

Mayo



BRUSH WASHER

Model 859

OPERATOR'S MANUAL

MAYO MANUFACTURING, INC. LIMITED WARRANTY

THE FOLLOWING WARRANTIES FOR MACHINERY, EQUIPMENT OR PARTS SOLD BY MAYO MANUFACTURING, INC. ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR THOSE WARRANTIES IMPOSED BY STATUE, INCLUDING, BUT NOT LIMITED TO ANY AND ALL IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND OF ANY AND ALL OTHER WARRANTY OBLIGATIONS ON THE PART OF MAYO MANUFACTURING, INC. (The Company).

The Company warrants the machinery, equipment or parts delivered against faulty workmanship or the use of parts delivered against faulty workmanship or the use of defective materials for a period of one (1) year from the date of shipment.

The Company's warranties set forth above are the only warranties made by the Company and shall not be enlarged, diminished or affected by, and no obligation or liability shall arise out of the Company's rendering technical or other advice or service in connection with the machinery, equipment or parts.

Parts or components furnished to the Company by third persons are guaranteed only to the extent of the original manufacturer's guarantee to the Company, a copy of which will be supplied to the Purchaser upon written request to the Company.

LIABILITY

THE COMPANY'S SOLE AND EXCLUSIVE MAXIMUM LIABILITY, AND PURCHASER'S SOLE AND EXCLUSIVE REMEDY under the above warranty shall be, at the Company's option, the repair, or replacement of the machine, equipment or part which is found to be defective due to faulty workmanship or defective materials, and is returned by the Purchaser to the Company within the warranty period. Shipment both ways and in transit damage shall be at the purchaser's risk and expense. If the Company elects to repair or replace the machine, equipment, or part, the Company will have a reasonable time within which to do so.

The remedies set forth above are available upon the following conditions:

1. Purchaser has promptly notified Company upon discovery that the machinery, equipment, or parts are defective due to faulty workmanship or defective materials; and
2. Purchaser provides Company with a detailed description of the deficiencies; and
3. Company's examination discloses that the alleged deficiencies exist and were not caused by accident, fire, misuse, neglect, alteration, or any other hazard or by Purchaser's improper installation, use or maintenance.

Such repair or replacement shall constitute fulfilment of all Company's liability to Purchaser, whether based on contract or tort.

This warranty does not apply to any machine that has been altered outside the factory in any way so as, in the judgement of Mayo, to affect its operation, reliability or safety, or which has been subject to misuse, neglect or accident.

In the event the Company breach any other provisions of the Purchase Agreement, the Company's EXCLUSIVE MAXIMUM LIABILITY AND PURCHASER'S EXCLUSIVE REMEDY, whether in contract or tort, otherwise shall not in any event exceed the contract price for the particular machine, piece of equipment or parts involved.

IN NO EVENT SHALL COMPANY BE LIABLE TO ANYONE FOR SPECIAL, COLLATERAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY PROVISIONS OF THIS CONTRACT OR WARRANTY. SUCH EXCLUDE DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, costs of REMOVAL AND REINSTALLATION OF ITEMS, Loss of GOODWILL, LOSS OF PROFITS, LOSS OF USE OR INTERRUPTION OF BUSINESS.

WARRANTY VOID IF NOT REGISTERED

MAYO MANUFACTURING, INC.

BRUSH WASHER MODEL 859

WARRANTY REGISTRATION FORM & INSPECTION REPORT

WARRANTY REGISTRATION

This form must be filled out by the dealer and signed by both the dealer and the customer at the time of delivery.

Customer's Name _____

Dealer's Name _____

Address _____

Address _____

City, State/Prov., Code _____

City, State/Prov., Code _____

Phone Number (_____) _____

Washer Model _____

Serial Number _____

Delivery Date _____

DEALER INSPECTION REPORT

- _____ Inspect Electrical System
- _____ Lubricate Machine
- _____ Drive Belts Tensioned and Aligned
- _____ Speed Reducer Gearboxes Oil Level Checked
- _____ Check Condition of Brush Rolls
- _____ Check Condition of Belts and Pulleys
- _____ Check that all Water Holes Flow Freely
- _____ Check that Brush Roller Barrel Centered in Frame

SAFETY

- _____ All Decals Installed and Legible
- _____ Review Operating and Safety Instructions

I have thoroughly instructed the buyer on the above described equipment which review included the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date _____

Dealer's Rep. Signature _____

Signature _____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments, safe operation and applicable warranty policy.

Date _____

Owner's Signature _____

WHITE	YELLOW	PINK
MAYO MFG., INC.	DEALER	CUSTOMER

SERIAL NUMBER LOCATION

Always give your dealer the serial number of your Mayo Brush Washer when ordering parts or requesting service or other information.

The serial number plate is located where indicated. Please mark the number in the space provided for easy reference.



SERIAL NUMBER LOCATION

Model Number _____

Serial Number _____

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1 INTRODUCTION

Congratulations on your choice of a Mayo Model 859 Series Brush Washer and welcome to Mayo's quality line of potato handling equipment. This equipment is designed and manufactured to meet the needs of a discriminating buyer in the agricultural industry for the loading, unloading, processing and storing of harvest yields.

Safe, efficient and trouble free operation of your new Mayo Brush Washer requires that you, and anyone else who will be operating or maintaining the Brush Washer, read, understand and practice ALL of the Safety, Operation, Maintenance and Troubleshooting recommendations contained within this Operator's Manual.



This manual applies to all Model 859 Series Brush Washers manufactured by Mayo. Certain options may be available to specifically tailor the Brush Washer to your operation and may not be included in this manual. Please contact the manufacturer regarding additional information about these options. Use the Barrel Washer Table of Contents and Index as a guide to find specific information.

Keep this manual handy for frequent reference and so that it will be passed on to new operators or owners. Call your Mayo dealer if you need assistance, information or additional copies of this manual.

MACHINE ORIENTATION - The discharge end of the Brush Washer is the front. The hydraulic pump is on the right side of the frame.

2 SAFETY

SAFETY ALERT SYMBOL

This Safety Alert symbol means
ATTENTION! BECOME ALERT!
YOUR SAFETY IS INVOLVED!



The Safety Alert symbol identifies important safety messages on your Mayo Brush Washer and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill
Accidents Cost You Money
Accidents Can Be Avoided

SIGNAL WORDS:

Note the use of the signal words **DANGER**, **WARNING** and **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

- DANGER** - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.
- WARNING** - Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.
- CAUTION** - Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

If you have any questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer or Mayo, P.O. Box 497, Bus Highway 2, East Grand Forks, Minnesota, 56721. (Telephone) 218-773-1234, (FAX) 218-773-6693 or toll free at 1-800-223-5873.



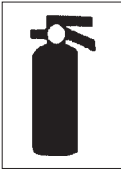

SAFETY

YOU are responsible for the **SAFE** operation and maintenance of your Mayo Brush Washer. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Brush Washer be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices while operating the Brush Washer.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but, also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this machine is familiar with the procedures recommended and follows safety precautions. Remember, most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Read and understand the Operator's Manual and all safety signs before supplying power to, operating, maintaining or adjusting the Brush Washer.
- Brush Washer owners must give operating instructions to operators or employees before allowing them to operate the Brush Washer, and at least annually thereafter.
- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Most accidents can be avoided.
- A person who has not read and understood all operating and safety instructions is not qualified to operate this machine. An untrained operator exposes himself and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.
- Think SAFETY! Work SAFELY!

2.1 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before supplying power to, operating, maintaining or adjusting the Brush Washer. 
2. Only trained, competent persons shall operate the Brush Washer. An untrained operator is not qualified to operate this machine.
3. Provide a first-aid kit for use in case of an accident. Store in a highly visible place. 
4. Provide a fire extinguisher for use in case of an accident. Store in a highly visible place. 
5. Install and properly secure all guards and shields before operating.
6. Wear appropriate protective gear. This list includes but is not limited to:
 - Protective shoes with slip resistant soles
 - Protective glasses or goggles
 - Heavy gloves
 - Hearing protection
7. Turn machine OFF, place all controls in their OFF position, shut down and lockout power supply and wait for all moving parts to stop before servicing, adjusting, maintaining, repairing or cleaning. (Safety lockout devices are available through your Mayo dealer parts department).
8. Know the emergency medical center number for your area.
9. Review safety related items with all operators annually.


2.2 EQUIPMENT SAFETY GUIDELINES

1. Safety of the operator and bystanders is one of the main concerns in designing and developing a machine. However, every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions in this section. To avoid personal injury or death, study the following precautions and insist those working with you, or for you, follow them.
2. In order to provide a better view, certain photographs or illustrations in this manual may show an assembly with a safety shield removed. However, equipment should never be operated in this condition. Keep all shields in place. If shield removal becomes necessary for repairs, replace the shield prior to use.
3. Replace any safety sign or instruction sign that is not readable or is missing. Location of such safety signs is indicated in this manual.
4. Never use alcoholic beverages or drugs which can hinder alertness or coordination while operating this equipment. Consult your doctor about operating this machine while taking prescription medications.
5. **Under no circumstances should young children be allowed to work with this equipment. Do not allow persons to operate or assemble this unit until they have read this manual and have developed a thorough understanding of the safety precautions and of how it works. Review the safety instructions with all users annually.**
6. This equipment is dangerous to children and persons unfamiliar with its operation. The operator should be a responsible, properly trained and physically able person familiar with farm machinery and trained in this equipment's operations. If the elderly are assisting with farm work, their physical limitations need to be recognized and accommodated.
7. Never exceed the limits of a piece of machinery. If its ability to do a job, or to do so safely, is in question - **DON'T TRY IT.**
8. Do not modify the equipment in any way. Unauthorized modification result in serious injury or death and may impair the function and life of the equipment.
9. In addition to the design and configuration of this implement, including Safety Signs and Safety Equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of the machine. Refer also to Safety Messages and operation instruction in each of the appropriate sections of the auxiliary equipment and machine Manuals. Pay close attention to the Safety Signs affixed to the auxiliary equipment and the machine.

2.3 STORAGE SAFETY

1. Store the Brush Washer on a firm level surface.
2. If required, make sure the unit is firmly blocked up.
3. Drain all the water from the collector basin in the bottom of the frame and recirculation system.
4. Make certain that all mechanical locks are safely and positively connected before storing.
5. Store away from areas of human activity.
6. Do not allow children to play on or around the stored Brush Washer.
7. Lock out power by turning off master control panel, junction box or unplugging the power cord and padlocking the door shut to prevent electrocution or unauthorized start up of the Brush Washer.

2.4 SAFETY TRAINING

1. Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator or bystander.
2. In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of this equipment.
3. It has been said, "The best safety feature is an informed, careful operator." We ask you to be that kind of an operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Accidents can be avoided.
4. **Working with unfamiliar equipment can lead to careless injuries. Read this manual, and the manual for your auxiliary equipment, before assembly or operating, to acquaint yourself with the machines. If this machine is used by any person other than yourself. It is the machine owner's responsibility to make certain that the operator, prior to operating:**
 - a. **Reads and understands the operator's manuals.**
 - b. **Is instructed in safe and proper use.**
5. Know your controls and how to stop pilers, stingers, Brush Washers, conveyors and any other auxiliary equipment quickly in an emergency. Read this manual and the one provided with your other equipment.
6. Train all new personnel and review instructions frequently with existing workers. Be certain only a properly trained and physically able person will operate the machinery. A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death. If the elderly are assisting with farm work, their physical limitations need to be recognized and accommodated.

2.5 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.
2. Replace safety signs that are missing or have become illegible.
3. Replaced parts that displayed a safety sign should also display the current sign.
4. Safety signs displayed in Section 3 each have a part number in the lower right-hand corner. Use this part number when ordering replacement parts.
5. Safety signs are available from your authorized Distributor or Dealer Parts Department or the factory.

How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Determine exact position before you remove the backing paper. (See Section 3).
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

2.6 PREPARATION

1. Never operate the Barrel Washer and auxiliary equipment until you have read and completely understand this manual, the auxiliary equipment Operator's Manual, and each of the Safety Messages found on the safety signs on the Brush Washer and auxiliary equipment.

2. Personal protection equipment including hard hat, safety glasses, safety shoes, and gloves are recommended during assembly, installation, operation, adjustment, maintaining, repairing, removal, or moving the implement. Do not allow long hair, loose fitting clothing or jewelry to be around equipment.



3. **PROLONGED EXPOSURE TO LOUD NOISE MAY CAUSE PERMANENT HEARING LOSS!**

Motors or equipment attached can often be noisy enough to cause permanent, partial hearing loss. We recommend that you wear hearing protection on a full-time basis if the noise in the Operator's position exceeds 80db. Noise over 85db on a long-term basis can cause severe hearing loss. Noise over 90db adjacent to the Operator over a long-term basis may cause permanent, total hearing loss. **NOTE:** Hearing loss from loud noise (from tractors, chain saws, radios, and other such sources close to the ear) is cumulative over a lifetime without hope of natural recovery.



4. Clear working area of debris, trash or hidden obstacles that might be hooked or snagged, causing injury, damage or tripping.
5. Operate only in daylight or good artificial light.
6. Be sure machine is properly anchored, adjusted and in good operating condition.
7. Ensure that all safety shielding and safety signs are properly installed and in good condition.
8. Before starting, give the machine a "once over" for any loose bolts, worn parts, cracks, leaks, frayed belts and make necessary repairs. Always follow maintenance instructions.

2.7 INSTALLATION SAFETY

1. Disconnect and remove all mechanical locks, anchor chains and any other transport devices that would hinder or prohibit the normal functioning of the Brush Washer upon start up. Serious damage to the machine and/or personal injury to the operator and bystanders may result from attempting to operate the machine while mechanical locking devices are still attached.
2. Position the machine on firm, level ground before operating.
3. Have at least one extra person available to assist when elevating, moving or connecting to other equipment.
4. Make certain that sufficient amperage, at the proper voltage and frequency (60Hz) is available before connecting power. All wiring should comply with ANSI/NFPA 70 electrical requirements. If you are uncertain, have a licensed electrician provide power to the machine.
5. If using Brush Washer as part of material handling system, anchor securely to other equipment before starting.

2.8 LOCK-OUT TAG-OUT SAFETY

1. Establish a formal Lock-Out Tag-Out program for your operation.
2. Train all operators and service personnel before allowing them to work around the Brush Washer.
3. Provide tags at the work site and a sign-up sheet to record tag out details.
4. Do not service or maintain the Brush Washer unless motors are OFF and the power locked out at the master panel. Keep others away.

2.9 OPERATING SAFETY

1. Make sure that anyone who will be operating the Brush Washer or working on or around the unit reads and understands all the operating, maintenance and safety information in the operator's manual. Also read and follow the instructions in the manuals of other equipment in the system.
2. **Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Mayo dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.**
3. Establish a lock-out tag-out policy for the work site. Be sure all personnel are trained in and follow all procedures. Lock-out tag-out all power sources before servicing the unit or working around loading/unloading equipment.
4. Install and properly secure all guards and shields before operating.
5. Replace all worn or failed components immediately.
6. Keep hands, feet, hair and clothing away from all moving parts.
7. Clear the area of bystanders, especially small children, before starting.
8. Make sure all control switches are in the off position before connecting power supply.
9. Insure all water system and supply components in good condition before starting.
10. Keep all electrical components tight, dry and in good repair.
11. Keep all hydraulic components leak free and in good condition.
12. Before supplying electrical power to the machine, be sure that you have adequate amperage at the proper phase and voltage to run it by following ANSI/NFPA 70 Wiring Standard. If you do not know or are unsure, consult a licensed electrician.
13. Keep the working area clean and dry.
14. Review safety instructions annually.

2.10 MAINTENANCE SAFETY

1. Read and understand all the information contained in the Operator's Manual regarding operating, servicing, adjusting, maintaining and repairing.
2. **Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Mayo dealer parts department), relieve hydraulic pressure and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.**
3. Follow good shop practices:

- Keep service area clean and dry.
- Be sure electrical outlets and tools are properly grounded.
- Use adequate light for the job at hand.



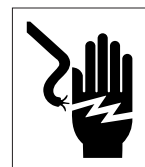
4. Make sure all guards and doors are in place and properly secured when operating the Brush Washer.
5. Always use personal protection devices such as eye, hand and hearing protectors, when performing any service or maintenance.
6. Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore your equipment to original specifications. The manufacturer will not be responsible for injuries or damages caused by use of unapproved parts and/or accessories.

7. A fire extinguisher and first aid kit should be kept readily accessible while performing maintenance on this



equipment.


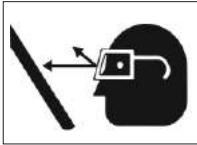
8. Periodically tighten all bolts, nuts and screws and check that all cotter pins are properly installed to ensure unit is in a safe condition.
9. When completing a maintenance or service function, make sure all safety shields and devices are installed before placing unit in service.
10. **Do not work on Brush Washer electrical system unless the power cord is unplugged or the power supply is locked out. Lock-out tag-out power source before performing any maintenance work.**



2.11 ELECTRICAL SAFETY

1. Have only a qualified licensed electrician supply power. All wiring should comply with ANSI/NFPA 70 electrical requirements. Always follow local, state/provincial and federal electrical codes.
2. Make certain that the Brush Washer is properly grounded at the power source.
3. Make certain that all electrical switches are in the OFF position before plugging the Brush Washer in.
4. **Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Mayo dealer parts department), relieve hydraulic pressure and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.**
5. Disconnect power before resetting any motor or breaker overload.
6. Replace any damaged electrical plugs, cords, switches and components immediately.
7. Do not work on Brush Washer electrical system unless the power cord is unplugged or the power supply is locked-out tagged-out.

2.12 HYDRAULIC SAFETY

1. Make sure that all components in the pump system are kept in good condition and are clean.
2. Before applying pressure to the system, make sure all components are tight, and that lines, hoses and couplings are not damaged.
3. Do not attempt any makeshift repairs to the hydraulic lines, fittings or hoses by using tapes, clamps or cements. The hydraulic system operates under extremely high pressure. Such repairs will fail suddenly and create a hazardous and unsafe condition.
4. Wear proper hand and eye protection when searching for a high pressure hydraulic leak. Use a piece of wood or cardboard as a backup instead of hands to isolate and identify a leak.


5. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from fluid piercing the skin surface.
6. Relieve pressure on hydraulic system before servicing, maintaining or repairing the hydraulic system.

2.13 EMPLOYEE SIGN-OFF FORM

Mayo Manufacturing, Inc. follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASABE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining a Mayo built machine must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

SIGN-OFF FORM

DATE	EMPLOYEE'S SIGNATURE	EMPLOYER'S SIGNATURE

3 SAFETY SIGN LOCATIONS

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various Safety Signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



A



B



REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various Safety Signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



C



D



REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

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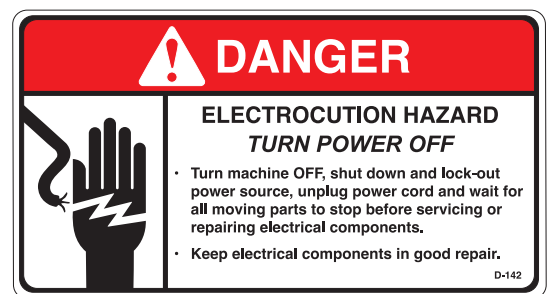
- Think SAFETY! Work SAFELY!



E



F



REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various Safety Signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

4 OPERATION



OPERATING SAFETY

- Make sure that anyone who will be operating the Barrel Washer or working on or around the unit reads and understands all the operating, maintenance and safety information in the operator's manual. Also read and follow the instructions in the manuals of other equipment in the system.
- **Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Mayo dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.**
- Establish a lock-out tag-out policy for the work site. Be sure all personnel are trained in and follow all procedures. Lock-out tag-out all power sources before servicing the unit or working around loading/unloading equipment.
- Install and properly secure all guards and shields before operating.
- Replace all worn or failed components immediately.
- Keep hands, feet, hair and clothing away from all moving parts.
- Clear the area of bystanders, especially small children, before starting.
- Make sure all control switches are in the off position before connecting power supply.
- Insure all water system and supply components in good condition before starting.
- Keep all electrical components tight, dry and in good repair.
- Before supplying electrical power to the machine, be sure that you have adequate amperage at the proper phase and voltage to run it by following ANSI/NFPA 70 Wiring Standard. If you do not know or are unsure, consult a licensed electrician.
- Keep the working area clean and dry.
- Review safety instructions annually.

4.1 TO THE NEW OPERATOR OR OWNER

The Mayo Manufacturing Brush Washer is designed to wash potatoes to remove dirt, mud and residue prior to placing in storage or transporting for processing. Be familiar with the machine before starting.

It is the responsibility of the owner or operator to read this manual and to train all other operators before they start working with the machine. Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the worksite. Untrained operators are not qualified to operate the machine.

Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the worksite. Untrained personnel are not qualified to operate this machine.

Many features incorporated into this machine are the result of suggestions made by customers like you. Read this manual carefully to learn how to operate the machine safely and how to set it to provide maximum efficiency. By following the operating instructions in conjunction with a good maintenance program, your Brush Washer will provide many years of trouble-free service.

4.2 MACHINE COMPONENTS

The Mayo Manufacturing Brush Washer consists of an intake, rotating drum and brush rollers, discharge gate and water pipes with holes to spray water into the potatoes, drum and brushes for cleaning. Generally a Brush Washer is a component in a conveying line and is used to clean the potatoes prior to processing.

Customers must provide a steady supply of potatoes into the machine and out of the machine. A self-contained hydraulic pump is mounted on the left rear corner of the frame to provide pressurized oil to raise and lower the discharge end of the drum (change drum operating angle) and position the discharge gate.

Adjust the water flow rate, drum angle and discharge gate position to set and control the cleaning perfor-

mance. Electric motors on top of the frame drive the drum rotation and brush roller rotation. Water is diverted into the pipe on top of the inside of the drum to spray water on the potatoes and brush rollers during operation. An auxiliary spray bar (pipe) can be connected to a water source to bring more water to the cleaning process.

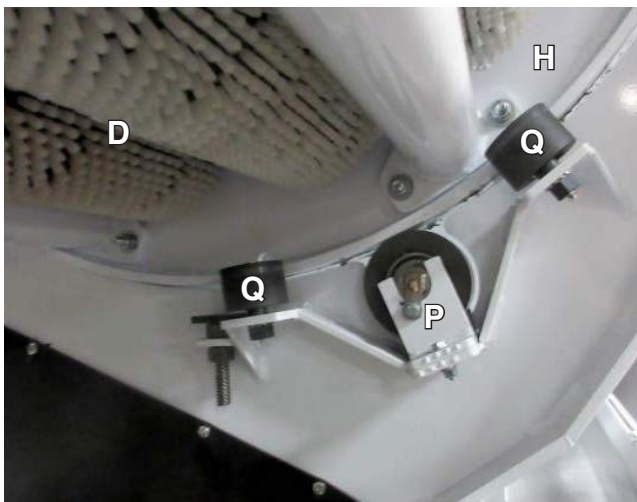
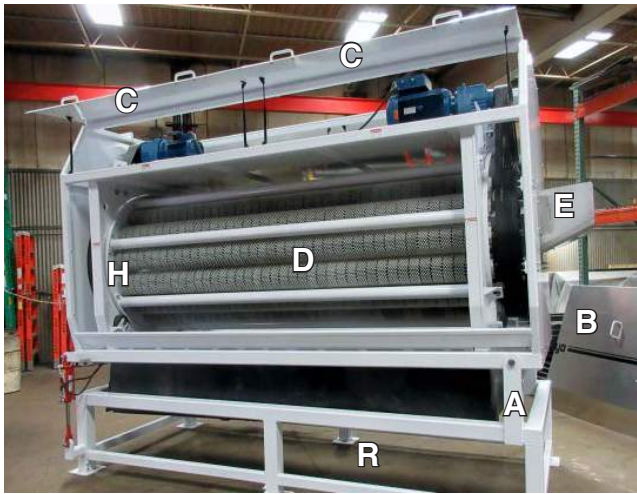
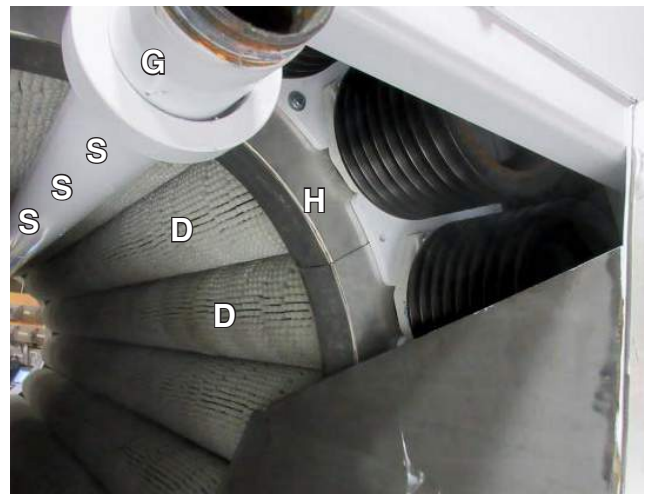
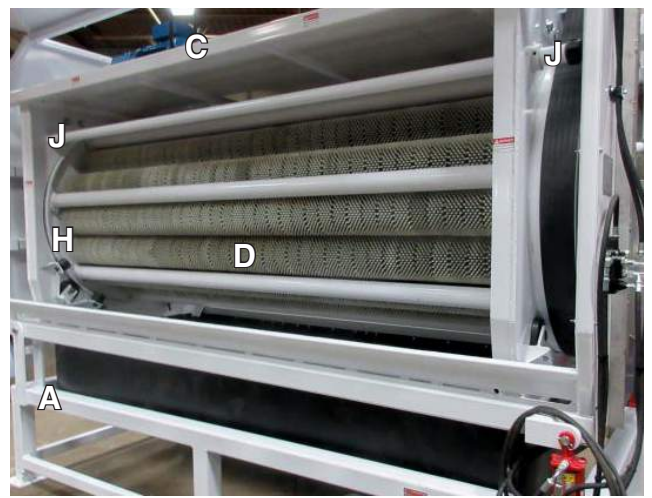
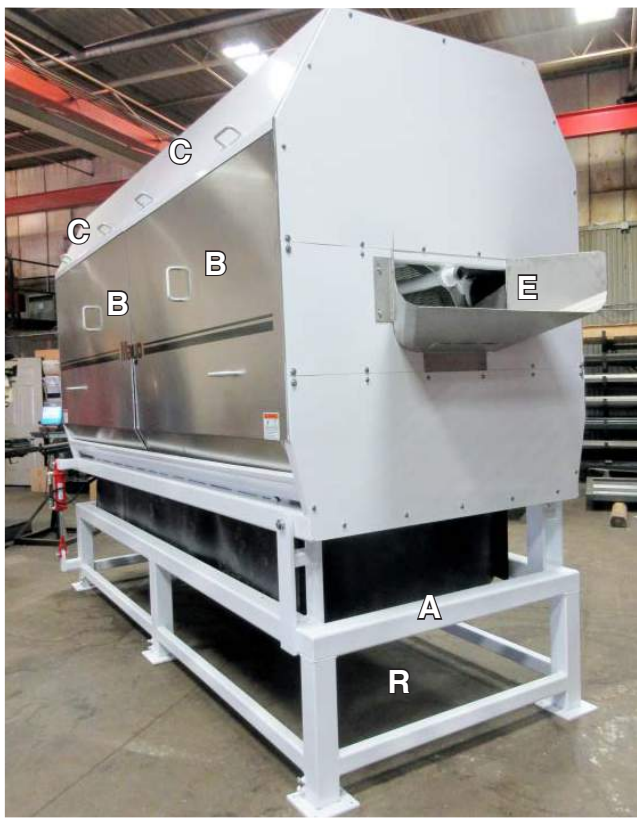
Hydraulic control valves are adjacent to the discharge chute when the operator can observe the cleanliness of the potatoes leaving the machine and adjust the machine parameters as appropriate. It is the customer's responsibility to provide a method to catch the water under the frame for cleaning, filtering, recycling or disposal.

An optional control system is available that allows the operator to adjust the drum and brush rotation speed to obtain the optimum performance.

- | | | |
|----------------------------|-----------------------------------|--------------------------------|
| A Frame | H Drum | P Drum Support Wheels |
| B Side Panels | J Auxilliary Water Pipe | Q Drum Centering Wheels |
| C Top Access Doors | K Drum Drive Motor | R Water Discharge Area |
| D Brush Rollers | L Roller Drive Motor | S Water Spray Holes |
| E Intake | M Hydraulic Pump | T Control Panel |
| F Discharge | N Hydraulic Control Valves | |
| G Center Water Pipe | O Discharge Gate | |



FIG. 1 MACHINE COMPONENTS



4.3 GENERAL OPERATION THEORY

A Brush Washer is positioned in the line of conveying equipment that loads trucks to take the potatoes for processing. This unit can be located at a storage or transfer facility and used prior to the potatoes being loaded into the transport truck.

Fresh and recycled (cleaned or filtered) water must be provided to the machine by the customer at the required volume and pressure for optimum performance. Insufficient volume and pressure will compromise the washing performance.

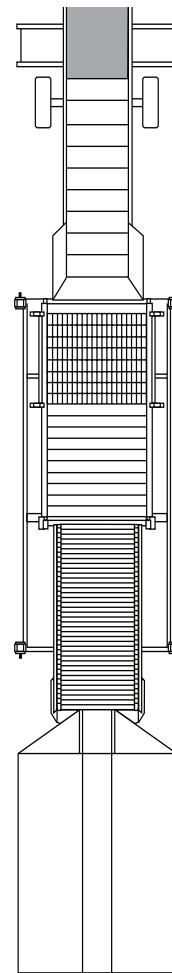
Potatoes are fed into the intake by one of several types of conveying machines which could include, but is not limited to a telescoping conveyor, a straight conveyor, a sizing conveyor, a chain conveyor, a transport truck, a holding hopper, etc.

When the potatoes are scrubbed, cleaned and finally rinsed with clean water at the end of the brush rollers, they are discharged out the back of the machine.

Use the roller drum angle and discharge gate position to control the speed that the potatoes move through the machine. Move them through slowly if the potatoes are dirty and faster if they require less washing.

The customer must provide a means to remove the clean potatoes from the washer as they are discharged.

Minimize all drop heights to prevent bruising of the potatoes.



Brush Washer



Positioned

FIG. 2 POSITIONED (TYPICAL)

4.4 MACHINE BREAK-IN

Although there are no operational restrictions on the Brush Washer when used for the first time, it is recommended that the following mechanical items be checked:

A. Before Starting:

1. Read Brush Washer and auxiliary equipment manuals before starting.
2. Turn gearbox breather 1/4 turn to open breather and remove tag.

B. After operating for 1/2 hour:

1. Retorque all fasteners and hardware.
2. Check that all electrical connections are tight and cords are routed out of the way or protected.
3. Check that all hydraulic fittings are leak free and components are in good condition.
4. Check the integrity of the water supply, piping and discharge holes. Clean discharge holes if any are plugged or have a distorted discharge pattern.
5. Inspect drum, drive pulleys/rollers and brush rollers for entangled material. Remove material.
6. Check the alignment and tension of the drum and brush rollers drive systems. Realign or tighten as required.
7. Check the centering of the drum in the frame. Re-center if required.
8. Check oil level in the speed reducing gearboxes for the brush roller and drum drive systems. Top up as required.
9. Clean the water collection tank under the drum of all the mud, soil and debris.
10. Lubricate all grease fillings.

C. After 2, 5 and 10 hours of operation:

1. Repeat steps 1 through 10 from Section B.
2. Then go to the regular servicing and maintenance schedule as defined in the Maintenance Section.



Drum Drive



Roller Drive

FIG. 3 BREATHERS



4.5 PRE-OPERATION CHECKLIST

Safe and efficient operation of your new Brush Washer requires that each operator reads and follows all safety precautions and operating procedures contained in this section. Performing the following pre-operation checklist is important for personal safety as well as for continued mechanical soundness and longevity of your new Mayo Brush Washer. The checklist should be performed before operating the Brush Washer and prior to each operation thereafter.

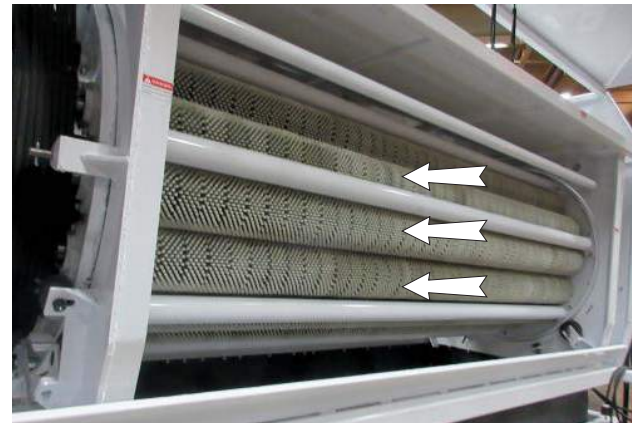
1. Lubricate the machine according to the schedule prescribed in the "Maintenance Section".
2. Insure that proper protective gear is in good repair and available for use by each operator. Make certain that each operator uses the protective gear. Protective gear includes but, is not limited to:
 - Leather gloves
 - Safety glasses or face shield
 - Full length protective clothing
 - Steel toed boots with slip resistant soles.
3. Insure that all safety guards and shields are in good repair and securely in place.
4. Check that all feet are down and securely anchored with their setscrews.
5. Check the integrity of water supply, piping and water holes. Clean water holes if any are plugged or have a distorted discharge pattern. Clean water collection tank.
6. Inspect drum, drive pulleys and brush rollers for entangled material. Remove entangled material.
7. Check the alignment and tension of drum and brush roller drive systems. Realign or tighten as required.
8. Check oil level in speed reduction gearboxes for the drum and brush roller drives. Top up as required.
9. Check that the drum is centred in the frame. Adjust if necessary as outlined in the 'Maintenance Section'.
10. Check that all electrical connections are tight and cords are routed out of the way or protected.
11. Check that the hydraulic fittings are leak free and components are in good condition.



11. Be sure the working area is clean and dry to prevent tripping or slipping.



Feet (Typical)



Brush Rollers (Typical)



Water Holes (Typical)

FIG. 4 INSPECTION (TYPICAL)

4.6 CONTROLS

It is recommended that all operators review this section of the manual to familiarize themselves with the location and function of all machine controls before starting. Some machines may vary slightly due to custom features but they are similar and all controls are labelled.

1. Hydraulic Controls:

A set of hydraulic valves are mounted on the back of the frame next to the discharge.

a. Lever A:

This 3 position spring-loaded-to-center-neutral lever controls the position or angle of the drum. Raise the lever and hold to raise the back of the drum. Push down on the lever and hold to lower the back of the drum. Release the lever and it will return to its centered neutral position and the drum will stop moving.

b. Lever B:

This 3 position spring-loaded-to-center-neutral lever controls the position of the discharge chute. Lift the lever and hold to raise the position of discharge chute. Push down on the lever and hold to lower the chute. Release the lever and it will return to its neutral centered position and the chute will stop moving.

NOTE:

The hydraulic pump must be on for these controls to function.

2. Master Plugs:

Each motor on the machine is designed with a plug at the end of the power cord. Always unplug it before performing any service, maintenance or repairs on the machine.

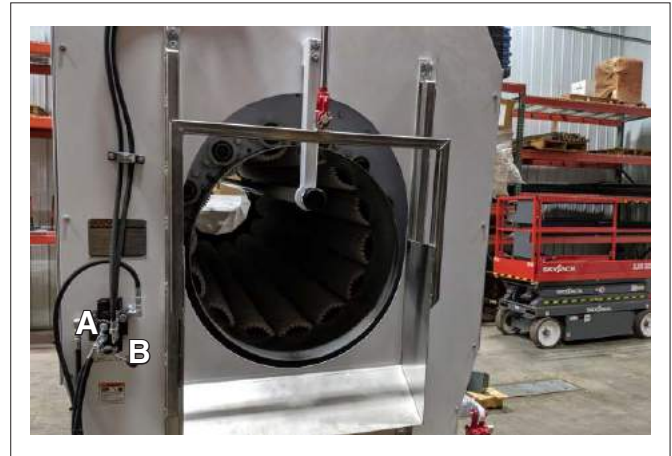
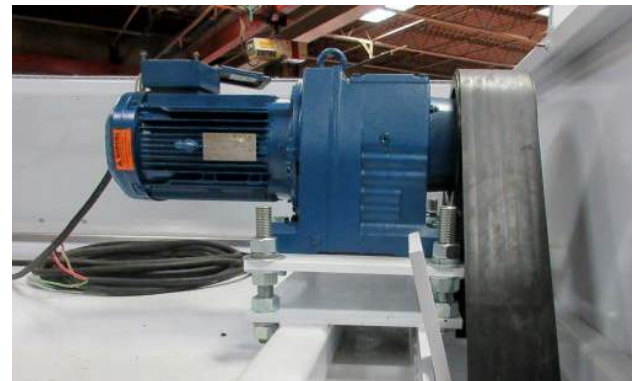


FIG. 5 HYDRAULIC CONTROLS



HYDRAULIC PUMP



DRUM DRIVE



ROLLER DRIVE

FIG. 6 MASTER PLUGS

3. Variable Speed Control Panel:

a. Brushes:

This 2 position rotary switch controls the power to the electric motor that turns the brushes. Turn the switch clockwise to turn OFF and counter-clock-wise to turn ON.

b. Brush Speed:

This infinitely variable rotary switch controls the speed of the electric motor turning the brushes. Turn the switch fully counter-clock-wise to stop the brushes and slowly clockwise to start the brushes and gradually increase speed. Normally setting at a relatively slow speed provides adequate tumbling of the potatoes for cleaning as they move through the machine.

c. Drum:

This 2 position rotary switch controls the power to the electric motor that drives the drum. Turn the switch clockwise to turn OFF and counter-clockwise to turn ON.

d. Drum Speed:

This infinitely variable rotary switch controls the speed of the electric motor driving the drum. Turn the switch fully counter-clockwise to stop the drum and slowly clockwise to start the drum and gradually increase speed. Set the speed appropriate for the application. The potatoes should be clean when they exit the drum.

e. Pump:

This 2 position rotary switch controls the power to the hydraulic pump. Turn the switch clockwise to turn OFF and counter-clockwise to turn ON.

e. Emergency STOP:

This red two-position push-pull switch controls the power to the machine. Push the switch in to cut power and turn all functions off. Turn switch 1/4 turn clockwise and switch will pop out. This switch must be pulled out for the machine to operate.

4. Pressure Gauge:

The hydraulic pump system is equipped with a pressure gage that displays the pressure in the hydraulic system. Each system is designed with a relief set at 1750 psi from the factory. Generally the pressure varies between 500-900 psi for steady state operation. It can operate from 900 to 1250 psi when moving the drum or discharge chute position.



FIG. 7 CONTROL PANEL



FIG. 8 PRESSURE GAUGE

4.7 MACHINE PREPARATION

The machine must be properly prepared prior to using. Before starting machine, be sure that the following items are appropriate for your machine and operating requirements:

1. Power:

Have a licensed electrician provide power at the required voltage, phase and amperage for your machine by following ANSI/NFPA 70 Wiring Standard. An improper source of power will cause damage to electrical components and could create an electrical hazard to the operator, workers or bystanders.

Be sure to use an extension cord of the correct specifications for the power being carried. Route the cord so that it does not interfere with the working area. Provide appropriate protection when people or equipment must go over the cord. Inspect the cord occasionally to be sure it is not damaged. Replace immediately if it is damaged.

2. Feet Set Screws:

Each side of the machine is designed with three telescoping feet on each side of the frame that allow the frame to be levelled on any type of surface. Use the two set screws on each foot to keep the frame level and yet support the weight of the machine. Tighten set screws to secure.

3. Drum Lock:

Remove the drum lock pin from the frame bracket to allow the drum to rotate. Place pin and retainer in their locked position



FIG. 9 FEET FRAME SET SCREWS (TYPICAL)

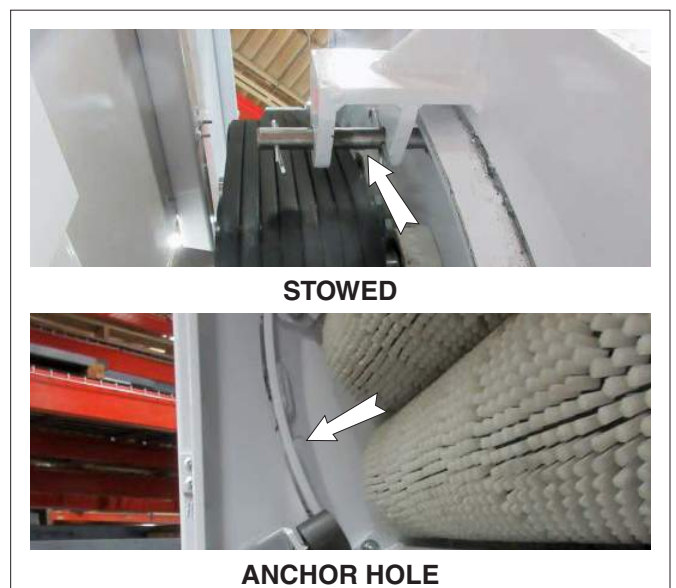


FIG. 10 DRUM LOCK

4. **Wash Water Supply:**

Provide a 30 - 50 gpm (up to 200 gpm) 35 - 40 psi source of water to the machine. More water is recommended if the potatoes are dirty and the auxilliary wash line is used. Normally water from the bottom is filtered or cleaned and then recycled back through the wash system. The Mayo 12000 Series Recirculating Tank works well for recycling and cleaning an adequate supply of water.

A 2 inch inlet water line supplies water to the intake which provides water to the center wash water line. An auxilliary wash water line is positioned on the right side that can be connected to provide more wash water when the potatoes are dirty.

- a. Water Inlet.
- b. Centre Line.
- c. Auxilliary Wash Line.

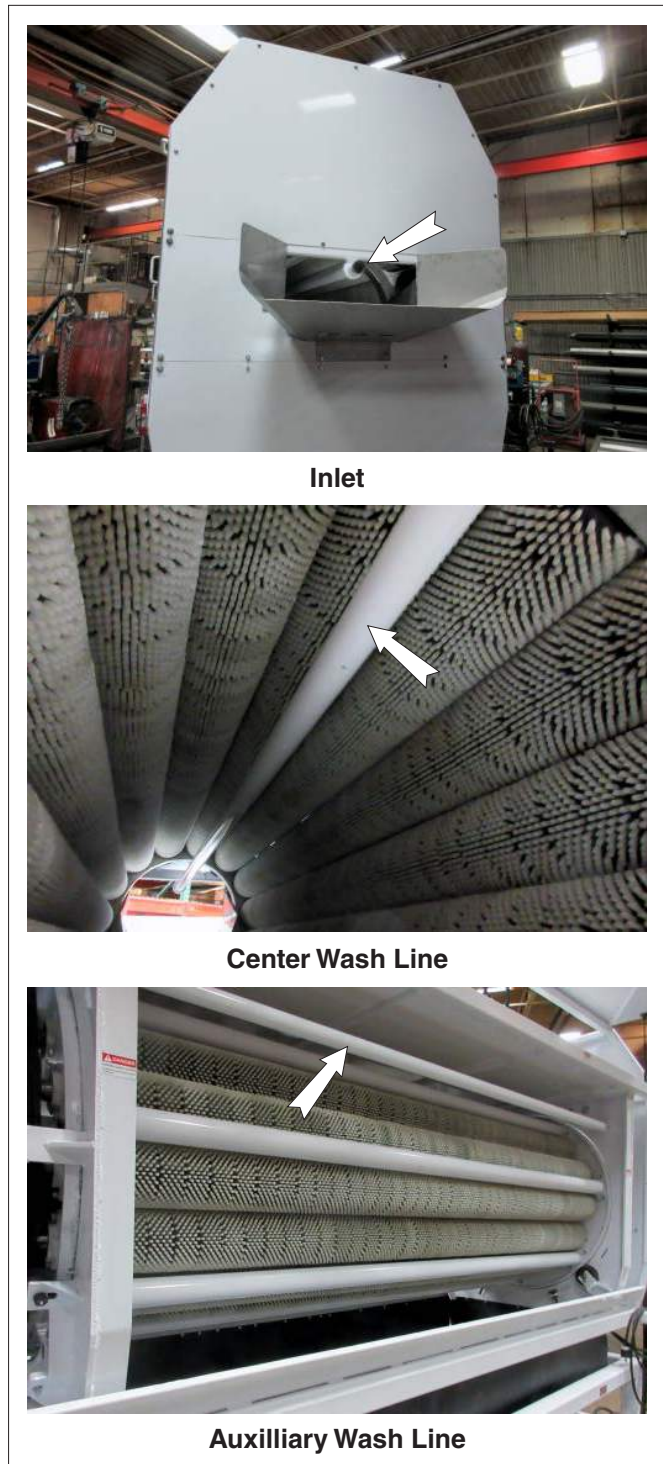
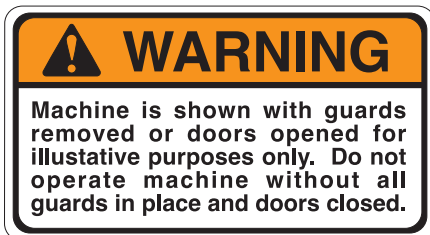


FIG. 11 WASH WATER SUPPLY (TYPICAL)

5. **Discharge Water:**

All the water that is used by the machine in the washing process, drops straight down and can go into a pan or other component to move it to the disposal site. It is recommended that the water be filtered and recycled to minimize the need for water.



FIG. 12 DISCHARGE WATER AREA

6. **Auxiliary Equipment:**

Each customer must provide a means of supplying a steady flow of potatoes to the intake and a means to remove the clean ones. Normally this is done by using another piece of equipment such as another conveyor or piler. Always connect the adjacent equipment securely to the washer to prevent movement.

a. System

b. Discharge



FIG. 13 AUXILIARY EQUIPMENT

4.8 OPERATING



OPERATING SAFETY

- Make sure that anyone who will be operating the Barrel Washer or working on or around the unit reads and understands all the operating, maintenance and safety information in the operator's manual. Also read and follow the instructions in the manuals of other equipment in the system.
- **Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Mayo dealer parts department) and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.**
- Establish a lock-out tag-out policy for the work site. Be sure all personnel are trained in and follow all procedures. Lock-out tag-out all power sources before servicing the unit or working around loading/unloading equipment.
- Install and properly secure all guards and shields before operating.
- Replace all worn or failed components immediately.
- Keep hands, feet, hair and clothing away from all moving parts.
- Clear the area of bystanders, especially small children, before starting.
- Make sure all control switches are in the off position before connecting power supply.
- Insure all water system and supply components in good condition before starting.
- Keep all electrical components tight, dry and in good repair.
- Before supplying electrical power to the machine, be sure that you have adequate amperage at the proper phase and voltage to run it by following ANSI/NFPA 70 Wiring Standard. If you do not know or are unsure, consult a licensed electrician.
- Keep the working area clean and dry.
- Review safety instructions annually.

Follow this procedure when using the Brush Washer:

1. Review Section 4.7 Machine Preparation and follow all the instructions.
2. Review and follow the pre-operation checklist (See Section 4.5).
3. Review the location and function of all controls (see Section 4.6).
4. **Water Intake:**
Provide a supply of fresh or recycled water to the machine through the 2" water line above the intake, or to the auxiliary wash line on the left side. Use an over-center cam lock coupler on each fitting to secure the line. Be sure the cam locks go over center to provide a good seal.
5. **Water Discharge:**
Place a large waste collection pan or other means to catch and collect the cleaning water after it has washed the potatoes. Clean filters and recycle the wash water for the most environmentally friendly way to operate. Always dispose of the used water in an environmentally safe manner.



FIG. 14 WATER LINES



FIG. 15 WATER DISCHARGE

6. **Starting Machine:**

- a. Clear the area of bystanders. Know where everyone is before starting.
- b. Place all controls in the OFF position.
- c. Plug in power cords.
- d. Turn the power to the machine ON.
- e. Turn the water supply ON.
- f. Turn the conveyor ON that moves potatoes away from the machine.
- g. Turn the Brush Washer drum and brush rollers drive ON.
- h. Turn the pump ON that removes the discharge water from the bottom containment compartment if so equipped.
- i. Turn the conveyor ON that moves the potatoes into the washer.

7. **Stopping Machine:**

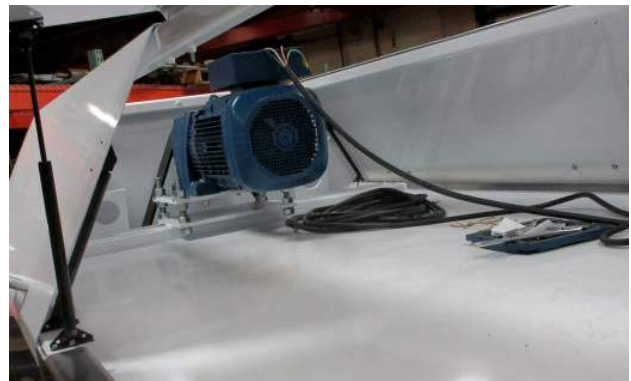
- a. Turn OFF the conveyor that moves potatoes to the washer.
- b. Wait until the potatoes have moved out of the washer.
- c. Turn the conveyor OFF that moves potatoes away from the machine.
- d. Turn the water supply OFF.
- e. Turn the pump, drum and roller drives OFF.
- f. Turn the power OFF to the machine.



Hydraulic Pump



Drum Drive



Roller Drive

FIG. 16 STARTING/STOPPING

8. **Emergency STOP:**

Turn the power to the machine OFF. This will stop the brush rollers, drum and pump. Then turn the water supply off. Correct the problem before turning the power on to restart the machine.

If the machine is equipped with the optional drum and brush speed control, depress the red emergency switch to stop machine. Correct the problem before releasing switch and restarting machine.



FIG. 17 CONTROL PANEL

9. **Equipment Attachment:**

Provide a means for bringing a flow of potatoes into the intake and a means of removing them from the discharge. Since the machine is positioned on the ground for operation, it will not move. Do not allow the auxiliary equipment to move. Normally, connecting them will prevent movement.

10. **Cleaning Speed:**

The brush washer drum and brush rollers can be configured with Variable Speed Drives. Adjust the speed of rotation, angle of the drum and height of the discharge gate in any combination to achieve the desired cleaning quality and / or speed.

Watch the cleanliness of the potatoes coming out of the discharge. If they are still dirty slow the feeding rate, to keep the potatoes in the drum longer or decrease the drum angle.

- a. Increase drum speed for additional agitation while product travels through the barrel.
- b. Increase brush rotation speed for more aggressive cleaning of the particular product.
 - i. Speed adjustment is achieved by rotating the variable dial rotary switch for speed control.
 - ii. Turn clockwise to increase speed, turn counter clockwise to reduce speed.

If the potatoes are clean, reverse any of the above items to increase the speed and volume of potatoes that move through the washer.

Watch the cleanliness of the potatoes coming out of the discharge. If they are still dirty slow the speed, increase the cleaning rate by increasing the flow of water and/or raising the discharge gate. If the potatoes are clean, decrease the flow of water and/or lower the discharge gate height.



FIG. 18 AUXILIARY EQUIPMENT (TYPICAL)



FIG. 19 VARIABLE CONTROLS (TYPICAL)

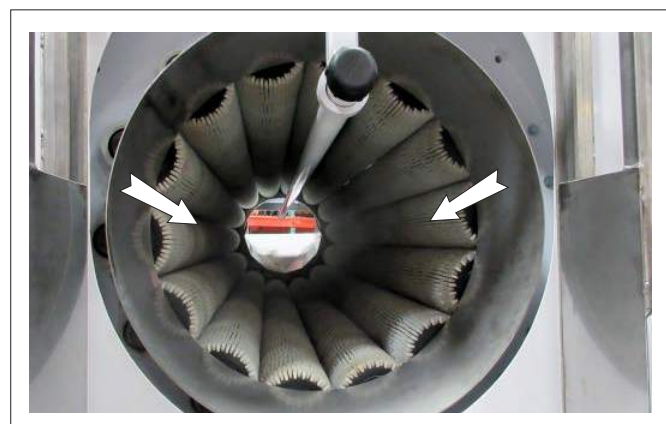


FIG. 20 DRUM

11. **Wash Water:**

Water is used with the tumbling action to clean the potatoes as they move through the drum. Water is distributed throughout the machine with a pipe in the top center of the drum and an auxiliary pipe on the left side of the drum. 1/4" holes in the bottom of the pipes distribute the water across the entire drum.

- a. Water Intake
- b. Center Pipe
- c. Auxiliary Wash Pipe

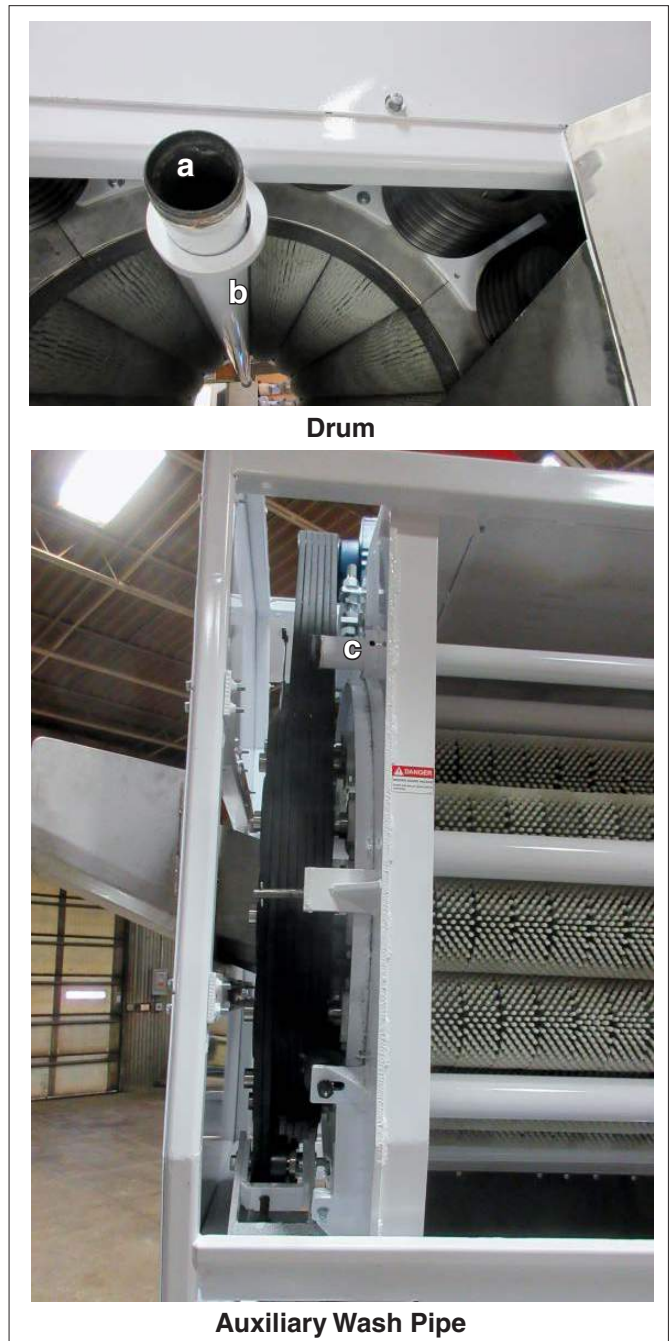


FIG. 21 WASH WATER (TYPICAL)

12. **Water Containment:**

Wash water is sprayed on the top of the potatoes as they move through the drum and drops into the bottom of the frame for collection and recycling. The best results are obtained if the water is cleaned, filtered and recycled.



FIG. 22 WATER CONTAINMENT AREA

13. Discharge Gate:

The machine is designed with a moveable gate at the discharge end of the drum. Use the hydraulic lever control to raise or lower the gate as appropriate to control the quality of the cleaning. Raise to increase cleaning and lower if the potatoes are clean.



FIG. 23 DISCHARGE GATE

14. Drum Lock:

The drum is designed with a lock pin through the drum outer ring frame. Engage the lock pin through the frame to anchor the drum and keep it secure for moving or while servicing or maintaining the unit. Remove retainer, pull and push the handle on the lock to engage and disengage the pin. Turn the drum slowly by hand to align the pin and hole. Use the hair pins to secure the lock pin in its engaged or disengaged configuration. Always lock-out tag-out the machine before performing any service or maintenance.

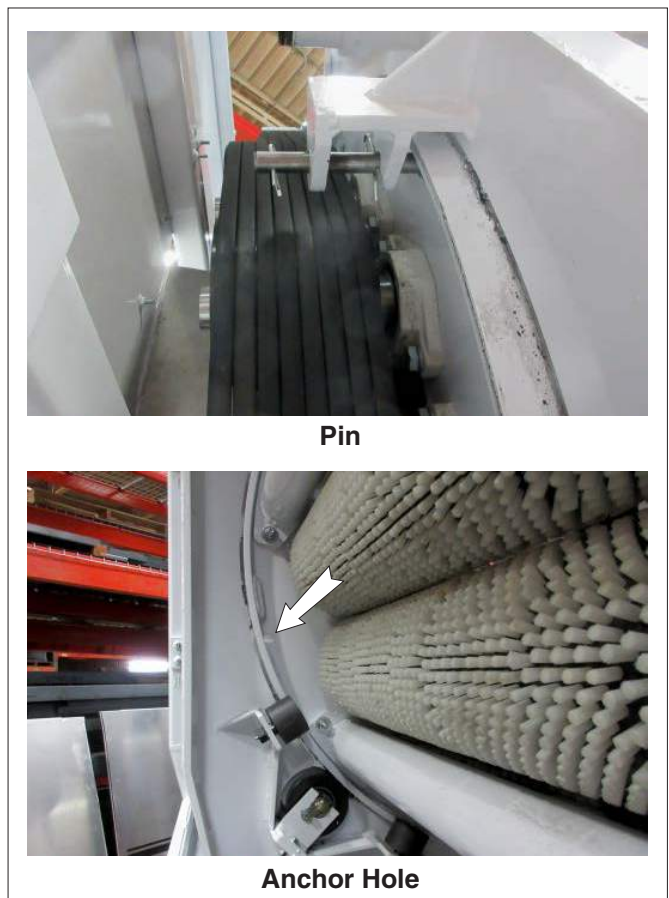


FIG. 24 DRUM LOCK

15. Centering Wheels/Tires:

The drum is supported by two wheels on each side of the drum and centered in the frame by two wheels/tires on the front end. They must be set to just touch the drum but not push on it. Set so the drum is centered in the frame and doesn't touch either end during operation.



Front (Typical)



Rear (Typical)

FIG. 25 SUPPORT WHEELS



Front



Rear

FIG. 26 SUPPORT WHEELS

16. **Bruising:**

Potatoes are sensitive to bruising during the gathering, transporting and handling phases of harvesting. Bruising is kept to a minimum by maintaining a full flow of potatoes through each machine and minimizing all drop heights. Bruising during the washing phase can be minimized by keeping the drop height between each machine as small as possible.



Intake



Discharge



Operating

FIG. 27 DROP HEIGHT

17. Brush Rollers:

The machine is designed with a series of brush rollers arranged in a tube or drum for the potatoes to move through for cleaning. The drum itself rotates and each individual brush roller rotates. The dual action of the rotating drum and rollers insures that all sides of the potato get brushed and cleaned as it moves through the drum. Check the condition of the brush rollers daily to be sure all are in good condition. Clean, remove entangled material, repair or replace as required to maintain them in good condition.



Left Side



Right Side



Inside

FIG. 28 DROP HEIGHT

18. Water Quality:

It is recommended that the customer provide a means to clean the wash water as it accumulates under the frame. Although the filters or cleaning systems remove the dirt and trash, they do not remove all the fines. After recycling the water for a period of time, the fines will accumulate and the water will get dirty. Change the water when this happens.



FIG. 29 OPERATING SYSTEM

19. Operating Hints:

- a. Be sure that all workers and operators are supplied with and use the required safety gear.
- b. Keep the working area clean and as dry as possible to prevent slipping and tripping.
- c. Train all operators before starting. An untrained operator is not qualified to operate this machine and can expose himself and others to needless hazards.
- d. Secure all pieces of equipment together to prevent unexpected movement and separation.
- e. Keep the conveyors and Brush Washer as full as possible to minimize bruising during the washing process.
- f. Check the holes in the bottom of the water pipe in the drum and on the right side to see if any are plugged. Unplug if any blockages are found. The best performance is obtained if water is distributed from each hole the full length of the drum.
- g. Establish a lock-out-policy for the worksite.

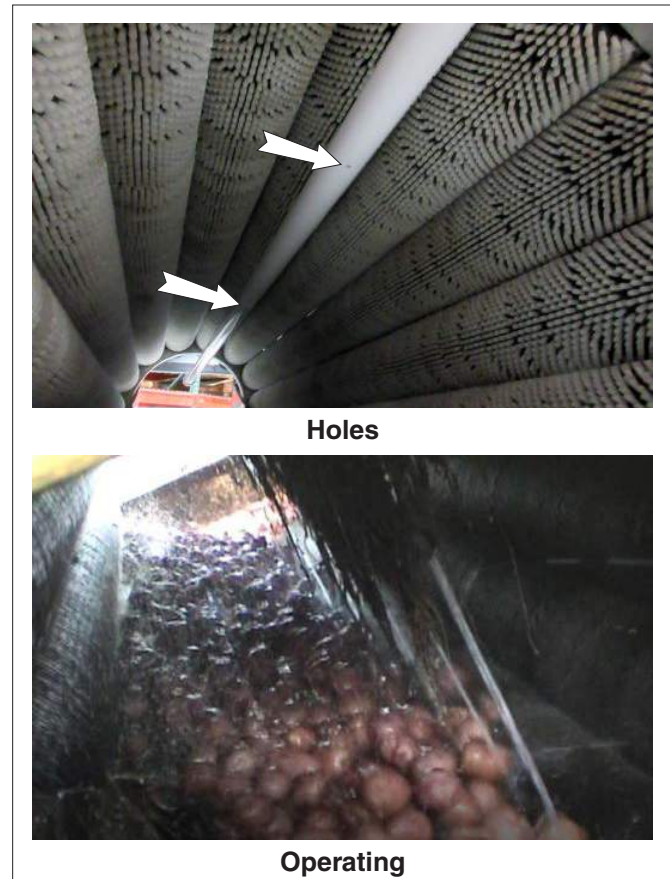


FIG. 30 WASHING

4.9 STORAGE



STORAGE SAFETY

- Make sure all water has been drained from the washing system and the used water holding compartment.
- Store the Brush Washer on a firm, level surface.
- If required, make sure the unit is solidly blocked up.
- Make certain all mechanical locks are safely and positively connected before storing.
- Store away from areas of human activity.
- Do not permit children to play on or around the stored machine.
- Lock out power by turning emergency stop OFF at master control panel or frame and unplugging power cord from machine.

4.9.1 PLACING IN STORAGE

At the end of the season, the machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at the beginning of the next season. Follow this procedure:

1. Use fresh water to flush the water systems to remove all contaminants. Check the discharge pattern of each hole. Clean or replace any hole with an unusual pattern.
2. Check all rotating parts for entangled material. Remove.
3. Turn the power OFF at the master control panel and lock out.
4. Unplug and remove power cords from machine.
5. Thoroughly wash the machine using a pressure washer to remove all dirt, mud, debris or residue. Be sure the containment compartment is clean and then dried to prevent rust.
6. Lubricate all grease fittings. Make sure all grease cavities have been filled with grease to remove any water residue from the washing.
8. Inspect all the water hoses, lines, fittings and holes. Tighten any loose fittings. Replace any hose that is badly cut, nicked, abraded or separating from a fitting. Replace any damaged components.

8. Inspect all the hydraulic hoses, lines and fittings. Tighten any loose fittings. Replace any hose that is badly cut, nicked, abraded or separating from a fitting. Replace any damaged components.
9. Inspect all the electrical cords, lines, junction boxes and motors. Tighten any loose connections. Replace any cord that is badly cut, nicked or abraded. Replace any damaged components.
10. Inspect each system. Check the condition of the drive belts. Replace if badly worn. Check the alignment of the pulleys. Align if required. Properly tension drive belts.
11. Touch up all paint nicks and scratches to prevent rusting.
12. Select a storage area that is dry, level and free of debris (In a building is recommended).



FIG. 31 STORED (TYPICAL)

4.9.2 REMOVING FROM STORAGE

When preparing to use the machine at the start of the season, follow this procedure:

1. Move to the working area if appropriate.
2. Check
 - a. Water, hydraulic and electrical systems.
 - b. All drive systems.
 - c. All hardware. Tighten as required.
3. Replace any defective components.
4. Go through the pre-operation checklist (Section 4.5) before starting.

5 SERVICE AND MAINTENANCE



MAINTENANCE SAFETY

- Read and understand all the information contained in the Operator's Manual regarding operating, servicing, adjusting, maintaining and repairing.
- Turn machine OFF, shut down and lock out power supply (safety lockout devices are available through your Mayo dealer parts department), relieve hydraulic pressure and wait for all moving parts to stop before servicing, adjusting, maintaining or repairing.
- Follow good shop practices:
 - Keep service area clean and dry.
 - Be sure electrical outlets and tools are properly grounded.
 - Use adequate light for the job at hand.
- Make sure all guards and doors are in place and properly secured when operating the Brush Washer.
- Do not work on Brush Washer electrical system unless the power cord is unplugged or the power supply is locked out. Lock-out tag-out power source before performing any maintenance work.

5.1 SERVICE

5.1.1 FLUIDS AND LUBRICANTS

1. **Grease:**
Use an SAE multi-purpose high temperature grease with extreme pressure (EP) performance meeting or exceeding the NLGI #2 rating for all requirements.
2. **Speed Reducer Gear Box Lubricant:**
Use a Mobil Glygoyle 460 (details pg. 45) or equivalent.
 - a. Drum drive.
Capacity: 1 qt (1 liter).
 - b. Roller drive.
Capacity: 1 qt (1 liter).

3. **Hydraulic Oil:**
Use Mobile DTE FM 32 Hydraulic Oil or equivalent. Reservoir Capacity: 2.5 US gallons.
4. **Storing Lubricants:**
Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.

5.1.2 GREASING

Refer to Section 5.1.1 for recommended grease. Use the Maintenance Checklist provide to keep a record of all scheduled maintenance.

1. Use only a hand-held grease gun for all greasing. Air powered greasing systems can damage the seals on bearings and lead to early bearing failure.
2. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.
3. Replace and repair broken fittings immediately.
4. If a fitting will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

5.1.3 SERVICING INTERVALS

8 Hours or Daily

The period recommended is based on normal operating conditions. Severe or unusual conditions may require more frequent servicing.

1. Check the condition of the brush rollers. Remove any entangled material. Clean if dirty. Repair if damaged.



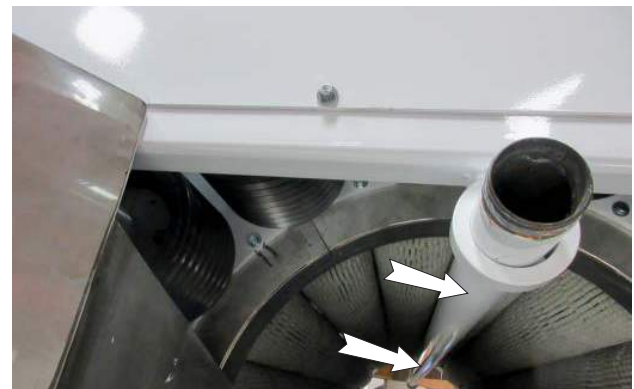
Inside



Outside

FIG. 32 BRUSH ROLLERS

2. Check the condition of the water distribution holes in the bottom of the water tubes that extend through the drum and on the auxiliary tube on the left side of the frame.



Inside



Left Side

FIG. 33 WATER HOLES (TYPICAL)

100 Hours

1. Grease brush roller shaft bearings on the discharge end of drum drives with 1 shot of grease.



FIG. 34 BRUSH ROLLER - DISCHARGE END (TYPICAL)

2. Greasing Procedure:

- a. Mark the end of a roller.
- b. Give the marked roller bearing and the adjacent ones a shot of grease.
- c. Manually turn the drum to access more bearings.
- d. Grease the next bearings.
- e. Continue until all bearings are greased.



FIG. 35 ROLLER MARKED

3. Grease brush roller shaft bearings on the input end or roller drive with one shot of grease.

IMPORTANT

Only sealed bearings are used on the machine. Sealed bearings should never be greased more often than weekly or every 100 hours. Do not over grease. Do not give bearing more than 1 shot of grease each time it is greased. Once the bearing seal is broken, the bearing must be greased each day or the bearing will fail.

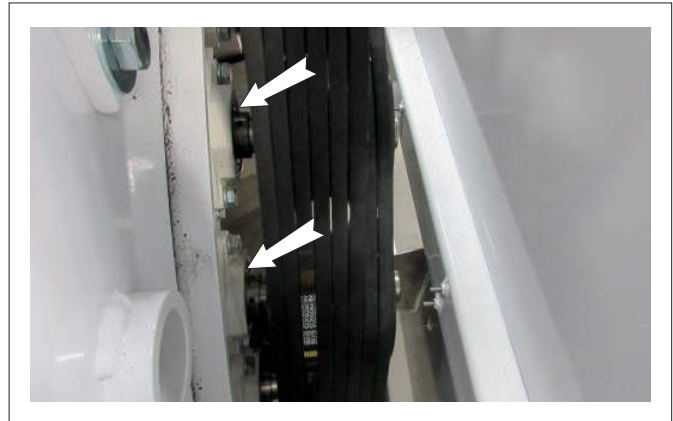
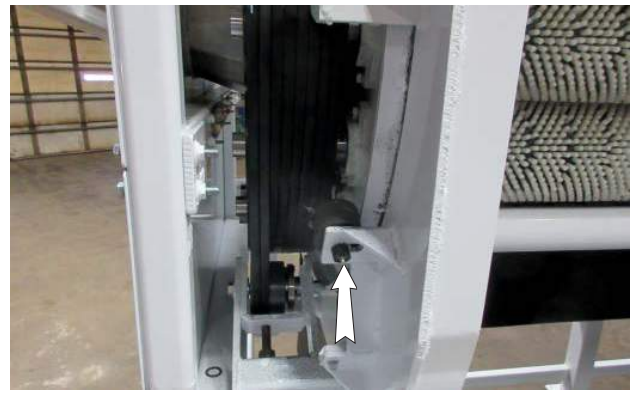
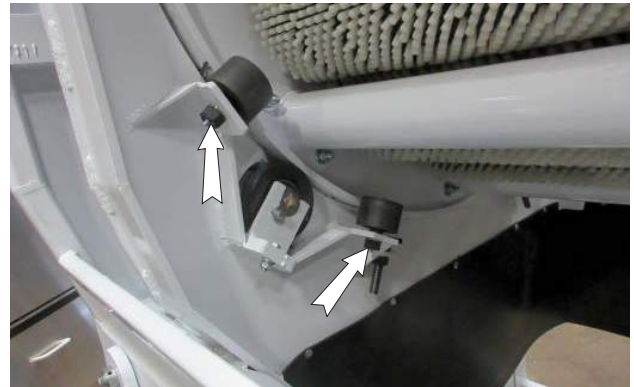


FIG. 36 BRUSH ROLLER - INPUT END (TYPICAL)

4. Grease the drum centering roller shaft bearings.
 - a. Inside drum frame.
 - b. Outside drum frame.



Left Side - Outside Drum Frame



Left Side - Inside Drum Frame



Right Side - Inside Drum Frame

FIG. 37 DRUM CENTERING ROLLER SHAFT BEARINGS

5. Grease drum support wheel shaft bearings.

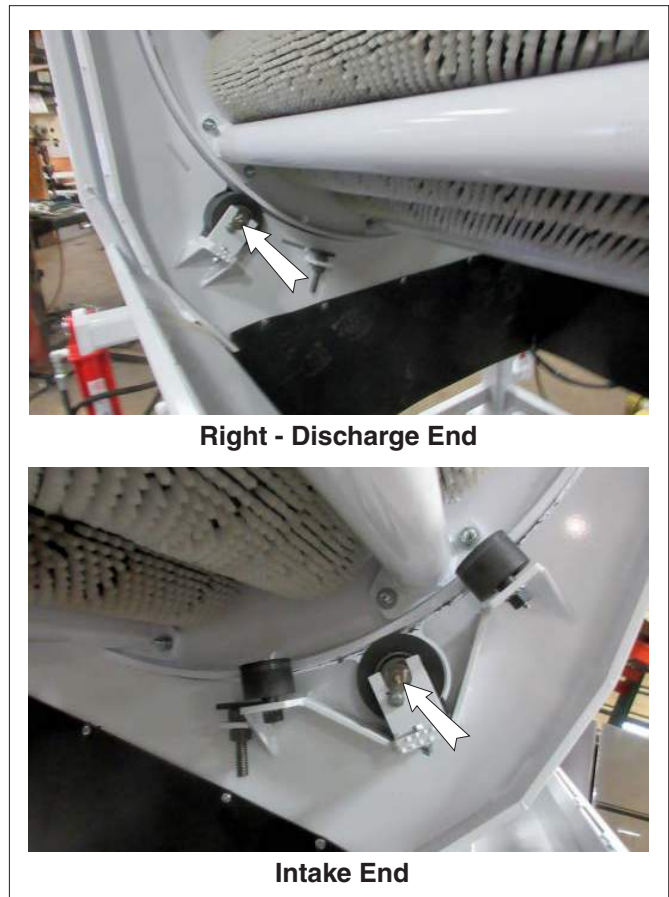


FIG. 38 DRUM SUPPORT WHEEL SHAFT BEARINGS (TYPICAL)

6. Check drive belt tension and alignment:
 - a. Drum drive.



Tension



Alignment

FIG. 39 DRUM DRIVE

b. Brush roller drive.

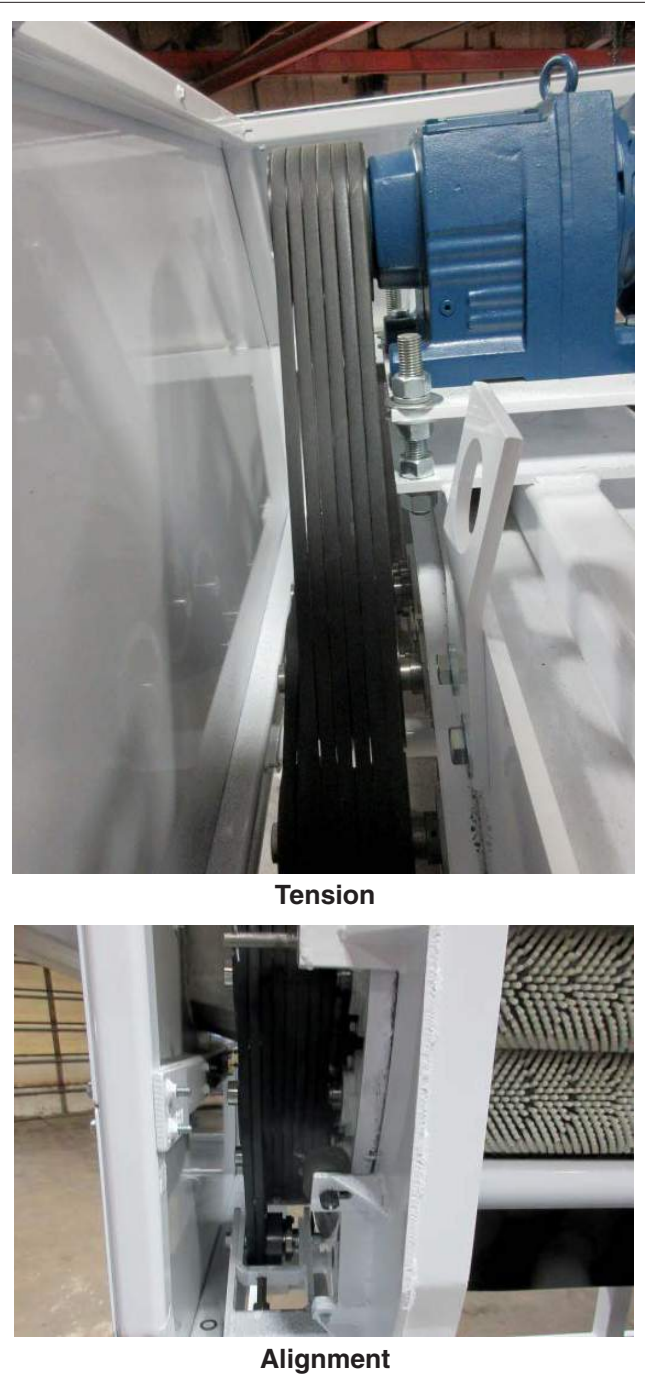


FIG. 40 BRUSH ROLLER DRIVE

200 Hours or Annually

1. Check centering of drum wheels.

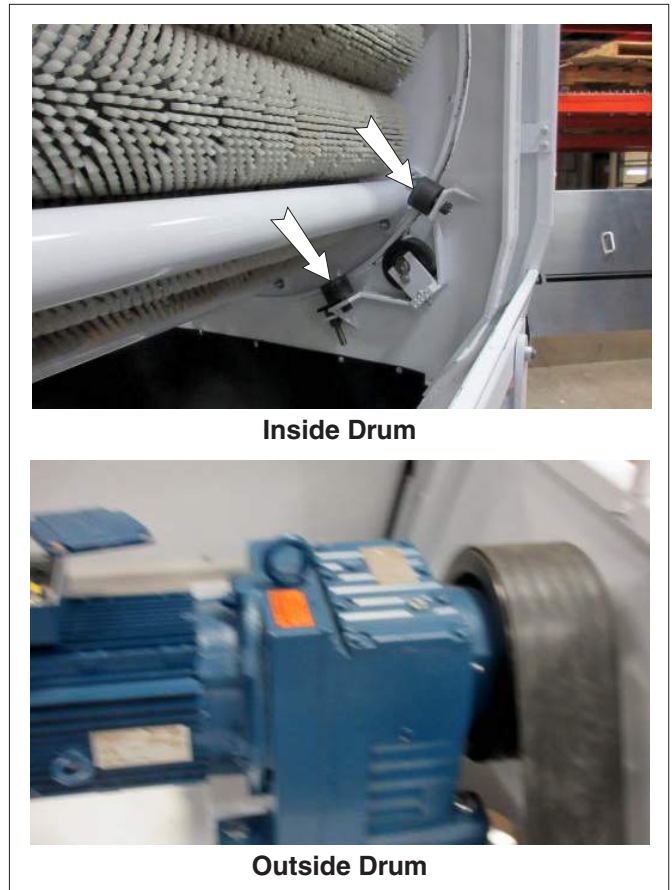


FIG. 41 CENTERING DRUM WHEELS (TYPICAL)

2. Check oil level in hydraulic pump reservoir.

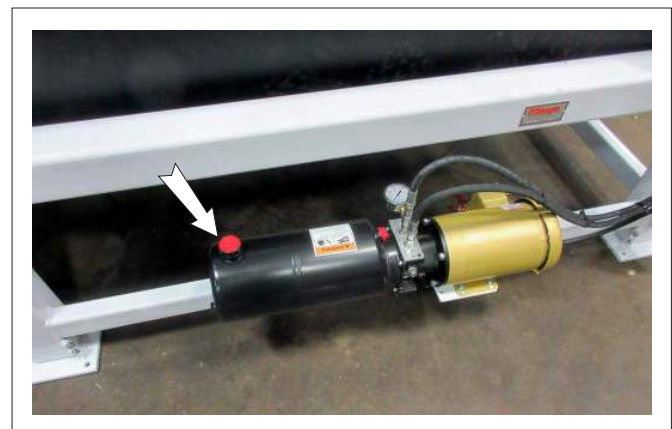
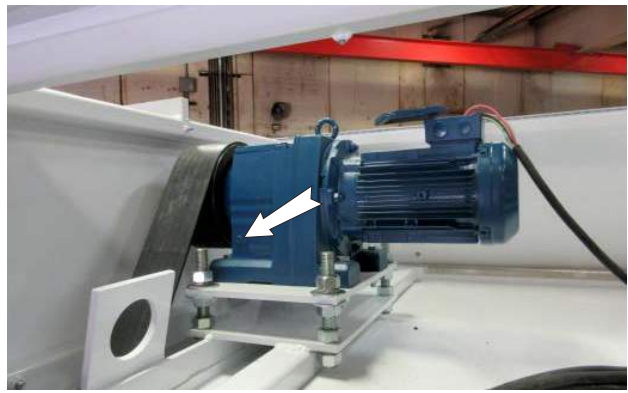
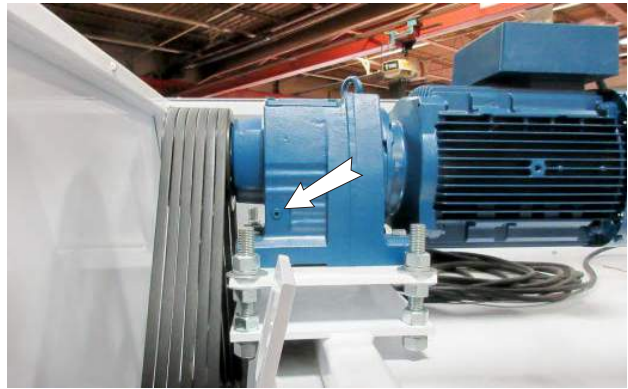


FIG. 42 HYDRAULIC RESERVOIR

3. Check the oil level in the gearboxes:



Drum Drive



Brush Roller Drive

FIG. 43 LEVEL PLUG (TYPICAL)

4. Wash machine.



Outside



Inside

FIG. 44 MACHINE

Every 1000 Hours or 2 Years

1. Change oil in gearboxes.
 - a. Drain.
 - b. Level.
 - c. Fill



Brush Roller Drive



Drum

FIG. 45 BRUSH ROLLER DRIVE

5.2 MAINTENANCE

By following a careful service and maintenance program on your machine, you will enjoy many years of trouble-free use.

5.2.1 ELECTRIC SYSTEM INSPECTION

Electricity provides power to all systems on the Brush Washer. To maintain the integrity of each system and provide a safe working environment for the operator, it is important that a daily inspection be done to make sure that all systems and components are in good working condition. To provide a safe working environment, have a licensed electrician provide power to the machine.

When inspecting the electrical system and components, follow this procedure:

1. Place all controls in the OFF or neutral position.
2. Turn power OFF at the master panel and lock-out before starting the inspection.
3. Unplug power cords.
4. Inspect all electrical components looking for:

IMPORTANT

Do not operate the machine unless the master panel is equipped with a lock-out device. Always engage lock-out device before performing any maintenance work. Lock-out devices are available from your dealer or the factory.

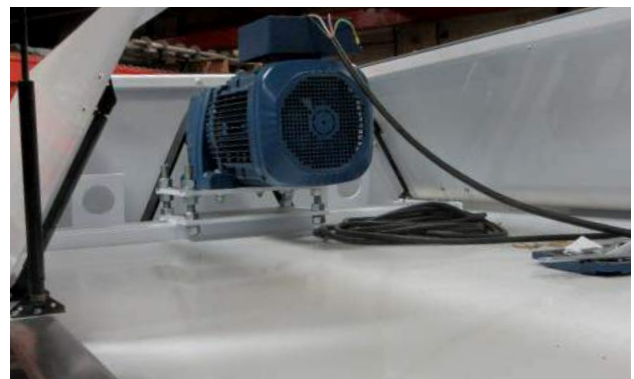
- a. Damaged plugs.
 - b. Frayed or loose wires.
 - c. Cut or cracked insulation.
4. Replace any damaged components immediately.
 5. Be sure all components are grounded.
 6. Be sure there is no water or moisture in any junction box or enclosure. Dry the components before turning power on. Be sure that all compartments seal properly when closed.



HYDRAULIC PUMP



DRUM DRIVE



ROLLER DRIVE

FIG. 46 ELECTRICAL SYSTEM

5.2.2 SPEED REDUCER GEARBOX OIL

Each brush roller drive and drum rotation systems are driven by an electric motor that is attached to a high ratio speed reducing gearbox to give the required operating speed. The gearbox is equipped with a drain, level and fill plug. Every 100 hours, the oil level should be checked. Every 1000 operating hours or bi-annually, whichever comes first, the oil should be replaced. Check more frequently if there are leaks around any of the plugs or shaft seals. When checking oil level or changing oil, follow this procedure.

1. Run the Brush Washer until the gearboxes are warm. Warm oil will remove more contaminants than cold stagnate oil.
2. Stop the Brush Washer.
3. Place all controls in their OFF or neutral position.
4. Turn the power OFF at the master panel and lock-out.
5. Unplug power cords.
6. **Checking oil level:**
 - a. When the gearbox is cold, remove the level plug from the side of the gearbox.
 - b. When the oil just fills the threads of the level plug, it is at the correct level.
 - c. Add oil through the fill plug as required.
 - d. Install and tighten level and fill plugs.
6. **Changing oil:**
 - a. Place a container under the drain plug.
 - b. Remove the drain.
 - c. Allow 10 minutes to drain.
 - d. Install and tighten the drain plug.
 - e. Remove the level and fill plugs.
 - f. Add approximately 1 qt (1 liter) of Winsmith Worm Gear Mobil Glygoyle 460 lubricant or equivalent (Details pg. 45). Use the level plug to determine the proper amount of oil.

NOTE

It may be necessary to add teflon tape or pipe sealant to the drain plug prior to installation to prevent leaking.



Brush Roller



Drum

FIG. 47 GEARBOXES (TYPICAL)

- g. Check that the air passage through the breather is open.
- h. Install and tighten the fill and level plugs.
- i. Dispose of the used oil in an environmentally safe manner.

5.2.3 BREATHER CLEANING

Each gearbox is equipped with a breather in the fill plug that vents the internal pressure to atmosphere. As the gearbox temperature increases and decreases during the operating and stopped modes, the pressure in the gearbox will increase or decrease if it is not vented to atmosphere. An increase in internal pressure will cause the shaft seals to leak until the gearbox runs low on or out of oil. To check on or clean the breather, follow this procedure:

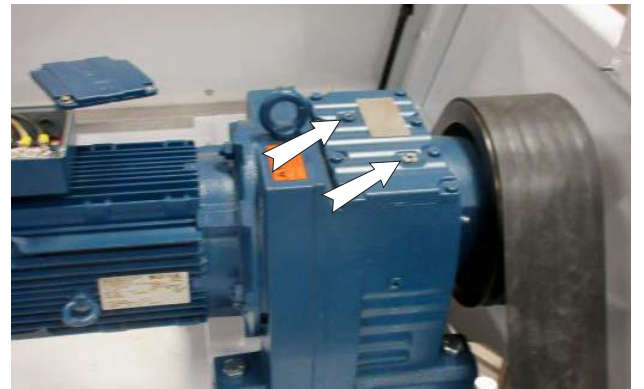
1. Place all controls in their OFF or neutral position.
2. Turn the power OFF at the master panel and lock-out.
3. Remove the fill plug/breather from the gearbox.
4. Check that the vent passage through the plug is open.
5. If plugged, soak in a solvent over night.
6. Use a high-pressure air hose to blow the passage open. Use a probe to clear the passage if the hole is caked with dirt.
7. Install and tighten the breather plug.

IMPORTANT

Always clean the breather if any leaks are noticed around shafts.



Brush Roller



Drum

FIG. 48 GEARBOXES (TYPICAL)

5.2.4 DRUM ROTATION DRIVE SYSTEM

Power to rotate the drum is provided by an electric motor through a speed-reducing gearbox and banded belt drive system on the rear of the frame. Adjust the motor base to set the belt tension and alignment. To maintain the drive system, follow this procedure:

1. Place all controls in their OFF or neutral position.
2. Turn the power OFF at the master panel using the emergency stop switch and lock-out.
3. Unplug power cord.
4. **Tension:**
The belt is correctly tensioned when it doesn't slip during operation. Move the motor base to adjust the tension.
 - a. Loosen jam nut on idler roller position rod.
 - b. Use position rod to move idler roller to its appropriate position.
 - c. Tighten jam nut to its specified torque.
5. **Alignment:**
The pulleys need to be aligned to operate properly. Sight along their faces or use a staright edge across the faces of the pulleys. Slide the pulleys on the shaft to adjust.
6. **Replacement:**
 - a. Move the motor base into its loosest position.
 - b. Remove pin from left splice and open belt.
 - c. Connect the end of the replacement belt to the end of the old belt.
 - d. Pull the old belt out and thread the replacement belt into place.
 - e. Check the tension and alignment of the belt frequently during the first 10 hours of operation and set as required. Then, go to the regular maintenance schedule. Normally a drive belt will seat itself during the first 10 hours of operation and then require less adjustment.
 - f. Move the motor base to set the belt tension and adjustment.

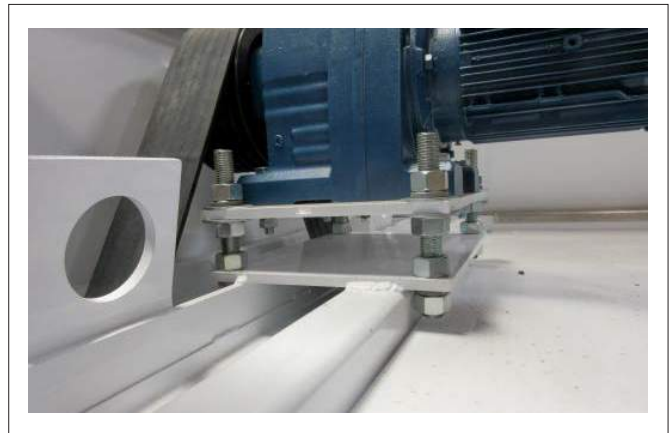


FIG. 49 MOTOR BASE



FIG. 50 ALIGNMENT/SPLICE

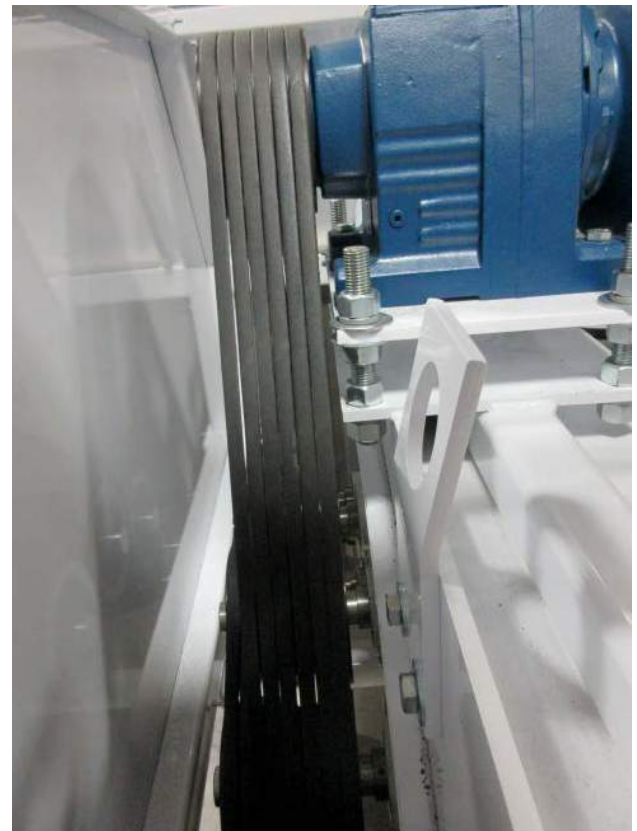
5.2.5 BRUSH ROLLER BELT DRIVES

Power to drive the brush roller is provided by an electric motor positioned on the top of the frame. The belt tension should be snug and tight enough to prevent slipping during operation. Adjust the motor mounting base to set the master belt tension and alignment. Use the adjustable tensioner pulley at the bottom of the drive to set the tension of the secondary belt drive system. When maintaining the drive systems, follow this procedure:

1. Place all controls in their OFF or neutral position.
2. Turn the power OFF at the master panel.
3. Unplug power cords.
4. Remove the guard over the belt drive systems.
5. **Belt Tension:**
They are tensioned correctly when the belts do not slip when the machine is being used. Use the motor mounting base adjusting system to set the master belt tension and the idler pulley to set the tension of the secondary drive belt system.
6. **Pulley Alignment (Master Belt):**
 - a. Sight across the face of pulleys to check the alignment or use a straight edge.
 - b. If the pulley faces are more than 1/32 inch from the straight edge, the pulleys must be aligned.
 - c. Loosen the motor mounting frame position bolt jam nut.
 - d. Use the position bolt to move the motor mounting plate to move the pulley to the desired position.
 - e. Tighten motor mounting frame position bolt jam nut to its specified torque.
7. **Belt Replacement (Master Belt):**
 - a. Place motor assembly in its loosest position.
 - b. Remove secondary belt.
 - c. Remove old belt and install a new one.
 - d. Move the motor base into position to set pulley position with the pulleys aligned and the belt tension properly set.
 - e. Tighten motor mounting frame position jam nut to their specified torque.

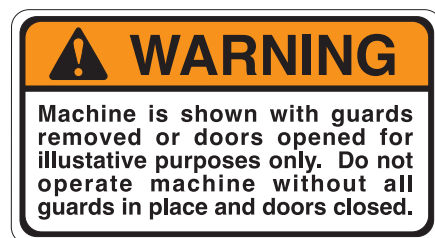


Motor Base



Alignment

FIG. 51 BRUSH ROLLER MASTER



- f. Check and adjust the tension and alignment frequently during the first 10 hours of operation until the belt is broken-in.

8. Close and secure the guard.

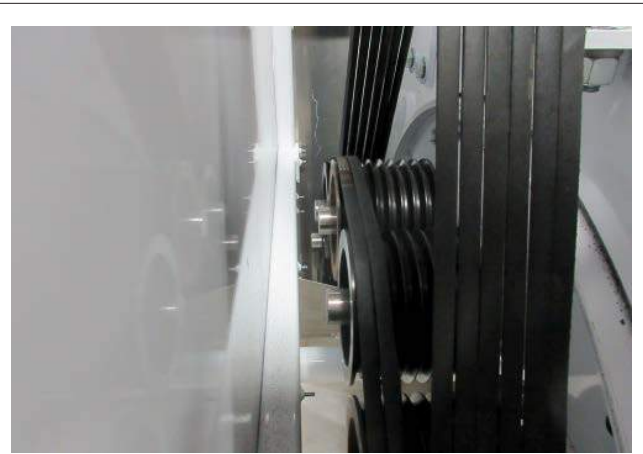
9. **Pulley Alignment (Secondary Belt):**

- a. Sight across the face of pulleys to check the alignment or use a straight edge.
- b. If the pulley faces are more than 1/32 inch from the straight edge, the pulleys must be aligned.
- c. Loosen the anchor bolts on the pulley tapered hub and move the pulley to the required position.
- d. Tighten anchor bolts to their specified torque.
- e. Repeat with other pulleys as required.

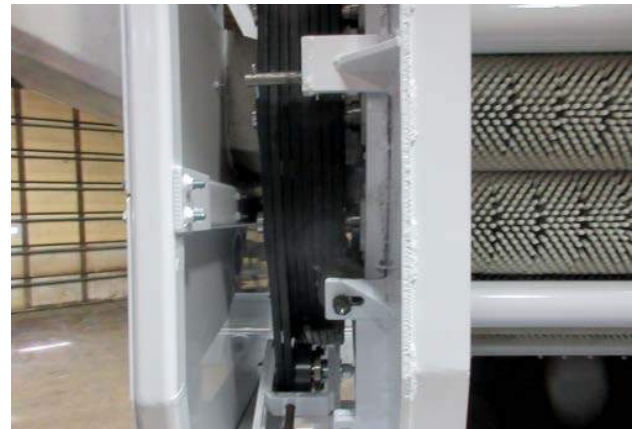
10. **Belt Replacement (Secondary Belt):**

- a. Place tensioning pulley in its loosest position.
- b. Remove secondary belt.
- c. Remove old belt and install a new one.
- d. Move the tensioning pulley into position to set pulley position with the pulleys aligned and the belt tension properly set.
- e. Tighten tensioning pulley frame position jam nut to their specified torque.
- f. Check and adjust the tension and alignment frequently during the first 10 hours of operation until the belt is broken-in.

- 11. Close and secure the guard.



Alignment



Tensioning Pulley

FIG. 52 BRUSH ROLLER SECONDARY



5.2.6 CENTERING WHEEL POSITION

The machine is designed with wheels on the end of the drum to support it while it rotates. They all run against the channel on the end of the drum frame. Wheels on the inside and outside of the intake end of the drum are used to center the drum in the frame. Check the settings every 50 hours and adjust as required.

Follow this procedure when setting guide wheels:

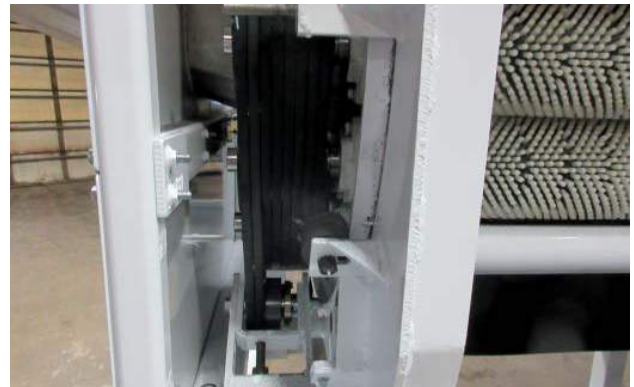
1. Place all controls in their OFF or neutral position.
2. Turn the power OFF at the master panel and lock-out.
3. Unplug power cord.
4. **Side Drive Wheels:**

The wheels should just touch the drum and allows it to keep it rotating.

 - a. Remove the side panels on intake end.
 - b. Loosen centering wheel bearing mounting bolts.
 - c. Tap bearing housing to move centering wheel to required position.
 - d. Tighten centering wheel bearing mounting bolts to their specified torque.
 - e. Repeat with other centering wheel assemblies.
 - f. Install and secure side panels on intake end.



Inside Drum



Outside Drum

FIG. 53 CENTERING WHEEL (TYPICAL)S



5.2.7 DRUM LOCKS

The Brush Washer is designed with 2 lock systems to lock the barrel in position to prevent it from moving for storage, inspections, service or maintenance. Review this information and follow it before performing any service work on the machine.

1. Place all controls in their OFF or neutral position.
2. Turn the power OFF at the master panel lock-out.
3. Unplug power cord.
4. Remove the guard over the drive systems.

5. Drum Rotation Lock:

The drum frame is designed with a sliding anchor pin that is placed in the hole in the drum end panel. *Turn the drum by hand to align the pin and hole if required.

6. Drum Support Brackets:

The machine is designed with drum frame support brackets on each corner of the drum. Raise the bracket to support the weight of the drum when servicing the drum support or centering wheels. Lower bracket when servicing is completed and rest the weight back on the drum wheels on all corners.



Lock Pin



Anchor Hole

FIG. 54 DRUM ROTATION LOCK



Lock Pin



Anchor Hole

FIG. 55 DRUM SUPPORT BRACKETS

6 TROUBLE SHOOTING

The Mayo Brush Washer uses a flow of water to scrub potatoes as they move through the machine. It is a simple and reliable system that requires minimum maintenance.

In the following section, we have listed many of the problems, causes and solutions to the problems that you may encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please contact your local Mayo dealer or the factory. Before you call, please have this Operator's Manual and the serial number from your machine ready.

PROBLEM	CAUSE	SOLUTION
Washer won't run.	No power.	Plug in machine. Turn power ON at master panel.
	Tripped circuit breaker.	Reset circuit breaker.
Drum won't turn.	No power.	Turn power ON.
	Tripped motor starter.	Reset starter.
	Failed drive belt.	Replace belt.
Potatoes not clean.	Dirt not scrubbed loose.	Increase time spent in cleaning drum by increasing flow of water, raising discharge gate or leveling drum angle.
	Insufficient scrubbing.	Increase time spent in cleaning drum by increasing flow of water, raising discharge gate or levelling drum angle.
	Wash water dirty.	Replace wash water with clean water.
	Too many potatoes.	Slow feeding rate
	Water collection area filled with dirt.	Increase frequency to clean dirt from collection area and keep it clean.

7 SPECIFICATIONS

7.1 MECHANICAL

Polisher Mechanical Specifications: Model: 859

Description	Unit of Measure	Model		Comment
		859		
Features of the machine				
Intake Chute Width	In	36"		
Discharge Chute Width	In	34"		
Total length of the machine	Ft-in	14'0"		Includes intake/ discharge chutes
Total width of the machine	Ft-in	6'0"		-
Total height of the machine	Ft-in	9'6"		-
Machine weight and mass balance				
Total Weight of Machine (no product)	Lbs	9,500		Estimated shipping weight
Machine Hydraulic System				
Hydraulic Tank Capacity	Gal	2.5		Design Tank Capacity
Hydraulic Relief Set point	Psi	1750		Main Relief pressure set point
Machine Electrical System				
Incoming Power Supply 208-240V/480V 3PH	Amps	70/35		1-3Hp; 1-5Hp; 1-15Hp 3Ph motors

MAYO MFG. RECOMMENDS THE FOLLOWING MOBIL PRODUCTS OR THEIR EQUIVALENTS

Lubricant Type	Component	Specification	Recommended Lubricant	Recommended Temperature / Service Interval
Hydraulic Oil	Hydraulic Reservoir	ISO 32, Synthetic Food Grade, NSF-H1	Mobil SHC Cibus 32	All Temperatures/Oil sample guidance or 12 months
	Hydraulic Reservoir	ISO 32, Food Grade, NSF-H1	Mobil DTE FM 32	10F to 140F/Oil sample guidance or 12 months
Grease	Greased Bearings/ Points	Food Grade	Mobilgrease FM 222	All/Weekly or as needed
	Greased Bearings/ Points	Non-Food	Mobilgrease XHP 222	
Gear Oil	Winsmith Worm Gear Reducer	Poly Alkylene Glycol (PAG) ISO 460 NSF H1	Mobil Glygoyle 460	All/See Manual Note: Do not Substitute
	Browning Helical Gear Reducer	Synthetic, PAO Type ISO 220 NSF H1	Mobil SHC 630 or Mobil SHC Cibus 220 (NSF H1)	All/Change Every Two Years
	Auburn Planetary Wheel Drives	SAE GL-5 75w90	Mobil Delvac Synthetic 75w90	All/Change Every Two Years

Please contact factory at 1-218-773-1234 or 1-800-223-5873 for your machines particular specifications.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

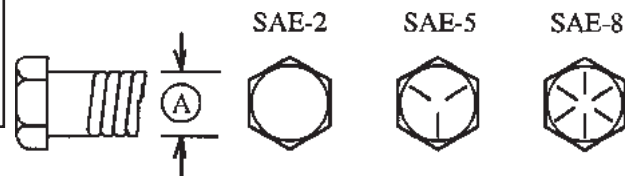
7.2 BOLT TORQUE

CHECKING BOLT TORQUE

The Barrel Washers shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

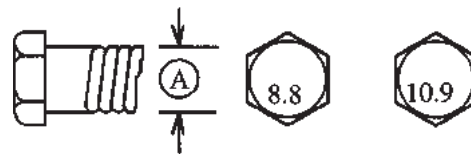
ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*					
	SAE 2 (N.m) (lb-ft)		SAE 5 (N.m) (lb-ft)		SAE 8 (N.m) (lb-ft)	
1/4"	8	6	12	9	17	12
5/16"	13	10	25	19	36	27
3/8"	27	20	45	33	63	45
7/16"	41	30	72	53	100	75
1/2"	61	45	110	80	155	115
9/16"	95	60	155	115	220	165
5/8"	128	95	215	160	305	220
3/4"	225	165	390	290	540	400
7/8"	230	170	570	420	880	650
1"	345	225	850	630	1320	970



METRIC TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*			
	8.8 (N.m) (lb-ft)		10.9 (N.m) (lb-ft)	
M3	.5	.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

* Torque value for bolts and capscrews are identified by their head markings.

7.3 HYDRAULIC FITTING TORQUE

5.2.7 TIGHTENING O-RING FITTINGS*

1. Inspect O-ring and seat for dirt or obvious defects.
2. On angle fittings, back the lock nut off until washer bottoms out at top of groove.
3. Hand tighten fitting until back-up washer or washer face (if straight fitting) bottoms on face and O-ring is seated.
4. Position angle fittings by unscrewing no more than one turn.
5. Tighten straight fittings to torque shown.
6. Tighten while holding body of fitting with a wrench.

* The torque values shown are based on lubricated connections as in reassembly.

Tube Size OD	Nut Size Across Flats	Torque Value*		Nut Size Across Flats	
(in.)	(in.)	(N.m)	(lb-ft)	(in.)	
3/8	1/2	8	6	2	1/3
7/16	9/16	12	9	2	1/3
1/2	5/8	16	12	2	1/3
9/16	11/16	24	18	2	1/3
3/4	7/8	46	34	2	1/3
7/8	1	62	46	1-1/2	1/4
1-1/16	1-1/4	102	75	1	1/6
1-3/16	1-3/8	122	90	1	1/6
1-5/16	1-1/2	142	105	3/4	1/8
1-5/8	1-7/8	190	140	3/4	1/8
1-7/8	2-1/8	217	160	1/2	1/12

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

7.4 ELECTRICAL SCHEMATIC

Line phasing, line voltage, control voltage, and accessory options can vary substantially for each machine.

Please contact factory at 1-800-223-5873 for your machine's specific electrical layout.

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