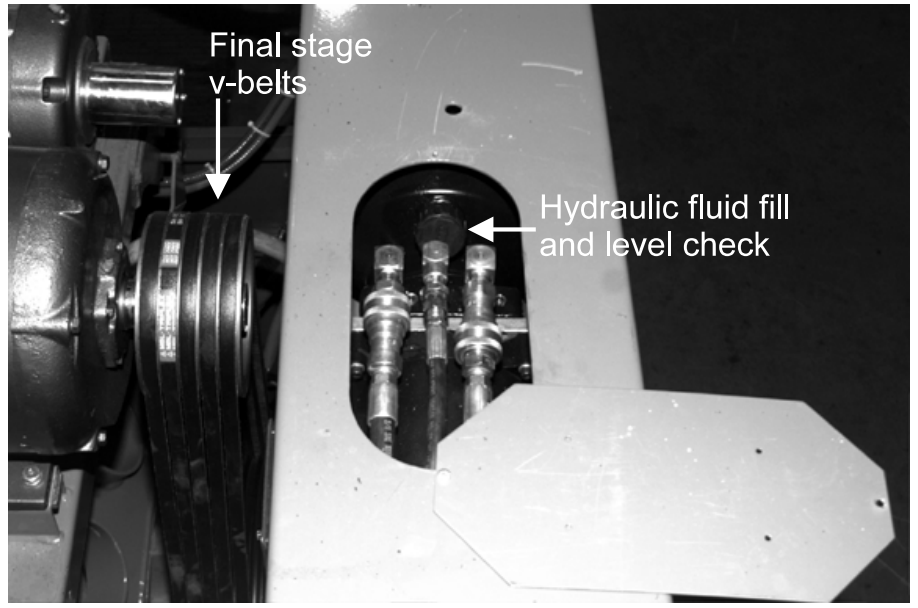


FIGURE 1 (MSSM0201CE)
Hydraulic Fluid Reservoir Fill and Level Check Point (located at rear of 48", 52", and 72" tilt machines only)

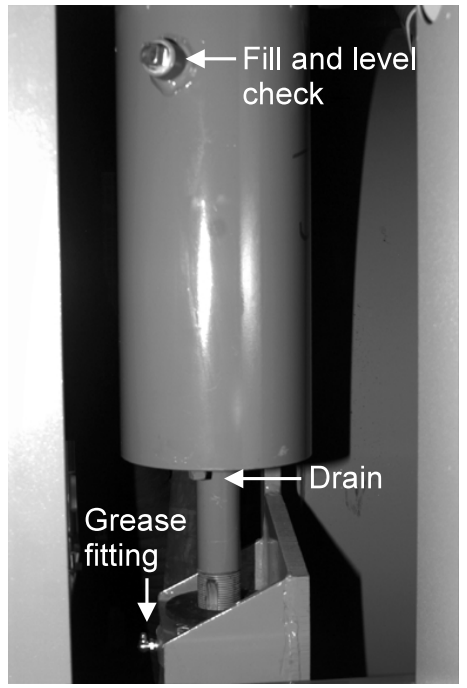


FIGURE 2 (MSSM0201CE)
Typical Hydro-Cushion® Maintenance Points

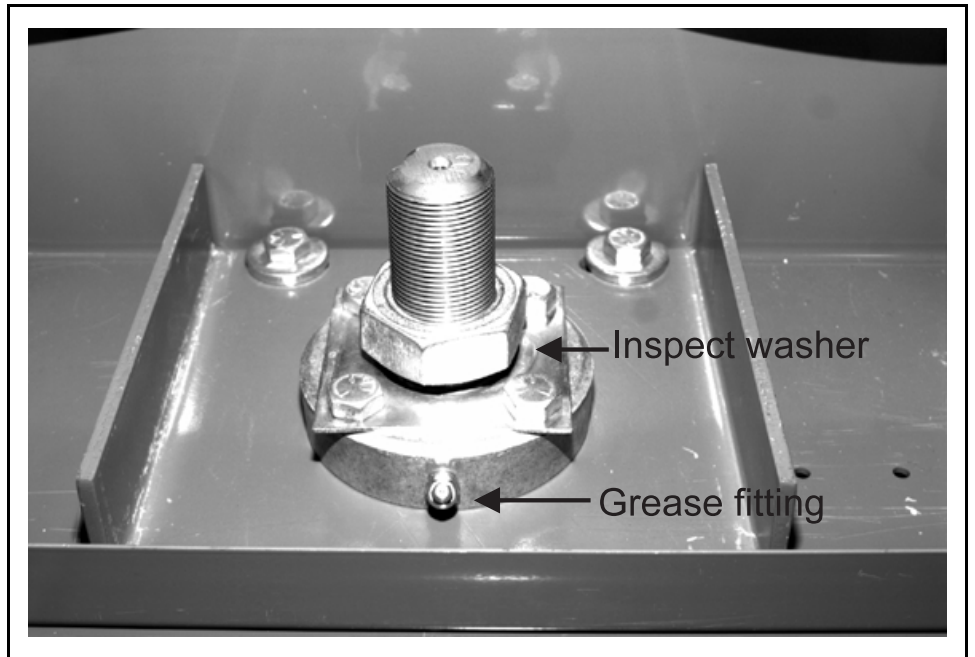


FIGURE 3 (MSSM0201CE)
Typical Upper Hydro-Cushion® Grease Fitting

Daily and Weekly Maintenance Items

Frequency	Component	Action
Daily	**Hydraulic Tilt System** (48", 52", and 72" Tilt machines) • Reservoir FIGURE 1 and NOTE 1	Check fluid with machine not tilted
	Hydro-Cushions® (all machines) FIGURES 2 and 3	Check for leaks
Weekly	**Final stage and other v-belts** (throughout all machines) FIGURES 1 and 12 NOTES 2 and 3	Check for wear and tension

NOTE 1: Tank should be approximately three-quarters full when the machine is not tilted. Do not over-fill.

NOTE 2: V-belt instructions for the first week of operation
- After 24 hours operation (three eight hour days), tighten final stage v-belts.
- After 80 hours operation (ten eight hour days), tighten final stage v-belts again.
- After 160 hours of operation (twenty eight hour days), tighten final stage v-belts, and check all other v-belts and tighten if necessary.

NOTE 3: All v-belts are not alike. “Super” or “High Capacity” v-belts frequently have considerably higher capacities than “Standard” belts. Sometimes, one brand of v-belt is more suitable than another brand of v-belt, although both v-belts are “interchangable”. It is always best to purchase replacement belts from the original manufacturer of the equipment. Purchasing exact replacements of the original belts is the best way to assure belt life equal to the original set.
Occasionally, Milnor® will change a belt specification to improve belt life.
Belts purchased from Milnor® are as currently specified.

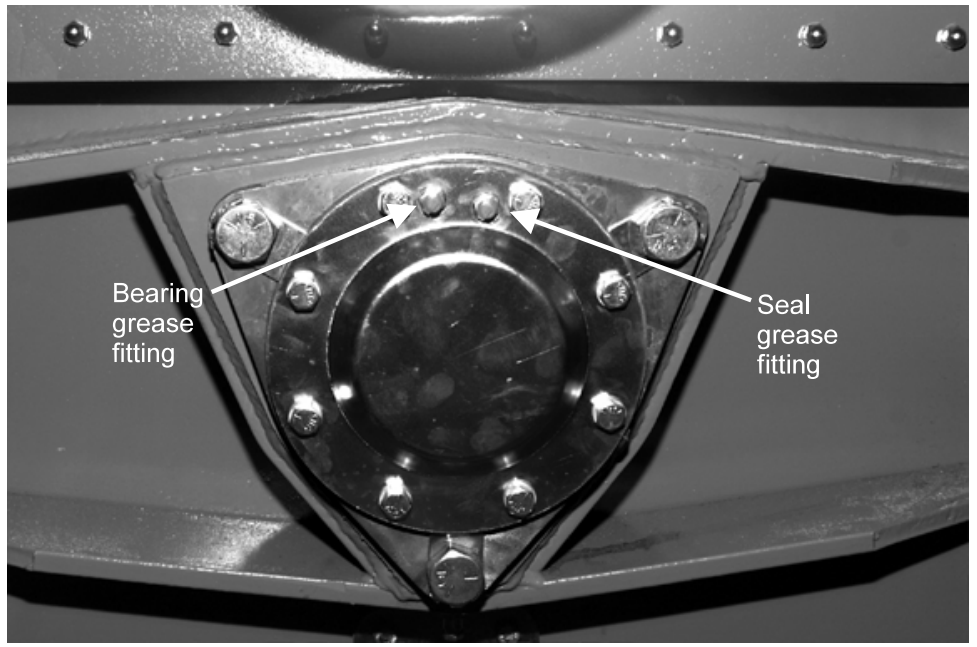


FIGURE 4 (MSSM0201CE)
42" Divided Cylinder Front Bearing and Seal Grease Fittings

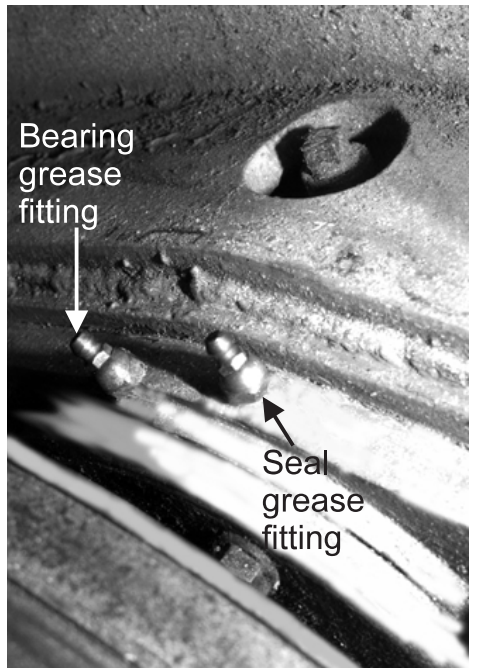


FIGURE 5 (MSSM0201CE)
42" Staph-Guard® Front and Rear Bearing and Seal Grease

Monthly Maintenance Items

Frequency	Component	Action
Monthly (see NOTE 4)	**All Divided cylinder and Staph-Guard® main bearing and seals** FIGURES 4 through 10, NOTES 5 and 6	
	• Each bearing grease fitting	0.37 ounces (10.6 grams), six strokes at two locations
	• Each seal grease fitting	0.12 ounces (3.54 grams), two strokes at two locations

NOTE 4: Once a month or once every 200 operating hours, whichever occurs first.

NOTE 5: Main bearings and jackshaft bearings (if so equipped) are prepacked with lubricant at the factory. Do not add grease for thirty days. During the first month's operation, some grease will ooze out of the automatic grease fittings at the bottom of the housing(s). This is normal. These grease fittings allow excess grease to escape, thus avoiding over-heating. This escaping lubricant need not be replaced. Every time these bearings are lubricated, the surplus grease will come out of the spring loaded relief fittings after a few hours running time.

NOTE 6: Bearings can run hot enough to make it extremely uncomfortable for a person to hold his hand on the bearing housing for more than a few seconds. This is normal.

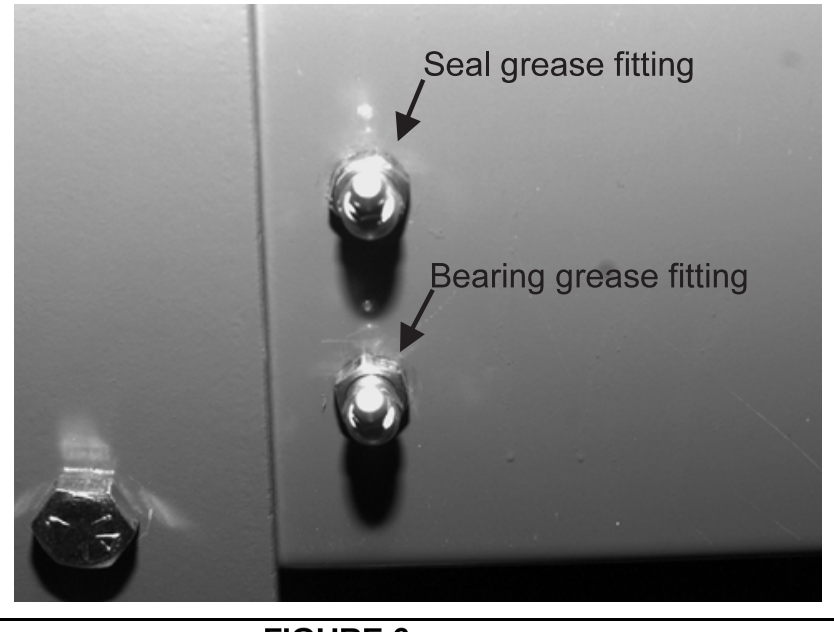


FIGURE 6 (MSSM0201CE)
42" Divided Cylinder Rear Bearing and Seal Grease Fittings

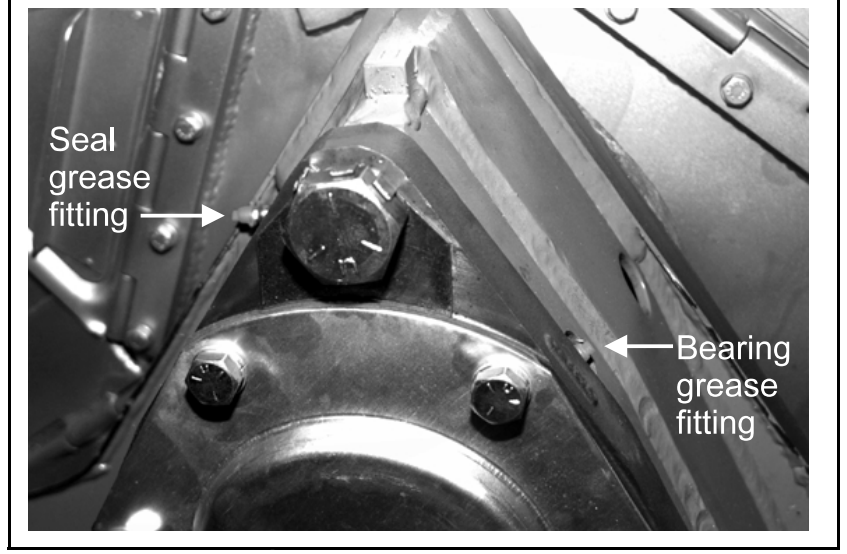


FIGURE 7 (MSSM0201CE)
60" and 72" Divided Cylinder Front Seal and Bearing Grease Fittings

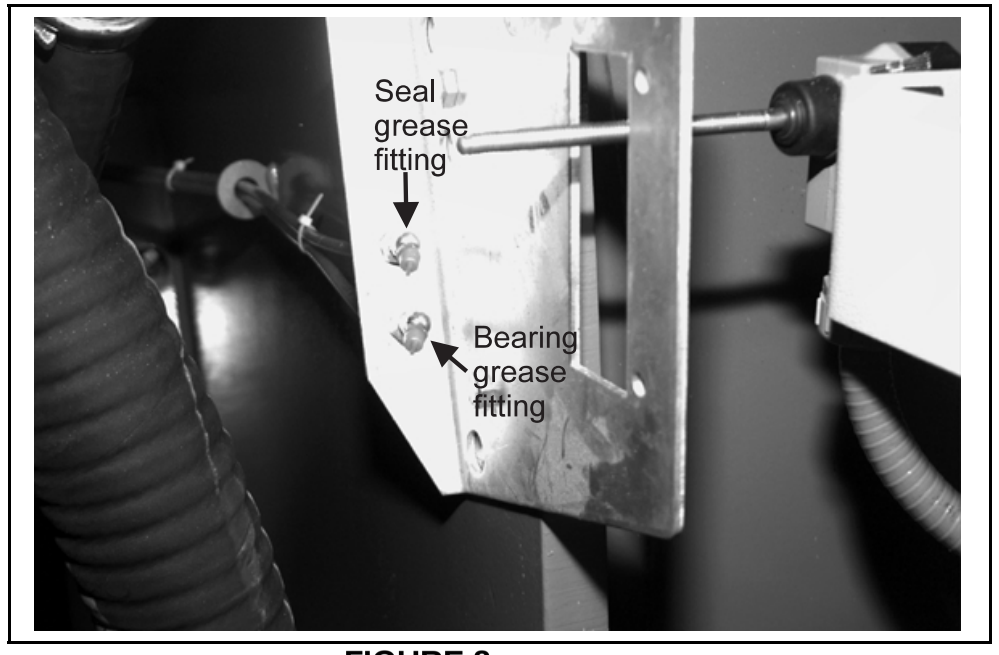


FIGURE 8 (MSSM0201CE)
60" and 72" Divided Cylinder Rear Seal and Bearing

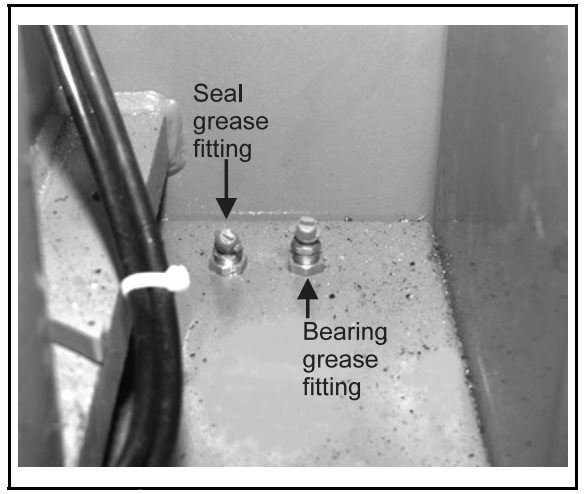


FIGURE 9 (MSSM0201CE)
60044 and 72044 Staph-Guard® Front Bearing and Seal Grease Fit-

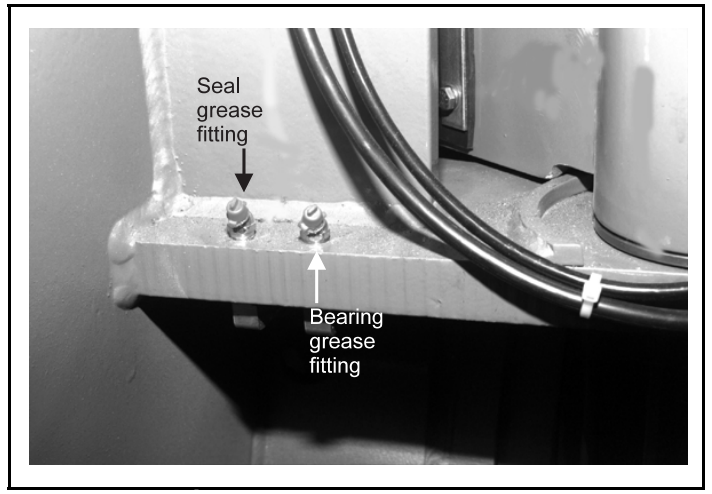


FIGURE 10 (MSSM0201CE)
60044 and 72044 Staph-Guard® Rear Bearing and Seal Grease Fittings (lo-

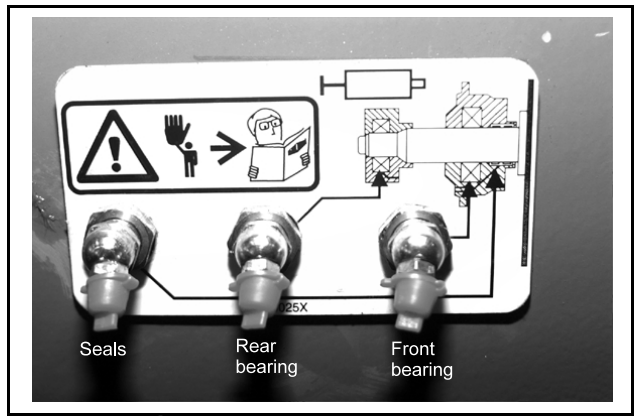


FIGURE 11 (MSSM0201CE)
All Open-Pocket Machine Seal and Bearing Grease Fitting Plate

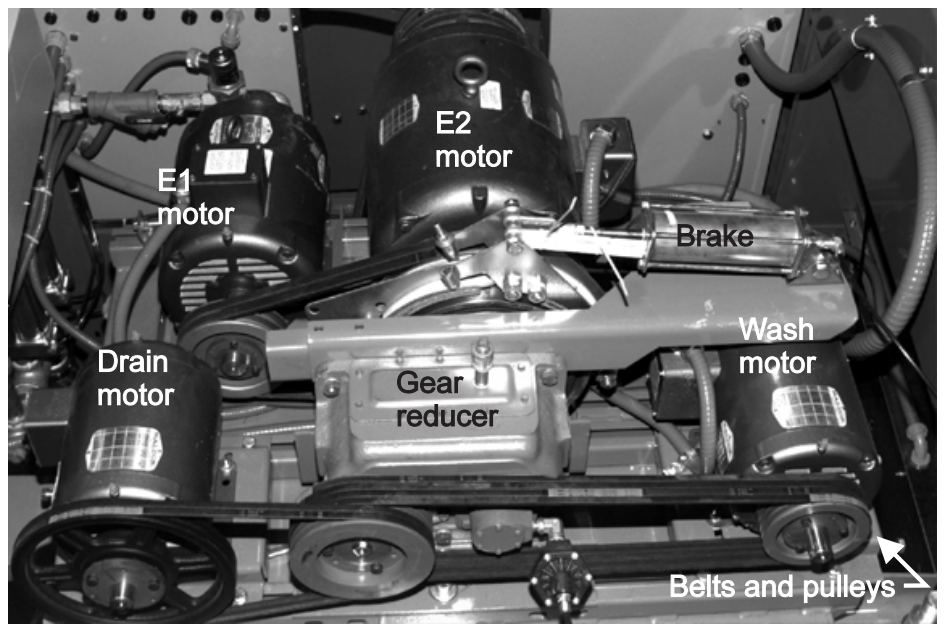


FIGURE 12 (MSSM0201CE)
Typical Drive Train Components (48" machine shown)

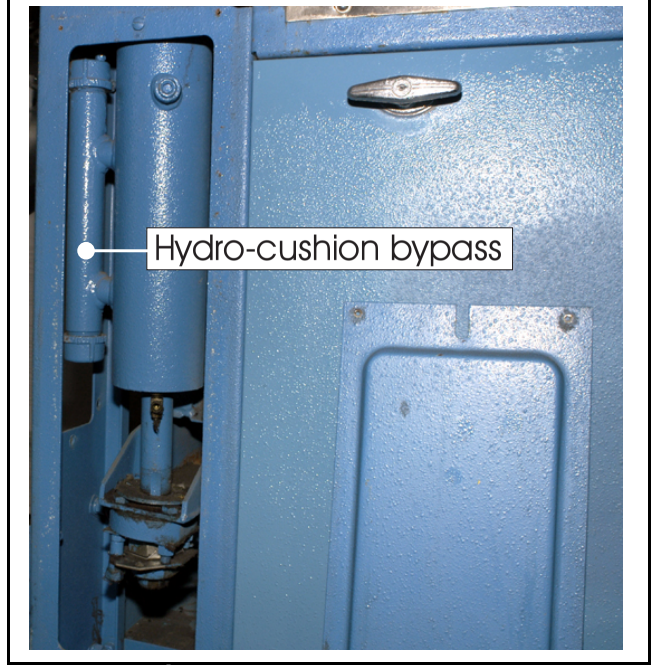


FIGURE 13 (MSSM0201CE)
Hydrocushion Bypass Valve (48" machines only")

Monthly Maintenance Items

Frequency	Component	Action
Monthly (see NOTE 4)	**42" Open pocket main bearings and seals** FIGURE 11, NOTES 5 and 6	
	• Front and rear bearing grease fitting	0.12 ounces (3.54 grams), two strokes at two locations
	• Seal grease fitting	0.06 ounces (1.77 grams), one stroke at one location
	48" Open pocket main bearings, seals and Hydro-Cushions® FIGURES 11 and 13, NOTES 4, 5, 6 and 7	
	• Front and rear bearing grease fitting	0.31 ounces (8.85 grams), five strokes at two locations
	• Seal grease fitting	See “Semi-AnnualMaintenance Items” in this section
	• Hydro-Cushion® bypass (48" open-pocket only)	Drain small quantity of oil. If milky, see note 7 below
	52" and 72" Open pocket main bearings and seals FIGURE 11, NOTES 4, 5, and 6	
	• Front bearing grease fitting	0.62 ounces (17.7 grams), ten strokes at one location
	• Rear bearing grease fitting	0.31 ounces (8.8 grams), five strokes at one location
	• Seal grease fitting	0.19 ounces (5.31 grams), three strokes at one location
	Drive train components FIGURE 12	
	• Pulleys and clutches	Check for wear
	• All components	Remove soil build-up

NOTE 7:“Milky” oil is contaminated by water. Drain cylinder and unscrew cap on bottom of bypass (See BMP890047). Remove piston rod and inspect the upper piston cups and lower piston for wear or damage. Worn piston cups allow water from the air supply to enter hydrocushion. Repair worn parts and change oil.

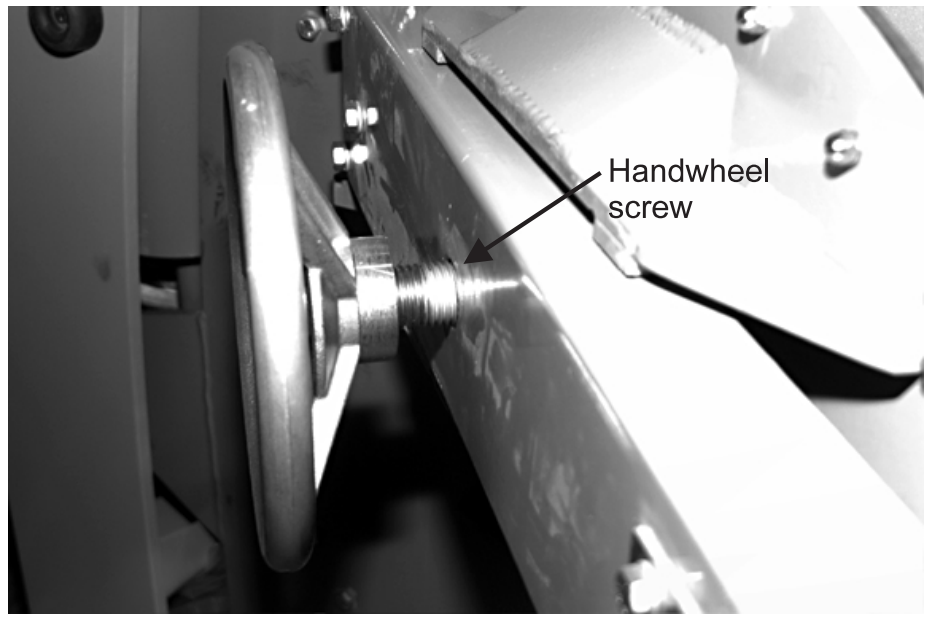


FIGURE 14 (MSSM0201CE)
Handwheel Screw
(42" Divided Cylinder and Staph-Guard® only)

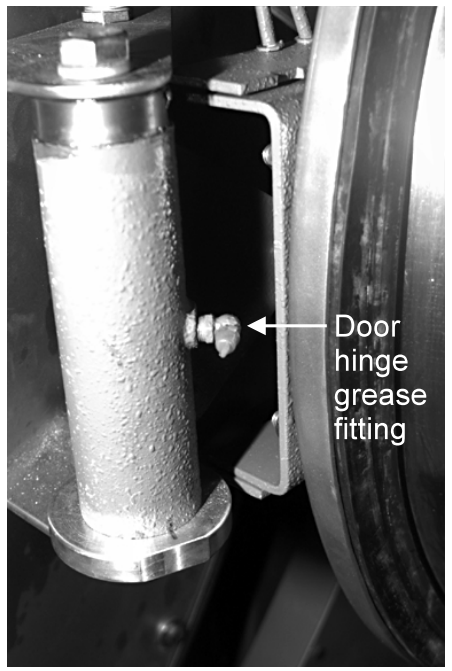


FIGURE 15 (MSSM0201CE)
Typical Door Hinge

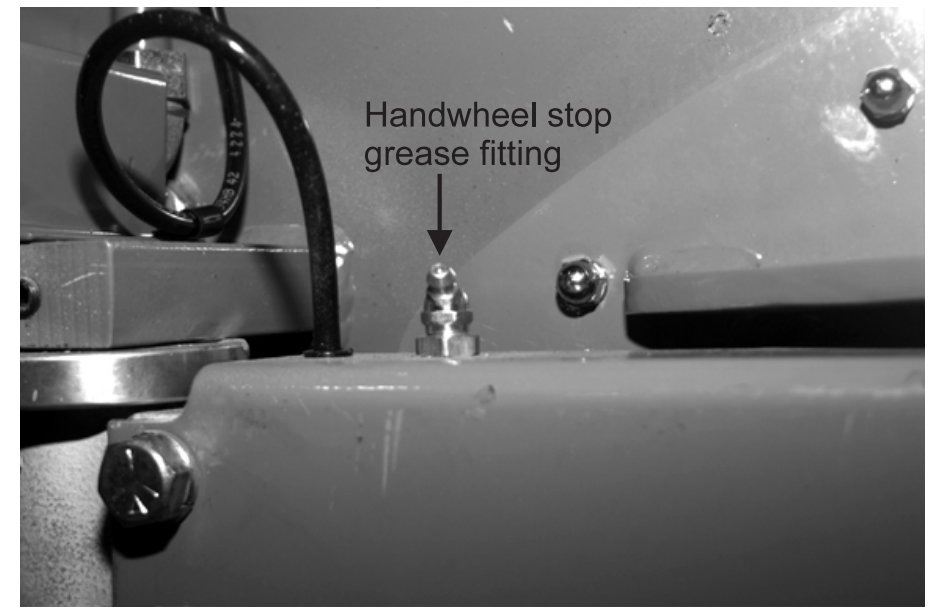


FIGURE 16 (MSSM0201CE)
Handwheel Stop
(42" Divided Cylinder and Staph-Guard® only)

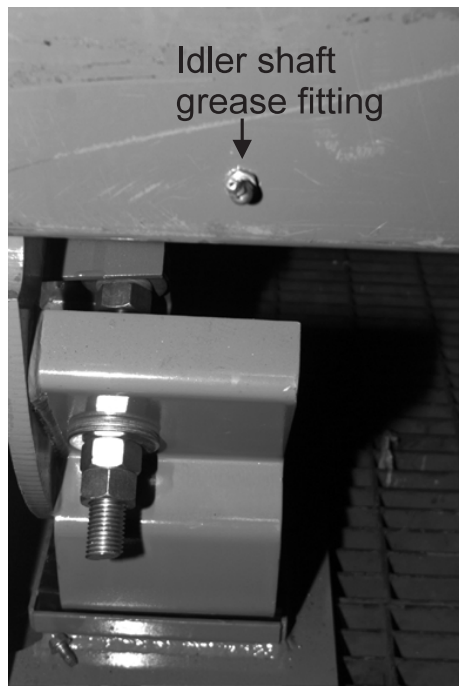


FIGURE 17 (MSSM0201CE)
42" Staph-Guard®
Idler Shaft
Grease Fitting

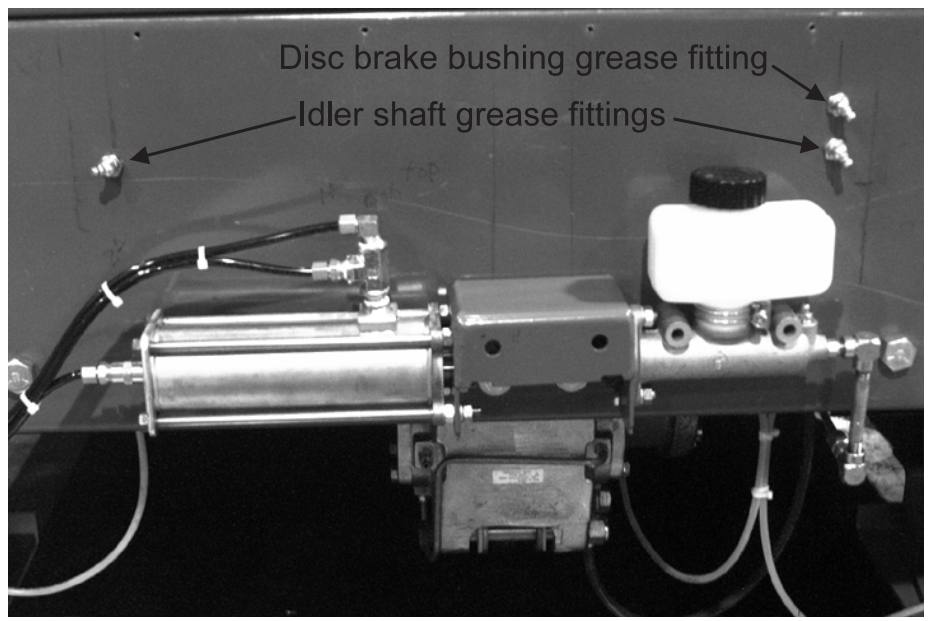


FIGURE 18 (MSSM0201CE)
60" and 72" Staph-Guard® Idler Shaft
and Disc Brake Grease Fittings
(60" shown)

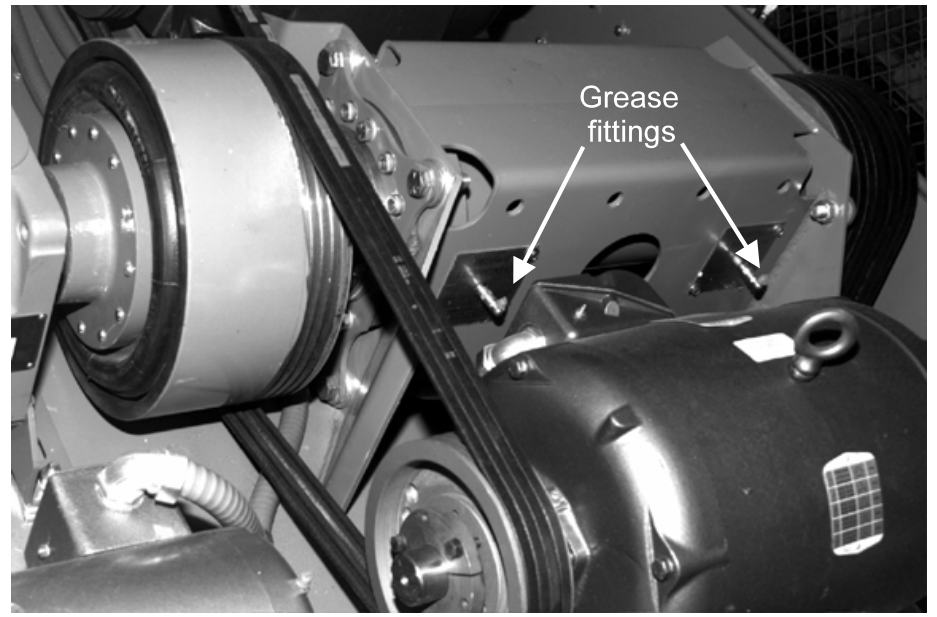


FIGURE 19 (MSSM0201CE)
Typical Jackshaft
Grease Fittings
(52" machine shown)

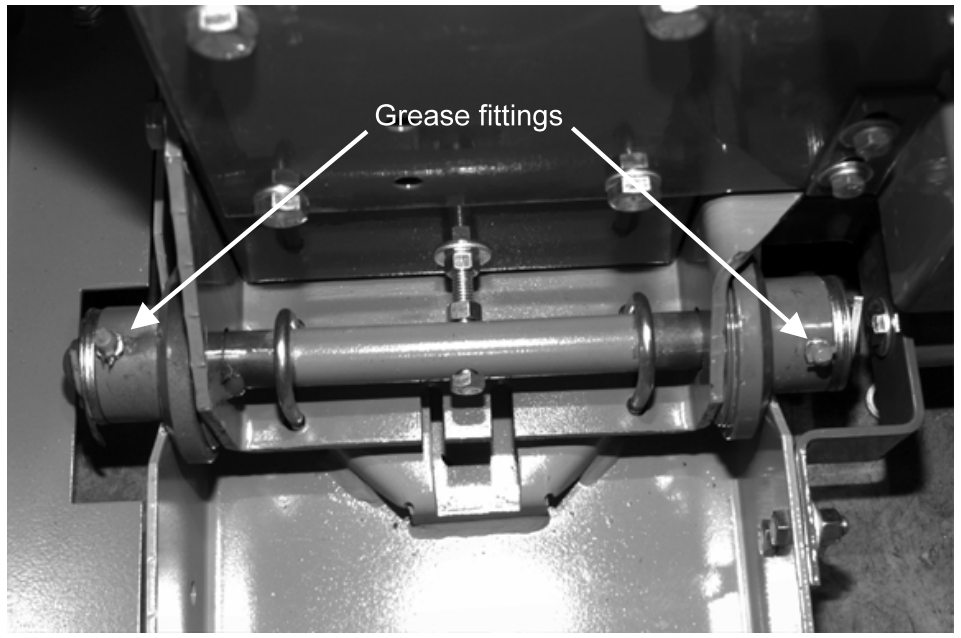


FIGURE 20 (MSSM0201CE)
Tilt Wheels
(42"and 48" tilt machines only)

Monthly Maintenance Items

Frequency	Component	Action
Monthly (see NOTE 4)	**Handwheel screw** (42" Divided Cylinder and Staph-Guard®) • Screw thread FIGURE 14	Three drops of light machine oil
	Door hinges • Grease fittings FIGURE 15	0.12 ounces (3.54 grams), two strokes at each location
	Handwheel stop (42" Divided Cylinder and Staph-Guard®) • Grease fitting FIGURE 16	0.06 ounces (1.77 grams), one stroke at one location
	Idler shaft (Staph-Guard® only) • Grease fittings FIGURES 17 and 18	0.31 ounces (8.85 grams), five strokes at two locations
	Disc brake (60" and 72" Staph-Guard® only) • Grease fittings FIGURE 18	0.12 ounces (3.54 grams), two strokes at one location
	Jackshaft (if equipped) • Grease fittings FIGURE 19 NOTES 5 and 6	0.12 ounces (3.54 grams) two strokes at two locations
	Tilt wheels (42", 48", and 72" Tilt Models) • Grease fittings FIGURE 20	0.12 ounces (3.54 grams), two strokes at each locations

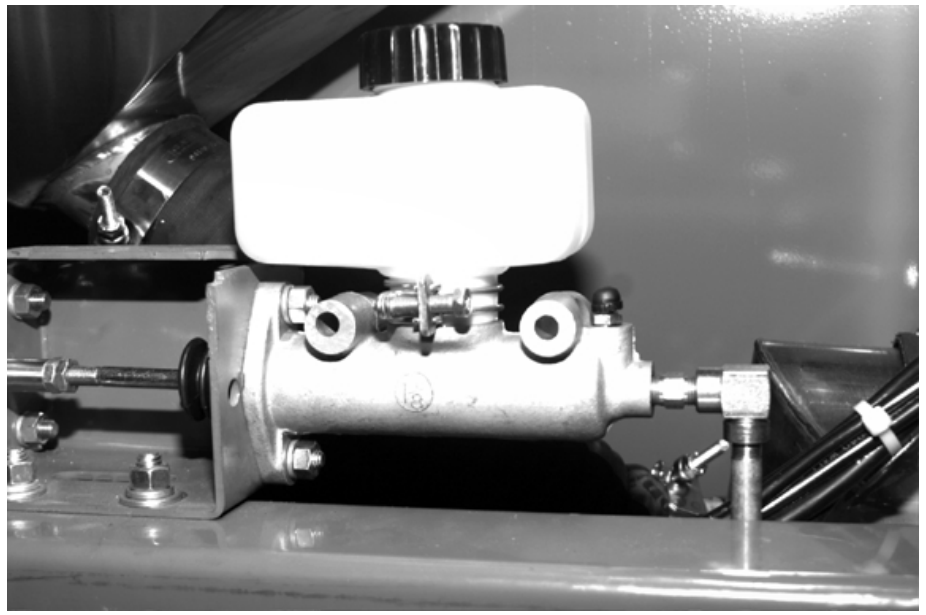


FIGURE 21 (MSSM0201CE)
Disk Brake Reservoir (Staph-Guard® only)

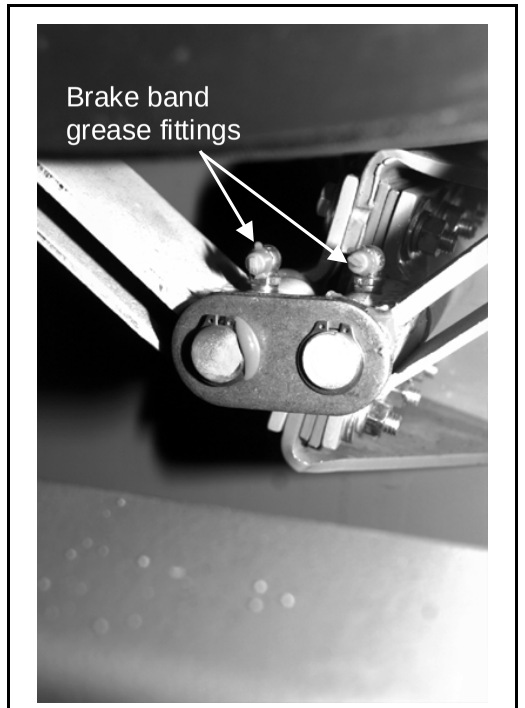


FIGURE 22 (MSSM0201CE)
Brake Band Grease Fittings (60044 and 72044WP2/WP3)

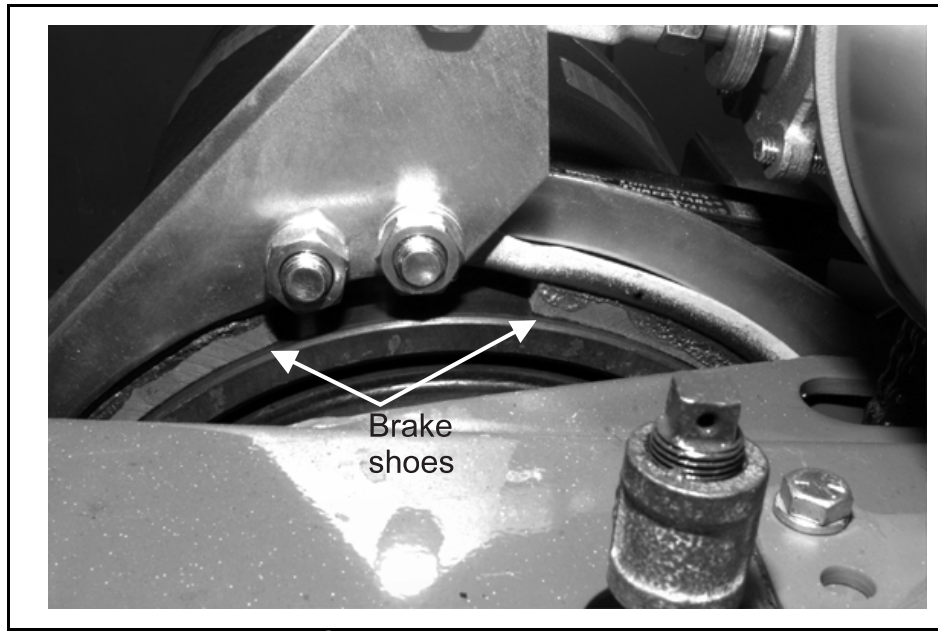


FIGURE 23 (MSSM0201CE)
Brake Shoes (all machines)

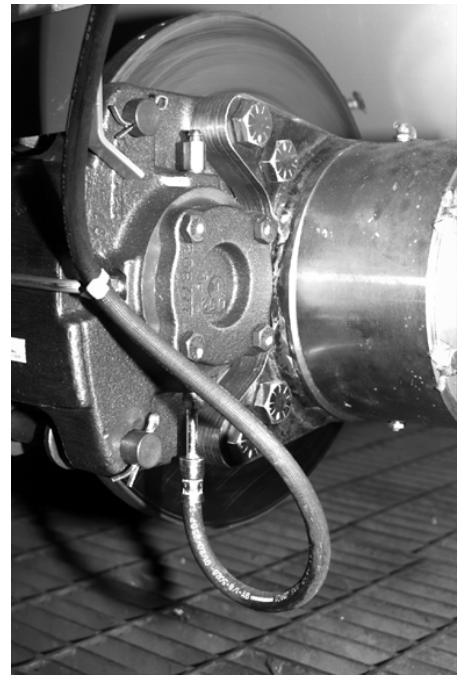


FIGURE 24 (MSSM0201CE)
Disk Brake (Staph-Guard® only)

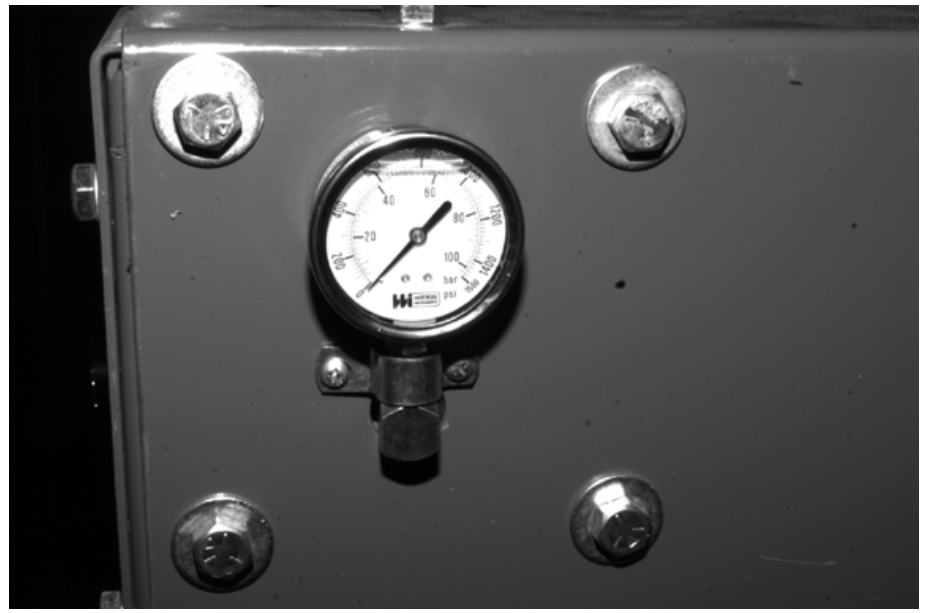


FIGURE 25 (MSSM0201CE)
Hydraulic Tilt Pressure Gauge (On rear of 42", 48", and 72" tilt models)

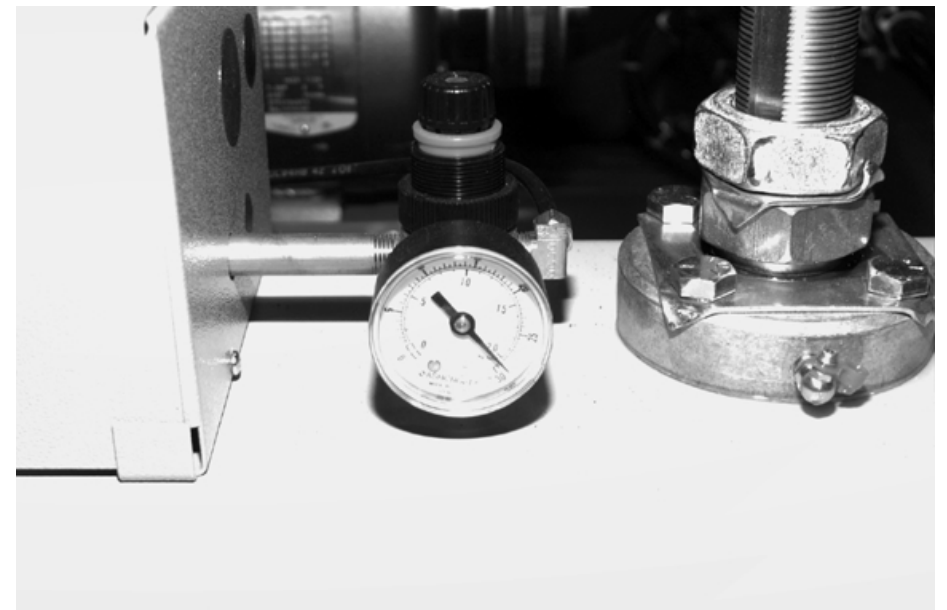


FIGURE 26 (MSSM0201CE)
Door Seal Pressure Regulator

Quarterly Maintenance Items

Frequency	Component	Action
Quarterly	**Brake Components**	
	• Disk brake reservoir (60" and 72" Staph-Guard® only) FIGURE 21	Check level, refill as required (Always use fresh fluid from a sealed container)
	• Brake band grease fittings (60044 and 72044 WP2/WP3 only) FIGURE 22	0.06 ounces (1.77 grams), one stroke at two locations. Do not allow grease to drip on brake surfaces.
	• Brake shoes FIGURE 23	Check for wear, adjust or replace as required.
	• Disc brake pads (60" and 72" Staph-Guard®only) FIGURE 24	Check for wear, replace as required
	Hydro-Cushions® FIGURES 2 and 3	Check oil level, add as necessary Inspect washer, replace as necessary
	Motors FIGURE 12 NOTES 8 and 9	See “BALDOR MOTOR MAINTENANCE...,” MSSM0274AE in this manual.
	Hydraulic tilt pressure gauge FIGURE 25	Check pressure while machine is returning from a tilted position
	• 42" Open pocket	800 PSI (55 Bar)
	• 48" Open pocket	900 PSI (62 Bar)
	• 72" Open pocket	1000 PSI (69 Bar)
	Door seal pressure regulator FIGURE 26	Check settings with machine in bare manual and clockwise wash rotation. See instructions for operating individual outputs in the reference manual.
	• 42" and 48" Open pocket	48 - 50 PSI (3.37 - 3.51Kg/cm^2)
	• 60" and 72" Rapid load	25 - 28 PSI (1.76 - 1.97 Kg/cm^2)
	• 60" and 72" Staph-Guard®	18 - 20 PSI (1.27 - 1.41 Kg/cm^2)

NOTE 8: If motor manufacturer’s instructions conflict with manual section, follow nameplate instructions. motors are warrantied by their manufacturers, not by Milnor®.

NOTE 9: Pump grease slowly with relief ports open. Do not over-lubricate.

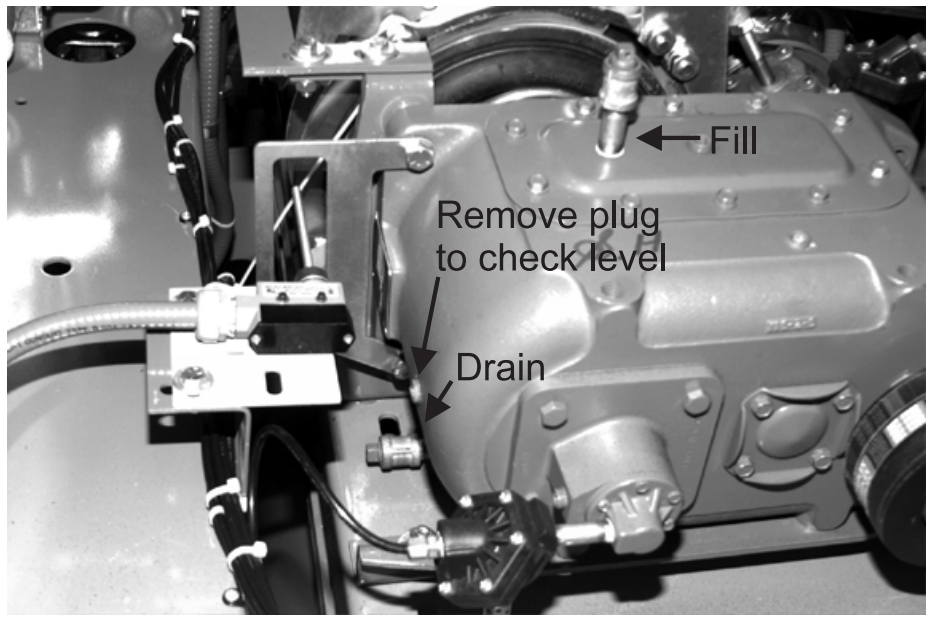


FIGURE 27 (MSSM0201CE)
Typical Gear Reducer Fill and Drain

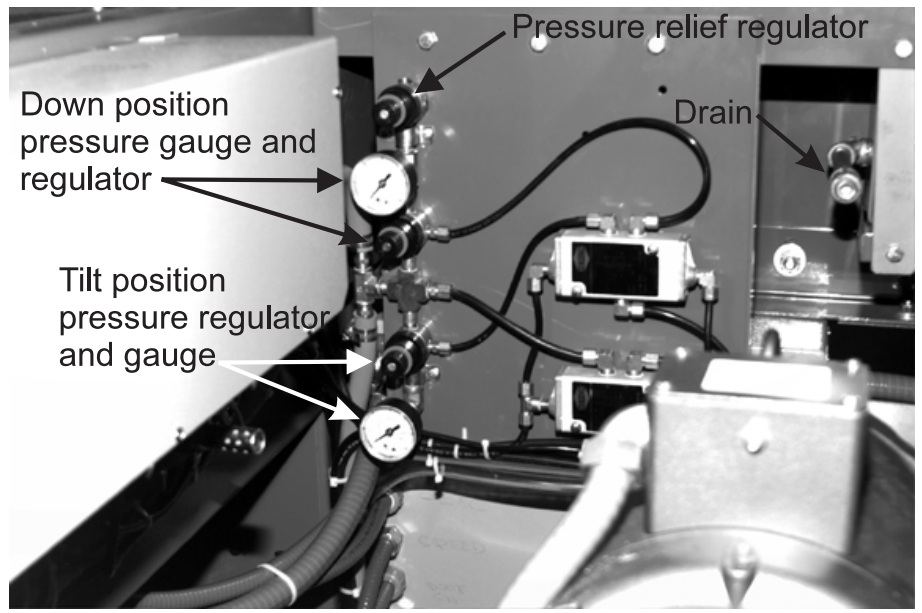


FIGURE 28 (MSSM0201CE)
Push Back and Forward Hydraulic System Gauges and Regulators (42", 48", and 72" Tilt Models)

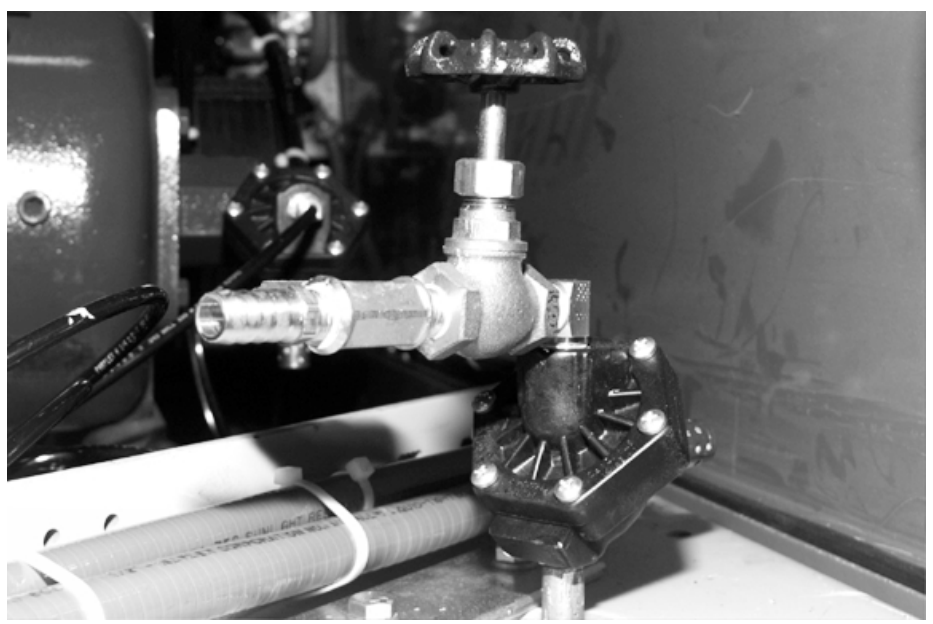


FIGURE 29 (MSSM0201CE)
Push-Down Control Valve (72" Rapid load and Staph-Guard® only)

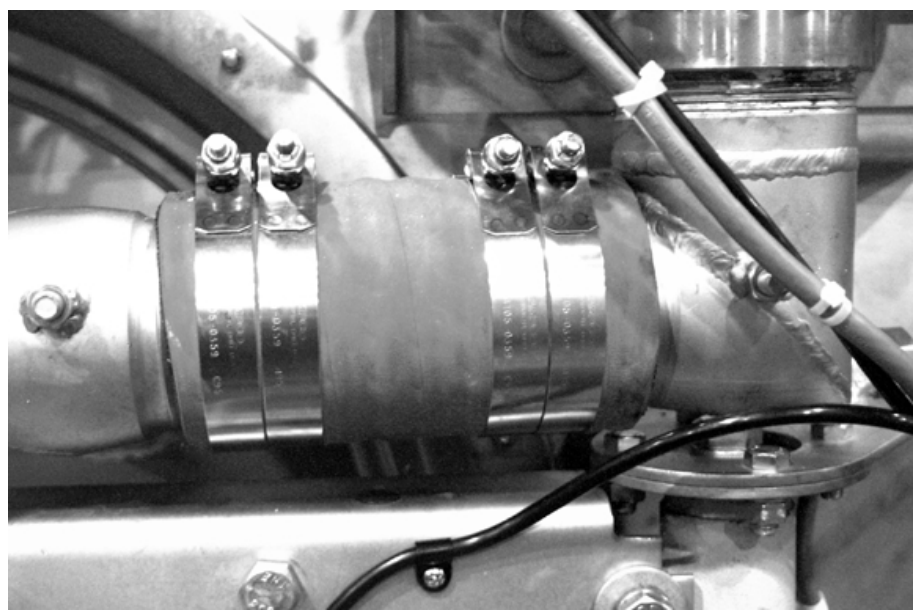


FIGURE 30 (MSSM0201CE)
Shell Door Recirculation Hose (48" dye machine only - cover removed for clarity)

Semi-Annual Maintenance Items

Frequency	Component	Action
Semi-Annual	**Main bearings and seals** • 48" Seal grease fittings FIGURE 11	0.12 ounces (3.54 grams), two strokes at one location
	Gear reducer FIGURE 27	Check oil level, refill as required
	Push Back and Forward System FIGURE 28 and NOTE 10	
	• Down position pressure gauge and regulator	Check pressure in a “wash step” 3 - 5 PSI (.21- 0.35 Kg/cm^2)
	• Tilt position pressure regulator and gauge	Check pressure in a “wash step” 30 PSI (2.11Kg/cm^2)
	Push-down control valves (72" Rapid load and Staph-Guard®) FIGURE 29 and NOTE 11	Observe operation and adjust if required
	Recirculation (48" dye models only) FIGURE 30	Replace hose

Annual or Less Frequent Maintenance Items

Frequency	Component	Action
Annual	**Gear reducer** FIGURE 27	Change oil and clean magnetic plug (if so equipped)
	Hydro-Cushions® FIGURE 2	Change oil
Every 2 years	**Hydraulic system** FIGURE 28	Change oil

NOTE 10: 52" and 72" machines are not equipped with a tilt pressure regulator or gauge.

NOTE 11: Adjust push-down control valves so that machine moves down evenly, and all push-down sockets meet simultaneously. If the back of the machine comes down first, close the valve slowly. If the front comes down first, open the valve.

LUBRICANTS FOR MILNOR® MACHINES

The following are lubricants used in Milnor® machines. Always refer to the preventive maintenance instructions for specific lubricating instructions. Consult lubricant manufacturer to verify equivalence before using a substitute. Mixing different base greases can cause bearing and seal damage.

Washer-Extractors

Open Pocket Machines	Bearing housings	Gear reducers	Isolators	Hydro-Cushions®	Motors	Commutator cam	Balancing mechanism	Disc brake (if so equipped)	Hydraulic tilt mechanism	Door latches	Other grease points
30015, 20, 22, C, S, and M	30										
3022F8J	220		220								
36021Q4x, 36026Q4x											
36021BWP						Wells	1540				
36021Q6x, 36026Q6x, 42024Q4x, 42026Q6x	EPLF 2	220			EPLF 2						
36030Fxx			1030					DOT 3			
42032Fxx											
42026QHP 48032BHP/BTL/BTN 48036QHP/QTL/QTN		220		220					1030	Door	EPLF 2
52038WP1/WTL/WTN				1030							
64046ExN 72046ExN 72058JxN			1030					DOT 3	68		
Divided Cylinder Machines											
42031 - 44 WP2/3 42031 - 44 SP2/3 60044 SP2/3 72044 SP2/3	EPLF 2	220		1030	EPLF 2			DOT 3		Door	EPLF 2

CBW®, Extractor, Press, Shuttles, Conveyors, and Dryvacs

	Bearing housings	Gear reducer	Drive motors	Hydro-Cushions®	Hydraulic mechanisms	Disc brake	Mist oiler	Guide rollers	Drive/Support rollers	Blower shaft bearings	Press pressure pump	Blower motors	Inflatable rib couplings	Shuttle chain	All other grease points
CBW®		220					T32	EPLF 2	EPLF 2						
42032M7E	EPLF 2			220	68	DOT 3							SRI		EPLF 2
42032M9E			EPLF 2	32											
Single Stage Press		1030													
Press							23				630				
Dryer									EPLF 2	EP2		R			
Shuttle & Conveyor		634												FL	
Dryvac										EP2		R			

Oils

DOT 3	=	NAPA Super Heavy Duty Brake Fluid DOT 3
23	=	Shell Tellus® 23
30	=	High quality SAE 30, 40, or 50 weight motor oil (non-detergent, if available)
32	=	Shell Tellus® 32
T32	=	Shell Turbo® T32
68	=	Shell Tellus® 68
220	=	Shell Morlina® 220
630	=	Valvoline Special Moly® EP 630
634	=	Mobile SHC® 634 Oil
1030	=	Shell Rotella T® 10W30
1540	=	Shell Rotella T® HD 15W40

Greases

Door	=	Doorease® Stick lubricant
EPLF 2	=	Shell Alvania® EP-LF Type 2
EP2	=	Shell Darina® EP-2
FL	=	Recol Food Lubricant
R	=	Shell Dolium® R
Wells	=	Wells CL200 Cam Lubricant
SRI	=	Chevron SRI oil

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.

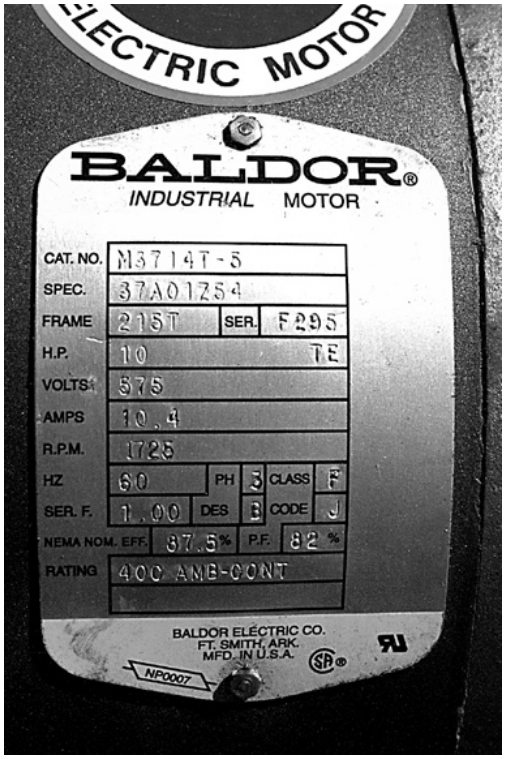


FIGURE 1 (MSSM0274AE)
Typical Motor Data Plate

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^{O}F (43^{O}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^{O}F (40^{O}C)	Clean, little corrosion	Deep groove ball bearing
Severe	122^{O}F (50^{O}C)	Moderate dirt, corrosion	Ball thrust, Roller
Extreme	>122^{O}F (>50^{O}C) or Class H Insulation (**Note 1**)	Severe dirt, abrasive dust, corrosion	All bearings
Low Temperature	-22^{O}F (-30^{O}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.

FLUSHING WATER SEALS AND LEAK - OFFS IN 52" AND LARGER WASHER-EXTRACTORS

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 unless qualified and authorized.**
- ☞ **Lock OFF and tag out power at the wall disconnect before servicing, or in accordance with factory service procedures.**

Required Kits—This procedure requires bulb pump kit (p/n KZ5CP00100), one gallon (3.8 liters) of mineral spirits, a hand operated grease pump, and the specified lubricants.

Background Information—The grease filled bearing housings for 52 inch and larger machines are supplied with two water seals and a grease seal as shown in FIGURES 1 and 2. Bath liquor is prevented from entering the bearings by two water seals separated by grease filled cavity (FIGURE 2). Any water leaking past the water seals is drained by the leak-off cavity. The grease seal retains the grease in the housing. The seal grease cavity and the leak-off cavity can become clogged with lint and debris, resulting in seal and bearing failure. Every six months, flush out these cavities with mineral spirits, as described within. Normally, flushing is done less often than greasing. However, whenever flushing is due, it should be done just prior to greasing, during the same maintenance session.

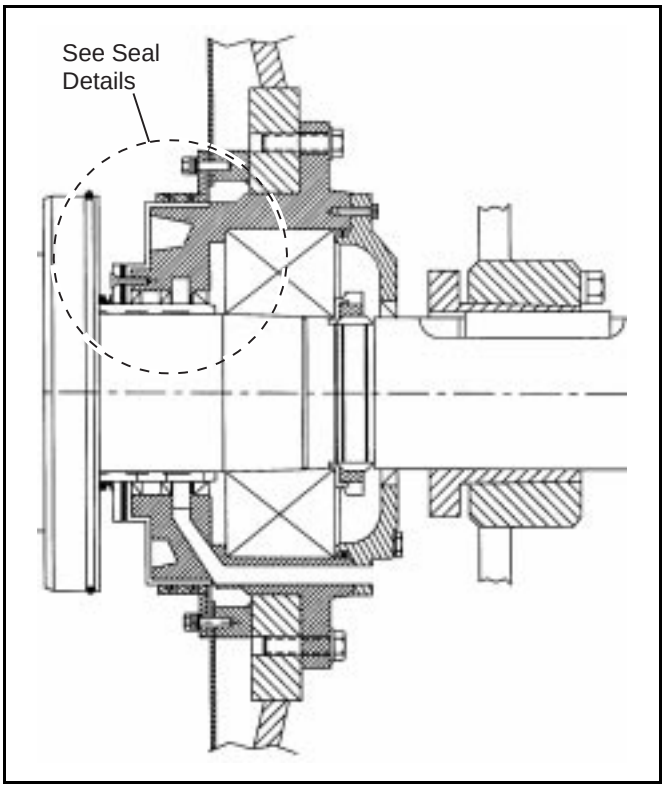


FIGURE 1 (MSSM0271AE) — Typical Bearing Housing for 52 through 72 Washer-Extractors

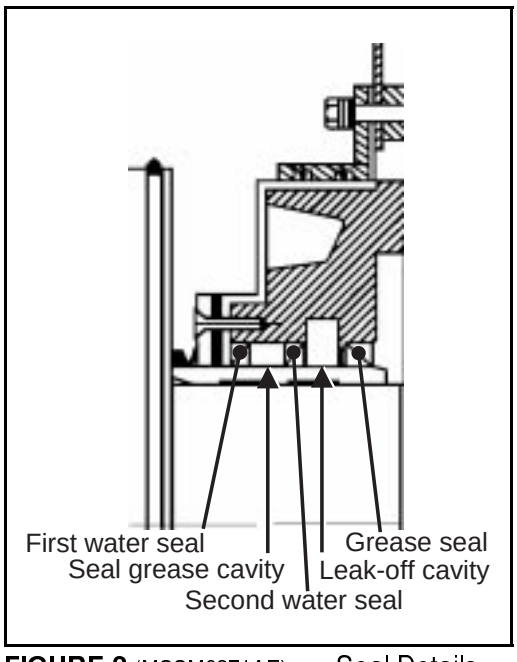


FIGURE 2 (MSSM0271AE) — Seal Details

NOTICE: BEARING DAMAGE HAZARD

BEARING DAMAGE HAZARD—Bearings will quickly burn up if grease is contaminated by mineral spirits.

- ☞ **DO NOT attempt to force mineral spirits into the bearing housing. If mineral spirits do not flow easily through the seal cavity grease relief and leak-off, ream out grease relief and leak-off drain.**
- ☞ **DO NOT attempt to flush the main or rear bearing.**

Flushing the Seal Grease Cavity—Before beginning, study the main bearing assembly drawing in the service manual to identify inlets, connections, reliefs, and leak-offs.

1. Locate the tubing running from the seal cavity grease point to the bearing housing (FIGURE 3). Disconnect this tubing at the bearing housing.
2. Install the bulb pump.
3. Remove the seal cavity grease relief fitting (if so equipped) to prevent the mineral spirits and contaminated grease from being pushed back into the shell under the first water seal. FIGURE 4 shows the internal passage from the seal cavity grease inlet to the seal grease cavity (FIGURE 2) and the internal seal cavity relief passage from the seal grease cavity to the grease relief fitting (if so equipped) on the housing.
4. Flush until the mineral spirits dripping from the seal cavity grease relief are clear (approximately two quarts - 1.9 liters).
5. Re-install seal cavity grease tubing and grease relief fitting (if so equipped).

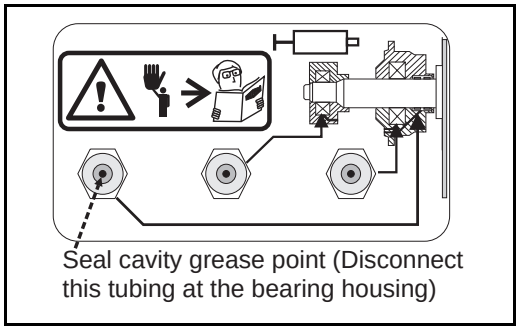


FIGURE 3 (MSSM0271AE) — Identifing the Seal Cavity Grease Point

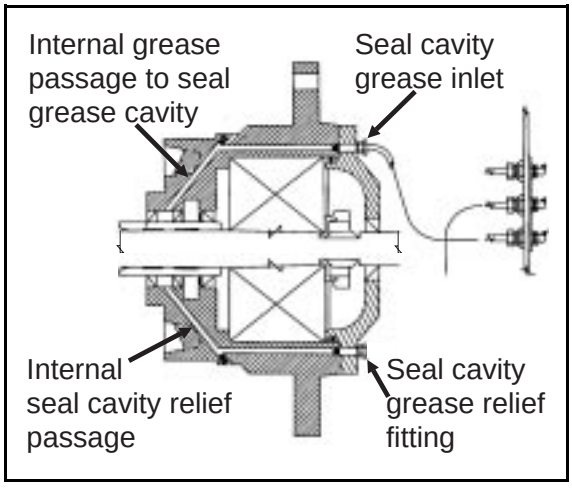


FIGURE 4 (MSSM0271AE) — Internal Seal Grease Cavity Passage and Relief

Flushing the Leak-off Cavity

1. Remove the vented plug at the flushing connection and install the bulb pump.
2. Pump approximately two quarts (1.9 liters) of mineral spirits into the flushing connection until the spirits flow easily out of the leak-off drains. FIGURE 5 shows the internal passage from the flushing connection, through the leak-off cavity, and the internal drain to the exterior of the housing.
3. After flushing, replace the vented plug, then see "Greasing Seals and Bearings" in the Preventive Maintenance section.

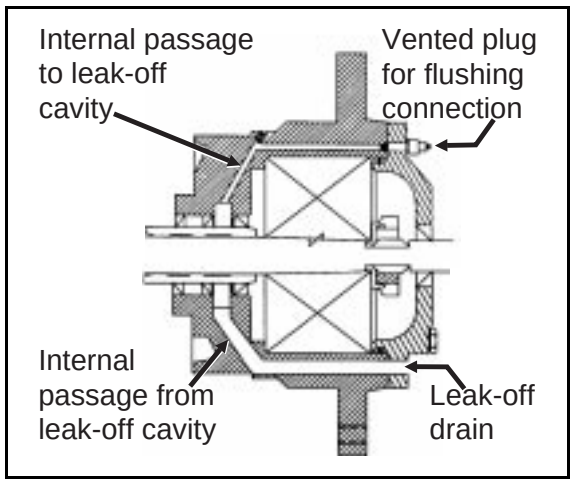


FIGURE 5 (MSSM0271AE) — Internal Flushing Passage and Leak-off

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.

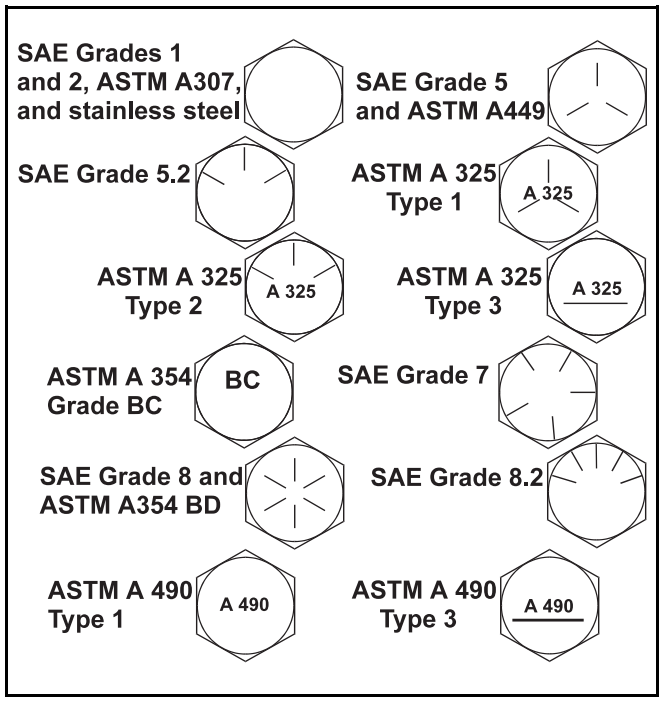


FIGURE 1 (MSSM0101CE)
Fastener Grade Markings

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.

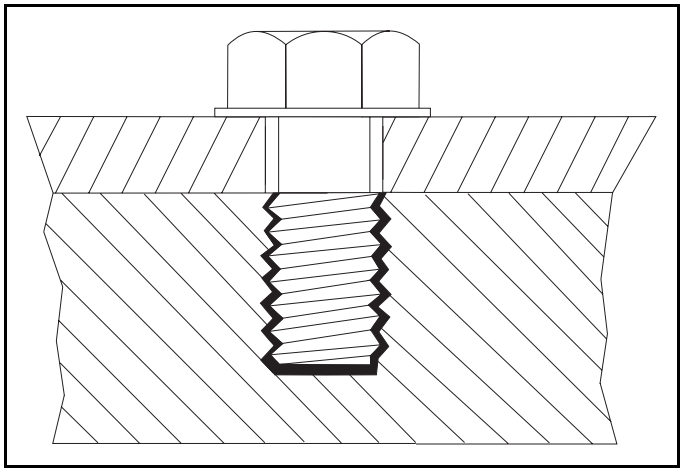


FIGURE 2 (MSSM0101CE)
Correct Threadlocker Use

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.

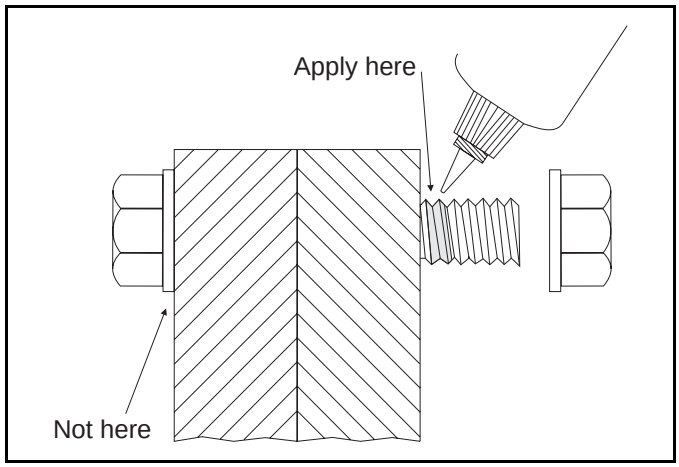


FIGURE 3 (MSSM0101CE)
Applying Threadlocker to Through Hole

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.

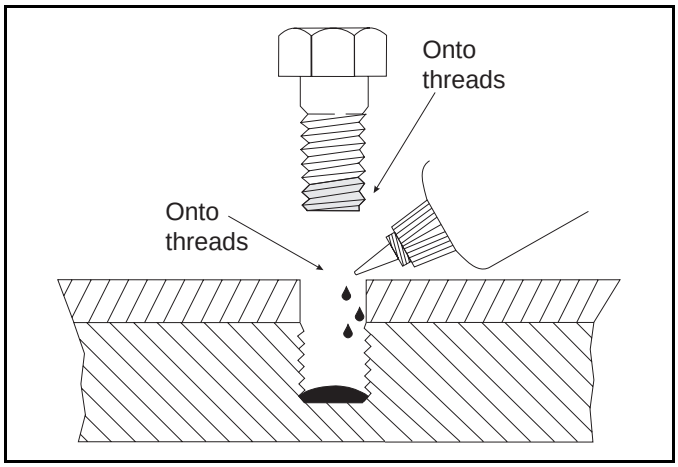


FIGURE 4 (MSSM0101CE)
Applying Threadlocker to Blind Holes

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).

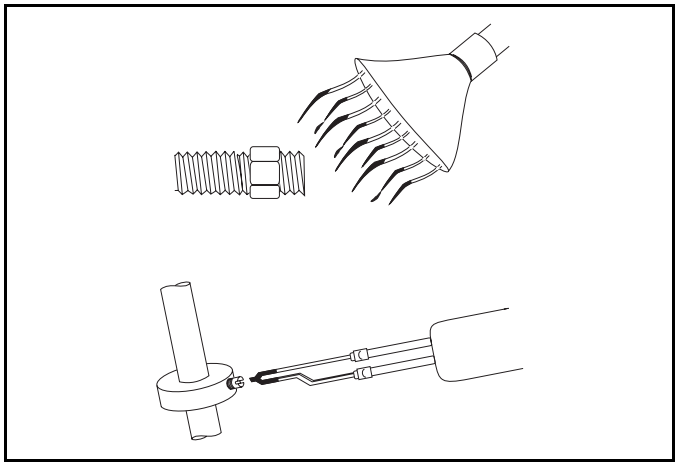


FIGURE 5 (MSSM0101CE)
Removing High Strength Threadlocker

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)

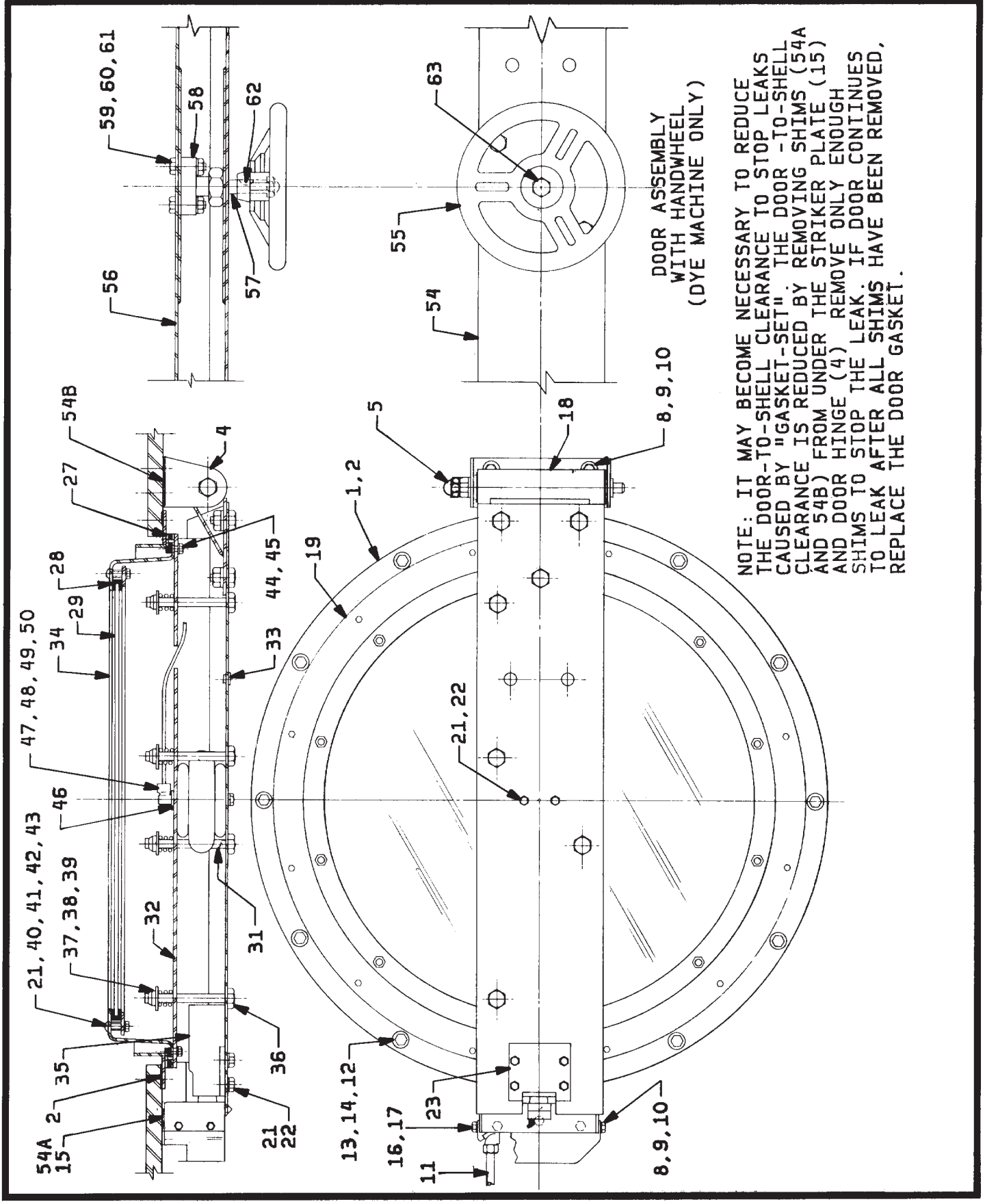
Nominal bolt size	18 - 8 Stainless Steel	316 Stainless Steel	Brass	Aluminum 2024 - T4
7/8 - 9	194.0 (263.03)	202.5 (274.55)	158.8 (215.30)	124.6 (168.93)
7/8 - 14	193.2 (261.94)	201.7 (273.47)	157.9 (214.08)	124.2 (168.40)
1 - 8	286.7 (388.71)	299.6 (406.20)	234.6 (318.07)	183.8 (249.20)
1 - 14	259.2 (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

Shell and Door Assemblies

DOOR ASSEMBLY
5238 WE1, WTB, WTF & DYA

BMP750053
83414B



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DOOR ASSEMBLY
52038WE1,WTB,WYF & DYA

BMP750053R/94476A (Page 1)

001	Y3 25084C	94266# RING DOOR MACHINED=34.125BC
002A	03 25026	GASKET=DOOR MTG RING 1/8" 33+5/8"BC
002B	03 25026A	GASKET=DOOR MTG RING 1/16"33+5/8"BC
002C	03 25026B	GASKET=DOOR MTG RING 1/32"33+5/8"BC
003	W3 25178S	79062C* COVER=WLMT,DOORSW=ALL 5238
004	03 25170	92636C HINGE BKT.BOLT-ON=52T BND@PT
005	A25 04500	82103U BEARING&HINGE PIN ASSY,52T
008	15K151	HXCAPSCR 1/2-13UNC24X1.25 GR5 PLATE
009	15U300	LOKWASHER REGULAR 1/2 ZINC PLT
010	15U490	FLAWASH 1+1/2X17/32X1/4ZINC
011	E25 00100	78446T* DOOR INTLK SWITCH ASSY
012	15U246	FLATWASHER 1"ODX25/64IDX1/8"304 S/S
013	15K100	HEXCAPSCR 3/8-16X1+1/4 SS18-8
014	15U260	LOCKWASHER MEDIUM 3/8 SS18-8
015	W3 25159S	91083C* WLMT,DOORSSTRIKER,SS =ALL52
016	15K031	BUTSOKCAPSCR 1/4-20X1/2 SS18-8
017	15U181	LOCKWASHER MEDIUM 1/4 SS18-8
018	W3 25071	93352C* HINGE WELDMENT-30"DOOR
019	03 25060A	94367D DOOR FABRICATED=30"TAPERED
021	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL
022	15K085	HEXCAPSCR 3/8-16UNC2AX3/4 GR5 ZINC
023	02 15633	ADJPLATE=DOORLATCH
024	15K214E	HXCAPSCR 5/8-11UNC2AX1.5 GR5 ZNC/CD
025	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2
026	15U315	LOKWASHER MEDIUM 5/8 ZINCPL
027	03 25085A	77441C GASKET-40 DURO 3/8T=4"DEEPDR
028	03 25083	79023B GASKET=DOOR GLASS 26.5/26.4
029	03 25013A	GLASS=26.5"D FOR NEW 4"DEEP DOOR
030	03 25089	92636D CHANNEL=DOOR OUTER=52"BND@PR
031	60B090	01Z AIRMT STY131 1CONV F#W013587731
032	03 25061	79401D CHANNEL=DOOR INNER BND@ PRNT
033	12P1ALHP	HOLEPLUG, NYLON 9/16" HEYCO #2653
034	X3 25058A	94266#MACH=DOOR GLASS RETAINER RING
035	SA 15 028	70239D$ DOOR LATCH ASSY-DIVCYLS
036	15K203	HXTAPSCR 1/2-13UNC2AX5 GR5 ZINC
037	15U314	FLATWASHER(USS STD) 5/8" ZNC PLT
038	15G234	LOKNUT 1/2-13NC CAD FLXLOC#21FKF813
039	02 18187S	82477B SPRING=DOOR STAINLESS STEEL
040	15K106	BTNHDSOKCAPSCR 3/8-16NCX1+3/8 GR5
041	24G030N	ROLLED WASHER .379"ID NYLTITE #37W
042	27B2400K0L	92601A SPACER ROLL.43ID.562L.03T SS
043	15G200	01Z HXCPNUT 3/8-16 UNC2A 5/8X1/2
044	15G205	HXNUT 3/8-16UNC2B ZINC GR2
045	15N222	FLTCNTSUNKMACSCR 3/8-16UNC2AX1 GR2
046	5SB0E0CBEO	HEXPIPBUSH 1/4 X 1/8 BRASS 125#
047	53A031B	BODY-MAL90ELL1/4X1/8COMPPH#269C-42B
048	53A059A	NUT 1/4"COMP.HOLYOKE ANDERSON#61A-4
049	53A500	1/4" SLEEVE-DELRIN
050	53A501	TUBEINSERT .170"OD
051	MESSAGE MS	SOME PRODUCT STRUCTURE MISSING
052	MESSAGE MS	SOME PRODUCT STRUCTURE MISSING
054	W3 25089D	93216#*CHANNEL=DOOR OUTER STAINLESS
054A	03 25159W	79507BSHIM=DOOR LATCH STRIKER=52WTB
054B	03 25170A	79376B SHIM=HINGE BKT BOLT-ON=52WTB
055	02 15053	94061B HANDWHEEL-10" DDS+KW+POLISH (DYE MACHINE ONLY)
056	W3 25061	79401D*CHANNEL-DOOR INNER-STAINLESS (DYE MACHINE ONLY)
057	02 15036	84527B DOOR HANDLE SCREW 100-175WE (DYE MACHINE ONLY)
058	X2 15035	87387A RETAINER=DOOR HANDLE SCREW (DYE MACHINE ONLY)
059	15U260	LOCKWASHER MEDIUM 3/8 SS18-8 (DYE MACHINE ONLY)
060	15K122	HEXCAPSCR 3/8-16UNCX2 SS18-8 (DYE MACHINE ONLY)
061	15G205	HXNUT 3/8-16UNC2B ZINC GR2 (DYE MACHINE ONLY)
062	15E007	KEY #7 WOODRUFF 3/4X1/8 SAE1035 (DYE MACHINE ONLY)
063	15G244	HEXCAPNUT 3/4-10 #3292 BRASS-NICKPL (DYE MACHINE ONLY)

******** END OF PARTS LIST ********

Door Latch Assembly

36030F8S 42032F7S 52038WTL 60044WP2 72044DA1,WP2

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

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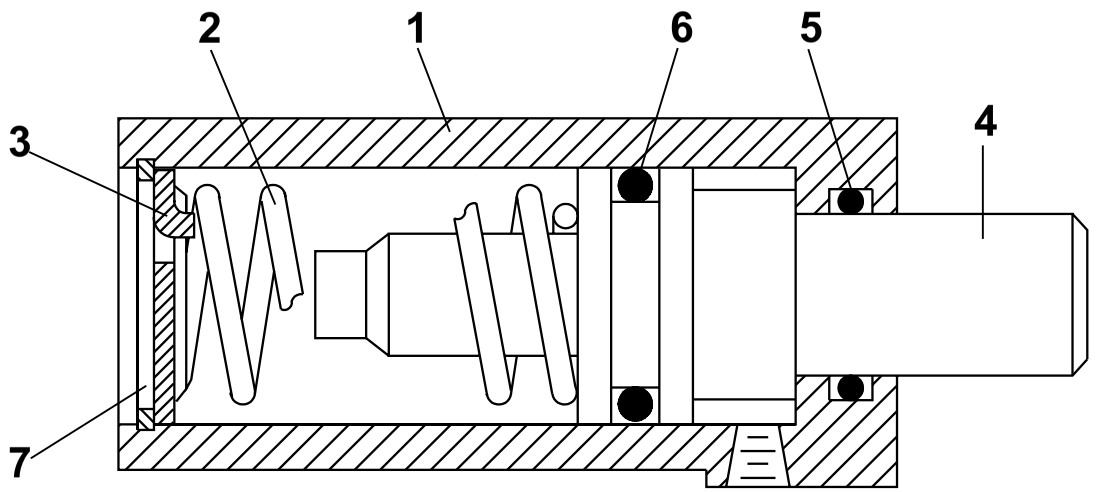

Parts List—Door Latch Assembly

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	SA 10 020	90516B* DOORLATCH ASSY-SMALL	
			----------COMPONENTS----------	
all	1A	02 10188	CYLINDER-DOORLATCH	
all	1B	02 10188L	97087# CYL=DR LATCH W/TAP LEFT SIDE	
all	2	02 10222	82391B SPRING=DOOR LATCH=BALCOM	
all	3	02 10221	RETAINER-DOORLATCH SPRING	
all	4	Y2 10314	70256B* PLUNGER=DOOR INTERLOCK	
all	5	60C112	ORING 5/8 ID 3/32CS BN 70 DURO #114	
all	6	60C115	ORING 3/4 ID 1/8CS BN70 DURO #210	
all	7	17B014	INTRETRING IND#3000-X100-ST-ZD ZINC	

Section 3

Drive Assemblies

DRIVE BASE COMPONENTS ON HYDRO-CUSHION® MACHINES

General Description of Drive Mechanism

Major drive train components of the drive base include the following:

1. Drive motors: Wash, Drain, E-1 (low extract), E-2 (high extract) and Autospot. (The E1 motor is optional on 42" machines and standard on larger models except for 64" machines, which use one 2-speed extract motor. Autospot is optional on divided cylinder machines and not applicable to open pocket machines.)
2. Belts and pulleys
3. Jackshaft (The jackshaft assembly is used on 52", 60", 64" and 72" machines only. On 42" and 48" machines, the E2 (high extract) motor also serves as the jackshaft.)
4. Clutch and drum assembly
5. Gear reducer
6. Brake assembly (The brake is located on the drive base on 42" and 48" machines only. On larger models, it is located elsewhere.)
7. Centrifugal switch

Concept of Drive Train Operation—See FIGURE 1. During washing and inching, the cylinder is driven by the wash motor through the gear reducer and the clutch, while the drain motor and the extract motors merely coast. As soon as the drain valve opens, the wash motor is shut off and coasts with the extract motors, while the drain motor drives the cylinder through the reducer and clutch. During extraction, both the wash and drain motors are shut off, the clutch disengages, and the extract motor drives the cylinder through the jackshaft pulley and main "V" belt drive. At the expiration of extract, the extract motor shuts off, the brake is applied, and either the drain or wash motor (depending upon whether the drain valve is open or closed) starts and runs idle while the brake decelerates the machine. When the machine has slowed down sufficiently to actuate the centrifugal switch, the brake is automatically released, and the clutch engages, returning the machine to wash or drain speed.

Advance Preparations for Drive Assembly Maintenance

The drive train on your Milnor® machine has been designed to give long, trouble-free service under continuous use. Strict adherence to the lubrication schedule, proper belt tensioning, and the normal good practice of inspecting your machine regularly for possible problems is the best way of prolonging service life.

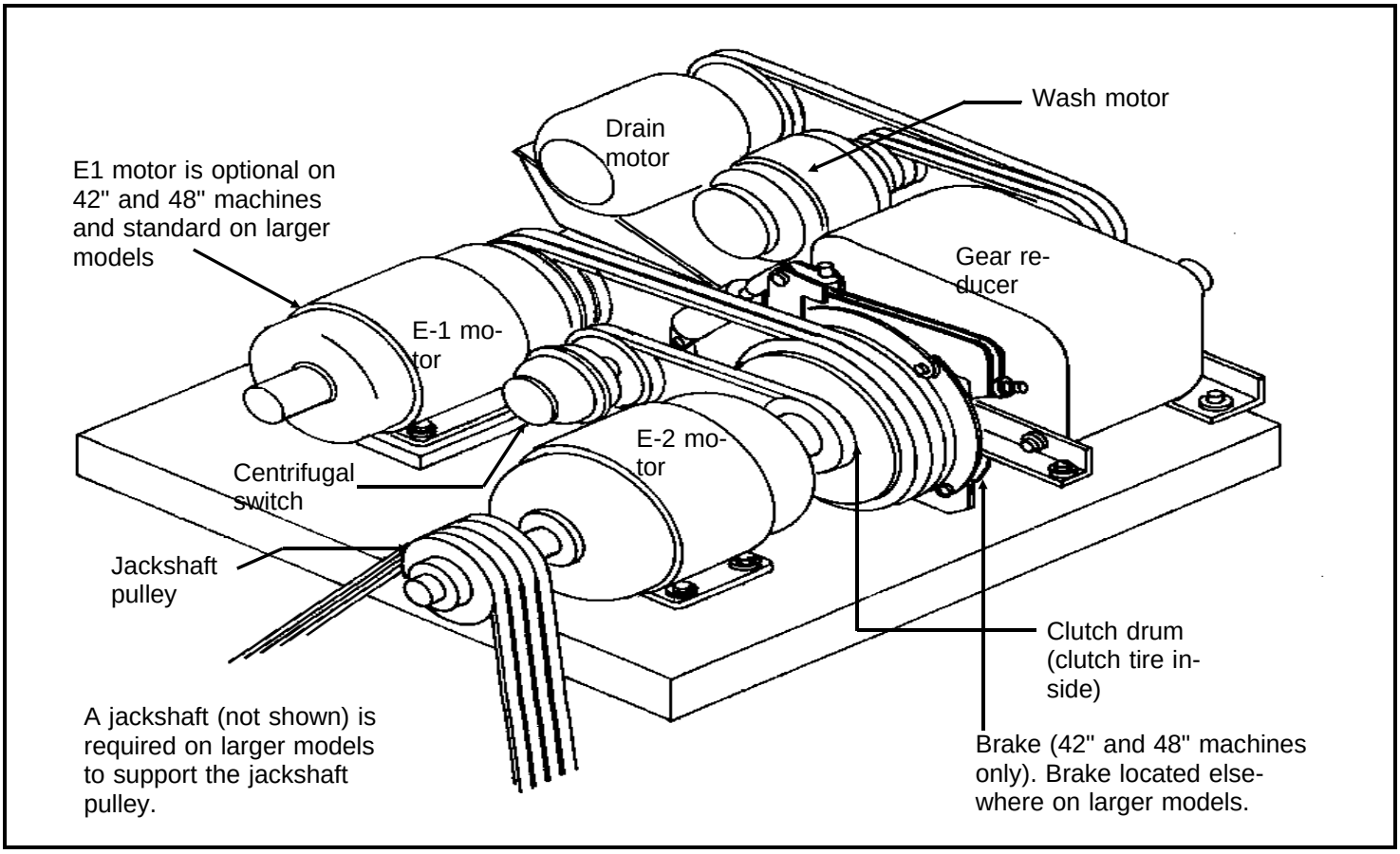

FIGURE 1 (MSSMA407BE)
Drive Base: 42" and 48" Machines
(Shows Concept of Operation For All Hydro-cushion® Washers and Dye-extractors®)

Eventually, however, drive train components may require replacement. If this becomes necessary, the following preparations and precautions will help to minimize down time:

1. Inspect belts regularly and purchase a replacement set for future use, before those on your machine become severely worn. This is especially important for the main drive belts. Purchase a belt tension tester (see "V-BELT TENSION ADJUSTMENTS") and familiarize yourself with its use. It is also recommended to stock an extra clutch tire.

2. Although any motor can fail with no prior warning, two signs of potential failure are 1) motor running slower than normal and 2) motor emitting a loud or unusual noise. If either condition is detected, immediately check for voltage fluctuations in your electrical supply. Fluctuations greater than 10% below or 10% above those specified may cause the above symptoms and are extremely detrimental to the motor. If voltage fluctuations are not detected, yet the symptom persists, then the motor will probably soon fail. A slow running motor may indicate a bad rotor; whereas a loud or unusual noise likely indicates worn bearings. If possible, make immediate repairs to avert complete failure. If this is not possible, make sure replacement parts will be on hand when needed. Note however, that if a motor is allowed to fail, this is almost sure to require a new or completely rebuilt motor.

3. Familiarize yourself with the various components of the drive base and with the procedures herein.

Motor, Belt, and Pulley Replacement

Part numbers for belts, pulleys, and related components may be found on the Drive Chart and/or Drive Assembly drawings for your machine. When ordering motors and motor parts from the Milnor® factory, provide the machine model and serial number and the motor function (i.e., wash, drain, E1 (low extract), E2 (high extract) or Autospot). Replacement rotors and bearings are available from Milnor® for some motors.

Whenever a motor, belt, or pulley is replaced, the corresponding pulleys must be precisely aligned when reinstalled, the taper lock bushing properly tightened and the belt(s), properly tensioned. (See "V-BELT TENSION ADJUSTMENTS" for tensioning procedure using a tension testing device available from the Milnor® factory.)

All pulleys (used for power transmission) on Milnor® Hydro-cushion® machines use taper lock bushings. This feature greatly facilitates the removal and/or adjustment of these pulleys. Components of the taperlock bushing are identified below.

To Remove a Pulley

1. See FIGURE 2.

2. Remove the belts. Release belt tension by adjusting the position of the component to which the pulley is attached with the jack screws, until the belts easily slip off of the sheave. **Do not force belts off by using a pry bar or rolling the sheave.**

3. Loosen all three bushing cap screws.

4. Put two cap screws into the push-off holes in the bushing flange and tighten alternately until the sheave has loosened from the bushing (see FIGURE 2).

5. Remove sheave and bushing from the shaft.

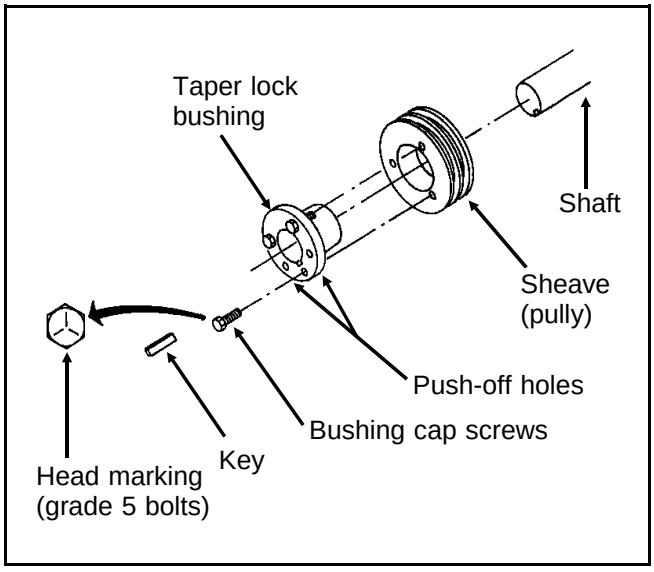

FIGURE 2 (MSSMA407BE)
Typical Taperlock Bushing Construction

To Maximize Belt Life

1. Never mix new and used belts on a drive.

2. Never mix belts from more than one manufacturer.

3. Always replace with the right type of belt and observe V-belt matching limits.

4. Inspect belt grooves in sheaves and replace sheave for any of the following reasons:

a. Worn groove side walls. Walls should be straight (not curved inward) when viewed in cross section.

b. Chipped or broken side walls.

c. Shiny groove bottoms (indicating that belt is bottoming out).

To Replace Pulleys and Belt(s)

1. Clean the tapered bore of the sheave, mating surface of the bushing, bore of the bushing, and the shaft until free of any foreign substance (including paint).

NOTE: Do not use lubricants, "Locktite," or other adhesives on these mating surfaces.

2. Assemble the key in the shaft keyway checking to ensure the key is a snug fit, neither too tight nor too loose.

3. Loosely assemble the sheave and bushing on the shaft in the approximate location for proper belt alignment, allowing for take-up movement of the sheave. Make certain Grade 5 bolts, identified by the head marking shown in FIGURE 3, were supplied.

4. Carefully tighten the cap screws alternately and progressively until the taper is seated (approximately the "Initial Torque" as shown in the "Taperlock Bushing Bolt Torque Specs" elsewhere herein). Rotate the sheave to detect any wobble or runout (see FIGURE 2 next page).

5. Install the belts onto the sheaves (driving and driven) and with the slack of each belt on the same side, adjust

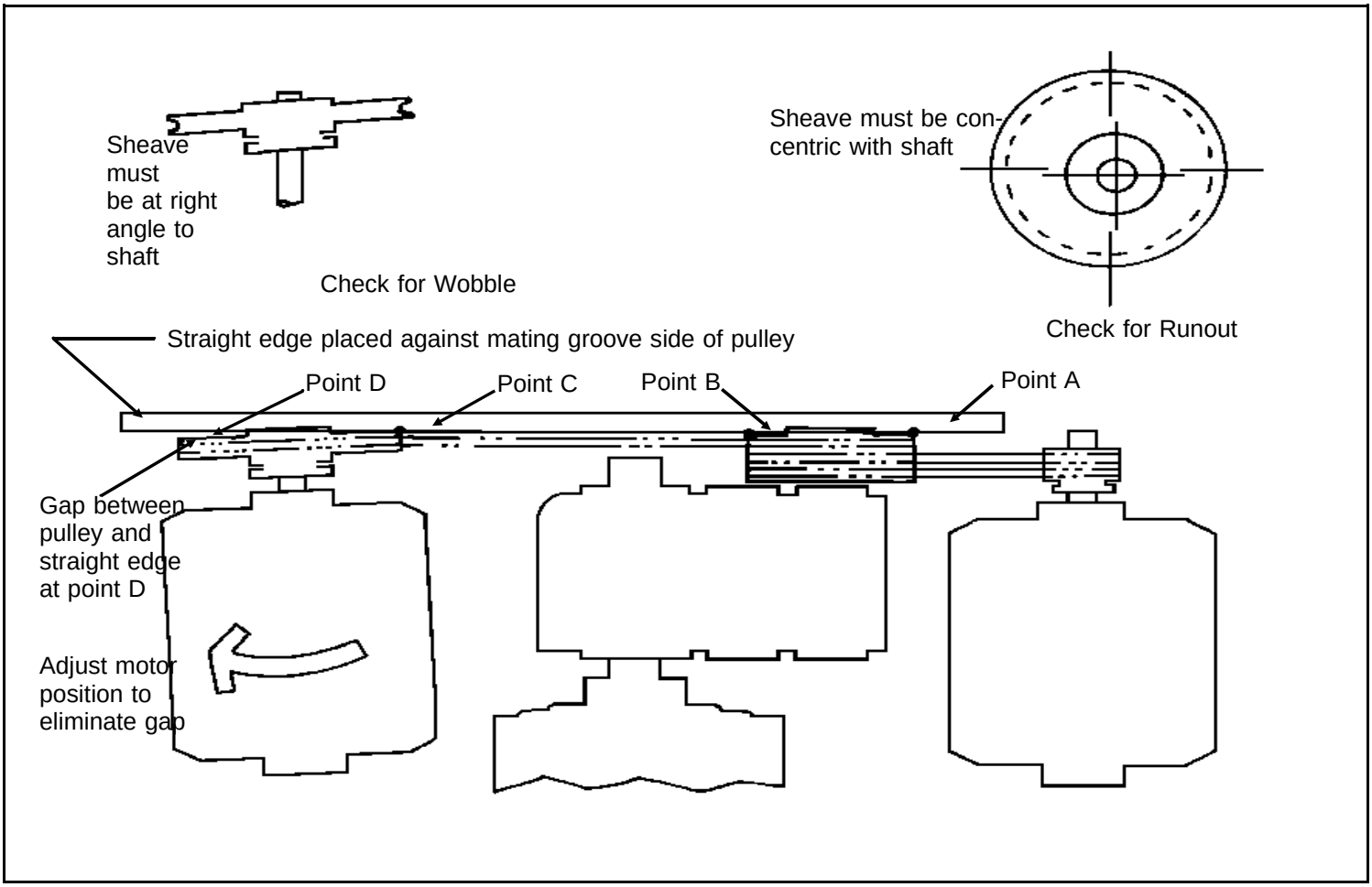

FIGURE 3 (MSSMA407BE)
Test for Pulley Alignment
(Straight edge must touch points A, B, C, and D)

the motor position with the motor mount (or other component) jack screws until all slack is taken up. **Do not force belts onto the sheaves by using a pry bar or rolling the sheaves.**

6. Check for sheave alignment as shown in FIGURES 3. The sheaves must be aligned within 1/64" per foot between shaft centerlines and in no case greater than 1/8". Readjust the sheave position as required to correct alignment.

7. Continue to alternately and progressively tighten cap screws to the “Final Torque” shown in the table. Use a torque wrench for the final torque check. When properly mounted, the gap between the bushing flange should not be less than .078" nor more than .130".

8. Check for proper belt tension and adjust if required. See “V-BELT TENSION ADJUSTMENTS” (see Table of Contents).

Taperlock Bushing Bolt Torque Specifications

Size Code (Stamped on bushing)	**Bolt Size** (All National Coarse Thread)	**Initial torque** (in lb.)	**Final torque** (in lb.)
G	1/4 x 5/8	48	115
H	1/4 x 3/4	48	115
P_1	5/16 x 1	96	240
P_2	5/16 x 1	96	240
Q_1	3/8 x 1 1/4	174	430
Q_2	3/8 x 1 1/4	174	430
R_1	3/8 x 1 3/4	174	430
R_2	3/8 x 1 3/4	174	430
S_1	1/2 x 2 1/4	420	1080
S_2	1/2 x 2 1/4	420	1080
SH	1/4 x 1 3/8	54	115
SDS	1/4 x 1 3/8	54	115
SD	1/4 x 1 7/8	54	115
SK	5/16 x 2	90	240
SF	3/8 x 2	180	430
M	3/4 x 6 3/4	1350	3700

Gear Reducer and Clutch

For gear reducer part numbers, see Gear Reducer Assembly and Reducer Air Seal drawings for your machine. For clutch components, see Drive Assembly drawing for your machine.

Concept of Clutch Operation—The clutch (see cross section view, next page) consists of a tubeless tire mounted to the gear reducer output shaft and a drum similar to an automobile brake drum, mounted to the jackshaft (or E2 motor shaft), within which the tire nests. When the tire is automatically inflated on command from the machine controls, it grips the inside of the drum, thus engaging the gear reducer and the jackshaft. When air pressure is released, the tire deflates, thus disengaging the gear reducer and jackshaft and allowing the machine to run in extract without overspeeding the reducer, wash motor or drain motor.

Air controlled by a solenoid valve is admitted to the clutch through a hole in the center of the gear reducer shaft. The air is prevented from entering the reducer housing itself by a mechanical end face seal located inside the air inlet on the gear reducer. The reducer is also fitted with a vented fill plug to prevent build up of air pressure in the housing, should the mechanical seal fail. A quick release valve permits instant clutch release by providing a large area "short circuit" exhaust connection near the clutch. The quick release valve is necessary for the clutch used on Milnor® washer-extractors, and is furnished as original equipment. The air supplied to the clutch must be free of oil and moisture.

⚠ CAUTION ⚠

If the machine makes a loud screeching sound like skidding automobile tires during deceleration from extract speed to wash speed, turn the *Master switch* to *off* immediately and refer to the troubleshooting procedures.

Alignment Requirements—The gear reducer must be positioned on the drive base such that its output shaft is on the same axis as the jackshaft (or E2 motor shaft), as shown in FIGURE 4. Otherwise, the clutch tire will not properly engage the drum. Slight misalignment reduces the service life of the clutch tire and perhaps other components. Severe misalignment may result in serious damage to the jackshaft, clutch, or gear reducer (i.e., broken shaft).

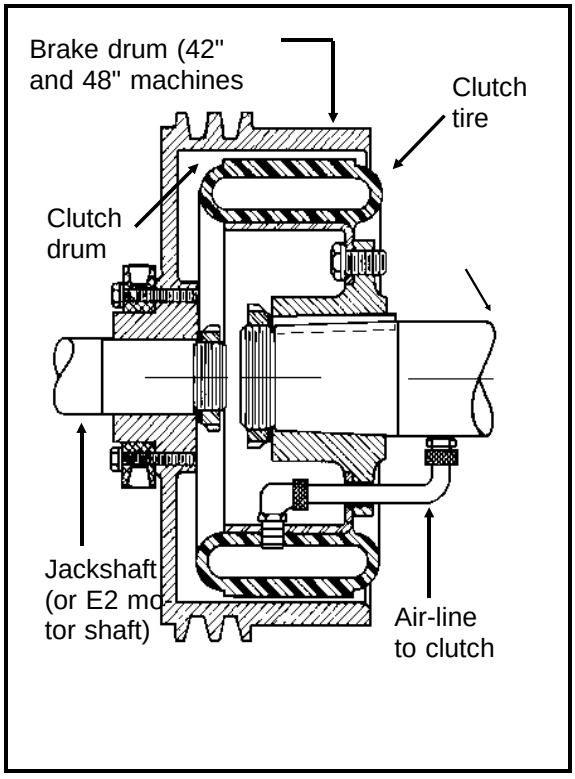

FIGURE 4 (MSSMA407BE)
Cross Section View of Clutch

To Remove the Gear Reducer and Clutch

1. Remove all belts from the gear reducer and clutch drum pulleys as previously explained.
2. Remove the air line to the quick release valve located on the reducer air seal.
3. Remove any other components which may be mounted to the gear reducer mounting bracket, such as Autospot motor, brake assembly, etc.
4. *On all machines except 64" models,* shims are used under the gear reducer mounting bracket, to align the gear reducer.

It is essential when removing the gear reducer, to record the positions of these shims so that they may be replaced in the exact same position later. Bearing this in mind, carefully remove the gear reducer mounting bracket (with the reducer attached) from the drive base. Note that the clutch tire, attached to the reducer output shaft, must be allowed to slip out of the clutch drum as the reducer is removed.

4a. On 64" machine models only (i.e., 64042BTN), check and adjust the jacking bolts on the gear reducer support bracket under the input shaft side of the reducer to be sure they are just touching the drive base. Leave the angle bracket between the reducer mounting bracket and the drive base side members firmly attached to the drive base. Remove only the two bolts and one dowel pin on each side of the reducer mounting bracket that attaches it to the angle brackets.

5. The gear reducer should not be unbolted from the mounting bracket unless absolutely necessary (i.e., replacing an old gear reducer with a new one); since this will complicate clutch alignment. The clutch tire may be removed from the gear reducer by removing the retaining locknut, as well as the connection where the short length of copper tubing meets the reducer shaft, then gently working the assembly off of the tapered shaft with a rubber mallet or pulling fixture. The clutch drum may also be removed from the jackshaft, if required, by removing the retaining locknut and pulling the drum off with a pulling fixture. **Do not attempt to drive the drum off with a hammer or mallet.**

6. In addition to any other required maintenance, inspect the various belts and the clutch tire. These components should be replaced at this time if they show appreciable wear. It is highly recommended to replace the belts that drive the clutch drum pulley, unless these are brand new.

To Replace the Gear Reducer and Clutch—Reassemble all components in reverse order of their removal. **Remember that all components such as motors, brake, etc. must be properly adjusted, using the alignment procedures described herein.**

When the gear reducer and mounting brackets are replaced on the drive base, *with the shims replaced in their original positions,* this should achieve rough alignment of the reducer. If, however, the gear reducer was removed from its mounting brackets, or the jackshaft was removed from its housing, the reducer may be out of rough alignment.

To align the gear reducer and clutch:

1. Observe the position of the clutch tire within the drum and check for clearance between the tire and drum all around, with a feeler gauge. **Determine that the tire is roughly centered within the drum. If it is, skip to step 3.** If not, proceed to step 2a or 2b.

2a. For all machines except 64" models, add or remove shims from between the gear reducer mounting brackets and drive base as required to roughly position the clutch tire within the drum in accordance with the "CLUTCH ALIGNMENT REQUIREMENTS" drawing.

2b. On 64" machine models only (i.e., 64042BTN), remove the two bolts and one dowel pin from each side of the gear reducer mounting bracket and using C-clamps to secure the mounting bracket to the angle brackets, adjust the position of the gear reducer to achieve rough alignment in accordance with the "CLUTCH ALIGNMENT REQUIREMENTS" drawing. If the existing bolt holes are now misaligned, either enlarge the existing holes or drill new holes as required and reinstall the four bolts. Mark any new bolt holes as being the correct ones. Do not reinstall the dowel pins.

3. Temporarily disconnect the internal air line to the gear reducer and connect an external, valve-controlled air line to the reducer, but do not inflate the tire yet.

4. Loosen but do not remove the bolts that attach the gear reducer mounting brackets to the drive base. (On 64" machine models, check to be sure the jacking bolts under the input shaft side of the reducer are resting on the drive base then loosen the bolts and remove the dowel pins if they were reinstalled.)

5. Inflate the clutch tire to cause the gear reducer to position itself with the clutch precisely centered. (It should move very little, if at all.)

6a. On all machines except 64" models, add or remove shims as required to firmly seat the reducer mounting brackets on the drive base and tighten down the mounting bolts.

6b. On 64" machine models only (i.e., 64042BTN), tighten down the mounting bolts. If the dowel pin holes are aligned, reinstall the pins. If the holes are not aligned, drill new holes, install the dowel pins, and mark the new holes as being the correct ones.

7. Replace the internal air line to the gear reducer.

8. Energize power to the machine and run in wash, while observing for any evidence of gear reducer misalignment such as 1) wobbling of the gear reducer or related components, or 2) any apparent difficulty of the clutch tire to engage the drum (i.e., an extended squealing sound).

9. If any of the above symptoms are observed, repeat the alignment procedures.

Jackshaft Replacement: 52", 60", 64", and 72" Machines

Jackshaft components may be found in the JACKSHAFT BEARING ASSEMBLY drawing for your machine. Replacement jackshafts are supplied, preassembled and are installed as a one-piece unit. To replace the jackshaft, proceed as follows:

1. Remove belts, gear reducer, and clutch drum exactly as previously explained.

2. Lower the drive base using the drive base jacking bolts. Remove the main drive belts and the jackshaft pulley.

3. Remove the grease fittings (or grease lines as appropriate).

4. To remove the jackshaft bearing assembly from its housing, it is convenient to remove the mounting plates from both ends of the housing. Shims may have been installed between the mounting plates and the housing to align the jackshaft within the housing. **It is essential to record the positions of these shims, so that they may be replaced in the exact same position later.**

On some models, the front mounting plate differs from the rear plate. Therefore, it is also necessary to identify the mounting plates as front or rear, so that they will be returned to the same positions. Remove each mounting plate by first unbolting the jackshaft from the plate then unbolting the plate from the housing.

5. Remove the jackshaft bearing assembly from the housing.

6. In addition to any other required maintenance, inspect all belts that were removed and replace with new belts, if they show appreciable wear.

To replace the jackshaft, reassemble all components in reverse order of their removal. Make certain that the jackshaft is properly oriented with the clutch end of the shaft to the front of the machine and that all shims are returned to their original positions. Install all jackshaft mounting bolts hand tight. Lift each end of the jackshaft with a pry bar (one end at a time) then tighten the bolts on that end, so that the jackshaft will sit as high as possible in the housing. This will provide for greater clearance between the clutch pulley and the drive base for the belts and easier alignment of the jackshaft. When tightening the bolts, tighten first the bolts that secure the jackshaft to the mounting plate, then those that secure the mounting plate to the housing. **Remember that all components such as motors, gear reducers, brakes, etc., must be properly adjusted, using the alignment procedures explained herein.**

Brake Assembly

Concept of Operation—On 42" and 48" Hydro-cushion® machines, the brake is located on the drive base. (The clutch drum is also the brake drum.) On 60" and 72" Staph-guard® machines, the brake is located on the idlershaft. On all other 52", 60", 64", and 72" machines, it is located on the cylinder shaft (thus, the main drive pulley and brake drum are combined). Machines covered by these instructions use spring loaded air cylinders to hold the brake band against the drum. Open-pocket machines use only one level of braking ("first brake") and divided cylinder machines (WE's and SG's) use two levels ("first" and "second" brake). The "first" brake is normally *on,* and braking pressure is supplied by the action of the springs inside the brake air cylinder. The "first" brake is released by applying air to the top of the air cylinder to counteract the springs. This occurs whenever the cylinder rotates under power. On divided cylinder machines, the "second" brake which is *on* whenever the cylinder is at rest *with the door open,* supplements the "first" brake with air pressure applied to the back of the air cylinder.

Brake Assembly Maintenance—For identification of brake components and specific adjustment procedures refer to the Brake Assembly, Drive Assembly and/or Brake Air Cylinder drawings for your machine. Specific adjustment procedures are also found on the Brake Assembly drawing for your machine.

The brake may be readily adjusted to compensate for wear by adjusting the nuts on the air cylinder stem. If brake components must be removed or repaired, it is essential to adjust the brake upon replacement in accordance with the Brake Assembly drawing.

> **NOTE:** For any adjustment procedure requiring air pressure to the brake, do not attempt to perform this procedure by energizing the washer as it is not possible to release the "first" brake without the cylinder rotating under power.

To release the "first" brake without energizing the washer:

1. Disconnect the internal air line to the air cylinder. (This is the only air line to the air cylinder on open-pocket machines and the air line closest to the air cylinder stem on divided cylinder machines.)
2. Temporarily connect a direct air line to the air cylinder where the internal line was removed and apply air to release the brake.
3. On divided cylinder machines, make sure the doors are closed (to release the "second" brake).

Centrifugal Switch

Concept of Operation—After an extraction, the centrifugal switch will signal the Miltrol as soon as the washer cylinder has slowed sufficiently to permit the wash speed clutch to re-engage. Also, until this low speed has been attained, the Miltrol circuits prevent the opening of the shell door, thus providing safety interlocking.

This centrifugal switch assembly consists of three mercury tube switches wired in parallel, and connected to two copper rings. The shaft of the centrifugal switch is driven by the extract motor shaft and rotates at the same speed as the extract motor. At a predetermined speed, centrifugal force will cause the mercury switches to open the circuit. At lower speeds, there is always at least one switch closed, thus maintaining the circuit continuity. Two spring loaded carbon brushes, riding on the copper contact rings, transmit this electrical signal to the Miltrol.

This electrical signal is used to energize the speed relay at the expiration of extraction, when the predetermined reclutching speed has been reached. The combined operation of the extract relay and the speed relay in the Miltrol perform all the functions of operating the brake, clutch, and extract motors incidental to the automatic entrance into extraction, and subsequent return to wash speed.

Centrifugal Switch Maintenance—See Centrifugal Switch Assembly for your machine for identification of switch components.

The centrifugal switch is very simple, yet of *vital* importance. Failure of one of the mercury switches to make contact, an irregular contact between the brushes and the contact rings, a loose connection in the wiring, or any other condition that would cause an open circuit will prevent the clutch from engaging, in which case the machine will not operate after having braked down from extract speed.

The carbon brushes should be inspected occasionally, and replaced when worn. The copper contact rings may be cleaned with *fine* emery when needed. (Do not scratch the surface of the contact rings.)

⚠ WARNING ⚠

A short circuit or ground in the centrifugal switch or its associated wiring will cause the wash speed clutch to engage in high speed rotation. This condition would be identified by an extremely loud screeching sound as soon as the machine stops extracting. The sound would be similar to skidding auto tires. Such a malfunction is very dangerous and must be corrected at once before further operation.

⚠ CAUTION ⚠

Turn *off* power at main wall switch before entering centrifugal switch. This assembly carries high voltage, and remains energized when Miltrol master switch is *off.*

⚠ CAUTION ⚠

Over-lubrication of extract motor bearings will force grease into centrifugal switch housing and will cause the centrifugal switch to malfunction.

DRIVE BASE ASSEMBLY FOR 5238 WE1 (A25-00450A)

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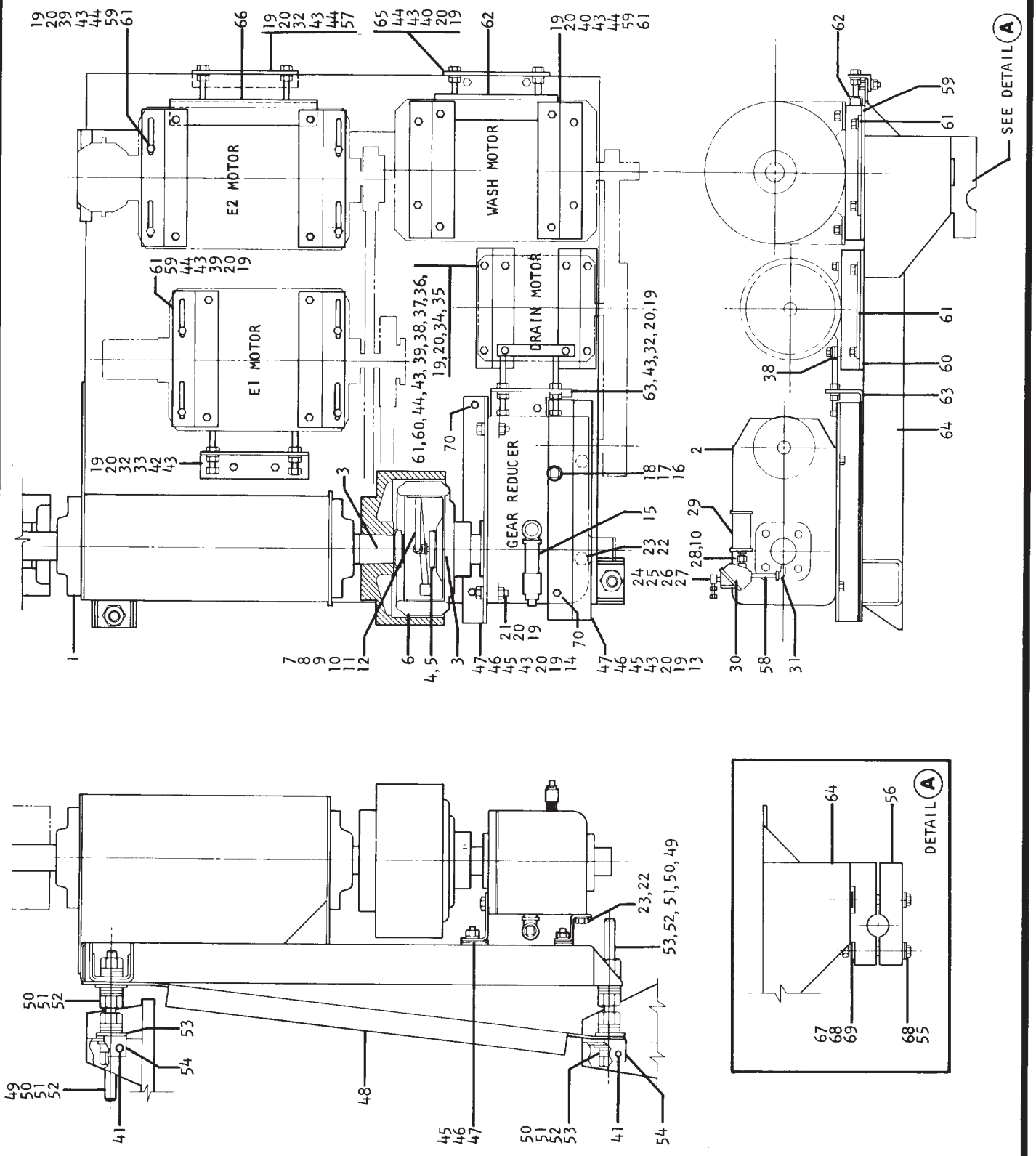
83412B



Drive Base Assembly

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

Litho in U.S.A.

Parts List—Drive Base 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	P001	GBJ25001	87332# JKSHFT ASSY TIMKEN 52U+72S	
all	P002	54S022A	REDUCER 3220-300EC=AUTOSPOT	
all	P003	15E230	STRMACHKEY 3/8SQX2+1/2 TOL.+0 -.022	
all	P004	56AHW12	W12 BEARING LOCKWASHER	
all	P005	56AHN12	N12 BEARING LOCKNUT	
all	P006	54H150	REPLACED BY KIT K15 0002	
all	P007	5N0E01KG42	NPT NIPPLE 1/4X1.5 TBE GALSTL SK40	
all	P008	53A023	MALECONN 3/8TX1/4P COMPFIT WO#68	
all	P009	5SL0EBEA	NPT ELBOW 90DEG 1/4" BRASS 125#	
all	P010	5SB0G0EDEO	NPTHEXBUSH 3/8X1/4 GALCI 125#	
all	P011	53A043G	MAL90ELL-BR 3/8X1/4COMP AND#69A-6B	
all	P012	90A021	COPPERTUBE 3/8"X.032X50' EA=1 ROLL	
all	P013	02 19131	88473C BRACKET=FRONT REDUCER MOUNT	
all	P014	02 19130	86226C BRACKET=REAR REDUCER MOUNT	
all	P015	AD 28 008	93456B DRAIN=DIVCYL GEAR REDUCER	
all	P016	5SCC0GNF	NPT COUP 3/8 GALMAL 150#	
all	P017	5N0GCLSG42	NPT NIPPLE 3/8XCLS TBE GALSTL SK40	
all	P018	5SP0GFFSSV	NPT PLUG 3/8 SQSOLIDVENTBLKSTL	
all	P019	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	P020	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	P021	15K182	HEXTAPSCR 1/2-13X2ZINC GR5 FULLTHRD	
all	P022	15K211	HXCAPSCR 5/8-11UNC2AX1 GR5 ZINC/CAD	
all	P023	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	P024	53A031XB	BODY=MAL90EL 1/4X1/4COMP #269C-4-4B	
all	P025	53A059A	NUT 1/4"COMP.HOLYOKE ANDERSON#61A-4	
all	P026	53A500	1/4" SLEEVE-DELRIN	
all	P027	53A501	TUBEINSERT .170"OD	
all	P028	5N0ECLSBE2	NPT NIPPLE 1/4XCLS TBE BRASS 125#	
all	P029	27A005	MUFFLER 3/8" ALLIED #B38 "BANTAM"	
all	P030	96M051	USE KZK5B00100	
all	P031	5SL0EBEC	NPT ELBOW 90DEG STRT 1/4" BRASS 125	
all	P032	15D119	HXTAPSCR 1/2-13X4 GR5 ZNC FULLTHRD	
all	P033	15U280	01Z FL+WASHER(USS STD)1/2 ZNC PL+D	
all	P034	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	P035	15K110	HEXCAPSCR 3/8-16UNC2AX1.5 GR5-PLTD	
all	P036	15U240	FLATWASHER(USS STD) 3/8" ZNC PLT	
all	P037	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	P038	02 15869	79332A SHIM-AUTOSPOT MTG BKT 8/4244	
all	P039	02 18692	96191D CLAMP-MOTOR ADJUSTING ZEE	
all	P041	15P200	02Z TRDCUT-F HXWASHD 3/8-16X3/4NIK	
all	P043	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 PLATED	

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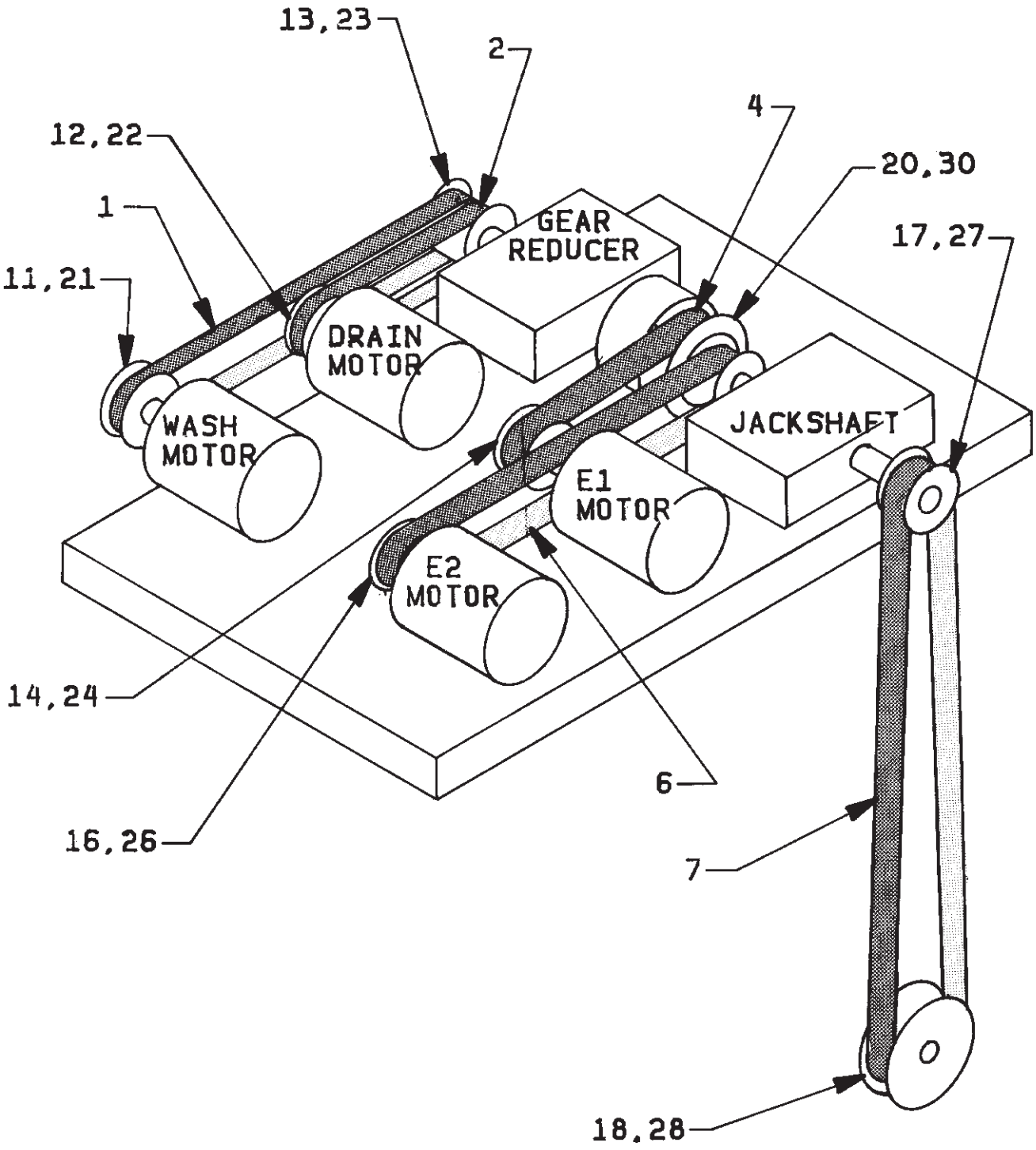
Parts List, cont.—Drive Base Assembly

Used In	Item	Part Number	Description	Comments
all	P044	15G232	SQNUT 1/2-13UNC3B SAE ZINC GR2	
all	P045	15U475	SQFLATWASHER 1/64X2X2 9/16ID ZINCPL	
all	P046	15U476	SQFLATWASHER 1/32X2X2 9/16ID ZINCPL	
all	P047	15U477	SQFLTWSHR 1/8X2X2 9/16ID HTDIP GALV	
all	P048	02 18701	83266C SWAY BRACE=WE DRIVE BASE	
all	P049	02 19023	94353A DRIVE BASE ADJ. SCREW 13.5LG	
all	P050	15G250	HXNUT 1-8UNC2B SAE ZNC GR2	
all	P051	15U400	LOCKWASHER MEDIUM 1" ZINCPL	
all	P052	02 18610	96273A 1"SETS-SPHERICAL WASHERS CAD	
all	P053	02 15630	75428A FLATWASH 2.75 X .25+ZINC PLT	
all	P054	02 15652	75690B FORK=MOTOR MOUNT ADJ SCREW	
all	P055	15K255	03Z HXCPSC-3/4-10X6 GR8/2C	
all	P056	03 25293	80396B BAR=MOTOR MNT HING PIN CLAMP	
all	P057	02 15864	70195B ANGLE=MOUNT TAKE-UP	
all	P058	5N0E02KG42	NPT NIPPLE 1/4X2.5 TBE GALSTL SK40	
all	P061	03 25148L	74175A STIFFENER=MOTOR MT BRACKET	
all	P062	03 25148P	74215C BRACKET=MOTOR TAKE UP 8"LG	
all	P063	03 25148N	75815C BRACKET=MOTOR TAKE UP 7.5"LG	
all	P064	W3 25148D	96107D*DRIVEBASE 5238 (50+60)TIMKEN	
all	P066	03 25148M	74175C BRACKET=MOTOR TAKE UP 11"LG	
all	P067	15U340	LOCKWASH MEDIUM 3/4 ZINCPL	
all	P068	17W050	04Z SPHERICALWASHER SET 7/8 M/F	
all	P069	15G240A	HEXNUT 3/4-10UNC2B SAE GR8 ZINC/CAD	
all	P070	15U490	FLAWASH 1+1/2X17/32X1/4ZINC	

5238 WEU DRIVE CHART
50 & 60 CYCLES

BMP740120
83381A



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PELLERIN MILNOR CORPORATION

5238 WEU Drive Chart
50 + 60C

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

Litho in U.S.A.

Parts List—5238 WEU Drive Chart

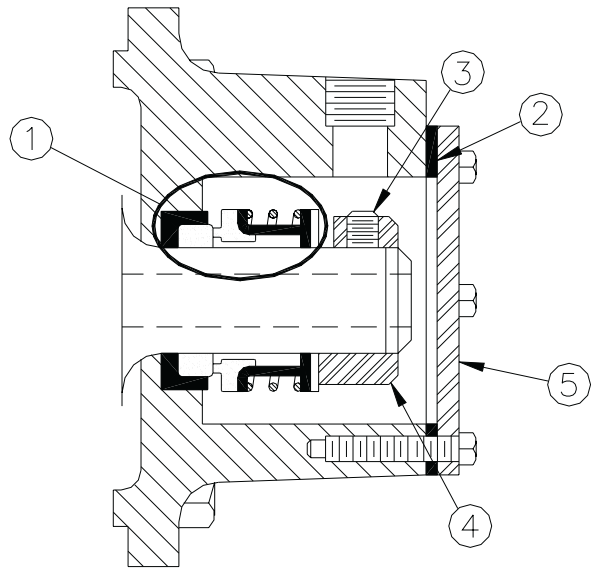
Find the correct assembly first, then find the needed components. The item letters (A, B, C, etc.) assigned to assemblies are referred to in the "Used In" column to identify which components belong to an assembly. The item numbers (1, 2, 3, etc.) assigned to components relate the parts list to the illustration.

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	D25 00350	83331B* DRIVECHART 52WE1+TILT 50CY	50 CYCLE
	B	D25 00360	83331B* DRIVECHART 52WE1+TILT 60CY	60 CYCLE
			----------COMPONENTS----------	
all	1	56VB066X	VBELT BX66 RAWEDGE COG	
all	2	56VB046X	VBELT SN5-8877 BX46 (EA=1 BELT)	
all	4	56VR063S	VBELT 3V630	
all	6	56VR0950M3	VBELT 3V950 MATCHSET=3 "EA"=1 BELT	
all	7	56VS1600M8	VBELT 5V1600 MATCHSET=8 "EA"=1 BELT	
all	11	56052B2SDS	VPUL 2B5.2/A4.8 (SDS) TYPE QD	
all	12	56094B3SK	VPUL 3B9.4/A9.0 (SK) TYPE QD	
all	13	02 15918A	92102C V-PUL 3B5.2PD QD TYPE"SD"STL	
all	14	560595R4Q1	01ZVPUL 4G3V5.95(Q1)BRN#PE5061 STL	
all	16	561055R3SK	VPUL 3G3V10.55 (SK) TYPE QD	
A	17	561310S8F	VPUL 8G5V13.1 (F) TYPE QD	
B	17	561080S8F	VPUL 8G5V10.8 (F) TYPE QD	
all	18	03 25105	87387C VPUL+BRAKEDRM 8G5V30.0-M HUB	
all	20	X2 19032	91463D PULLEY+CLUTCH DRUM=1/60WED	
all	21	56Q1GSDS	1+3/8" BUSHING,VPUL QD TYPE "SDS"	
all	22	56Q1GSK	1+3/8" BUSHING,VPUL QD TYPE "SK"	
all	23	56Q1ESD	1+1/4" BUSHING VPUL QD TYPE "SD"	
all	24	56Q1PQ1	1+3/4" BUSHING,VPUL BROWNING "Q1"	
all	26	56Q1MSK	1+5/8" BUSHING,VPUL QD TYPE "SK"	
all	27	56Q2HF	2+7/16" BUSHING,VPUL QD TYPE (F)	
all	28	56Q5EM	5+1/4" BUSHING,VPUL QD TYPE "M"	
all	30	X2 15106	94251B FLANGE=CLUTCH DRIVE 2.5	

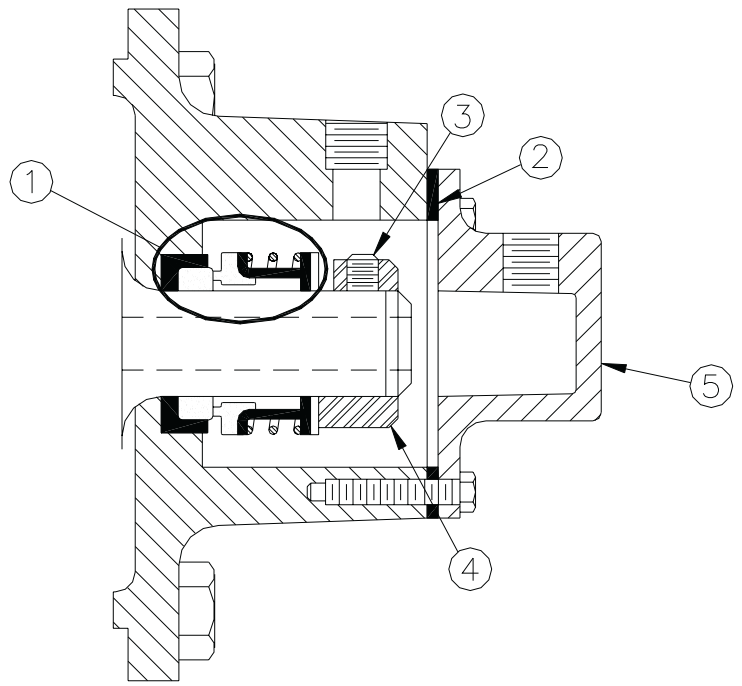
Reducer Air Seal

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

Litho in U.S.A.



00A–00C



00D–00F

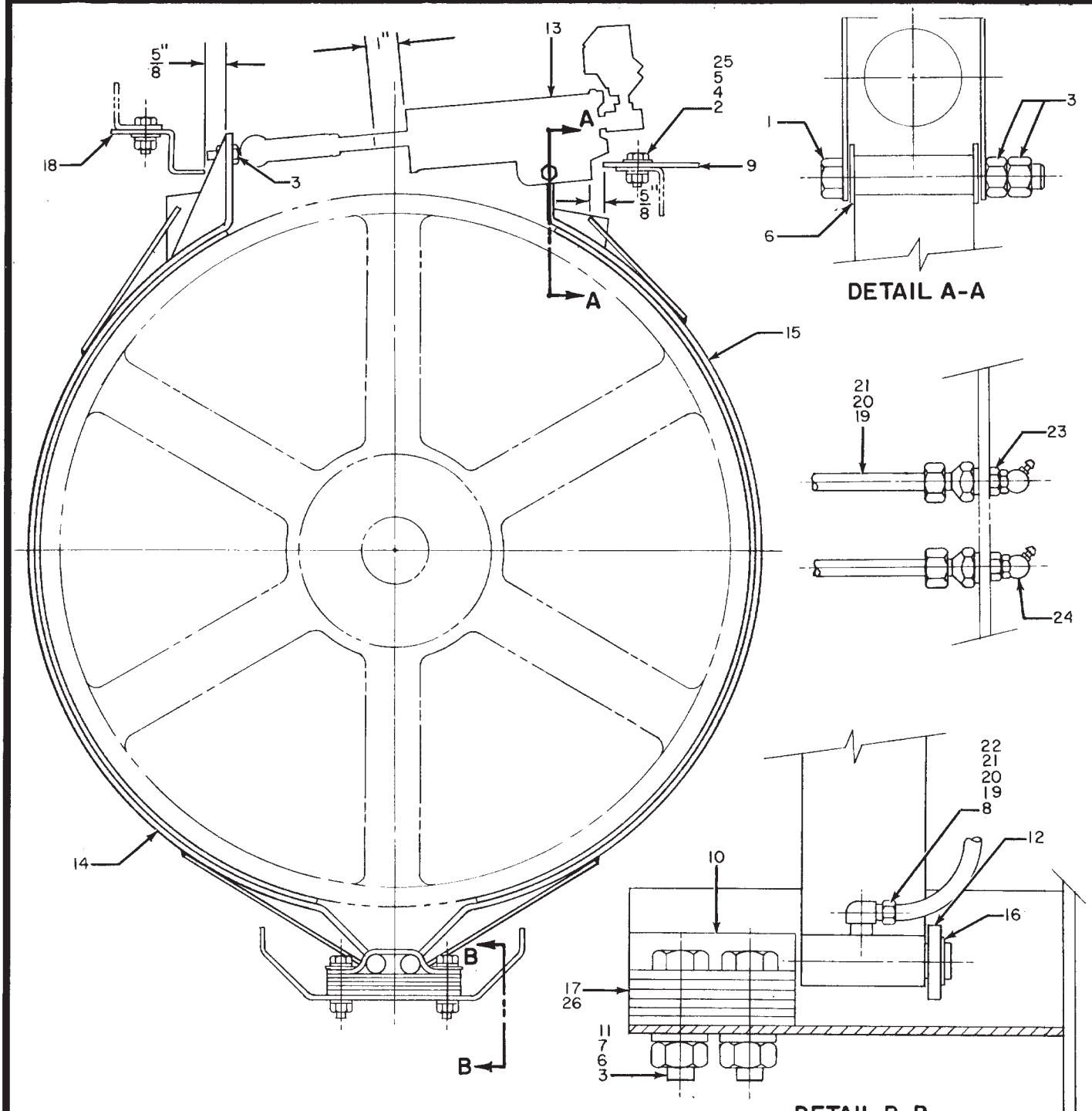
Parts List—Reducer Air Seal

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	

BRAKE INSTALLATION-5238

BMP750050
83417B



1. WITH BRAKE APPLIED, GROOVE ON AIR CYLINDER STEM SHOULD BE 1" FROM FROM AIR CYLINDER HEAD. ADJUST ROD END AND YOKE TO SET THIS DIAMETER.
2. WITH BRAKE APPLIED, BRAKE STOPS MUST BE 5/8" ±1/16" FROM BRAKE SHOES.
3. WHEN BRAKE IS RELEASED, BRAKE SHOE AND AIR CYLINDER ASSEMBLY SHOULD REST FIRMLY AND SQUARELY AGAINST BRAKE STOPS.
4. WHEN BRAKE IS RELEASED, IT SHOULD CLEAR THE DRUM BY APPROXIMATELY 3/16".
5. DO NOT OVER TIGHTEN PIVOT BOLT... AIR CYLINDER MUST MOVE EASILY ABOUT THE BOLT.
6. KEEP BOTH YOKE ARMS IN AN HORIZONTAL PLANE - DO NOT SKEW OR COCK YOKES.
7. BRAKE SHOES MUST PIVOT EASILY ABOUT PINS.
8. DO NOT ALLOW GREASE OR OIL ON BRAKE DRUM.

Brake Installation

52038

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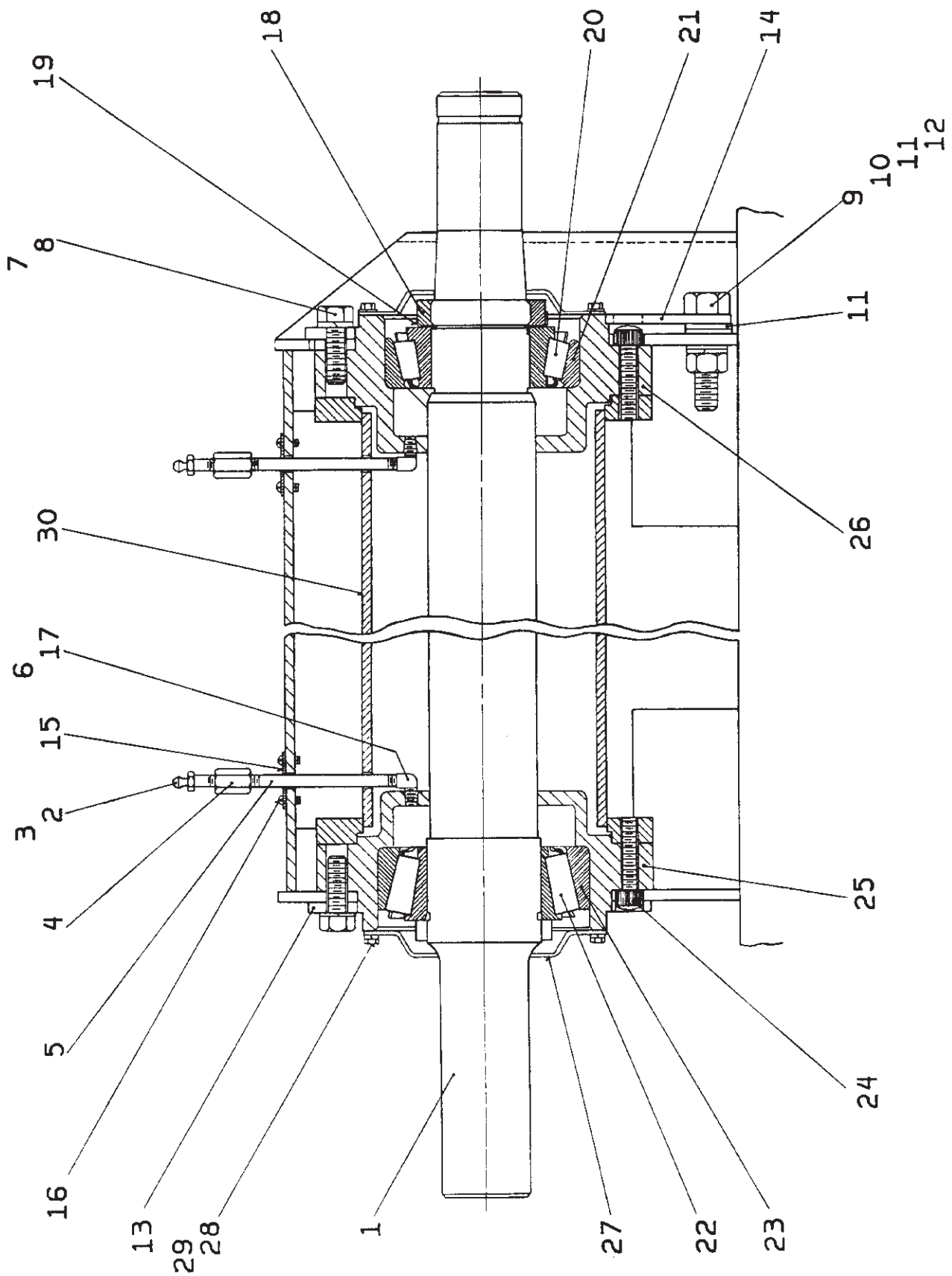
Parts List—BRAKE INSTALLATION

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
			none	
			----------COMPONENTS----------	
all	1	15D119	HXTAPSCR 1/2-13X4 GR5 ZNC FULLTHRD	
all	2	15G205	HXNUT 3/8-16UNC2B ZINC GR2	
all	3	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
all	4	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC/CAD	
all	5	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	6	15U280	01Z FL+WASHER(USS STD)1/2 ZNC PL+D	
all	7	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	8	53A031B	BODY-MAL90ELL1/4X1/8COMPPH#269C-42B	
all	9	02 175080	78196B PLATE-BRAKE STOP	
all	10	MESSAGE NU	THIS P/S ITEM NUMBER NOT USED <>	
all	11	15K162	HXCAPSCR 1/2-13UNC2AX1.5 GR5 PLATED	
all	12	02 18516B	BRAKEPIN WASHER	
all	13	A25 00600	89457V* BRAKE AIRCYL=52WE1 +52TILT	
all	14	SA 28 153N	94153#*BRAKEBAND RT(NON-ASB)52+60WE	
all	15	SA 28 154N	94153#*BRAKEBAND LT(NON-ASB)52+60WE	
all	16	17B062	EXTRETRING S/S INDUST#3100-75-SS2	
all	17	03 25229C	78531B SHIM=BRAKE HINGE 7GA.	
all	18	03 25229D	78117C "Z"IRON=BRAKE STOP(BEND@PRT)	
all	19	53A500	1/4" SLEEVE-DELRIN	
all	20	53A501	TUBEINSERT .170"OD	
all	21	53A059A	NUT 1/4"COMP.HOLYOKE ANDERSON#61A-4	
all	22	53A007B	BODY=FEMCONN 1/4X1/4 COMP W#B66X4X4	
all	23	5SB0E0CBEO	HEXPIPBUSH 1/4 X 1/8 BRASS 125#	
all	24	54M020	GREASEFIT 30DEG 1611-B ALEMITE	
all	25	15U240	FLATWASHER(USS STD) 3/8" ZNC PLT	
all	26	03 25229E	78531A HALFSHIM=BRAKE HINGE 16 GA	

JACKSHAFT BEARING ASSEMBLY
5238, 6036, 6044, 6442, 7244

BMP820109
89253C



Jackshaft Bearing Assembly

52, 60, 64, 72

Pellerin Milnor Corporation
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Parts List—Jackshaft 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----------				
	X	GBJ25001	87332# JKSHFT ASSY TIMKEN 52U+72S	52 W/E,60+72 STAPHGUARD
	Y	GBJ28001	87332D JKSHFT ASSY TIMKEN 60W+72W+T	60,64+72 W/E
	Z	ABJ25001	92327C*JKSHFT-BRGHOUS ASSY-TIMKENS	ONLY
----------COMPONENTS----------				
all	1	X2 18711B	93417D JACKSHAFT=TIMBRG W/TRUSTWASH	
all	2	54M025	HYDRAULICFIT 1/8"-90 ALEMITE#1613-B	
all	3	20H012	SHELL ALVANIA EP-2 # 71125 E=35LBPL	
all	4	5SCC0CBE	NPT COUP 1/8 BRASS 125# 103A-A	
all	5	5N0C04AG42	NPT NIPPLE 1/8X4 TBE GALSTL SK40	
all	6	5SL0CBEC	NPT ELBOW 90DEG STRT 1/8"BRASS 125#	
all	7	15K151	HXCAPSCR 1/2-13UNC24X1.25 GR5 PLATE	
all	8	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	9	15K221	HEXCAPSCR 5/8-11 UNC2X2GR5 ZINC	
all	10	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	11	15U314	FLATWASHER(USS STD) 5/8" ZNC PLT	
all	12	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2	
(Y onlY	13	02 19382	89016D BEARHOUSE MT PLATE REAR	)
(X,Y)	14	02 19383	89016D BEARHOUSE MT PLATE FRONT	
all	15	01 10237	82446B NAMEPLATE LUBG BRG JACKSHAF	
all	16	15P185	TRDCUT-F HXHD 1/4-20UNC2AX3/4 ZNC	
all	17	51A001	ADAPTER 1/8 PT BRASS	
all	18	56AHN14	N14 BEARING LOCKNUT	
all	19	56AHW14	W14 BEARING LOCKWASHER	
all	20	54AT060	01Z CONE TIMKEN 644 1/BOX+ PT NO	
all	21	54AU060	01Z CUP TIMKEN 632 1/BOX+PT NO	
all	22	54AT050	01Z CONE TIMKEN 6461 1/BOX+ PT NO	
all	23	54AU050	01Z CUP TIMKEN 6420 1/BOX+ PT NO	
all	24	15K193	06Z SKCPSC-1/2-13X2.75GR8 HK	

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Parts List, cont.—Jackshaft Bearing Assembly

Used In	Item	Part Number	Description	Comments
all	25	X2 19381	94182D BEARHOUSE=LG BRG REAR TIMKEN	
all	26	X2 19381B	94182D BRGHSE=SM BRG FRONT W/WASHER	
all	27	02 19384	82296C COVER=BRG HOUSE FT+REAR	
all	28	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	29	15K030	HEXCAPSCR 1/4-20UNC2X1/2 GR5 ZINC	
all	30	X2 19378	88506C BRGHSG SUP=TIMKENS MACHINED	

Centrifugal Switch Assembly

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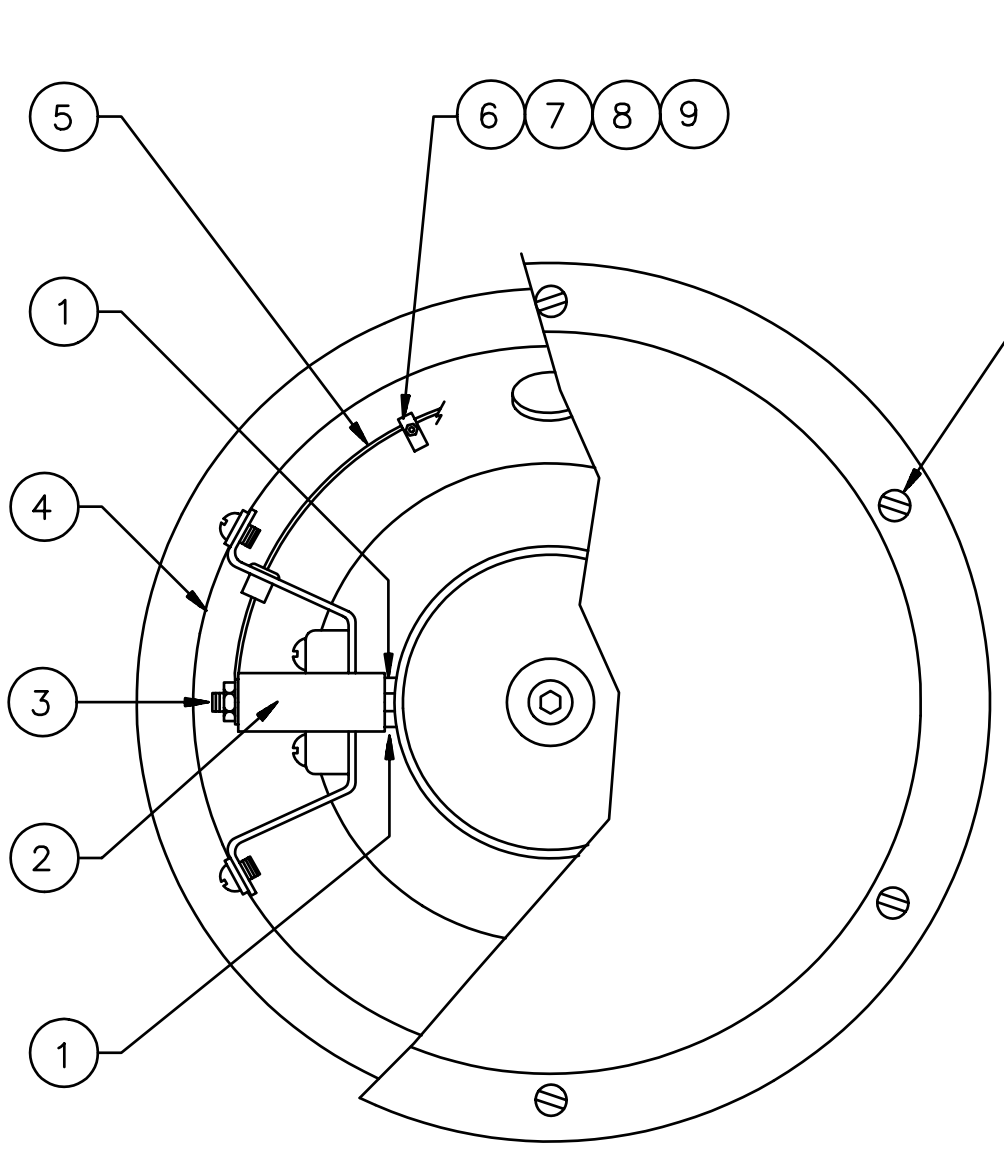

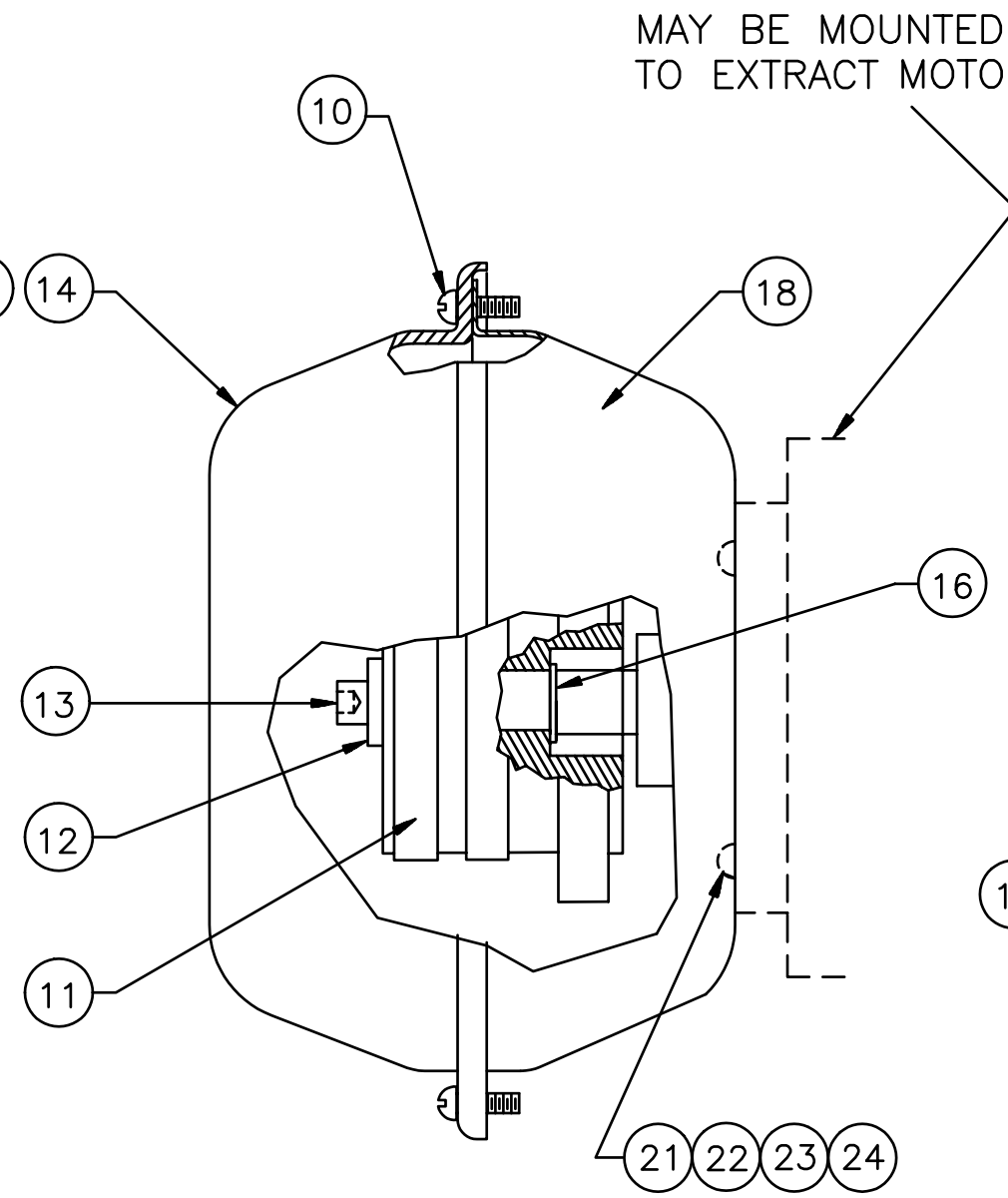

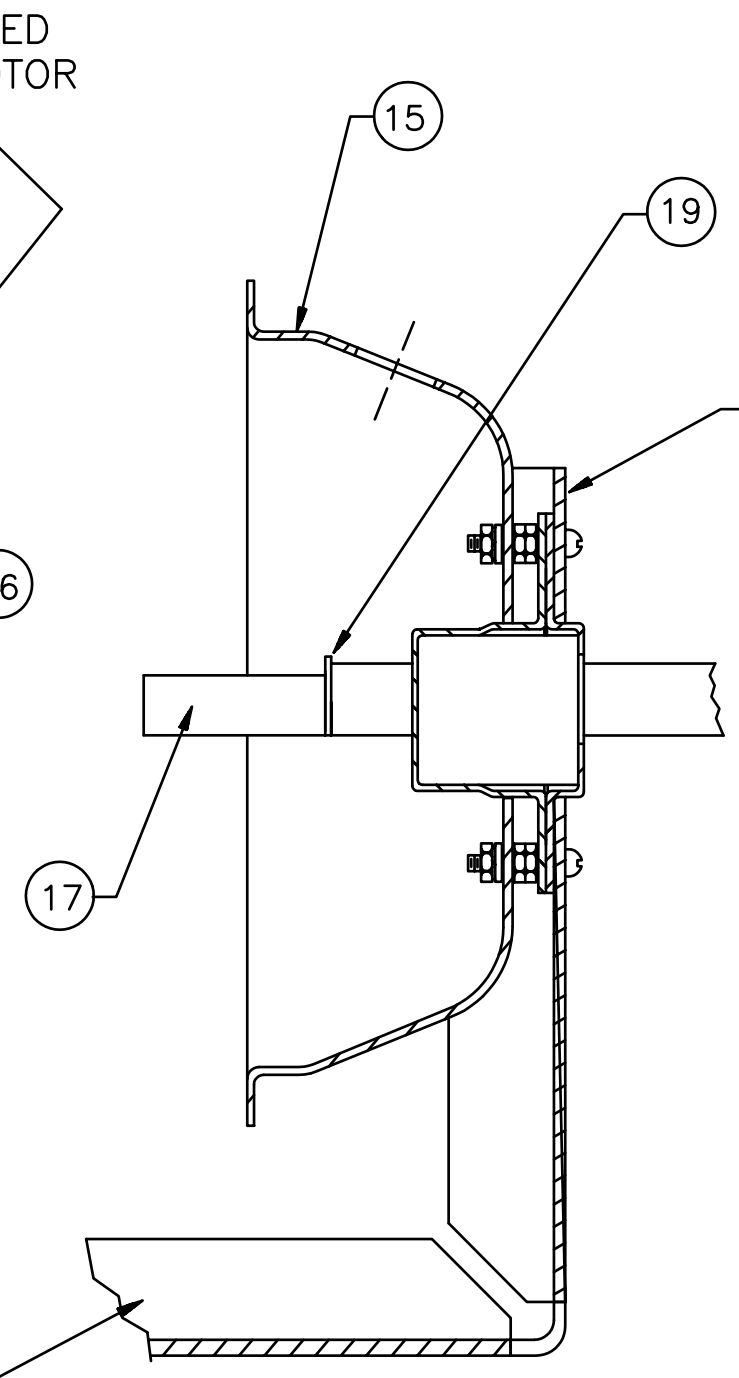

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Litho in U.S.A.

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	

V-BELT TENSION ADJUSTMENTS FOR 48", 52", 60" AND 72" WASHER-EXTRACTORS

This instruction is to be used for adjusting the belt tension on the following machine models:

48032BHE	48032BTG	48032BTH	48036QHE	48036QTG	48036QTH		
52038WE1	52038WTF	52038WTB	52038WTG	52038WTH			
60036WE2	60036WE3	60036SG2	60036SG3	60044WE2	60044WE3	60044SG2	60044SG3
72044SG2	72044SG3	72044WE2	72044WE3	72044WTB	72044WTG	72044WTH	

A belt tension testing device (Milnor® part number 30T001) and a straight edge are required when tensioning unbanded belts.

Tension Settings—Unbanded Belts

Set the o-rings on the tension testing device (see FIGURE 1) as follows:

1. Move the upper o-ring to the topmost position, resting against the bottom edge of the cap.
2. Find the proper belt deflection setting (by machine model and belt function) in the appropriate table below.
3. Move the lower o-ring on the tension tester to this deflection setting on the inches scale.

NOTE 1: The tension testing device is marked on one side in inches and pounds and on the other side in centimeters and kilograms. All values in the tables are in inches (in.) and pounds (lbs.).

NOTE 2: The instruction sheet provided with the tension testing device should not be used. Use only the instructions provided herein.

NOTE 3: The reference (ref.) code shown in the tables are for factory use only.

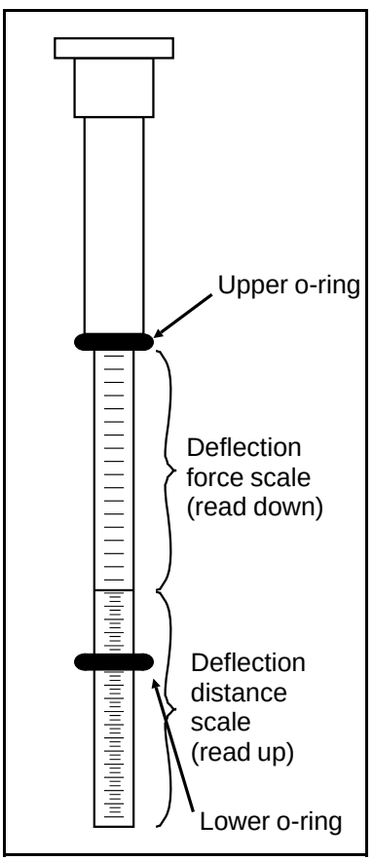

FIGURE 1 (MSSMA405AE)
Tension Settings

Belt Tension Measurements

Unbanded Belts

1. Place a straight edge along the top edge of the belt to be tested so that it spans both pulleys. Place the tension tester in the center of the belt and press down on the cap until the lower o-ring is in line with the straight edge, as shown.
2. Read the setting of the upper o-ring on the lbs scale of the tension tester.
3. Compare this value with the acceptable range in the appropriate table. If the belt is brand new (has never been run), use the range in the Initial Tension column. If the belt is not brand new, locate the acceptable range in the Final Tension column.
4. If the reading on the tension tester is *less* than the range shown in the table, the belt is *too loose* and must be tightened. If the reading is *greater* than the range shown in the table, the belt is *too tight* and must be loosened. Adjust the belt until the reading falls within the acceptable range in the table.

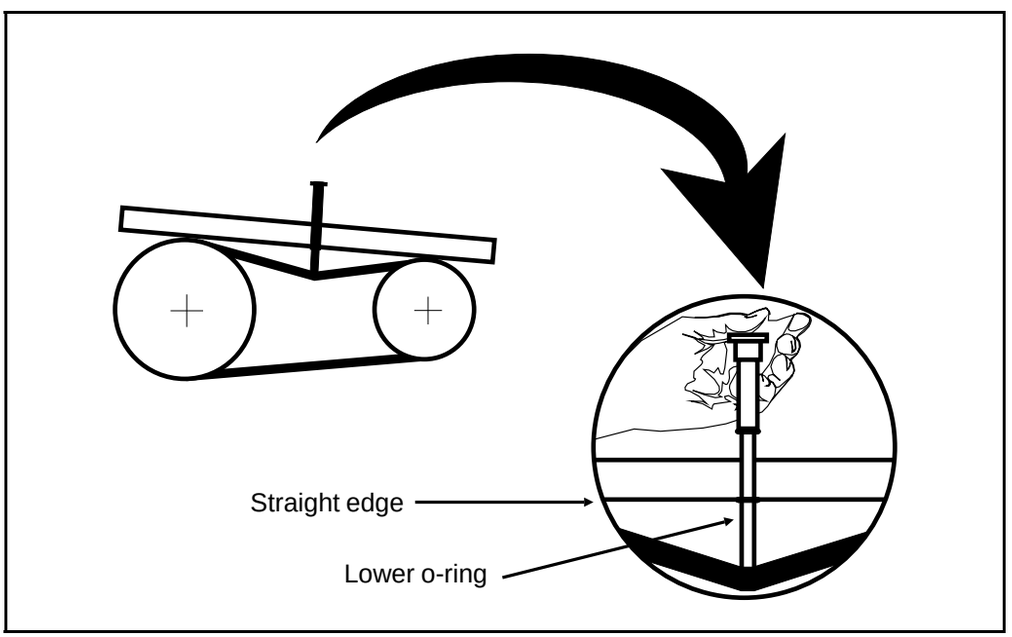

FIGURE 2 (MSSMA405AE)
Measuring Belt Tension

Tensioning Banded Belts

48032BHE, BTG, BTH

	Belt Deflect. (inches)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
WASH/ 2 SPEED WASH	9/32	6.6 - 9.2	KP3	5.1 - 7.1	KN
DRAIN	5/32	5.7 - 7.6	JP3	4.4 - 5.9	JN
MAIN 50C	35/64	10.5 - 14.3	NP3	8.1 - 11.0	NN
MAIN 60C	17/32				
LOW SPEED EXTRACT	13/64	6.6 - 9.2	KP3	5.1 - 7.1	KN

48036QHE, QTG, QT

Belt Deflect (in.)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
5/16	5.7 - 7.6	JP3	4.4 - 5.9	JN
5/32	6.6 - 9.2	KP3	5.1 - 7.1	KN
17/32	10.5 - 14.3	NP3	8.1 - 11.0	NN
17/32				
3/16	9.62 - 13.0	MP3	7.4 - 10.0	MN

52038WE1, WTF, WTB, WTG, WTH

	Belt Deflect. (inches)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
WASH/ 2 SPEED WASH	25/64	10.5 - 14.3	NP3	8.1 - 11.0	NN
DRAIN	5/32	10.5 - 14.3	NP3	8.1 - 11.0	NN
E1	1/4	6.6 - 9.2	KP3	5.1 - 7.1	KN
E2	1/2	6.6 - 9.2	KP3	5.1 - 7.1	KN
MAIN 50C	11/16	18.2 - 26.0	SP3	14.0 - 20.0	SN
MAIN 60C	23/32	16.9 - 20.8	RP3	13.0 -16.0	RN

60036 + 60044WE2 + WE3

Belt Deflect (in.)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
3/16	5.7 - 7.6	JP3	4.4 - 5.9	JN
13/32	6.6 - 9.2	KP3	5.1 - 7.1	KN
17/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
11/32	6.6 - 9.2	KP3	5.1 - 7.1	KN
43/64	16.9 - 20.8	RP3	13.0 - 16.0	RN
45/64				

48032BHE, BTG, BTH

	Belt Deflect. (inches)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
WASH/ 2 SPEED WASH	1/4	5.7 - 7.6	JP3	4.4 - 5.9	JN
DRAIN	3/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
E-1	9/32	6.6 - 9.2	KP3	5.1 - 7.1	KN
E-2	39/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
UPPER JACK TO LOWER JACK LOWER JACK TO UPPER JACK	BANDED BELTS NEED SPECIAL INSTRUCTIONS				

48036QHE, QTG, QT

	Belt Deflect (in.)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
WASH/ 2 SPEED WASH	17/64	5.7 - 7.6	JP3	4.4 - 5.9	JN
DRAIN	33/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
E-1	17/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
E-2	5/8	6.6 - 9.2	KP3	5.1 - 7.1	KN
UPPER JACK TO LOWER JACK LOWER JACK TO UPPER JACK	BANDED BELTS NEED SPECIAL INSTRUCTIONS				

52038WE1, WTF, WTB, WTG, WTH

		Belt Deflect. (inches)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
WASH/ 2 SPEED WASH		15/64	5.7 - 7.6	JP3	4.4 - 5.9	JN
DRAIN		13/32	6.6 - 9.2	KP3	5.1 - 7.1	KN
E1		17/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
E2		5/16	6.6 - 9.2	KP3	5.1 - 7.1	KN
MAIN	50C	45/64	16.9 - 20.8	RP3	13.0 -16.0	RN
	60C	11/16	16.9 - 20.8	RP3	13.0 -16.0	RN

60036 + 60044WE2 + WE3

		Belt Deflect (in.)	Initial Tension (lbs.)	(ref.)	Initial Tension (lbs.)	(ref.)
WASH/ 2 SPEED WASH		15/64	5.7 - 7.6	JP3	4.4 - 5.9	JN
DRAIN		25/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
E1		17/64	6.6 - 9.2	KP3	5.1 - 7.1	KN
E2		5/16	6.6 - 9.2	KP3	5.1 - 7.1	KN
MAIN	50C	3/4	16.9 - 20.8	RP3	13.0 - 16.0	RN
	60C	23/32	16.9 - 20.8	RP3	13.0 - 16.0	RN

Section 4

Bearing Assemblies

Main Bearing with Air Inject

52038WP1/WTL/WTN, 64046E6N/J6N, 72046E5N/J5N, 72058J5N

BMP970011/99244V
(Sheet 1 of 3)

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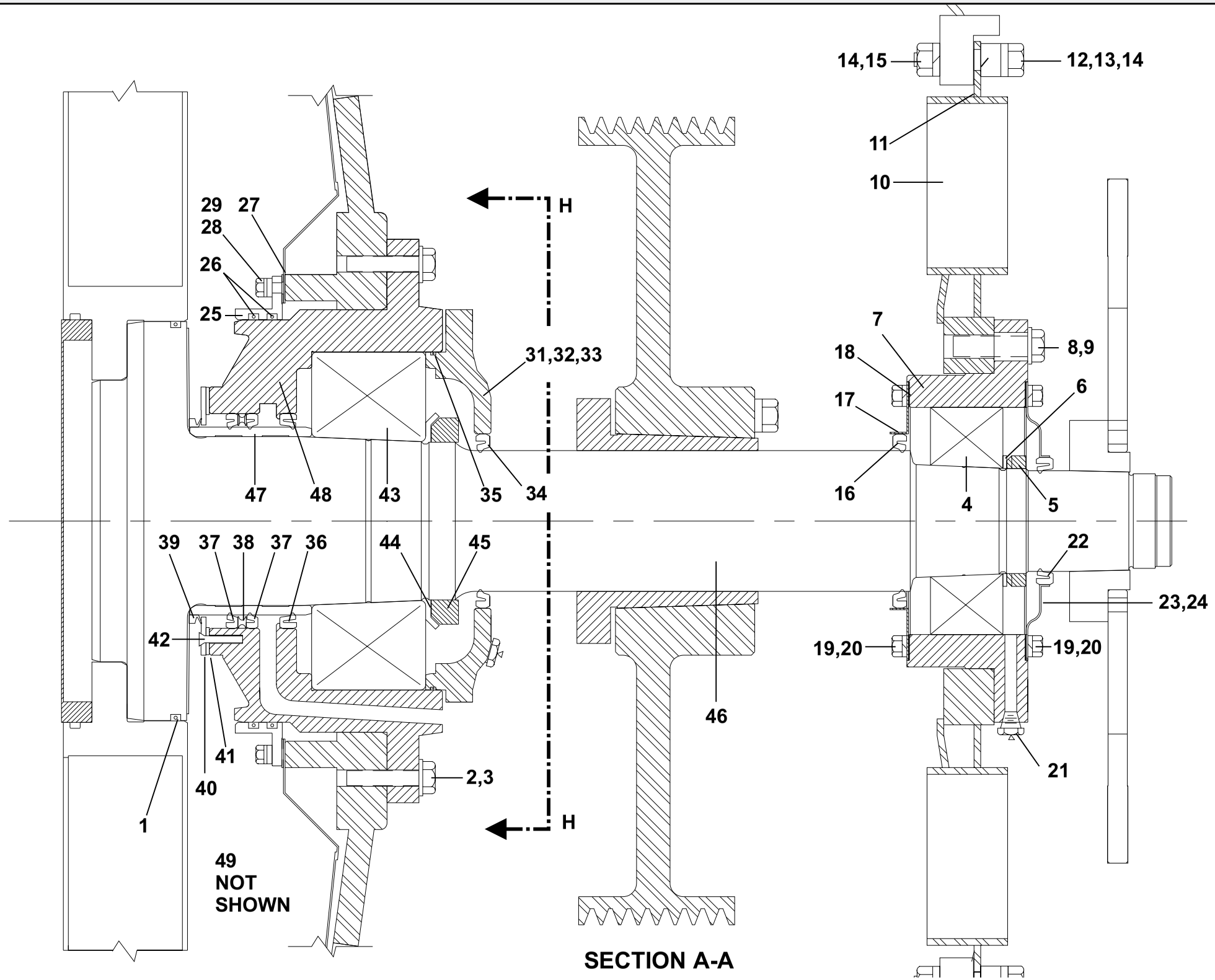

SECTION A-A

Main Bearing with Air Inject

52038WP1/WTL/WTN, 64046E6N/J6N, 72046E5N/J5N, 72058J5N

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BMP970011/99244V (2 of 3)
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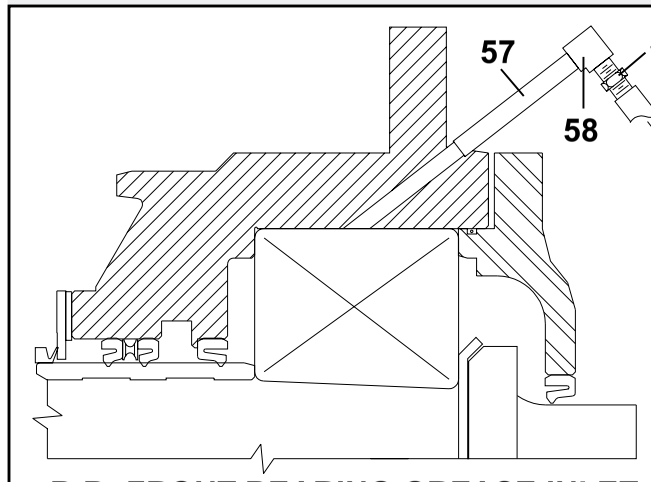
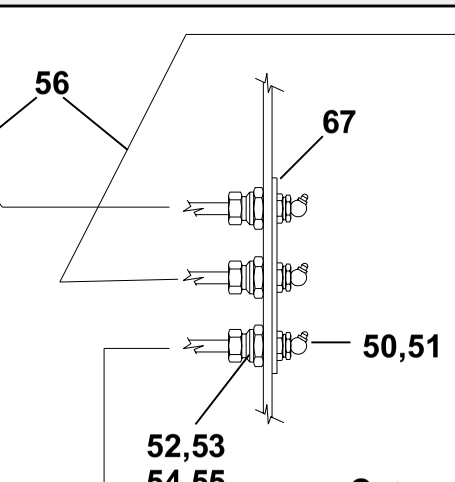
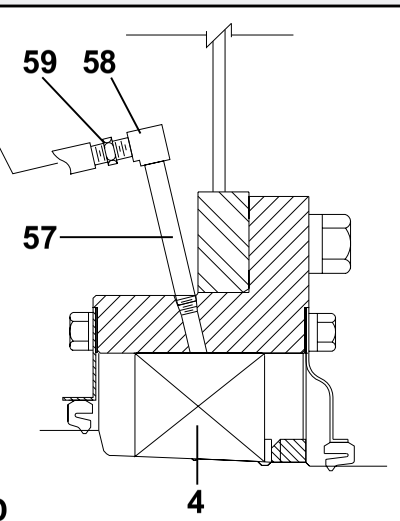
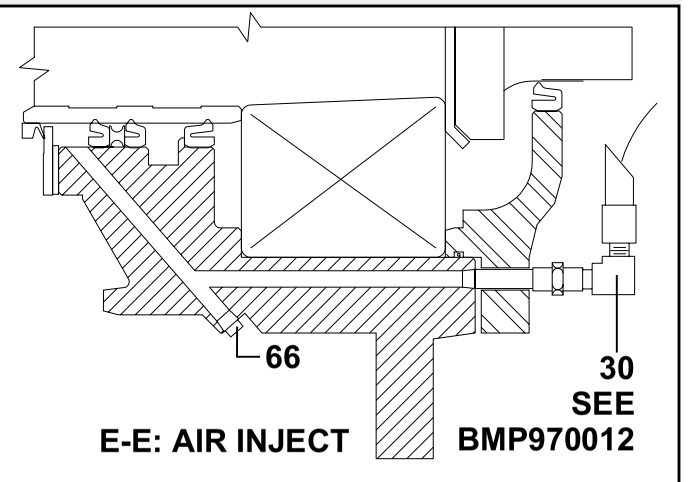


B-B: FRONT BEARING GREASE INLET



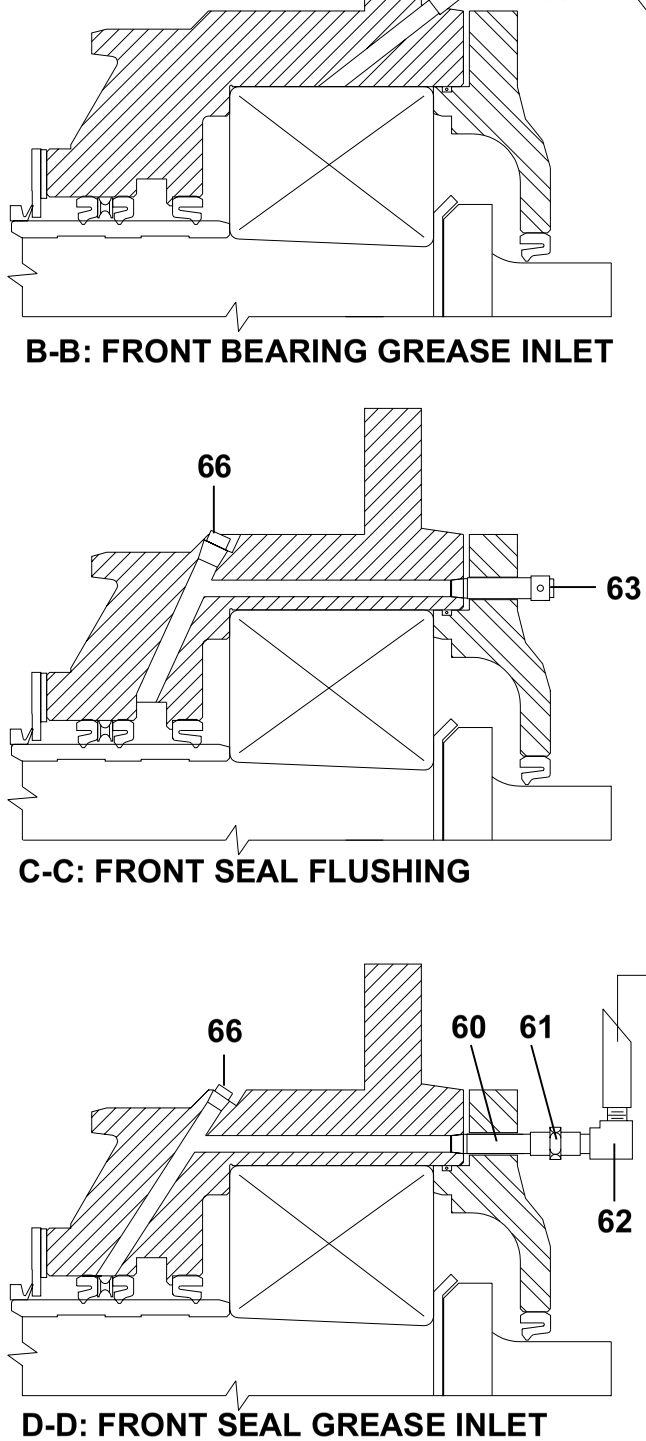


REAR BEARING GREASE INLET

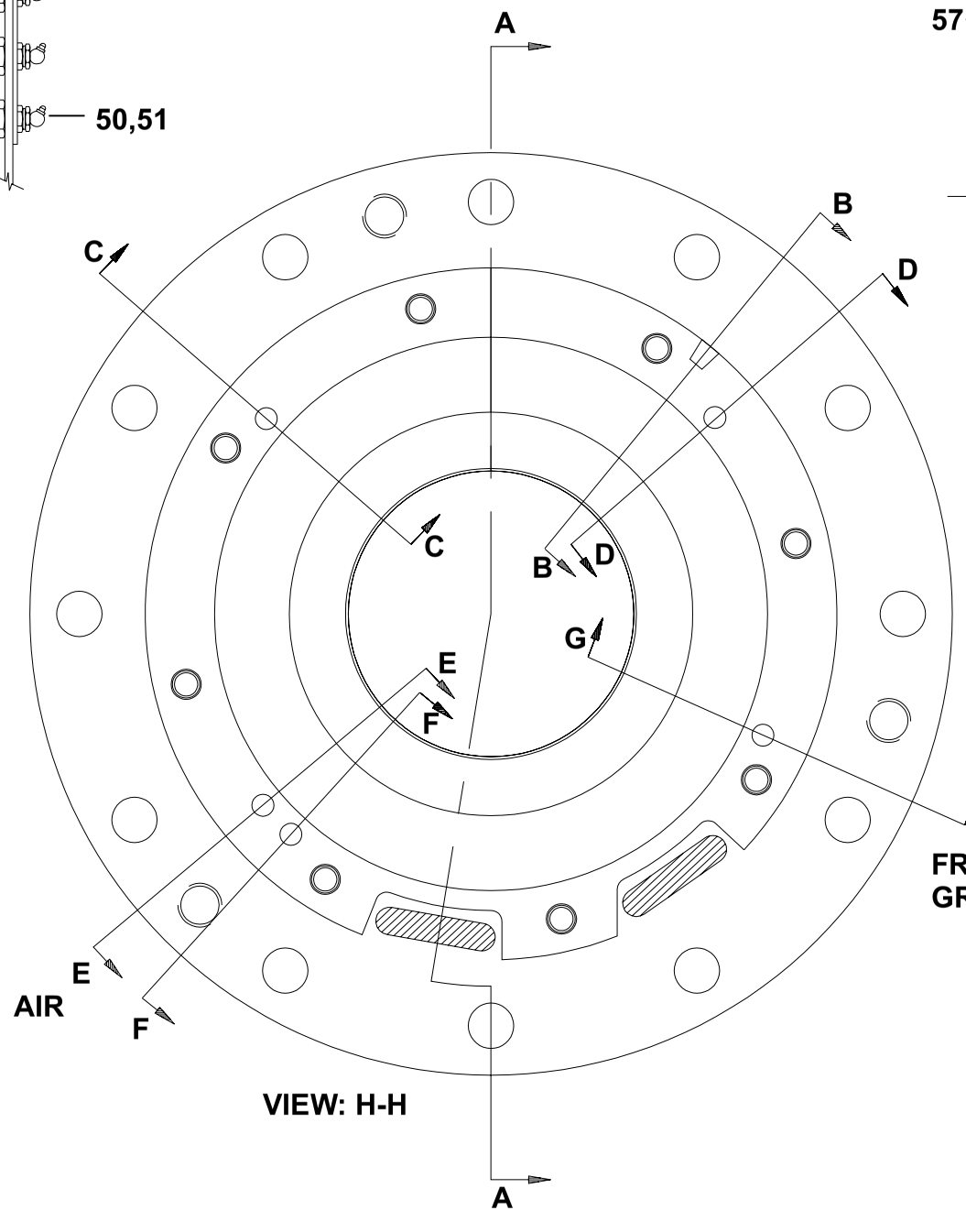


E-E: AIR INJECT

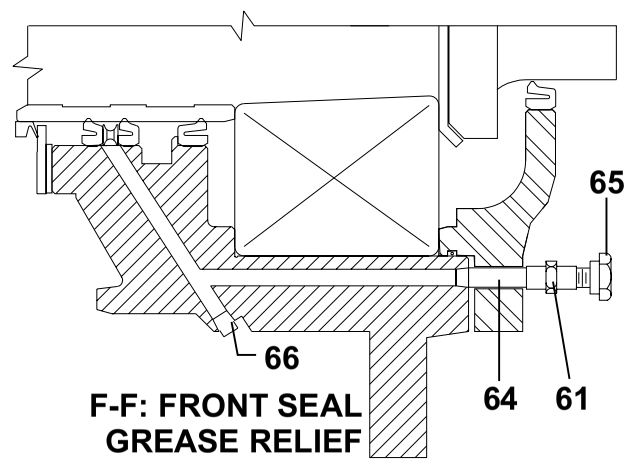
C-C: FRONT SEAL FLUSHING



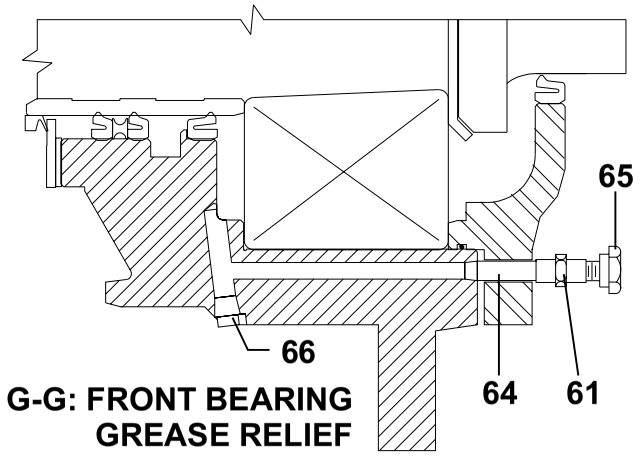
D-D: FRONT SEAL GREASE INLET



VIEW: H-H



F-F: FRONT SEAL GREASE RELIEF



G-G: FRONT BEARING GREASE RELIEF

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Parts List—Main Bearing with Air Inject

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	GBM52002FE	91431D*MAIN BEARING ASSY(BUNA)5238W	52038
	B	GBM52002FV	91431#*MAIN BEARING ASSY(VITON)5238	52038
	C	GBM58003FE	97000Z INST=MAINBRG 64+72 STD W/AIR	64046,72046,72058
	D	GBM58003FV	97000Z INST=MAINBRG 64+72 VIT W/AIR	64046,72046,72058
	E	GBM58003DV	97000Z INST=MAINBRG 64+72 DVI W/AIR	64046,72046,72058
	F	ABN52002FE	96447Z*FRNT BRG ASSY W/VSEAL 5238WE	A
	G	ABN52002FV	96447Z*FRNT BRG ASSY W/VITON 5238WE	B
	H	ABN58003FE	97253Z ASSY=FRNTBRG 64+72 STD W/AIR	C
	J	ABN58003FV	97253Z ASSY=FRNTBRG 64+72 VIT W/AIR	D
	K	ABN58003DV	97253Z ASSY=FRNTBRG 64+72 DVI W/AIR	E
	L	ABM52002FE	96031#*FRNT BRG ASSY W/VSEAL 5238WE	F
	M	ABM52002FV	96031D*FRNT BRG ASSY W/VITON 5238WE	G
	N	ABM58003FE	97253Z*PRTS=FRNTBRG 64+72 STD W/AIR	H
	P	ABM58003FV	97253Z*PRTS=FRNTBRG 64+72 VIT W/AIR	J
	Q	ABM58003DV	97253Z*PRTS=FRNTBRG 64+72 DVI W/AIR	K
			COMPONENTS	
A-E	1	60C192V	03Z 0RING 15IDX1/4CS VITON #459	
A-E	2	15K236C	09Z HXCPSCR-1-8X2.75 GR8/ZC	
A-E	3	15U393	03ZFLTWASH 1"ZNC DICR	
A-E	4	56S22320T	05Z SPHEROLBRG KOYO#22320RKW33C3FY	
A-E	5	56AHN20	AN20 BEARING LOCKNUT	
A-E	6	56AHW20	W20 BEARING LOCKWASHER	
A-E	7	X3 25108A	92691D REAR BRG HOUSING=FLOATING	
A-E	8	15K236C	09Z HXCPSCR-1-8X2.75 GR8/ZC	
A-E	9	15U393	03ZFLTWASH 1"ZNC DICR	
A,B	10	W5 20056	82061C*PLATE=REAR BNG MOUNT WELD	
C,D,E	10	W3 25228	93016C* PLATE=REAR BRG MOUNT WELD	
A-E	11	17E010	DOWEL PIN 1/2"X 1"(.0002) STD FIN	
A,B	12	15K235AB	HXCAPSCR 3/4-10UNC2AX3"GR8 ZINC PLT	
C,D,E	12	15K235A	03Z HXCPSC 3/4-10X2.5 GR 8	
A-E	13	15U319A	93467B F-WASH=.753IDX13/8ODX1/2"THK	
A-E	14	15U340	LOCKWASH MEDIUM 3/4 ZINCPL	
A-E	15	15G240A	HEXNUT 3/4-10UNC2B SAE GR8 ZINC/CAD	
A-E	16	24S127	06ZSEAL5.25X6.50X.625 JM#7112LUP	
A-E	17	03 25131	73037A SEALHOLDER=REAR BRNG	
A-E	18	03 25137	92627A GASKET=REAR BRG SEAL HOLDER	
A,B	19	15K100	HEXCAPSCR 3/8-16X1+1/4 SS18-8	
C,D,E	19	15K086E	BUTSOKCAPSCR 3/8-16X3/4SS NYPT	
A,B	20	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
C,D,E	20	15U250	SEALWASHER 3/8" S/S PARKER #600-430	
A-E	21	54M029	RELIEFFIT 1/8STR ALEMITE 47200	
A-E	22	24S112	03Z SEAL 3.75X4.75X.500 CS/BUNA	
A-E	23	03 25134	73067C SEALHOLDER REAR BRG XTENSION	
A-E	24	03 25137	92627A GASKET=REAR BRG SEAL HOLDER	
A-E	25	Y3 25233	93102# MACH RING=BEARHSG STATICSEAL	
A-E	26	60C192	ORING 15IDX1/4CS BUNA70 #459	
A-E	27	03 25237	92627B GASKET=SEAL MTG RING	
A-E	28	15K100	HEXCAPSCR 3/8-16X1+1/4 SS18-8	
A-E	29	15U250	SEALWASHER 3/8" S/S PARKER #600-430	

Parts List, cont.—Main Bearing with Air Inject

Used In	Item	Part Number	Description	Comments
A-E	30	AIR58003	97000Z AIR INJECT ASSY=BNG HOUSE	
L-Q	31	X3 25107S	98436CMACH=FRBRGCAP=RR LEAKOFF/AIR	
L-Q	32	15K225	05Z HXCPSCR 5/8-11X2+1/2	
L-Q	33	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
L-Q	34	24S127	06ZSEAL5.25X6.50X.625 JM#7112LUP	
L,N,P,Q	35	60C186	ORING 12.0IDX1/8CS BUNA70 #278	
M	35	60C186V	O-RING 12.0IDX1/8 VITON-N 70 DURO	
L,N	36	24S130	04Z SEAL 7X8X.625 JM#6862 NITRILE	
M,P,Q	36	24S130V	05ZSEAL7.0X8.0X.625 JM#19636LUPV	
L,M.N.P	37	24S130T	SEAL7.0X8.0X.437JM#3892LUPNTRL	
Q	37	24S130TV	SEAL7.0X8.0X.437JM#3892LUPVIT	
L,M,N,P,Q	38	24S130LR	99066CLANTERN RING=7X8X.313	
L,M,N	39	24S131FN	02Z SEAL 6.89-7.28X6.37X.31NTV180A	
M,P	39	24S131FV	03ZSEAL 6.89-7.29X6.38X.31 V180A	
L-Q	40	Y3 25106	97346NV-SEAL COVER 52/72 WE/DYE	
L-Q	41	03 25106G	92627CV-SEALCOVER GASKET (N-8051)	
L-Q	42	15K040A	BUTSOKLOKCAPSCR 1/4-20X3/4 188	
L-Q	43	56S22330T	SPHEROLBRG 22330LBK-C3-W33-C40	
L-Q	44	56AHW30	W30 BEARING LOCKWASHER	
L-Q	45	56AHN30	AN30 BEARING LOCKNUT	
F,G	46	X3 25010A	92367D MAINSHAFT 6.3MAXDIA=72WE1	
H,J,K	46	X3 65057A	97106E MAIN SHAFT-FORGED 7246/58	
L-Q	47	X5 20051A	96256C SLEEVE=SEAL	
F,G,H,J	48	X3 25106S	99056DMACH FRNTBRGH=RR LEAKOFF/AIR	
K	48	Y3 25106T	97291D MACH=DYE BHS W/AIR 64/72	
L,M,N,Q	49	20C008C	112697 THDLK-RMVBL #242-41	
P	49	20C007G	071497 THDLK-RMVBL #242-31	
L-Q	50	54M020	GREASEFIT 30DEG 1611-B ALEMITE	
L-Q	51	5SB0E0CBEO	NPTHEXBUSH 1/4X1/8 BRASS 125#	
L-Q	52	53A007B	BODYFEMCON.25X.25COMP.#B66A-4B	
L-Q	53	53A059A	NUT 1/4"BR.HOLYOKE AND #61A-4	
L-Q	54	53A500	1/4" SLEEVE-DELRIN	
L-Q	55	53A501	TUBEINSERT .170"OD	
L-Q	56	60E004TC	02ZTUBING NYL(NAT)1/4"ODX.17ID *	
L-Q	57	5N0C03AG42	NPT NIP 1/8X3 TBE GALSTL SK40	
L-Q	58	5SL0CBEA	NPTELB 90DEG 1/8 BRASS 125#	
L-Q	59	53A005B	BODYMALCON1/4X1/8COMP #B68A-4A	
L-Q	60	5N0C01KG42	NPT NIP 1/8X1.5 TBE GALSTL S40	
L-Q	61	5SCC0CBE	NPT COUP 1/8 BRASS 125# 103A-A	
L-Q	62	53A031B	BODY-EL90MALE.25X1/8 #269C-42B	
L-Q	63	5SP0CBESSV	NPT PLUG 1/8 SQSLDVENT BRASS	
L-Q	64	5N0C01KG42	NPT NIP 1/8X1.5 TBE GALSTL S40	
L-Q	65	54M029	RELIEFFIT 1/8STR ALEMITE 47200	
L-Q	66	5SP0CBEHS	NPT PLUG 1/8 HXCTRSNK BRASS	
L-Q	67	01 10025X	97263B NPLT:BEARING+SEAL LUB - ISO	

Air Inject Assembly

52038WP1/WTL/WTN 64046E6N,J6N 72046E5N/J5N, 72058J5N

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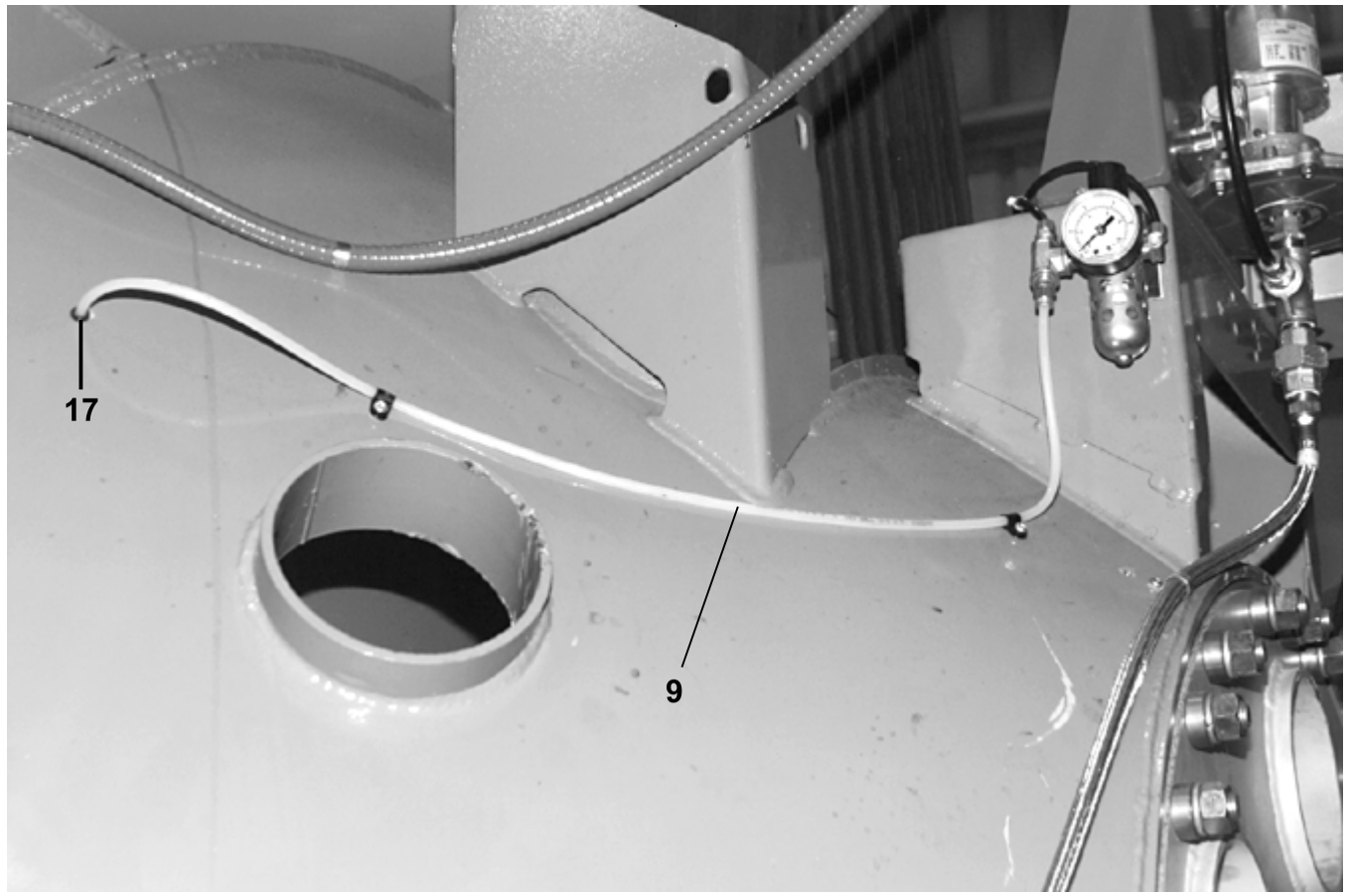
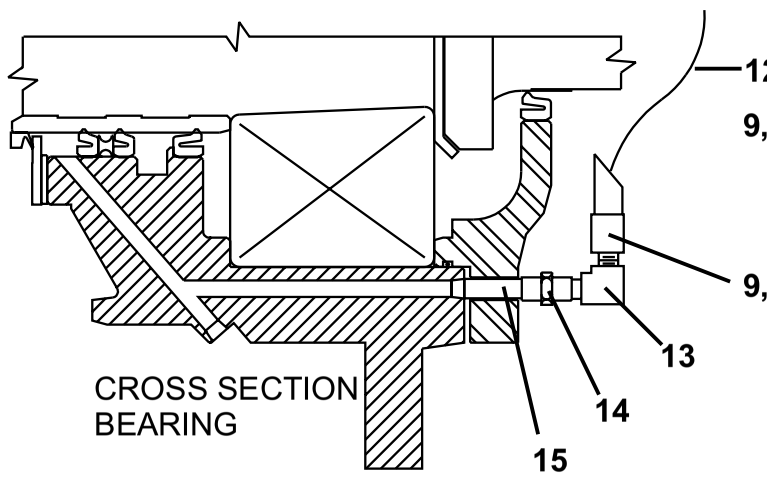
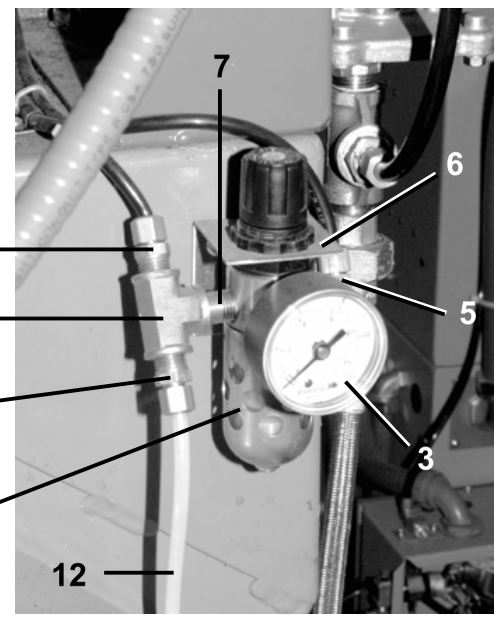
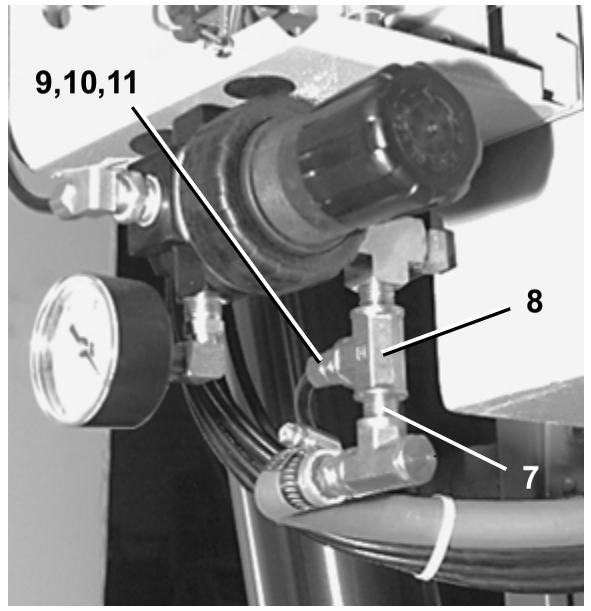


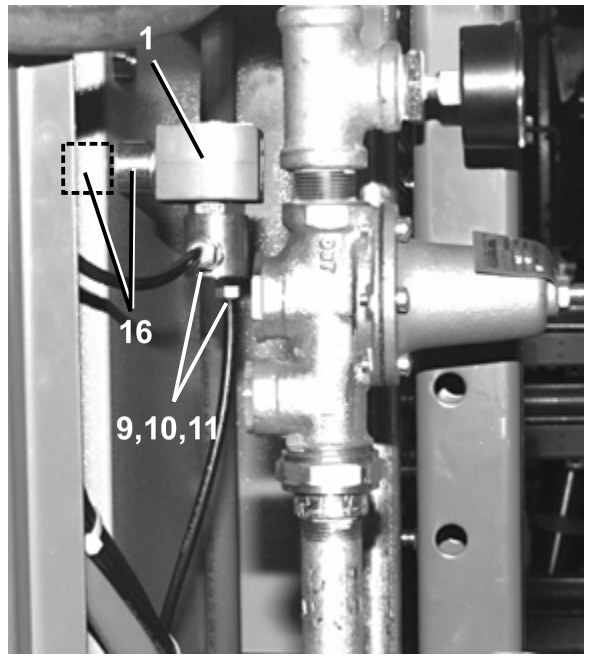
(64046E6N SHOWN)



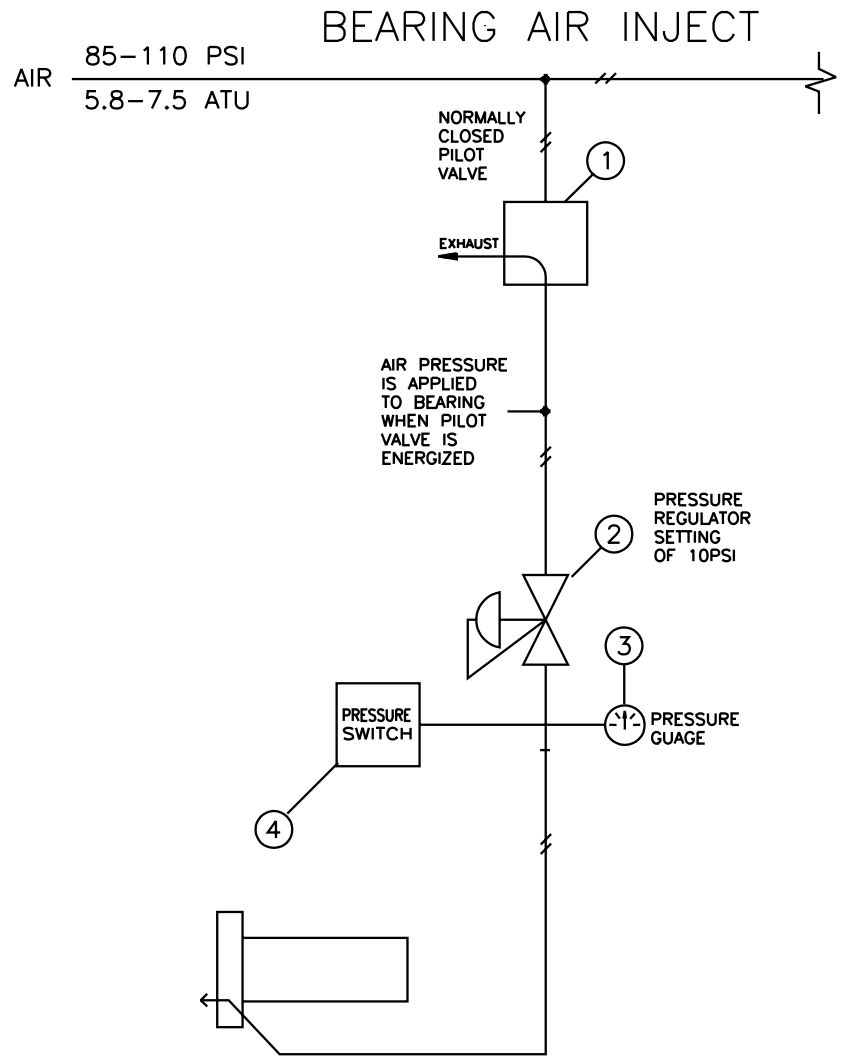




Main Air



Pilot Valve



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Parts List—Air Inject 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	AIR58003	97000Z AIR INJECT ASSY=BNG HOUSE	
			----------COMPONENTS----------	
all	1	96TBC2BA37	04Z 1/4" N/C 2WAY 120V50/60C VALVE	
all	2	96J019G	1/4"FILTERREG 0-60PSI	
all	3	30N095	03ZPRESSGAUGE 1/8"BACKCN.0-15PSI	
all	4	09N082B05	00Z PRESSW NASON CLOSE @ 5 LB	
all	5	53A031XB	BODY-EL90MALE.25X25 #269C-4-4B	
all	6	03 01666	97141B FILTER REG SUPPORT BKT	
all	7	5N0ECLSBE2	NPT NIP 1/4XCLS TBE BRASS 125#	
all	8	51V015	03Z TEE PIPE 1/4"FGDBRASS101-T7-444	
all	9	53A059A	NUT 1/4"BR.HOLYOKE AND #61A-4	
all	10	53A500	1/4" SLEEVE-DELRIN	
all	11	53A501	TUBEINSERT .170"OD	
all	12	60E004TC	02ZTUBING NYL(NAT)1/4"ODX.17ID *	
all	13	53A031B	BODY-EL90MALE.25X1/8 #269C-42B	
all	14	5SCC0CBE	NPT COUP 1/8 BRASS 125# 103A-A	
all	15	5N0C01KG42	NPT NIP 1/8X1.5 TBE GALSTL S40	
all	16	15K005	04Z SKCPSCR 6-32X3/8 SELFOK	
all	17	12P1AGSB	SNAPBUSH 3/8"MH X 1/4" T=1/8	

Section 5

Frame, Pivots and Suspension

SUSPENSION ADJUSTMENTS FOR OPEN POCKET, HYDRO-CUSHION® MACHINES

The suspension system on Milnor® Hydro-cushion® machines is adjusted and thoroughly tested at the factory. It should not require subsequent adjustment unless the machine is distorted during shipment or installation or unless some component of the system, such as a Hydro-cushion® cylinder is replaced.

There are two primary objectives when adjusting the suspension system on any Hydro-cushion® machine model:

1. To position the shell in the proper location within the frame (hanging dimensions) to maximize freedom of movement of the shell and to insure proper draining, and
2. To adjust the length of up and down travel at each of the push-down locations (push-down travel) so the shell will not be distorted (racked) when pushed down.

All Milnor® Hydro-cushion® machines contain these suspension system components (see FIGURE 1):

1. Hydro-cushion® cylinders—which suspend the shell and cylinder within the frame and provide vibration damping during extraction.
2. Pneumatic push-down devices (air bags)—which when inflated, force the shell downward where it is held against rigid pads during loading, unloading, washing, and draining.
3. Metal or rubber pads—some rigidly fixed to the shell and some rigidly fixed to the frame, which come in contact when the shell is pushed down.

The actual configuration of these components varies from model to model.

How Shell Adjustments are Made

Regardless of machine model, repositioning of the shell is always accomplished by adjusting the nuts at the top of the upper Hydro-cushion® shafts. To move the shell up or down at the location of any Hydro-cushion®, see FIGURE 2 and proceed as follows:

⚠ CAUTION ⚠

These procedures should be accomplished with power to the machine locked *off.*

1. Straighten the tongues on the keyed lock washer using pliers, screw driver, etc.
2. Loosen the lock nut (upper hex nut) and move it all the way up to the top of the shaft, but do not remove it.
3. Use the adjusting nut (lower hex nut) to “crank” the shaft up or down as required.
4. Once final adjustment is made, while holding the adjusting nut to prevent it from turning, retighten the lock nut against the adjusting nut (with the lock washer between).
5. Rebend the tongues on the lockwasher as before, to prevent movement of the nuts.

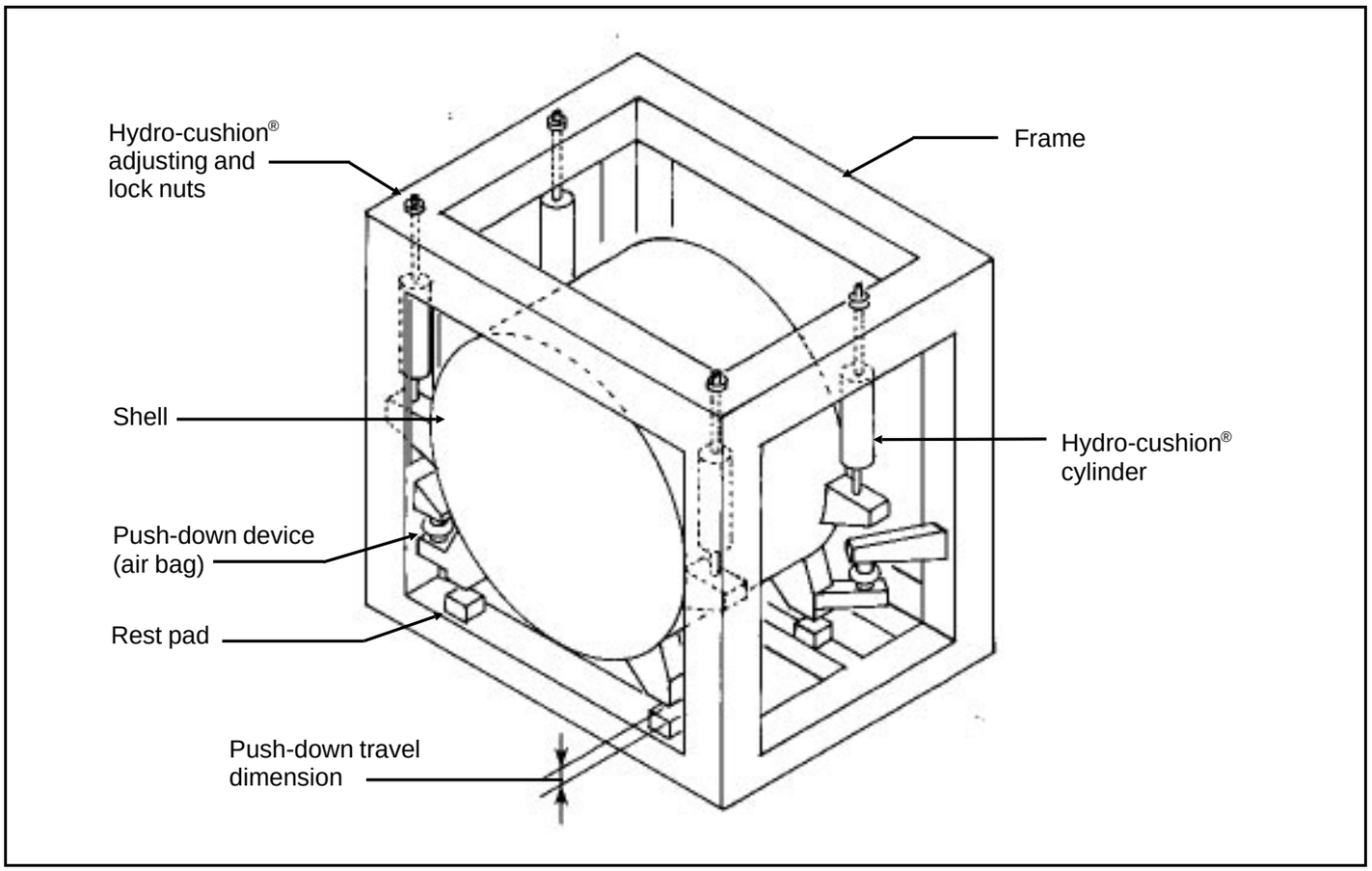


FIGURE 1 (MSSM0208AE)
Hydro-cushion® Suspension System Components
(Does not depict a specific machine)

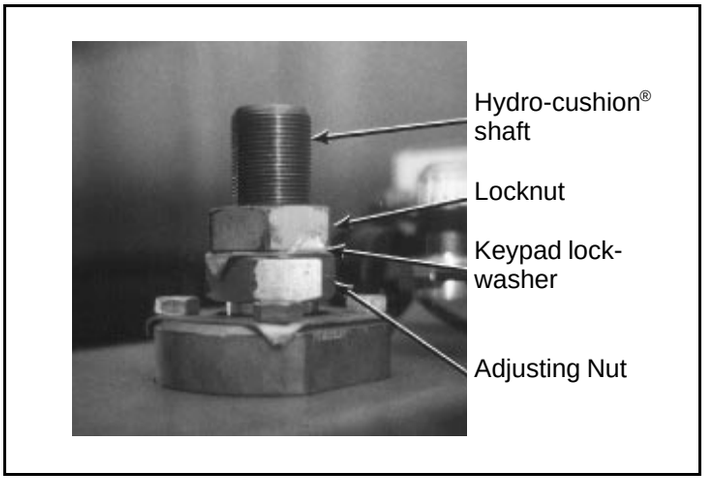
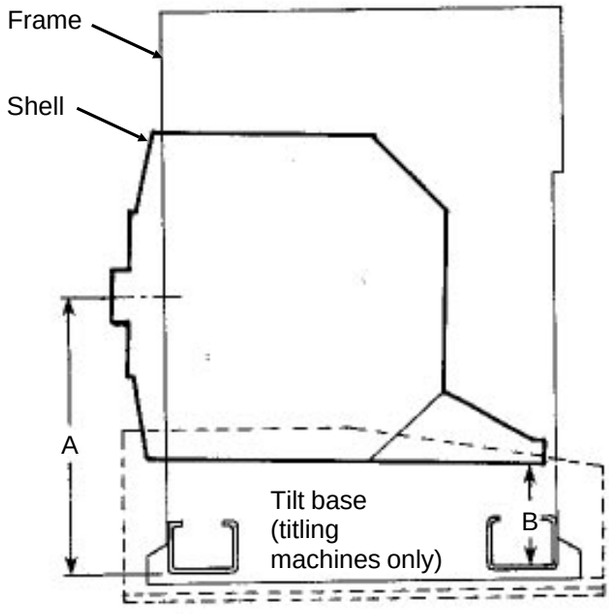


FIGURE 2 (MSSM0208AE)
Hydro-cushion® Upper Shaft
and Adjusting Nuts

Adjustments to 42" and 48" Machines

Shell Hanging Dimensions and Adjustment Procedures—These machine models have three Hydro-cushion® cylinders: one on each front corner and one centered in the rear. Locate the shell hanging dimensions for your machine in FIGURE 3 and adjust your machine accordingly. The front dimension from the bottom edge of the lower frame cross brace vertically to the center of the door hinge should be repeated on the left and right sides of the door hinge to assure that the shell is horizontal, left to right.



MACHINE MODEL	DIMENSION A	DIMENSION B
42026QHE	41 3/8" (1051)	10" (254)
42026QTG/QTH	41 3/8" (1051)	10" (254)
48032BHE	41 1/4" (1048)	10 1/4" (260)
48032BTG/BTH	41 1/4" (1048)	10 1/4" (260)
48036QHE	41 1/4" (1048)	10 1/4" (260)
48036QTG/QTH	41 1/4" (1048)	10 1/4" (260)

FIGURE 3 (MSSM0208AE)
Shell Hanging Dimensions for 42" and 48" Open-Pocket Machines
(Right side view of 42" machine shown)

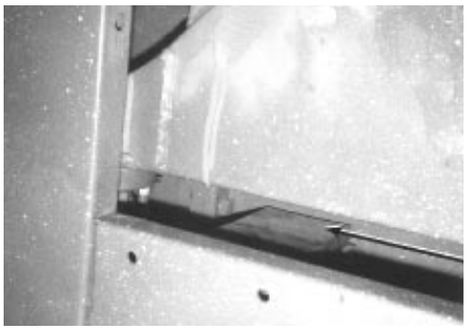
Push-Down Travel Dimensions and Adjustment Procedures—The arrangement of push-down stops on these machines is as shown in FIGURE 4. Each of the two rubber rest pads on the front of the machine may be raised or lowered by adding shims to or removing them from beneath the rubber pads. The rear rest pad may be adjusted by loosening the bolts on the adjustable bracket, adding shims to or removing them from between the adjustable bracket and the lower rear frame cross member, then retightening the bolts. (Extra shims and adhesive for securing them was provided with your machine.) The push-down travel dimension must be as shown for your machine in the table in FIGURE 4.

⚠ CAUTION ⚠

Some of the following procedures require power to the machine. Take the necessary precautions to assure that no-one operates the machine controls while personnel are adjusting the push-down components.

To adjust the push-down travel, proceed as follows:

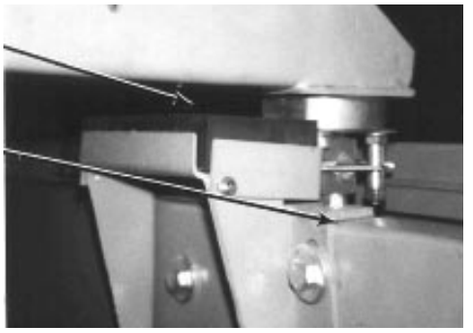
1. With the *Master switch* set to *off* and the shell hanging free, verify that gaps A and B as shown in FIGURE 4 are correct for your machine. If not, adjust the shims as required.
2. Once the proper arrangement of shims is established, secure the shims and rest pads in position with the adhesive provided.



Gap B (rear push-down)

Shim here.

Gap A (front push-down)



FRONT PADS

REAR PADS

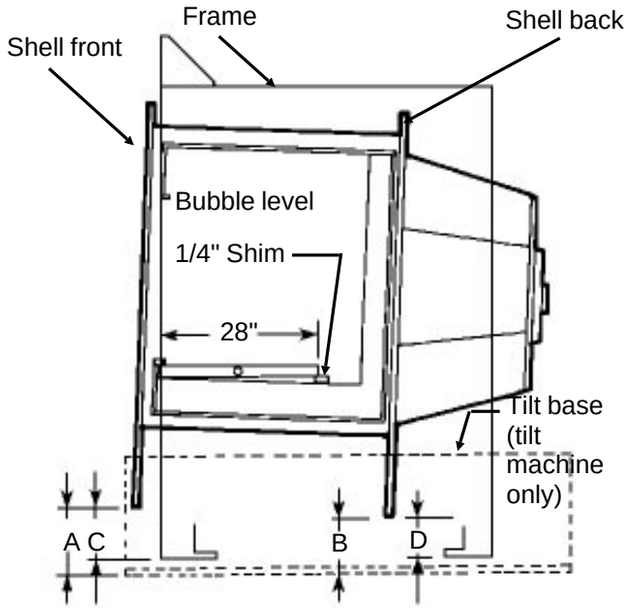
MACHINE MODEL	GAP A	GAP B
42026QHE	1 7/8" (48)	7/8" (22)
42026QTG/QTH	1 7/8" (48)	7/8" (22)
48032BHE	1 5/8" (41)	1 1/8" (29)
48032BTG/BTH	1 5/8" (41)	1 1/8" (29)
48036QHE	1 5/8" (41)	1 1/8" (29)
48036QTG/QTH	1 5/8" (41)	1 1/8" (29)

FIGURE 4 (MSSM0208AE)
Push-down Travel Adjustments for 42" and 48" Open Pocket Machines (42026QWE shown)

Adjustments to 52" and 72" Machines

Shell Hanging Dimensions and Adjustment Procedures—To adjust the shell, see FIGURES 5 and 6 and proceed as follows:

1. Locate the shell hanging dimensions for your machine in the table and illustration in FIGURES 5 and 6 and adjust your machine accordingly. Take measurements on the left and right sides of the shell, to assure that the shell is horizontal, left to right.



MACHINE MODEL	DIMENSIONS			
	A	B	C	D
52038WTG/WTH	6 1/8" (156)	5 7/8" (149)		
52038WTB	6 1/8" (156)	5 7/8" (149)		
52038WE1			4 1/2" (114)	3 1/2" (89)

FIGURE 5 (MSSM0208AE)
Shell Hanging Dimensions for 52" Open-Pocket Machines (Right Side View of 52wtb Shown)

2. Check the slope of the cylinder with a 28" bubble level as shown in FIGURES 5 and 6. Note that with the appropriate size shim under one end of the level as shown, the bubble indicator should read level.

3. If further adjustment is required to achieve the proper slope of the cylinder, make small adjustments at all four corners. For example, if the cylinder slope is too slight, try raising the two front corners by 1/16" (2mm) and lowering the two rear corners by 1/16" (2mm). Always split the difference.

NOTE: Only slight deviations from the dimensions shown should be used to achieve the proper slope of the shell. If large deviations are required, this may indicate that the frame is not properly set. (Check base plate or tilt base as appropriate for level.) If not, this condition should be corrected before attempting to adjust the shell.

Push-Down Travel Dimensions and Adjustment Procedures—These machines have push-down stops on the four corners of the frame. When pushed down, the ring weldments (which move with the shell) must seat firmly onto the plugs which are mounted atop the base pads. The push-down travel dimension must assure

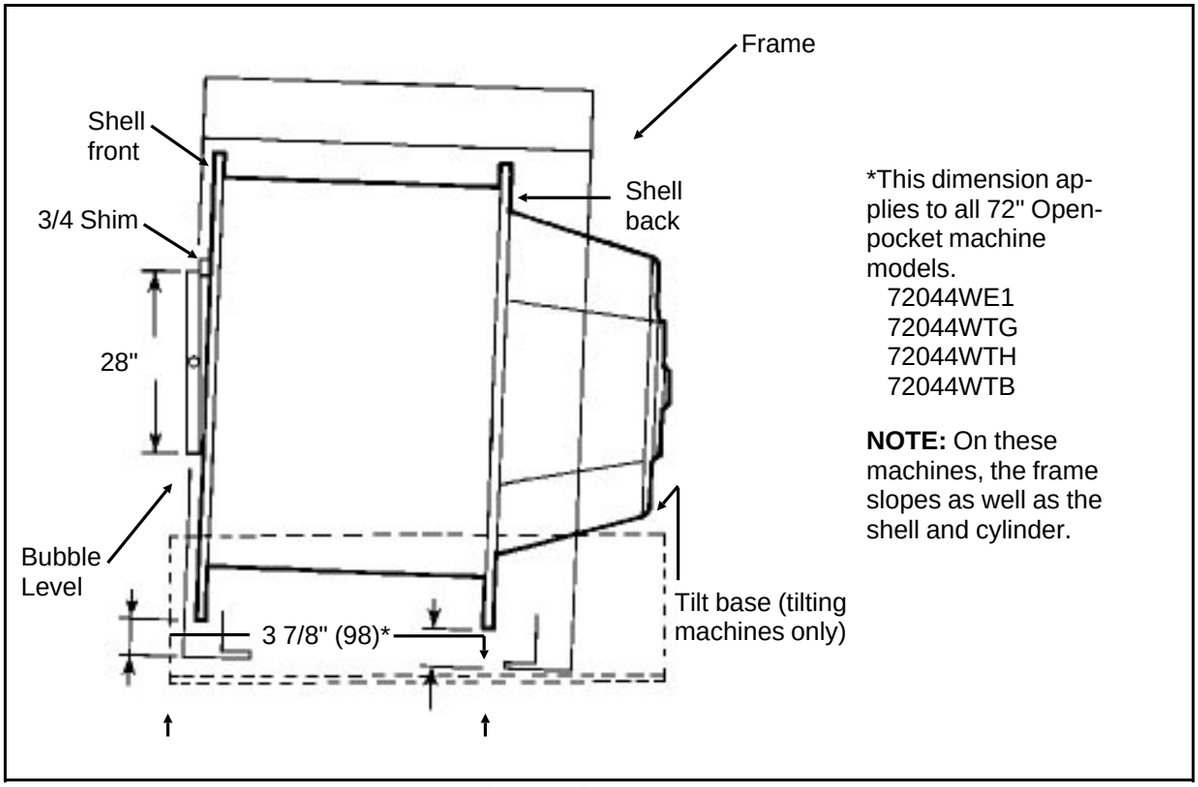


FIGURE 6 (MSSM0208AE)
Shell Hanging Dimensions for 72" Open-Pocket Machines
(Right Side View of 72WTB Shown)

that 1) the ring weldments and plugs are far enough apart when the shell is not pushed down, so as not to interfere with the free movement of the shell, and 2) that all four stops are in solid contact when the shell is pushed down.

⚠ CAUTION ⚠

Some of the following procedures require power to the machine. Take the necessary precautions to assure that no one operates the machine controls while personnel are adjusting the push-down components.

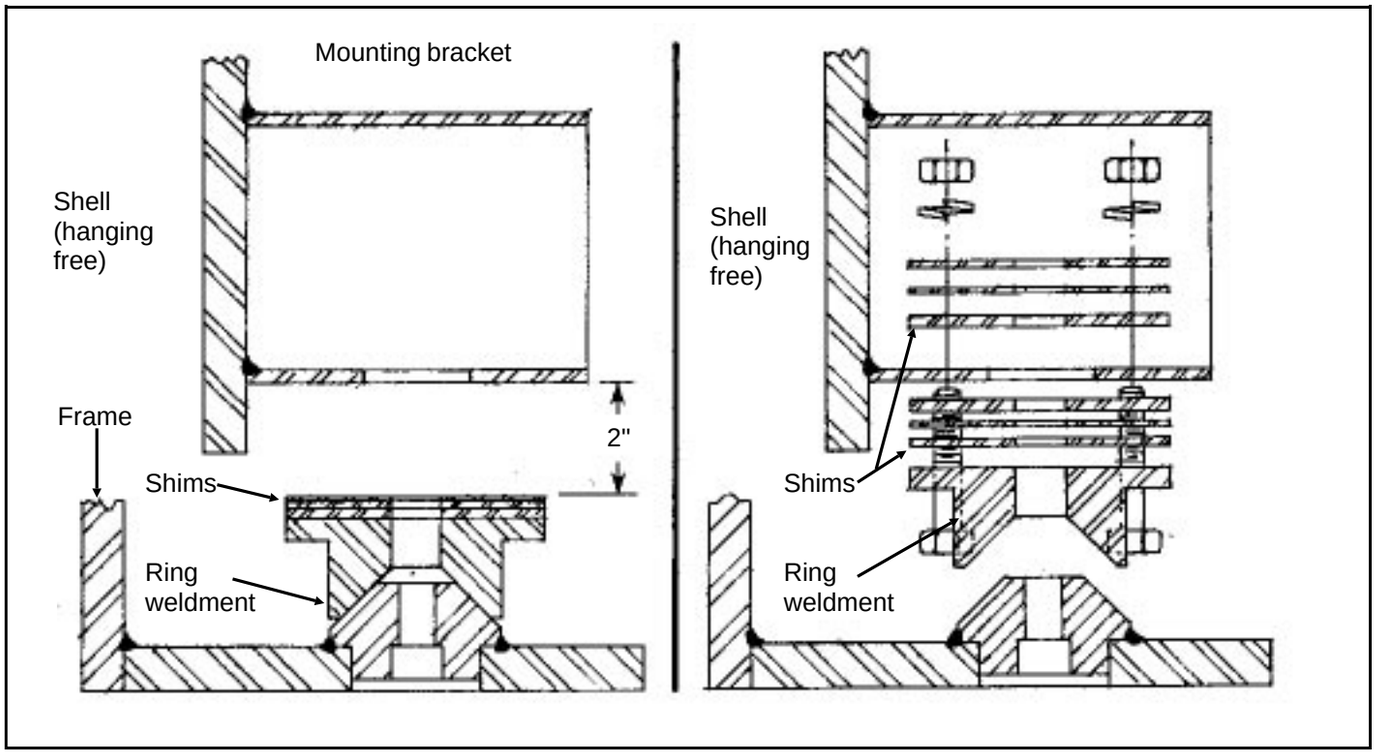


FIGURE 7 (MSSM0208AE)
Shimming and Reconnecting Ring Weldments

To adjust the push-down travel, proceed as follows:

1. With the *Master switch* set to *off* and the shell hanging free, remove the bolts securing the ring weldments to the mounting brackets. Set each ring weldment on top of its respective plug, removing any shims which may have been used and placing them next to the ring weldment.
2. Measure the gap between the top of the ring weldment and the bottom of the mounting bracket, at each location.
3. Stack shims on top of the ring weldment as required to make each gap exactly 2 inches as shown in FIGURE 7. If the gap at any location is less than 2 inches without shims, the shell must then be raised in the frame, using the procedures previously described.
4. Once the proper arrangement of shims is made, remount the ring weldment and shims to the mounting bracket (FIGURE 7). Any extra shims may be stacked on the top side of the mounting bracket plate to which the ring weldment is attached.

52" and 72" machines have valves which control the air flow to the push-down air bags. On 52" machines this is a globe valve, located on the left side of the machine, behind the waist high, front to back frame member. Throttling of this valve causes variations in the flow of air between the left side and right side push-downs. On 72" machines, a needle valve located on each push-down air bag, is used to throttle the air flow to each individual push-down.

5. While observing the movement of the shell, cycle the *Master switch* between *off* and *manual*.

6. If any rocking or twisting motion of the shell is detected as the shell pushes down, throttle the air supply valve(s) as required, to achieve a smooth even downward motion of the shell.

NOTE: On 72" open pocket machines, if any rocking or twisting motion is present when the shell pushes down, the balancing system may not function properly.

Step 7 which follows applies to 52" machines only. On these machines only, the push-down mounting brackets are adjustable up and down and must be positioned such that the air bags function within their limits of expansion and contraction. This adjustment is made as follows:

7. With the *Master switch* set to *off* and the shell hanging free, measure the gap between the push-down mounting bracket and the ring weldment mounting bracket at each location. Adjust the push-down mounting bracket to achieve a gap of 6 3/8" (162). (The gap must not drop below 6 3/8" (162) when shell is not pushed down nor exceed 8 3/8" (213) when it is pushed down as shown in FIGURE 8.)

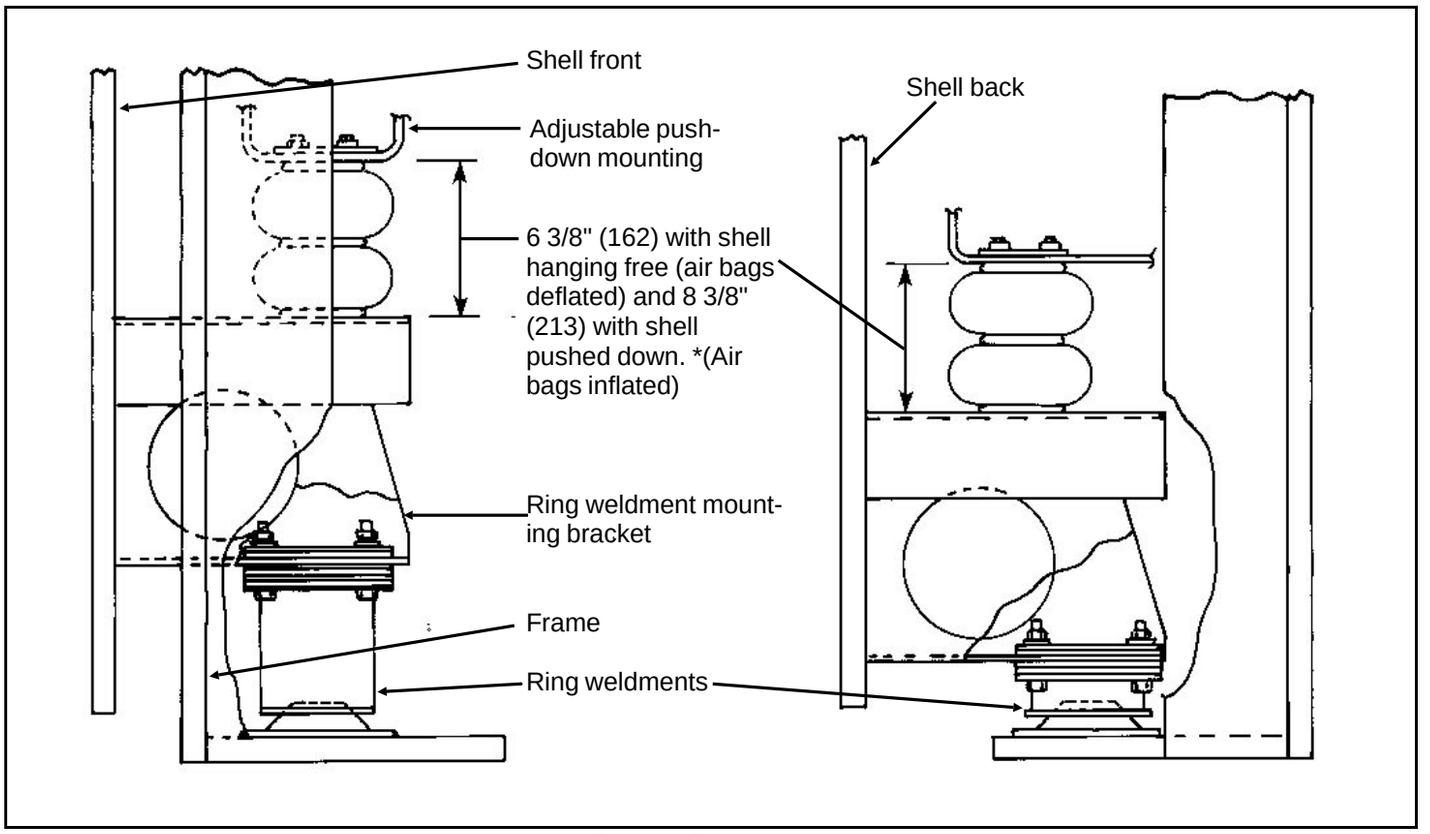


FIGURE 8 (MSSM0208AE)
Push Down Bracket Adjustment: 52" Machines
***(Shell Shown Pushed Down)**

Adjustments to 64" Machines

Applicable Models—The procedures herein apply to the following machine models:

64042BHP
64042BTL (AAC) and later models
64042BTN (AAC) and later models

For adjustments to 64042BTL (AAA) or (AAB) models and 64042BTN (AAA) or (AAB) models consult the Milnor® factory.

Shell Hanging Dimensions and Adjustment Procedures—64042BHP, BTL and BTN machine models have three Hydro-cushion® cylinders: one on each front corner and one centered in the rear. Adjust the position of the cylinder in the frame to achieve the dimensions shown in FIGURE 9. The front dimension from the bottom edge of the base plate (not the tilt base) vertically to the centerline bolt on the shell front ring should be repeated on the left and right sides of the door hinge to assure that the shell is horizontal, left to right.

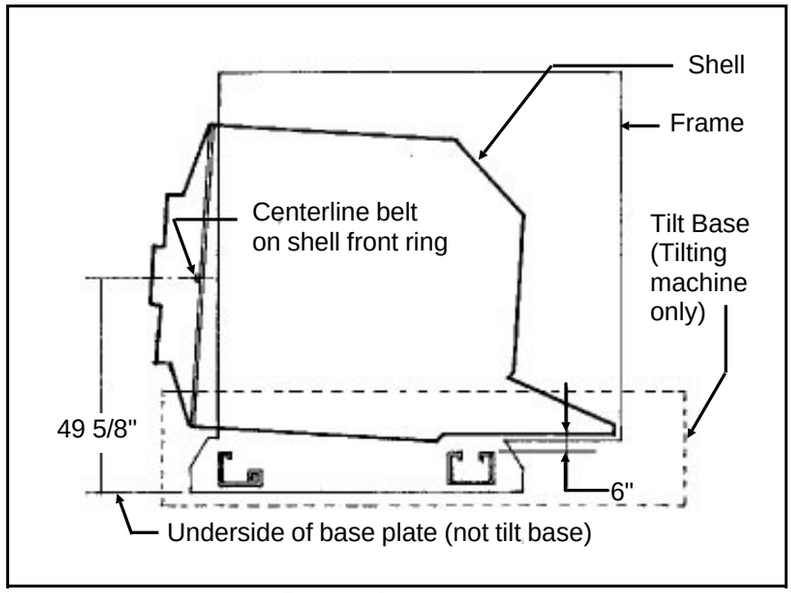


FIGURE 9 (MSSM0208AE)
Shell Hanging Dimensions for 64" Machines (Right side view)

Push Down Travel Dimensions and Adjustment Procedures—64" machines have a push-down stop on each front corner and two push-down stops under the cylinder tail. When pushed down, the ring weldments (which move with the shell) must seat firmly onto the plugs which are mounted atop the lower cross braces. The push-down travel dimension must assure that 1) the ring weldments and plugs are far enough apart when the shell is not pushed down, so as not to interfere with the free movement of the shell, and 2) that all four stops are in solid contact when the shell is pushed down.

⚠ CAUTION ⚠

Some of the following procedures require power to the machine. Take the necessary precautions to assure that no one operates the machine controls while personnel are adjusting the push-down components.

To adjust push-down travel, see FIGURE 10 and proceed as follows:

1. With the *Master switch* set to *off* and the shell hanging free, unbolt the ring weldments from their mountings. On the rear push-downs only, unbolt but do not remove the plugs from their mountings, also.

2. Set the ring weldments on top of the plugs then measure the gap between each ring weldment and its mounting.

3. Remove or add shims where shown in FIGURES 10 and 11 to achieve the gaps shown. If the gap at any location is less than that specified, without shims, the shell must then be raised in the frame, using the procedures previously described.

4. Once the proper arrangement of shims is made, remount the ring weldments. On the rear members, also remount the plugs.

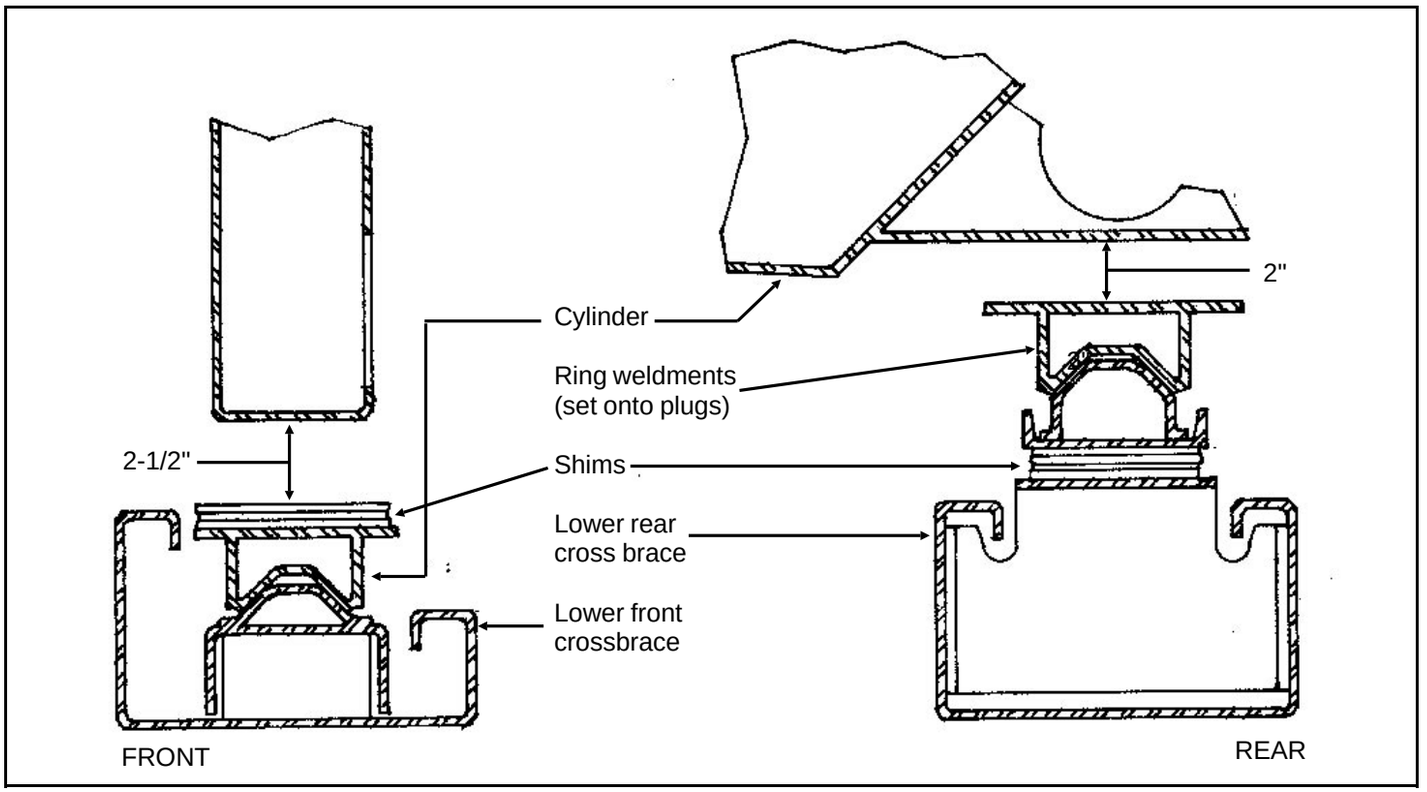


FIGURE 10 (MSSM0208AE)
Shimming Ring Weldments (64" Machines)

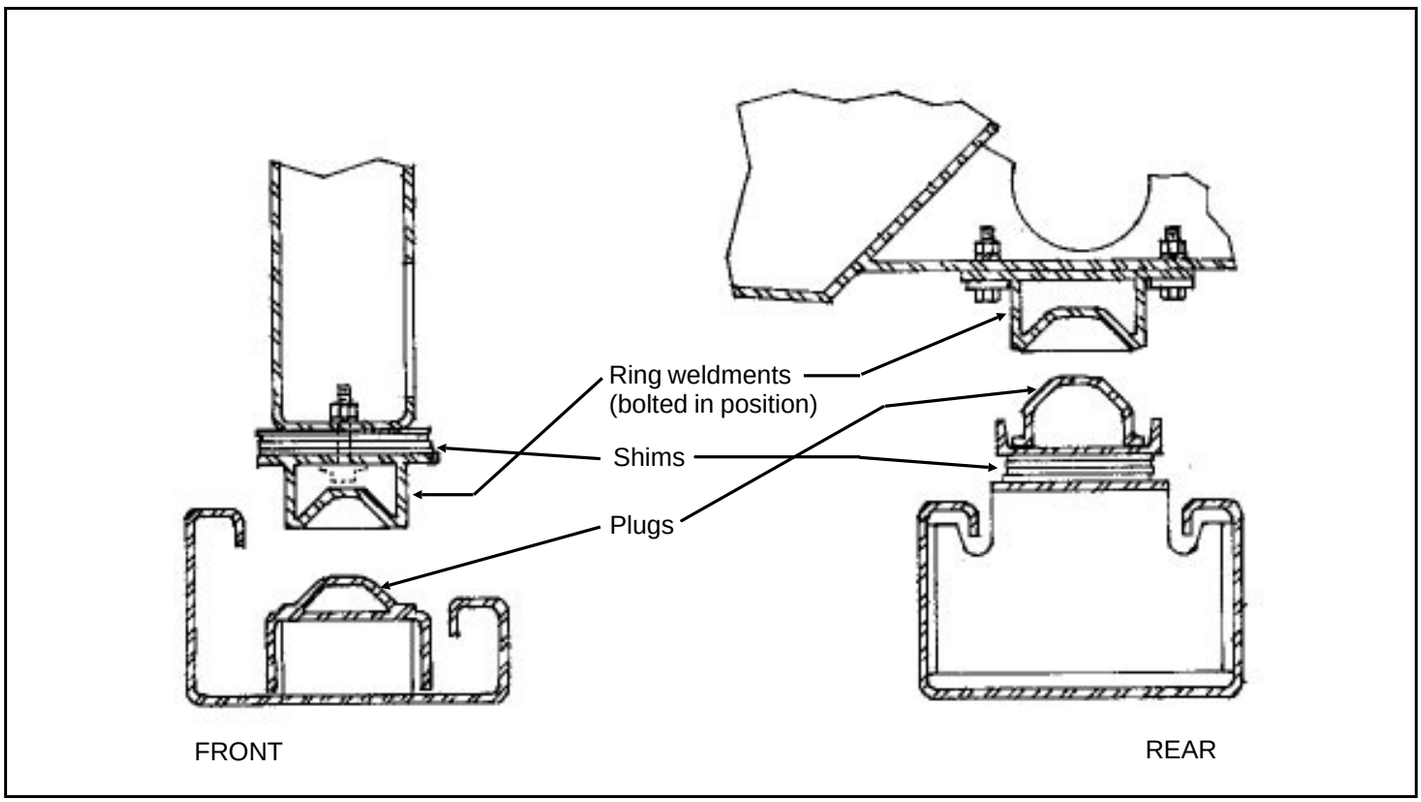


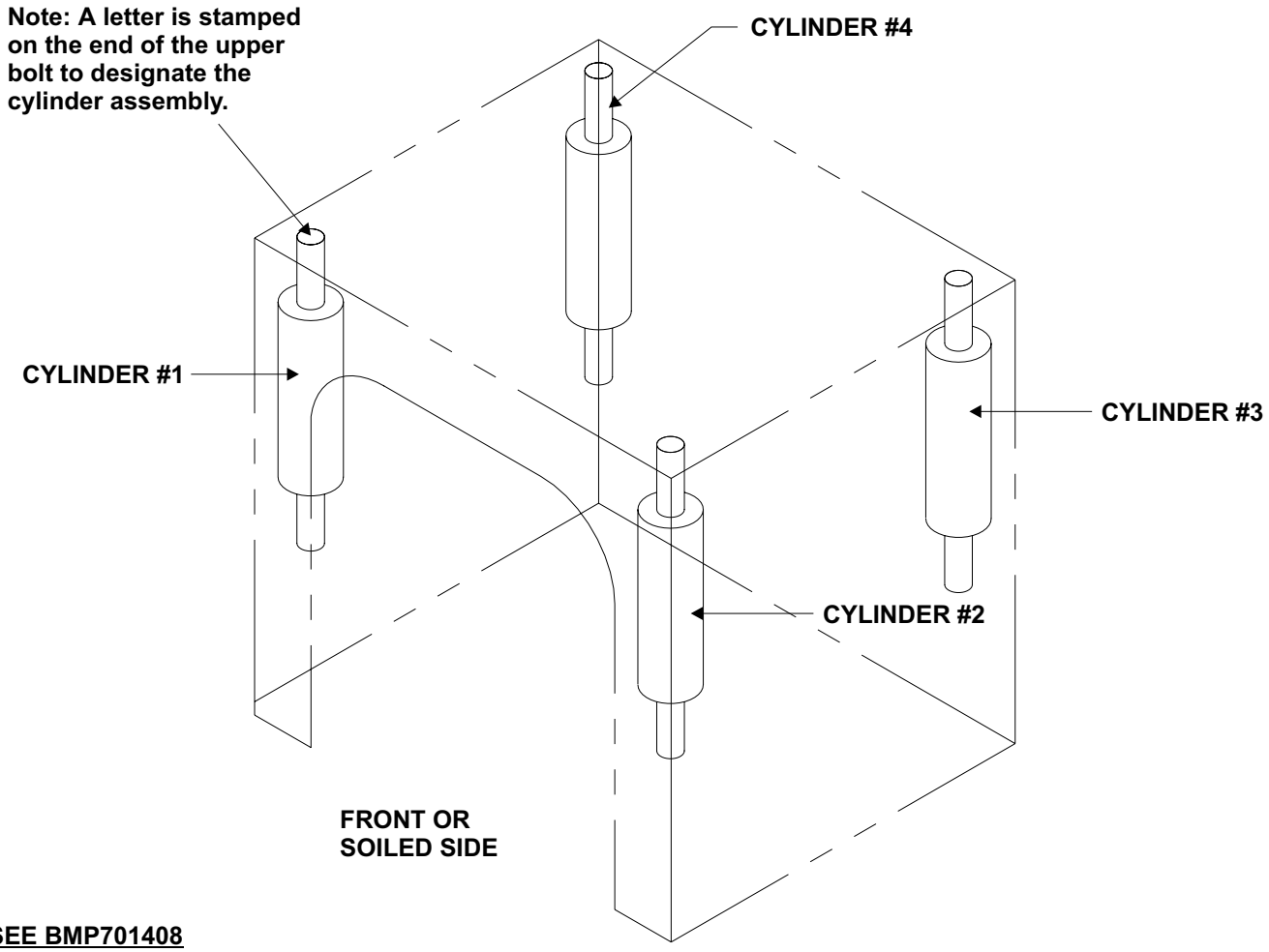
FIGURE 11 (MSSM0208AE)
Reconnecting Ring Weldments (64" Machines)

Suspension Cylinder Locations

Use with BMP701408

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

Litho in U.S.A.



SEE BMP701408
FOR REPAIR PARTS:
HYDROCUSHION CYLINDER ASSEMBLY "*B*"
THROUGH HYDROCUSHION CYLINDER ASSEMBLY "*K*"

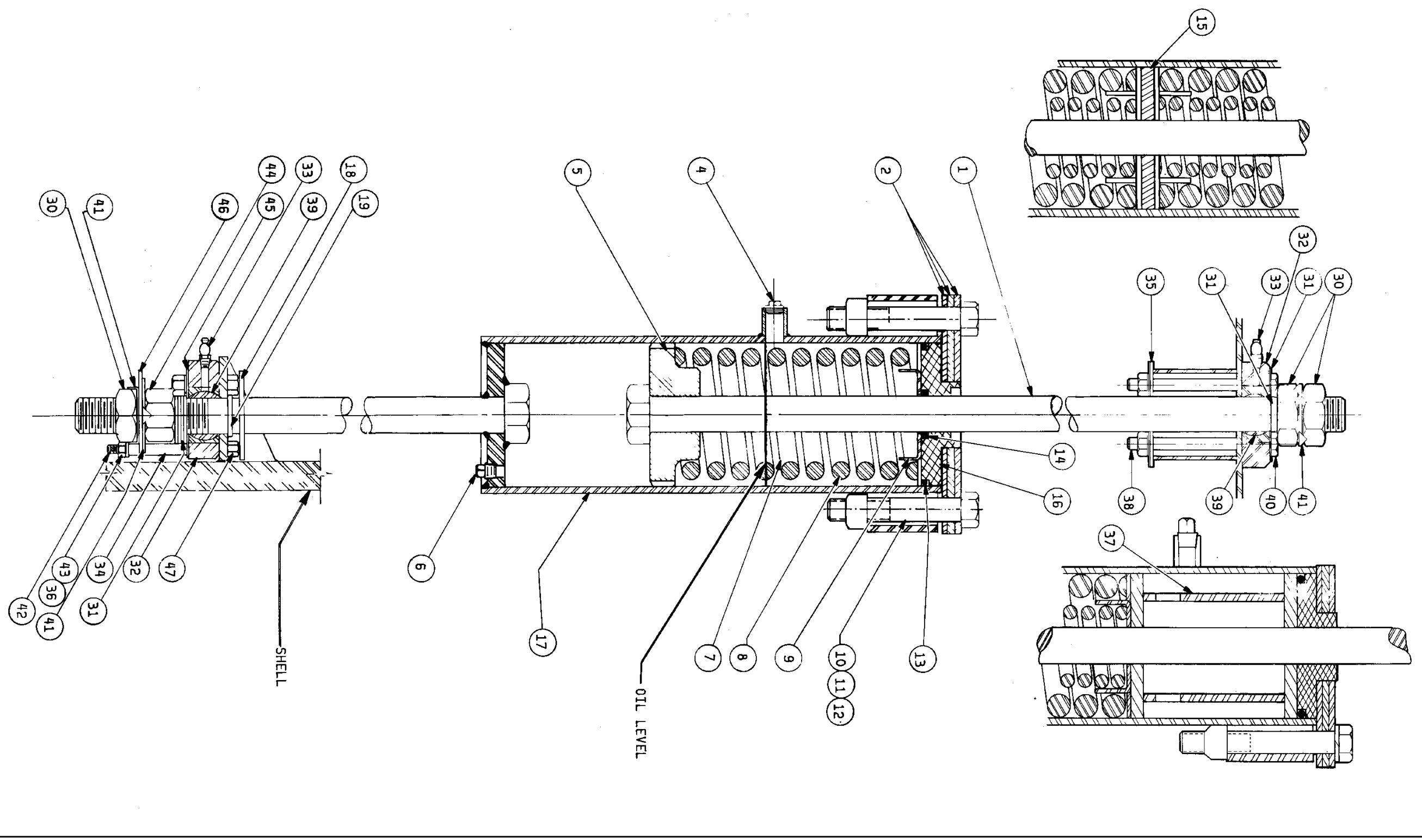
	MACHINE MODELS:							
POSITION:	42031 CP2,NP2 WP2,WP3	42031 SP2,SP3	42044 CP2,NP2 WP2,WP3 D7P	42044 SP2,SP3	52038 WTL,WTN WP1	60044 WP2,WP3 SP2,SP3	72044 WP2,WP3 DA1	72044 SP2,SP3
CYLINDER #1	B	B	C	C	D	K	H	G
CYLINDER #2	B	C	B	C	D	K	H	G
CYLINDER #3	B	C	B	C	D	K	F	G
CYLINDER #4	B	C	C	C	D	K	F	G

Suspension Cylinder Assemblies

42031,42044,52038,60044,72044

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

Litho in U.S.A.



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

Litho in U.S.A.

Parts List—Suspension 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----------	
	B	SA 16 039	*HYDROCUSHION CYL ASSY-"B"	CYLINDER ASSY B
	C	SA 16 038	*HYDROCUSHION CYL ASSY-"C"	CYLINDER ASSY C
	D	SA 28 091	*HYDROCUSHION CYL ASSY-"D"	CYLINDER ASSY D
	F	SA 36 021	*HYDROCUSHION CYL ASSY-"F"	CYLINDER ASSY F
	G	SA 36 023	*HYDROCUSHION CYL ASSY-"G"	CYLINDER ASSY G
	H	SA 36 047	*HYDROCUSHION CYL ASSY-"H"	CYLINDER ASSY H
	K	SA 29 031K	*HYDROCUSHION CYL ASSY-"K"	CYLINDER ASSY K
			(Note: To identify which cylinder is supplied with your machine, see BMP701235/2000133V which should be located in the manual next to this document. Once you know which cylinder assembly you have, "B-K" listed above, Identify your parts by referencing the "Used In" coding.)	
			----------COMPONENTS----------	
ABCDK	1	02 18244	BOLT=HYDCYL 27+7/8LG+KEYWAY	
K	1	02 18244A	BOLY=HYDCYL 28+7/8LG+KEYWAY	
FGH	1	03 06201	BOLT=HYDCYL 41+7/8LG+KEYWAY	
all	2	02 18840A	UPCAP=HYDROCYL 42+52+60	
all	4	5SP0KGFSS	NPT PLUG 1/2 SOSOLID GALSTL	
BC	5	X2 15356	PISTON=HYDROCYL 6"- 6 NOTCH	
DFGHK	5	X2 18228	PISTON=HYDROCYL 6"- 3 NOTCH	
all	6	5SP0GGFSS	NPT PLUG 3/8 SQ SOLID GALSTL	
FG	7	03 06139	SPRING=INNER HYDRO CYL 331LB/IN	FULL SPRING (PURPLE)
G	7	03 06139A	SPRING=INNER HYDRO CYL	PLUS ½ SPRING "G" ONLY (PURPLE)
H	7	03 06338	SPRING INNER-GOLD 14"LONG	GOLD
B	8	02 16068	MAIN SPRING 212LB/IN RED	RED
C	8	02 16125	MAIN SPRING 300LB/IN BLACK	BLACK
D	8	02 19039	MAIN SPRING 480LB/IN GREEN	GREEN
FG	8	03 06138	SPRING=OUT HYDROCYL 667LB/IN	ORANGE
G	8	03 06138A	SPRING=OUT HYDRO CYL	ORANGE
H	8	03 06337	SPRING-OUTER-GOLD 14.5"LONG	GOLD
K	8	03 09016	MAIN SPRING 1035LB/IN BLUE	BLUE
ABCDFGK	9	02 18619	BUSHING RETAINER + CAD	
H	9	03 06358	BUSHING RETAINER.CAD	
all	10	15B237	HXCAPSCR 1-8UNC2AX5.5 SAEGR5 Z	
all	11	15G255A	SQNUT 1-8UNC2B SAE ZINC GR2	
all	12	15U400	LOCKWASHER MEDIUM 1" ZINCPL	
all	13	60C159A	0RING 5.475ID 1/4CS BN70 #433	
all	14	24S040	SEAL URETHNE 1-7/16 2.25 13/32	
GH	15	M2 18690	LOWER CAP=HYDROCYL	
all	16	02 18839A	MACHBUSH HYDRCYL CAP #433-OR	
BC	17	SA 15 084	*HYDCUSH CYL WLDMT (18"X/12")	
DI	17	SA 28 090	*HYDCUSH CYL WLDMT (18"/23")	
FGH	17	W3 06203	*HYDCUSH CYL WLDMT (35"/12")	
K	17	W2 18233	*HYDCUSH CYL WLDMT (20"X22")	
all	18	02 175034	SHIELD-BALLBUSH-4/HYDRO MACH	
BDFGH	19	02 02230	6 WATER BARRIER (NEOPRENE)	
all	30	15G268	HXFINJAMNUT 1+1/2-12UNF2B ZINC	
all	31	02 18571A	PISTON ROD WASHER-.25"TK	
all	32	X3 06252	RETAINER-BALBUSH=4/72WEDU	
all	33	54M025	HYDFIT 1/8"-90 ALEMITE 1613-B	
all	34	27B240	SPCRROLL.5ID.813L.062T STLZNC	
all	35	02 18534	HOLDPLATE= BALLBUSH ZNC/CAD	
all	36	15G230	HXNUT 1/2-13UNC2B SAE ZINC GR2	
F	37	W3 06200	*SPACER=HYDRO-CUSHION CYL	
all	38	15K203	HXCAPSCR TFL 1/2-13X5 GR5 ZINC	
all	39	54A705	BALBUSH 1.5 SKF#GEZ108ESAVE467	
all	40	15N037	HXCAPSCR 1/2-13UNC2AX6.5 GR5 Z	
all	41	02 18256	LOKWASH-TONGUE 8/WEH ZINC	
all	42	15K202	HXCAPSCR 1/2-13UNC2AX5 GR5 ZIN	
all	43	15U300	LOKWASHER REGULAR 1/2 ZINC PLT	
all	44	15G231	HXFINJAMNUT 1/2-13UNC2B ZINC G	
all	45	02 18534	HOLDPLATE= BALLBUSH ZNC/CAD	
all	46A	02 18795A	WASH-TIMING=HYDRO CYL 45DEG	USE ONE
all	46B	02 18795B	WASH-TIMING=HYDRO CYL 75DEG	USE ONE
all	47	15K191	HXCAPSCR 1/2-13UNC2AX2.5 GR5 Z	
FGH	48	AVH52001	ASSY=OILFIL SPOUT 72HYD CYL	

Section 6

Control and Sensing Devices

DESCRIPTION AND MAINTENANCE OF THE ELECTRONIC BALANCING SYSTEM FOR WASHER-EXTRACTORS AND TEXTILE MACHINES

Components of the Balancing System

The water balancing system consists of electrical and mechanical components which sense the location and magnitude of an imbalance in the cylinder, and by injecting water into the rib (or ribs) opposite that imbalance, re-balance the cylinder. The basic components (FIGURE 1) include:

- *The accelerometer and balance filter board.*
- *The proximity switch and target.*
- *The analog to digital balance board.*
- *Balancing water valves, rings, and ribs.*

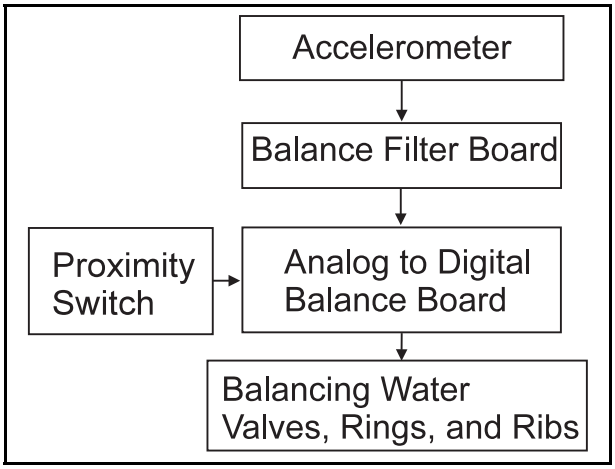


FIGURE 1 (MSSMA401BE)
System Components

Accelerometer and Balance Filter Board— In a flexibly supported washer-extractor (after an initial excursion at the onset of extraction), the unbalanced cylinder rotates about the center of mass resulting in the "light side out" and the "heavy side in" as shown in FIGURE 2. This causes the shell front to oscillate. The door-latch mounted accelerometer (FIGURE 12), and the filter board produce a voltage which fluctuates with this occillation. The fluctuating voltage can be represented as a sine wave (FIGURES 6 and 7).

Proximity Switch and Target—The target passes the proximity switch once per revolution (see FIGURE 4), thus producing a timing signal.

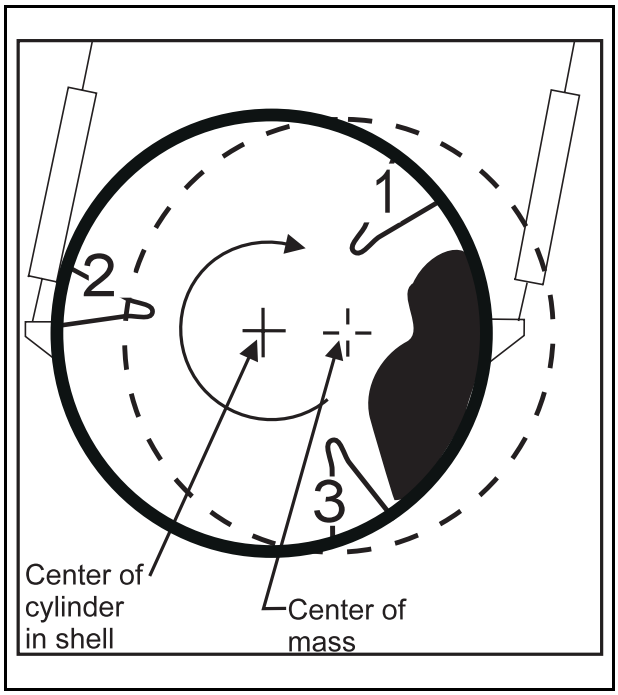


FIGURE 2 (MSSMA401BE)
Flexibly Supported Machine (Hydro-cushion® shown)

Analog to Digital Balance Board—This board uses the accelerometer sine wave and the timing signal to determine the magnitude and location of the imbalance, and in turn control the balancing valve and safety relays mounted on the board (see FIGURE 3), the three balancing water valve relays add water to the individual ribs opposite the imbalance. The machine excursion relay (not used on ExN, JxN, TxN machines) and balance excursion relay make a microprocessor input, causing a

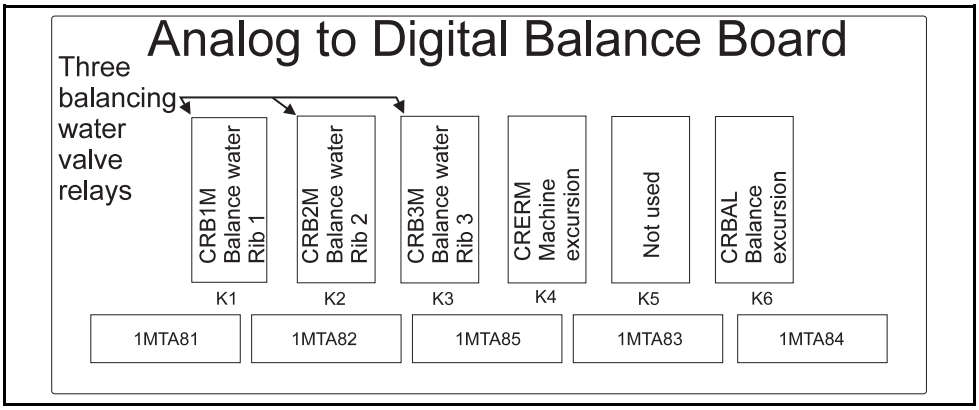


FIGURE 3 (MSSMA401BE)
Balance Board Details

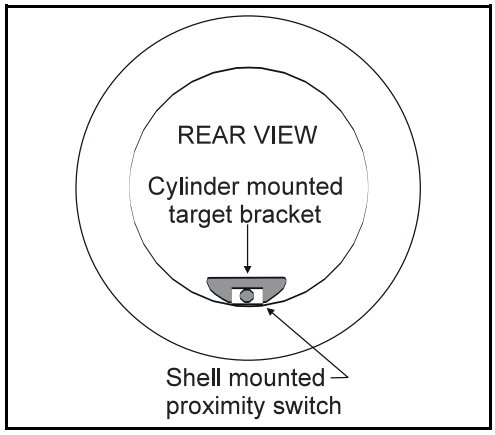


FIGURE 4 (MSSMA401BE)
Proximity Switch and Target (64046 E6N shown)

recycle, if shell excursions or an out-of-balance condition exceed acceptable limits. The machine excursion input causes a recycle at any time in extract, whereas the balance excursion input is checked just before the onset of high speed extraction, and then again from a few seconds after the onset of high speed extract throughout the remainder of extraction.

Balancing Water Valves, Rings, and Ribs—The water from balancing water valves enters the ribs via individual injection nozzles aimed into respective pick-up rings on the back of the cylinder. Corresponding valves, nozzles, and rings must be connected as shown in FIGURE 5.

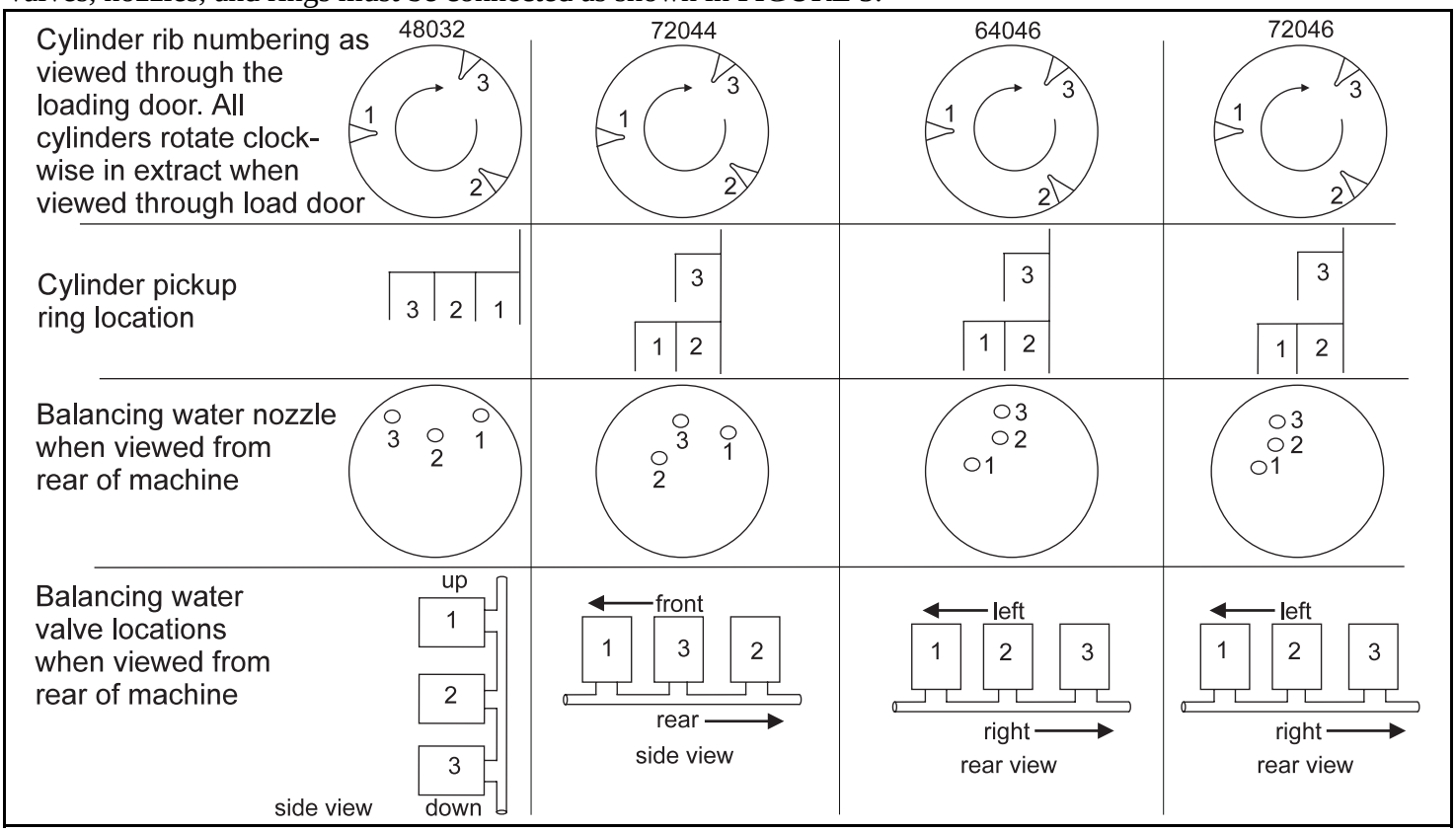


FIGURE 5 (MSSMA401BE)
Hydro-cushion and Suspended Machines

How the Balancing System Works

Determining where the imbalance is and correcting the imbalance takes place in two steps over several revolutions. FIGURE 6, *Step One—Finding the Imbalance*, describes in detail how the machine determines the location of the imbalance.

FIGURE 7, *Step Two—Cancelling the Imbalance*, explains how the machine cancels the imbalance in two stages. During the *first stage*, the machine adds water at the same rate to both ribs opposite the imbalance. The added water in the rib nearest the imbalance, together with the original imbalance, causes the center of mass to shift exactly opposite a rib. During the *second stage*, additional water is added to the counterbalancing rib until the cylinder again rotates about its geometric center. This causes accelerometer sine waves to again fall within the normal (balanced) range and shut off the balancing water valves. The ribs retain their water during the remainder of the extraction cycle, (except for some slight leakage from the ribs which is automatically replenished).

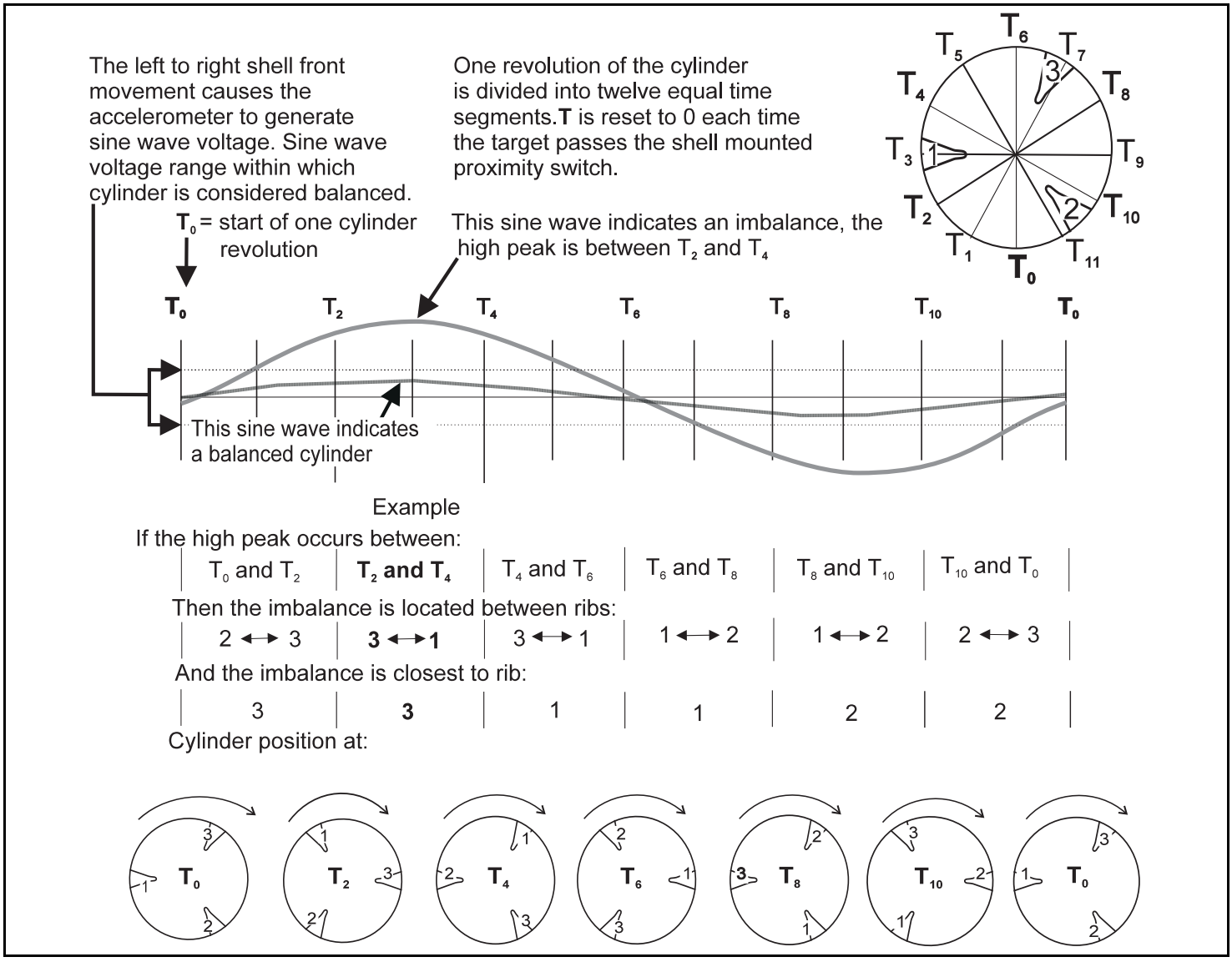
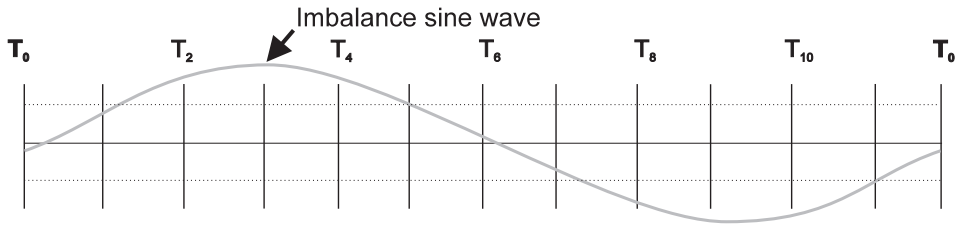
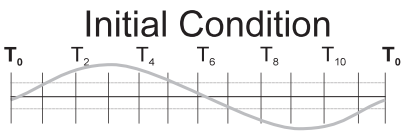
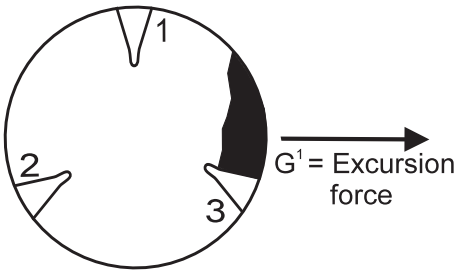


FIGURE 6 (MSSMA401BE)
Step 1—Finding the Imbalance

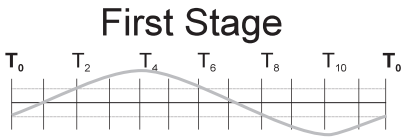
In this example, the high peak of the sine wave occurs at T_3, telling the balancing system that an imbalance is located between ribs 1 and 3, and the imbalance is closest to rib 3. Self balancing takes place in two stages over several revolutions.

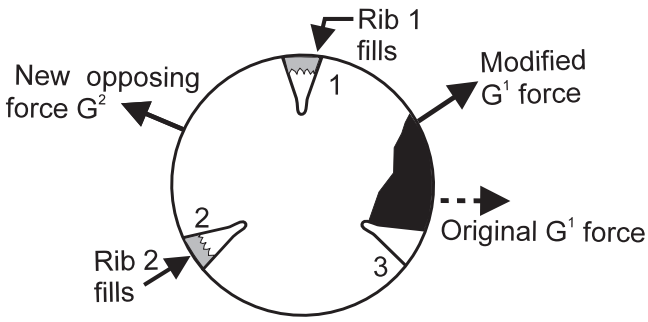




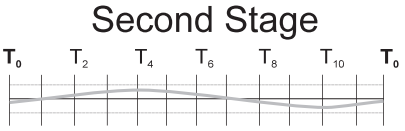


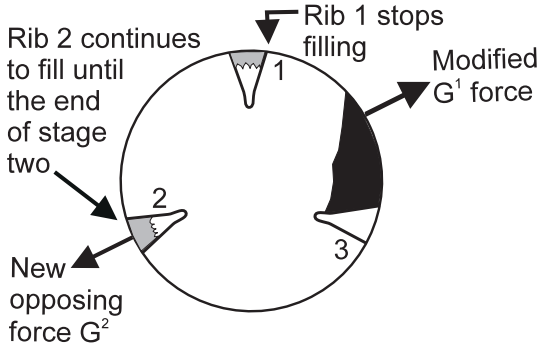
The maximum excursion force G^1, occurs next to rib 3, exactly at the area of maximum imbalance. Since no counterbalancing rib is exactly opposite the imbalance, (a requirement for balancing) the maximum excursion force must be moved to a point opposite a rib.





Simultaneously filling ribs 1 and 2 creates a new opposing excursion force G^2. This new G^2 force modifies the vector of the original force G^1 as shown above, resulting in moving the G^1 force to a point opposite rib 2. The second stage of balancing can now begin.





At the onset of the second stage of balancing, Rib 1 stops filling while Rib 2 continues to fill. This results in moving the opposing G^2 force to a point opposite the original G^1 force. Ultimately the, two forces equalize, reducing the shell front excursion, and the amplitude of the resulting accelerometer sine waves. All water valves shut off when sine waves fall within normal (balanced operation) range and the balancing system resumes monitoring operation.

FIGURE 7 (MSSMA401BE)
Step 2—Cancelling the Imbalance

Monitoring the Balancing System

Status panel lamps monitor balancing system functions. This status panel (FIGURE 8), includes:

Balance Excursion Lamp—This lamp illuminates whenever the three wire circuit is energized. If this lamp extinguishes during E1 (low extract), the machine will not enter E2 (high extract), but recycles instead (see “Recycle Circuit” in this section).

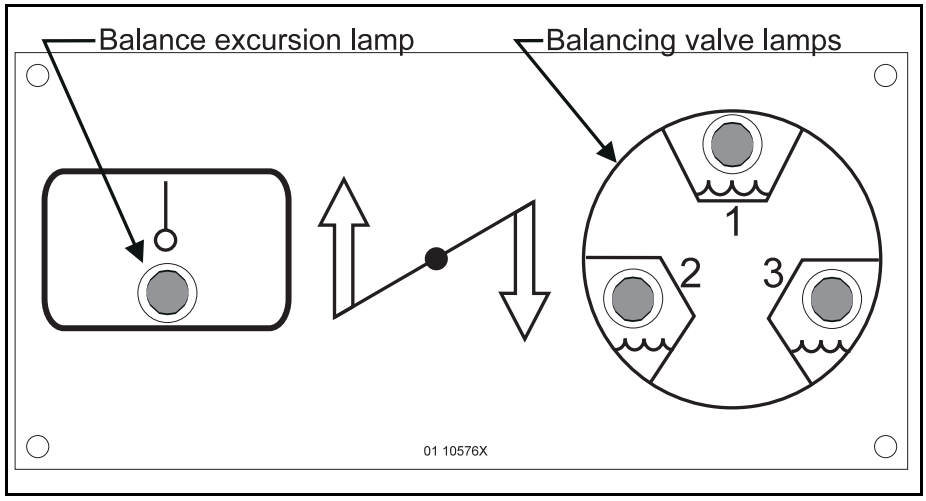


FIGURE 8 (MSSMA401BE)
Balancing System Status Panel

Balancing Valve Lamps—These three lamps go ON and OFF with their respective balancing valves. Lamps should be OFF once balancing is completed, except for intermittent valve operation as the balancing system compensates for changing imbalances (caused by varying load thickness, different absorption rates, etc.). All three lamps should never illuminate except at the onset of low speed extraction and again at the onset of high extraction. At all other times, only one or two of the three lamps should illuminate until balance is achieved, never all three. Continuous recyling over several loads may indicate a need for service.

Balancing System Maintenance

Aiming Injection Nozzles—When properly aimed and adjusted, the injection nozzles correctly deliver balancing water from each balancing water valve to the pickup ring for the appropriate rib. If not aimed or adjusted correctly, water may splash (or fall) into the wrong pick-up ring and enter the wrong rib, rendering the system unworkable. 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 FIGURE 9. Any splashing causes water to enter the wrong ring, rendering the system inoperative. Periodically check nozzle alignment and for cracks, clogs, and debris in the rings.

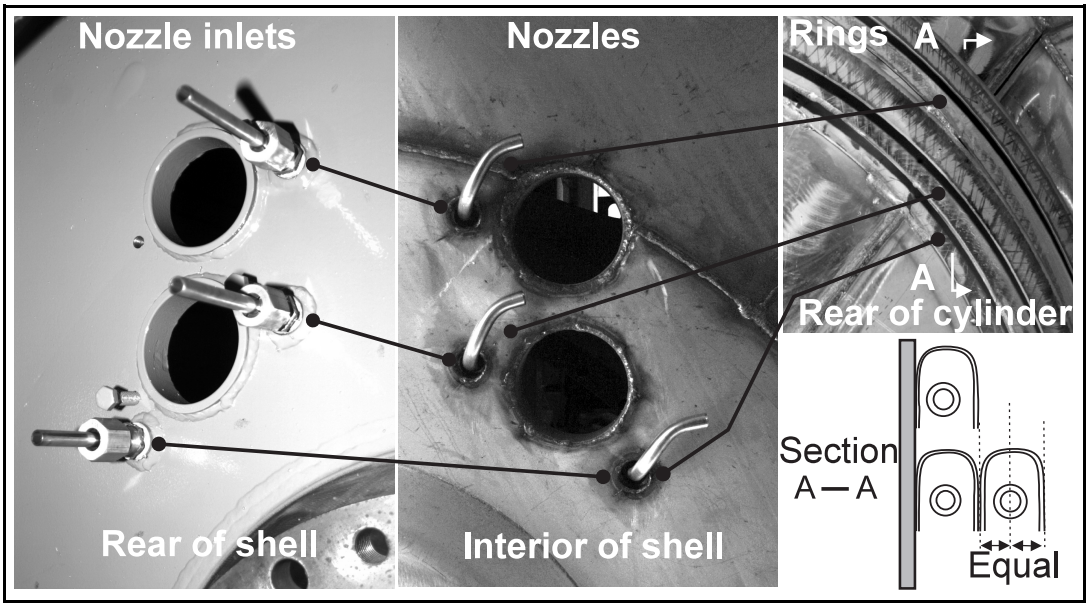


FIGURE 9 (MSSMA401BE)
Aiming the Balancing Nozzles

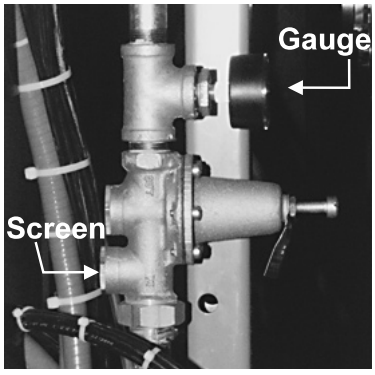


FIGURE 10 (MSSMA401BE)
Water Pressure Gauge

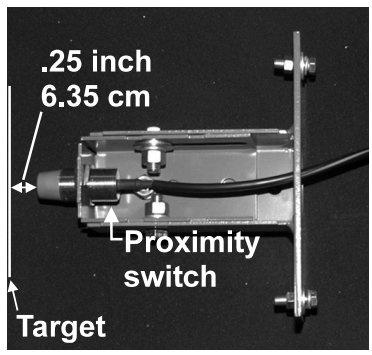


FIGURE 11 (MSSMA401BE)
Proximity Switch

Checking Water Pressure—Check pressure regulator for 28 PSI (1.96 Kg/sq cm) water pressure when there is no water flow and approximately 10 - 15 PSI (0.70 - 1.05 Kg/sq cm) when water valves are operating. Clean screen and/or adjust regulator as required (FIGURE 10).

Positioning the Proximity Switch—Adjust a replacement proximity switch, (FIGURE 11), .187 - .25 inch (4.75 - 6.35) from the target plate.

Preparing to Set Accelerometer—Accelerometer voltage must be adjusted with the shellfront in the drain/extract position. In order to do this, put the machine in a valid formula and stop in an wash step. The machine will drain with the shellfront at the 10 degree tilt necessary for setting the accelerometer. The following displays are typical. They may appear differently according to machine model and/or options.

RUN FORMULA 00 OR OK POWER OFF	Machine is ready for load and the *Run Formula menu* is displayed, as shown at left, ENTER NEXT **Accesses *formula 00* .**
FILLING MACHINE	Machine filling with water
RUN FORMULA 00 FORMULA 00	① **Silences the operator signal and starts the process.**
10:38 F0005S03 2:37 dF=A055/D140 * HC3	Alternates With 10:38 STEP01 2:37 WAIT FOR LEVEL HC3

DRAINING TO SEWER

CANCEL ESCAPE Cancels step. The water, chemical, and steam valves close, the drain opens (machines with normally open drain valves), and the shellfront tilts to the angle necessary for the correct adjustment of the accelerometer. Machines with normally closed drain valves must be drained before continuing (See VIEWING INPUTS/OUTPUTS AND ACTUATING OUTPUTS ON THE MARK III MICROPROCESSOR CONTROL...).

3 WIRE DISABLED FAULT: SEE MANUAL

0 Disables the three wire circuit, preventing machine from entering intermediate extract, and displaying an error message. CANCEL ESCAPE cancels the formula, silences the operator signal.

Cancel button,

Adjusting the Accelerometer—Measure accelerometer voltage at balance filter board connector from 1MTA 86-4 to 1MTA 86-5 with the machine in a formula and the cylinder tilted to the drain/extract position as described in “Preparing to Set Accelerometer” in this section. The accelerometer is adjusted by the screw (FIGURE 12). Set accelerometer voltage between 2.3 - 2.5 VDC, the higher the voltage, the more sensitive the circuit. Output voltages beyond 5 VDC indicate a defective unit.

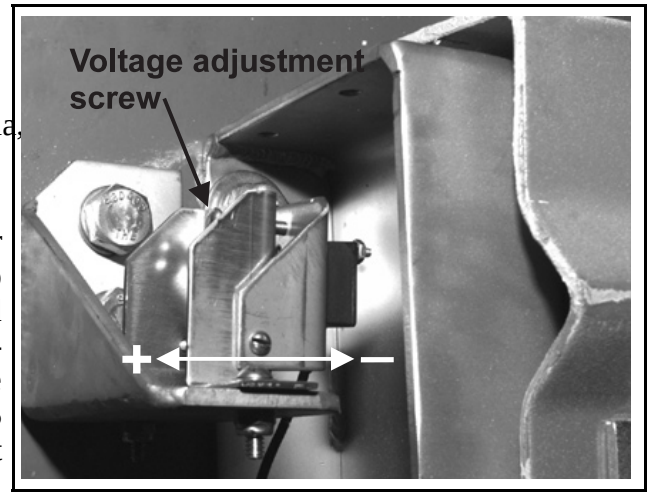


FIGURE 12 MSSMA401BE
Accelerometer

Additional Protection for Excessive Imbalance

Two devices, the recycle and the vibration circuits, independent of the balancing system, protect the machine from excessive imbalances.

Recycle Circuit—The recycle circuit automatically redistributes an out of balance load. It becomes operational when extract commences and is actuated by the machine excursion switch (FIGURE 13). Although the excursion switch initiates a recycle anytime it is actuated during extraction, the primary purpose of this switch is to sense an excessive imbalance during the onset of extraction. When a recycle is initiated, the cylinder comes to a full stop, rotates 16 seconds CCW in wash speed, 7.5 seconds in CW wash speed, and 7.5 seconds in drain speed, then re-enters extract. During a recycle, the program timing stops, and starts again 7.5 seconds after high extract has again been achieved. The machine recycles up to five times, before repeating the final bath (without chemicals) and re-entering extraction.

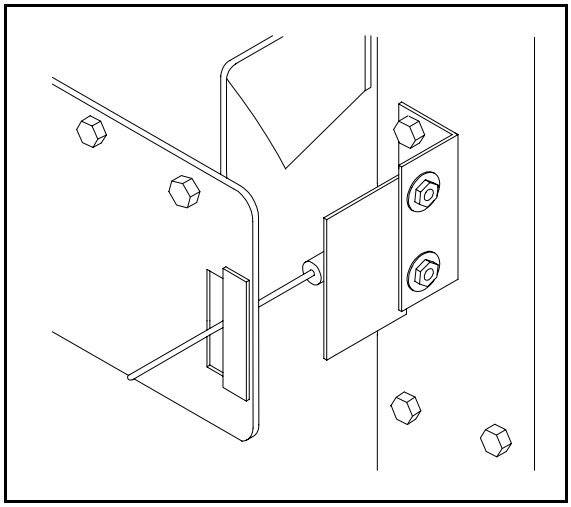


FIGURE 13 (MSSMA401BE)
Excursion Switch

NOTICE

The excursion switch actuator 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.

Vibration Circuit—The vibration safety switch (FIGURE 14) reacts to excessive vibration which is not contained by the balancing system, actuating a switch which de-energizes the three wire relay. When this occurs, the cause of the vibration should be determined and corrected. See "VIBRATION SAFETY SWITCH ADJUSTMENTS" elsewhere in this manual.

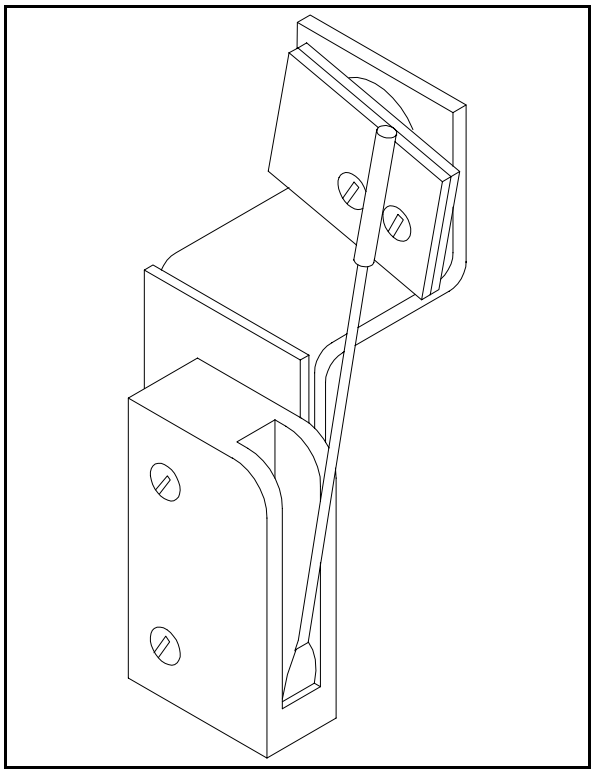


FIGURE 14 (MSSMA401BE)
Vibration Safety Switch

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

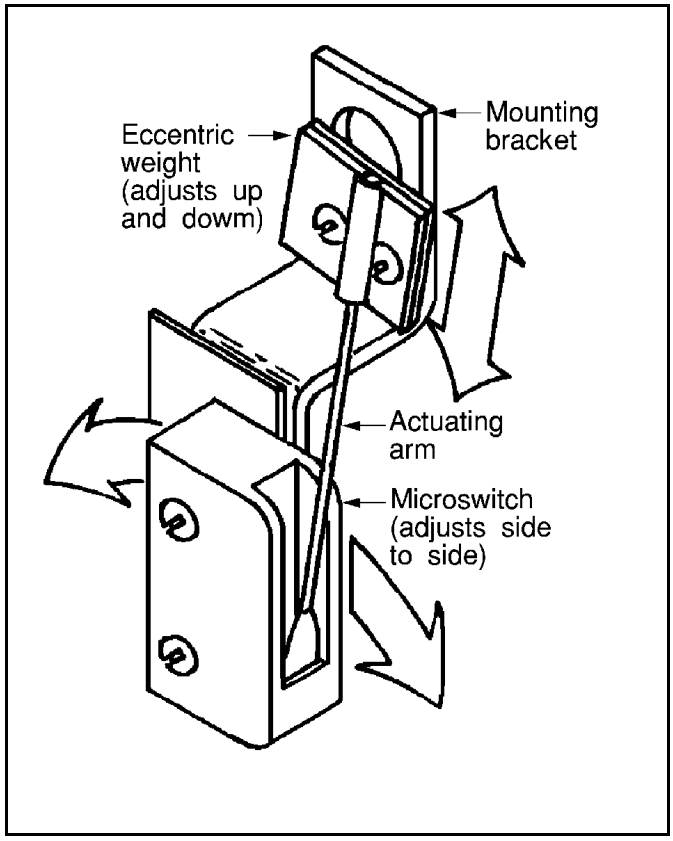


FIGURE 1 (MSSMA408BE)
Vibration Switch

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.

UP AND DOWN LIMIT SWITCH ADJUSTMENTS FOR 52" AND 72" TILTING MACHINES

The down limit switches prevent the machine from operating unless it is fully seated in the cradle. On tilt both way machines, each pair of front and rear down limit switches also prevent the opposing tilt cylinders from actuating if the adjacent tilt wheels are not fully seated (i.e., the front down limit switches will not allow the machine to tilt forward unless the front tilt wheels are fully seated). Each pair of down limit switches is connected in series to assure that the right *and* left tilt wheels are both seated. The up limit switch(es) determines the limit of tilt electrically but are set close to the point where the tilt cylinders would bottom out and mechanically prevent further tilting.

All limit switches were properly set at the Milnor® factory and *do not normally require adjustment when the machine is installed.* However, the up limit switch(es) should be adjusted if the tilt limits vary from those called for herein, especially if the hydraulic cylinders bottom out. The down limit switches must be checked and adjusted, if any down limit is preventing machine operation when the machine is fully seated.

FIGURES 1 and 2 show the limit switch locations.

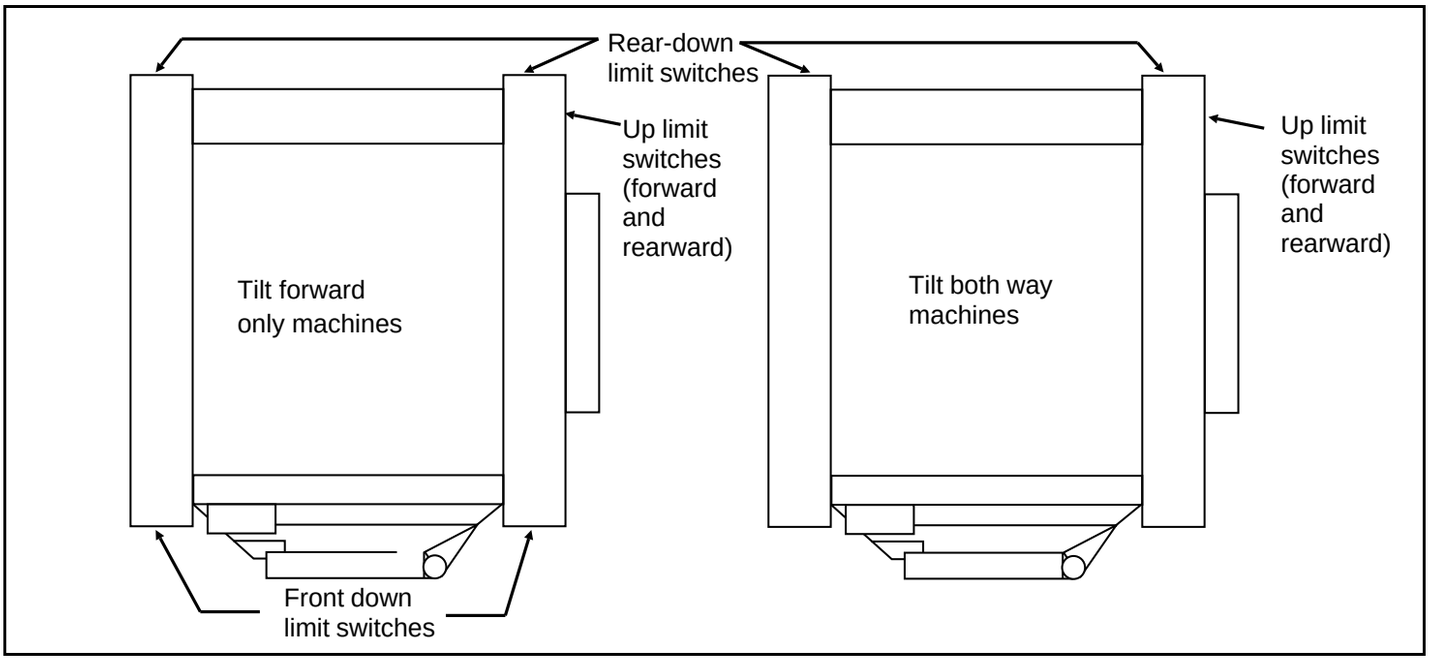
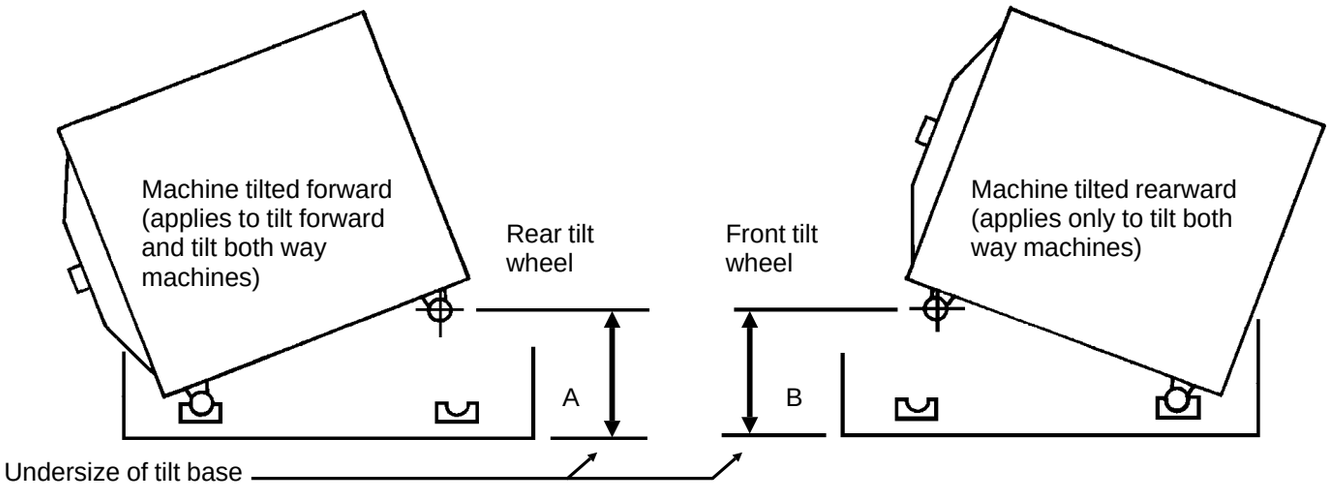


FIGURE 1 (MSSMA415AE)
Switch Locations
(Views Looking Down From Above)

Up Limit Switch Adjustment (Front and Rear Same)

The proper tilt limits are shown in FIGURES 2, 3, and 4. Measurements are taken from the base vertically to the center of the appropriate tilt wheel.



Machine (Size)	DIMENSION "A"	DIMENSION "B"
All 52" machine (i.e., 52038WTB/WTG)	29 1/2" (749)	37" (939)
All 72" machine (i.e., 72044WTB/WTG)	36 7/8" (937)	38 1/2" (978)

FIGURE 2 (MSSMA415AE)
Right Side Views of Machine Tilted

To adjust either up limit switch, see FIGURE 3 and proceed as follows:

⚠ CAUTION ⚠

Before performing maintenance on a tilted machine always 1) install the factory supplied support brackets, 2) lock power *off*, and 3) have an assistant assure that no one attempts to energize or operate the machine controls.

1. Set the up limit switch mounting bracket such that the switch is at its farthest position away from the hydraulic cylinder that depresses it (allowing for greatest travel of machine).
2. Energize the washer.
3. Using the tilt controls (see "NORMAL OPERATION . . ." elsewhere), tilt the machine until the limit of tilt, shown in FIGURE 2, is achieved.
4. Lock power *off* and install the factory supplied support brackets.

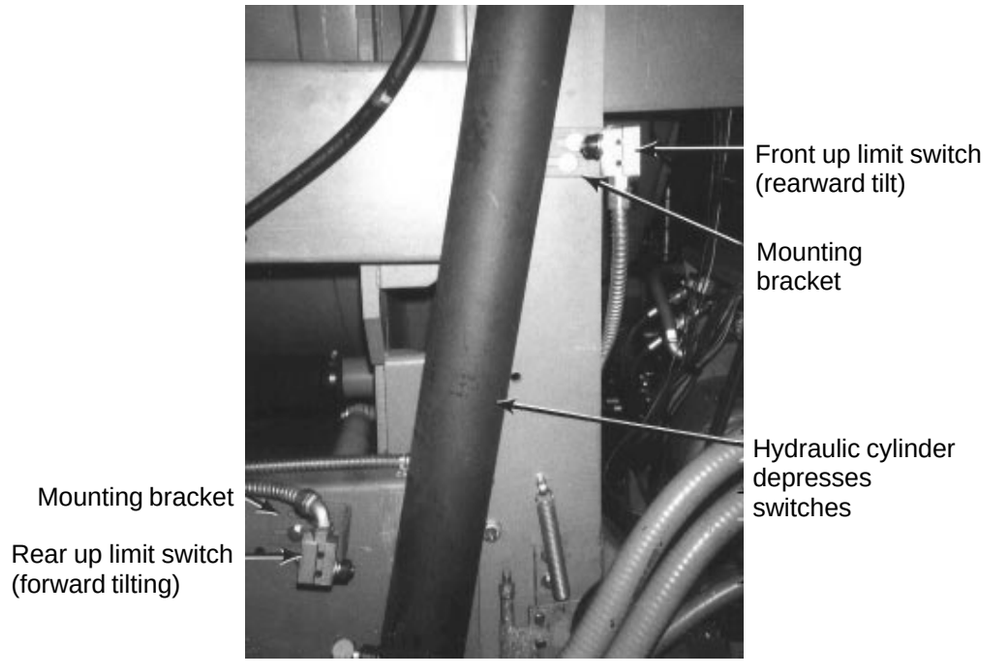


FIGURE 3 (MSSMA415AE)
Up Limit Switches
(52" machine in down position)

5. Reset the up limit switch mounting bracket, such that the switch is depressed by the actuating device *just enough to make the switch actuate and no more* (listen for the click). This is to insure that the switch does not bottom out and become damaged before the tilt cylinder reaches its maximum stroke. Also check to be sure that at the instant of actuation, the switch is perpendicular to the hydraulic cylinder that depresses it, not at an angle. Adjust if necessary.
6. Remove the support brackets and energize the machine.
7. Test the up limit switch by returning the machine to the *down* position then tilting it, allowing it to be stopped by the limit switch. Readjust if necessary.

Down Limit Switch Adjustment (Front and Rear Same)

To adjust any down limit switch, see FIGURE 4 and proceed as follows:

1. Place the machine in the *down* position.

2. With the machine fully seated in the cradle, de-energize the machine.

3. Place a 1/8" shim between the switch actuating rod and the switch and reset the switch adjusting bracket on the mounting bracket such that the switch bottoms out with the shim in place.

4. Remove the 1/8" shim.

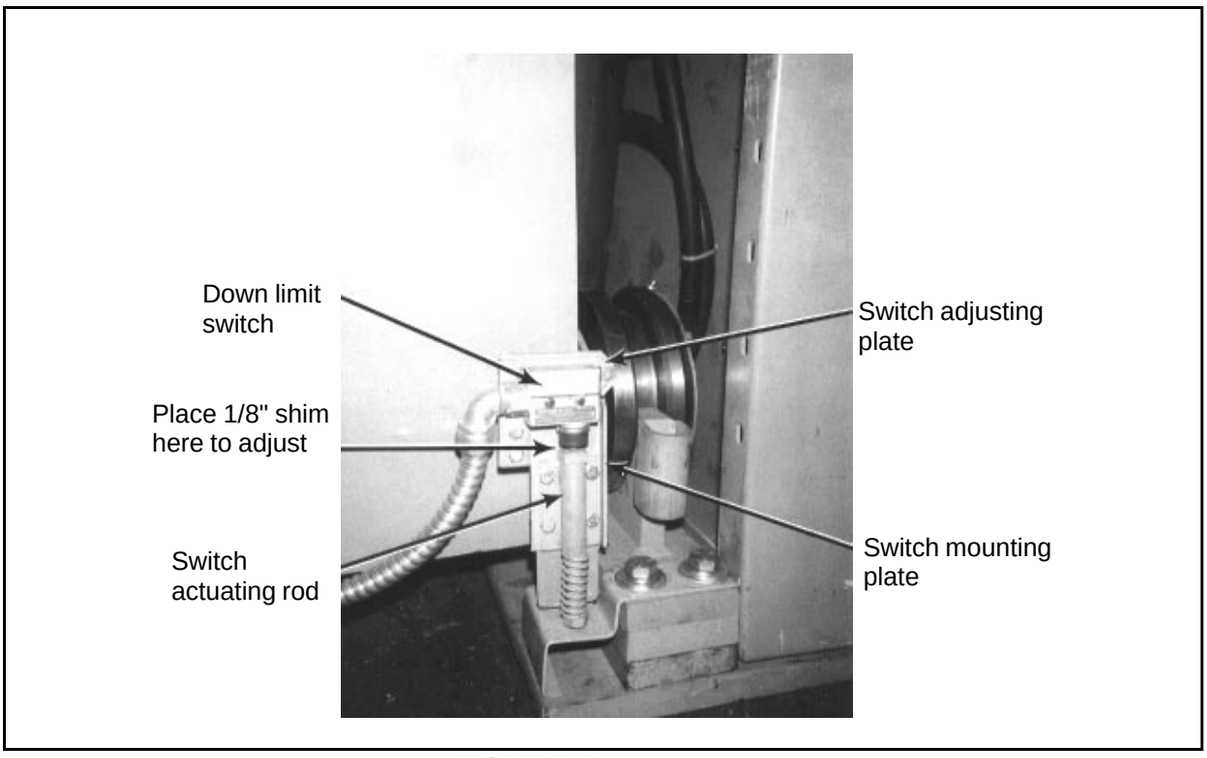


FIGURE 4 (MSSMA415AE)
Down Limit Switch Assembly
(52" machine in down position)

LIMIT SWITCH ADJUSTMENT INSTRUCTIONS

FOR UP LIMIT SWITCHES:

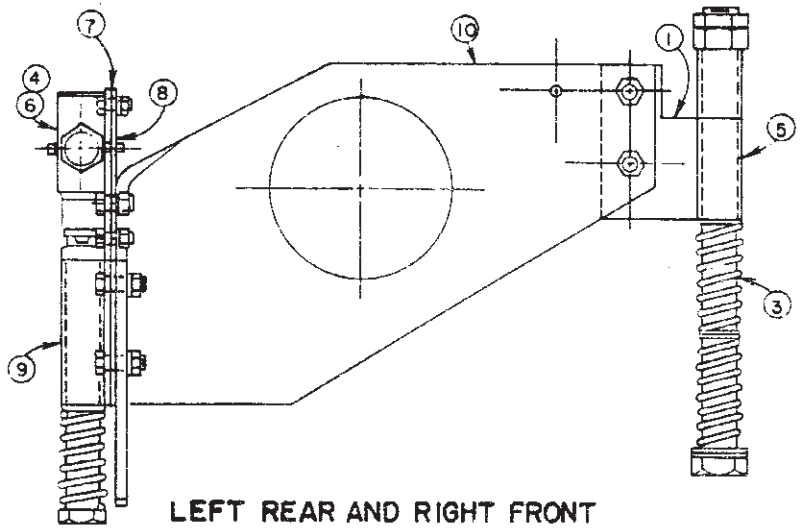
1. TILT FRONT UP TILL HYDRAULIC CYLINDER BOTTOMS.
2. ALLOW 1" VERTICAL DECLINE AND STOP MACHINE (PUSH STOP BUTTON).
3. ADJUST FRONT UP LIMIT SWITCH (POSITIONED ON REAR FRAME).
4. REPEAT PROCESS FOR REAR UP LIMIT SWITCH.

FOR DOWN LIMIT SWITCHES:

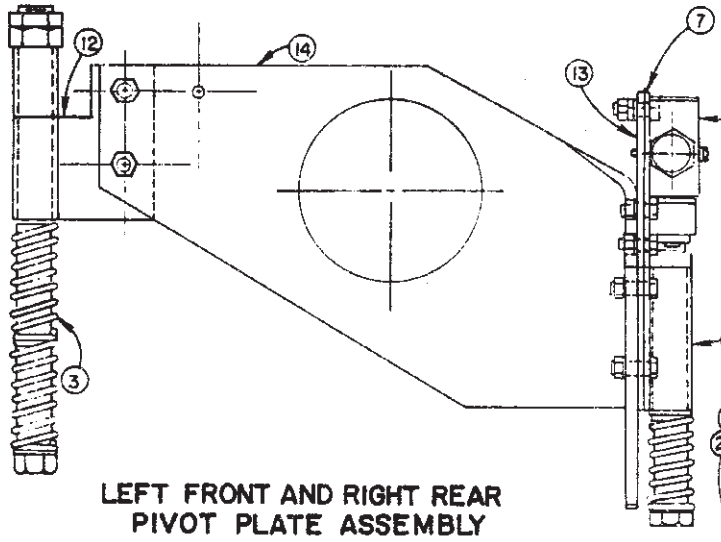
1. MOUNT DOWN LIMIT SWITCH ON ADJUSTING BRACKET (ITEM #29).
2. WITH TILT WHEEL IN CRADLE, PLACE A 1/8" SHIM BETWEEN THE WELDED NUT ON ITEM #22 AND THE SWITCH. POSITION THE SWITCH SO THAT IT BOTTOMS AGAINST THE SHIM THEN TIGHTEN ADJUSTING BRACKET (ITEM #29) TO MOUNTING BRACKET (ITEM #27/#28) AND REMOVE SHIM.

NOTES:

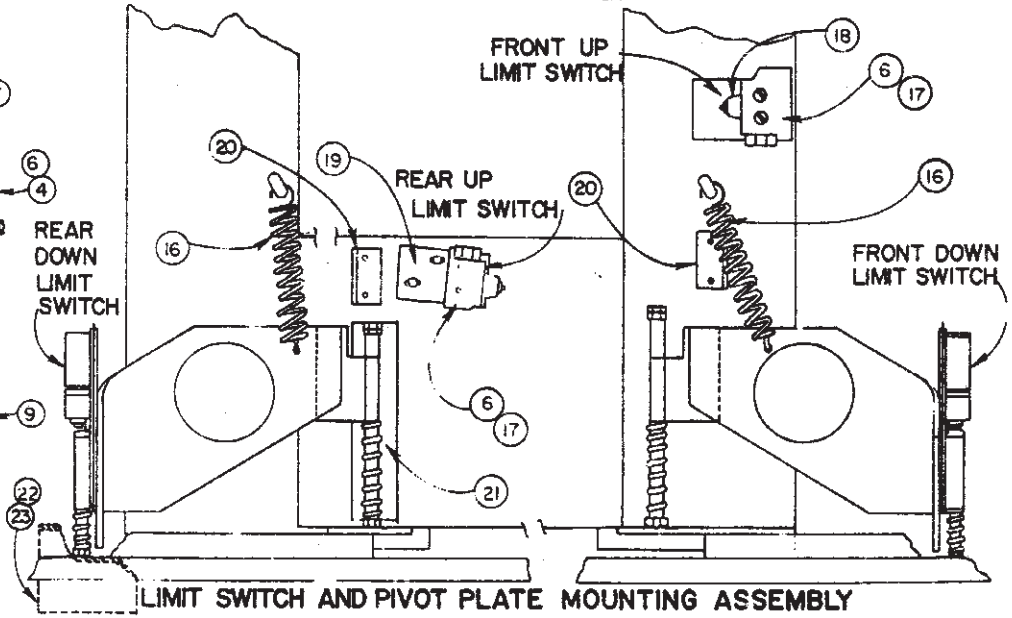
1. UP LIMIT SWITCHES REQUIRED ON ONE SIDE OF MACHINE.
2. UP LIMIT SWITCHES MUST NOT BOTTOM WHEN MACHINE IS TILTED TO THE MAXIMUM LIMIT OF THE HYDRAULIC CYLINDERS.
3. DOWN LIMIT SWITCHES MUST NOT BOTTOM AGAINST WELDED NUT WHEN INSTALLED.



LEFT REAR AND RIGHT FRONT PIVOT PLATE ASSEMBLY



LEFT FRONT AND RIGHT REAR PIVOT PLATE ASSEMBLY



LIMIT SWITCH AND PIVOT PLATE MOUNTING ASSEMBLY

Limit Switch Pivot Plate Mounting Assembly

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

Litho in U.S.A.

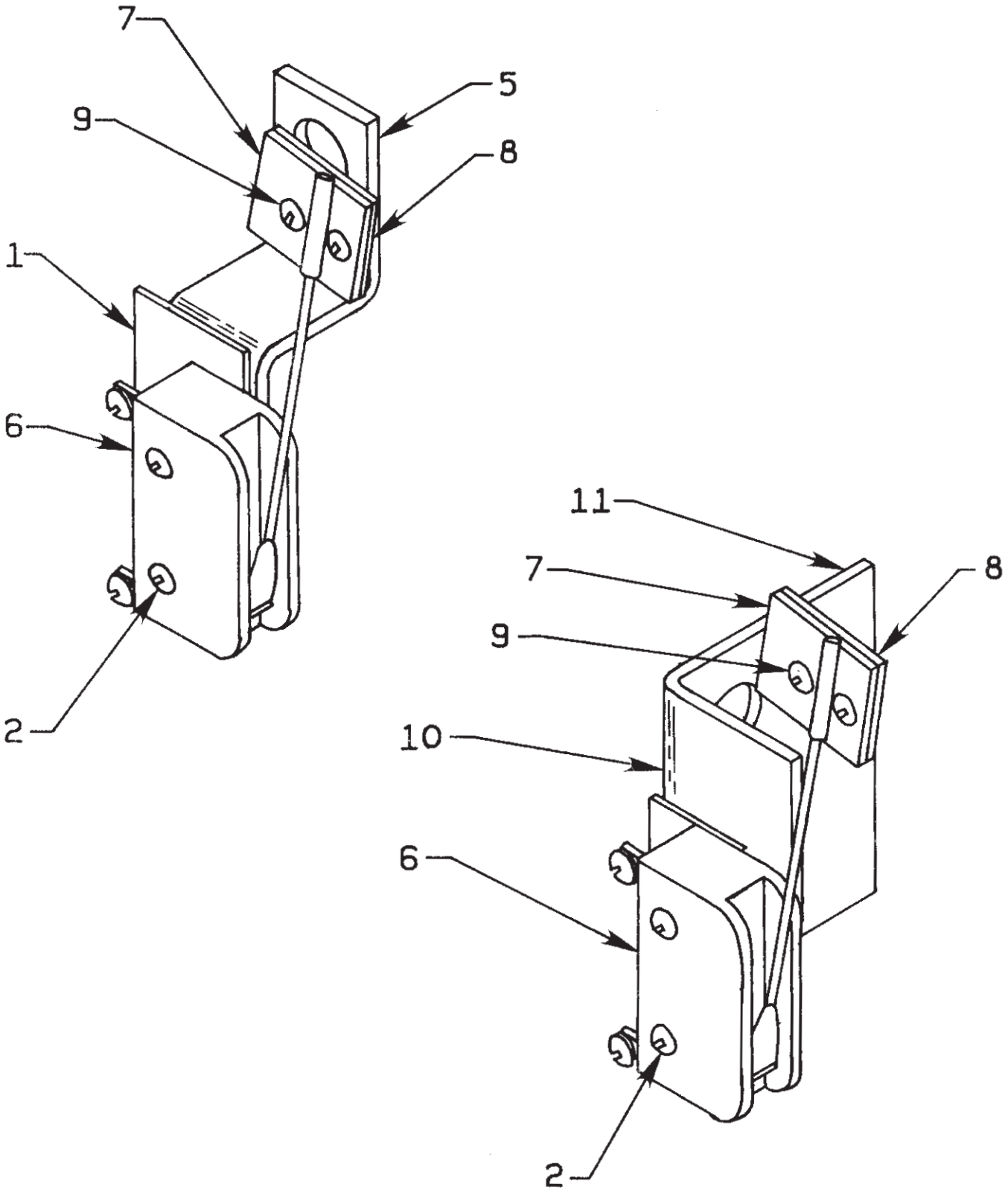
Parts List—Limit Switch Pivot Plate Mounting

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	W3 25600	80241B*SCRWSTP BRKT WELD=RT-FT+LT-R	
all	2	03 25596	80133B SHIM=SCREW STOP BRKT 52+72T	
all	3	01 09028	SPRING-BRAKEPRESSURE	
all	4	03 25602	80133B BRKT=LIM.SW.(72 FRT ONLY)	
all	5	02 02506B	78297A SPACER-SHELDOR-60+72 WED	
all	6	09R012STDG	82026#* 09R012 +MOUNTING HDWRE+INST	
all	7	03 25617	82233B MTG.PLATE=LIMIT SW. 52&72T	
all	8	03 25616A	82233# MTG.PLATE=SPRG.STOP WELD,RGT	
all	9	W3 25595	87481B*SPRG STP WELD=LIMITSW,52+72T	
all	10	03 25270	82163D ANGLE&PIVOT=LMTSW.MT,LT-FRT	
all	10	03 25271A	82163# ANGLE&PIVOT=LMTSW.MT,RT-RR	
all	11	10CA250001	83171NCABLE FOR DOWN LIMIT RETROFIT	
all	12	W3 25601	80241#*SCRWSTP BRKT WELD=LT-FT+RT-R	
all	13	03 25616	82233C MTG.PLATE=SPRG.STOP WELD,LFT	
all	14	03 25269	82163# ANGLE&PIVOT=LMTSW.MT,RT-FRT	
all	14	03 25271	82163D ANGLE&PIVOT=LMTSW.MT,LT-RR	
all	15	10CA25003R	83171NDWN LMTSW CABLE REAR DWNLMTSW	
all	16	03 01430	74527B SPRING-LIMIT SWITCH=TILT	
all	17	20A015GA	73115A SHIM=FRICTION=CWU DOORSWITCH	
all	18	03 25264	77391B BRKT=MTG UPLMTSW RR BND@PRNT	
all	19	03 25264A	77391B BRKT=MTG UPLMTSW FT BND@PRNT	
all	20	03 25544	81206B LIMITSW STOP 52+72T BEND@PRT	
all	21	03 25602	80133B BRKT=LIM.SW.(72 FRT ONLY)	
all	22	05 20210	81347C BRKT=DOWN LIMSW.STOP,RGT 72T	
all	23	05 20211	81347# BRKT=DOWN LIMSW.STOP,LFT 72T	

VIBRATION SWITCH ASSEMBLY

BMP700613
83211A



Vibration Switch Assembly

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

Litho in U.S.A.

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	

Section 7

Chemical Supply Devices

RULES FOR THE FIELD INSTALLATION OF PUMPED-TYPE LIQUID SUPPLY SYSTEMS

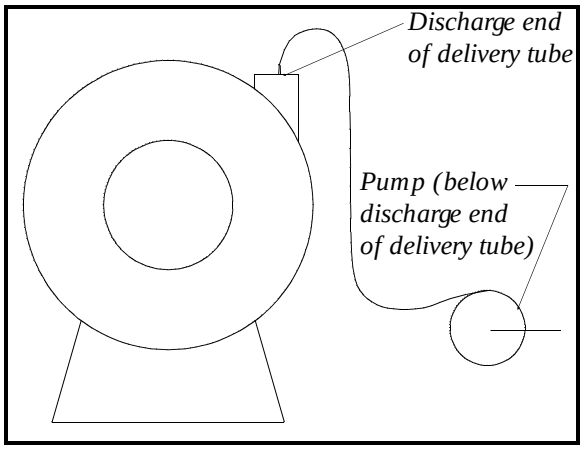
APPLICABILITY: All Washer-Extractor Models

GENERAL

Pellerin Milnor Corporation does not guarantee machines against damage from corrosion caused by improper installation and/or operation of pumped-type liquid supply systems. The following precautions must be observed when pumps are used:

1. Always install the pumping unit lower than the discharge end of the chemical delivery tube as shown at right. This will prevent any excess chemical concentrate from dribbling out of the tube and onto unprotected machine surfaces when the machine is idle.

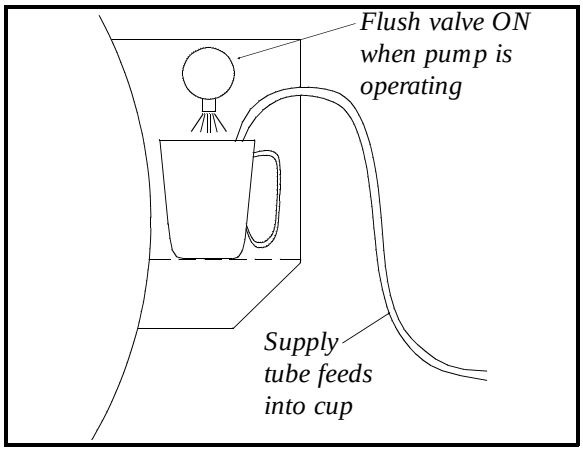
   Merely putting a "drip loop" in the delivery tube won't help much. (It might reduce the dribble a little, but not enough to prevent damage.) **The real solution is to install the pumps below the discharge end of the delivery tubes so excess chemical won't dribble out of the tube long after the pumps stop.**



2. If the machine is also equipped with a flushing supply injector:

   a. Always wire the new system so the appropriate flushing valve also operates whenever chemical is being injected. This will dilute the concentrated chemical with obvious advantages. If possible, the water flushing valve should remain on for a minimum of 30 seconds after the longest injection time for that chemical.

   b. Always inject the chemical into a plastic cup (and direct the flushing water into the same cup). This way, any chemical that dribbles out



of the tube after the pump stops will be diluted by the water remaining in the cup.

3. Never inject any concentrated chemical directly onto any metal, rubber, or plastic surface of the machine other than the plastic cups provided.

It is not enough to merely inject the chemical onto a surface that will be subsequently flushed or wetted sometime during the wash process. This is because the "culprit" is the chemical which dribbles out later. The damage occurs when the residue of a chemical (even a diluted chemical) dries on a surface—as when a chemical dribbles out of the delivery tube after the last wash cycle is finished. As the chemical dries, the water content evaporates—leaving a deposit of a very concentrated chemical which is then free to attack the host surface throughout the night (or over the weekend) or until the machine is returned to service.

The only realistic solution is to make sure that the discharge end of each chemical delivery tube is above the pump so excess chemical left in the tube after the pump stops cannot dribble out later.

Supply Injector
6036, 6044 & 5238

BMP700940/97287V
(Sheet 1 of 2)

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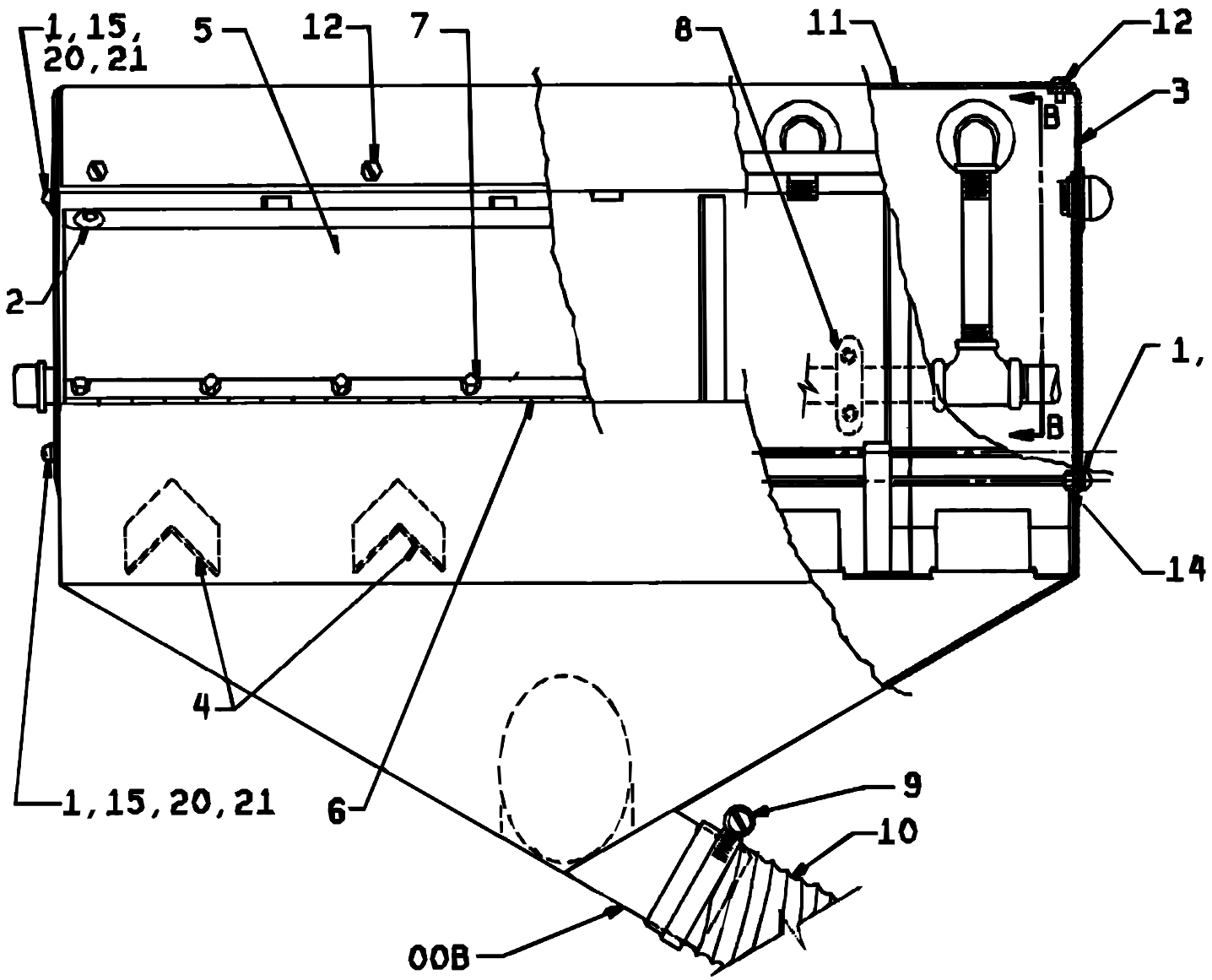
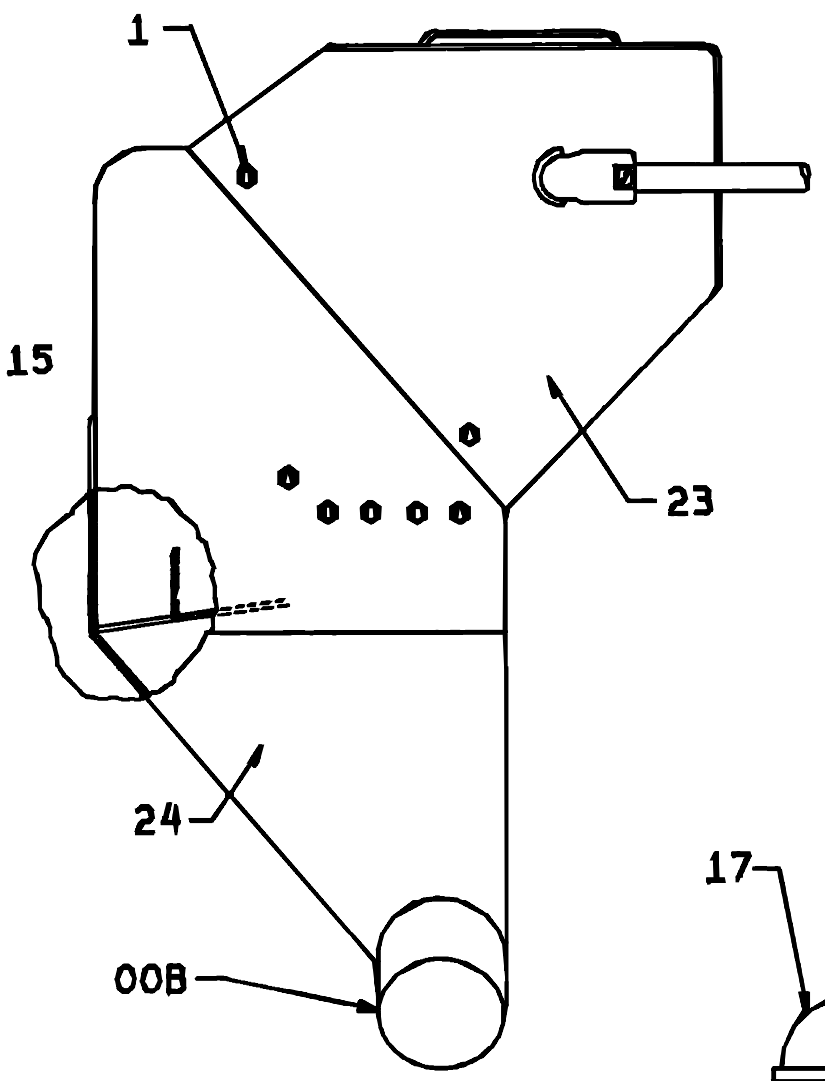
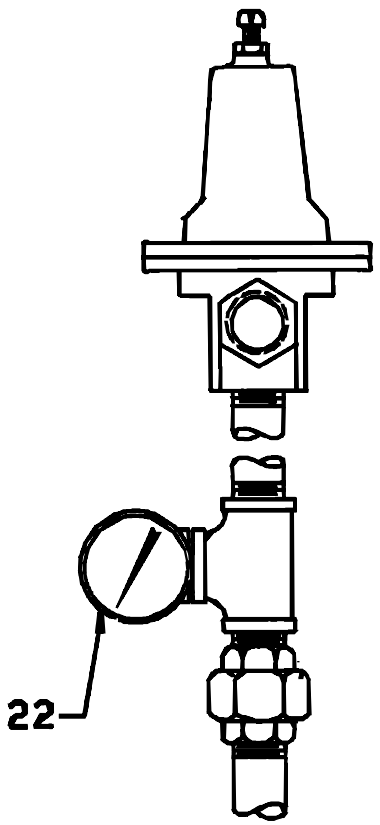


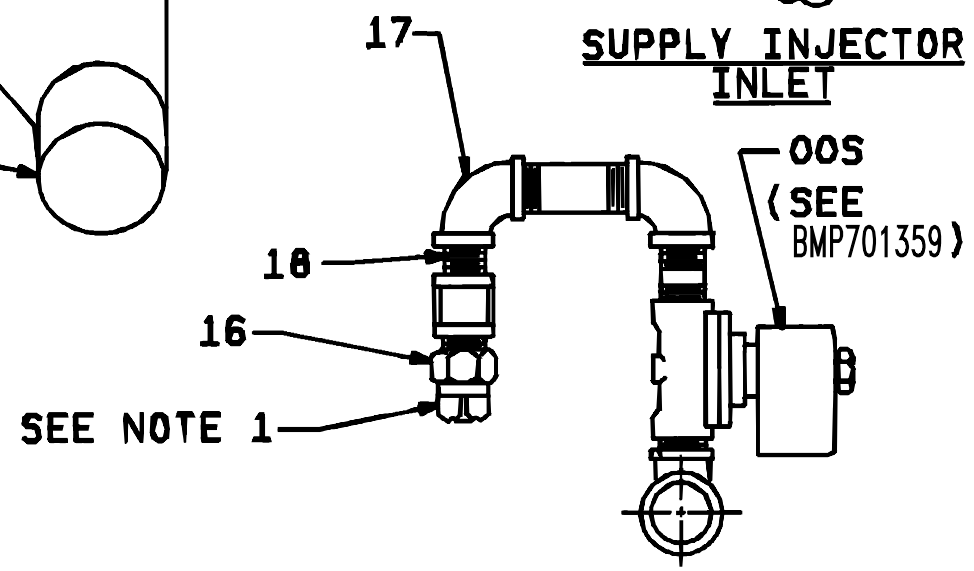
NOTES:

1. THIS NOZZLE USED IN COMPARTMENTS 1 & 2 ONLY.





SUPPLY INJECTOR INLET



SECTION B-B

142

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Litho in U.S.A.

Parts List—Supply Injector

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	A28 18300	85031D* ASSY,5FLUSH SUPINJ=6036WE	6036
	B	SA 28 085	SUPPLYINJECTOR 5FLUSH=60" DIVCYLS	6044
	D	A28 18600	90346D$PIPING+VALVE=SUP INJ ASSY	
	E	SA 28 086	70256C* COVER ASSY=SUPPINJ	00A & 00B
			----------COMPONENTS----------	
all	1	15G121	HXCAPNUT 10-24UNC2 #3266BR NKLPLTG2	
all	2	60C001	RUBBER BUMPER BLK W/WASHER ONLY#698	
all	3	02 18024	66023Z FRONT VALVCLOZ	
all	4	02 18179	76164B DIVIDER-SUP INJ	
all	5	02 18543	93352C LID=SUPPLY INJECTOR	
all	6	02 02649	89356A HINGE=VALVE ENCLOSURE-16.25"	
all	7	15J004	01Z TUBULAR RIVET TRS#40988 3/16"	
all	8	15K105	HXCAPSCR 3/8-16UNC2A1.25 GR5 PLATED	
all	9	27A074	HOSECLAMP 2+1/16-3"CADSCR+1/25 BAND	
all	10	60E301A24A	HOSE= *2.5"ID PE X 24"	
all	11	02 18564	85013C ENCLOSURE=SUPPLY INJ VALVE	
All	12	15P010	12Z PHILPAN TRDCUTSCRTYP10-24X1/2SS	
all	13	27A126	MEASURECUP 48OZ STOWAY1025P	
all	14	15G130	HEXMACHSCRNUT 10-24UNC2 SS18-8	
all	15	24G018N	ROLLED WASHER .194"ID NYLTITE #10W	
all	16	27A001	NOZZLE BRASS 1/2" SPRAYSYS #HH29SQ	
all	17	5SL0PNFA	NPT ELBOW 90DEG 3/4" GALMAL 150#	
all	18	5N0PCLSB42	NPT NIPPLE 3/4XCLS TBE BRASS STD	
all	20	15N117	RDMACSCR 10-24UNC2X3/8SS18-8	
all	21	15U160	LOCKWASHER MEDIUM #10 SS18-8	
All	22	30N100	07Z PRESSGUAGE 1/8"BACKCONN 0-30PSI	
all	23	02 18025	66022Z REAR VALVCLOZ	
all	24	W2 18559	92612#* SUP-CHUTE 5-FLUSH=6044W+S+	

Section 8

Water and Steam Piping Assemblies

Water Level Switch Assembly

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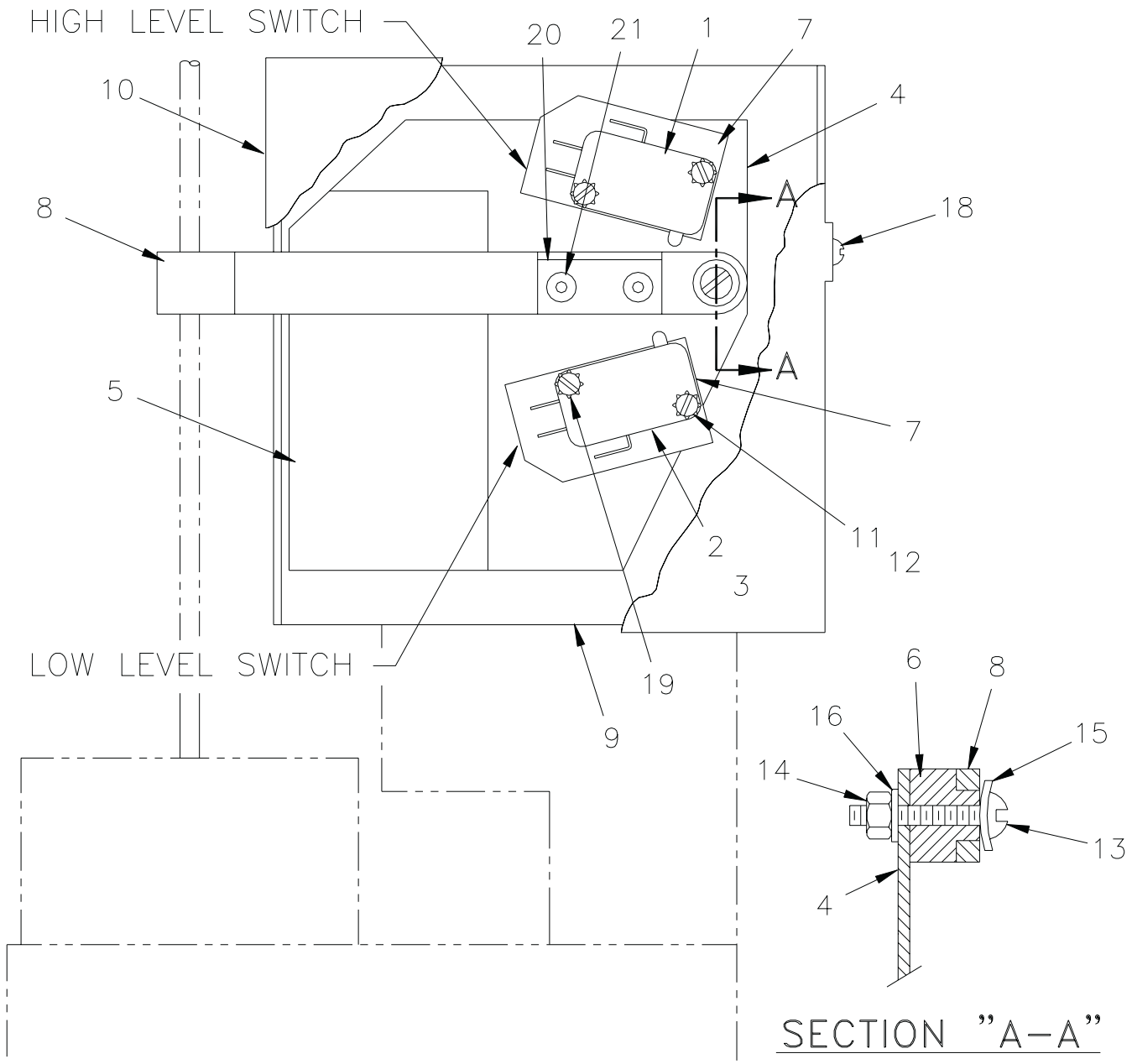
Litho in U.S.A.

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	

Water Level Float Chamber

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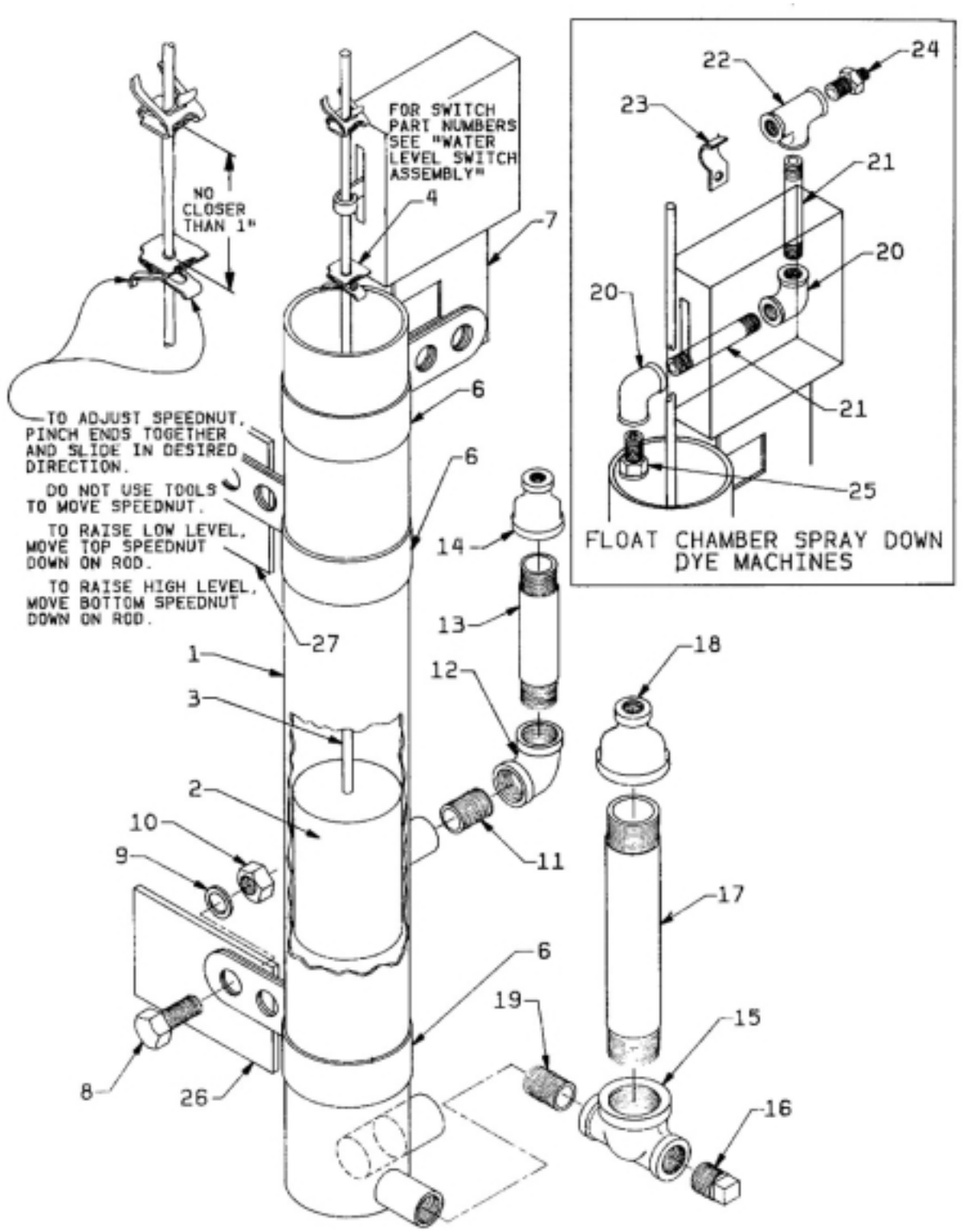

Parts List—Water Level Float Chamber

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 FLOAT CHAMBER ASSEMBLY

Pellerin Milnor Corporation
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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	78226U FLOAT CHMBR ASSY=8.25"CLDCON	
	B	ALL11001	92052D*FLOAT CHAMBER INSTAL=4226QHE	
	C	A14 07200C	80326L$ ASSY=FLOAT SPRAY 42DAZ	
	D	ALL48001	92052#*FLOAT CHAMBER ASSY 4832-36	
	E	AD 14 046	78267U*FLOAT CHMBR INSTAL=35#+60#W	
	F	AD 15 047	92053# FLOAT CHMBR 25.25ASY=42+72WE	
	G	ALL11000	92053#*FLOAT CHMBR 33.25ASSY=4226Q	
	H	G28 18700A	80086D FLOAT CHAMBER 25.25 INST=60"	
	I	G36 07500A	80086# FLOAT CHAMBER 25.25 INST=72"	
	J	G25 02600A	77137# FLOAT CHAMBER INSTAL=5238	
	K	GLL64002	85376D FLOAT CHAMB=FRAME INSTL 64NP	
	L	ALL64002	92086D FLT CHAMBR ASSY64NP W/90D 1N	
			----------COMPONENTS----------	
alL	1	W2 14432	91436T* FLOAT-TUBE L=25.25"	
alL	1	X2 14432K	77521B FLOAT CHAMBER 96"LG REUSE	FOR USE WITH REUSE SUMP
alL	1	W2 14432M	84472T*FLOAT CHAMBER-33.25"W/90DIN	
alL	2	X2 02239	92683# FLOAT=PLAST LVL CONT(SANDED)	TO ORDER SEE ITEMS 30+31
alL	3	02 02146	84277A LEVEL CONTROL FLOAT ROD=25"L	TO ORDER SEE ITEM 30
alL	3	02 02146E	84277# LEVEL CONTROL FLOAT ROD=66"L	TO ORDER SEE ITEM 31
alL	3	02 02146B	73336A COUPLING=FLOAT ROD	FOR USE WITH REUSE SUMP
alL	4	17N050	10-24 SPEEDNUT #C10733-1024-373	TO ORDER SEE ITEMS 30+31
alL	6	02 15642A	CLAMP-3"FLOAT CHAMBER	
alL	7	02 15097C	88036B BRACKET LEVCONT PER PRINT	
alL	8	15K039	HXCAPSCR 1/4-20UNC2AX3/4 GR5 ZNC/CD	
alL	9	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
alL	10	15G165	HXNUT 1/4-20UNC2BSAE ZC GR2	
alL	11	5N0KCLSG42	NPT NIPPLE 1/2XCLS TBE GALSTL SK40	
alL	12	5SL0KNFA	NPT ELBOW 90DEG 1/2" GALMAL 150#	COOLDOWN OPT.

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Parts List, cont.—WATER LEVEL FLOAT CHAMBER

Used In	Item	Part Number	Description	Comments
alL	13	5N0K04AG42	NPT NIPPLE 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
alL	17	5N1A07AG42	NPT NIPPLE 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 NIPPLE 1/2XCLS TBE GALSTL SK40	4226,4832,4836,6442
alL	20	5SL0EBEA	NPT ELBOW 90DEG 1/4" BRASS 125#	SPRAY-DOWN /DYE MACHINES
alL	21	5N0E03KBE2	NPT NIPPLE 1/4X3.5 TBE BRASS 125#	SPRAY-DOWN /DYE MACHINES
alL	22	51V015	03Z TEE PIPE 1/4"FGDBRASS101-T7-444	SPRAY-DOWN /DYE MACHINES
alL	23	12P014KK	01Z CABLE CLMP NONMTL 1/2IDX1/2WIDE	SPRAY-DOWN /DYE MACHINES
alL	24	53A008B	BODY=BRMALCON 1/4X1/4COMP W#B68X4X4	SPRAY-DOWN /DYE MACHINES
alL	25	27A003	NOZZLE 1/4" BRASS SQUARE PATTERN	SPRAY-DOWN /DYE MACHINES
alL	26	02 10506	84417B BRACKET-BOTTOM FLOAT=CHAMBER	3016,3621
alL	26	02 15663	85093C BRKT=FLOAT CHAMBER MTG	4231,4241,7244
alL	26	02 15649	83403B BRKT=FLOAT CHAMBER MTG	6036,6044
alL	26	03 25298A	83182C FLOAT CHAMBER BRACK	4832,4836,6442
alL	27	02 10505	70097B BRACKET=TOP FLOATCHMBR	3016,3621
alL	27	02 15649	83403B BRKT=FLOAT CHAMBER MTG	4231,4241,6036, 6044,7244
alL	27	08 01065	84402B BRACKET=LEVEL CNTRL MT 90DEG	4226DYA
alL	27	03 25298A	83182C FLOAT CHAMBER BRACK	4832,4836,6442
alL	30	SA 02 011	90013C*FLOAT ASSY L=25"-STD LEVEL	ITEMS 002,003A,004
alL	31	SA 02 011B	90013#*FLOAT ASSY L=66" 42DA+52DYA	ITEMS 002,003B,004

8” & 10” Stainless Dump Valve

42044WP2/CP2/SP2/SP3/NP2 52038WP1 60044WP2/WP3/SP2/SP3
72044WP1/D5N 72058SP2

BMP780095/2000133V
(Sheet 1 of 1)

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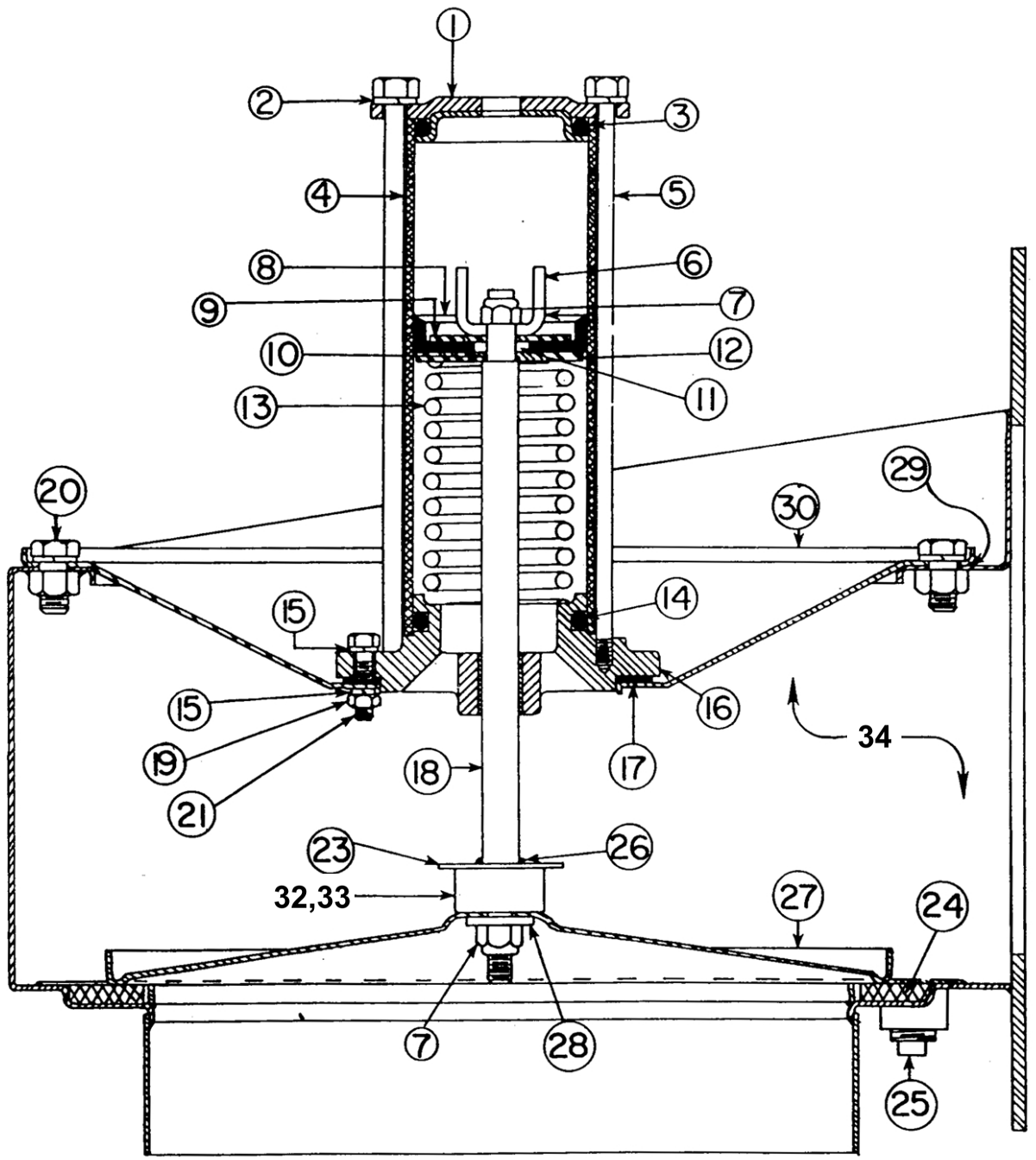

Parts List—8” & 10” Stainless Dump Valve

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	SA 28 124	*8"SGL.DUMPVALVE 4244+52+60	42044WP2/CP2/SP2/SP3/NP2 52038WP1 60044WP2/WP3/SP2/SP3
	B	SA 36 015	10"SGL.DUMP VALVE 72WE+SG+WT	72044WP1/SP2, 72058D5N
	C	SA 28 158	* BONNET+AIRCYL=8"SS DUMPVALV	8" DUMP VALVE
	D	SA 36 044	* BONNET+AIRCYL=10"SS DUMPVAL	10" DUMP VALVE
			----------COMPONENTS----------	
all	1	02 02101	CYLHEAD W/TAPPED HOLE	
all	2	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
all	3	60C132	ORING 2"IDX3/16CS BUNA70 #329	
all	4	02 02068	AIRCYL-STAINLESS=DUMPVALVE	
all	5	02 10585D	TIE BOLT=5/16-18X7.875 PLTD	
all	6	03 01313	STOP=AIR CYL W/2+11/16STROKE	
all	7	15G220	LTHX THIN LOKNUT 3/8-24 SSNTE	
all	8	02 02194	PISTONCUP=DUMPVALVE 2+3/8"	
all	9	02 02085	UP WASHER=2"OD=PISTON CUP	
all	10	60C106	ORING 5/16ID 1/16CS BUNA70#011	
all	11	02 02185	WASHER=PISTON CUP COMP LIMIT	
all	12	02 02105	PISTON CUP WASHER STNLS STL	
all	13	03 06429	SPRING=2.11ODX6.5FL 64#/"	
all	14	60C132	ORING 2"IDX3/16CS BUNA70 #329	
all	15	24G020N	ROLLED WASH.252ID NYLTITE 25W	
all	16	X2 02743	BONNET=2"DUMP VALVE	
all	17	02 18931F	GASKET=DUMPVALVE-1/60+72WEHU	
all	18	02 16021I	DUMPVAL STEM-4"+8"316SS	
all	19	15G168	SQNUT 1/4-20UNC2 SS18-8	
all	20	15K086	HXCAPSCR 3/8-16NCX3/4 SS18-8	
all	21	15K041S	HEXCAPSCR 1/4-20UNC2AX1 SS18-8	
all	23	02 16021E	WASHER 3/8IDX1.250D DUMPVAL	
A	24	02 18068	9 SEAT-RESILIENT=8"DUMPVALVE	
Bl	24	03 06084	SEAT-RESILIENT=10"DUMPVALVE	
all	25	5SP0KGFSS	NPT PLUG 1/2 SOSOLID GALSTL	
all	26	60C106	ORING 5/16ID 1/16CS BUNA70#011	
A	27	02 18796	DISC-8" DUMP VALVE S/S	
B	27	03 06083	DISC-10"DUMP VALVE S/S	
all	28	15U245	FLTWASH 3/8 STD COMM 18-8 SS	
all	29	03 06086G	GASKET=10" DUMP VALVE BONNET	
A	30	02 18931E	BONNET-8"DUMP VALVE	8" DUMP VALVE
B	30	03 06086F	BONNET=10"DUMP VALVE	10" DUMP VALVE
All	32	02 16021C	BUMPER=DUMP VALVE BONNET	
all	33	02 16021D	DUMP VALVE BUMPER RETAINER	
A	34	W2 18931	* BODY=8"DUMPVALV=4244,60,52	8" DUMP VALVE
B	34	W3 06086	*BODY=10"DUMP VALVE 72WE,SG,T	10" DUMP VALVE

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

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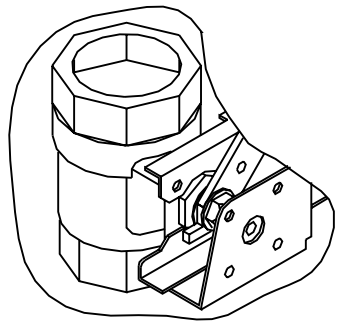
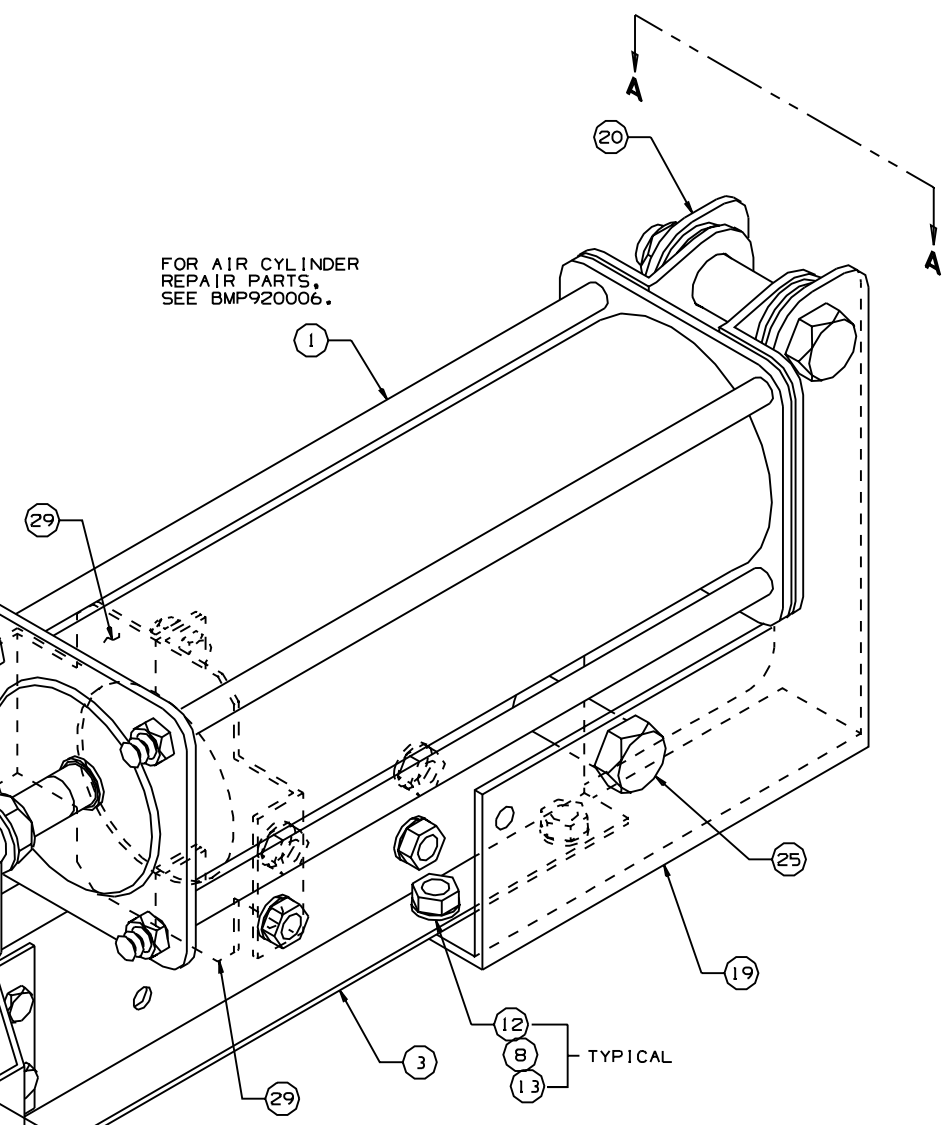
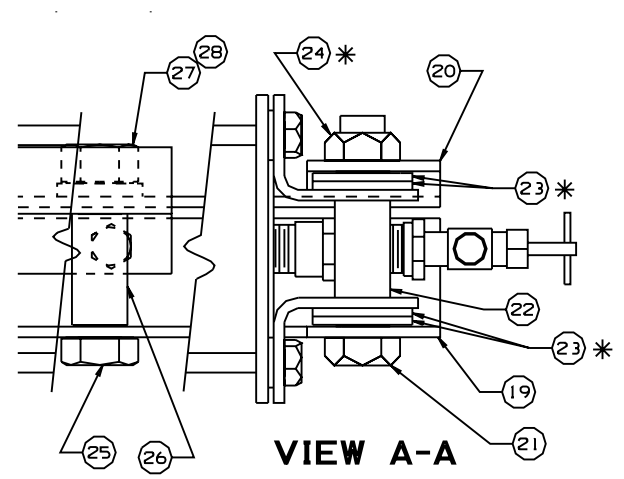


90° VALVE SET

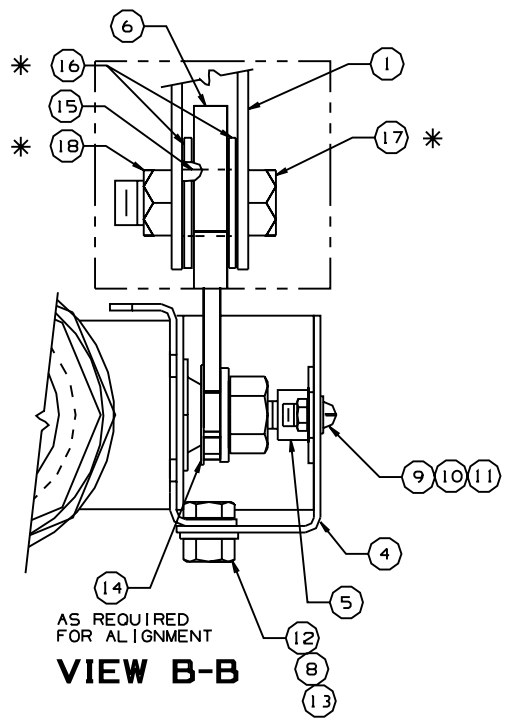


FOR PROPER ALIGNMENT OF ASSEMBLY:

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

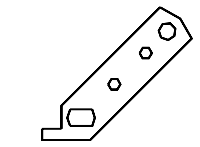


VIEW A-A

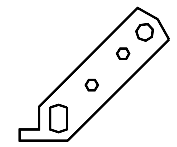


AS REQUIRED FOR ALIGNMENT

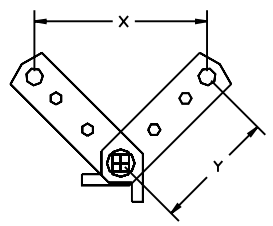
VIEW B-B



NORMALLY OPEN CRANK (ITEM 6)



NORMALLY CLOSED CRANK (ITEM 6)



STROKE DIMENSIONS

SIZE	X	Y
2" VALVES	3.89	2.75

NOTES:

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

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

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

Pellerin Milnor Corporation
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Parts List—Actuators & Mounting Hardware for Watts Ball Valves

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	AA	96D085BCSL	92000Z 1.00WAT BVAL+ACT/BR/NC/ST/LH	
	AB	96D085BCSR	93513S 1.00WAT BVAL+ACT/BR/NC/ST/RH	
	AC	96D085BOSL	93513S 1.00WAT BVAL+ACT/BR/NO/ST/LH	
	AD	96D085BOSR	93513S 1.00WAT BVAL+ACT/BR/NO/ST/RH	
	AE	96D085SOSR	92000Z 1.00WAT BVAL+ACT/SS/NO/ST/RH	
	AF	96D085SCSR	92000Z 1.00WAT BVAL+ACT/SS/NC/ST/RH	
	BA	96D086BCSL	93513S 1.25WAT BVAL+ACT/BR/NC/ST/LH	
	BB	96D086BCSR	93513S 1.25WAT BVAL+ACT/BR/NC/ST/RH	
	BC	96D086BOSL	93513S 1.25WAT BVAL+ACT/BR/NO/ST/LH	
	BD	96D086BOSR	93513S 1.25WAT BVAL+ACT/BR/NO/ST/RH	
	BE	96D086SCNR	92000Z 1.25WAT BVAL+ACT/SS/NC/90/RH	
	BF	96D086SCSL	92000Z 1.25WAT BVAL+ACT/SS/NC/ST/LH	
	BG	96D086SCSR	92000Z 1.25WAT BVAL+ACT/SS/NC/ST/RH	
	BH	96D086SOSL	92000Z 1.25WAT BVAL+ACT/SS/NO/ST/LH	
	BJ	96D086SOSR	92000Z 1.25WAT BVAL+ACT/SS/NO/ST/RH	
	CA	96D087BCSL	93513S 1.50WAT BVAL+ACT/BR/NC/ST/LH	
	CB	96D087BCSR	93513S 1.50WAT BVAL+ACT/BR/NC/ST/RH	
	CC	96D087BOSR	93513S 1.50WAT BVAL+ACT/BR/NO/ST/RH	
	CD	96D087SCNR	92000Z 1.50WAT BVAL+ACT/SS/NC/90/RH	
	CE	96D087SCSR	92000Z 1.50WAT BVAL+ACT/SS/NC/ST/RH	
	CF	96D087SOSR	92000Z 1.50WAT BVAL+ACT/SS/NO/ST/RH	
	DA	96D088BCSR	92177S 2.00WAT BVAL+ACT/BR/NC/ST/RH	
	DB	96D088BCNR	92177S 2.00WAT BVAL+ACT/BR/NC/90/RH	
	DC	96D088BCSL	92177S 2.00WAT BVAL+ACT/BR/NC/ST/LH	
	DD	96D088BOSR	92177S 2.00WAT BVAL+ACT/BR/NO/ST/RH	
	DE	96D088SCNR	92177S 2.00WAT BVAL+ACT/SS/NC/90/RH	
	DF	96D088SCSR	92177S 2.00WAT BVAL+ACT/SS/NC/ST/RH	
	DG	96D088SOSR	92177S 2.00WAT BVAL+ACT/SS/NO/ST/RH	
	DH	96D088BCNL	92177S 2.00WAT BVAL+ACT/BR/NC/90/LH	
	DJ	96D088BOSL	92177S 2.00WAT BVAL+ACT/BR/NO/ST/LH	
	DK	96D088SCSL	92177S 2.00WAT BVAL+ACT/SS/NC/ST/LH	
	DL	96D088SOSL	92177S 2.00WAT BVAL+ACT/SS/NO/ST/LH	
			----------COMPONENTS----------	
AA-AD, BA-BD, CA-CC	1	SA 10 056F	92000Z AIRCYL=2.38ODX2.70STX20.5#CD	
AE-AF, BE-BJ, CD-CF	1	SA 10 056G	92000Z*AIRCYL=2.38ODX2.70STX20.5#SS	
DA-DD, DH-DJ	1	SA 10 057C	95222D AIRCYL=3.0ODX3.89ST171/176CD	
DE-DG, DK-DL	1	SA 10 057D	95222# AIRCYL=3.0ODX3.89ST171/176SS	
AA-AE	2	96D085WEXS	07Z BALVAL 1" BRZ WATTS#B6400SSZ107	
AF	2	96D085WSS	07Z BALVAL 1" SS WATTS S8000-Z107	
BA-BD	2	96D086WEXS	08Z BAVAL 1+1/4BRZ WATS#B6400SSZ107	
BE-BJ	2	96D086WSS	08Z BAVAL 1+1/4"SS WATTS S8000-Z107	
CA-CC	2	96D087WEXS	09Z BAVAL 1+1/2BRZ WATS#B6400SSZ107	

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

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

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

Used In	Item	Part Number	Description	Comments
all	11	15G126	01Z HXLOCKNUT NYLON 10-24 UNC SS NM	
all	12	15N159	HEXCAPSCR 1/4-2OUNC2AX7/16 18-8SS	
all	13	15G170	HEXNUT 1/4-20UNC2 SS18-8	
AA-AF,BE, CD,DA-DL	14	07 20703D	89354B WASHER=2.00"WATTS CRANK	
BA-BD, BF-BJ, CA-CC,CE, CF	14	07 20703C	89354B WASHER=1.25-1.50 WATTS CRANK	
all	15	02 15893	92683B SPACER=BALL VALVE CRANK STEM	
all	16	15U188	01Z FLTWASH 1/4 STD COMM SS18-8	
all	17	15N186	HXCAPSCR 1/4-20UNC2X3/4SS18-8	
all	18	15G164	01Z HX THIN LOCKNUT NYL1/4-20 SS	
BA,BB,BE, BJ,CE	19	03 01661A	92271B BRKT=RHT AIR CYL SUPT-S/S	
DA,DB, DD-DG	19	03 01625A	92271B 3" AIR-CYL SPT BRK R-SIDE RT	
DC,DH-DL	19	03 01625B	92271# 3" AIR-CYL SPT BRK R-SIDE LT	
BE,BG,BJ, CE-CF	20	03 01662A	92271B BRKT=LFT AIR CYL SUPT-S/S	
DA,DB, DD-DG	20	03 01625C	92271B 3" AIR-CYL SPT BRK L-SIDE RT	
DC,DH, DJ-DL	20	03 01625D	92271# RIGHT=3"AIR CYL SUPT BRKT	
all	21	15K190S	HXCAPSCR 1/2-13UNC2AX2.5 FLTHRD SS	
all	22	27B24S0K1P	SPACER ROLL.5ID1.75L.062T 304 SS	
all	23	15U318S	FLATWASH 1.12ODX.656IDX.09T 304 SS	
AB,DA-DL	24	15G234NS	HXLOCKNUT NYL 1/2-13UNC2 SS18-8	
all	25	15K180S	HXCAPSCR 1/2-13UNCAX2 18-8SS	
all	26	27B24SSK1F	SPACER ROLL.5ID1.25L.062T S/S	
all	27	15U310	LOKWASHER REGULAR 1/2 SS18-8	
all	28	15G231S	HXFINJAMNUT 1/2-13UNC2B SS18-8	
AA-AF	29	03 01633	92651C ACTUATOR SUPPORT BRKT 1.0"	
BA-BJ	29	07 20771	88407C ACTUATOR SUPPORT BRKT 1.25"	
CA-CF	29	07 20770	88243B ACTUATOR SUPPORT BKT 1+1/2	
DA-DL	29	03 01626	89473B ACTUATOR SUPPORT BRKT 2"VAL	

Watts Ball Valves and Repair Kits

Pellerin Milnor Corporation
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BMP920007/96067V (1 of 2)
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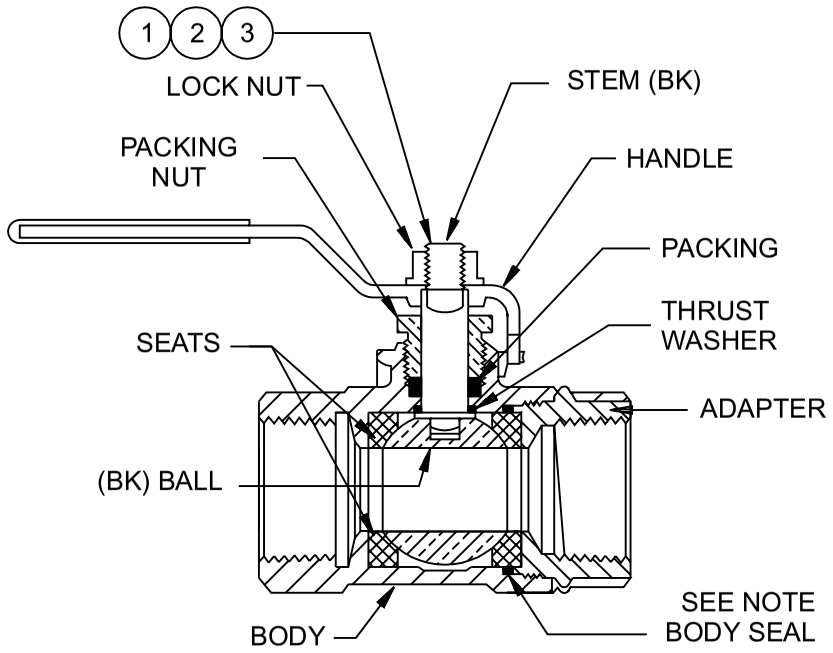
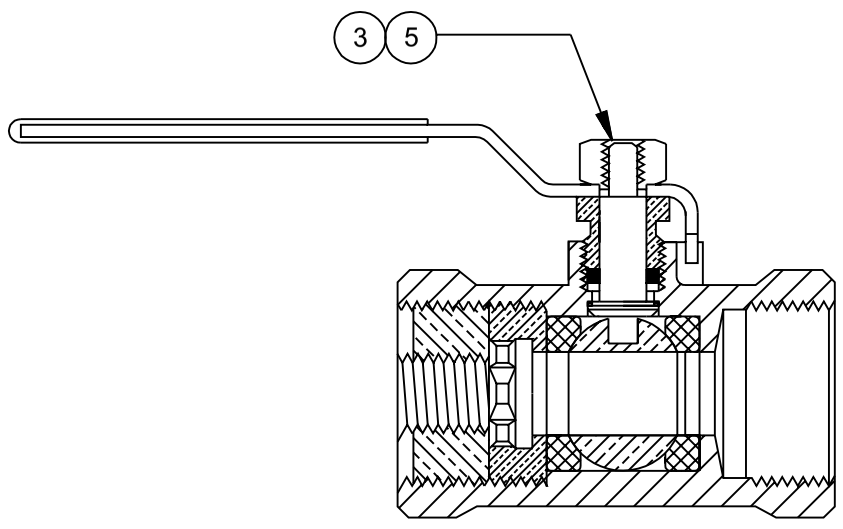
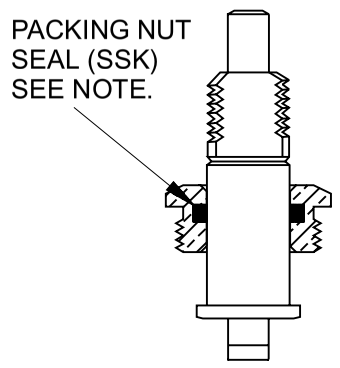
BALL VALVES WITHOUT ACTUATOR PADS FOR MANUAL OPERATION



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

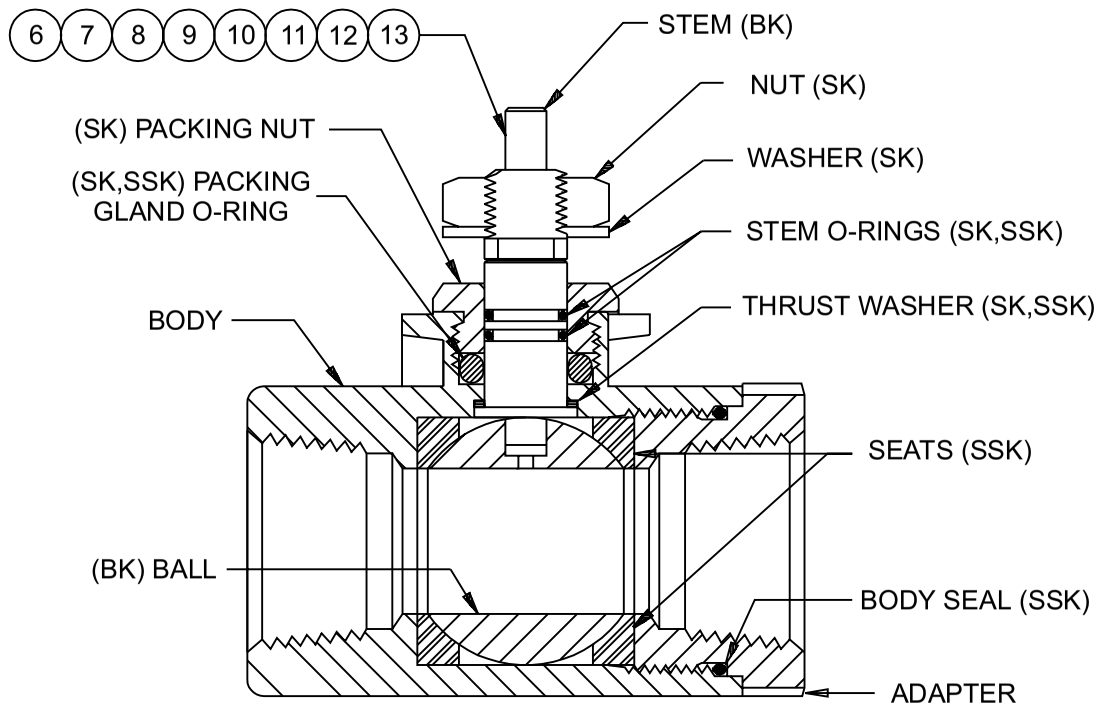


3/4",1"
BRONZE
NO REPAIR KITS



DETAIL
OLD STYLE STEM

AIR OPERATED BALL VALVES



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
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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	

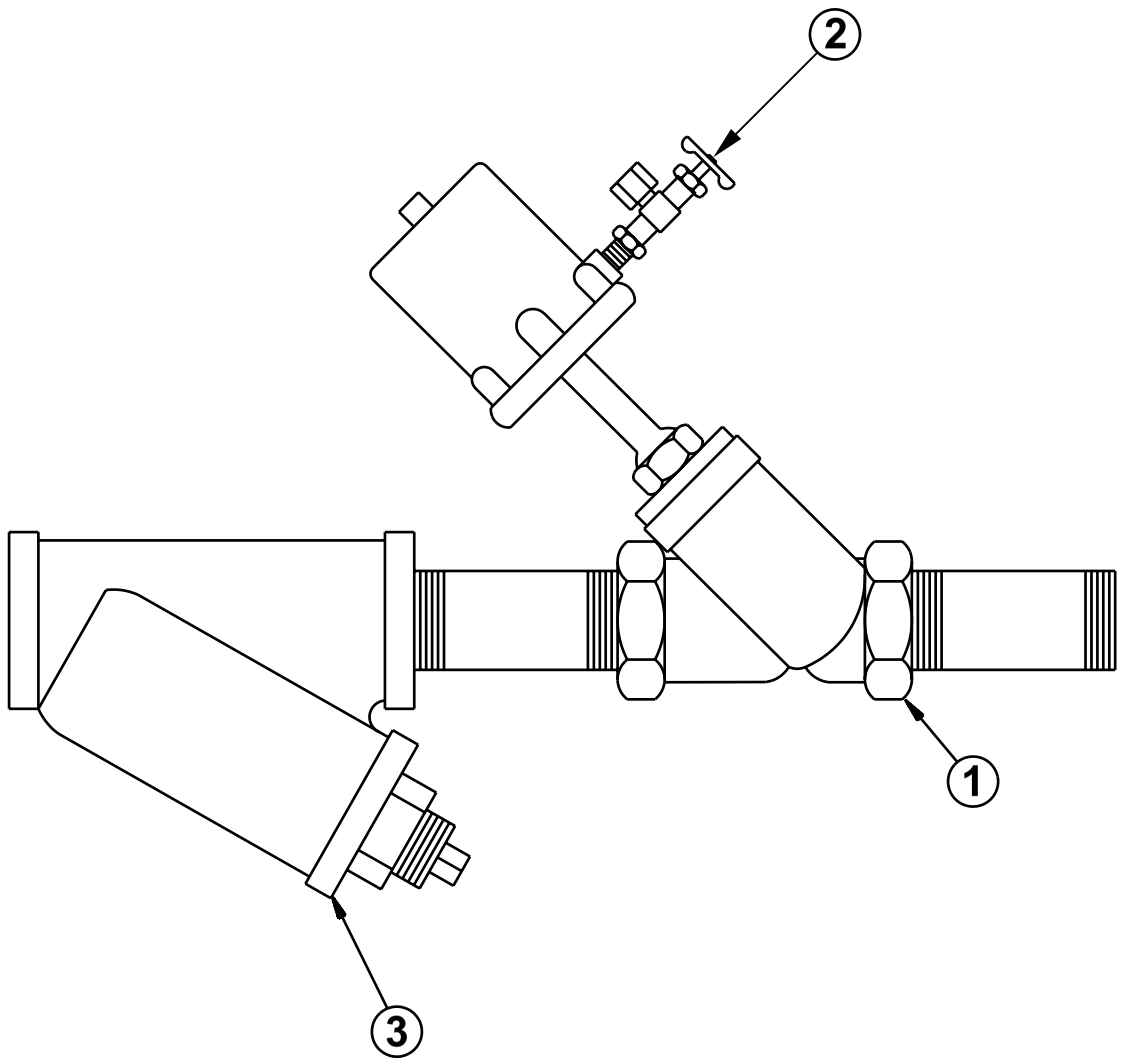
Parts List, cont.—Watts Ball Valves and Repair Kits

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	

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.

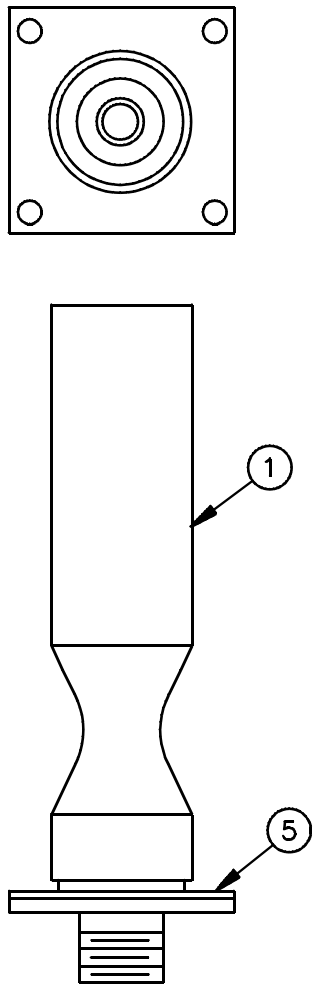
Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	W	96D0009ER1	02Z REPAIRKIT 3/4" STEAM VALVE	KIT FOR 001A
	X	96D0011ER1	02Z REPAIR KIT 1.25" STEAM VALVE	KIT FOR 001B
	Y	96D0011ER2	ACTUATOR HOUSING FOR BURKET #251	KIT FOR 001B
	Z	96D0011ER3	REPAIR KIT MULLER 1.25 VALVE #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

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

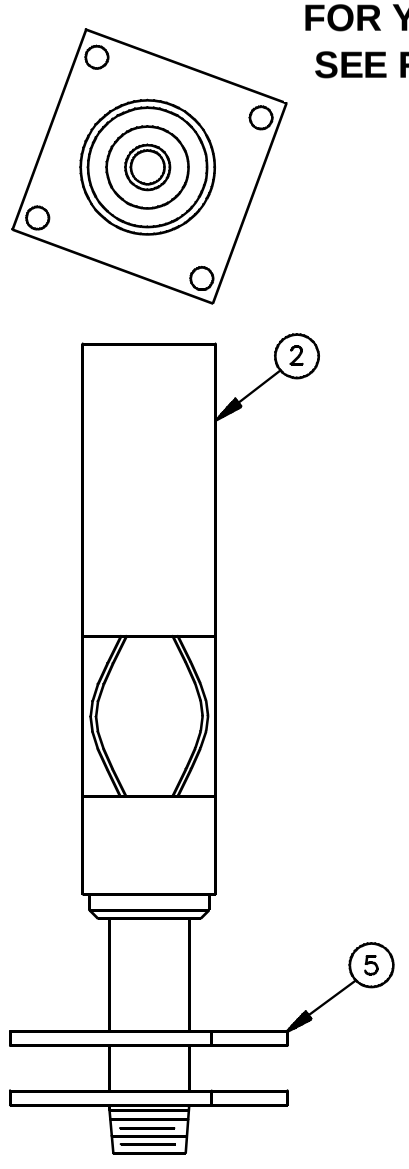
DRAWING
(See other page for parts list, if applicable.)

STEAM SPARGER ASSEMBLIES

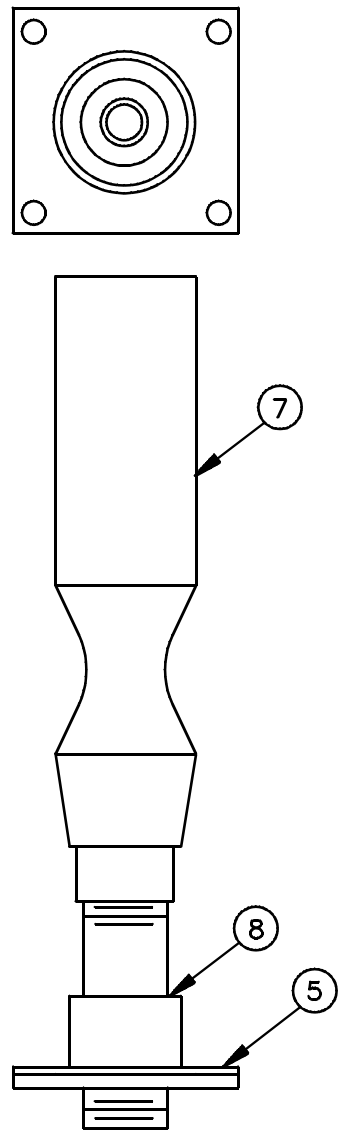
NOTE: TO DETERMINE ASSEMBLY NUMBER FOR YOUR MACHINE SEE REVERSE SIDE



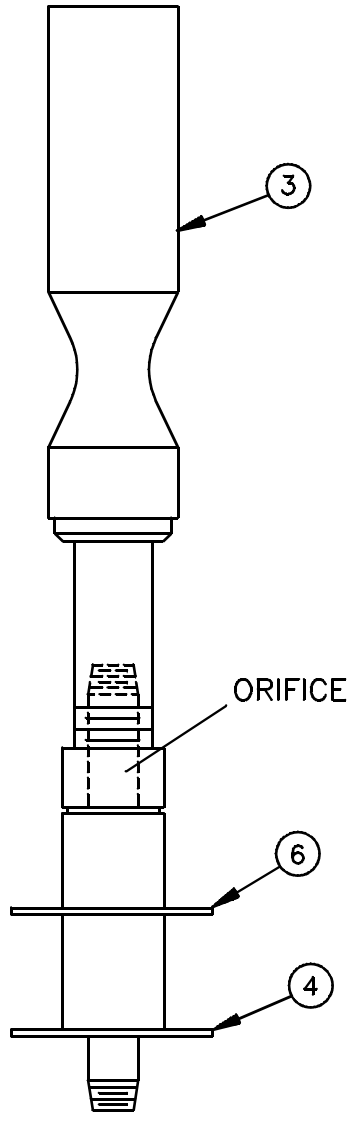
ASS14001
ASS25001
ASS52001
ASS52001D
ASS65001



ASS29001



ASS64001



ASS60005A - (3/4" ORIFICE)
ASS60006A - (1/2" ORIFICE)
ASS60007A - (3/4" ORIFICE)
ASS60008A - (1/2" ORIFICE)

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.)

STEAM SPARGER ASSEMBLIES

ITEM	PART NUMBER	DESCRIPTION	HOW PART IS USED IN ASSEMBLY (Only if pertinent)
00A	ASS14001	91533@*STM SPARGER 5/8 ORIFICE 3621	3621F8P
00B	ASS25001	91533T*52&60 STEAM SPARGER3/4ORFICE	4231+44+6044WP'S;5238WT'S,WP1;7244WP'S,WE1
00C	ASS52001	90092Y*72SGU STEAM SPARGER3/40RFICE	7244DBN,WTL,WTN
00D	ASS52001D	900921*72TILT/DYE/DAN ST.SPAR 3/40R	7244SP2,SP3
00E	ASS29001	90206D*6044DA3 ST.SPARGER 3/4ORFICE	6044D3A
00F	ASS64001	902061*6442 STEAM SPARGER 3/4ORFICE	6442BTL,BTN,BHP,TTL,TTN
00FF	ASS64001A	94277#*ASSY 2PART 6442 STM SPARGER	USED ON 00F-CONTAINS ITEMS 3-4 ONLY
00G	ASS65001	92000Z ASSY=SPARGER 3/40RFICE TPIPE	6446E6N,J6N 7258J5N
00H	ASS60005A	92612T*ASSY=STM MIXER .5 ORF-24.5"L	CBW .5" ORIFICE 24.5"L
00I	ASS60006A	92612#*ASSY=STM MIXER .75 ORF-24.5L	CBW .75" ORIFICE 24.5"L
00J	ASS60007A	92612T*ASSY=STM MIXER .5 ORF-21.5"L	CBW .5" ORIFICE 21.5"L
00K	ASS60008A	92612#*ASSY=STM MIXER .75 ORF-21.5L	CBW .75" ORIFICE 21.5"L
001A	W2 14628A	95496#*WLM=STM SPARGER .63 ORF-12"L	00A
001B	W3 64566B	95496C*WLM=STM SPARGER .75 ORF-12"L	00B-00D,00G
002	W2 19565A	92637Y*WLM=STM SPARGER .75 ORF-15"L	00E
003	W3 64564	94277D*PART1=2PART 6442 STM SPARGER	00F
004	W3 64564A	94277#*PART2=2PART 6442 STM SPARGER	00F
005	02 11369D	95191B GASKET STEAM FLANGE MTG DYE	00A-00G
		******** END OF PARTS LIST ********	

LITHO IN USA

Section 9

Pneumatic Piping and Assemblies

3-Way Pilot Valves

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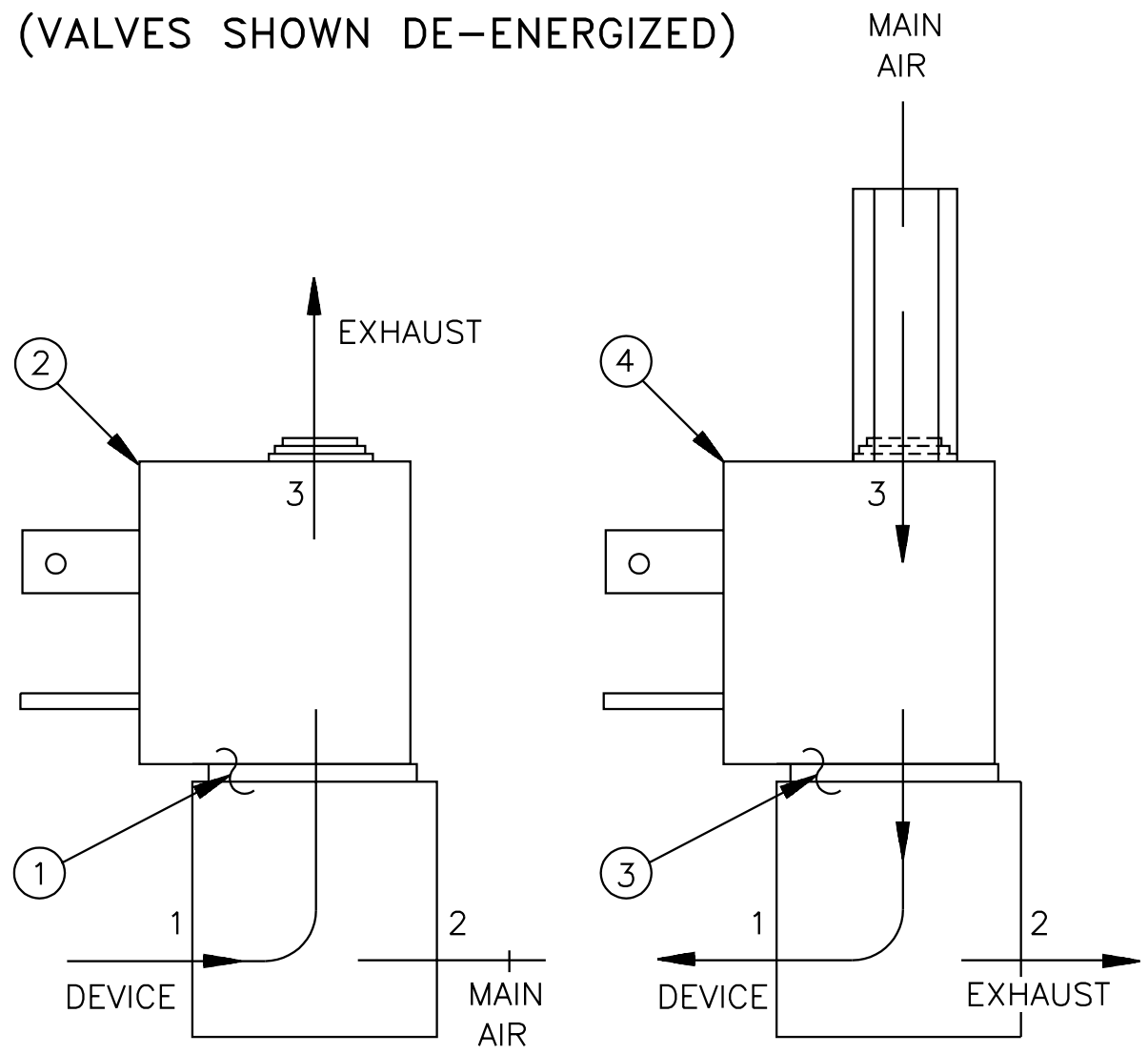
BMP900032/91182V (1 of 1)
Litho in U.S.A.



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	

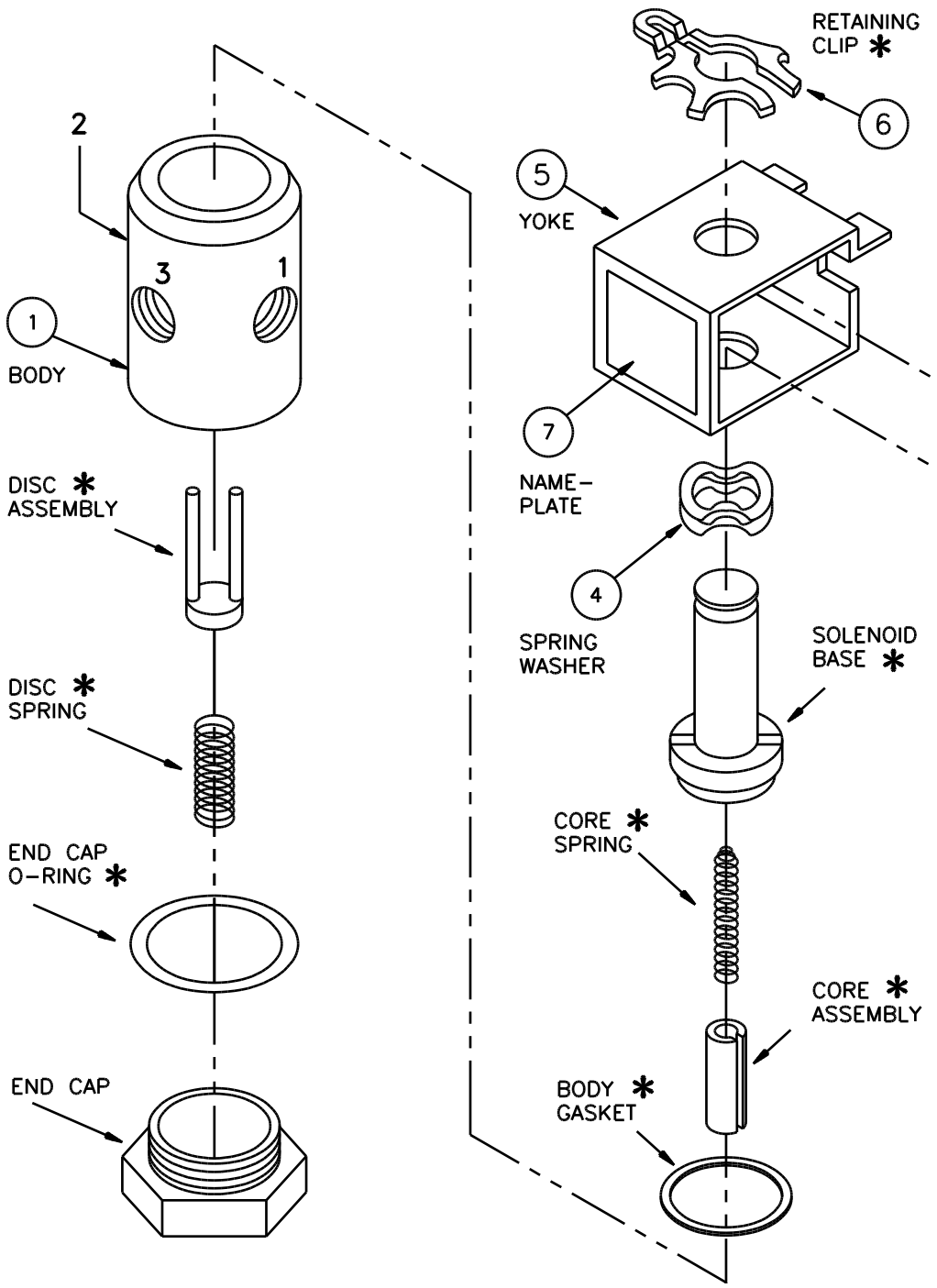
Asco 3-way Solenoid Valves

Applicable Models

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

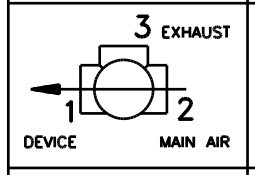
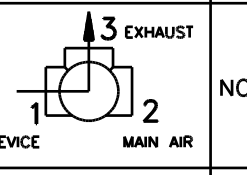
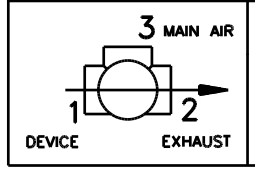
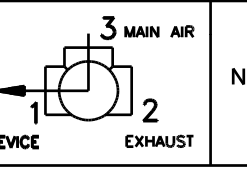
BMP701359/97086V (1 of 2)

Litho in U.S.A.



COMPONENTS LABELED (✱) ARE CONTAINED IN KIT "00Q", SEE PARTS LIST FOR OTHER AVAILABLE KITS.

FLOW DIAGRAMS:

ENERGIZED	DE-ENERGIZED	VALVE
		NORMALLY CLOSED
		NORMALLY OPEN

OPERATION

NORMALLY CLOSED VALVE – OPEN WHEN ENERGIZED
CLOSED WHEN DE-ENERGIZED

NORMALLY OPEN VALVE – CLOSED WHEN ENERGIZED
OPEN WHEN DE-ENERGIZED

Identification and Description

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

Safety Instructions

⚠ DANGER ⚠

SHOCK HAZARD - will cause death or severe injury.

☞ **Lock OFF - and tag out power at wall disconnect before servicing. Power switches on machine and control box disable only control circuit power in electrical boxes.**

⚠ WARNING ⚠

EXPLOSION HAZARD- may cause serious injury.

☞ **Release pressure to valve before disassembly.**

⚠ CAUTION ⚠

BURN HAZARD - Solenoid enclosures become too hot to touch when energized for a long period. This will not damage the solenoid, but may cause a painful burn.

☞ **Allow solenoids to cool before servicing the valves.**

Cleaning - Clean all solenoid valves periodically. If the voltage to coil is correct, sluggish valve operation usually indicates that cleaning is required.

Maintainence

READ ALL SAFETY STATEMENTS ABOVE BEFORE PROCEEDING ANY FURTHER!

Coil Replacement

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

Valve Disassembly and Reassembly

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

Troubleshooting

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

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Litho in U.S.A.

Parts List—Asco 3-way Solenoid Valves

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	96TAC3AA24	04Z 1/8" N/C 3WAY 24V50/60C VALVE	COMPLETE VALVE ASSEMBLY
	B	96TAC3AA37	04Z 1/8" N/C 3WAY 120V50/60C VALVE	COMPLETE VALVE ASSEMBLY
	C	96TAC3AA71	04Z 1/8" N/C 3WAY 240V50/60C VALVE	COMPLETE VALVE ASSEMBLY
	G	96TBC3BA24	04Z 1/4" N/C 3WAY 24V50/60C VALVE	COMPLETE VALVE ASSEMBLY
	J	96R300AAM	78183L*NC VALVEBODY+HARDWARE	VALVE BODY+HARDWARE 00A,00B,00C
	Q	96V304A	PARTKIT 8320 1/8" ASCO#K260767	VALVE REPAIR KIT ALL SEE PARTS WITH (*) FRONT
	R	96V236B	PARTKIT 8320 1/4 ASCO#K302142P	00G
			----------COMPONENTS----------	
J all	1 1	96V300 96R300AB	1/8" VALVEBODY ASCO #UX8320B13 73111F 1/8"BODY-3WAY.06D NORM OPEN	 00K
A,	2	96T1002A24	SOLENOID 24V ASCO#260283-005	00D
B,	2	96T1003A37	COIL 120V50/60C ASCO#162-919-1	00E
C,	2	96T1003A71	COIL 120V50/60C ASCO#162-919-2	00F
all	2	96T1003A24	COIL 24V50/60C ASCO *162-919-3	
all valves	3	96V300GB	SLEEVE ASCO#101400-1	00P
+ kits J-				
all all valves except G	4 4	15U275 96V1002WSH	SPRINGWASHER 7/16" GAR#3W-325 ZINC STARWASHER MXX ASCO#238589-1	
all valves except G	5	96V300GA	YOKE ASCO#78-345-1	
all valves except G	6	96V300F	METAL CLIP ASCO #92-059-1	
G	6	96V1002CLP	METAL CLIP MXX ASCO#176-993-1	
G	7	96V1002PLT	NAMEPLTE,BLK MXX ASCO#258775-1	
all	8	96V300L	SPRING-DISC N/O ASCO#90-083	00K

Parts List, cont.—Asco 3-way Solenoid Valves

Used In	Item	Part Number	Description	Comments

Pressure Regulators

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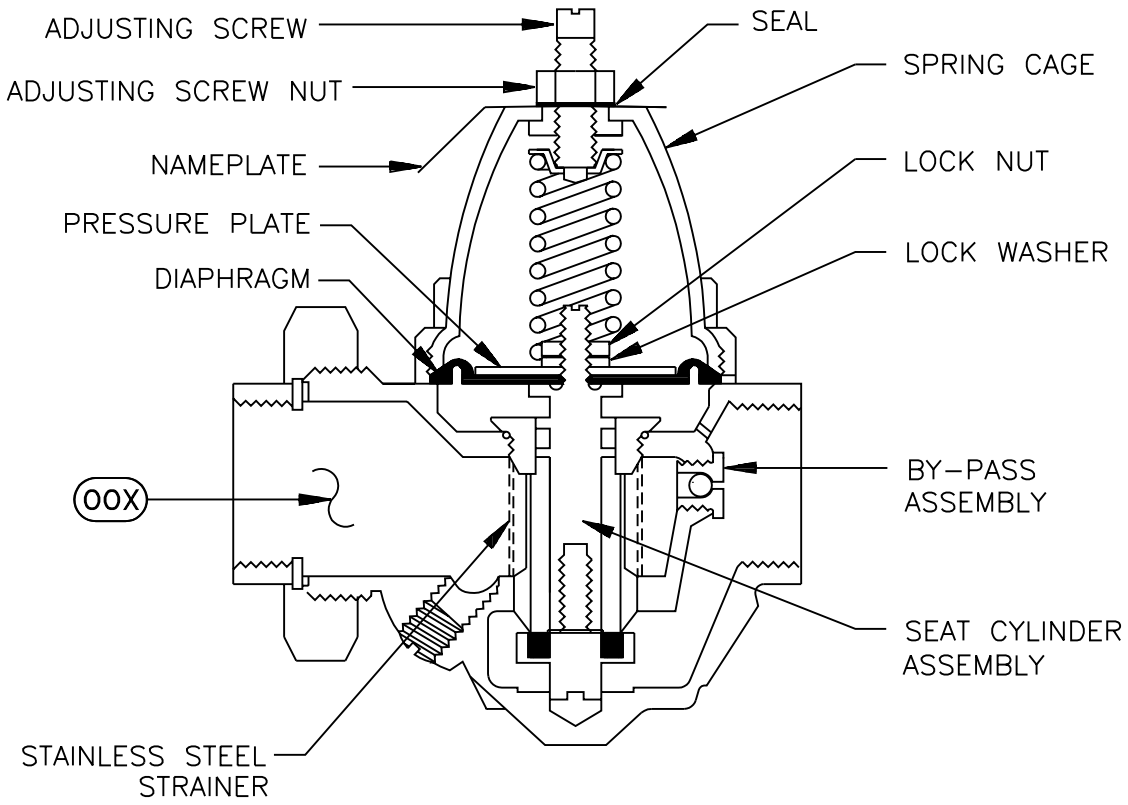
Litho in U.S.A.



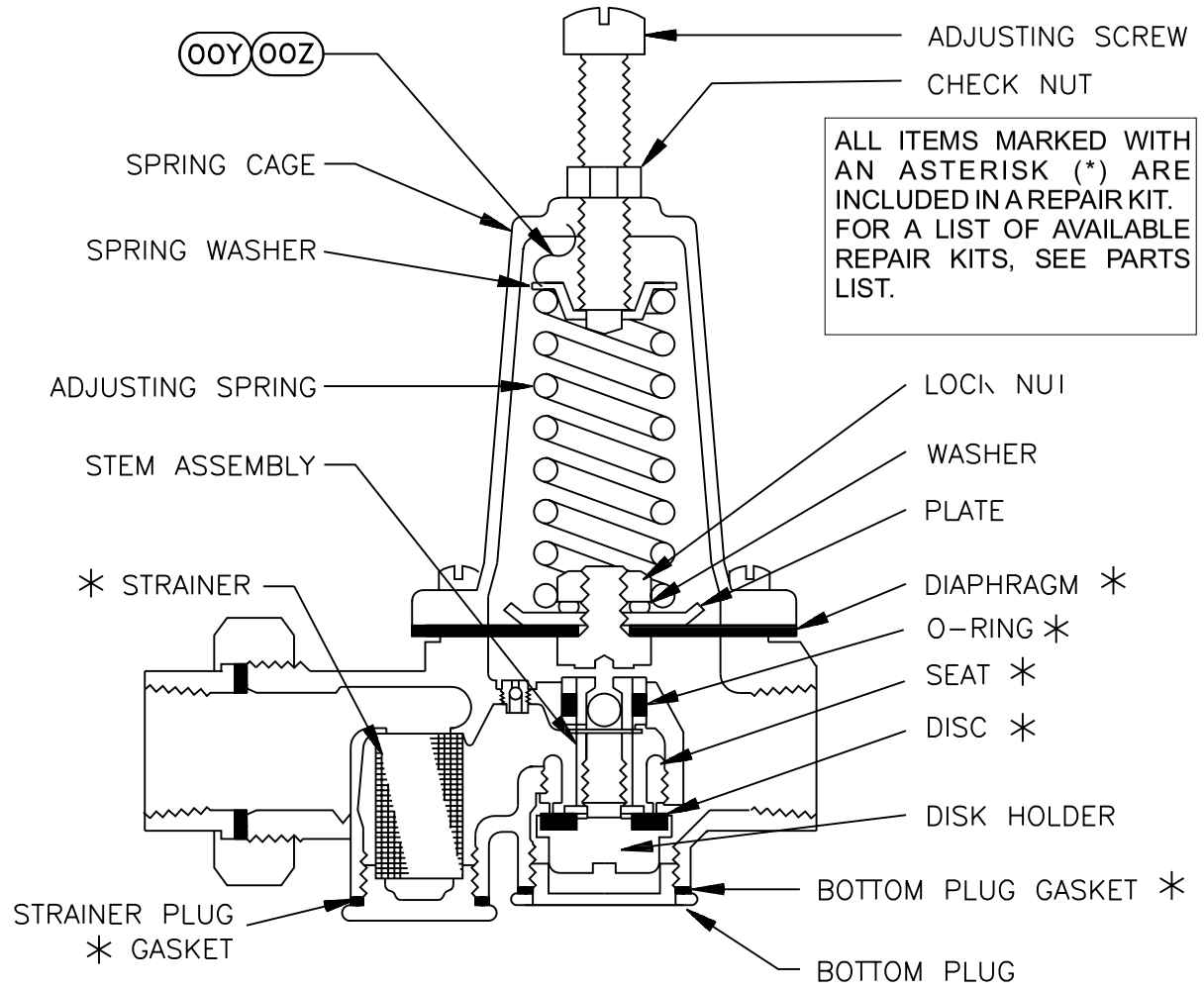
TO CLEAN OR REPLACE PARTS:

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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Litho in U.S.A.

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	

Quick Exhaust Valves

Pellerin Milnor Corporation
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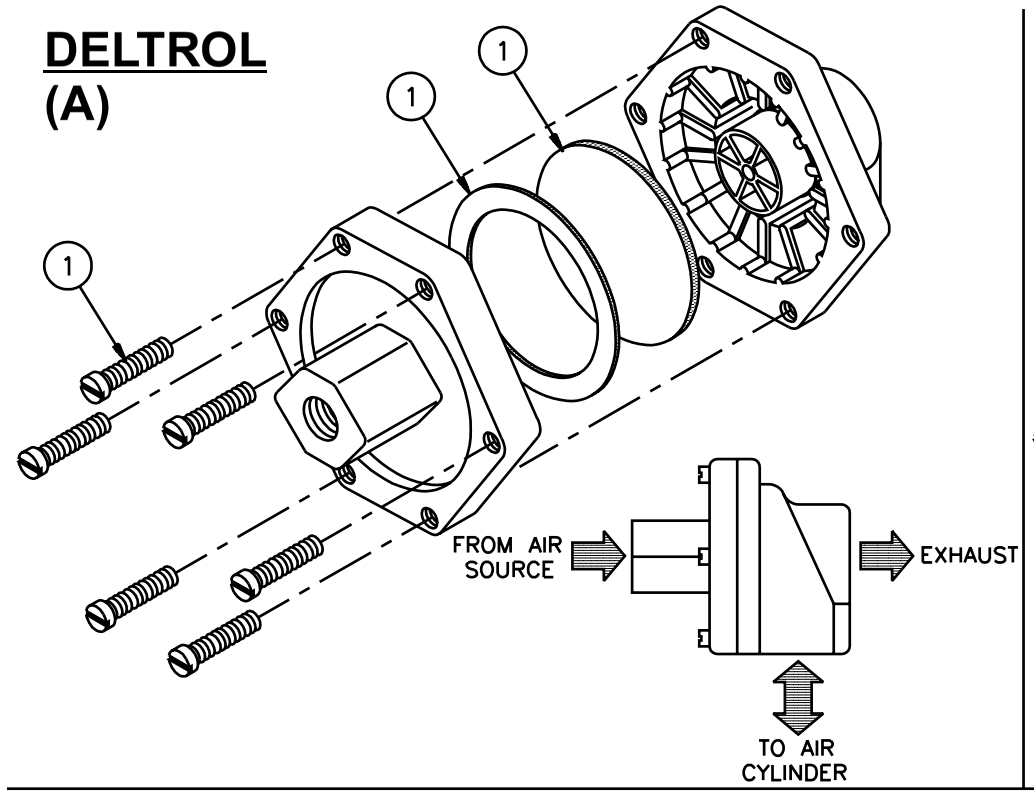
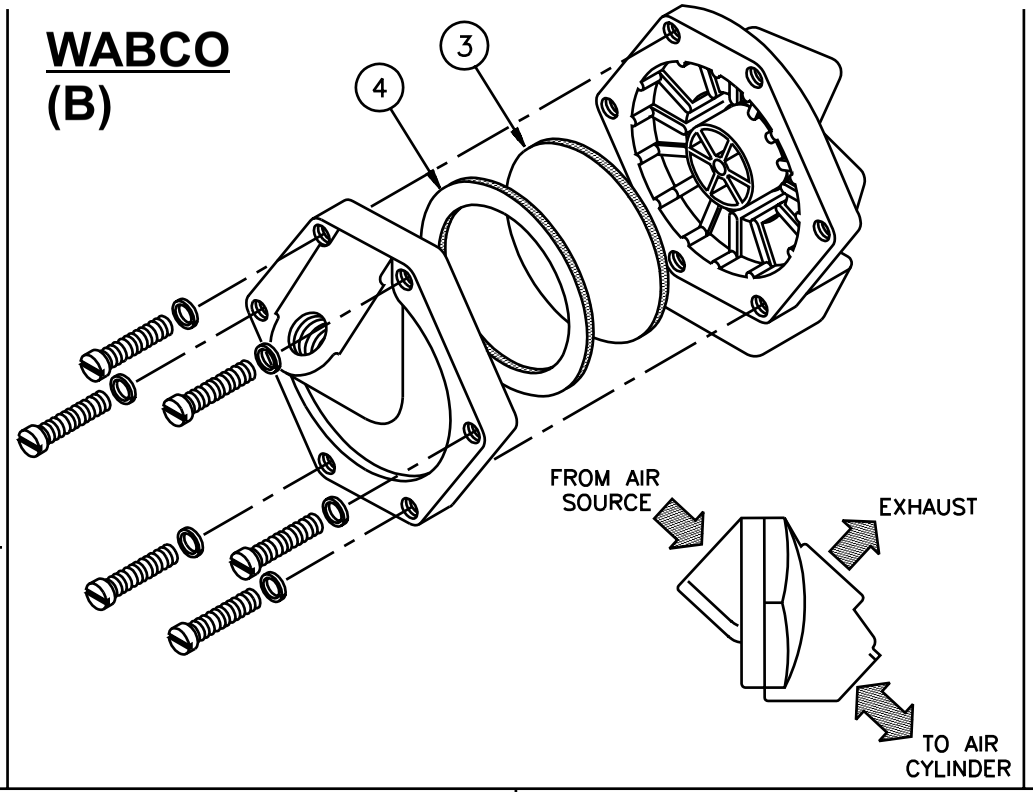
Litho in U.S.A.

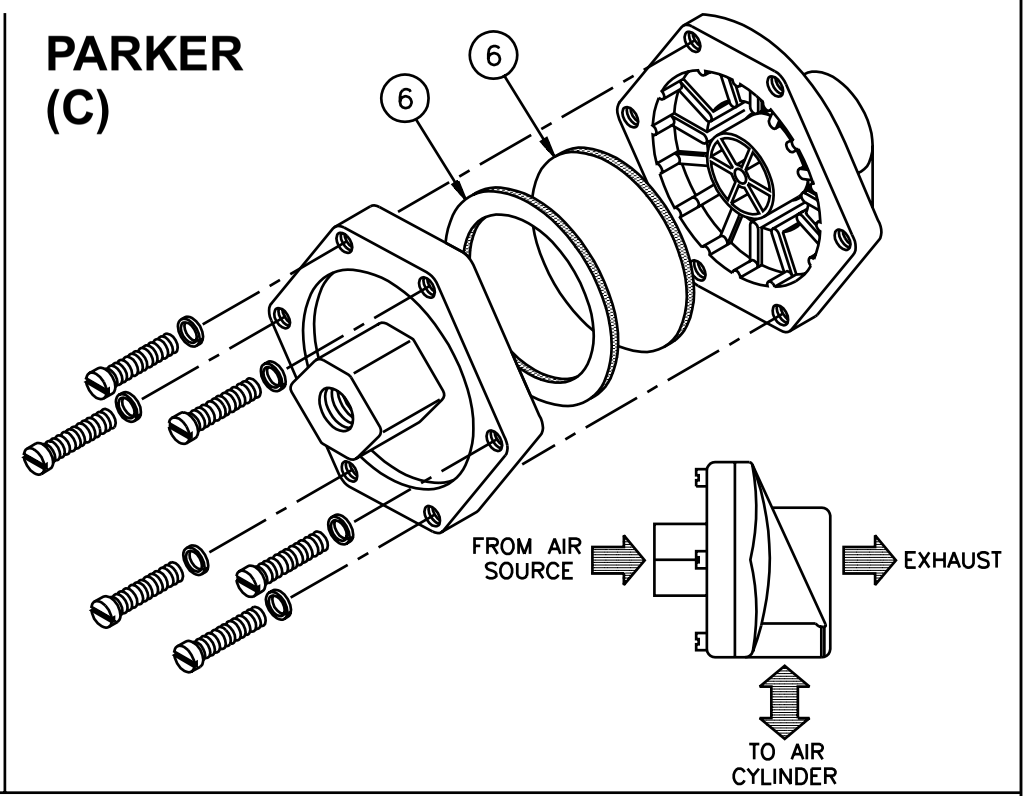
DELTROL
(A)



WABCO
(B)

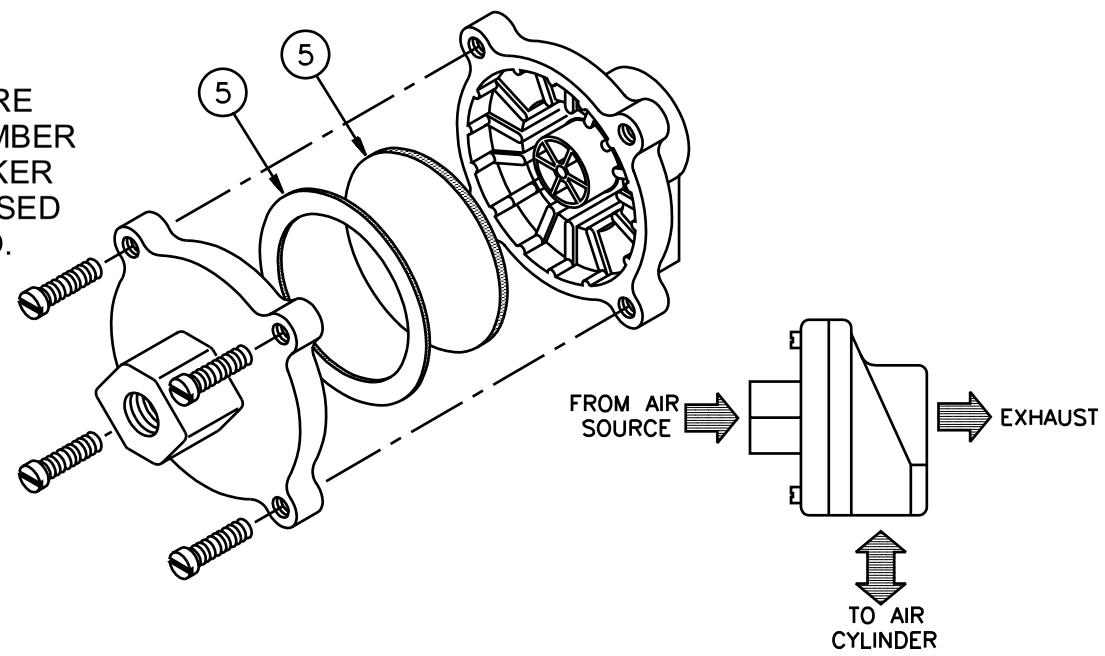


PARKER
(C)



ASCO
(D)

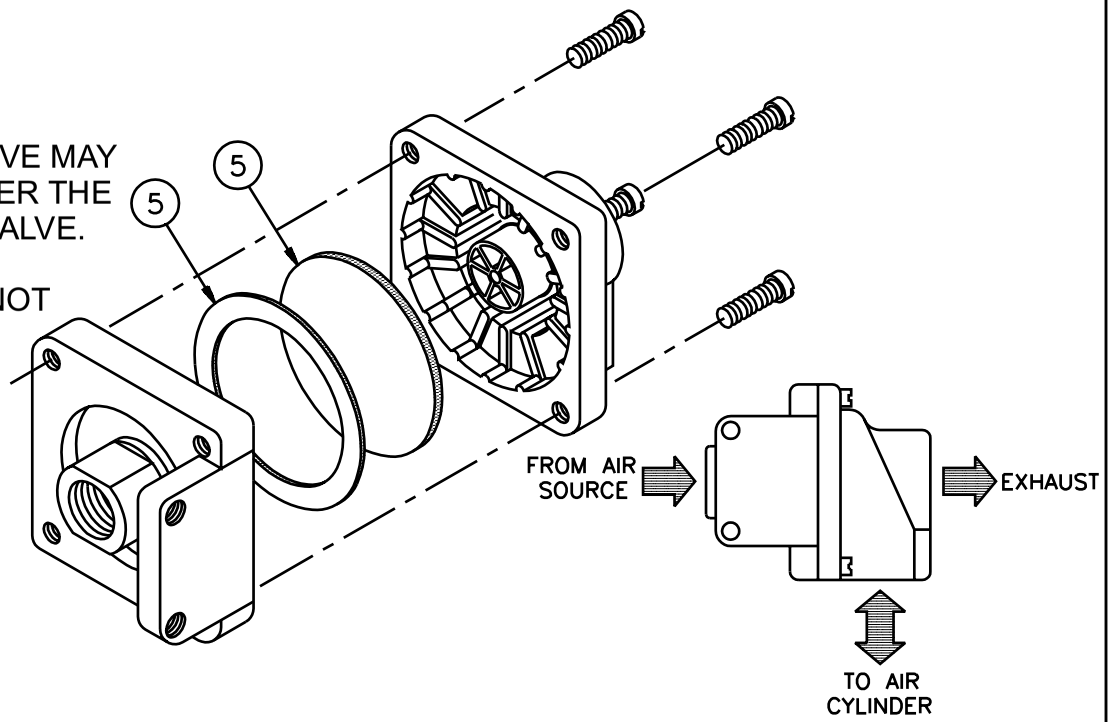
NOTE: ASCO VALVES ARE USED PRIOR TO NOVEMBER 1987. SINCE THEN PARKER VALVES HAVVE BEEN USED IN PLACE OF THE ASCO.



GOYEN
(E)

NOTE: THE GOYEN VALVE MAY BE REPLACES BY EITHER THE WABCO OR DELTROL VALVE.

THE GOYEN VALVE IS NOT TO BE USED IN PLACE OF THE WABCO OR DELTROL VALVE.



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Parts List—Quick Exhaust Valves

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	MESSAGE B2	REPAIR KITS ONLY <>	DELTROL
	B	96M051	USE KZK5B00100	WABCO
	C	96M054	QWIKEXHAUSTVLV 3/4"URETHANE	PARKER
	D	MESSAGE B1	PARTS NO LONGER SOLD	ASCO
	E	MESSAGE B2	REPAIR KITS ONLY <>	GOYEN
	F	96M055	QUICK EXHAUST VALVE 1/4”	DELTROL
			----------COMPONENTS----------	
all	1	96M053A	KIT,QWIKRELVLV EV20A#10091-18	DELTROL VALVE ONLY
all	3	96M051B	DIAPHRAM,QWIKREL WAB#PS112-12	WABCO VALVE ONLY
all	4	96M051A	GASKET,WABCO QUICK EXHAUST VLV	WABCO VALVE ONLY
all	5A	96M052A	REPKIT,QES#M1319 (FOR 96M052)	GOYEN VALVE ONLY
all	5B	96M055A	REPAIR KIT FOR 96M055# 10128-99	DELTROL VALVE ONLY
all	6	96M054K	REPKIT 3/4"QWIKEXHAUSTVLV	PARKER VALVE ONLY

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.

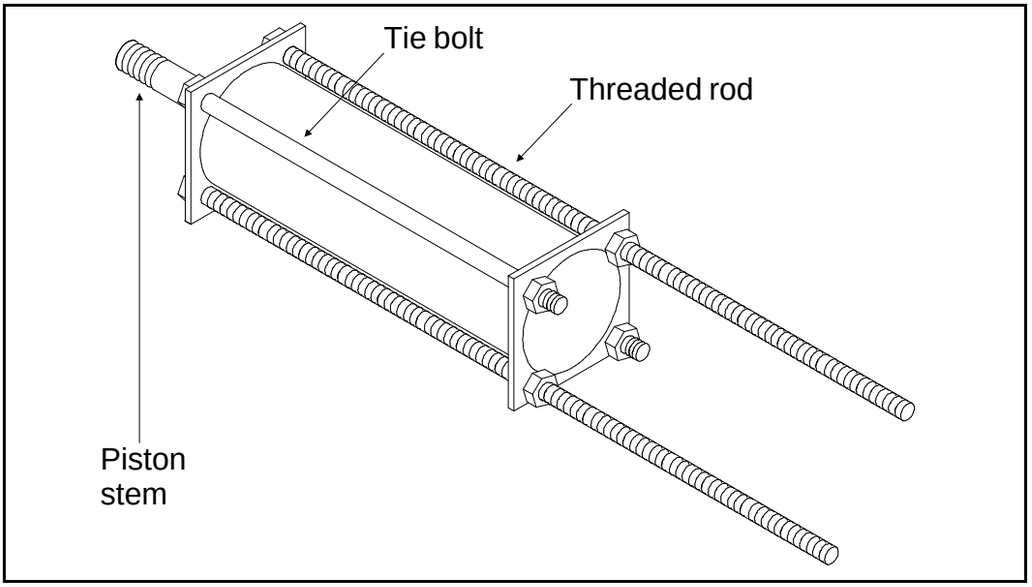

FIGURE 1 (MSSM0130AE)
Using Threaded Rods

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.

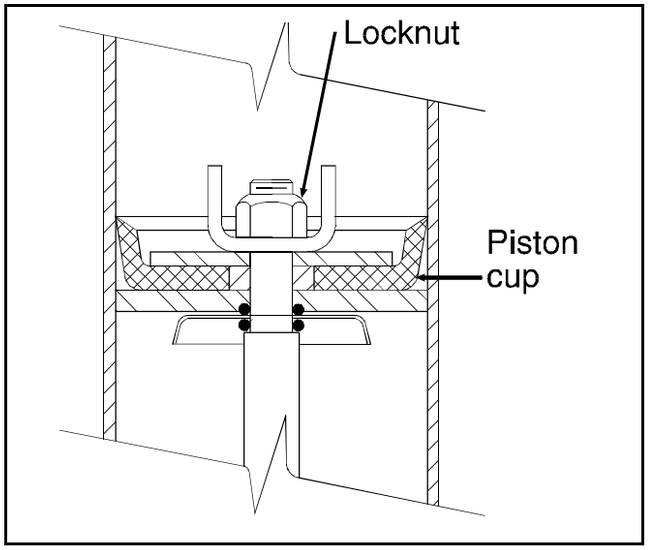

FIGURE 2 (MSSM0130AE)
Correct Piston Cup Shape

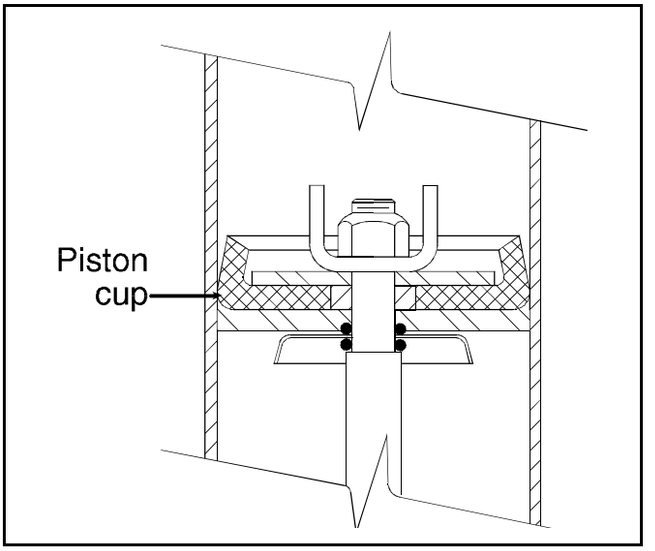

FIGURE 3 (MSSM0130AE)
Distorted Piston Cup Shape

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

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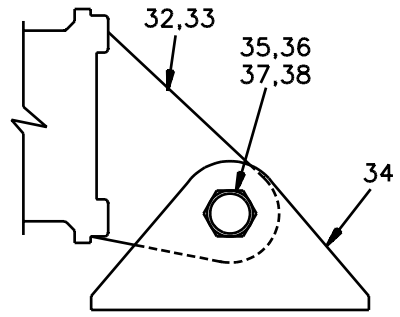
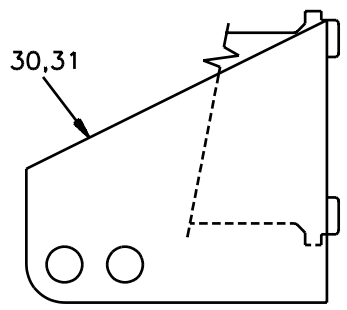
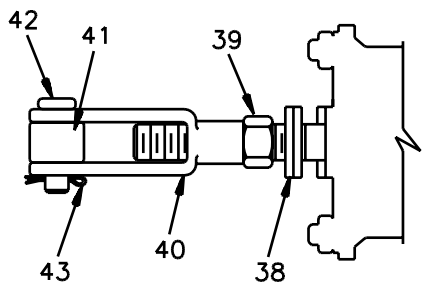
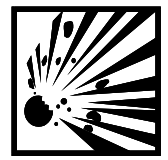




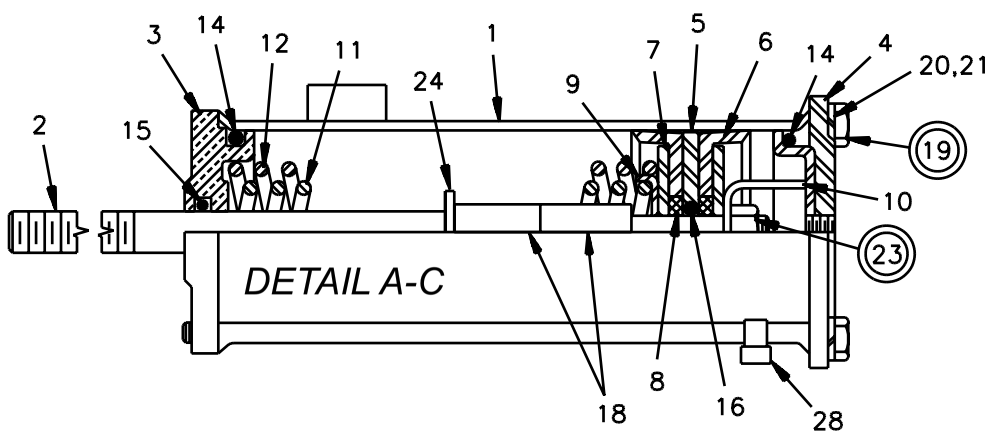


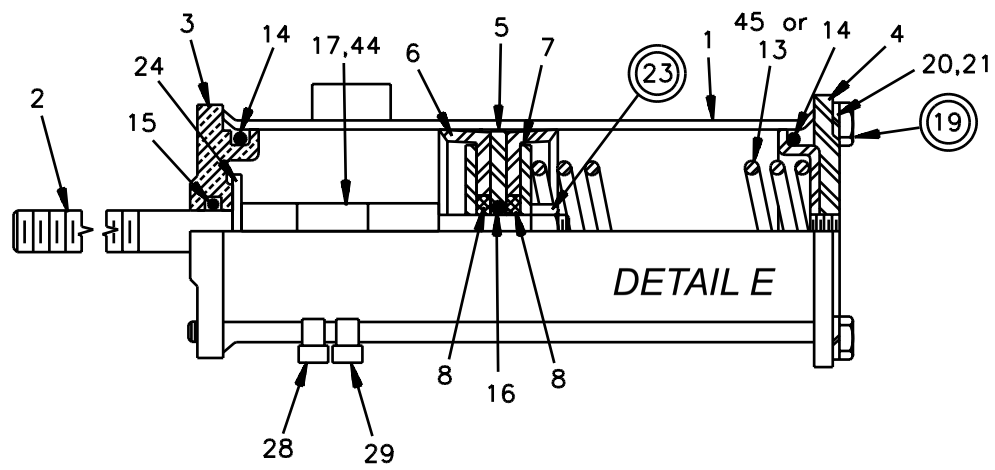
AIR CYLINDER MOUNTING HARDWARE

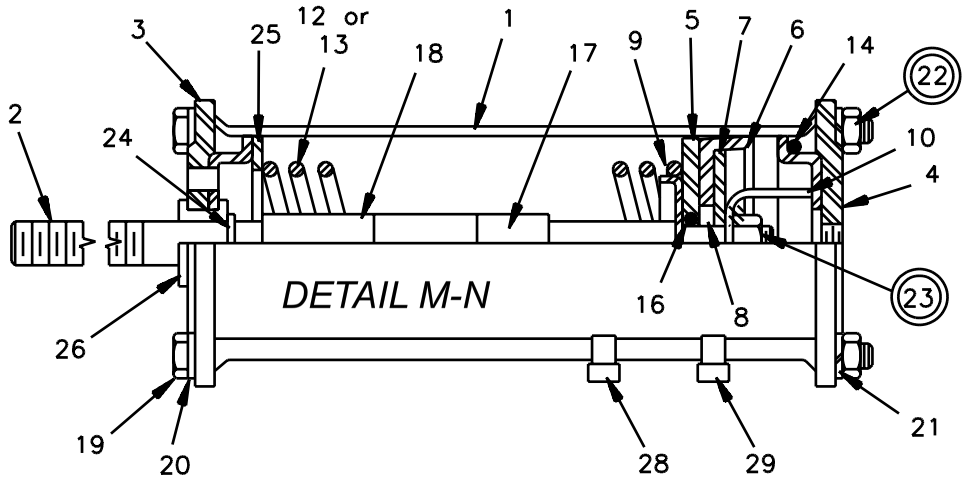
⚠ WARNING ⚠

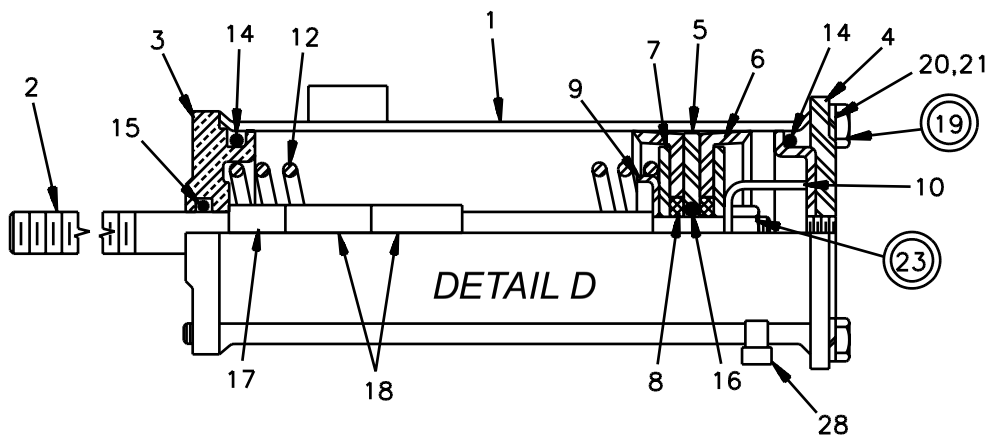


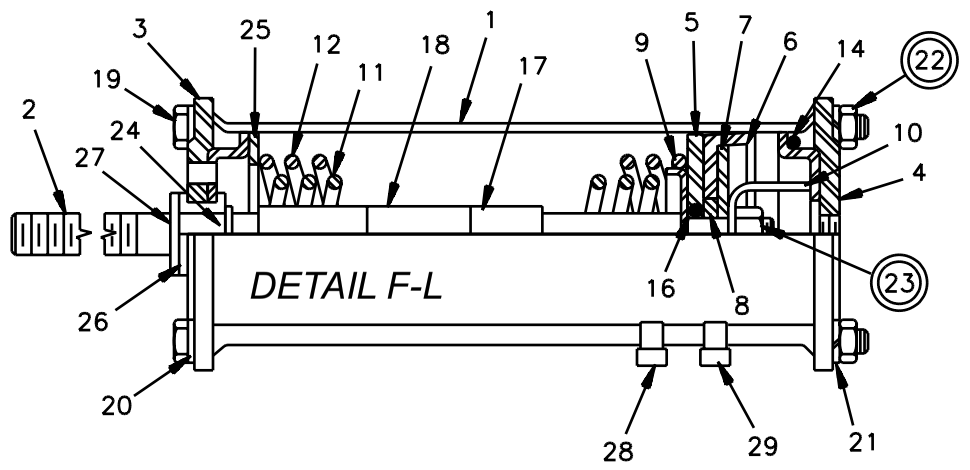
EXPLOSION HAZARD - Air cylinder can burst apart with great force.
Circled items are under high spring tension.
Follow maintenance instructions MSSM0130AE carefully.

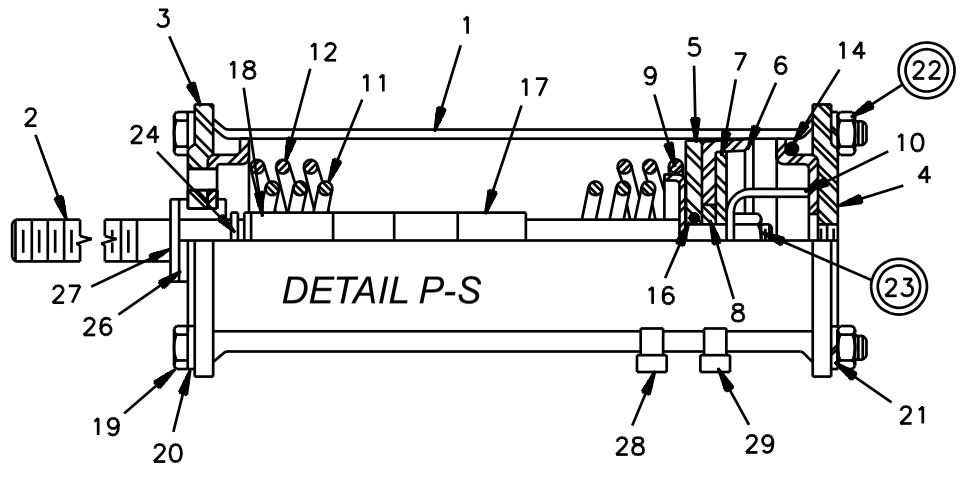












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Parts List—Air Cylinder Assemblies

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#/"	

Air Cylinders for 2" Watts Ball Valves

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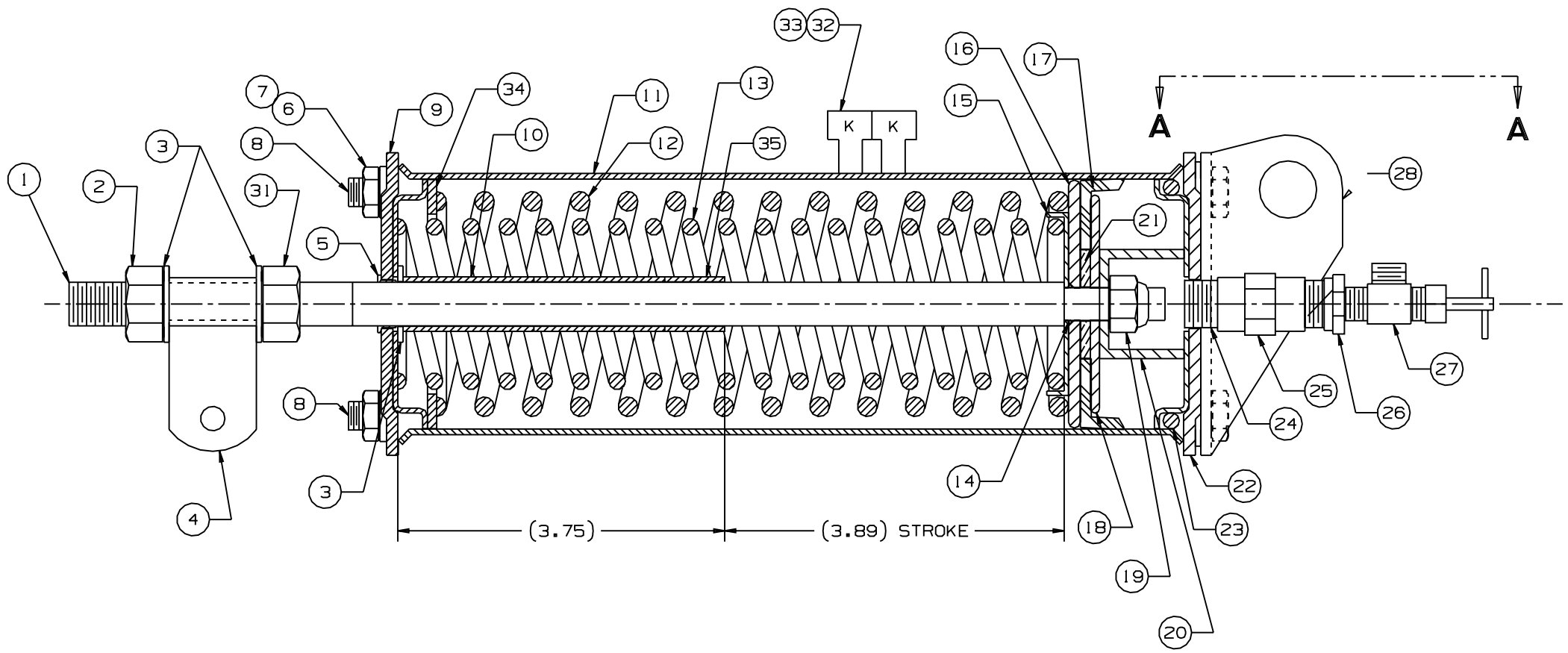

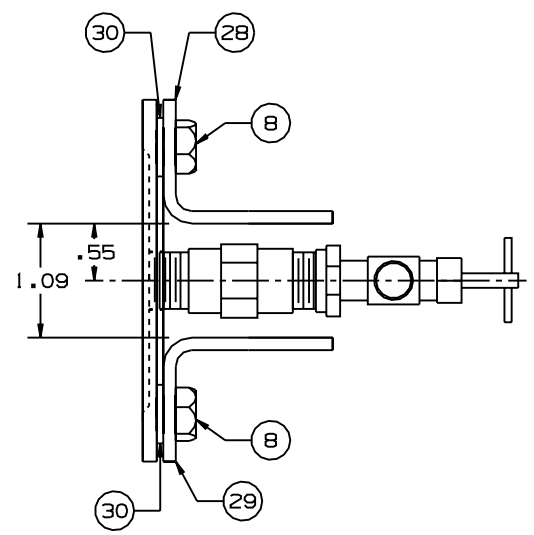

VIEW A-A

NOTES:

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

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Parts List—Air Cylinders for 2" Watts Ball Valves

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	A	SA 10 057C	95222D AIRCYL=3.0ODX3.89ST171/176CD	
	B	SA 10 057D	95222# AIRCYL=3.0ODX3.89ST171/176SS	STAINLESS
	C	SA 10 056F	92000Z AIRCYL=2.38ODX2.70STX20.5#CD	
	D	SA 10 056G	92000Z AIRCYL=2.38ODX2.70STX20.5#SS	STAINLESS
			----------COMPONENTS----------	
A,B	1	03 01615	94191B PISTON STEM 3"AIRCYL	
C,D	1	02 18650	96461B STEM=2 WAY AIRCYLINDER BRAKE	
all	2	15G234NS	HXLOCKNUT NYL 1/2-13UNC2 SS18-8	
all	3	15U243S	FLAWASHER 7/8ODX33/64IDX16GA 18-8SS	
all	4	03 01209A	92536B STEMCLIP H=1.313 BALVAL S/S	
all	5	54E220	NYLINER 8L2FF BUSHING 1/2X9/16X.140	
A	6	15G191	HXFINJAMNUT 5/16-24UNC2 ZINC GR2	
B,C,D	6	15G190	HEXFINJAMNUT 5/16-18NC2 SS18-8	
A	7	15U210	LOKWASHER MEDIUM 5/16 ZINCPL	
B,C	7	15U205	LOCKWASHER MEDIUM 5/16" 18-8SS	
D	7	15U200S	FLATWASHER US STD 5/16 SS18-8	
A	8	02 10585H	91142# TIE BOLT=5/16-18X10LNG PLTD	
B	8	02 10585G	91142# TIE BOLT=5/16-18X10LG (SS)	
C	8	02 10585E	91142# TIE BOLT=5/16-18X8.25LG PLTD	
D	8	02 10585A	91142# TIE ROD-5/16-18X8+1/4 (SS)	
A	9	03 01623	90351C CYLINDER HEAD 3"AIRCYLINDER	
BI	9	03 01623A	90351# CYLHEAD 3"AIRCYLINDER-S/S	
C	9	02 02546	87341C CYLHEAD=SLIDESTEM	
D	9	02 02546S	87341# CYLINDER HEAD=SLIDE STEM SS	
all	10	27B32024SS	SPACER ROLL .51IDX.6250DX1.5L STN S	
A,B	11	03 01621	94266BTUBE 2+7/8 AIR CYLINDER 9"	
C,D	11	02 02068	94266A AIRCYL-STAINLESS=DUMPVALVE	
A,B	12	03 01617C	92133B SPRING=FL11.5SR23.5#MD2.368	
C	12	02 15881	96471# SPRING=BRAKE2.1OD11FL15.5#/"	
D	12	02 15881A	85504Z SPRING,02 -15881+HEAVY PAINT	
A,B	13	03 01616C	92133B SPRING=FL11.35SR20.5MD1.811	
C	13	02 15880	96471B SPRING=BRAKE1.5OD10.3FL17#/"	
D	13	02 15880A	85504Z SPRING,02-15880 +HEAVY PAINT	
all	14	60C106	ORING 5/16ID 1/16CS BN 70 DURO #011	
A,B	15	03 01620A	92133B 3"AIR CYL=SPRING RETAINER	
C,D	15	02 18651	73171A WASHER=2 WAY BRAKE CYL	

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

Used In	Item	Part Number	Description	Comments
A,B	16	X3 01619A	92066# MACH=3"ACYL BRASS PISCUP WSH	
C,D	16	02 02105B	92253B 2.38"ACYL BRASS PISCUP WASHR	
A,B	17	02 19302	93356B PISTON CUP 2+7/81D CYLINDER	
C,D	17	02 02194	93217B PISTONCUP=DUMPVALVE 2+3/8"	
A,B	18	03 01618	91522B PISTON CUP WASHER 3"AIRCYL	
C,D	18	02 02085	94092B UP WASHER=2"OD=PISTON CUP	
all	19	15G220	02Z LTHX THIN LOKNUT 3/8-24 SSNTE	
A,B,D	20	03 01313S	85506B+STOP=AIRCYL W/2+11/16STR.SS	
C	20	03 01313	70219A STOP=AIR CYL W/2+11/16STROKE	
A,B	21	03 01630	87506B 3"AIRCYL PSTN CUP COMPLMTWSH	
C,D	21	02 02185	79237A WASHER=PISTON CUP COMP LIMIT	
A	22	03 01622	88531# CYL HEAD TAPHOLE 3"AIRCYL SS	
B	22	03 01622A	88531# CYLHEAD TAPHOLE-3"ARCYL S/S	
C	22	02 02101	71334A CYLHEAD W/TAPPED HOLE	
D	22	02 02101S	88531B CYLINDER HEAD TAP HOLE (SS)	
A,BI	23	60C134	ORING 2.5 ID 3/16CS BN 70 DURO #333	
C,D	23	60C132	ORING 2"IDX3/16CS BUNA70 #32	
all	24	5N0ECLSBE2	NPT NIPPLE 1/4XCLS TBE BRASS 125#	
all	25	5SCC0EBE	NPT COUP 1/4 BRASS 125# #103	
all	26	5SB0E0CBEO	HEXPIPBUSH 1/4 X 1/8 BRASS 125#	
all	27	96H018	NEEDLE VALVE	
A,B	28	03 01627B	92023# LEFT=3"AIR CYL MNTG BRKT	
C	28	03 01660C93231B	BRKT=AIR CYL MONUT LEFT	
D	28	03 01660A	92271B BRKT=AIR CYL MNT LFT-S/S	
A,B	29	03 01627A	92023B RIGHT=3"AIR CYL MNTG BRKT	
C	29	03 01660D	BRKT=AIR CYL MOUNT RIGHT	
D	29	03 01660B	92271# BRKT=AIR CYL MNT RHT-S/S	
all	30	15U200	FLATWASHER(USS STD) 5/16"ZNC PLT	
all	31	15G231S	HXFINJAMNUT 1/2-13UNC2B SS18-8	
all	32	20L601K	ID TAG NAT'L #1614 ALUM EMB LET "K"	
all	33	27B2400K0N	SPACER ROLL.5ID .687L .062T STL/ZNC	
all	34	03 01620E	92136B.WASHER=2.86ODX2.06IDX.105THK	

AIR VALVES & MOUNTING HARDWARE

BMP780087
83457B

DETAIL A

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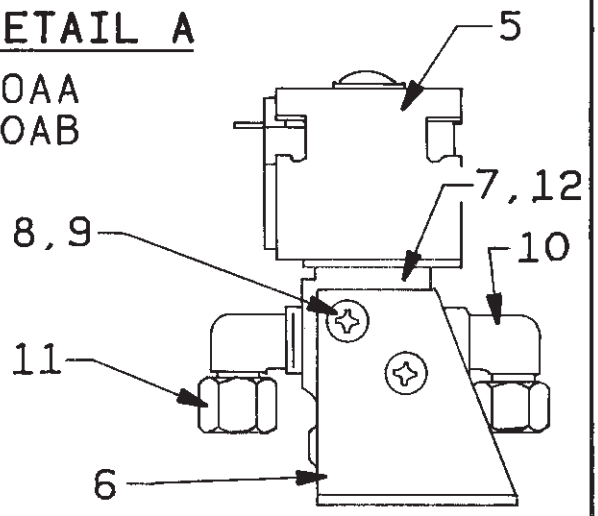
00AB



DETAIL B

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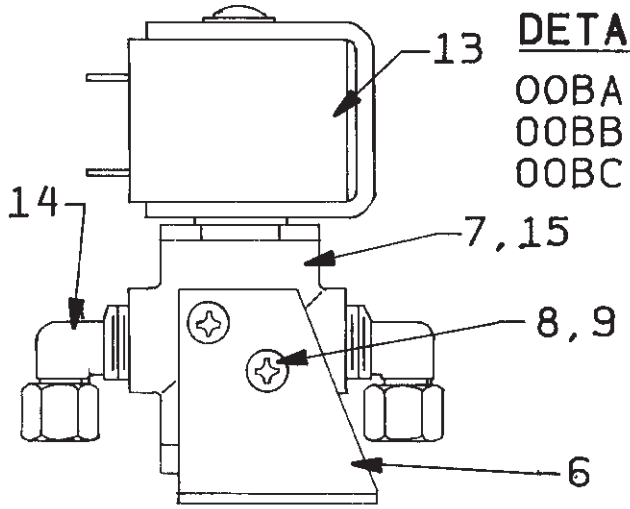

DETAIL C

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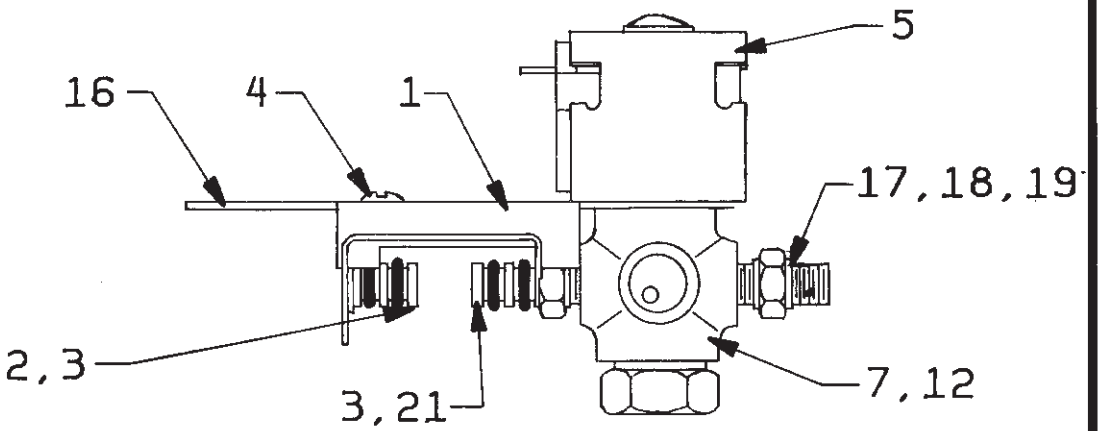

DETAIL D

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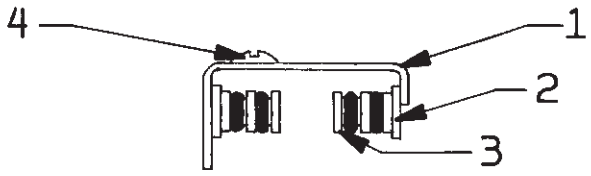

DETAIL E

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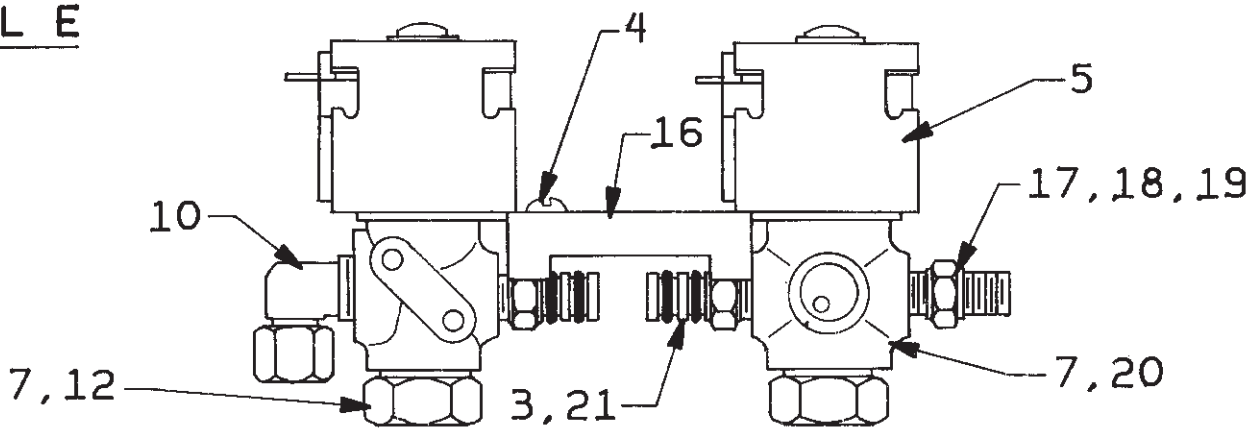

Air Valves & Mounting Hardware

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Parts List—Air Valves & Mounting Hardware

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
	AA	AVA030537	78173S ONE 1/8 AIRVALVE REG.AIR120V	
	AB	AVA030571	84386S ONE 1/8 AIRVALVE REG.AIR240V	
	BA	AVA030324	79066S1/4"NC24V ASCO AIRVAL+MTG HWD	
	BB	AVA030337	79066S1/4"NC120VASCO AIRVAL+MTG HWD	
	BC	AVA030371	79066S1/4"NC240VASCO AIRVAL+MTG HWD	
	CA	AVA030224	78173S1/8"NC24V ASCO AIRVAL+MTG HWD	
	CB	AVA030237	84386S1/8"NC120VASCO AIRVAL+MTG HWD	
	CC	AVA030271	84386S1/8"NC240VASCO AIRVAL+MTG HWD	
	DA	AVA0304	78136# TWO PLUGS+MTG HWD	
	EA	AVA030124	78173S TWO 1/8"AIRVALVE+MTG HWD 24V	
	EB	AVA030124A	78182S TWO 1/8AIRVAL+MTG HWD 1-NO	
	EC	AVA030137	82183S TWO 1/8 AIRVALVE+MTG HWD120V	
	ED	AVA030137A	78182S TWO 1/8AIRVAL+MTG HWD 1-NO	
	EE	AVA030171	78173S TWO 1/8"AIRVALVE+MTG HWD240V	
	EF	AVA030171A	78182S TWO 1/8AIRVAL+MTG HWD 1-NO	
			----------COMPONENTS----------	
all	1	03 01524	79177B CHANNEL=PLUG HOLDER	
all	2	03 01509	77362A PLUG=MANIFOLD PORTS	
all	3	60C105	ORING 1/4 ID 1/16CS BN 70 DURO #010	
all	4	15P105	05Z TRDCUT-F PANHD 8-32X5/8 NIKSTL	
AA,CB,EC, ED	5	96T1001A37	SOLENOID 120V50/60C ASCO#260283-002	
AB,CC,EE, EF	5	96R300B02	COIL 220/50SFT-240/60SFT#162-919-26	
EA,EB,CA	5	96T1001A24	SOLENOID 24V50/60C ASCO#260283-001	
all	6	03 01182B	78036B ANGLE=SUPPORT AIR VALVE	
all	7	03 01538	86053B CHANNEL=OIL SHIELD-1/8AIRVAL	
all	8	15P101	04Z TRDCUT-F PANHD 8-32X3/8 NIKSTL	
all	9	15U120	LOCKWASHER MEDIUM #8 ZINCPL	
all	10	53A031B	BODY-MAL90ELL1/4X1/8COMPPH#269C-42B	
AB only	11	53A032	MAL90ELL 5/16X1/8POLYFLO #169P-5-2	
all	12	96R300AAM	78183L*NC VALVEBODY+HARDWARE	
BA only	13	96T1002A24	SOLENOID 24V50/60C ASCO#260283-005	
BB only	13	96T1002A37	SOLENOID 120V50/60C ASCO#260283-006	
BC only	13	96T1002A71	SOLENOID 240V50/60C ASCO#260283-007	
all	14	53A031XB	BODY=MAL90EL 1/4X1/4COMP #269C-4-4B	

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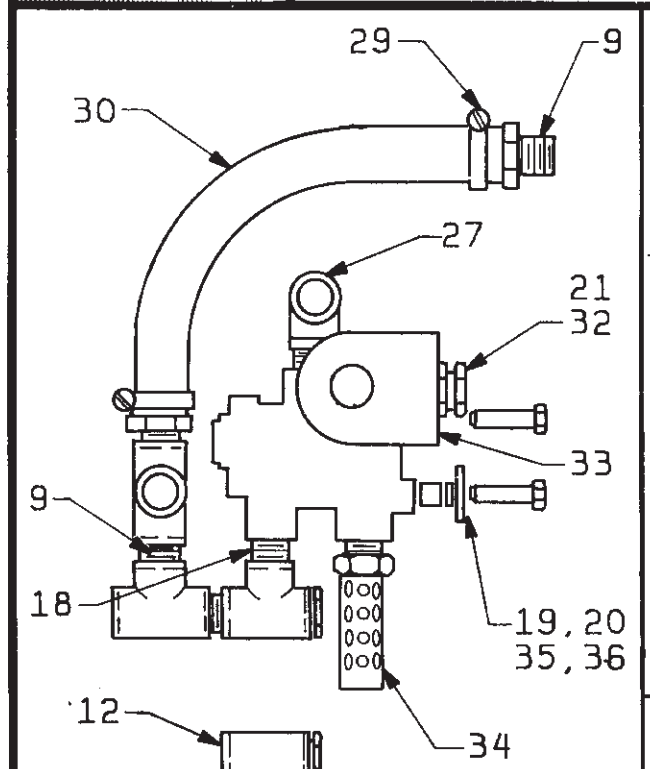
Parts List, cont.—Air Valves & Mounting Hardware

Used In	Item	Part Number	Description	Comments
all	15	96V350	1/4" VALVEBODY ASCO #UFTX8320A89	
all	16	03 01523	85096C BRKT=LOCK AIR VALVE	
all	17	53A005B	BODY=MALECONN 1/4X1/8COMP #B68A-4A	
all	18	53A059	SLEEVE 1/4" COMP IMP #60F BRASS	
all	19	53A059A	NUT 1/4"COMP.HOLYOKE ANDERSON#61A-4	
EB,EC,EF	20	96R300ABM	78183@*NO VALVEBODY+HARDWARE	
all	21	03 01508	77362A FITTING-SCREW 7/16 HEX	

UNIVERSAL AIRVALVE BOX ASSEMBLY

BMP780088
83457C



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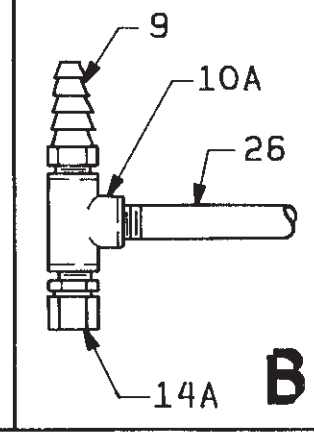

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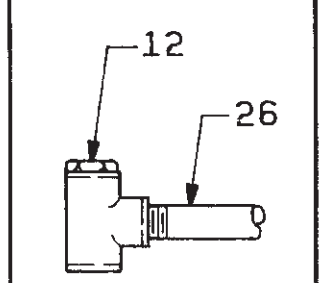

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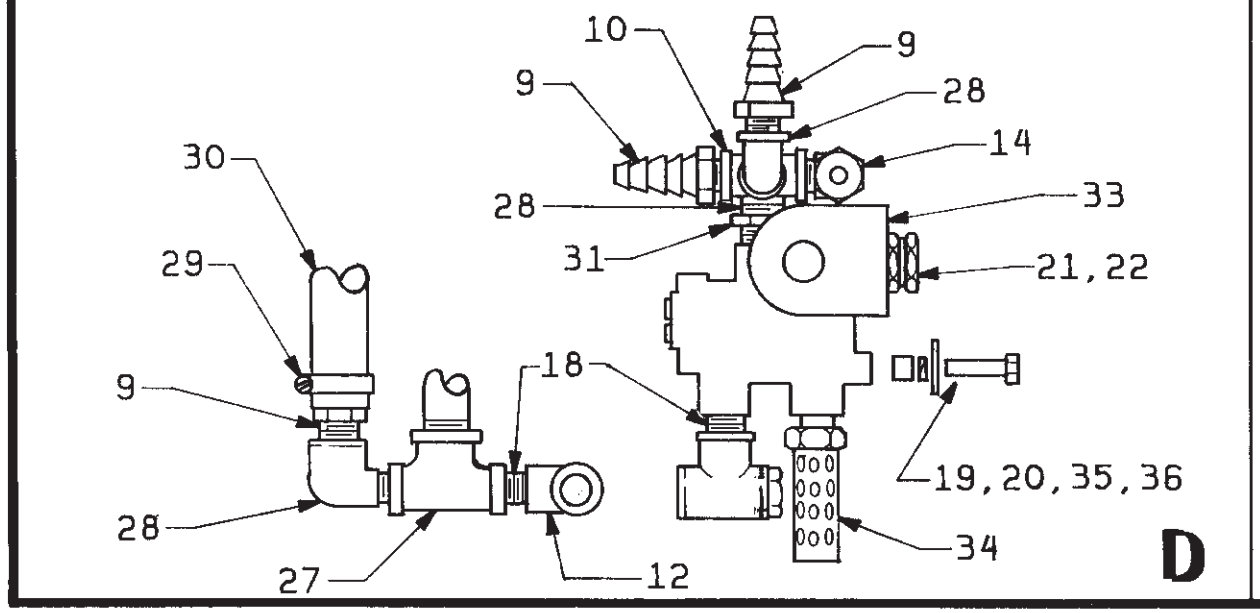

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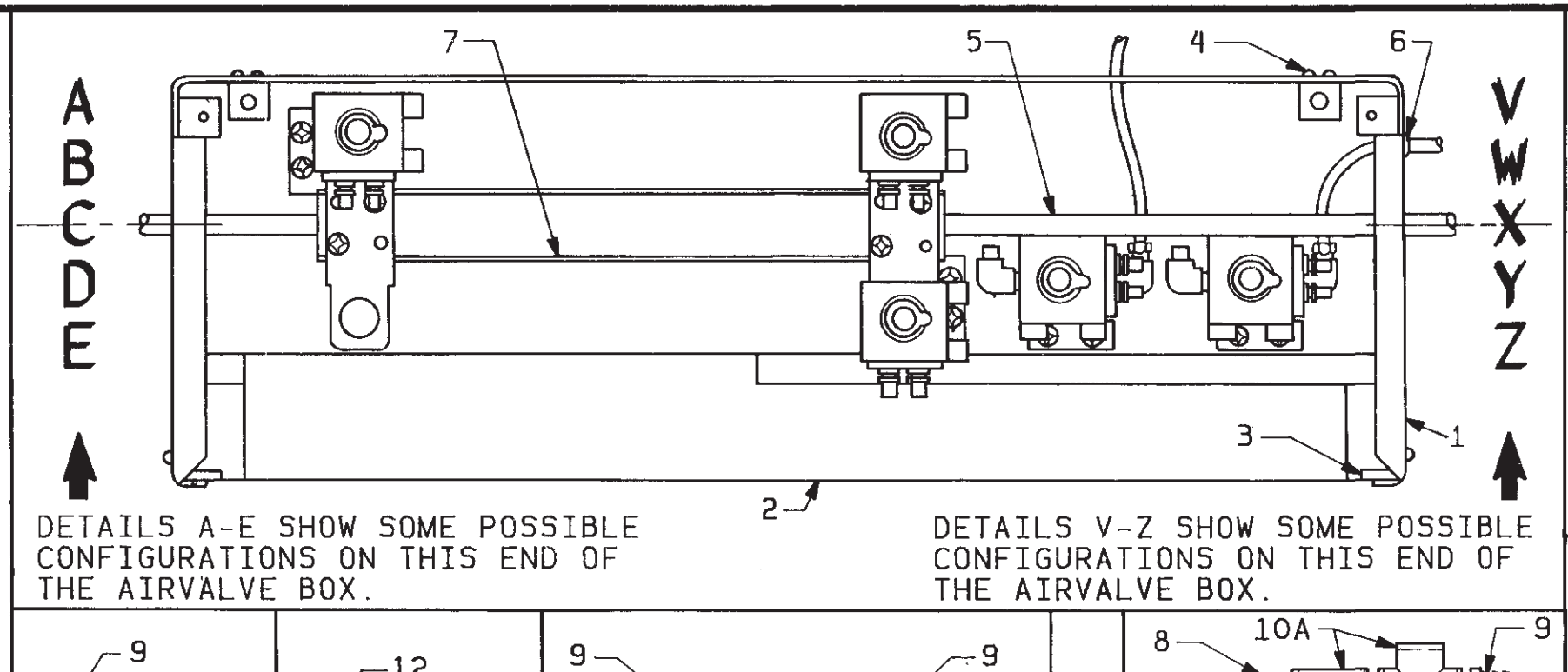
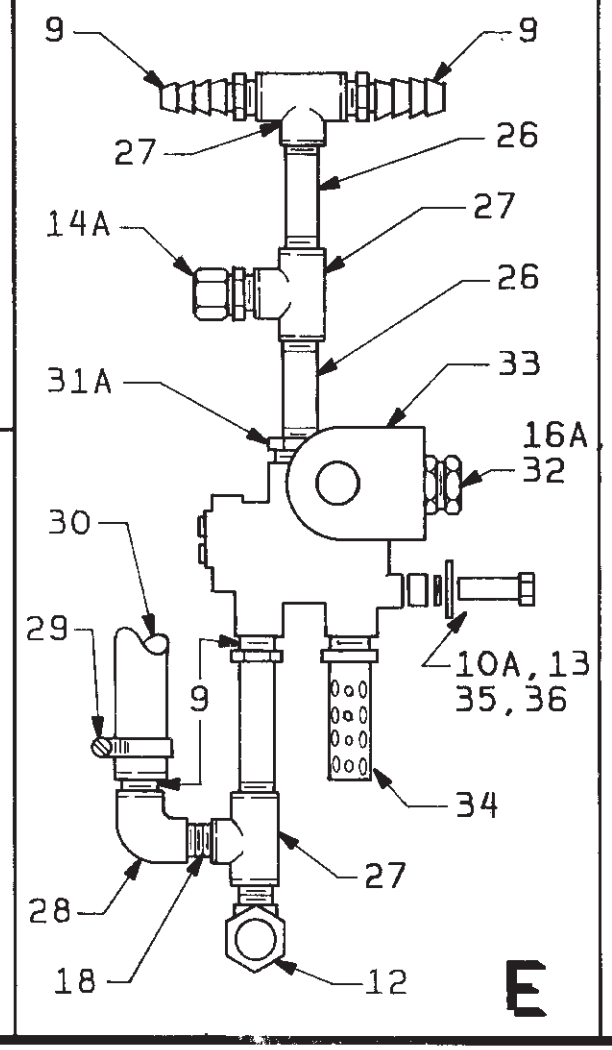


DETAILS A-E SHOW SOME POSSIBLE CONFIGURATIONS ON THIS END OF THE AIRVALVE BOX.

DETAILS V-Z SHOW SOME POSSIBLE CONFIGURATIONS ON THIS END OF THE AIRVALVE BOX.



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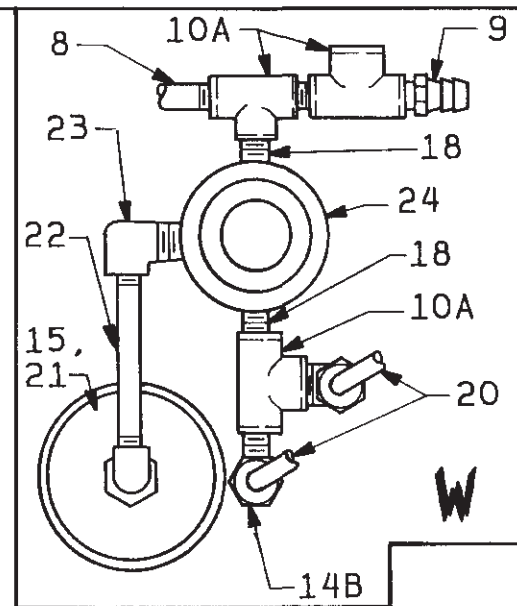

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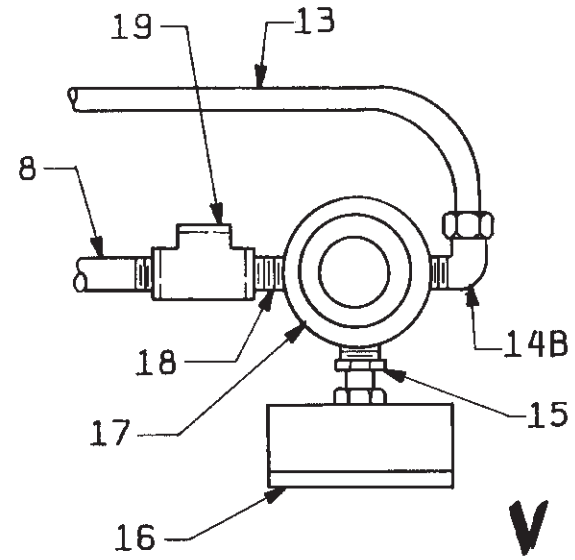

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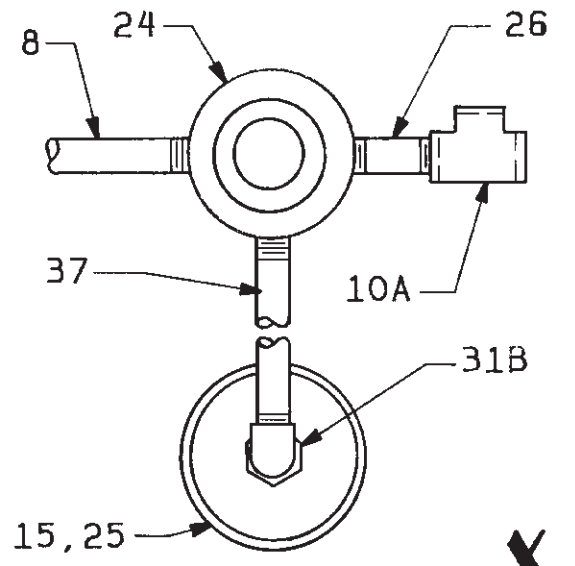

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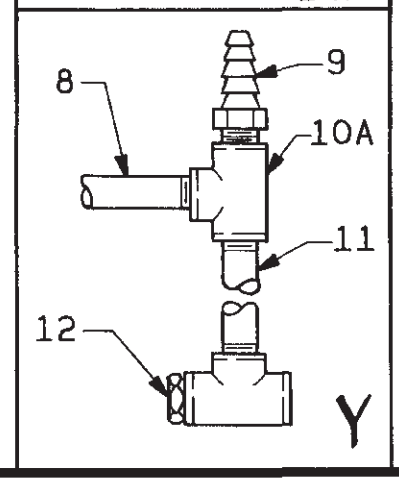

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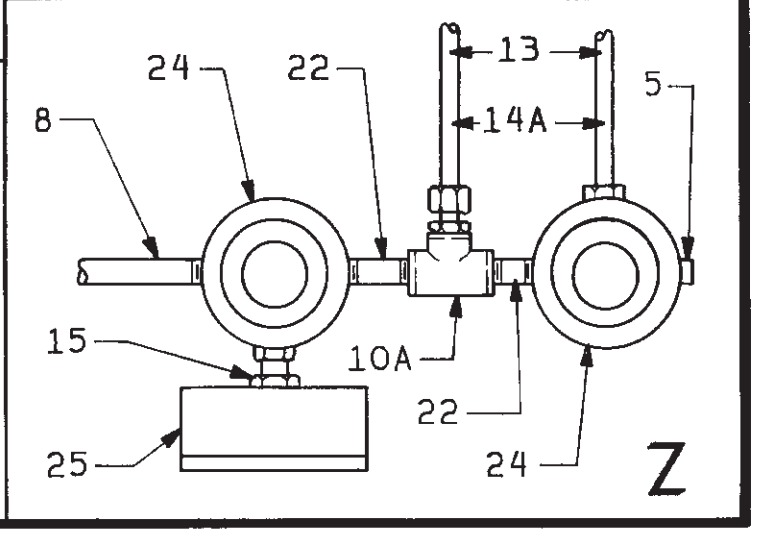

Z

P/L UNIVERSAL AIRVALVE BOX

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Parts List—P/L UNIVERSAL AIRVALVE BOX

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	03 01180A	84232D ENCL=AIR VALVE FORMED	
all	2	03 01180B	84136B PLATE=BOTTOM AIRVALVE BOX	
all	3	17C051	01Z RECP BKT #2 FAST CAMLOCK	
all	4	15J051	01Z POPRIVET 1/8DIAX.265 LONG S/S	
all	5	51P013	PLUG HXCNTRSUNK 1/4"BRASS	
all	6	12P1AHSB	SNAPBUSH.437MHX.312 T=1/8HEYCO#2043	
all	7	X3 01507A	88462# MANIFOLD BLOCK MACH 12PORTS	
all	8	5N0E11ABE2	NPT NIPPLE 1/4X11 TBE BRASS 125#	
all	9	51E507	HOSESTEM BRASS 1/4 MPTX1/2 HOSE I.D	
all	10	51V015	03Z TEE PIPE 1/4"FGDBRASS101-T7-444	52DRA+DYA ONLY
all	10	5SX0EBF	NPT CROSS 1/4" BRASS 150# 2205P-4	52WE1;60;72;WE2+WE3
all	11	5N0E05KB42	NPT NIPPLE 1/4X5.5 TBE BRASS STD	
all	12	51T020	STRAINER-T 1/4"ANCHOR #101ST-4	
all	13	60E004TE	04Z 1/4"OD X.170"ID NYLON TUBING *	
all	14	53A008B	BODY=BRMALCON 1/4X1/4COMP W#B68X4X4	52DRA+DYA ONLY
all	14	53A031XB	BODY=MAL90EL 1/4X1/4COMP #269C-4-4B	52WE1;60;72;WE2+WE3
all	15	5SB0E0CBEO	HEXPIPBUSH 1/4 X 1/8 BRASS 125#	
all	16	30N100	07Z PRESSGUAGE 1/8"BACKCONN 0-30PSI	60;72;WE3 ONLY
all	16	30N101	08Z PRESSGAUGE 1/8"BACKCONN O-60PSI	60;72;WE2 ONLY
all	17	96J019BE	78486T*PRESSURE REG=EPOXY SET 28PSI	
all	18	5N0ECLSBE2	NPT NIPPLE 1/4XCLS TBE BRASS 125#	
all	19	15U185	FLATWASHER(USS STD) 1/4" ZNC PLT	
all	20	02 10456	65025A BUSHING=SENSDEV PIVOTPIN	
all	21	12K005	01Z 1/2 CONDUIT NIPL-CHASE"LONG TYP	
all	22	5N0E02ABE2	NPT NIPPLE 1/4X2TBE BRASS 125#	
all	23	5SL0CBEC	NPT ELBOW 90DEG STRT 1/8"BRASS 125#	

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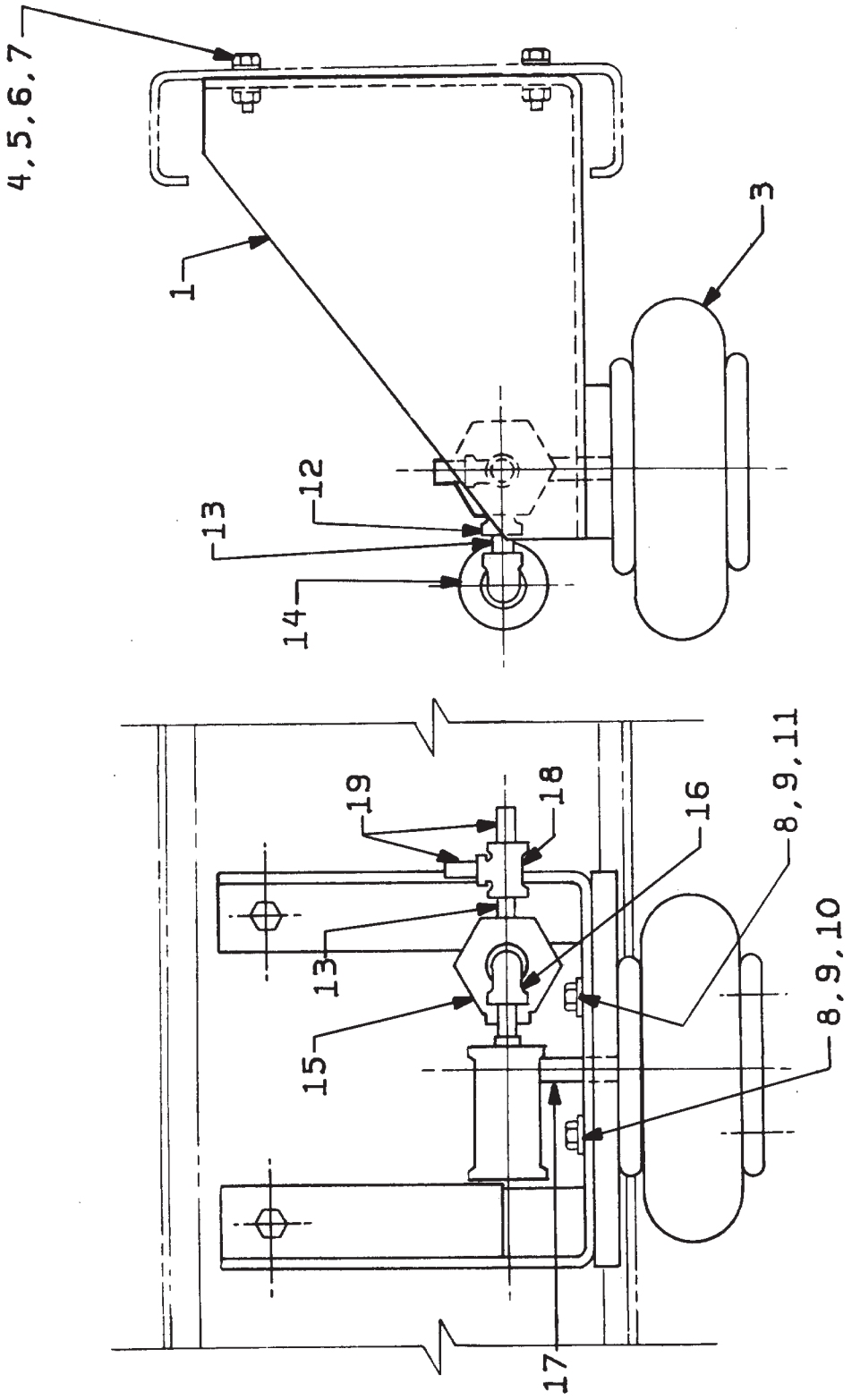
Parts List, cont.—P/L UNIVERSAL AIRVALVE BOX

Used In	Item	Part Number	Description	Comments
all	24	96J019E	1/4"PRESSREG2-50PSI #R07-200-RNEA	
all	25	30N095	03Z PRESSGAUGE 1/8"BACKCONN 0-15PS1	
all	26	5N0E03KBE2	NPT NIPPLE 1/4X3.5 TBE BRASS 125#	
all	27	5S0EBEA0G	NPT TEE 1/4X1/4X3/8 BRASS 125#	
all	28	5SL0EBEC	NPT ELBOW 90DEG STRT 1/4" BRASS 125	
all	29	27A090	HOSECLAMP,11/16-1.5" CADSCR HS-16	
all	30	60E085	07Z H0SE WATER 1/2" DAY 7192-50250*	
all	31	5SB0G0EDEO	NPTHEXBUSH 3/8X1/4 GALCI 125#	
all	31	5SL0EBEA	NPT ELBOW 90DEG 1/4" BRASS 125#	(USED ON 52 DRA ONLY)
all	32	12K070	1/2" CONDUIT LOCKNUT PECO #201J	
all	33	96TCC3AA71	04Z 3/8" N/C 3WAY 240V50/60C VALVE	
all	34	27A005	MUFFLER 3/8" ALLIED #B38 "BANTAM"	
all	35	15K039	HXCAPSCR 1/4-20UNC2AX3/4 GR5 ZNC/CD	
all	36	15U180	LOCKWASHER MEDIUM 1/4 ZINCPL	
all	37	5N0E07AB42	NPT NIPPLE 1/4X7 TBE BRASS STD	

AIR CUSHION INSTALLATION

BMP750049
83433A



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AIR CUSHION INSTALLATION

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Parts List—AIR CUSHION INSTALLATION

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

Used In	Item	Part Number	Description	Comments
			----------ASSEMBLIES----------	
			none	
			----------COMPONENTS----------	
all	1	03 25258D	88293D LT PUSHDOWN BRKT BEND @PRINT	
all	2	MESSAGE NU	THIS P/S ITEM NUMBER NOT USED <>	
all	3	60B100	REPLACED BY KIT K15 0004	
all	4	15G238	HXNUT 5/8-11UNC2B SAE ZINC GR2	
all	5	15U315	LOKWASHER MEDIUM 5/8 ZINCPL	
all	6	15K214E	HXCAPSCR 5/8-11UNC2AX1.5 GR5 ZNC/CD	
all	7	15U314	FLATWASHER(USS STD) 5/8" ZNC PLT	
all	8	15U240	FLATWASHER(USS STD) 3/8" ZNC PLT	
all	9	15U255	LOCKWASHER MEDIUM 3/8 ZINCPL	
all	10	15K110	HEXCAPSCR 3/8-16UNC2AX1.5 GR5-PLTD	
all	11	15K095	HXCPSCR 3/8-16UNC2AX1 GR5 ZINC/CAD	
all	12	5SB0G0EDEO	NPTHEXBUSH 3/8X1/4 GALCI 125#	
all	13	5N0ECLSBE2	NPT NIPPLE 1/4XCLS TBE BRASS 125#	
all	14	27A005	MUFFLER 3/8" ALLIED #B38 "BANTAM"	
all	15	96M051	USE KZK5B00100	
all	16	5SL0ENFA	NPT ELBOW 90DEG 1/4" GALMAL 150#	
all	17	5N0E02KG42	NPT NIPPLE 1/4X2.5 TBE GALSTL SK40	
all	18	51V015	03Z TEE PIPE 1/4"FGDBRASS101-T7-444	
all	19	5N0E01KG42	NPT NIPPLE 1/4X1.5 TBE GALSTL SK40	

Section 10

Hydraulic Schematics and Devices

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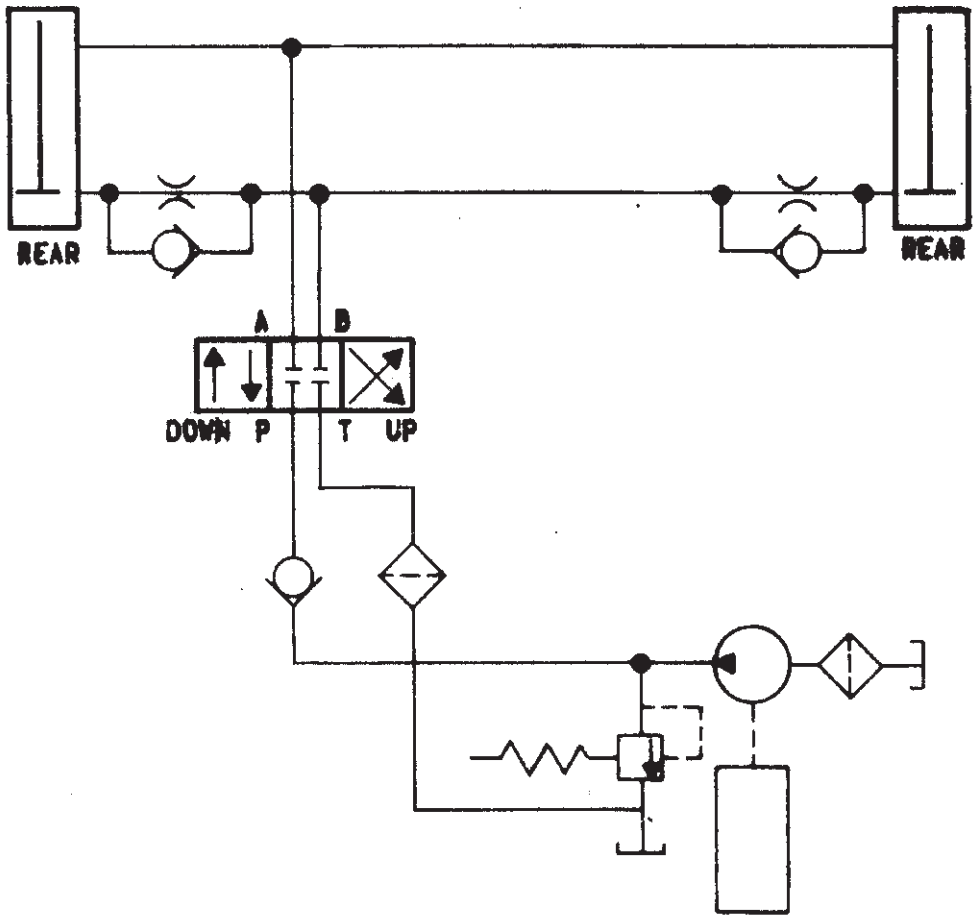

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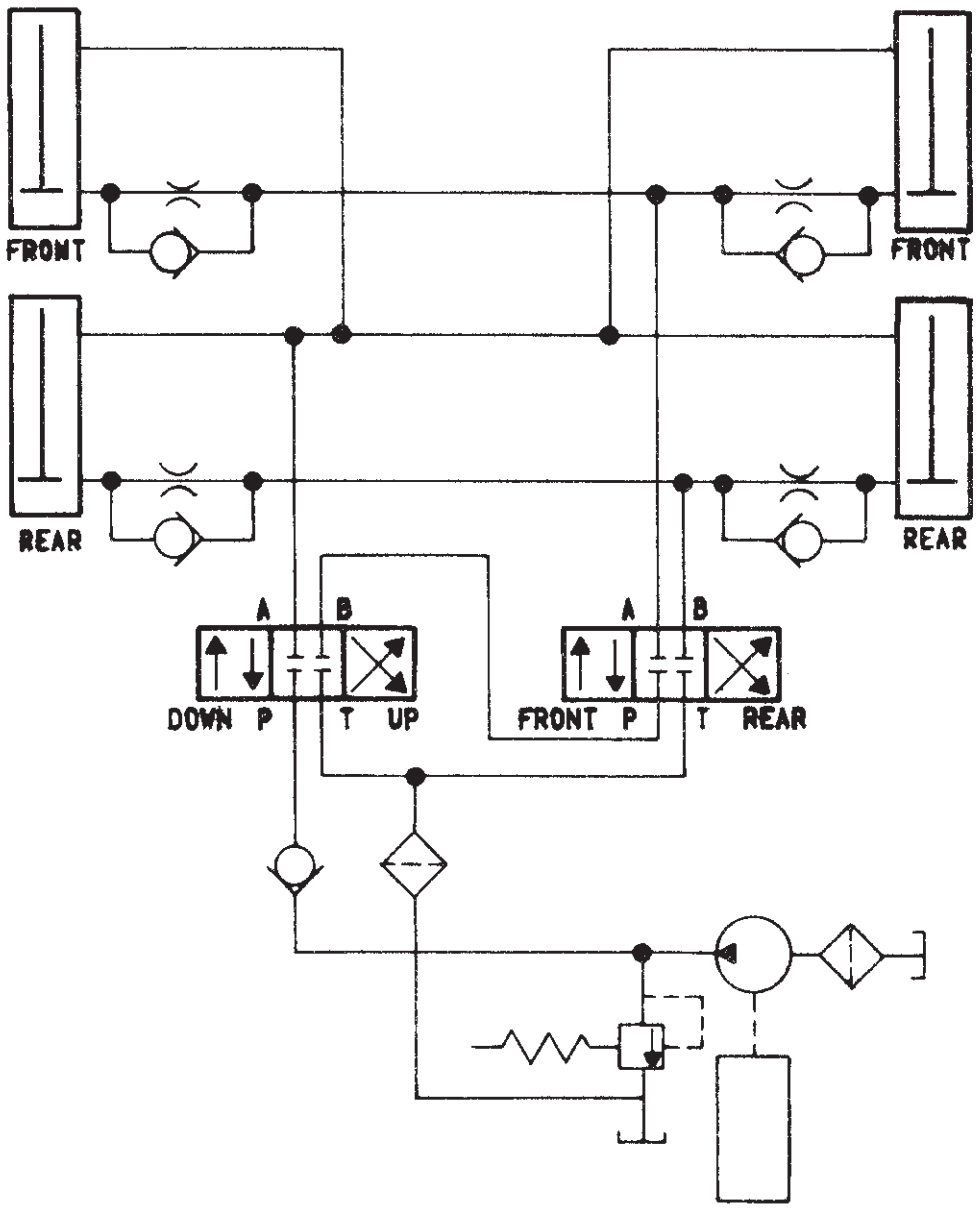
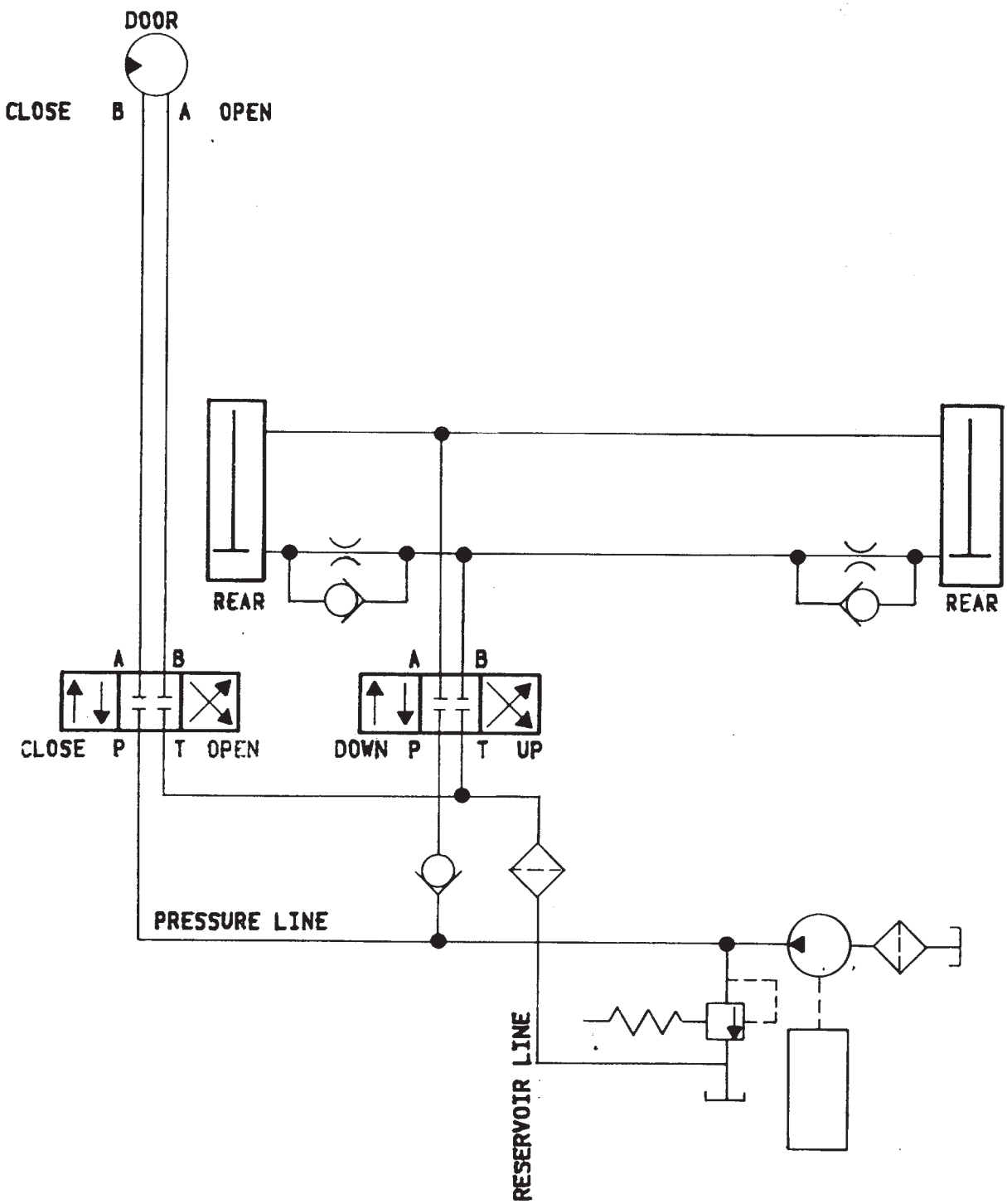


MILNOR	52038, 64042, 72044 TILT 1 WAY AUTO DOOR. HYDRAULIC SCHEMATIC	BMP850008 85097A



52038, 64042, 72044 TILT 2 WAYS AUTO DOOR. HYDRAULIC SCHEMATIC

BMP770058
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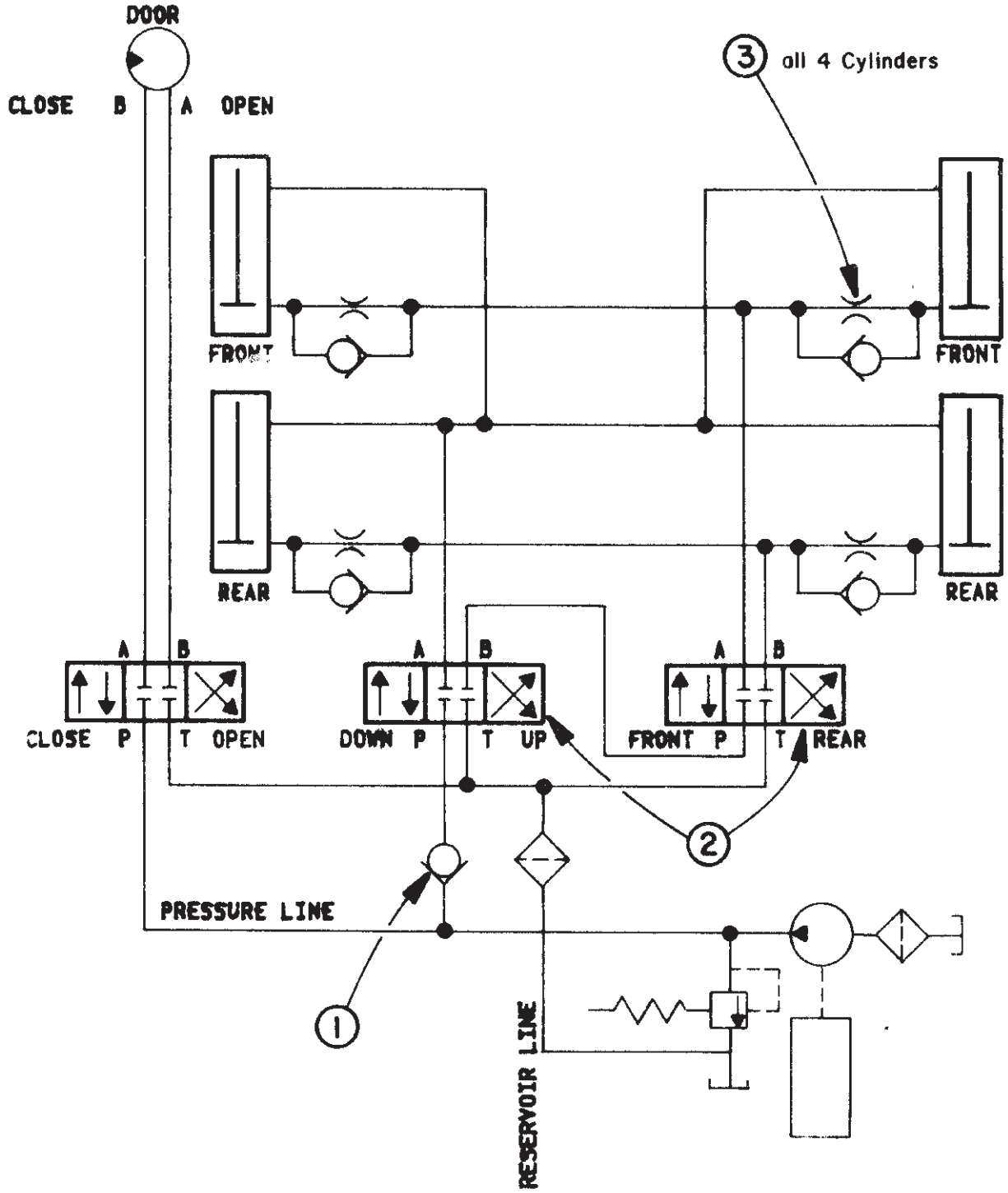

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