Mayo

BARREL WASHER

OPERATORS 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.

BARREL WASHER MODEL 824

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 _____

Address _____

City, State/Prov., Code _____

Phone Number (_____) _____

Dealer's Name _____

Address _____

City, State/Prov., Code _____

Washer Model _____

Serial Number _____

Delivery Date _____

DEALER INSPECTION REPORT

_____ Inspect Electrical System
_____ Lubricate Machine
_____ Drive Chains Tensioned and Aligned
_____ Speed Reducer Gearboxes Oil Level Checked
_____ Check Condition of Barrel Drive Rolls
_____ Check Functioning of Water Pan Float Switch
_____ Check Condition of Chain/Sprocket Setting
_____ Check that all Water Holes Flow Freely
_____ Check Elevator Conveyor Tension and Alignment

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 Barrel 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 824 Barrel 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 Barrel Washer requires that you, and anyone else who will be operating or maintaining the Barrel 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 824 Barrel Washers manufactured by Mayo. Certain options may be available to specifically tailor the Barrel 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 Barrel Washer is the front. The control panel 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 Barrel 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 Barrel Washer. **YOU** must ensure that you and anyone else who is going to operate, maintain or work around the Barrel 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 Barrel 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 Barrel Washer.

- Barrel Washer owners must give operating instructions to operators or employees before allowing them to operate the Barrel 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.

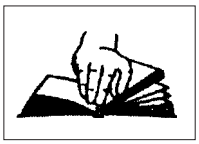
- A person who has not read and understood all operating and safety instructions is not qualified to operate this machine. An untrained operator exposes himself and bystanders to possible serious injury or death.

- 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 Barrel Washer.



2. Only trained, competent persons shall operate the Barrel 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 Barrel 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 Barrel Washer.

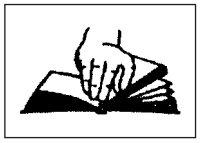
7. Lock out power by turning off master control panel, junction box or unplugging the power cord and padlocking the door shut to prevent electrocution or unauthorized start up of the Barrel Washer.

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, Barrel 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 Barrel 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 Barrel 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 Barrel 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 Barrel 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 Barrel 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 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.

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. 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.

12. Keep the working area clean and dry.

13. 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.

5. Make sure all guards and doors are in place and properly secured when operating the Barrel Washer.

6. Always use personal protection devices such as eye, hand and hearing protectors, when performing any service or maintenance.

7. 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.

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

9. Periodically tighten all bolts, nuts and screws and check that all cotter pins are properly installed to ensure unit is in a safe condition.

10. When completing a maintenance or service function, make sure all safety shields and devices are installed before placing unit in service.

11. **Do not work on Barrel 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 Barrel Washer is properly grounded at the power source.

3. Make certain that all electrical switches are in the OFF position before plugging the Barrel 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 Barrel Washer electrical system unless the power cord is unplugged or the power supply is locked-out tagged-out.

2.12 TRANSPORT SAFETY

1. Make certain that you are in compliance with local, state/provincial and federal regulations regarding transporting agricultural equipment on public roadways.

2. Make certain that all wheels and tires are in good repair and that tires are inflated to proper pressure. Do not under-inflate or over-inflate.

3. Make certain that all wheel bolts/lug nuts are tightened to proper torque specifications (refer to specification chart in Section 7.2).

4. Raise elevator fully up before transporting to prevent dragging the hopper on the ground when going through low spots.

5. Raise and secure the frame outriggers and secure with set screws before transporting or moving.

6. Wrap up and tie all loose electrical ends to the frame.

7. Be sure that any necessary SMV (slow moving vehicle) signs, reflectors and lights required by law are in proper place and are clearly visible to oncoming and overtaking traffic.

8. Be sure that the Barrel Washer is positively hitched to the towing vehicle. Use a safety cable to assure a safe hitch hook-up when transporting.

9. Follow local regulations regarding maximum weight, width and length when transporting.

10. Do not exceed 15 MPH (25 Km/H). Reduce speed on rough roads and surfaces.

11. Do not allow anyone to ride on the Barrel Washer or towing vehicle during transport.

12. Always use hazard flashers on the towing vehicle when transporting.

13. Always use pilot vehicles in front and behind when towing on a public road.

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.

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- Think SAFETY! Work SAFELY!

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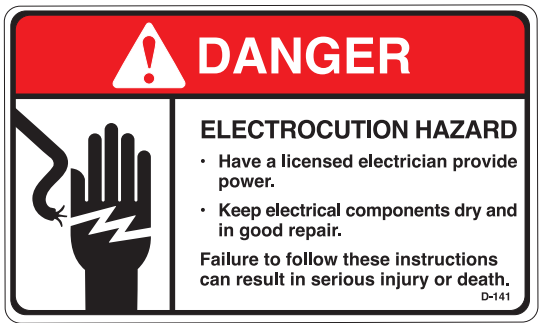

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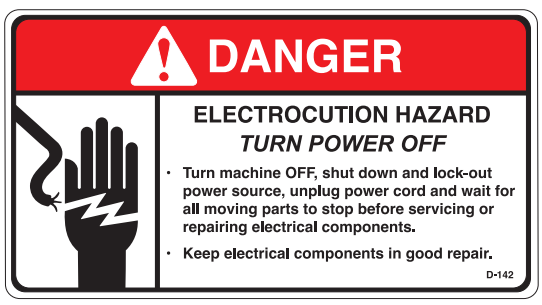
- Think SAFETY! Work SAFELY!

E

F



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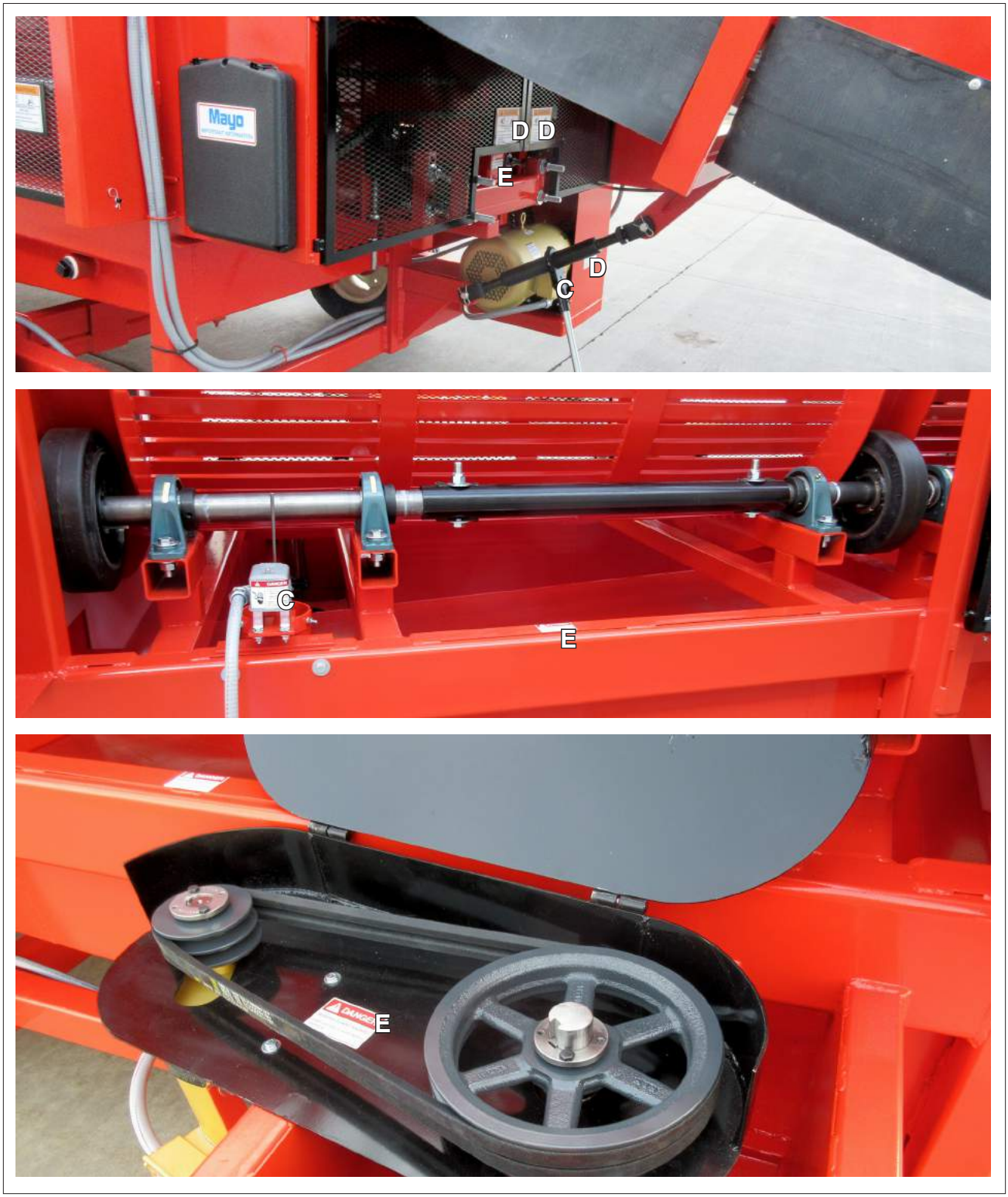


REMEMBER - If Safety Signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

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 Barrel 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 Barrel Washer will provide many years of trouble-free service.

4.2 MACHINE COMPONENTS

The Mayo Manufacturing Barrel Washer consists of an intake elevator, tumbling drum, wash bed and discharge gate for cleaning potatoes prior to shipment for processing. Generally a Barrel Washer is a component within a conveying line and is used to clean and wash the potatoes.

Customers provide conveyors to move the potatoes into and out of the Barrel Washer as part of the potato preparation line. Restrict the discharge to keep the potatoes in the drum and wash bed area a longer time to reduce the speed the potatoes move through the machine to provide more washing time.

5 rubber wheels/rollers on each side of the drum turn and support the drum when operating. Rubber wheels/rollers on each end of the drum centre the drum in the frame while turning.

Tumbler slats are installed at 2 positions on the inside of the drum to roll/tumble the potatoes as they move through the drum to expose all sides of the potato to the wash water.

An electric motor, speed reduction gearbox and roller chain drive system on the rear of the frame turns and supports the drum for washing. Wash water is distributed by 3 internal pipes with 1/4 inch holes in the bottom of the tubes to wash/clean the potatoes. Wash water flows into the bottom of the frame into the water compartment and removed by the sump pump on the right front corner of the frame. The water should be pumped into a settling tank, filtered and recycled.

Direct a flow of supplemental water into the top of the water collecting tank from both sides to flush the dirt and debris removed from the potatoes into the sump for removal from the system. A float switch in the left rear corner of the water collection pan starts and stops the sump pump to drain the water and sludge from the bottom of the pan and prevent plugging the system.

An electric motor through a speed reducing gearbox is mounted on the top left side of the elevator to power the elevator. A potato chain is used as the conveyor to allow dirt to fall off the potatoes before they go into the wash drum.

A Wash Drum
B Input Elevator
C Discharge
D Elevator Chain
E Turning Wheels
F Centering Wheels
G Water Lines
H Water Tubes/Pipes
J Drum Drive System
K Drum Drive Gearbox
L Elevator Drive
M Control Panel
N Sump Pump Drive System
O Sump Pump
P Sump Pump Discharge
Q Flush Water Intake
R Water Collection Tank
S Tumbler Rods
T Outriggers

FIG. 1 MACHINE COMPONENTS


G
A
F
B
M
E
E
E
E
C
Q
N
R
T
T
P
O
T


N


A
H H H
S
S
H H H
B


J
J
K

4.3 GENERAL OPERATION THEORY

A Barrel 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.

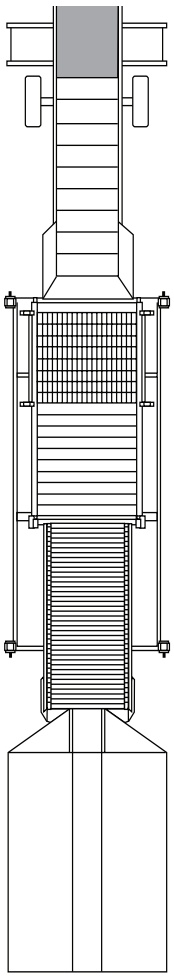
Fresh and recycled (cleaned or filtered) water must be provided to the machine by the customer at the required volume and pressure for optimum performance. Insufficient volume and pressure will compromise the washing performance.

Potatoes are fed into the intake elevator 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 wash drum, they are discharged out the back of the machine.

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.



Barrel Washer

Positioned

FIG. 2 POSITIONED (TYPICAL)

4.4 MACHINE BREAK-IN

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

A. **Before Starting:**

1. Read Barrel 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 the integrity of the water supply, piping and discharge holes. Clean discharge holes if any are plugged or have a distorted discharge pattern.

4. Inspect drum, drive wheels/rollers and elevator for entangled material. Remove material.

5. Check the alignment and tension of the elevator, drum and sump pump drive systems. Realign or tighten as required.

6. Check the centering of the drum in the frame. Re-center if required.

7. Check oil level in the speed reducing gearboxes for the elevator and drum drive systems. Top up as required.

8. Clean the water collection tank under the drum of all the mud, soil and debris.

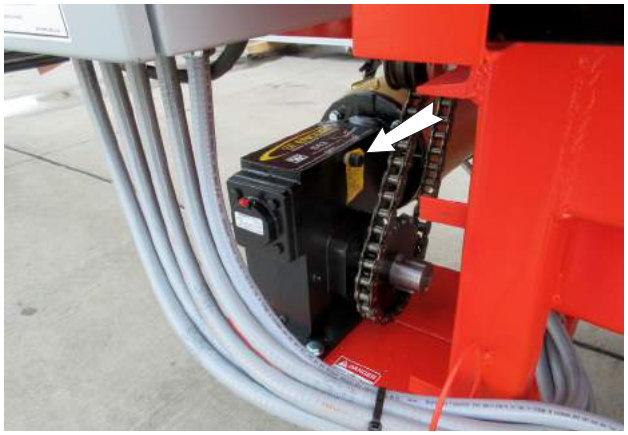
9. Lubricate all grease fillings.

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

1. Repeat steps 1 through 9 from Section B.

2. Then go to the regular servicing and maintenance schedule as defined in the Maintenance Section.

Elevator



Drum

FIG. 3 BREATHERS

WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

4.5 PRE-OPERATION CHECKLIST

Safe and efficient operation of your new Barrel 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 Barrel Washer. The checklist should be performed before operating the Barrel 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 outrages 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 wheels and elevator for entangled material. Remove entangled material.

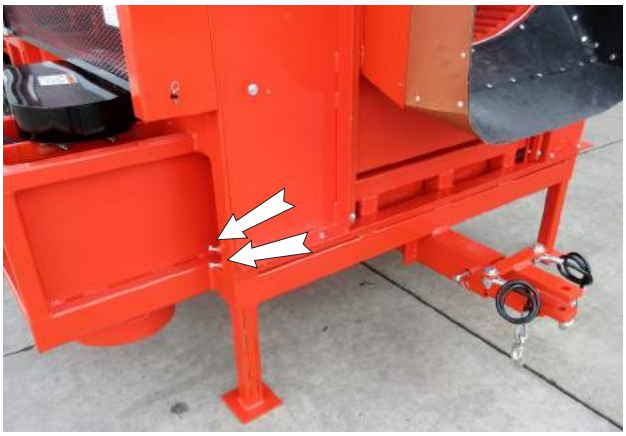
7. Check the alignment and tension of drum and sump pump drive systems. Realign or tighten as required.

8. Check oil level in speed reduction gearboxes for the drum and elevator drives. Top up as required.

9. Check that the elevator conveyor potato chain is centred on the head and tail sprockets. 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. Be sure the working area is clean and dry to prevent tripping or slipping.



Outriggers (Typical)

Elevator

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

2. **Elevator:**
   This 2 position rotary switch controls the power to the electric motor taht drives the elevator. Turn the switch clockwise to turn ON and counter-clockwise to turn OFF.

3. **Drum Speed:**
   This infinitely variable rotary switch controls the speed of the electric motor turning the drum. Turn the switch fully counter-clockwise to stop the drum and slowly clockwise to start the drum 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.

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

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

6. **Green Indicator Light:**
   This green light will be illuminated when the pump is running. The light goes out when the pump is turned OFF.

7. **Emergency STOP (Control Panel):**
   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. Either this switch or the frame-mounted emergency stop switch will cut power to the mchine but both must be pulled out for the machine to operate.

FIG. 5 CONTROL PANEL

7. **Emergency STOP (Secondary):**
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. Either this switch or the control panel-mounted emergency stop switch will cut power to the mchine but both must be pulled out for the machine to operate.

FIG. 6 EMERGENCY STOP SWITCH - SECONDARY

8. **Master Plug:**
Each 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. 7 MASTER PLUG

9. **Pressure Gauge:**
The wash water intake system is equipped with a pressure gauge that displays the pressure in the line bringing water to the machine. Normally the system should be set at 30 - 50 gpm of flow at 35 - 40 psi for the best results. However the system pressure is dependent upon the pump supplying the water. The system can accommodate water flow up to 200 gpm depending on the auxiliary system components.

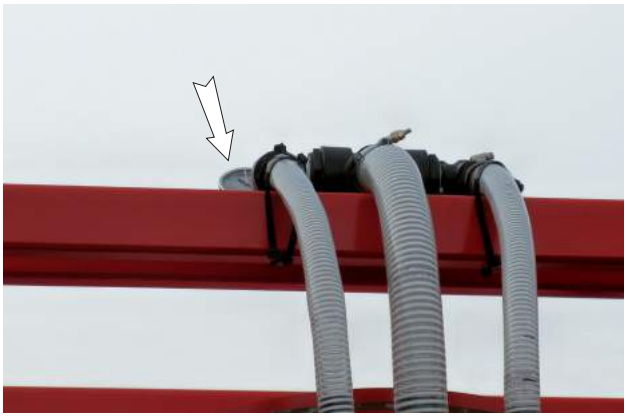


FIG. 8 PRESSURE GAUGE

10. **Water Compartment Float Switch:**
A switch is mounted on the rear left corner of the frame on a float that extends into the water compartment to monitor the level of the water in the compartment. When the water level rises, it trips the switch to engage the sump pump. As the water is pumped out, the switch engages again to turn the pump off. This feature prevents the pump from running continuously.

FIG. 9 FLOAT SWITCH

6. **Turnbuckles:**
Turnbuckles are used to position the drum angle and the elevator height. Turn the handle on the turnbuckle as required to set and position the drum angle and elevator height appropriate for the application.

   a. Drum Angle.

   b. Elevator Height.

Drum Angle

Elevator

FIG. 10 TURNBUCKLES

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. **Outrigger Set Screws:**
   Each side of the machine is designed with three telescoping outriggers 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 outrigger to keep the frame level and yet support the weight of the machine. Tighten set screws to secure.

FIG. 11 OUTRIGGER SET SCREWS

3. **Hitch:**
   Each machine is equipped with a tow hitch on the rear of the frame. Always configure it in its retracted position to minimize the chance of interfering with auxiliary equipment or obstructing access to the machine.

FIG. 12 RETRACTED HITCH

3. **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. 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 manifold which provides water to the 3 wash water lines. Two small lines on the side and a larger centre line for a large volume of water when the potatoes are dirty.

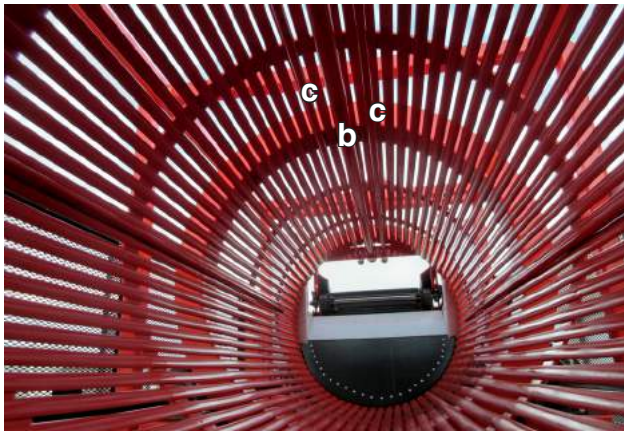
a. Water Inlet.

b. Centre Line.

c. Side Lines.

Inlet

Wash Lines



Drum

FIG. 13 WASH WATER SUPPLY (TYPICAL)

4. **Tank Flush Water Supply:**
Each machine is designed with 2 inch inlets on each side of the water containment tank to wash the dirt and sludge into the sump pump to keep the tank flushed out and prevent plugging. Dirty product can introduce a large amount of soil and mud into the bottom of the tank and potentially plug it. Set the water flow to move the dirt into the sump pump and remove it. Increase the water flow if mud builds up in the containment tank.

Right

Left

FIG. 14 TANK FLUSH WATER SUPPLY

5. **Discharge Water:**
Each machine is designed with a used water containment compartment pan and sump pump under the drum. The sump pump removes the used water, dirt slurry and debris from the compartment and moves it to the disposal site. Connect and secure the 3 inch discharge with a tube or piping as appropriate.

   a. Electric Motor.

   b. Pump Drive.

   c. Pump.

   d. Outlet.

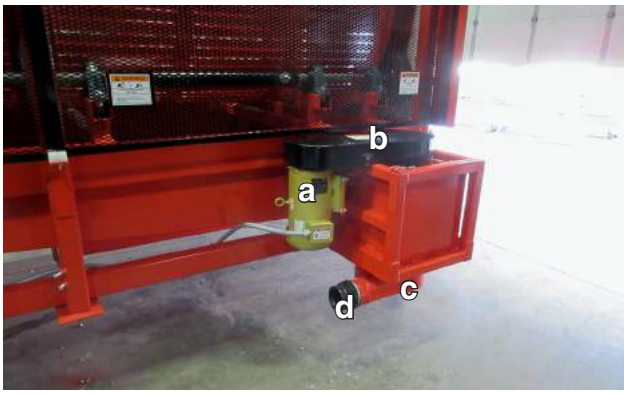


FIG. 15 DISCHARGE WATER

6. **Wash Water Depth Switch:**
Each used water containment compartment is equipped with a switch on a float that controls the power to the sump pump. When the water level rises to a certain level, the switch turns the pump on to empty the compartment. When the water level drops to a predetermined level, the switch turns the pump off. This prevents the pump from running continuously.

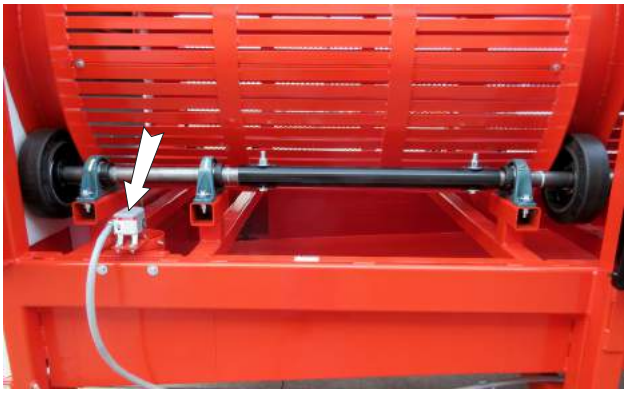


FIG. 16 WASH WATER DEPTH SWITCH

7. **Auxiliary Equipment:**
Each customer must provide a means of supplying a steady flow of potatoes to the input elevator. Normally this is done by using another piece of equipment such as another conveyor or holding hopper. Always connect the adjacent equipment securely to the washer to prevent movement.

   a. Input

   b. Discharge

FIG. 17 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 Barrel 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(s) above the intake on each side of the water pan. Use the over-center cam lock coupler provided on each fitting to secure the line. Be sure the cam locks go over center to provide a good seal.

Spray Bar

Right Side

Left Side

FIG. 18 WATER INTAKE

5. **Water Discharge:**
Attach a 3" pipe or large hose to the pump on the bottom of the water discharge containment compartment to send the used water to the disposal area. Always dispose of the used water in an environmentally safe manner.

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 cord.

   d. Turn the power to the machine ON by making sure both emergency stop switches are pulled out.

   e. Turn the water supply ON.

   f. Turn the conveyor ON that moves potatoes away from the machine.

   g. Turn the Barrel Washer drum drive ON.

   h. Turn the pump ON that removes the discharge water from the bottom containment compartment.

   i. Turn the elevator ON that moves the potatoes into the drum.

7. **Stopping Machine:**

   a. Turn OFF the elevator.

   b. Wait until the potatoes have moved out of the drum.

   c. Turn the conveyor OFF that moves potatoes away from the machine.

   d. Turn the water supply OFF.

   e. Turn the pump OFF.

   f. Depress one of the emergency stop switches.

NOTE

When the red emergency stop button on the control panel is depressed, the operator must go through steps 7:a through 7:e to turn all controls OFF before restarting.

8. **Emergency STOP:**
Depress either of the large red STOP button on the machine. This will stop the elevator, drum and pump. Then turn the water supply off. Correct the problem and be sure to turn all the individual controls OFF and pull out the Emergency Stop buttons before restarting the machine.

FIG. 19 WATER DISCHARGE OUTLET

Control Panel

Plug

Emergency Stop - Secondary

FIG. 20 STARTING/STOPPING

9. **Equipment Attachment:**
Provide a means for bringing a flow of potatoes into the elevator hopper 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.

   a. Intake

   b. Discharge

FIG. 21 AUXILIARY EQUIPMENT

10. **Drum AND Elevator Speeds:**
The drum and elevator are designed with a variable speed electric motor to allow the operator to change the drum and elevator speed to match it to the application. Use the drum speed, elevator speed, discharge gate height and water volume to determine the cleaning performance. Normally 5 to 10 rpm drum speed works well but the potatoes need to tumble as they go through the drum to remove the dirt. Set the elevator speed at 20 feet per minute to start. Vary as required to optimize performance.

   Watch the cleanliness of the potatoes coming out of the discharge. If they are still dirty decrease elevator 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.

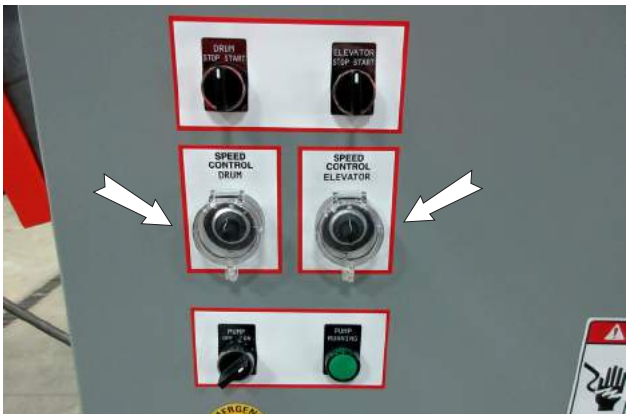


FIG. 22 DRUM AND ELEVATOR SPEEDS

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 pipes in the top center of the drum. 1/4" holes in the bottom of the pipes distribute the water across the entire drum.

a. Water Intake

b. Pipes

c. Wash Water

Operating

Water Line

FIG. 23 WASH WATER (TYPICAL)

12. **Water Containment Compartment:**
Wash water is sprayed on the top of the potatoes as they move through the drum and drops into the containment compartment for removal by the pump. The best results are obtained if the compartment is kept clean.

⚠ WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

Compartment (Typical)

Pump

FIG. 24 WATER CONTAINMENT COMPARTMENT

13. **Discharge Gate:**
The machine is designed with a moveable gate at the discharge end of the drum. Use the turnbuckles 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.

Operating

Gate

FIG. 25 DISCHARGE GATE

14. **Water Compartment Float:**
A float is installed in the rear of the wash water compartment to control the water level in the compartment. When the compartment fills with water from the washing or flushing systems, the float will turn the sump pump ON. When the compartment empties, the float will turn the sump pump OFF. Be sure to provide sufficient supplemental flow to prevent dirt build-up in the compartment.

FIG. 26 FLOAT

15. **Tumbling Rods:**
Although the rotation of the drum causes the potatoes to roll and provides a chance for the wash water to hit all sides of the each potato is it goes through the machine, two rods on the edge of the drum extending the full length of the drum provide an extra impulse to turn the potatoes.

FIG. 27 TUMBLING RODS

16. **Centering Wheels/Tires:**
The drum is supported by five wheels on each side of the drum and centered in the frame by two wheels/tires on each 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)

Raer (Typical)

FIG. 28 CENTERING WHEELS/TIRES

17. **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.

a. Intake

b. Discharge

Machine

Operating

FIG. 29 DROP HEIGHT

16. **Water Quality:**

It is recommended that the customer provide a means to clean the wash water as it is pumped out of the sump. Although 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.

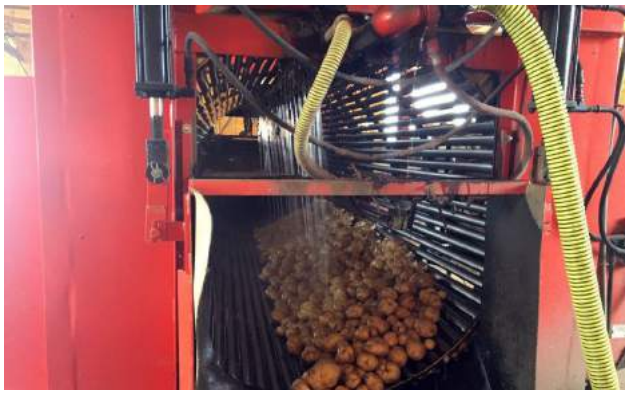


FIG. 30 OPERATING SYSTEM

17. **Operating Hints:**

a. Be sure that all workers and operators are supplied with and use the required safety gear.

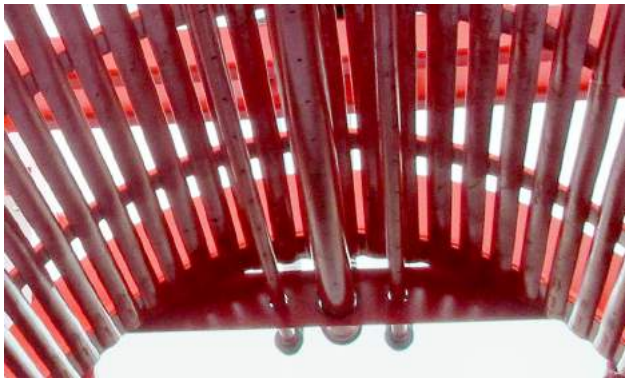
b. Keep the working area clean and as dry as possible to prevent slipping and tripping.

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 Barrel 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 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.



Holes

Operating

FIG. 31 WASHING

g. Use the variable speed dials on the control panel to change and set elevator speed and drum RPM to obtain the best performance.

FIG. 32 CONTROL PANEL

4.9 STORAGE

STORAGE SAFETY

- Make sure all water has been drained from the washing system and the used water holding compartment.
- Store the Barrel 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 using emergency stop switch and lock out.

4. Unplug and remove power cord 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.

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 roller chain. Replace if badly worn. check the alignment of the sprockets. Align if required. Properly tension roller chain.

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. 33 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 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.

4.10 TRANSPORT

TRANSPORT SAFETY

- Make certain that you are in compliance with local, state/provincial and federal regulations regarding transporting agricultural equipment on public roadways.
- Make certain that all wheels and tires are in good repair and that tires are inflated to proper pressure. Do not under-inflate or over-inflate.
- Make certain that all wheel bolts/lug nuts are tightened to proper torque specifications (refer to specification chart in Section 7.2).
- Raise elevator fully up before transporting to prevent dragging the hopper on the ground when going through low spots.
- Raise and secure the frame outriggers and secure with set screws before transporting or moving.
- Wrap up and tie all loose electrical ends to the frame.
- Be sure that any necessary SMV (slow moving vehicle) signs, reflectors and lights required by law are in proper place and are clearly visible to oncoming and overtaking traffic.
- Be sure that the Barrel Washer is positively hitched to the towing vehicle. Use a safety cable to assure a safe hitch hook-up when transporting.
- Follow local regulations regarding maximum weight, width and length when transporting.
- Do not exceed 15 MPH (25 Km/H). Reduce speed on rough roads and surfaces.
- Do not allow anyone to ride on the Barrel Washer or towing vehicle during transport.
- Always use hazard flashers on the towing vehicle when transporting.
- Always use pilot vehicles in front and behind when towing on a public road.

Mayo Barrel Washers are designed to be moved from location to location. The term moving is used to describe the action of moving the machine within the working area. Transporting is used to describe when the machine is being towed by a tractor or other power unit or loaded on a flat bed. When transporting, follow this procedure:

1. Disconnect and remove all auxiliary equipment from the Barrel Washer and position so the tractor or tow unit can back up to the front of the machine.
2. Extend the hitch.
3. Use the turnbuckle under the elevator to raise the elevator into its fully up position.

FIG. 34 HITCH EXTENDED

FIG. 35 TURNBUCKLE

4. Disconnect all water lines:

   a. Wash water.

   b. Supplemental flush water.

   c. Sump pump..

Wash

Flush

Sump

FIG. 36 WATER LINES

5. Raise the outriggers and tighten set screw anchors to their specified torque. Three outriggers on each side of the frame.

Left Side

Right Side

FIG. 37 OUTRIGGERS

6. Attach the tow hitch to the tractor or truck. Be sure to use a mechanical retainer through the drawbar pin.

7. Attach the safety cables between the hitch and the drawbar cage to prevent unexpected separation.

8. Install an SMV on the rear frame if towing with a tractor on a public road.

9. Use pilot vehicles and install extra lights on the machine when transporting.

10. Clean all the reflectors.

11. Place all controls in their OFF or neutral position.

12. Turn the power OFF at the master panel and lock out.

13. Unplug and tie up the power cord.

14. Be sure all bystanders are clear of the machine.

15. Keep to the right and yield the right-or-way to allow faster traffic to pass. Drive on the road shoulder, if permitted by law.

16. Make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic.

FIG. 38 POWER CORD

17. It is not recommended that the machine be transported faster than 15 mph (25 km/hr). Table 1 gives the acceptable transport speed as the ratio of tractor weight to Barrel Washer weight.

18. Do not allow riders on the machine or tractor.

19. Always use hazard flashers on the tractor when transporting unless prohibited by law.

Road Speed	Weight of fully equipped or loaded implement(s) relative to weight of towing machine
Up to 25 km/h (15 mph)	1 to 1, or less
Up to 16 km/h (10 mph)	2 to 1, or less
Do not tow	More than 2 to 1

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 Barrel Washer.
- Do not work on Barrel 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.
      Capacitiy: 2 qt (2 liter).

   b. Elevator drive.
      Capacity: 1 qt (1 liter).

3. **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 drum and drive wheels. Remove any entangled material. Clean if dirty. Repair if damaged.

Input

Discharge End

FIG. 39 DRUM/DRIVE WHEELS

2. Check the condition of the water distribution holes in the bottom of the water tubes that extend through the drum.

FIG. 40 WATER HOLES (TYPICAL)

Weekly or 50 Hours

1. Grease drum drive shaft bearings with 1 shot of grease.

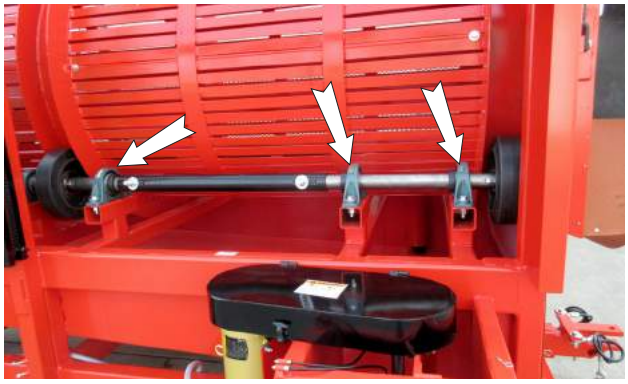
   a. Input drive (2 locations).

Input Drive

   b. Front - side drive - right side (3 locations each side).

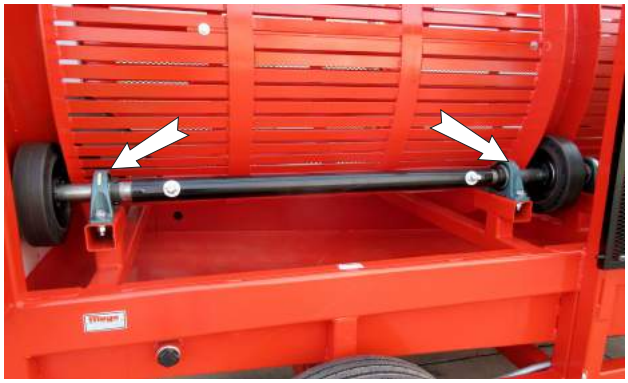
IMPORTANT

Only sealed bearings are used on the machine. Sealed bearings should never be greased more often than weekly or every 50 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.



Front - Side Drive

   c. Rear - side drive - left side (2 locations each side).



Rear - Side Drive

FIG. 41 DRUM SHAFT DRIVE BEARINGS

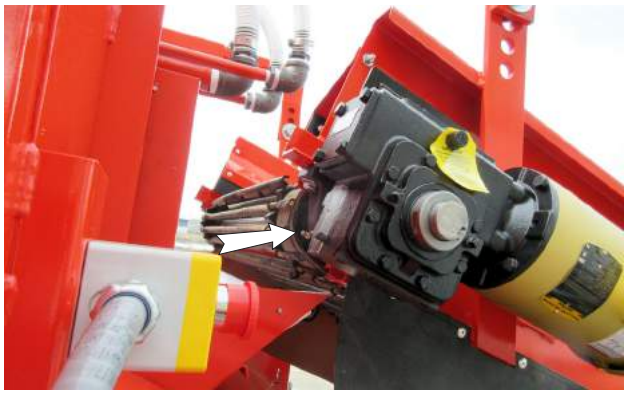
2. Grease the end guide roller shaft bearings.

Discharge

Intake

FIG. 42 GUIDE ROLLER SHAFT

3. Grease elevator conveyor shaft bearings.



Left

Right

FIG. 43 CONVEYOR SHAFT BEARINGS

4. Grease sump pump bearings.

FIG. 44 SUMP PUMP BEARINGS

5. Check tension of drive chain.

FIG. 45 DRIVE CHAIN

6. Check tension of pump drive belt.

FIG. 46 PUMP DRIVE BELT

7. Check tension and alignment of elevator conveyor.

Tension

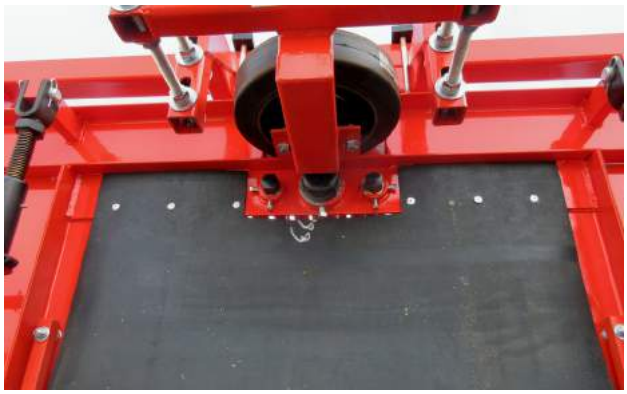
Alignment

FIG. 47 ELEVATOR CONVEYOR

200 Hours or Annually

1. Check centering of drum drive wheels.

Input



Discharge

FIG. 48 DRUM DRIVE WHEELS (TYPICAL)

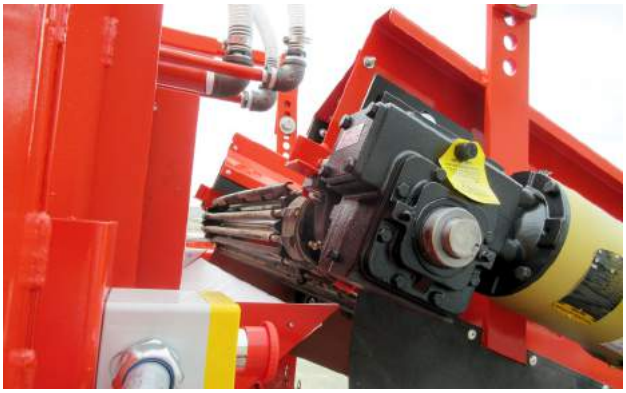
2. Check the position of drum drive wheels/tires.

Input (Typical)

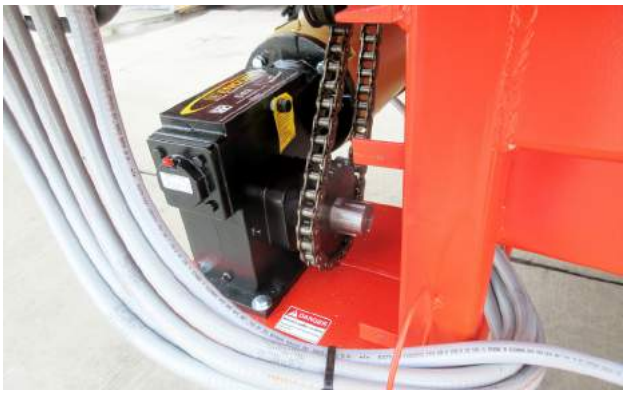
Discharge (Typical)

FIG. 49 DRUM DRIVE WHEELS/TIRES

3. Check the oil level in the gearboxes.



Elevator



Drum

FIG. 50 LEVEL PLUG (TYPICAL)

4. Grease turnbuckles.

Discharge

Intake

FIG. 51 TURNBUCKLES

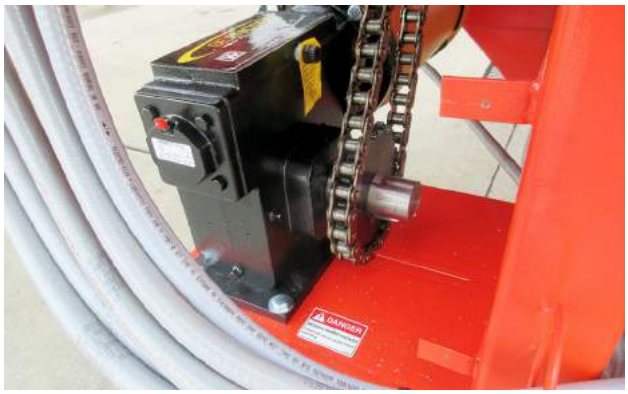
5. Wash machine.

FIG. 52 MACHINE

Every 1000 Hours or 2 Years

1. Change oil in gearboxes.

Elevator



Drum

FIG. 53 GEARBOXES

5.1.4 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

ACTION CODE:	CK	CHECK	CH	CHANGE	CL	CLEAN
	LU	LUBRICATE	RE	REPACK	IN	INSPECT

Maintenance

Hours																						
Serviced by																						
8 Hours or Daily																						
CK Drum & Drive Wheels																						
CK Water Distribution Holes																						
Weekly or 50 Hours																						
G Drum Drive Shaft Bearings																						
G End Guide Roller Shaft Bearings																						
G Elevator Conveyor Shaft Bearings																						
G Sump Pump Bearings																						
CK Drive Chain Tension																						
CK Pump Drive Belt Tension																						
CK Elevator Tension & Alignment																						
200 Hours or Annually																						
CK Drum Drive Wheel Centering																						
CK Drum Drive Wheel Position																						
CK Gearbox Oil Level																						
G Turnbuckles																						
CL Machine																						
Every 1000 Hours or 2 Years																						
CH Gearbox Oil																						

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 Barrel 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. 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.

Power Plug

Control Panel

Panel Open

FIG. 54 ELECTRICAL SYSTEM

5.2.2 SPEED REDUCER GEARBOX OIL

Each elevator 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 200 hours, the oil level should be checked. Every 1000 operating hours or 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 Barrel Washer until the gearboxes are warm. Warm oil will remove more contaminants than cold stagnate oil.

2. Stop the Barrel Washer.

3. Place all controls in their OFF or neutral position.

4. Turn the power OFF at the master panel and lock-out.

5. **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.

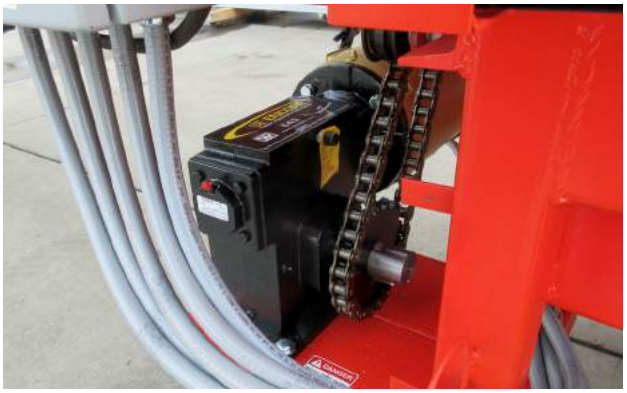
   e. Remove the level and fill plugs.

   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.

Elevator



Drum

FIG. 55 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

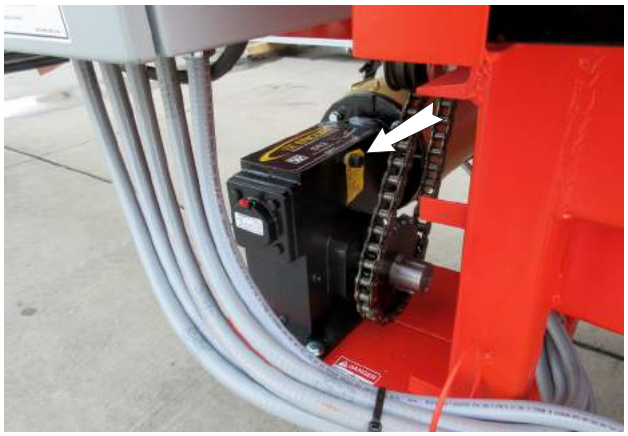
Each gearbox is equipped with a breather in the fill plug that vents the internal pressure to atmosphere. As the gearbox temperature increases and decreases during the operating and stopped modes, the pressure in the gearbox will increase or decrease if it is not vented to atmosphere. An increase in 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.

Elevator



Drum

FIG. 56 BREATHERS

5.2.4 DRUM ROTATION DRIVE SYSTEM

Power to rotate the drum is provided by an electric motor through a speed-reducing gearbox and roller chain drive system on the rear of the frame. The chain drive chain should have a slight sag in the top side between the sprockets. Adjust the idler rollers to set the chain 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 chain is correctly tensioned when there is a slight sag on the top side. Move the rollers 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.

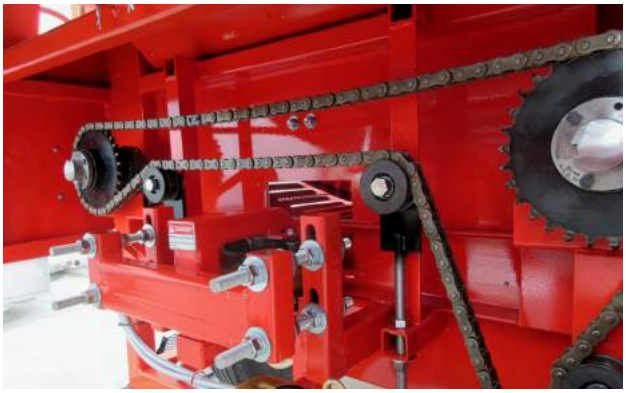


FIG. 57 IDLER ROLLERS

5. **Alignment:**
   The sprockets need to be aligned to operate properly. Sight along their faces or use a staright edge across the faces of the sprockets. Slide the sprocket on the shaft to adjust.

6. **Replacement:**

   a. Move the idler rollers into their loosest position.

   b. Remove the old chain.

   c. Install the new chain.

   d. Use the idler rollers to set the chain tension.

   e. Check the tension and alignment of the chain frequently during the first 10 hours of operation and set as required. Then, go to the regular maintenance schedule. Normally a drive chain will seat itself during the first 10 hours of operation and then require less adjustment.

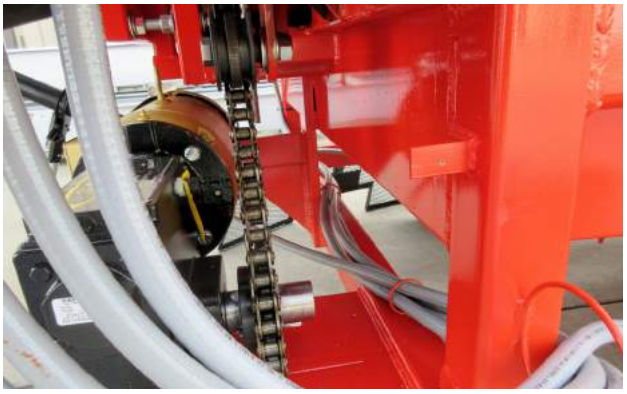


FIG. 58 ALIGNMENT

5.2.5 SUMP PUMP BELT DRIVE

Power to drive the sump pump is provided by an electric motor positioned on the side 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 belt tension and alignment. When maintaining 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. Open the guard over the belt drive system.

5. **Belt Tension:**
   It is tensioned correctly when the belt deflects 1/4 inch (6 mm) when pushed on with a 10 lb. force between the drive and driven pulleys. The belt should not slip when the machine is being used. Use the motor mounting base adjusting system to set the belt tension.

6. **Pulley Alignment:**

   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:**

   a. Place motor assembly in its loosest position.

   b. Remove old belt and install a new one.

   c. Move the motor into position to set pulley position with the pulleys aligned and the belt tension properly set.

   d. Tighten motor mounting frame position jam nut to its specified torque.

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

Belt

Alignment/Adjusting Bar

FIG. 59 SUMP PUMP BELT DRIVE

8. Close and secure the guard.

5.2.6 CONVEYOR BELT TENSION/ALIGNMENT OR REPLACEMENT

Potato chains are used to convey potatoes up the elevator. The tension and alignment of the conveyor should be checked daily to insure proper function. To maintain elevator conveyor, 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. **Conveyor Tension:**
   It is adjusted correctly when there is a 12 to 14 inch sag under the frame on the bottom or slack side of the conveyor during operation.

5. **Conveyor Alignment:**
   It is properly aligned when the conveyor centers in the frame. If the conveyor runs on the side of the frame, align the chain. Align by loosening the shaft bearing assembly on the loose side. Move the bearing assemblies on either the drive or driven shafts but always maintain the proper tension.

FIG. 60 CHAIN TENSION

Conveyor

Drive

Driven

FIG. 61 ALIGNMENT

6. **Replacement:**

   a. Move one or both of the shafts into their loosest position.

   b. Open the conveyor chain by removing the connector link.

   c. Attach the replacement chain to the end of the old conveyor chain.

   d. Slowly pull the old conveyor chain out of the machine and thread the new one into position.

   e. Disconnect the old conveyor chain and connect the ends of the new one together.

   f. Move the shaft into position to set the tension of the conveyor chain and secure the bearing assemblies.

   g. Check the tension and alignment of the new conveyor chain frequently during the first 10 hours of operation and set as needed. Normally a conveyor chain will seat itself during the first 10 hours of operation and then require less adjustment.

FIG. 62 CONVEYING CONNECTOR LINK

5.2.7 DRIVE/CENTERING WHEEL POSITION

The machine is designed with wheels on the sides of the drum to rotate it. They all run in channels around the circumference of the drum while running. They need to be set to run in the center of the channel during operation. Wheels on each end of the drum center the drum in the frame which keeps the drive wheels in their channels. 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 using the emergency stop switch and lock-out.

3. Unplug power cord.

4. **Side Drive Wheels:**
   The wheels should touch the drum to keep it rotating.

   a. Open the side screens.

   b. Loosen drive wheel bearing mounting bolts.

   c. Tap bearing housing to move drive wheel to required position.

   d. Tighten drive and wheel bearing mounting bolts to their specified torque.

   e. Repeat with other drive wheel assemblies.

   f. Close and secure side screens.

Front

Rear

FIG. 63 SIDE DRIVE WHEELS (TYPICAL)

WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

5. **Centering Wheels:**
The wheels should just touch the end frame of the drum to keep it centered.

   a. Loosen wheel frame mounting bolts.

   b. Loosen position bolt jam nuts.

   c. Use position bolts to move wheel to required position.

   d. Tighten position bolt jam nuts.

   e. Tighten wheel frame mounting bolts.

   f. Repeat with other wheel.

Front

Rear

FIG. 64 CENTERING WHEEL (TYPICAL)

⚠ WARNING

Machine is shown with guards removed or doors opened for illustative purposes only. Do not operate machine without all guards in place and doors closed.

5.2.8 LUBRICANT LIST

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

6 TROUBLE SHOOTING

The Mayo Barrel 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.
	No power.	Emergency stop switch depressed. Make sure both emergency stop switches are pulled out.
Drum won't turn.	No power.	Turn power ON.
	Tripped motor starter.	Reset starter.
	Failed drive chain.	Replace chain.
Potatoes not clean.	Dirt not scrubbed loose.	Increase time spent in cleaning drum by increasing flow of water or raising discharge gate.
	Insufficient scrubbing.	Increase time spent in cleaning drum by increasing flow of water or raising discharge gate. Be sure tumbler rods are installed and functioning as intended.
	Wash water dirty.	Replace wash water with clean water.
	Too many potatoes.	Slow feeding rate
	Water pan filled with dirt.	Increase flow of flush water to clean dirt from pan and keep it clean.

7 SPECIFICATIONS

7.1 MECHANICAL

Barrel Washer Mechanical Specifications: Model: 824

Description	Unit of Measure	Model 824		Comment
Features of the machine				
Infeed Elevating Conveyor Width	In	36”		
Total length of the machine – hitch retracted	Ft-in	26’0"		-
Total length of the machine – extended	Ft-in	27’10"		-
Total width of the machine	Ft-in	8’4”		-
Total height of the machine – Condition-1	Ft-in	8’11”		Plumbing removed
Total height of the machine – Condition-2	Ft-in	9’9”		w/ plumbing
Machine weight and mass balance				
Total Weight of Machine (no product)	Lbs	8300		Estimated shipping weight
Machine Tire and Wheel Information				
Tire – LT235-85R16	Lbs	4080		Max Operating Load
Tire – Inflation Pressure	Psi	110		Max Pressure (cold)
Machine Water System				
Infeed Water Flow	Gpm	30-200		Design Capacity
Infeed Water Pressure	Psi	35-40		Main Relief pressure set point
Machine Electrical System				
Incoming Power Supply 208-240V/480V 3PH	Amps	50/25		(1) 7.5HP, (1) 5HP, (1) 2HP- 3PH motors plus elec.
Onboard Control system 120V 1PH	Amps	3/1.5		Integrated Transformer
Remote control / Interlock				Per customer specification

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

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

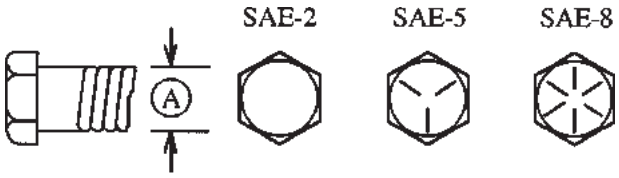
7.2 BOLT TORQUE

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.

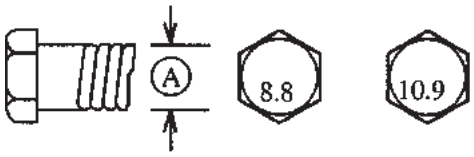
ENGLISH TORQUE SPECIFICATIONS

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 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.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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