

WORKMASTER

WE FIND A WAY — OR MAKE ONE !

GO-A8-PW Gate Opener



OPERATOR's GUIDE

WORKMASTER disclaims any liability for injuries, death or damages arising directly or indirectly, from the use, operation or application of this product not in accordance with the procedures, specifications and recommendations contained in this owner's manual. The user of this product is responsible to install, maintain and operate the product and parts or components manufactured or supplied by WORKMASTER in such a manner as to comply with all federal, state and local rules, ordinances, regulations and laws, including the Williams-Steiger Occupational Safety Act, and the American National Standards Institute Safety Code.

SYMBOLS

The following symbols are found throughout this Operator's Guide to alert the reader to the relative danger that may result from non-observance.



This indicates a situation in which a hazard is imminent and will result in a high probability of serious injury or death.



This indicates a potentially hazardous situation, which could result in minor to moderate injury.



CAUTION

This indicates a potentially hazardous situation or unsafe practice which could result in product or property damaged.



IMPORTANT

This symbol indicates a general statement to assist the user in the operation or maintenance of the equipment.

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I. INTRODUCTION

Fast, safe and economical unloading of covered hopper cars continues to be a problem at most unloading sites. One of the biggest contributors to this problem is the often time-consuming and difficult job of opening and closing bottom gates or doors of these hopper cars. Load compaction, weather conditions, age, abuse, or corrosive or gritty bulk materials can combine to prevent gate mechanisms from operating smoothly.

Regardless of cause, the costs associated with the problem are significant. Delays in emptying the hopper cars means slow car turnaround, increased demurrage costs, and interrupted production schedules. Even more importantly, the chance of worker injury is high since at many unloading sites, clumsy or dangerous makeshift tools are used during the "fight" to open a stubborn gate.

To meet our commitment of "**WE FIND A WAY – OR MAKE ONE®**", **WORKMASTER** has developed a line of Hopper Car Gate Openers and accessories which provide a safe, efficient and economical solution to the problem of opening easy, medium and hard-to-open hopper car gates.

There are pneumatic, electric and manual units available producing 1000 to 13000 ft. lbs. of torque to eliminate the need for "cheater" bars, sledge hammers, jacks and other improper tools sometimes used on this difficult job.

This Operation/Maintenance Manual details the specifications, operation, maintenance and safe use of the **GO-A8** Pneumatic Hopper Car Gate Opener. Experience has shown that the **GO-A8** Opener will open the most difficult car gates. However, the same experience demonstrates that total satisfaction in use depends on attention to detail in operating and maintaining the unit.



IMPORTANT

All persons involved in the operation and maintenance of this equipment should be thoroughly familiar with the contents of this manual.

II. SAFETY

To prevent injury to yourself or others, and/or damage to equipment, you should adhere to the following basic safety instructions.

1. Read carefully the entire Operator's Guide prior to installing or operating equipment.
2. Always follow proper precautions and use proper tools and safety equipment.
3. Be sure to receive proper training.
4. Always use the equipment and all its components in applications for which they are approved.
5. Be sure to assemble all components correctly.
6. Never use worn, defective or damaged components.
7. Practice good housekeeping at all times, and maintain good lighting around all equipment.
8. Perform Lock-out/Tag-out procedure on all energy sources to the equipment, mounting structure, loading and discharge systems in accordance with ANSI Standards before installation or maintenance.

III. REQUIRED MATERIALS

The following items are not supplied with your WORKMASTER Gate Opener but are necessary for its proper installation and operation.

- CLEAN and DRY compressed air capable of supplying 114 CFM @ 85 PSI
- High-quality air hose: 1" ID, preferably fitted with a Universal (Chicago type) coupling.



IV. SPECIFICATIONS AND COMPONENTS

To operate to **GO-A8-PW** effectively the user should be familiar with each of the Gate Opener's components. See **Figure 1** for a Component layout, and **Appendix A** for a breakdown of the Impactor and the list of Part Numbers.

The **GO-A8** Pneumatic Hopper Car Gate Opener consists of a heavy-duty reversible impact motor, self-closing lever control mechanism and a Rolling Cart. The **GO-A8** Opener is portable, rugged and capable of operating in the toughest environment. Under recommended operating conditions and with regular maintenance, the **GO-A8** Opener can generate up to 13000 ft./lbs. torque. The Impact Motor is air driven and requires a source of clean, dry compressed air for operation.

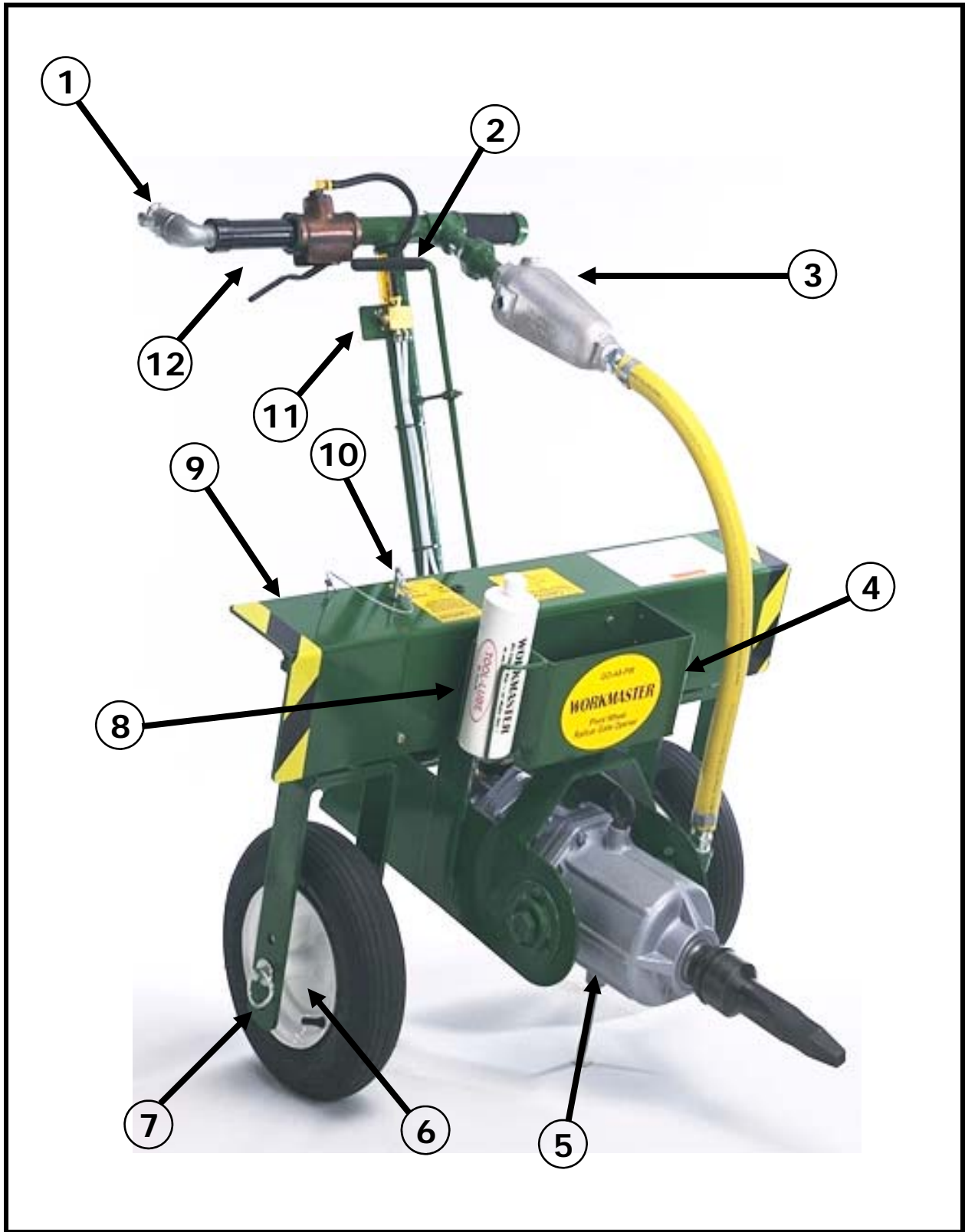
Every user should be aware of the technical specifications and operating characteristics shown below in **Table 1**.

Table 1: Technical Specifications

CHARACTERISTICS	GO-A8-PW
Length	33"
Width	42"
Height	45"
Weight	308 Lbs
Working Area Required	8 – 10 Ft Minimum – Site Specific
Free Speed	1500 RPM
Working Torque Range	1000 – 13000 Ft/Lbs
CFM/PSI Free Speed	150 @ 85 PSI
CFM/PSI Impacting	114 @ 85 PSI
Air Inlet	1" NPTF
Tire Size	400 x 8 Solid Polyurethane
Anvil Size	1-1/2"
Retainer Type	Socket Pin w/ O-Ring
Hose Size	1" ID
Lubrication	Air Tool Oil

Figure 1: Component Layout

(See pg 5 - 8 for details)



COMPONENT LAYOUT DESCRIPTIONS (See Figure 1, pg 4)

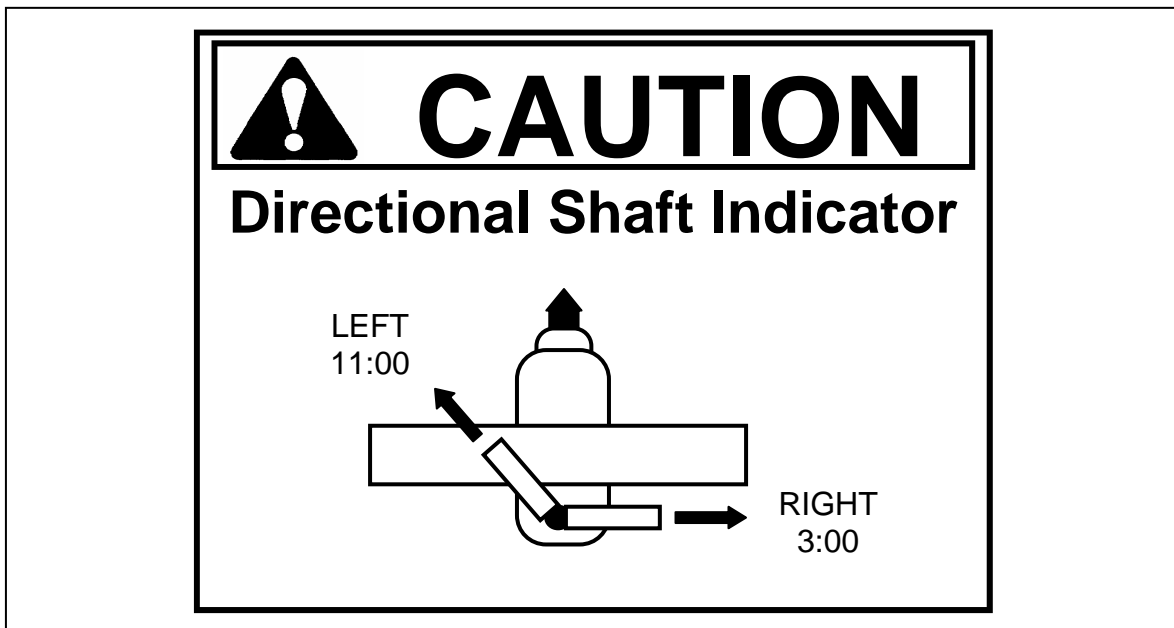
1. AIR INLET

The air inlet is a 1" NPT opening with a full-port, Universal (Chicago type) Coupling. The Coupling supplied is the recommended fitting for the **GO-A8**. Replacing the Coupling with a quick-connect type plug will restrict air flow to the Impactor.

2. FORWARD/REVERSE LEVER (F/R Lever)

The F/R Lever is a steel rod attached to a swivel joint providing a universal type pivoting action. The rod, painted with enamel, has a rubber, slip-on grip for control comfort. The F/R Lever controls the direction of rotation of the Impactor's square drive anvil. A decal located on the Cylinder Shield (Item 9) shows the position for clockwise anvil rotation (3 O'clock position), and for counterclockwise anvil rotation (11 O'clock position). A label attached to the Cylinder Shield, See **Figure 2**, shows these handle positions.

Figure 2: Forward/Reverse Label



3. IN-LINE LUBRICATOR

The In-Line Lubricator is a 16 oz, pineapple shaped oil reservoir. Pressure differences between the Lubricator's two chambers forces oil into the airline. Used in conjunction with the high-grade air tool oil provided, the Lubricator ensures the **GO-A8** operates properly, and extends the life of the Impactor.

4. TOOL BOX

The Tool Box, bolted to the front face of the Cylinder Shield, provides easy access storage for essential **GO-A8** accessories. When not being used, the Drive Fitting, Swage Tool and Anvil Extensions should be stored in the Tool Box, and not on the Impactor's square drive.

5. IMPACTOR

This heavy duty, reversible, pneumatic motor requires a source of clean, dry compressed air for producing the torque output. For a breakdown showing all the parts within the Impactor refer to **APPENDIX A: Exploded View**. The Impactor can pivot approximately 15° on its trunnions. For performance ratings, See **Table 1** located in the beginning of this section.

6. WHEEL-AXLE ASSEMBLY

The Wheel-Axle Assembly supports the **GO-A8** Rolling Cart on wide stance, flat-free tires, providing excellent balance. The wheels are attached and secured to the axle by a cotter pin. The Wheel-Axle connects the wheels to the left and right Height Adjustment Forks. The Forks are welded to a pivot bar which is actuated by a cylinder via the Pivot Toggle Switch (Item 11).

7. HEIGHT ADJUSTMENT FORK

Both Forks are designed to allow the operator to adjust the height of the Impactor's square drive. By repositioning the Wheel Assembly's Axle into the holes along the face of each Fork, the Impactor can be raised or lowered up to 4" to accommodate a variety of unloading site conditions. See **Section X** for adjustment instructions.

8. OIL CADDY

The Oil Caddy is welded to the Opener's Tool Box and is designed to serve a dual purpose. Primarily, the Oil Caddy allows the operator to keep a bottle of air tool oil on-hand at all times; secondly, the Oil Caddy serves as a reminder to check the oil level in the Lubricator. The oil level should be checked daily.

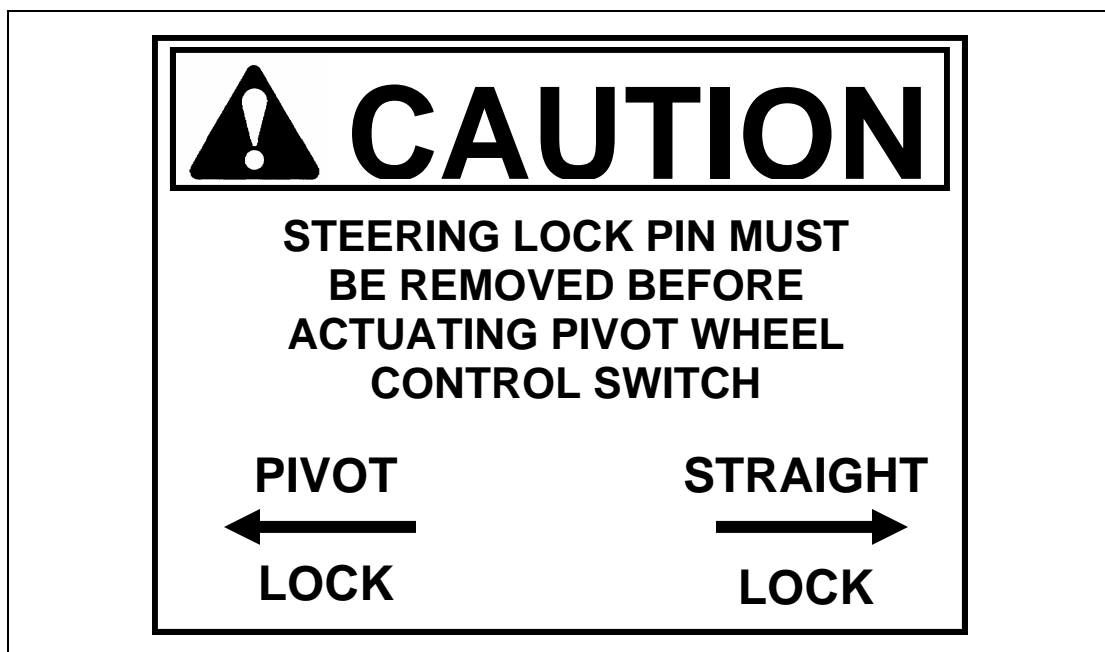
9. CYLINDER SHIELD

The Cylinder Shield protects the pneumatic cylinder which shifts the pivoting linkage at the cylinder plate forcing the shaft and fork frame to turn at a predetermined angle. The Cylinder Shield has safety lock pinholes that extend through the pivoting linkage plates and restrict wheel direction change until the pin is removed. This pivot wheel action allows the **GO-A8** to travel with rolling capstans.

10. PIVOT LOCKING PIN

The Pivot Locking Pin is used to lock the wheels and the Height Adjustment Forks in the straight or pivot position. The Pin, attached to the **GO-A8** by a coated lanyard, must be removed before actuating the pivot Toggle Switch. The Pin should be reinserted into the correct pinhole on the Cylinder Shield when the wheels are in the desired position. A label located on the Cylinder Shield, See **Figure 3**, shows which pin hole is used to lock the **GO-A8**'s wheels in the desired position.

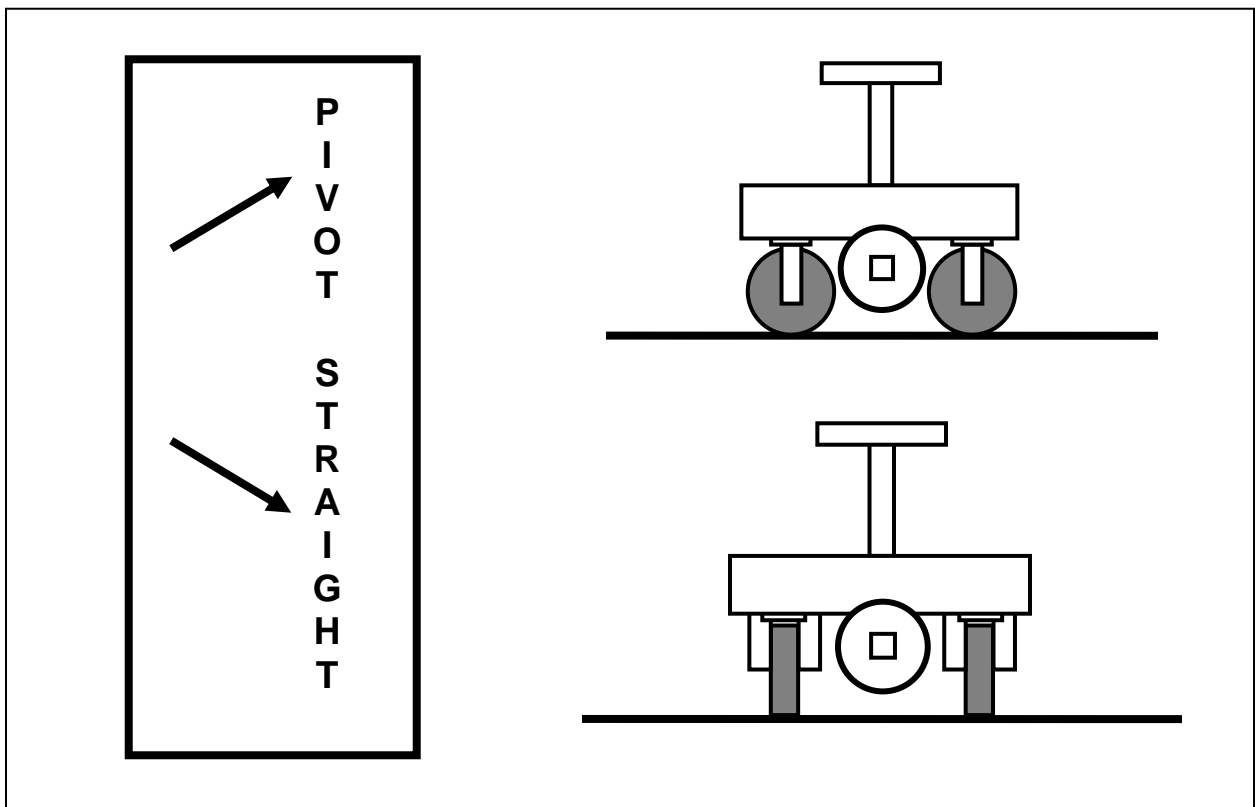
Figure 3: Locking Pin Label



11. PIVOT TOGGLE SWITCH

The Pivot Toggle Switch is a pneumatic actuated valve that controls the movement of the **GO-A8's** wheels and Height Adjustment Forks. When the Switch is in the PIVOT position, the wheels will rotate so that they are parallel to the railcar. When the Toggle Switch is in the STRAIGHT position, the wheels will move perpendicular to the railcar. A label located next to the Toggle Switch, See **Figure 4**, shows the Toggle Switch position for the desired wheel movement.

Figure 4: Toggle Switch Label



12. THROTTLE VALVE

The Throttle Valve is a self-closing, lever-operated valve that is attached to the right hand side of the frame on the Handle Assembly. The Throttle Valve has a spring loaded lever, which shuts off air to the Impactor as soon as the throttle is released. Only when the Throttle Lever is depressed will the Impactor be activated.

V. AIR REQUIREMENTS

An Air Compressor of sufficient capacity is needed to provide the necessary air volume (CFM), at the most efficient operating pressure (PSI), to ensure effective and economical operation of the **GO-A8** Opener.



IMPORTANT

Low or inadequate air pressure at the opener is costly and wasteful. An insufficient air volume will not allow the **GO-A8** Opener to operate effectively.

1. Air Pressure of 85 to 90 PSI is recommended for maximum performance. This setting represents required *operating air pressure at the Opener*, not at the Compressor. There is always a pressure drop between the Compressor and the Opener; only the pressure and volume at the Opener is effective in doing work. If the hose is relatively short (25' to 50'), and in good condition, the pressure drop between the Compressor (or Air Receiver Tank), and the Opener should not exceed 15% of initial pressure. Adjust Compressor output to compensate for drop.
2. Clean, moisture-free, lubricated air should be delivered to the Opener at all times. The air line delivering air to the Opener should be equipped with a coalescing type filter/dryer to collect and remove moisture and contaminants.
3. Quality air hose designed especially for heavy-duty service should be used. It should be constructed with an outer covering that resists abrasive wear, an oil-resistant inner tube, and should be able to withstand temperature extremes. It should have a working pressure of at least 200PSI.
4. All hose couplings and fittings between the compressor and the Opener should be full bore type, be in good condition, securely attached, and kept as tight as possible (check Coupling gaskets). Elimination of air leaks involves making the air system tight and then keeping it tight. At a typical unloading site, air losses through bad connections, too many connections and worn hose often reaches 25% of the total air compressed.

VI. PRE-START CHECK LIST

1. Fill the In-Line Lubricator with the air tool oil supplied. See **Section VII: Lubrication** for details.
2. With air pressure OFF, install Capstan Drive Fitting making sure that the Pin Retainer and O-Ring are properly seated.
3. Check In-Line Lubricator to insure proper oil level.
4. Connect all air hoses and make sure all controls are locked and properly secured.



Compressed air is an invisible hazard. Any component through which it passes is capable of releasing an explosive force which could result in personal injury or death. As noted earlier, all persons involved in the operation and maintenance of this equipment should be thoroughly familiar with its use.

5. When using new air hose, blow lubricated air through the hose to completely coat the inside with oil. This may take up to 10 minutes.



Be sure all hose connections are tightly secured. A loose hose not only causes air leaks, but can whip around and injure personal in the area. Secure hose couplings with safety pins, clips, cables or chains.

6. Each day, before opening any car gates, operate the **GO-A8**, free-speed, for about 5-minutes. This will allow oil to coat the Impactor's internal components.

VII. LUBRICATION

A heavy-duty Lubricator is permanently installed on the air line between the Throttle Valve and the Impactor. The Lubricator has two reservoirs. The upper chamber holds the oil while the lower chamber acts as a passageway for the air to enter and to exit the Lubricator. An adjustment valve between the two chambers allows air to enter the upper chamber pressurizing the chamber until the entire Lubricator is at equilibrium. When the **GO-A8-PW** is operated, air is drawn from the Lubricator. This flow of air drops the pressure in the lower chamber below the pressure in the upper chamber. The difference in pressure allows oil to be pushed into the lower chamber and then out to the Impactor. When the **GO-A8-PW's** throttle is released, the upper chamber is re-pressurized. When the throttle is engaged the lower chamber is pressurized and the cycle continues.



The Lubricator on the **GO-A8-PW** is empty when shipped from the factory. To avoid damage to the Impactor the Lubricator must be filled prior to operation.

1. To fill the Lubricator, simply remove the Fill Plug, See **Figure 5**, and pour 16 oz (1 pint) of the high grade air tool lubricant provided. It is not necessary to disconnect the airline to the **GO-A8-PW** while filling.

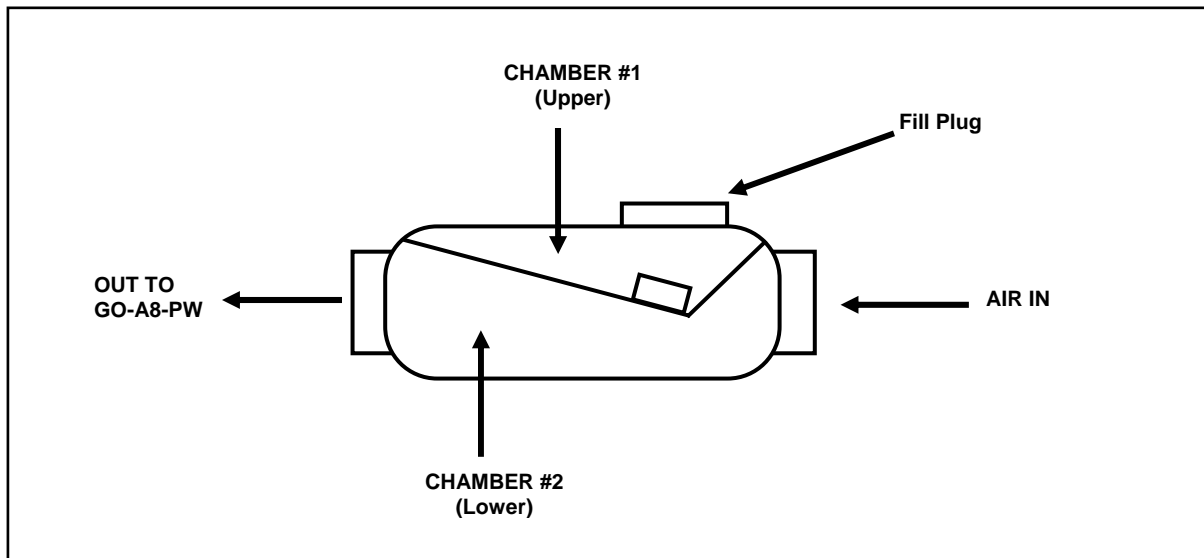


IMPORTANT

WORKMASTER's TOOL-LUBE Air Tool Oil is recommended. It is a High-Grade Air Tool Oil with absorbing emulsifiers. **Do Not Use** any of the following: Kerosene, hydraulic fluid, transmission fluid, spindle oil, motor oil or antifreeze.

2. Depending on temperature and frequency of operation, the adjustment valve inside the Lubricator may need to be reset. Most likely the factory setting of **FIVE** will be correct. If more lubricant is desired, remove the Fill Plug and using a flat tip screwdriver turn the valve counter-clockwise to raise the setting and clockwise to lower. It is not necessary to shut air off to the **GO-A8-PW** during this procedure.
3. Check the oil level sight glass daily.
4. For Lubricator replacement parts, See **APPENDIX E: Lubricator Components**, pg **E-1**.

Figure 5: Lubricator



5. For cold weather operation, such as winter conditions (below 40° F), when the **GO-A8** is used outdoors or in an un-heated service area, the Lubricator should be filled with a Winter Grade Air Tool Oil (**PN: 40007**).
6. For Food Service applications you must use a high-quality Food Grade Air Tool Oil. Contact your **WORKMASTER** Distributor for Product recommendation.

VIII. OPENING CAR GATES

1. Roll the **GO-A8** Opener up to the hopper gate until you "rough spot" position the Opener's output drive with the Railcar Gate's Capstan Socket.
2. Using the CAPSTAN SWAGE TOOL (optional accessory, **P/N 33-11120**), clean-out and square-up the Capstan Socket on the Car Gate so that the CAPSTAN DRIVE FITTING on the Impactor's Output Drive can be aligned properly, and fully seated in the Railcar Gate's Capstan Socket.



IMPORTANT

Regular use of the CAPSTAN SWAGE TOOL will ensure a long-life for your Drive Fitting and your Impactor's Square Drive Anvil. Also, a clean, square Capstan socket will maximize the torque transfer between the Opener and the Car Gate.

3. Disengage the Car Gate Locking Mechanism before attempting to open the gate.



CAUTION

Failure to disengage the Car Gate Locking Mechanism will cause damage to the Car Gate.

4. Roll the Opener forward toward the car gate until the CAPSTAN DRIVE FITTING is firmly seated in the Railcar's Capstan Socket.
5. Rotate the Forward/Reverse Lever to set the Impactor's motor rotation direction.



Keep your hands off the Throttle Lever until it is time to start the Opener. Plant feet firmly, and always keep both hands on the handle while operating the **GO-A8** Opener.

6. For Railcars with Rolling Capstans, remove the Pivot Locking Pin from the **GO-A8**'s straight position pin hole, and flip the Toggle Switch to the pivot position. This will cause the **GO-A8**'s tires to rotate parallel to the Railcar.
7. Secure the Pivot Locking Pin in the PIVOT lock pin hole. Make sure the Pin is fully seated so that no more than 1/4" of the Pin protrudes above the Cylinder Shield.
8. Grip the Opener's handle with both hands. Depress the Throttle Valve Lever slowly, applying a firm, steady inward pressure to the handle. The correct amount of pressure for maximum efficiency can be learned only by experience. Control the opening speed of gate travel so that the Gate does not unnecessarily slam against the end of the Gate Track.



CAUTION

Release the Throttle Lever the moment the Gate reaches its fully opened position. Prolonged impacting can cause structural damage to the gate mechanism.

9. If the Car Gate will not move, STOP using the **GO-A8** Opener and notify your supervisor, continued impacting will destroy the Gate.



Do not use other opening devices (pry bars, multipliers, etc.) in an attempt to "Help" the **GO-A8** Opener.

10. Once the Car Gate is fully opened, pull the Pivot Locking Pin from the Pivot lock pin hole, and flip the Toggle Switch to the Straight position. This will cause the Tires to rotate perpendicular to the Railcar.
11. Secure the Pivot Locking Pin in the Straight lock pin hole.
12. Roll the **GO-A8** Opener back from the Railcar thereby disengaging the CAPSTAN DRIVE FITTING from the Railcar's Capstan Socket.

IX. CLOSING CAR GATES

1. Roll the **GO-A8** Opener up to the hopper gate until you "rough spot" position the Opener's output drive with the Railcar Gate's Capstan Socket.
2. Re-examine the Capstan Socket. Look for rounded edges, spalling or mushrooming. If needed, re-use the Swage Tool to square-up the Socket.
3. Roll the Opener forward toward the car gate until the CAPSTAN DRIVE FITTING is firmly seated in the railcar's Capstan Socket.
4. Rotate the Forward/Reverse Lever to set the Impactor's motor rotation direction.



Keep your hands off the Throttle Lever until it is time to start the Opener. Plant feet firmly, and always keep both hands on the handle while operating the **GO-A8** Opener.

5. For railcars with rolling Capstans, remove the Pivot Locking Pin from the **GO-A8**'s STRAIGHT position pin hole, and flip the Toggle Switch to the Pivot position. This will cause the **GO-A8**'s tires to rotate parallel to the railcar.
6. Secure the Pivot Locking Pin in the Pivot lock pin hole. Make sure the Pin is fully seated so that no more than 1/4" of the Pin protrudes above the Cylinder Shield.
7. Grip the Opener's handle with both hands. Depress the Throttle Valve Lever slowly, applying a firm, steady inward pressure to the handle. The correct amount of pressure for maximum efficiency can be gained only by experience. Control the closing speed of the gate travel so that the Gate does not unnecessarily slam against the end of the gate track.



CAUTION

Release the Throttle Lever the moment the Gate reaches its fully closed position. Prolonged impacting can cause structural damage to the gate mechanism.

8. If the Car Gate will not move, STOP using the **GO-A8** Opener and notify your supervisor.



Do not use other opening devices (pry bars, multipliers, etc.) in an attempt to "Help" the **GO-A8** Opener.

9. Once the car gate is fully closed pull the Pivot Locking Pin from the Pivot Lock Pin hole and flip the Toggle Switch to the Straight position. This will cause the Wheels to rotate perpendicular to the Railcar.
10. Secure the Pivot Locking Pin in the Straight lock pin hole.
11. Roll the **GO-A8** Opener back from the Railcar thereby disengaging the CAPSTAN DRIVE FITTING from the Railcar's Capstan Socket.

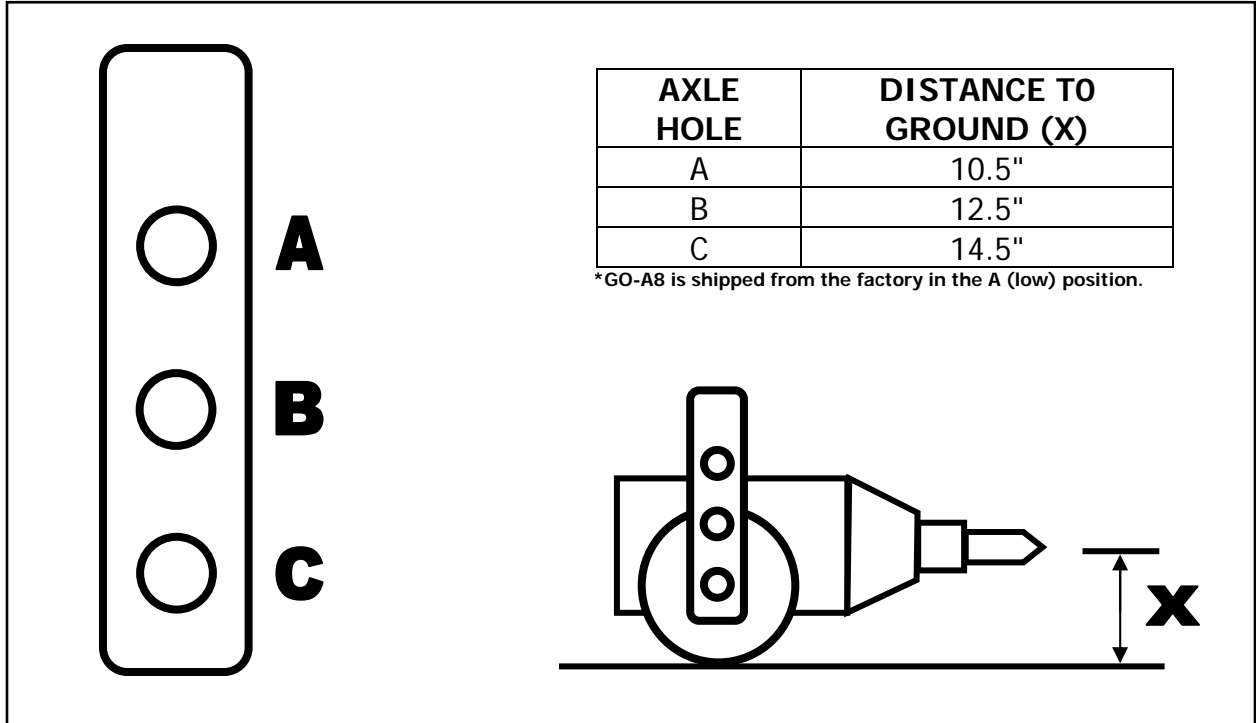
X. HEIGHT ADJUSTMENT

The height of the Gate Opener's Drive Shaft can be adjusted to help align the Drive Fitting with the Capstan. By repositioning the wheel axle pins, the Impactor can be raised or lowered up to 4".

To Adjust the height:

1. Pivot the wheels to the Straight position (parallel with wrench).
2. Disconnect the air supply line to the Gate Opener.
3. Tilt the Opener back onto the Foot Bar.
4. Remove the Locking Clips from both Wheel Axle Pins.
5. Remove Axle pins and move Wheels to the desired height. See **Figure 6**, for Height Adjustment Specifications.

Figure 6: Height Adjustment Specifications



6. Replace Axle Pins and Locking Clips.

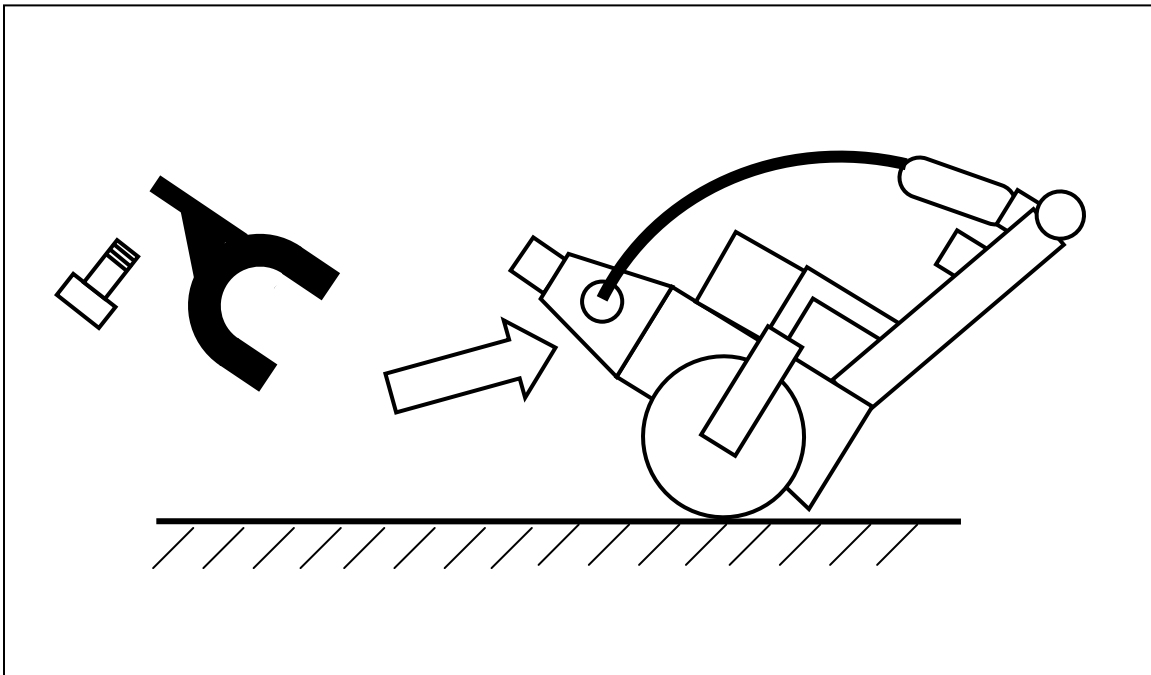
XI. EXHAUST DIVERTER

If you purchased the optional Exhaust Diverter, you can re-direct the exhaust flow backwards toward the **GO-A8**'s tires (instead of forward toward the Gate being opened). See **Section XVI** for ordering information.

To install the Exhaust Diverter:

1. Pivot the Wheels to the Straight position (parallel with wrench).
2. Disconnect the air supply line to the Gate Opener.
3. Tilt the Opener back onto the Foot Bar.
4. Dab the threads of the bolt provided with the Loc-tite provided.
5. Attach the Exhaust Diverter to the Impactor along its exhaust port. The edge of the Diverter should butt-up against the top of the exhaust port. See **Figure 7** for Exhaust Diverter positioning.

Figure 7: Exhaust Diverter Positioning



XII. STORAGE

1. When not in use the **GO-A8** should be stored in a clean, dry & sheltered area, safely out of the way.
2. If a sheltered area is not available and/or not practical, WORKMASTER's water-proof, puncture and tear resistant Protective Cover will provide excellent protection from both the elements and unloading site debris. See **Section XVI** for ordering information.
3. For prolonged storage (more than 2-weeks), the **GO-A8** should be operated, at free-speed, for about 10-minutes. This will allow oil to coat the Impactor's internal components.
4. All accessories including the Drive Fitting, should be stored in the **GO-A8's** Tool Box. Do not leave these items attached to the Impactor if they are not being used.

XIII. DISASSEMBLING THE IMPACTOR

To service the Impactor, it is necessary to remove the Impactor from the Rolling Cart. The following Instructions cover the complete and correct method of performing this operation:

1. Disconnect air supply from Throttle Valve Body.
2. Disconnect Air Hose assembly, at the Union and Air Inlet of Impactor.
3. Remove 1" FPT Elbow from the Impactor's Air Inlet boss.
4. Disconnect the Forward/Reverse Lever at the Universal Joint Connector.
5. Support front under-side of Impactor with a wooden block or like support.
6. Remove the [6] 5/16" Cap Screws and Lockwashers from the left and right Hub Sleeves.



Support the Impactor properly when removing it from the Frame. Failure to properly support the Impactor could result in injury.

7. CAREFULLY remove Hub Sleeves, one at a time, from the Frame.
8. CAREFULLY turn Impactor on a slight angle (3° - 5°), to extract the Housing's male gudgeon from the Cart Frame's Trunion.
9. The Impactor can be now disassembled for maintenance and/or repairs.
10. To reinstall Impactor into Cart Frame, reverse the above procedure.
11. To disassemble the Impactor refer to **Appendix A: Exploded View** while following Steps 12 - 22

12. Remove eight [8] Bolts (51) from Hammer Casing (29) and Motor Casing (23).
13. Separate Hammer Casing (29) from Motor Casing (23) and Separator (28).
14. Remove Impact Mechanism (30 to 38) from Hammer Casing (29).
15. Remove Separator (28) from Motor Casing (23). Examine Cone Roller Bearing (70) for damage and/or discoloration. Replace when necessary.
16. Remove six [6] Bolts (50) from Head Cover (5) and Motor Casing (23).
17. Separate Head Cover (5) from Motor Casing (23).
18. With a soft face hammer, tap spline end of Rotor (26), until Top Cylinder Plate (24) with Ball Bearing (69) is free of Motor Casing (23).
19. Remove nine [9] Rotor Blades (27) from Rotor (26).
20. To service Reverse Valve (6), completely remove Reverse Lever Set Screw (10) from Reverse Lever (8).



IMPORTANT

It may be necessary to apply heat to the set screws as Loctite adhesive is used to secure the set screws.

21. Remove Reverse Valve Cover (9) from Head Cover (5). Reverse Valve can only be removed from Reverse Valve Bushing (7).
22. Examine Reverse Valve Bushing (7) for damage and wear. Replace O-Ring (72) when reassembling.

XIV. PARTS INSPECTION

When the **GO-A8** Opener is in for maintenance and the Rolling Cart and Impactor have been disassembled (partial or complete), the components should be cleaned and inspected for wear before lubricating and reassembly of the Opener. Proper maintenance of equipment often depends upon the ability of a service technician to determine whether a part or assembly is worn to the point where it should be replaced. The following information is intended to help the service technician make this decision.

1. The **CYLINDER (25)** is a sleeve that has been hardened, ground and honed to close tolerance. It includes a series of slots or holes in the wall for porting the air to the Blades, and exhausting it to atmosphere. Examine the Cylinder on the inside diameter for rough circular grooves. If such grooves are in excess of .005" deep, replace the Cylinder. Such grooves are usually caused by foreign matter in the airline.



IMPORTANT

Installation of an air filter/dryer in the air supply line is the best method for reducing grooving and scoring of the cylinder. See **Section XVI: Accessories** for product information.

2. A badly scored Cylinder cannot be restored to usefulness by honing. Enlarging the inside diameter widens the seal point between the Rotor and Cylinder to a degree that will hinder the operation of the motor and will result in loss of speed and power.
3. Minor scoring and rust can be removed from the inside the Cylinder by using a Flybur Tool. This tool can be made from a slotted piece of metal dowel rod and a piece of 150 grit abrasive mounted in a small air or electric drill. If scoring cannot be removed with a light application of this tool, the Cylinder should be replaced.

4. The **ROTOR (26)** is the rotating member of the motor that transmits the torque produced by the Blades. It is machined of heat-treated steel and then ground to precise dimensions. Slots are milled in the body to accept the Blades. The front-end of the Rotor Spindle is splined for driving the **HAMMER CAM (31)**. Examine the end faces of the Rotor for roughness and smooth them with an India Hone if necessary. Normally, there should be no noticeable wear on these faces, since the Rotor is .003" (approx.) shorter than the Cylinder. Inspect the Blade slots for wear or burrs. A new Blade should move in and out of the slot freely. If necessary, use a honing stone to break away any sharp edges found on the corners of the slots of the Rotor. Examine the spline or gear teeth at the driving end. If they have become so worn that a step can be seen next to mating surfaces, then the Rotor should be replaced.

5. The **CYLINDER PLATES (24)** are machined from low-carbon steel. They provide support to the Front and Rear Bearings and enclose the Cylinder ends. The Ball Bearings are located in each Cylinder Plate and support the Rotor. If the face of the Front or Rear End Plate shows wear greater than a depth of .005" (or if Cylinder Plate is cracked) it should be replaced. Such wear is usually caused by incorrect Rotor spacing or a dirty air supply. Light score marks can often be lapped out with a 150 grit abrasive cloth on a flat surface plate.

6. The **BEARINGS (69)** provide a low friction support medium for the Rotor. To check the condition of a Bearing, hold the inner race and rotate the outer race by hand. If rough movement or substantial side-play are detected, replace the Bearing. It is also possible to compare a used Bearing with a new one to detect the amount of wear.



IMPORTANT

Open bearings may be washed in a fresh, clean solvent and then re-packed with a good quality bearing grease.

7. The **ROTOR BLADES (27)** are the most frequently replaced part since they are subjected to a high degree of movement and friction. The Blades are machined from a fibrous form of laminated phenolic. By means of various treatments, Blades are stabilized so that they can withstand a wide latitude of temperature, humidity, water and oil. They are almost immune to warpage. All such characteristics are necessary to the smooth cycling action of the Blades as they move in and out of the Rotor slot. When the motor is running at regular speed, the Rotor Blades will be in continuous and forceful contact with the cylinder wall. In this powerful rotation each Rotor Blade can develop a thrust of over 6 pounds. At such pressures, any foreign material caught between the outer edge of the Blade, and cylinder wall can cause wear, scoring, and possible breakage. An air filter can help remove such harmful material, and a Lubricator will provide a thin oil film between the edge of the blade and the cylinder wall. This provides a better pressure seal and lessens the friction and wear.

If the Blade loses 20% or more of its width, or when, in the Rotor slot, it is worn 3/16" or more below the OD of the Rotor, the Blades must be replaced.



IMPORTANT

Width and height can be checked by comparing the old blades with a new one.

Blades narrowed from wear will eventually tilt at the edge of the Rotor slot, and this will create a groove mark on the side of the Blade. The groove mark will then deepen enough to cause the Blade to break or bind on the edge of the slot. Blade breakage can cause severe damage to the interior of the Cylinder. A Blade that binds on the edge of the slot will stall the motor and keep it from moving.

Rotor Blades found to be within wear limits may be cleaned by a simple lapping operation on each side and edge. Place a piece of 400 grit waterproof sandpaper or fine Emery Cloth on a flat surface and lightly lap each side of the Blade. This will clean the Blade, but will not remove enough of the material to affect the overall performance of the Opener.



IMPORTANT

New Rotor Blades should also be lightly lapped before installing in Rotor to ensure that the Blades will move freely in the rotor slots.

It is good practice to replace the Blades each time the Impactor is disassembled for maintenance or repair. Routine replacement avoids the high cost of downtime caused by tool breakdown.

8. After the parts have been cleaned, inspected or, when needed, replaced, they should be wiped down with lightweight spindle oil or the air tool oil used in the Lubricator. The addition of the oil leaves a rust or moisture preventive film on the parts.
9. The **REAR PACKING (43)** and **FRONT PACKING (44)** should be inspected for wear and distortion.



CAUTION

It is good practice to replace the Front and Rear Packing each time the Impactor is disassembled for maintenance or repair.

10. The **TWIN HAMMER MECHANISM** of the Impactor is a highly effective design that delivers more power per pound and is less sensitive to air pressure fluctuations than any other design. Two Hammers strike instantaneous balanced blows to the Anvil's lobes generating powerful torque with minimal vibration.

To maintain this smooth balanced blow, particular attention must be given to the inspection of striking faces of both **HAMMERS (33)** and to the **ANVIL'S LOBES (36)**. If chipped or flattened surfaces are detected on either of the Hammers or the Anvil's lobes replace both the Hammers and the Anvil. The use of worn Hammers with a new Anvil, or vice-versa, will cause rapid wear of the new part.

XV. REASSEMBLING THE IMPACTOR

Once the Impactor's internal components have been inspected, repaired or replaced, the Impactor can be reassembled. The reassembly of the Impactor is essentially the disassembly instructions in reverse order.



IMPORTANT

Refer to **Appendix A: Exploded View** during reassembly

1. Wash all parts thoroughly in fresh, clean solvent.
2. Replace **REAR PACKING (43)** and **FRONT PACKING (44)**.
3. Coat all parts with a light film of spindle oil or air tool oil.
4. Clean and repack, with a good grade of grease, two [2] **BALL BEARINGS (69)** and **CONE ROLLER BEARING (70)**
5. Be sure all air passages are free of any dirt or foreign matter.
6. Grease the **IMPACT MECHANISM (30 to 38)** sparingly with a high-grade Impact Wrench Grease (SHELL's Alvania EP 2, or Equal).



IMPORTANT

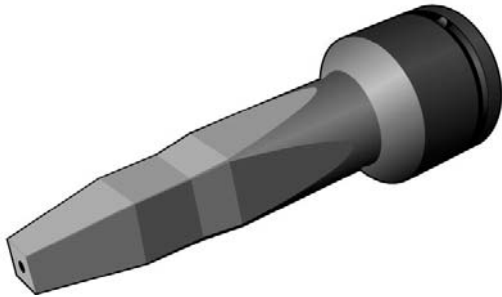
The outer surface of the Impact Mechanism is not a bearing surface and should not be greased. If too much grease accumulates between the Impact Mechanism and the **Hammer Casing (29)**, the action of the unit will be impaired. Cold temperatures compound the situation.

7. After the Impactor has been assembled, pour 2 oz. (6-8 squirts) of TOOL-LUBE air tool oil (supplied) in the Air Inlet to ensure immediate lubrication of the complete tool.
8. Before installing Impactor into Cart Frame, operate Impactor for a short period (3 to 5 minutes) of time to test for proper operation.
9. Check the free speed at the **ANVIL (36)** with a tachometer. Speed is 1500 RPM (approx.) at 85 PSI using 150 CFM (approx.).

XVI. ACCESSORIES

This Section describes the accessories available from WORKMASTER. The attachments and lubrication products are those that we recommend the Customer purchase based upon our specialized knowledge of and experience with the Opener and the parts required or in similar applications. Maintaining an inventory of the recommended lubricant, attachments, and accessories will significantly improve job site safety, increase the Opener's productivity, and reduce maintenance costs and down time associated with emergency acquisitions.

DRIVE FITTING



This tapered, 1-piece Drive Fitting is designed to fit every Railcar Capstan with full contact on all sides. Its 1-1/2" female sq. socket creates a large contact surface with the Impactor's Anvil. With a forged core and precision machined sides – tapered from a 1-1/2" square to a 3/4" square tip – this Drive Fitting is built-to-last.

PART #: 33-01410

ANVIL EXTENSION



Unmoveable obstacles and/or unloading site gaps can make getting your Gate Opener close to the Railcar's capstan impossible! These heavy-duty 12" and 20" Anvil Extensions make the impossible, possible. Each Extension is designed to not only extend your Gate Opener's reach, but to do so without any torque loss. They are precision machined, impact resistant, and constructed of hardened tool steel.

12" EXTENSION, PART # : 33-10012

20" EXTENSION, PART #: 33-10020

WORKMASTER

UNIVERSAL JOINT



Covered Hopper Cars come in a variety of shapes and sizes, and the height of a capstan and the surrounding terrain can vary just as much. This heavy duty Universal Joint can overcome these height variances by positioning your Drive Fitting directly in-line with the center of the capstan. Correct alignment with the capstan is critical to the life of your Gate Opener and can insure the solid in-line entry of the Drive Fitting on even the steepest of railroad slopes.

PART #: 33-10090

CAPSTAN SWAGING KIT

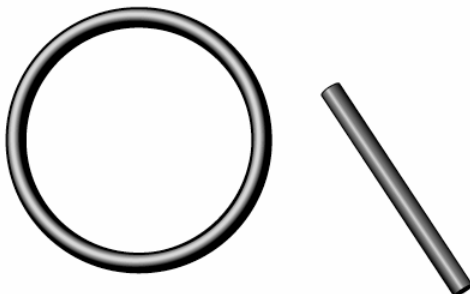


Over time the inside edges of a Railcar's capstan wear and become rounded. When this happens opening or closing a hopper car becomes an inefficient and costly task. The Capstan Swage Kit can bring new life to dull, worn and damaged capstans. With just a few, sharp hammer blows, worn or damaged capstans are quickly renewed. The Swage Tool is machined from Grade 4140 tool steel and specially heat treated for proper hardness. The non-sparking, non-magnetic Swagging Hammer, with a patented dead blow technology, delivers 40% more driving force than conventional style hammers. It has a 15" overall length and a 2-1/2" face that makes hitting the targeted Swage Tool a cinch every time. With an ergonomic grip design and weighing only 48oz. the Swagging Hammer is comfortable and easy to swing. Our Swage Tool and Swagging Hammer Kit can deliver the results you need to get difficult capstan sockets squared-up and ready to roll.

MEETS OSHA STANDARDS FOR NON-SPARKING HAMMERS.

PART #: 33-11120

PIN & RING CONNECTOR



If your unloading site sees a variety of railcars and you're constantly changing the accessories on your Gate Opener, you'll need **WORKMASTER's** Pin and Ring Connectors to help keep the job moving. The Pin is hardened steel, the Ring is nick-resistant rubber, together they make changing from your 12" Extension to your Universal Joint, to your 20" Extension, quick and easy. **WORKMASTER's** Pin and Ring Connectors are also OSHA approved because there are no protruding ends that can damage property or injure workers.

PIN, PART #: 32-50123

RING, PART #: 32-50000

WORKMASTER

RET-RING CONNECTOR



WORKMASTER's 1-1/2" Ret-Ring Connector secures your Drive Fitting to your Gate Opener, Extension or Universal Joint. One piece, molded of durable polyurethane, with a steel insert for added safety, the Ret-Ring Connector makes changing accessories quick and easy. Its bright blue color makes it easy to spot if dropped or misplaced and its enclosed design is OSHA approved for all Gate Opener and rotating tool applications.

PART#: 32-50001

FILTER/DRYER

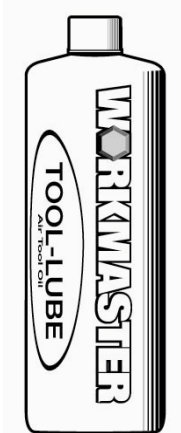


Stop water and dirt from entering your Gate Opener with **WORKMASTER's** Filter/Dryer Assembly. This unique accessory incorporates patented inverse flow technology and is engineered specifically to remove condensed liquids and dirt from the airlines feeding your Gate Opener or Pocket Vibrator. This Filter/Dryer Assembly prevents airline moisture problems from damaging your Pneumatic equipment.

- 1" Inlet, air flow up to 150 SCFM
- Metal Bowl
- Stainless Steel Element and Cotton replaceable Cartridge

PART#: 82-10420

AIR TOOL OIL



Keep your Gate Opener running longer - up to three times longer - cleaner, with less downtime and greater power using **WORKMASTER's** TOOL-LUBE Air Tool Oil. Special emulsifiers allow this unique oil to absorb 10% of its weight in water preventing the formation of rust, gum and sludge. With regular use of **WORKMASTER's** TOOL-LUBE you can expect your pneumatic Gate Opener to operate with greater consistency, reduced noise levels, and at its highest performance level.

1 QT, PART #: 36-21010
1 CASE, (12 QTS) PART #: 36-21014

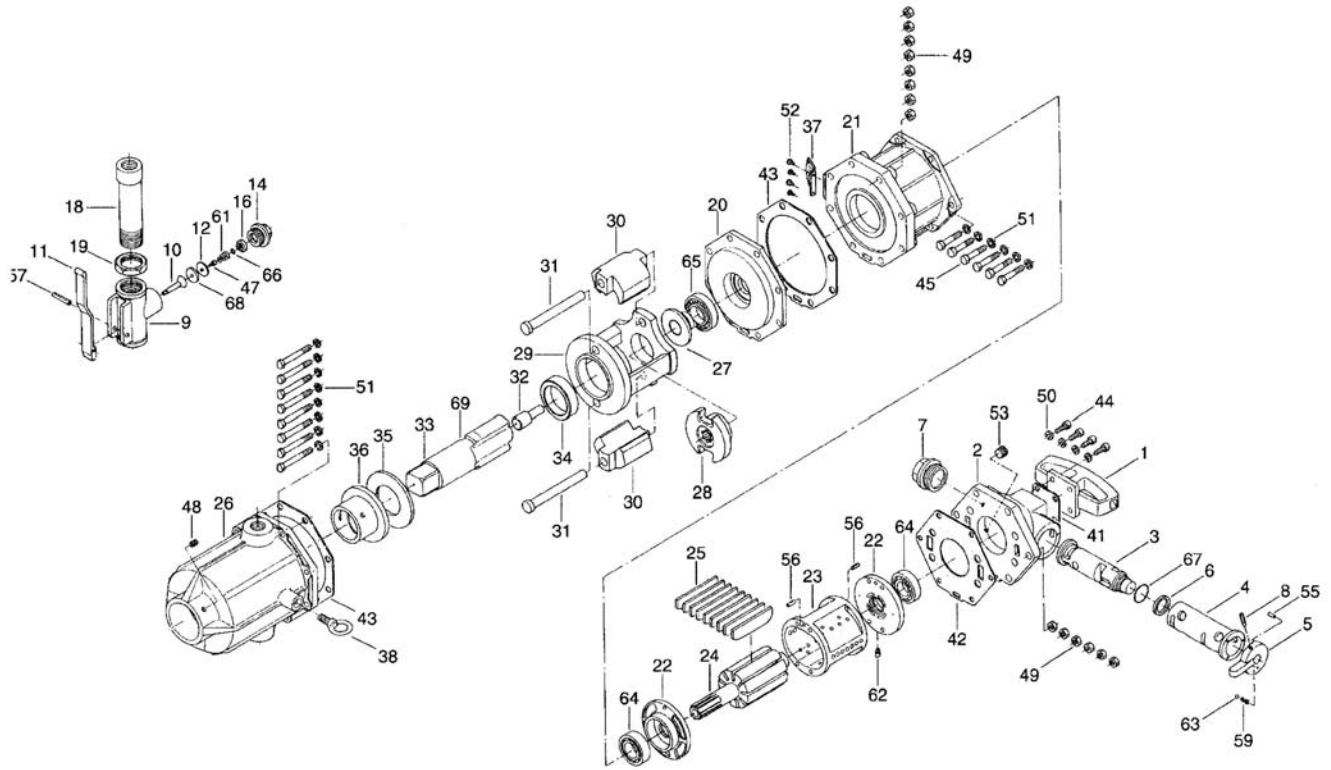
PROTECTIVE COVER



Rain, snow, wind blown dirt and plant debris can really do a number on your Railcar Gate Opener. But with **WORKMASTER's** water-proof, puncture and tear resistant protective cover, you can keep your Gate Opener working and looking like new. The Cover's tapered fit shelters your Gate Opener from the elements while maintaining the units mobility. Protect your Gate Opener from nicks, scratches dents and rust with **WORKMASTER's** Gate Opener Cover.

PART #: 30-20020

APPENDIX A: EXPLODED VIEW



PARTS LIST

Item #	Part#	Description	Qty	Item #	Part#	Description	Qty
1	33-20100	Head Handle	1	34	33-20131	Hammer Cage Bushing	1
2	33-20101	Head Cover	1	35	33-20132	Anvil Front Spacer	1
3	33-20102	Reverse Valve	1	36	33-20133	Anvil Bushing	1
4	33-20103	Reverse Valve Bushing	1	37	33-20158	Exhaust Deflector	1
5	33-20104	Reverse Lever	1	38	33-20134	Eyebolt	1
6	33-20160	Reverse Valve Spacer	1	41	33-20161	Handle Gasket	1
7	33-20105	Reverse Valve Cover	1	42	33-20135	Rear Packing	1
8	33-20106	Reverse Lever Set Screw	1	43	33-20136	Front Packing	2
9	33-20107	Valve Body	1	44	33-20138	Allen Head Bolt	4
10	33-20108	Valve	1	45	33-20139	Half-Head Bolt	6
11	33-20109	Throttle Trigger	1	46	33-20140	Half-Head Bolt	8
12	33-20110	Valve Packing Spacer	1	47	33-20141	Round Head Screw	1
14	33-20111	Regulator Valve Cover	1	48	33-20146	Allen Head Set Screw	1
16	33-20113	Valve Ring Casing	1	49	33-20144	Hex Nut	14
18	33-20114	Valve Body Pipe	1	50	33-20142	Spring Washer	4
19	33-20116	Valve Body Nut	1	51	33-20143	Spring Washer	14
20	33-20122	Separator	1	52	33-20159	Tapping Screw	4
21	33-20117	Casing	1	53	33-20151	Allen Head Plug	1
22	33-20118	Cylinder Plate	2	55	33-20149	Roll Pin	1
23	33-20119	Cylinder	1	56	33-20150	Roll Pin	2
24	33-20120	Rotor	1	57	33-20148	Roll Pin	1
25	33-20121	Rotor Blade	9	59	33-20145	Spring	1
26	33-20123	Hammer Casing	1	61	33-20147	Cone Spring	1
27	33-20124	Anvil Rear Spacer	1	62	33-20152	Round Head Notch	1
28	33-20125	Hammer Cam	1	63	33-20153	Steel Ball	1
29	33-20126	Hammer Cage	1	64	33-20154	Ball Bearing	2
30	33-20127	Hammer	2	65	33-20155	Cone Roller Bearing	1
31	33-20128	Hammer Pin	2	66	33-20156	O-Ring	1
32	33-20129	Pilot Pin	1	67	33-20157	O-Ring	1
33	33-20130	Anvil	1	68	33-20137	Packing	1

Part #	Description	Includes
32-50010	Rebuild Kit	#25, #42, #43
32-50012	Head Cover Assembly	#1-8, #41, #44, #50, #53, #55, #59, #63, #67
32-50015	Throttle Valve Assembly	#9-12, #14, #16, #18, #19, #47, #57, #61, #66, #68
32-50014	U-Joint Lever Assembly	#5, #8, #59, #63, plus F/R Swivel Joint (not shown)

APPENDIX B: TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	RECOMMENDED ACTION
<p>Tool runs slowly or not at all. Air flows only slightly from exhaust.</p>	<ul style="list-style-type: none"> • Airflow blocked by accumulation of dirt. • Motor parts jammed with dirt particles. • Air is escaping through housing connection that may have vibrated loose. 	<ol style="list-style-type: none"> 1. Check that all housing bolts are tight. If not, apply Loc-Tite and retighten. 2. Pour liberal amount of air tool oil into air inlet. 3. Operate tool in short bursts – quickly reversing rotation back and forth. 4. Repeat as needed. 5. Tap motor housing lightly with soft-faced mallet. 6. Disconnect air supply – then attempt to free motor by rotating drive shank manually.
<p>Tool runs and impacts but exhibits lack of power (will not open gates that it previously would)</p>	<ul style="list-style-type: none"> • Back head gasket (See APPENDIX A, Exploded View) broken through. 	<ol style="list-style-type: none"> 1. Replace Gasket.
<p>Drive Fittings will not stay on.</p>	<ul style="list-style-type: none"> • Shank pin w/O-Ring is not being used to secure Drive Fitting. 	<ol style="list-style-type: none"> 1. Replace Shank pin and O-Ring (See SECTION XVI).
<p>Premature Square Drive wear.</p>	<ul style="list-style-type: none"> • Drive Fitting sockets worn. 	<ol style="list-style-type: none"> 1. Replace worn Drive Fitting. (See SECTION XVI).
<p>Gate Opener gradually losing power but still runs at full free speed.</p>	<ul style="list-style-type: none"> • Internal parts are worn or sticking due to lack of lubricant. 	<p>OIL LUBED:</p> <ol style="list-style-type: none"> 1. Check in-line Lubricator sight glass for presence of air motor oil. <p>GREASE LUBED:</p> <p>NOTE: Vibration and heat usually indicate insufficient grease in the Hammer Case Assembly. The average greasing interval is six months. Severe operating conditions may require more frequent lubrication.</p> <ol style="list-style-type: none"> 1. Check for excess grease by rotating Square Drive by hand. It should turn freely. Excess grease is usually expelled automatically. 2. Disassembly is required for greasing. (See Disassembly Instructions).
<p>Gate Opener will not shut-off.</p>	<ul style="list-style-type: none"> • Throttle Trigger stuck or bent. • Throttle Valve Assembly broken or out of position. 	<ol style="list-style-type: none"> 1. Lubricate with air motor oil and operate trigger briskly. 2. Remove Throttle Valve Assembly and install new valve body assembly.
<p>Impactor housing bolts become loose.</p>	<ul style="list-style-type: none"> • Vibration from impacting. 	<ol style="list-style-type: none"> 1. Loctite the bolts and retighten.

APPENDIX C: COMPRESSED AIR SYSTEM

View the plant's air supply as a power transmission utility system. Correctly designed, installed and maintained, no other utility is as powerful, economical and unique as your Compressed Air System. Top performance of any air-driven device only occurs when the required operating PSI (air pressure) and CFM (air volume) are supplied, maintained, and controlled. Be sure to:

1. Eliminate or compensate for air leaks in pipes, couplings, valves and fittings.
2. Check that the ID of the couplings & supply hose are at least the size of the Opener's NPT tapped inlet port (eg, 1" NPT inlet = ID Hose \geq 1").

Use a **Filter** ($\leq 40\mu\text{m}$) to make sure the air supply is kept as clean and dry as possible. An air tool operated with excess moisture or contaminants in the system will suffer poor performance, premature wear, increased maintenance and downtime, and higher noise levels. The filter must be drained regularly, and its filtration element regularly cleaned or replaced. A **Regulator w/ gauge** is required so that the air tool's force, frequency, energy (air) consumption and noise can be adjusted and controlled. A **Lubricator** will extend the air tool's life. The Lubricator must be correctly sized, pressurized, oil-flow adjusted, and installed as close to the air tool as practical.

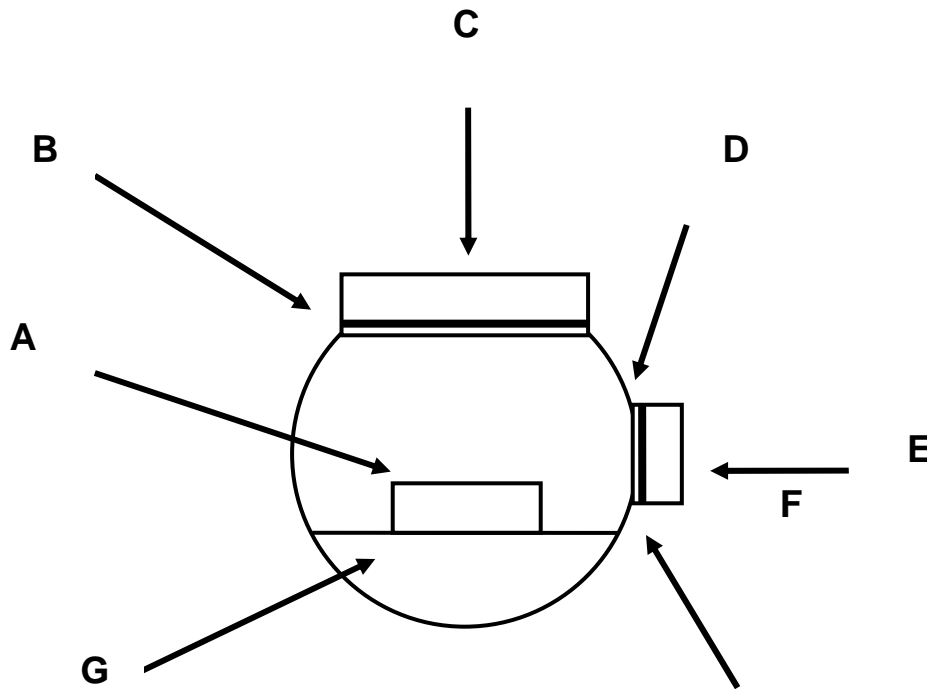
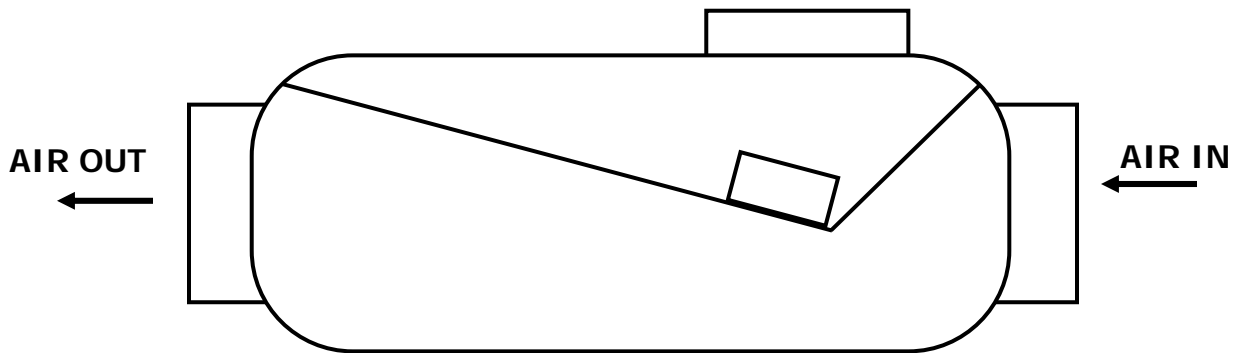
Lubrication rate must be tailored to specific needs. Precise control is difficult to achieve – it's affected by airflow (CFM), air pressure (PSI), oil level, temperature, and viscosity. **Do not over-lubricate**. Most devices need only a small amount of oil. Oil flooding causes: (1) sluggish operation; (2) oil laden exhaust air which causes: (a) back-pressure due to clogged mufflers; (b) product or atmosphere contamination. Regularly check Lubricator's oil level. Use only a **WORKMASTER** recommended oil (eg, **WORKMASTER's** TOOL-LUBE Air Tool Oil **PN: 36-21010**), or a high-grade air motor oil.

APPENDIX D: AIR SUPPLY PIPING

Use the Table below as a guide for sizing the airlines routed to your Gate Opener.

Recommended Pipe Size for Compressed Air Flow to 125 PSI									
Air Volume cfm	Pipe Length – feet (')								
	Nominal Pipe Diameter – inches (")								
	25'	50'	75'	100'	150'	200'	300'	500'	1000'
6	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"
18	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"
30	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1-1/4"	1-1/4"
45	3/4"	3/4"	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"
60	3/4"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/2"	1-1/2"
90	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/2"	1-1/2"	2"
120	1"	1-1/4"	1-1/4"	1-1/4"	1-1/2"	1-1/2"	1-1/2"	2"	2"
150	1-1/4"	1-1/4"	1-1/4"	1-1/2"	1-1/2"	2"	2"	2"	2-1/2"
180	1-1/4"	1-1/2"	1-1/2"	1-1/2"	2"	2"	2"	2-1/2"	2-1/2"
240	1-1/4"	1-1/2"	1-1/2"	2"	2"	2"	2-1/2"	2-1/2"	3"
300	1-1/2"	2"	2"	2"	2"	2-1/2"	2-1/2"	3"	3"
360	1-1/2"	2"	2"	2"	2-1/2"	2-1/2"	2-1/2"	3"	3"

APPENDIX E: LUBRICATOR COMPONENTS



ITEM	PART #	DESCRIPTION
A	851661	Oil Adjustment Valve
B	844319	Fill Plug O-Ring
C	452525	Fill Plug
D	452532	Sight Disk
E	452533	Sight Disc Lock Nut
F	847272	Sight Disc Seal
G	452531	Valve Gasket

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