



LIFTING ERGONOMICS TO NEW HEIGHTS

Premium Lift Systems

Revolution™ HD

1999-0520

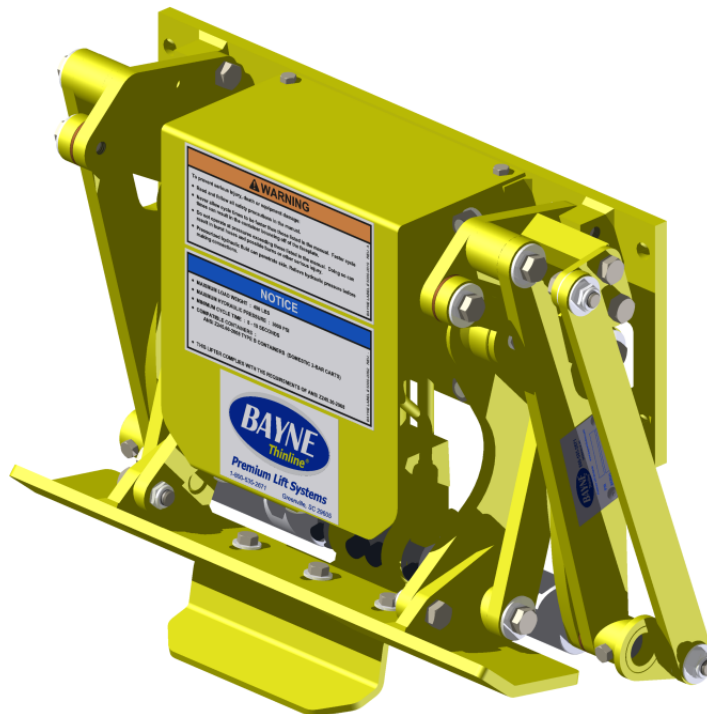
OPERATION AND PARTS MANUAL

ISSUED JUNE 2017

CUSTOMER NAME: _____

SERIAL NUMBER: _____

1999-0520 Revision No. 001



LICENSED UNDER ONE OR MORE OF
THE FOLLOWING U.S. AND CANADIAN PATENTS:

| | | | |
|-----------|-----------|-----------|-----------|
| 5,503,512 | 4,773,812 | 1,327,765 | 5,447,405 |
| 1,335,648 | 5,308,211 | 5,333,984 | 5,826,485 |



WARNING

IF INCORRECTLY USED, THIS EQUIPMENT CAN CAUSE SEVERE INJURY. THOSE WHO USE AND MAINTAIN THE EQUIPMENT SHOULD BE TRAINED IN ITS PROPER USE, WARNED OF ITS DANGERS, AND SHOULD READ AND FULLY UNDERSTAND THIS ENTIRE MANUAL BEFORE ATTEMPTING TO SET UP, OPERATE, ADJUST OR SERVICE THE EQUIPMENT. KEEP THIS MANUAL FOR FUTURE REFERENCE

IMPORTANT SAFETY NOTICE

Proper service and repair are important to the safe, reliable operation of the Bayne THINLINE® products. Service procedures recommended by Bayne THINLINE® are described in this Operation and Parts Manual and are effective for performing service operations. Some of these service operations may require the use of tools or blocking devices specially designed for the purpose. Special tools should be used when and as recommended. It is important to note that some warnings against the use of specific methods that can damage the product or render it unsafe are stated in the service manual. It is also important to understand these warnings are not exhaustive. Bayne THINLINE® could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each method. Consequently, Bayne THINLINE® has not undertaken any such broad evaluations. Accordingly, anyone who uses service procedures or tools which are not recommended by Bayne THINLINE® must first satisfy himself thoroughly that neither his safety nor the product safety will be jeopardized by the method he selects.

Revolution™ HD

TABLE OF CONTENTS

| | |
|---|-----------|
| Safety | 2 |
| Specifications | 3 |
| Installation Instructions | 4 |
| Operation Instructions | 10 |
| Diverter Valve Information | 13 |
| Maintenance Instructions | 15 |
| Actuator Assembly Instructions | 16 |
| Troubleshooting Chart | 24 |
| Appendix A - Assembly Drawings and Part Numbers | 26 |
| 1999-0520 - Revolution Lifter Assembly | 27 |
| H5700009 - Revolution Specification | 36 |
| 6900-0700 - Hydraulic Schematic | 37 |
| 6900-0704 - Hydraulic Schematic | 38 |
| M3500005 - Single/Dual Diverter Valve Parts | 39 |
| 8000-0780 - Diverter Valve Seal Kit | 40 |
| 6083-1010 - Single Hand Valve with Bracket | 41 |
| 8000-0085 - Hand Valve Seal Repair Kit | 42 |
| LUB4205B - Revolution HD Lubrication Points | 43 |
| Index | 45 |

Revolution™ HD

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Revolution™ HD

PART NUMBER: 1999-0520 REVISION NO. 001

OPERATION AND PARTS MANUAL

ISSUED JUNE 2017

Safety

SAFETY

WI-0070-A

To prevent serious injury, death or equipment damage, read and understand this entire manual before installing, operating, repairing or adjusting your **Bayne THINLINE®** Premium Lift System. Those using and maintaining this equipment must be thoroughly trained and familiar with the product.

A. Manual:

This manual must be kept in a location that is readily available for those who operate or maintain this equipment. Additional copies may be obtained from your local dealer or directly from **Bayne THINLINE®** Premium Lift Systems.

B. Lockout/Tagout Procedures:

All applicable OSHA lockout/tagout regulations must be followed when working on this equipment. Failure to comply with these procedures can result in serious injury or death.

C. Safety Decals:

Safety decals attached to your **Bayne THINLINE®** Premium Lift System warn of hazards related to the use of this equipment. Operators must read and follow all safety instructions while using this equipment. If the safety decals are not clearly readable, new decals may be obtained from your local dealer or directly from **Bayne THINLINE®** Premium Lift Systems.

Specifications

SPECIFICATIONS

WI-0502-A

A. Rotary Actuator - rack and pinion style design.

- Rack, pinion, and shaft bearings are constantly lubricated by the hydraulic oil for extended life.
- Body and caps are made of high quality ductile iron.
- Pinion output shaft and racks are made of high tensile alloy steel.
- The rotary actuator provides smooth motion throughout the lift cycle, which results in longer cart life with virtually no cart damage or abuse.

B. The lift unit measures only 7-5/8" thick from the rear of the mainframe to the outer most point of the lift saddle in the down position. This allows for easy dumping of large commercial containers without interference.

C. The cart is normally rotated to 51 degrees and placed over 13" inside the truck opening in the dump position thus reducing any potential spillage of materials.

D. The lift unit operates at a cycle time of 8 to 10 seconds for safe, fast, efficient service.

NOTICE

Cycle time is controlled by flow rate, as flow rate increases, cycle times decrease.

WARNING

Never operate faster than the cycle time listed above to avoid injury and maintain manufacturer's warranty.

E. Recommended flow rate is **2 to 2 1/2 GPM**

F. Hydraulic pressure requirements are as follows:

- **1800 PSI** normal working pressure
- **3000 PSI** maximum pressure

G. All lifters can be a bolt on type installation for easy, quick maintenance and less downtime.

H. Three (3) year limited warranty from date of delivery on all units and models when properly maintained and operated within the recommended cycle time.

NOTICE

All lift units and parts are inspected by our Quality Control Department before shipment to guarantee the highest performance and satisfaction.

For more information, please contact us at 800.535.2671.

Installation Instructions

INSTALLATION INSTRUCTIONS

WI-0252-A

The following information is intended to be a **GENERAL GUIDE** to installing the **Bayne THINLINE®** lifter on a typical refuse truck. Before starting the installation, read these instructions completely. **ALWAYS** use the proper tools, lift devices, and personal protective equipment to prevent injury while performing the installation.

NOTICE

If a **Bayne THINLINE®** Tap-In Kit was also acquired for this installation, refer to the installation instructions included in the Tap-In Kit manual for more detailed information.

A. Mounting lifter(s) on the truck :

1. The truck should be emptied and cleaned before any installation. The truck should be parked on a level solid surface, a concrete floor if possible.
2. All lights, tags, steps, etc. that will interfere with the installation should be removed and/or relocated.
3. Position the lifter(s) on the sill of the truck as in Figure below and mounting height drawing and tack weld in place. See **Appendix A** for drawings. If using an "S" unit for bolt on applications, tack weld the mounting plate in place and attach the lifter to the mounting plate using the 1/2" studs.

NOTICE

Tack weld only at this time so that adjustments can be made if necessary.

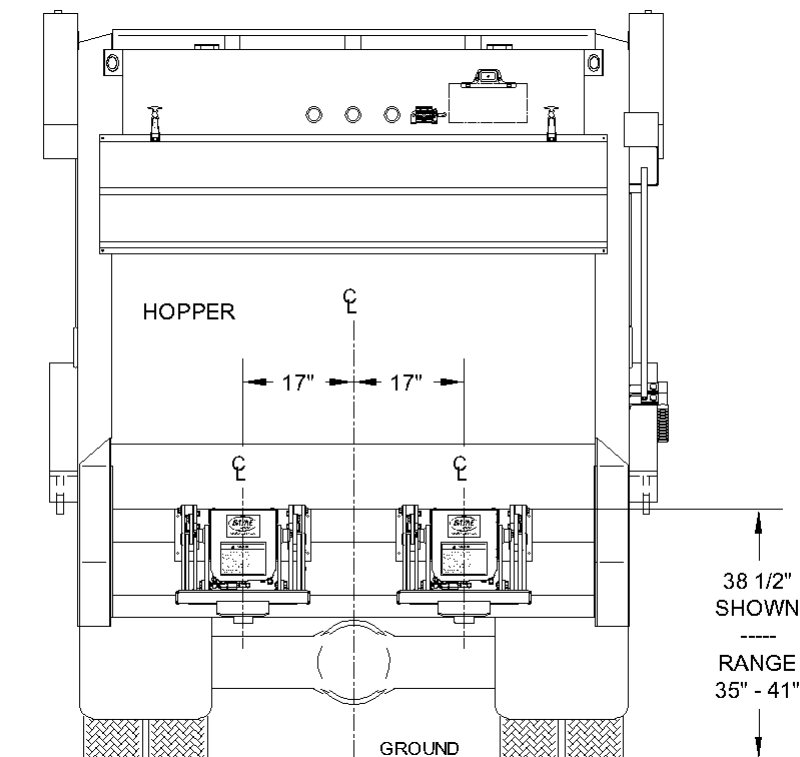


Figure 1 .

Installation Instructions

B. Mounting hand valve(s) on the truck :

1. Choose and mark an acceptable location(s) on the side(s) of the truck to mount the hand valve assembly(s) (Figure 2).
2. Remove the mounting bracket(s) from the hand valve assembly(s) and weld to the truck.
3. After the weld has cooled, paint the mounting bracket(s) to match the truck color.
4. After the paint has dried, reassemble the hand valve assembly(s) on the mounting bracket(s).

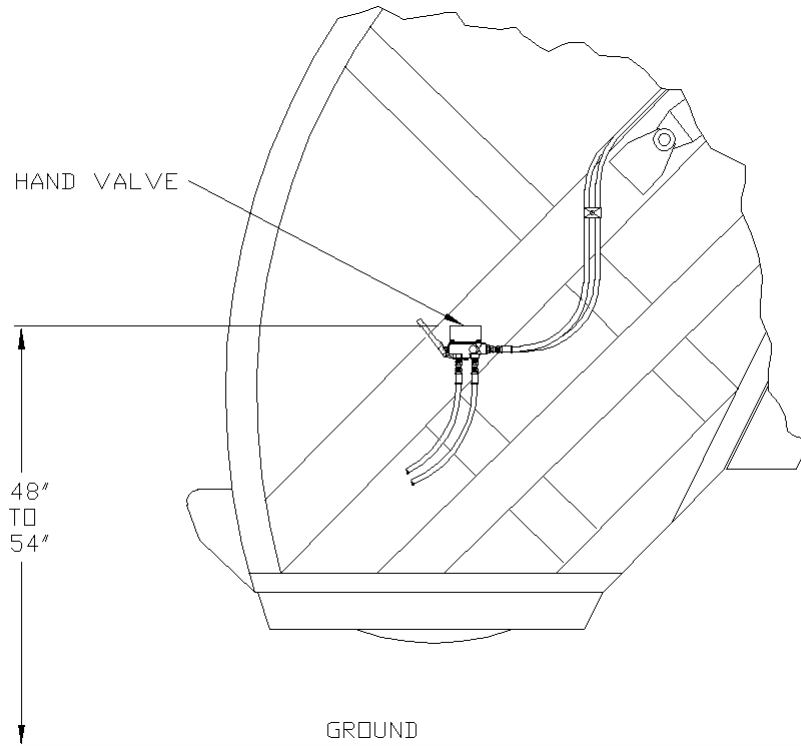


Figure 2.

C. Mounting diverter valve on the truck :

1. Choose and mark an acceptable location to mount the diverter valve assembly. This location should be near the truck's main hydraulic pressure and tank lines on the same area of the truck where the lifter is mounted.
2. Weld diverter valve mounting bracket to the truck.
3. After the weld has cooled, paint the mounting bracket to match the truck color.
4. After the paint has dried, bolt the diverter valve to the mounting bracket using the 1/4" bolts, washers, and elastic lock nuts.

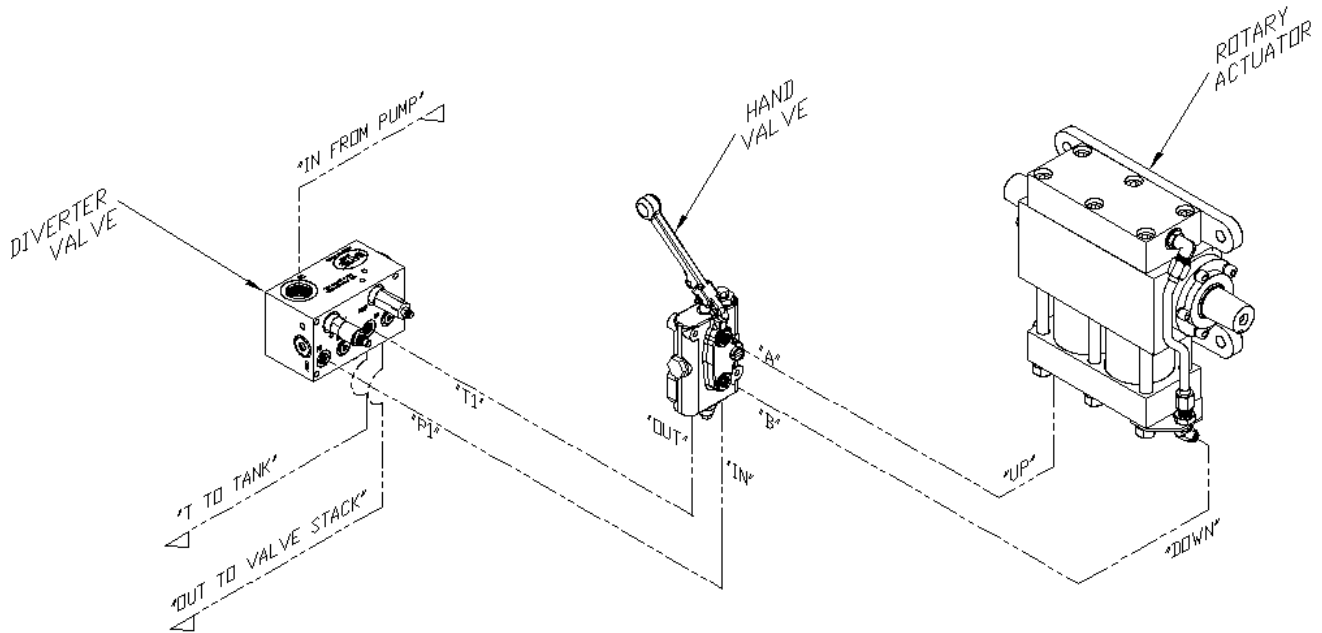
Installation Instructions

D. Making Hydraulic Connections :

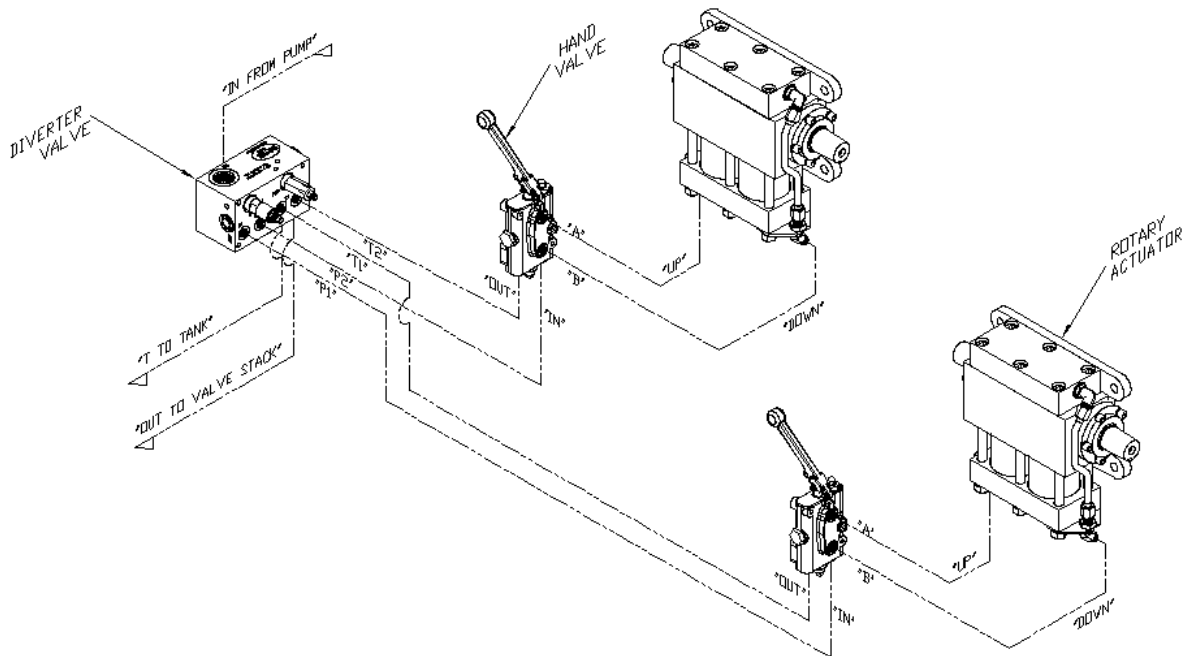
Before attempting any hydraulic connections, turn the truck's engine off and release all hydraulic pressure from the system. Refer to the hydraulic layouts in the Figure below and hydraulic schematics while performing the following steps. See **Appendix A** for drawings.

NOTICE

Always clean & lubricate fitting threads before installation.



Single Lifter Installation



Dual Lifter Installation
Figure 3.

Installation Instructions

D. Making Hydraulic Connections : (Continued)

1. Cut or disconnect truck's main hydraulic pressure line and install the diverter valve in series using the "IN" and "OUT" ports.
2. Connect the "T" port on the diverter valve to the truck's hydraulic tank line with an appropriate size line to handle the lifter system flow. (approximately 5 GPM max.)
3. Connect the "P1" port on the diverter valve to the "IN" port on the hand valve. **If installing dual lifters, connect the "P2" port on the diverter valve to the "IN" port on the other hand valve.**
4. Connect the "T1" port on the diverter valve to the "OUT" port on the hand valve. **If installing dual lifters, connect the "T2" port on the diverter valve to the "OUT" port on the other hand valve.**
5. Connect the "A" port on the hand valve(s) to the "UP" port of the rotary actuator(s).
6. Connect the "B" port of the hand valve(s) to the "DOWN" port of the rotary actuator(s).
7. Disassemble each hose clamp assembly and position weld plates where needed and weld in place.
8. After the weld has cooled, paint the weld plates to match the truck color.
9. After the paint has dried, reassemble the hose clamp assemblies around the hoses.

E. Adjusting relief valve settings :

The diverter valve (1) (Figure 4) supplies the cart lifter hydraulic system with approximately 2 GPM of oil flow. This diverter valve is equipped with a lifter circuit relief valve (3) set at 2300 psi, to prevent the diverter valve from shutting down if a blockage occurs in the lifter circuit. There is also a relief valve (5) set at 1800 psi in the hand valve (2) to protect the lifter from excessive pressure. These relief valves are preset from the factory to operate properly on most trucks with a system pressure between 2300 and 2500 psi without any adjustment. However, if any adjustment is necessary, follow these instructions.

WARNING

Bayne equipment is rated for a maximum pressure of 3000 psi. Operation at pressures above 3000 psi may damage equipment and cause personal injury. In order to avoid injury and maintain manufacturer's warranty never operate above 3000 psi.

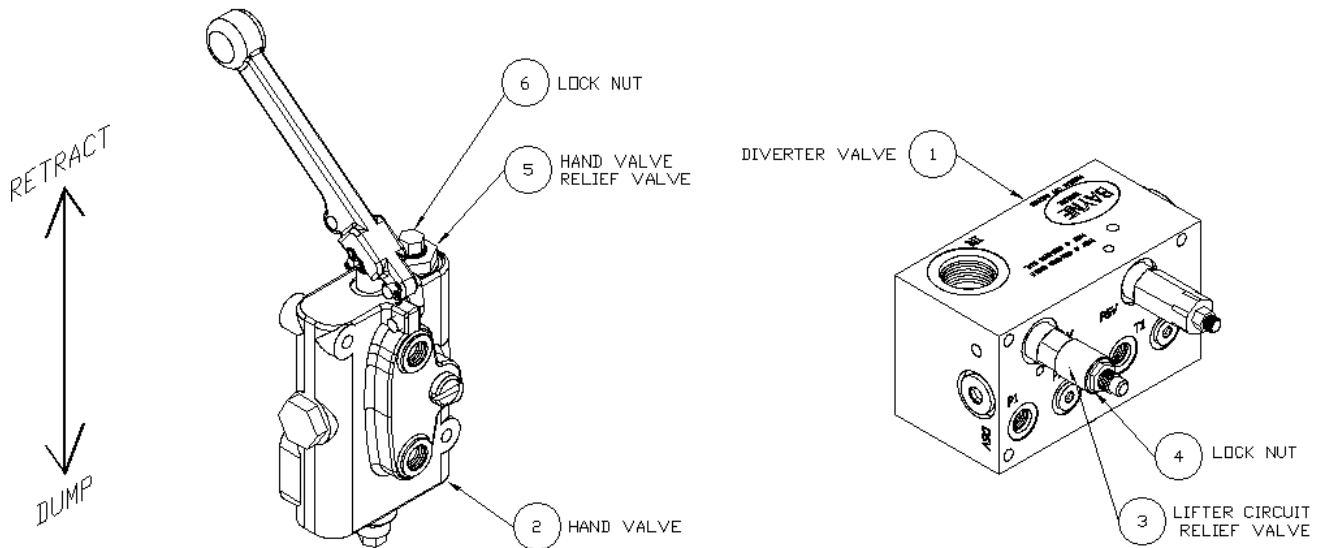


Figure 4.

Installation Instructions

E. Adjusting relief valve settings : (Continued)

1. Determine the truck's system pressure setting.
2. Loosen the lock nut(s) (6) (Figure 4) from the hand valve relief valve(s) (5) and turn the adjustment screw(s) clockwise until it bottoms out.
3. Loosen the lock nut (4) (Figure 4) on the lifter circuit relief valve (3) and turn the adjustment screw clockwise until it bottoms out.
4. Start the truck's engine and engage the hydraulic system.
5. Operate the handle on the hand valve (2) (Figure 4) back and forth a few times to bleed all air from the lifter hydraulic system.
6. Turn the truck's engine off and release all hydraulic pressure from the system.
7. Install a 3000 psi hydraulic pressure gauge with the necessary adapter in the hydraulic line connected to the "IN" port of the hand valve as shown in Figure 5. If installing dual lifters, install the hydraulic gauge at either one of the hand valves.

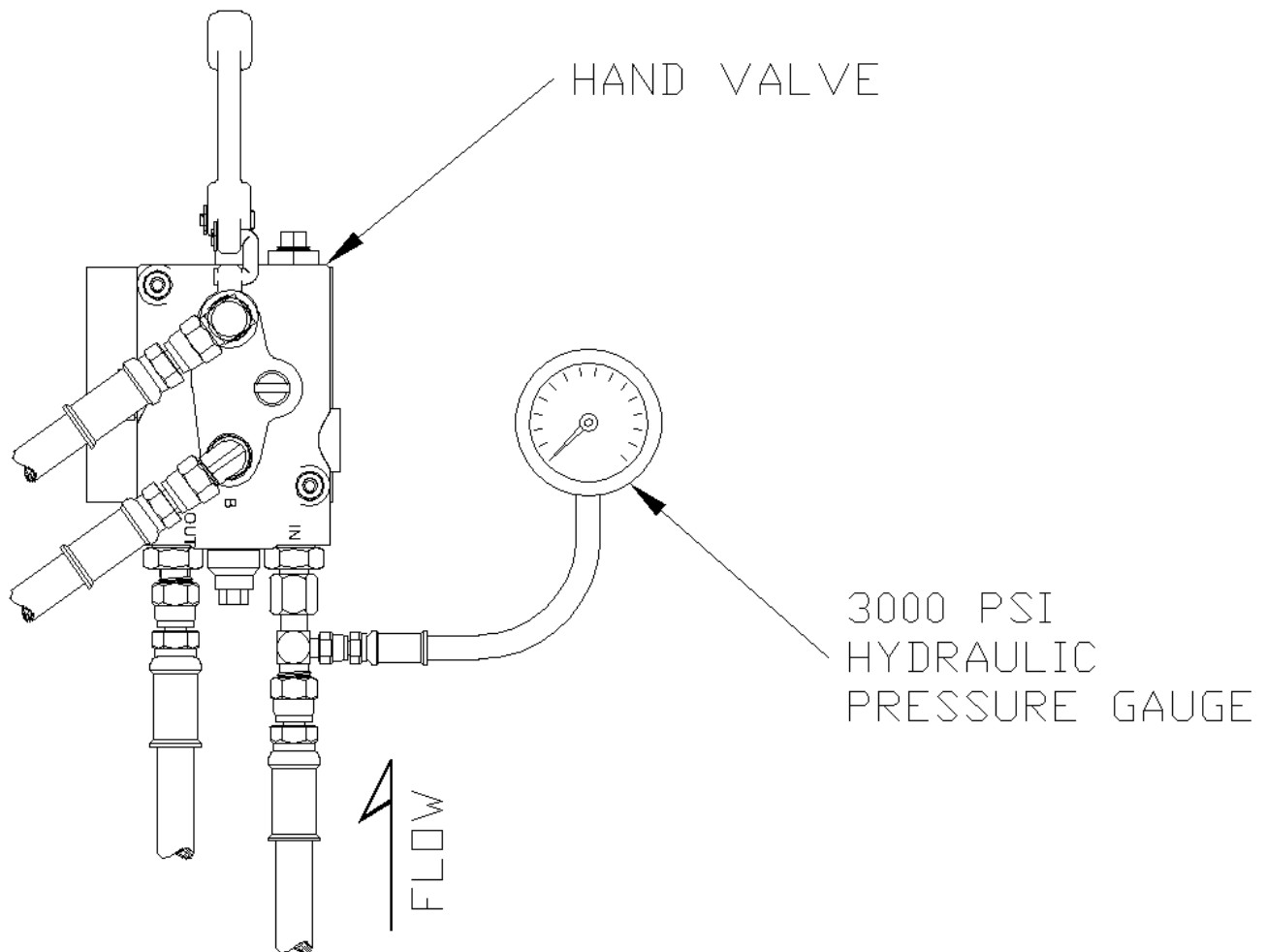


Figure 5.

Installation Instructions

E. Adjusting relief valve settings : (Continued)

8. Start the truck's engine and engage the hydraulic system.
9. Setting the diverter valve lifter circuit relief valve :
 - a. Have an assistant hold the handle on the hand valve (2) (Figure 4) (with pressure gauge installed at the "IN" port) in the "retract" position to show pressure on the gauge.
 - b. Turn the pressure relief adjusting screw on the lifter circuit relief valve (3) counter-clockwise until the pressure reading on the gauge is either 100 psi less than the truck system pressure or 2300 psi, which ever is the lowest.
 - c. Release the handle on the hand valve.
10. Setting the hand valve relief valve(s) :
 - a. Hold the handle on the hand valve (2) (Figure 4) (with pressure gauge installed at the "IN" port) in the "retract" position to show pressure on the gauge.
 - b. Turn the pressure relief adjusting screw on the hand valve relief valve (5) counter-clockwise until the pressure reading on the gauge is either 200 psi less than truck system pressure or 1800 psi, which ever is the lowest.
 - c. Release the handle on the hand valve.
 - d. Turn the truck's engine off and release all hydraulic pressure from the system.
 - e. Remove the hydraulic pressure gauge from the hydraulic line connected to the "IN" port of the hand valve.
 - f. For dual lifters, install the hydraulic pressure gauge in the "IN" port of the other hand valve as shown in Figure 5, start the truck's engine, engage the hydraulic system, and repeat step 10.
11. Reinstall the cap nut(s) (8) (Figure 4) on the hand valve relief valve(s) (5) to secure the correct pressure setting (s).
12. Tighten the lock nut (4) (Figure 4) on the lifter circuit relief valve (3) to secure the correct pressure setting.
13. The hydraulic circuit pressures are now set for optimum performance.

F. Final operation and mounting:

1. Start the truck's engine and engage the hydraulic system.
2. Place a cart on each lifter and operate to make sure there are no clearance problems and that the lifter engages the cart properly. Make any adjustments to the mounting position of the lifter(s) to ensure correct operation.
3. After locating an acceptable mounting position, complete the welding of the lifter(s) to the truck.

Operation Instructions

OPERATION INSTRUCTIONS

WI-0430-B

The **Bayne THINLINE®** Premium Lift System is a high quality durable dumper built to meet industry requirements. To insure the safety of all operators of this equipment, please read this manual carefully before operating the dumper. **FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE.**

The operating stages (Figure 6) in the cycle of the cart lifter are as follows:

1. **START** - Inspect the cart for damage before engaging the latch mechanism, then place the cart at the lifter.
2. **DUMP** - The rotary actuator cycles to dump the contents of the cart into the box. During this cycle, the lower hook automatically extends to "lock" the cart to the lifter.
3. **RETRACT** - The rotary actuator reverses its cycle returning the cart to the start position. The lower hook automatically retracts to "unlock" the cart from the lifter.

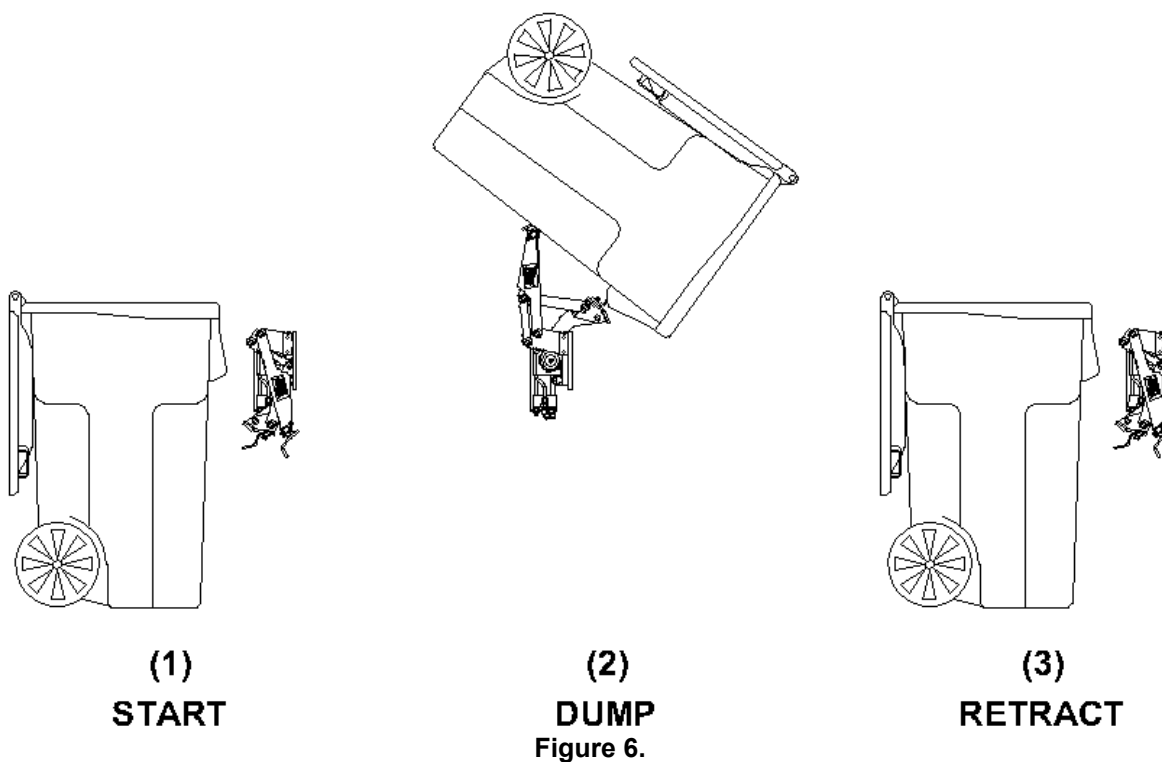


Figure 6.

WARNING

Operating under the recommended cycle time on any lifter will void the manufacturer's warranty

The rotational motions of the cart lifter are controlled with the use of a hand valve. Moving the handle on the hand valve in one direction will cause the lifter to perform the actuator dump stage (Figure 6). Moving the handle in the opposite direction will cause the lifter to perform the actuator reverse stage.

Operation Instructions

SAFETY ZONES

Stand Clear Zone

To prevent serious injury or death, operators and bystanders should remain outside the Stand Clear Zone (Figure 7) at all times during the operating cycle of the lifter. If at any point during the cycle persons enter this area, the operator must stop all motion of the lifter until the area is cleared.

Dump Zone

To prevent serious injury or death, operators and bystanders should remain outside the Dump Zone (Figure 7) at all times. If it becomes necessary to enter this area, all applicable OSHA Lock-out/Tag-out regulations must be followed.

Operator Area

To provide a clear, unobstructed view of both the Stand Clear Zone and Dump Zone, operators should remain within the Operator Area (Figure 7) at all times during the operating cycle of the lifter.

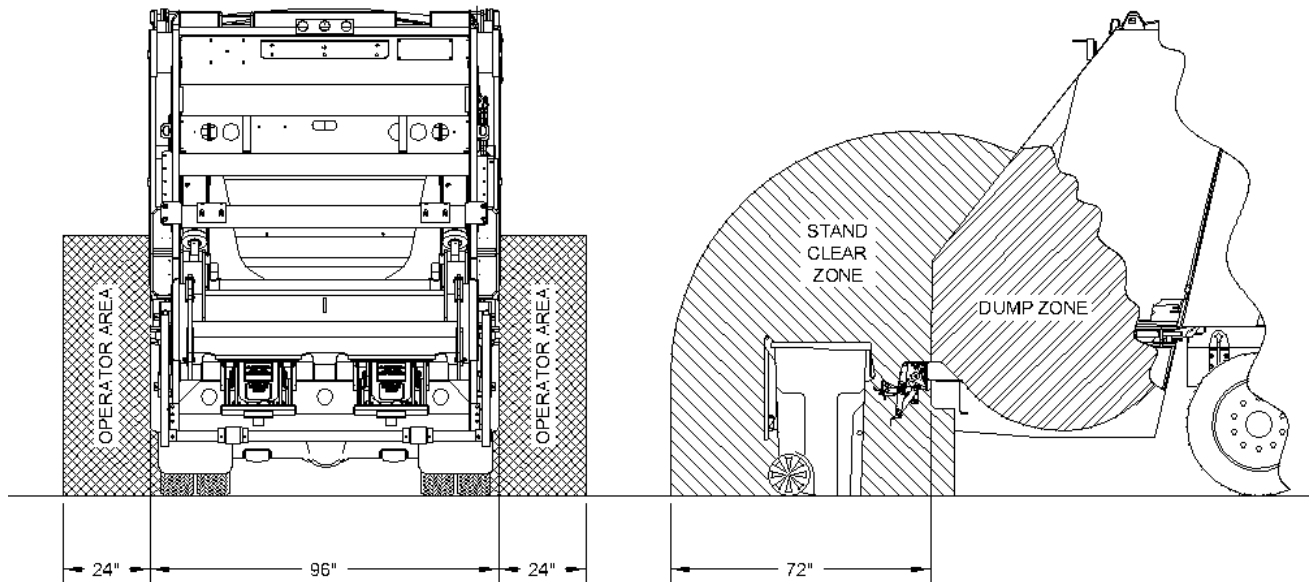


Figure 7.

Operation Instructions

LIFT SADDLE ADJUSTMENT

The lift saddle is equipped with slots and must be properly adjusted to accommodate the carts being lifted. Check the distance (A) (Figure 8) between the upper bar and the lower bar on the cart. If this dimension is between 14-3/4" to 15-1/2", adjust the lift saddle spacing (B) as required to match the cart.

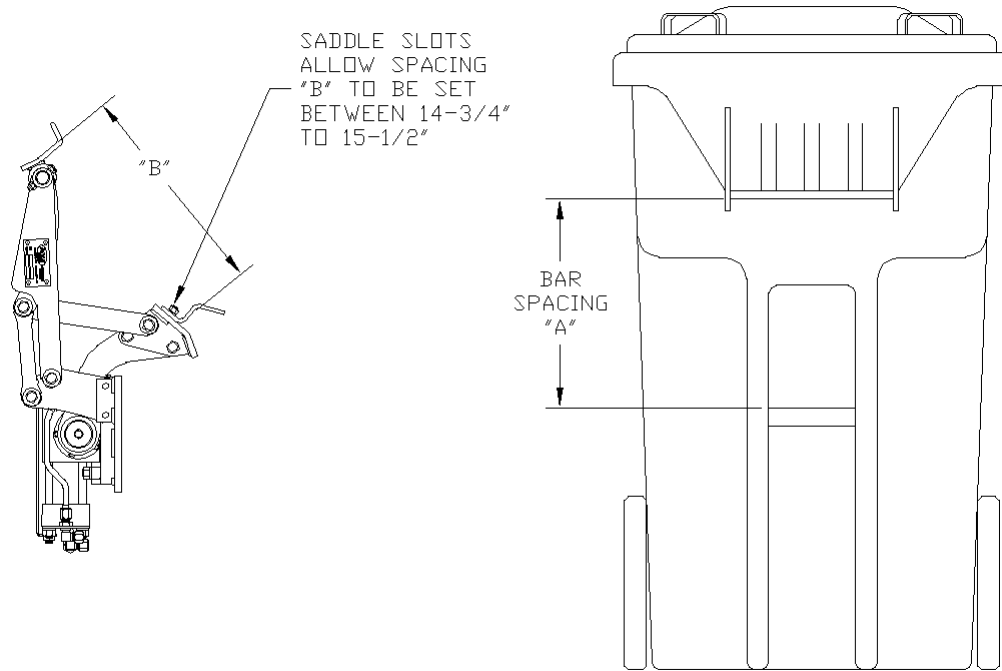


Figure 8.

CAUTION

It is the responsibility of the owner / operator of this equipment to adjust these dimensions to be compatible with his specific application. If the bar spacing is not within the specified range, please contact us on available options for non-standard carts.

Diverter Valve Information

OPERATION AND INSTALLATION INFORMATION

WI-0026

The Bayne diverter valve establishes priority flow to the lifter circuit “P1” and “P2” ports and bypasses oil to the “OUT” port, which typically supplies flow to the remainder of the truck’s hydraulic circuit. This bypass occurs only after the lifter circuit is satisfied. The priority flow is controlled by the flow regulator cartridge (FR1) (and FR2 in dual applications) in combination with the differential pressure sensing valve (DPS). This allows the valve to maintain constant flow regardless of changes in load pressure or volume flow rate. Since both the lifter circuit and bypass flow can be utilized in the operation of the truck regardless of which pressure is greater, a single pump can be used to supply two circuits or operations.

The lifter circuit flow is regulated and maintained by the flow regulator cartridge (FR1) (and FR2 in dual applications). The differential pressure sensing valve (DPS), rated for 75 gpm of flow and 3000 psi of pressure, is operated by an internal spring and dampening orifice (OR) which establishes a pressure drop across the block sufficient to ensure the correct operation of the flow regulator (FR1). For a dual diverter valve, a second flow regulator cartridge (FR2) is installed in the “FR2” cavity and a shuttle valve (DSV) is installed in place of the SAE plug in the “DSV” cavity. Once the pressure drop is established, a precision metered flow is provided to the tipper circuit(s) with additional flow being bypassed to the “OUT” port.

The operation of the diverter valve does not require the use of a tank line to be run to the “T” port. However, the efficiency of the block will be significantly increased if a tank line is installed. The logic circuit of the block will manage the flow of oil returning from the tipper circuit to ensure optimum performance. This is primarily controlled with the sequence valve (PSV) which is factory set and should not be adjusted. All oil returning from the tipper circuit will normally be regenerated into the outgoing flow to ensure that the downstream functions are not slowed in any way. When the downstream backpressure rises to a predetermined pressure, the block will redirect the flow to the “T” port to increase the overall efficiency of the block and reduce the pressure drop through the block. If the “T” port is connected to a tank line, the oil will be dumped through the block at a lower pressure. This allows downstream functions to operate at the highest possible pressure when pressure is being required. If the “T” port is blocked, the oil will be redirected back into the outgoing flow through the check valve (CV).

A relief circuit for the tipper function is controlled by a relief valve (RV), which is preset to 2300 psi. This can be adjusted to limit pressure to the tipper(s). This relief valve is more efficient than the relief in the hand valve and will operate with less noise. It is recommended that it be adjusted to relieve before the hand valve relief. It may also be used to limit the weight the lifter can dump. This may be beneficial in avoiding damage to cans resulting from overloading. This should be the only adjustment that the block may require. Any other adjustments should only be made after close consultation with Bayne’s Engineering Department to ensure proper operation.

Diverter Valve Information

Possible Problems

1. The most common cause of valve failure is dirty oil. If debris becomes lodged in the cartridge valves they will malfunction. Recommended filtration level is between 15 and 25 microns. Many systems filter the oil on the return side. This does not guarantee clean oil going into the system. It is important to ensure that the tank vent filtration element is properly maintained as well. Very small contaminants may not cause the valve to stop functioning, but can cause “stiction” in the cartridges between the body and the moving spool. This can cause improper operation. A slow moving tipper is most likely the result of contamination in the flow regulator cartridge. A pulsating noise may be the result of contamination in the differential pressure sensing valve causing it to stick. If any valve malfunctions, remove and thoroughly clean the valve, being extremely careful not to score or abrade the “o” ring seals or moving parts of the valve. Be sure that the spool moves freely in the valve body.
2. The flow regulator cartridges (FR1 and FR2) are designed to operate at a designated pressure of 80 psi. This means that in order for the valve to function properly, a minimum of 80 psi is required from the supply line through the “IN” port of the valve. This can present a problem on trucks with a dry valve pump system. Normally in the dry (off) mode of the pump, a flow of approximately 2 gpm at 20 psi is required to circulate through the open center system of the truck. This is for pump lubrication in the off mode. When the diverter valve is placed in the main pressure line of the truck, a blockage occurs because of the differential pressure sensing valve needing 80 psi to initially open and allow the flow regulators function. The path of the lubrication oil is therefore stopped because the valve does not open. When the oil is blocked, the pump will rotate and cavitate in the lubricating oil, causing heat to build up over an extended period of time, possibly leading to premature pump failure. To prevent this problem from occurring, a “bleed line” circuit needs be installed on the truck to allow passage of the lubricating oil back to tank.
3. On front load residential truck applications, several considerations need to be noted. The Bayne hand valve is an open center valve that allows for the lifter circuit to maintain flow through the hand valve and back to the diverter valve when the lifter is not being operated. If flow is not maintained through the hand valve, the oil will constantly be relieving over the lifter circuit relief valve (RV) in the diverter valve, which can cause an increase in operating temperature. Certain front load box designs allow for the hand valve to be located on the arms of the truck which keeps the hand valve in the lifter circuit at all times to maintain flow. Most problems occur with applications where the hand valve is located on the box itself. In this situation, when the operator disconnects the hydraulic lines to the box, a blocked condition occurs in the lifter circuit. To prevent this problem, the pump must be turned off prior to disconnecting the box hydraulic lines. Once the lines have been disconnected from the box, it is necessary to connect the two lines for the hand valve to each other to functionally complete the lifter circuit. It is recommended that male and female quick disconnects be used opposite each other on the truck to provide an uninterrupted circuit. Once the lines have been connected and the circuit continued, the pump could then be turned on to continue operations.

Maintenance Instructions

MAINTENANCE INSTRUCTIONS

WI-0140-A

NOTICE

The most common cause of hydraulic component failure is contamination of the hydraulic fluid (water, chips, dirt, etc.)
The **Bayne THINLINE®** Lift System comes clean from the factory. If removed, be sure the hoses, cylinder and fittings are clean before re-installing them on the unit.

Inspect your cart lifter on a weekly basis for loose bolts, fittings, oil leaks, etc. Tighten loose hardware as necessary and replace necessary seals to repair oil leaks.

In order to maintain warranty and for preventive maintenance, grease all points every 40 hours or 2500 cycles (once weekly) with a good multi-purpose grease at points shown in the lubrication drawing. See **Appendix A** for Revolution HD Lubrication Guide.

Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS

1100 Series Roller Bearing Actuator, Part Number 1120-1045 (WI-1135-B)

Licensed under on or more of the following U.S. Patents: 4,773,812 1,327,765 5,308,211 5,333,984

NOTICE

READ INSTRUCTIONS COMPLETELY BEFORE STARTING ASSEMBLY.

Before starting the assembly of the Rotary Actuator, refer to the exploded parts drawing and parts list (Figure C-13 found at the end of these instructions) to familiarize yourself with the individual components. Prepare a clean surface, in an area free of blowing dust and contaminants in which to assemble the Rotary Actuator. Be sure that all parts are thoroughly clean and dry before starting assembly.

NOTICE

All torque values given apply to clean dry threads only. Follow these directions closely when repairing the Rotary Actuator.

1. Install the piston seal load ring (13) (Figure 9) in the small groove on the head of the actuator rack (2). Place the "square" piston seal (17) over the load ring (13) in the same small groove (a small "blunt" flathead screwdriver may be used, taking care not to scratch or damage the seal). Install the wear ring (18) in the large groove on the head of the rack. Using a ring compressor, firmly seat the rings on the rack before setting it aside, this will help to reverse the effects of any stretching of the rings that occurred during installation. Repeat this procedure for the other rack.

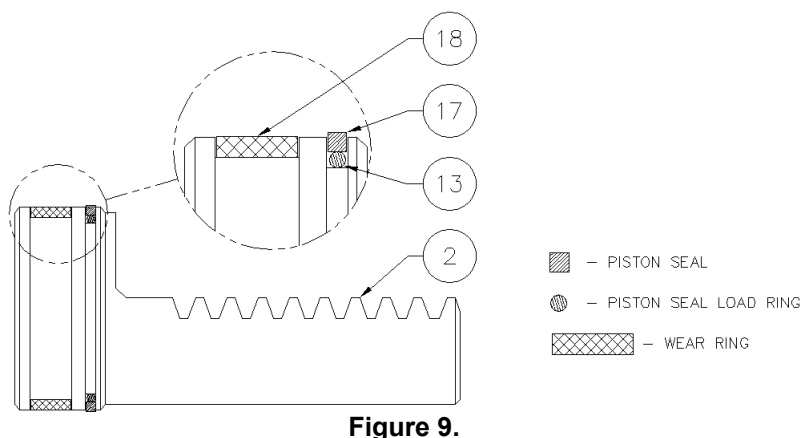


Figure 9.

2. Install the tube seal (12) (Figure 10) and "square" tube seal backup (16) on each end of the actuator tubes (3) (Figure 21). Be sure that the "square" tube seal backup ring is toward the inside of the tubes at both ends as shown. Press all rings firmly into the grooves. Repeat this procedure for the other tube.

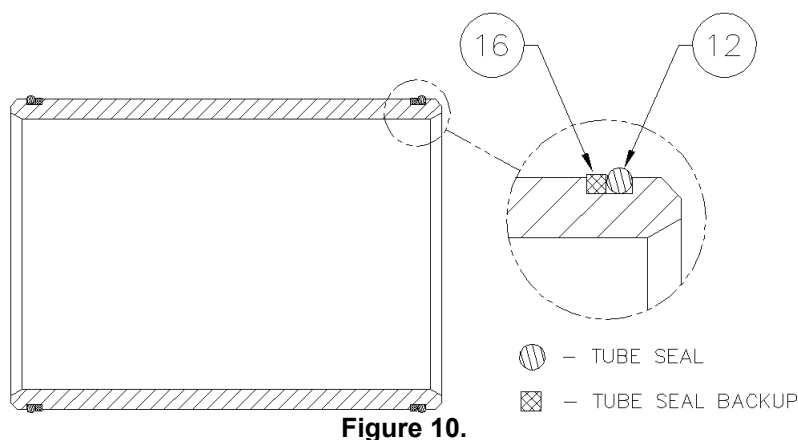


Figure 10.

Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS (CONTINUED)

3. Thoroughly clean the pinion shaft (1) (Figure 11) and inner races (10) with a mild solvent and dry completely. Spray the inner race contact area (shown in Figure 11) at each end of the pinion shaft and the inside diameter of the inner race thoroughly with LOCTITE 7649 N PRIMER. Apply LOCTITE RETAINING COMPOUND 609 around the pinion shaft at contact area and the inside diameter of the inner races. Slide the inner races (10) on the pinion shaft (radius end first as shown in Figure 11) until the races seat against the gear teeth. After the races seat against the gear teeth, twist the races on the pinion 360° to spread the retaining compound evenly. Wipe off any excess retaining compound.

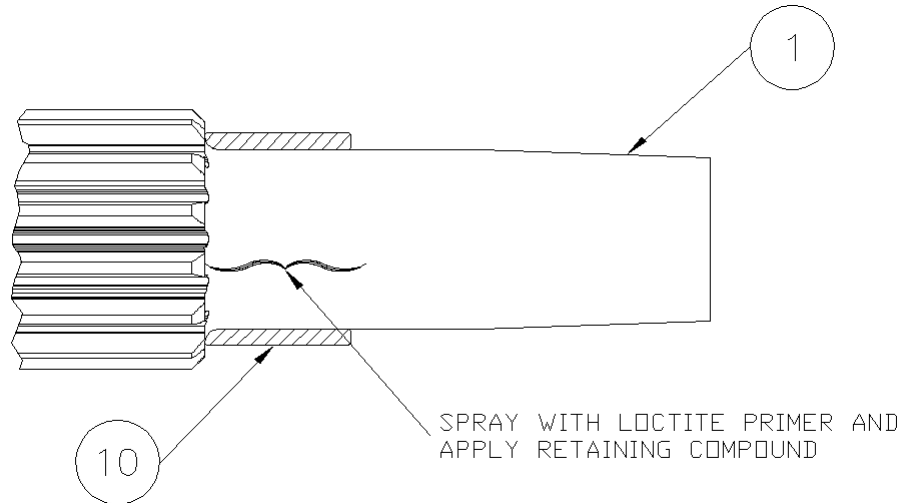


Figure 11.

4. Place the actuator body (7) (Figure 12) on the edge of the table, mounting flanges closest to the assembler with the counter-bores facing up. Insert the pinion shaft (1) through the bore on either side of the actuator body with the key ways facing back toward the mounting flanges and up away from the table with the center line of the key ways pointing in the position as shown in Figure 12. Center the pinion in the actuator body.

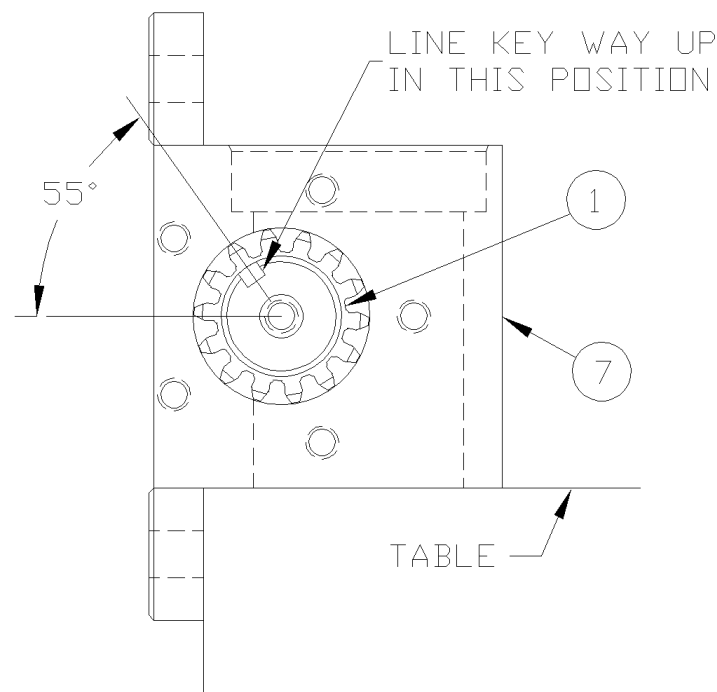


Figure 12.

Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS (CONTINUED)

5. Coat the head portion of the racks (2) (Figure 13) with STP Oil Treatment. Install the racks, head portion up with the teeth facing the flanges of the actuator body, into the dual set of bores in the body. Simultaneously slide the racks into the bores so that the racks mesh with the pinion in the same position. Rotate the pinion shaft to engage the racks into the pinion.

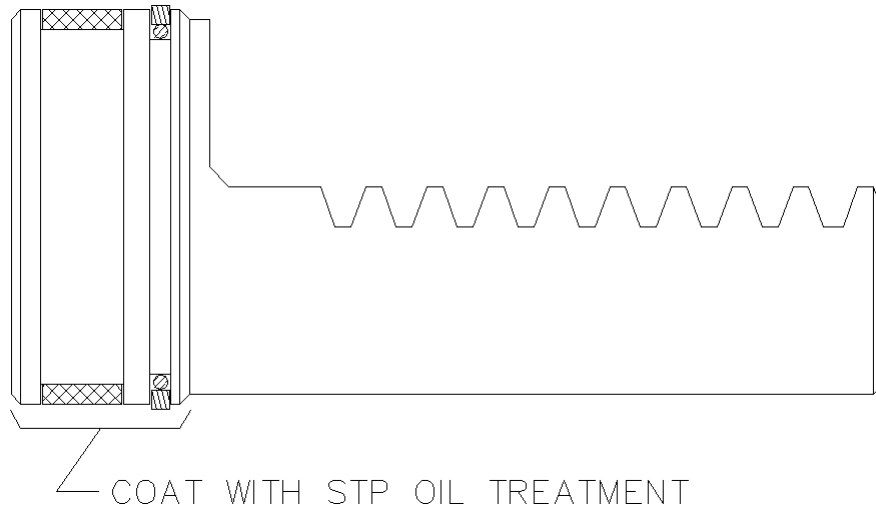


Figure 13.

6. Check the position of the racks in the pinion by making sure both racks seat against the actuator body at the same time and also when the racks are seated against the body, the key ways on the pinion shaft should be facing down toward the table and mounting flanges on the actuator body as shown in Figure 14.

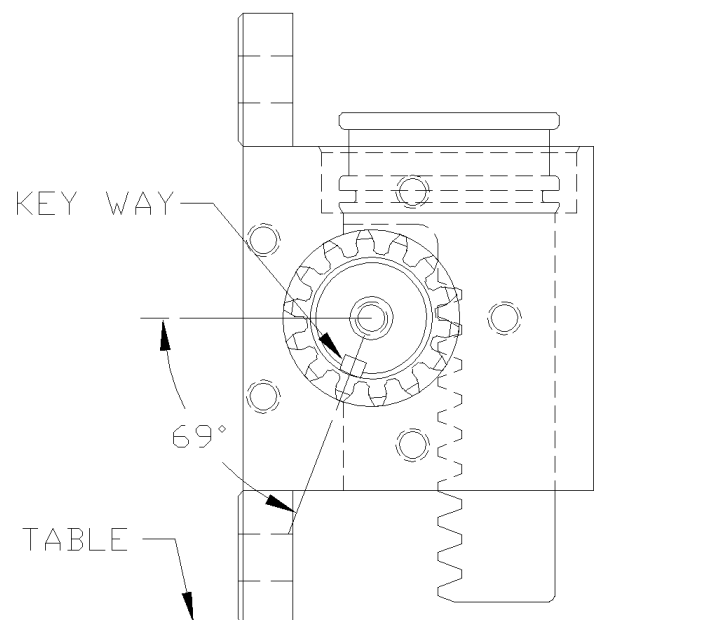
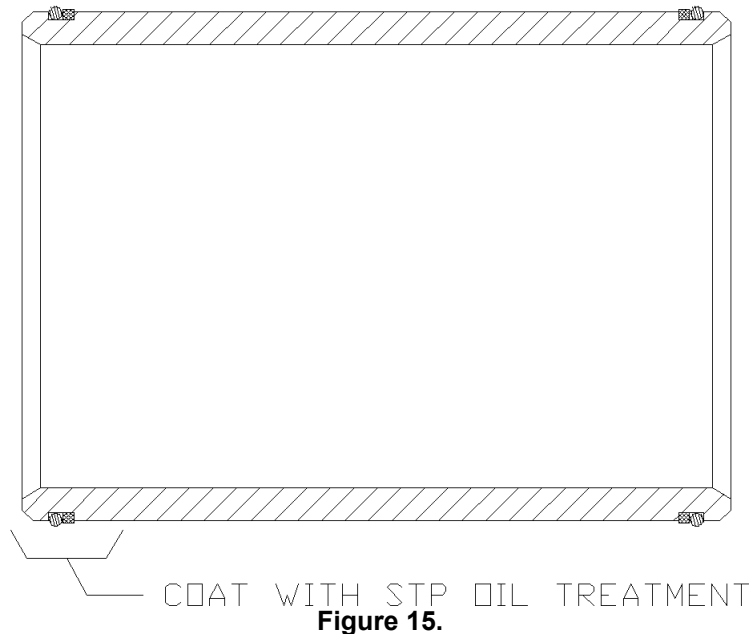


Figure 14.

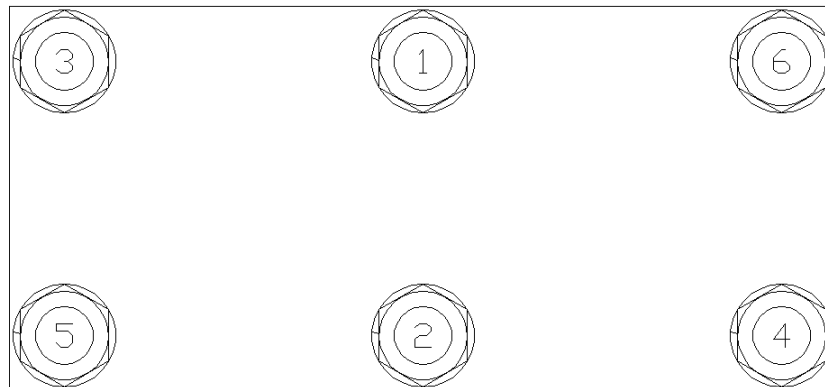
Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS (CONTINUED)

7. Coat one end of the actuator tubes (3) (Figure 21) around the seal area with STP Oil Treatment as shown in Figure 15. Using a rubber mallet, drive the coated end of the tube onto the exposed rack until the tube end seats in the actuator body, making sure that the seals remain in place as the tube enters the counter-bore. Repeat this procedure for the other side.



8. Install the four tie rod studs (6) and two tie rod studs (33) (Figure 21) by screwing the short threaded end into the actuator body. Hand tighten only at this time (the torque needed will be applied later in the procedure).
9. Place the tube cap (4) (Figure 21) on the table. Coat the sides of the two bores in the tube cap with STP Oil Treatment. Install the cap over the tubes and rod studs with the oil port positioned to the left as shown in Figure 21. Using a rubber mallet, tap the tube cap over the tubes until the tubes seat in the cap, making sure that the seals remain in place.
10. Place the tube mounting bracket (30) (Figure 21) over the two end rod studs opposite the oil port in the tube cap as shown in Figure 21.
11. Install the hex nuts (23) (Figure 21) and lock washers (24) on the tie rod studs. Torque the nuts to 50 ft-lb. in the sequence shown in Figure 16.

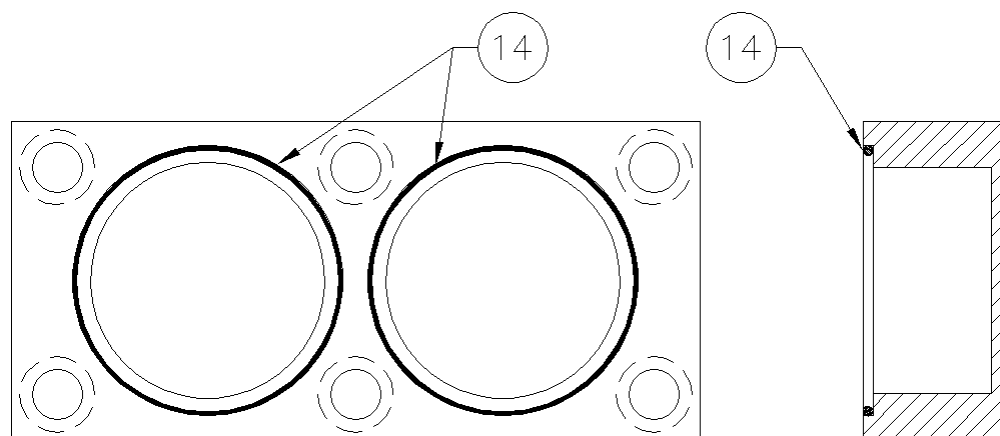


TUBE CAP TORQUE SEQUENCE
Figure 16.

Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS (CONTINUED)

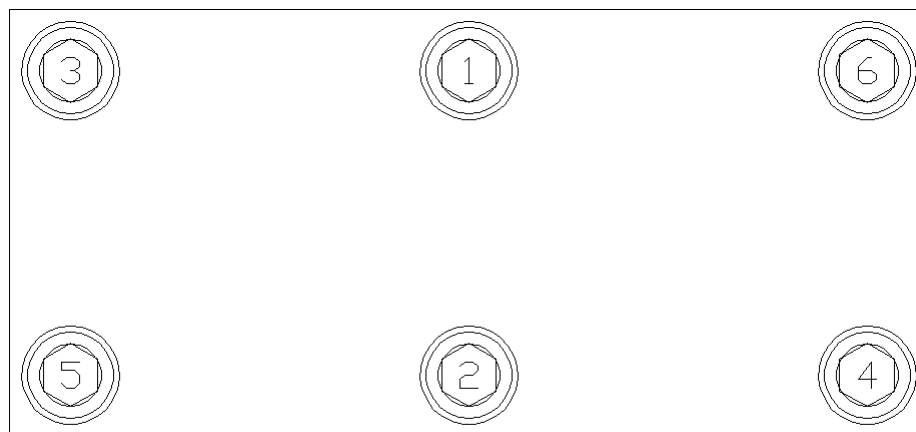
12. Place the rack cap (5) (Figure 21) bore side up on the table and coat the edge of each bore with STP Oil Treatment. Install the rack cap seals (14) (Figure 17) in the rack cap.



● – RACK CAP SEALS

Figure 17.

13. Reposition the actuator on the table mounting flanges down, and the lower tubes facing away from the assembler. Rotate the pinion shaft to allow 1" of the rack to protrude from the top of the actuator body. Install the rack cap with the oil port positioned to the left hand side of the actuator opposite the bottom oil port located in the tube cap as shown in Figure 21. Attach the rack cap to the actuator body using the socket head bolts (22) (Figure 21) and lock washers (26). Torque the bolts to 90 ft-lb. in the sequence shown in Figure 18.



RACK CAP TORQUE SEQUENCE

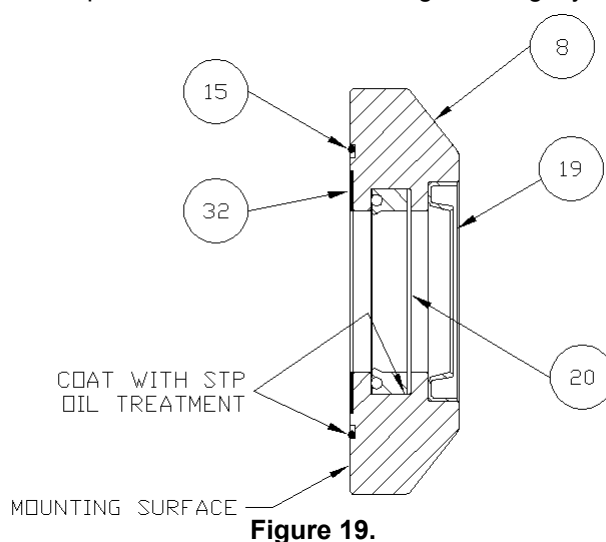
Figure 18.

14. Reposition the actuator so that the pinion shaft can be rotated with no obstacles. Rotate the pinion shaft to ensure that the racks move freely. Also make sure that the key ways point 15° past "straight up" toward the rack cap and 15° past "straight down" toward the tube cap at each end of the 210° stroke. If the assembly does not perform all of these functions correctly, it must be disassembled, cleaned, and reassembled.
15. Re-center the actuator pinion in the actuator body by tapping on one end of the shaft with a rubber mallet. Install the roller bearing (9) (Figure 21), over the pinion shaft and inner race, and into the actuator body. Repeat this procedure for the other bearing.

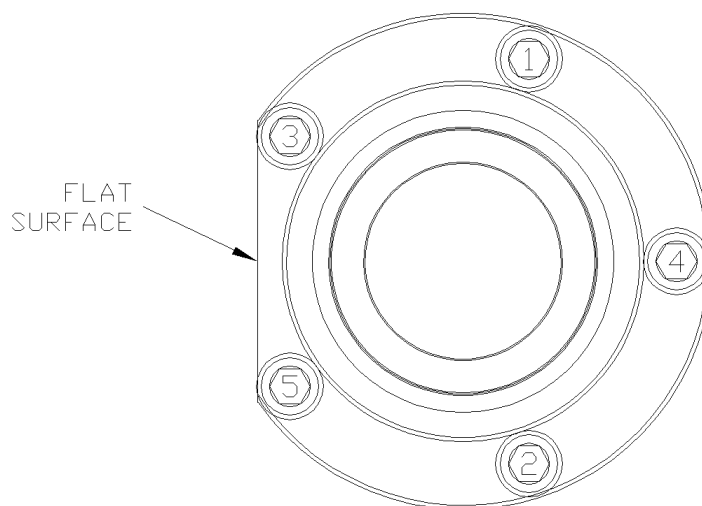
Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS (CONTINUED)

16. Thoroughly clean the bearing caps (8) (Figure 21) with a mild solvent and lubricate all seal grooves with STP oil treatment. Place the bearing caps (8) on the table (mounting surface down) and install the wiper ring (19) in the outside groove using a rubber mallet or small press. **(Avoid using tools that may damage seals or scratch bearing cap or bearing surfaces.)** Turn the bearing cap (8) over. Collapse the pinion seal (20) and carefully work it into the groove. Use fingers to carefully press the seal completely into the groove as shown in Figure 19. **Be careful not to score or scratch the sealing surface during the installation.** Install the bearing cap seal (15) and thrust washer (32) into their respective grooves on the bearing cap mounting surface as shown in Figure 19.
17. Coat the bearing cap seal area and pinion seal area shown in Figure 19 lightly with STP Oil Treatment.



18. Wrap masking tape or electrical tape around the pinion to cover the edges at the key-way. Slide the bearing cap assembly over the pinion shaft with the bearing cap seal facing toward the actuator body and the flat surface of the flange shown in Figure 20 facing toward the actuator mounting flanges. Press against the bearing cap until the shoulder seats against the actuator body, making sure that the seals remain in place. Install the bearing cap bolts (21) (Figure C-13) and lock washers (25). Hand tighten only at this time. Repeat this procedure for other bearing cap.
19. After both bearing caps have been installed, torque all bearing cap bolts to 30 ft-lb. in the sequence shown in Figure 20.



Actuator Assembly Instructions

ACTUATOR ASSEMBLY INSTRUCTIONS (CONTINUED)

20. Install the 90° fitting (27) (Figure 21) into the oil port on the side of the rack cap (5). Hand tighten only at this time.
21. Install the 90° bulk-head fitting (31) (Figure 21) up through the hole in the tube mounting bracket (30) bolted to the tube cap as shown in Figure 21. The 90° end must be pointing back toward the mounting flanges on the actuator body. Hand tighten only at this time.
22. Install the rack cap extension tube assembly (29) (Figure 21) between the fitting in the rack cap and the bulk-head in the tube mounting bracket as shown in Figure 21. Tighten all connections.
23. Install the orifice plug (11) (Figure 21) into the oil port on the side of the tube cap (4), and install the 90° fitting (27) into the oil port over the orifice plug as shown in Figure 21. Install the flow regulator (34) and necessary fittings (35) and (36) as shown and tighten.
24. Install the cap nuts (28) (Figure 21) onto the open fittings to prevent contamination of the unit until the hoses are installed.

Actuator Assembly Instructions

ACTUATOR ASSEMBLY

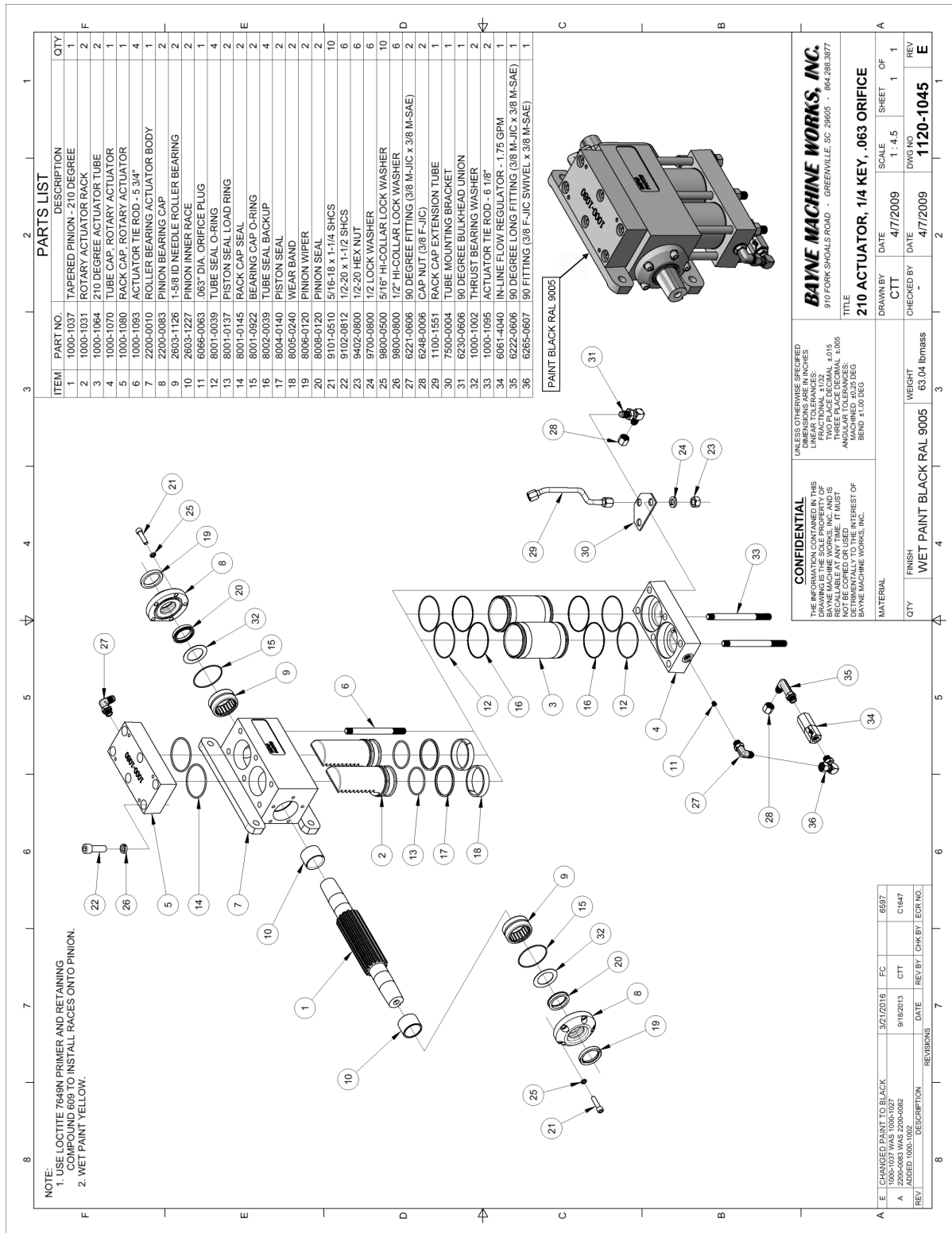


Figure 21.

Troubleshooting Chart

| TROUBLESHOOTING CHART | | |
|--|--|--|
| SYMPTOM | POSSIBLE CAUSES | CORRECTIVE ACTION |
| Lifter operation very erratic. | 1. Air trapped in system. | 1. Bleed all air from lifter hydraulic system. |
| | 2. Low oil level. | 2. Add oil to system. |
| Cart lifter will not pick up carts. | 1. Cart overweight. | 1. Reduce loaded weight of cart. |
| | 2. Lifter system hydraulic pressure too low. | 2. Check and adjust pressure relief on hand valve and lifter circuit relief in diverter valve. |
| | 3. Truck system hydraulic pressure too low. | 3. Check and adjust pressure on truck system relief and full system relief in diverter valve. |
| | 4. Faulty hand valve. | 4. Replace hand valve. |
| Lifter operates over recommended cycle time. | 1. Engine idle too low. | 1. Adjust engine idle. |
| | 2. Faulty hand valve. | 2. Replace hand valve. |
| | 3. Faulty truck hydraulic pump. | 3. Consult truck maintenance manual. |
| | 4. Trash in diverter valve. | 4. Remove orifice from diverter valve body and clean thoroughly. |
| | 5. Orifice in diverter valve is too small. | 5. Remove orifice from diverter valve body and increase diameter. |
| Lifter operates under recommended cycle time. | 1. Engine idle too high. | 1. Adjust engine idle. |
| | 2. Orifice in diverter valve is too large. | 2. Remove orifice from diverter valve body and replace with a smaller diameter. |
| Hydraulic components down stream of diverter valve not operating or operating extremely slow. | 1. Truck system hydraulic pressure too low. | 1. Check and adjust pressure on truck system relief and full system relief in diverter valve. |
| | 2. Faulty full system relief valve cartridge in diverter valve. | 2. Replace full system relief valve cartridge in diverter valve. |
| | 3. Faulty truck system relief valve. | 3. Consult truck maintenance manual. |
| | 4. System flow is being restricted. | 4. Ensure there is proper flow throughout the hydraulic system. Remove any restrictions. |
| | 5. Trash in flow regulator cartridge. | 5. Remove flow regulator cartridge from diverter valve body and clean thoroughly. |
| Diverter valve leaking oil around cartridges. | 1. Worn or damaged seals on cartridge valves. | 1. Install diverter valve seal kit. |
| Hand valve lever sticks in up or down position. | 1. Worn or broken spring center device. | 1. Install spring center kit. |
| | 2. Trash in or around hand valve shift spool. | 2. Disassemble and clean spool and housing. |
| | 3. Pressure (IN) and tank (OUT) ports are hooked up backwards. | 3. Make sure all hoses are plumbed according to the hydraulic schematic. |
| Hand valve leaking oil around shift spool. | 1. Worn or damaged seals. | 1. Install hand valve seal kit. |
| | 2. Worn spool. | 2. Replace hand valve. |
| Lower hook frequently breaking or bending. | 1. Saddle to hook spacing not adjusted properly. | 1. Adjust saddle to hook spacing per Operation Instructions. |
| | 2. Lift bars on carts are not standard dimensions. | 2. Replace cart or install new bars. |
| Lifter looses bar lift carts when dumping. | 1. Saddle to hook spacing not adjusted properly. | 1. Adjust saddle to hook spacing per Operation Instructions. |

Troubleshooting Chart

| TROUBLESHOOTING CHART | | |
|---|--|--|
| SYMPTOM | POSSIBLE CAUSES | CORRECTIVE ACTION |
| | 2. Lift bars on carts are not standard dimension. | 2. Replace cart or install new bars. |
| | 3. Broken spring on lower hook. | 3. Replace spring on lower hook. |
| | 4. Lower hook not operating freely. | 4. Clean and grease hook area. |
| Lift bars on cart are being spread apart or damaged. | 1. Saddle to hook spacing not adjusted properly. | 1. Adjust saddle to hook spacing per Operation Instructions. |
| | 2. Lift bars on carts are not standard dimensions. | 2. Replace cart or install new bars. |

Appendix A - Assembly Drawings and Part Numbers

APPENDIX A

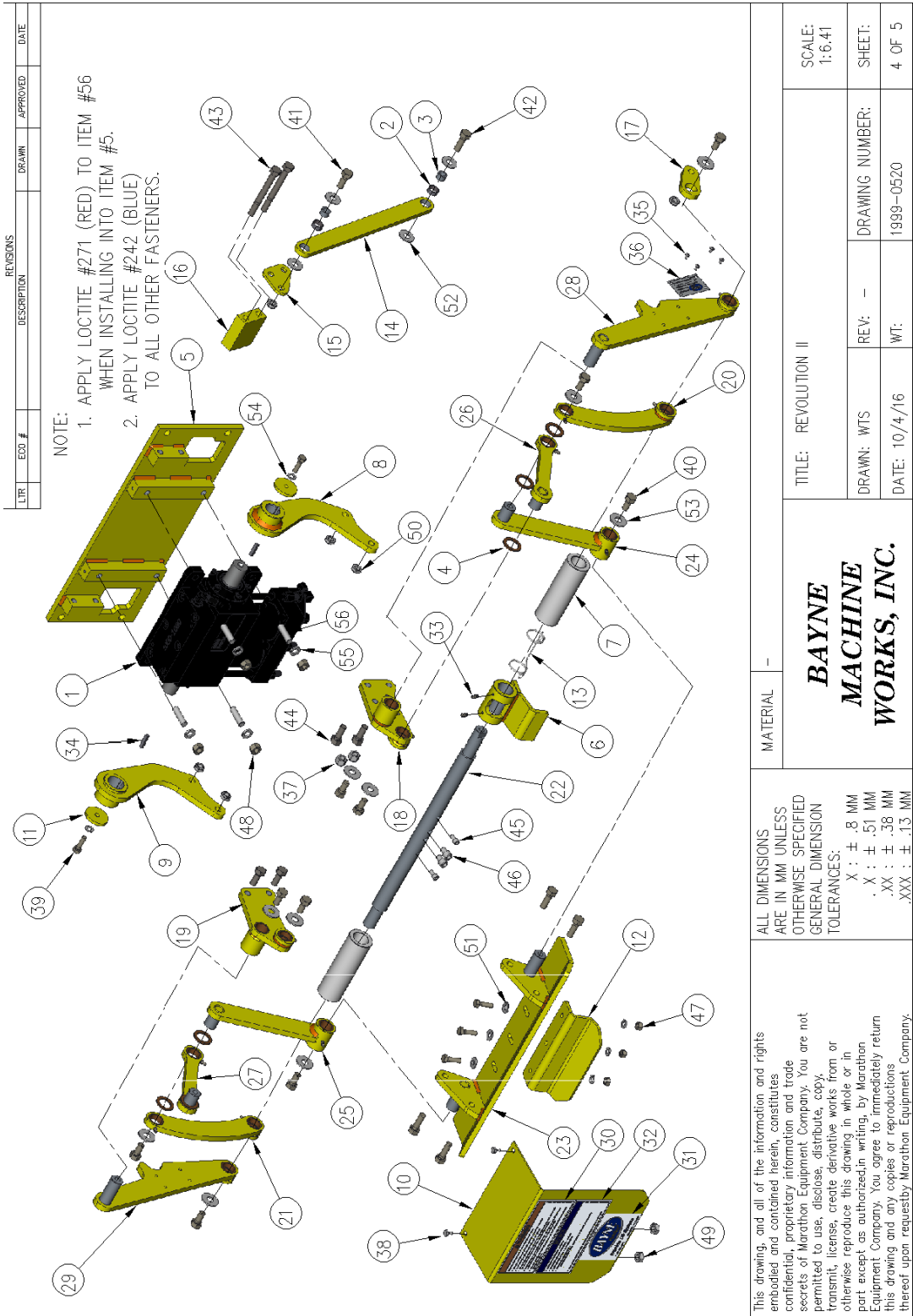
ASSEMBLY DRAWINGS AND PART NUMBERS

Appendix A - Assembly Drawings and Part Numbers

Revolution HD Assembly

24.

Appendix A - Assembly Drawings and Part Numbers



Appendix A - Assembly Drawings and Part Numbers

| REF | QTY | PART # | DESCRIPTION | ROUTING2 | UOM | WT | TOTAL WT |
|-----|-----|------------|---|----------|-----|--------|----------|
| 1 | 1 | 1120-1045 | 210 ACTUATOR, 1/4 KEY, .093 ORIFICE | | EA | MA0.00 | |
| 2 | 2 | 2603-1401 | SLEEVE BUSHING | | | | |
| 3 | 2 | 2603-1402M | LINK SLEEVE | | EA | 0.01 | |
| 4 | 6 | 4300-0038M | THRUST WASHER | | EA | 0.00 | |
| 5 | 1 | 4700-0004M | MAINFRAME WELDMENT | | EA | 0.00 | |
| 6 | 1 | 4700-0008M | HOOK WELDMENT | | EA | MA0.00 | |
| 7 | 2 | 4700-0012M | CROSS SHAFT ROLLER | | EA | 0.00 | |
| 8 | 1 | 4700-0013M | R.H. TORQUE ARM | | EA | MA0.00 | |
| 9 | 1 | 4700-0014M | L.H. TORQUE ARM | | EA | MA0.00 | |
| 10 | 1 | 4700-0031M | COVER PLATE | | EA | 2.47 | |
| 11 | 2 | 4700-0032M | TORQUE ARM WASHER | | EA | 0.00 | |
| 12 | 1 | 4700-0033M | SADDLE | | EA | 1.22 | |
| 13 | 1 | 4700-0034 | HOOK SPRING | | EA | 0.00 | |
| 14 | 1 | 4700-0041M | ROTATE LINK | | EA | 0.00 | |
| 15 | 1 | 4700-0042M | ROTATE TAB | | EA | 0.00 | |
| 16 | 1 | 4700-0047M | ROTATE TAB SPACER | | EA | 0.00 | |
| 17 | 1 | 4700-0101M | CROSS SHAFT EAR | | EA | 0.00 | |
| 18 | 1 | 4700-0102M | R.H. PIVOT PLATE ASSEMBLY | | EA | 0.02 | |
| 19 | 1 | 4700-0103M | L.H. PIVOT PLATE ASSEMBLY | | EA | 0.02 | |
| 20 | 1 | 4700-0110M | R.H. PUSH LINK ASSEMBLY | | EA | 0.02 | |
| 21 | 1 | 4700-0113M | L.H. PUSH LINK ASSEMBLY | | EA | 0.02 | |
| 22 | 1 | 4700-0130M | CROSS SHAFT | | EA | 0.00 | |
| 23 | 1 | 4700-0131M | LIFT PLATE WELDMENT | | EA | MA0.00 | |
| 24 | 1 | 4700-0133M | R.H. PULL LINK ASSEMBLY | | EA | 0.01 | |
| 25 | 1 | 4700-0136M | L.H. PULL LINK ASSEMBLY | | EA | 0.01 | |
| 26 | 1 | 4700-0138M | R.H. IDLER LINK ASSEMBLY | | EA | 0.01 | |
| 27 | 1 | 4700-0141M | L.H. IDLER LINK ASSEMBLY | | EA | 0.01 | |
| 28 | 1 | 4700-0143M | R.H. HOOK LINK ASSEMBLY | | EA | 0.01 | |
| 29 | 1 | 4700-0146M | L.H. HOOK LINK ASSEMBLY | | EA | 0.01 | |
| 30 | 1 | 5000-0010 | WARNING LABEL | | | | |
| 31 | 1 | 5000-0015 | BAYNE LOGO LABEL | | | | |
| 32 | 1 | 5000-0062 | NOTICE LABEL | | EA | 0.00 | |
| 33 | 2 | 7002-0400 | 1/4-28 STRAIGHT GREASE FITTING | | | | |
| 34 | 2 | 7300-0410 | KEY | | | | |
| 35 | 4 | 7500-0071 | 3/16 ALUMINUM DRIVE RIVOT | | | | |
| 36 | 1 | 7500-0770 | REVOLUTION SERIAL PLATE | | EA | 0.00 | |
| 37 | 2 | 8901-0800 | 1/2-13 ELASTIC LOCK NUT | | | | |
| 38 | 2 | 9001-0404 | 1/4-20 X 1/2 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | EA | 0.00 | |
| 39 | 5 | 9001-0610 | 3/8-16 X 1 1/4 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | | | |
| 40 | 10 | 9001-0808 | 1/2-13 X 1 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | | | |
| 41 | 1 | 9001-0810 | 1/2-13 X 1 1/4 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | | | |
| 42 | 5 | 9001-0812 | 1/2-13 X 1 1/2 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | | | |
| 43 | 2 | 9001-0836 | 1/2-13 X 4 1/2 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | EA | 0.00 | |
| 44 | 4 | 9002-0810 | 1/2-20 X 1 1/4 HEX HEAD CAP SCREW, GRADE 8, ZINC PLATED | | EA | 0.00 | |
| 45 | 2 | 9102-0504 | 5/16-24 X 1/2 SOCKET HEAD CAP SCREW, ZINC PLATED | | EA | 0.00 | |
| 46 | 2 | 9102-0704 | 7/16-20 X 1/2 SOCKET HEAD CAP SCREW, ZINC PLATED | | EA | 0.00 | |
| 47 | 3 | 9401-0600 | 3/8-16 HEX NUT, GRADE 8, ZINC PLATED | | | | |
| 48 | 4 | 9402-0800 | 1/2-20 HEX NUT, GRADE 8, ZINC PLATED | | | | |
| 49 | 2 | 9502-0800 | 1/2-20 HEX JAM NUT, GRADE 8, ZINC PLATED | | | | |
| 50 | 6 | 9521-0800 | 1/2-13 ELASTIC LOCK JAM NUT, GRADE 8, ZINC PLATED | | | | |
| 51 | 3 | 9600-0500 | 5/16 FLAT WASHER, ZINC PLATED | | | | |
| 52 | 4 | 9600-0700 | 7/16 FLAT WASHER, ZINC PLATED | | | | |
| 53 | 10 | 9600-0800 | 1/2 FLAT WASHER, ZINC PLATED | | | | |
| 54 | 5 | 9700-0600 | 3/8 LOCK WASHER, ZINC PLATED | | | | |
| 55 | 4 | 9700-0800 | 1/2 LOCK WASHER, ZINC PLATED | | | | |
| 56 | 4 | 9902-0814 | 1/2-20 X 1 3/4 THREADED STUD, ZINC PLATED | | | | |
| | | | TOTAL UNIT WEIGHT | | | | 36.50 |

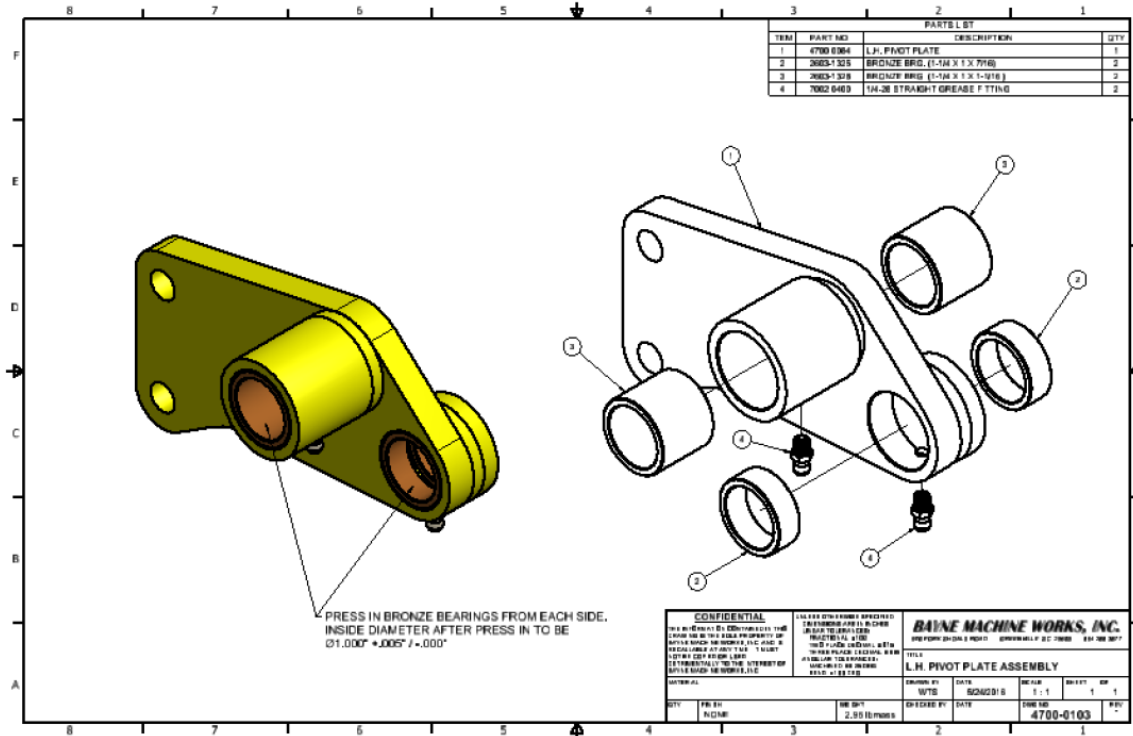
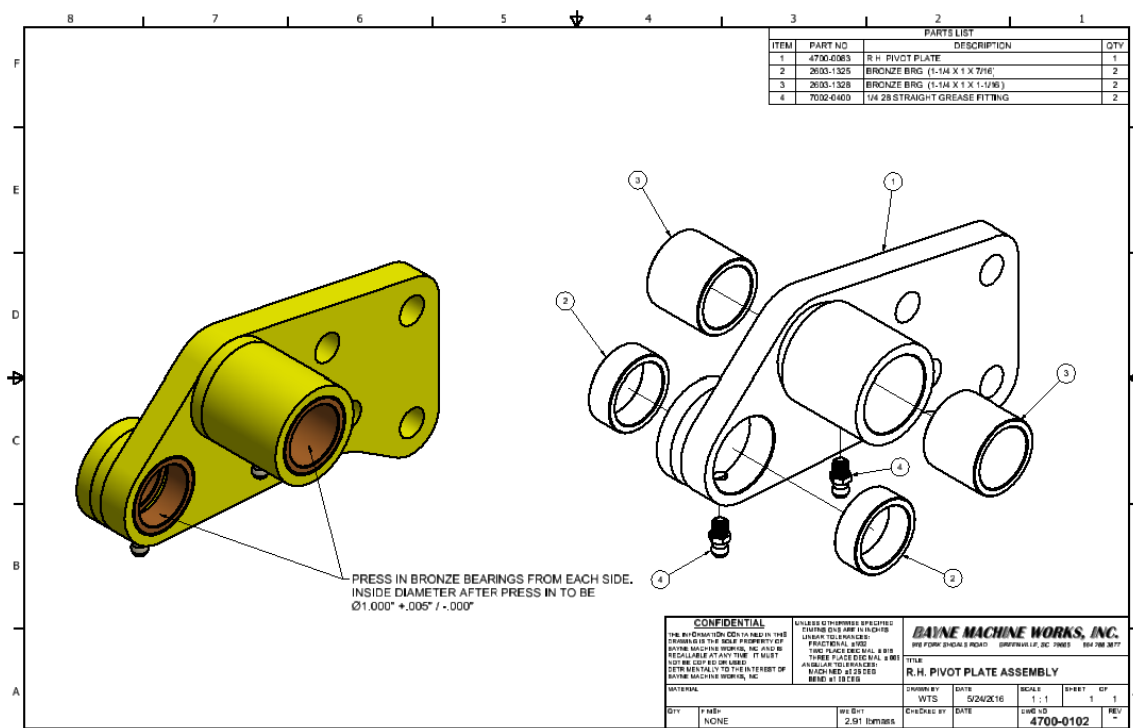
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.X : ± .51 MM
.XX : ± .38 MM
.XXX : ± .13 MM

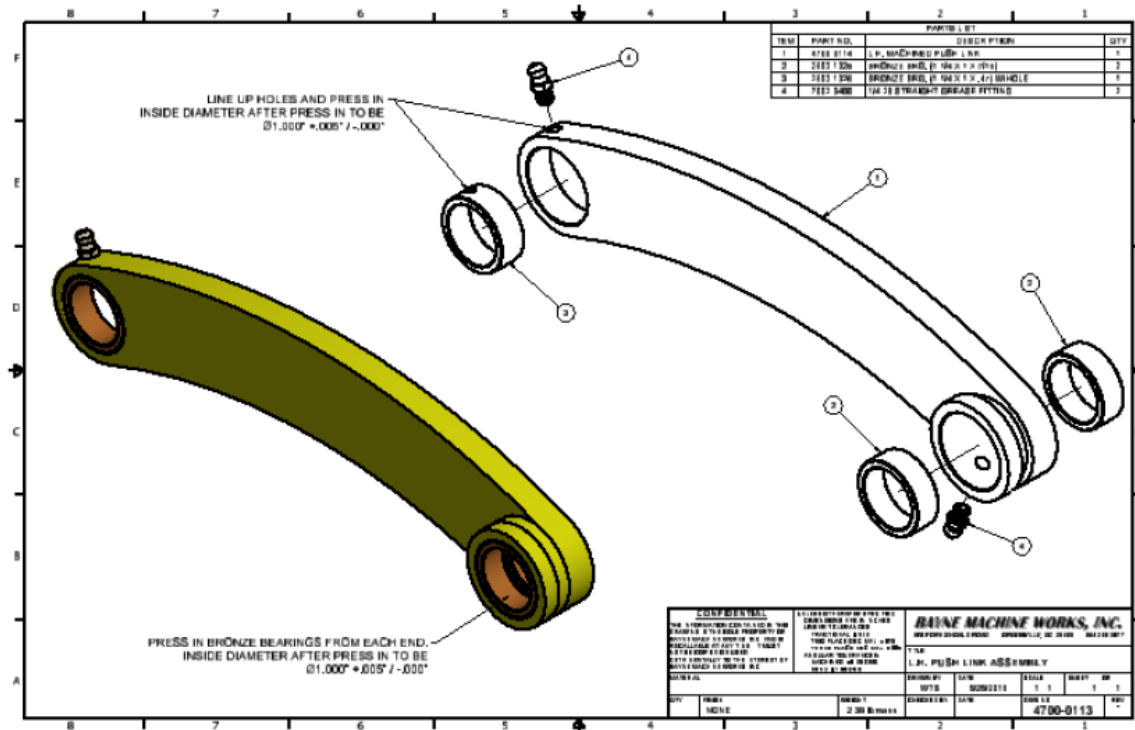
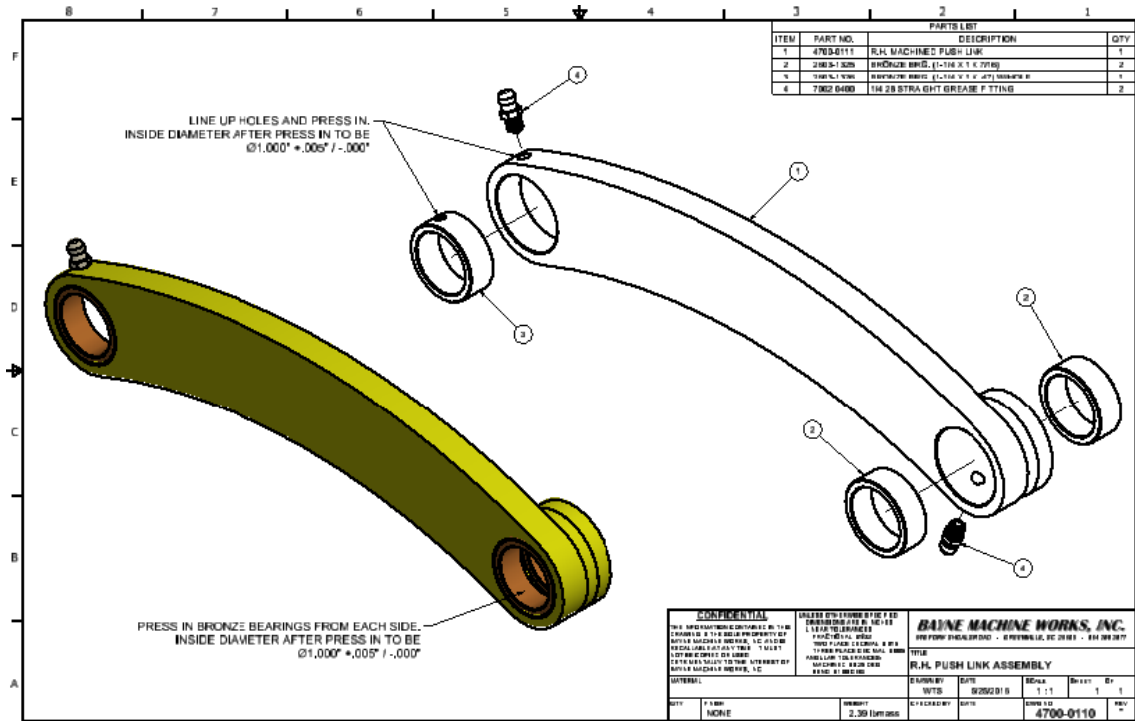
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**BAYNE
MACHINE
WORKS, INC.**

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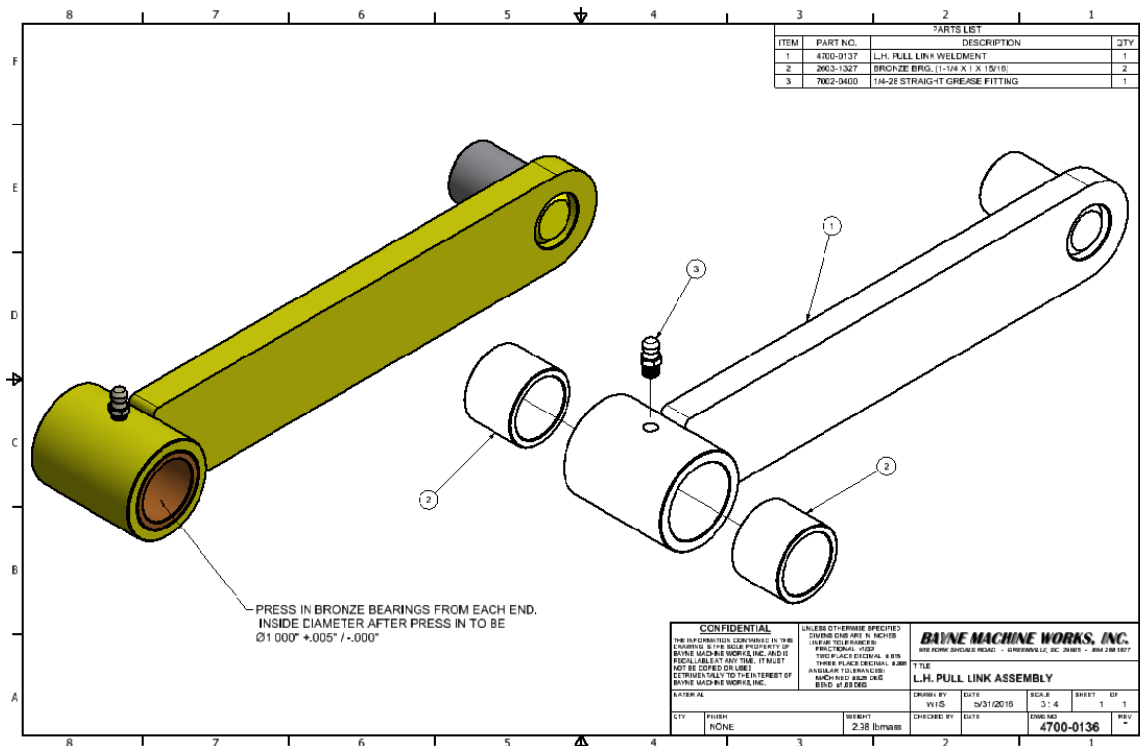
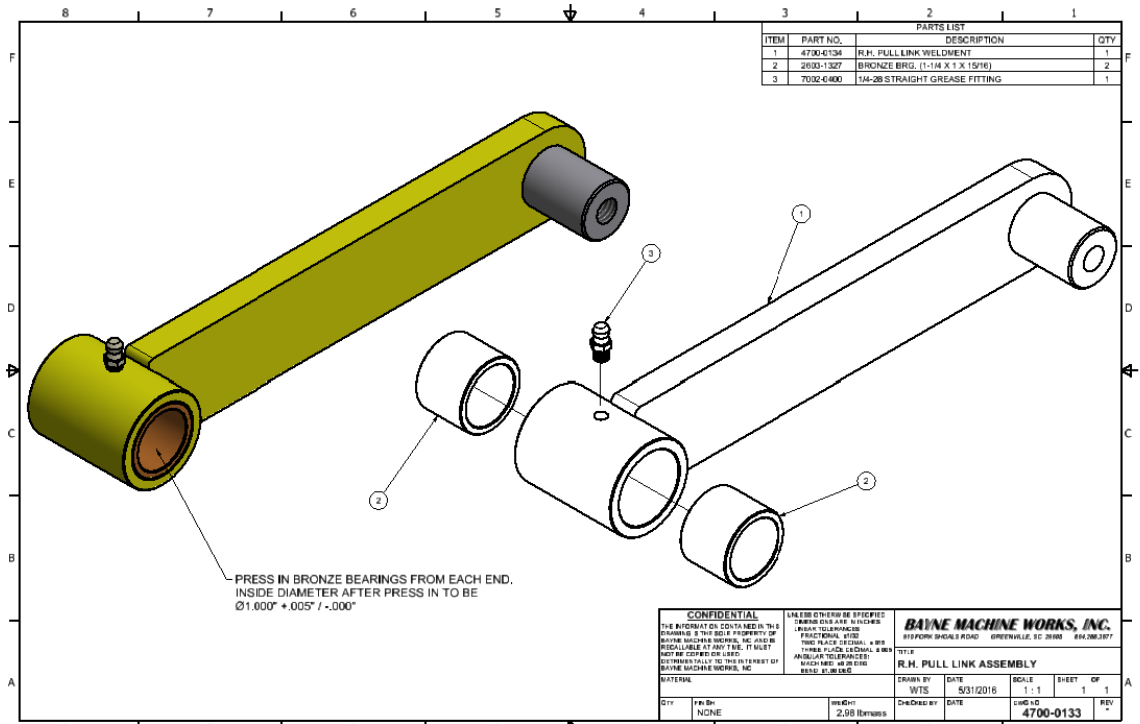
Appendix A - Assembly Drawings and Part Numbers



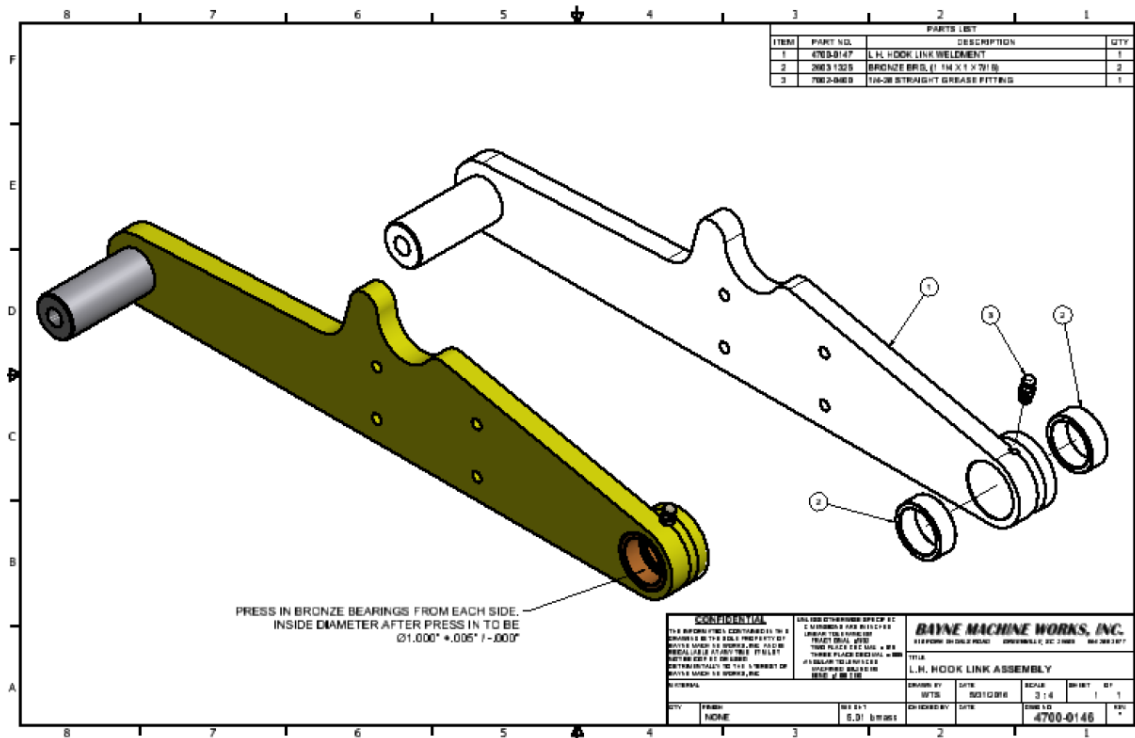
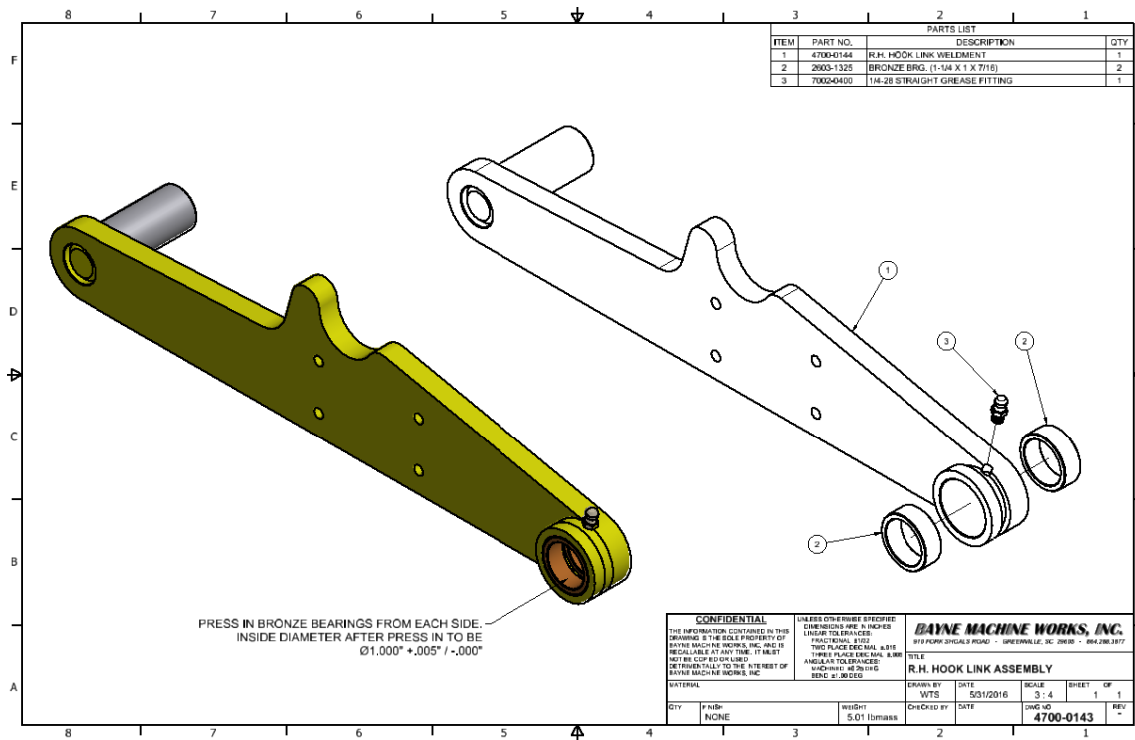
Appendix A - Assembly Drawings and Part Numbers



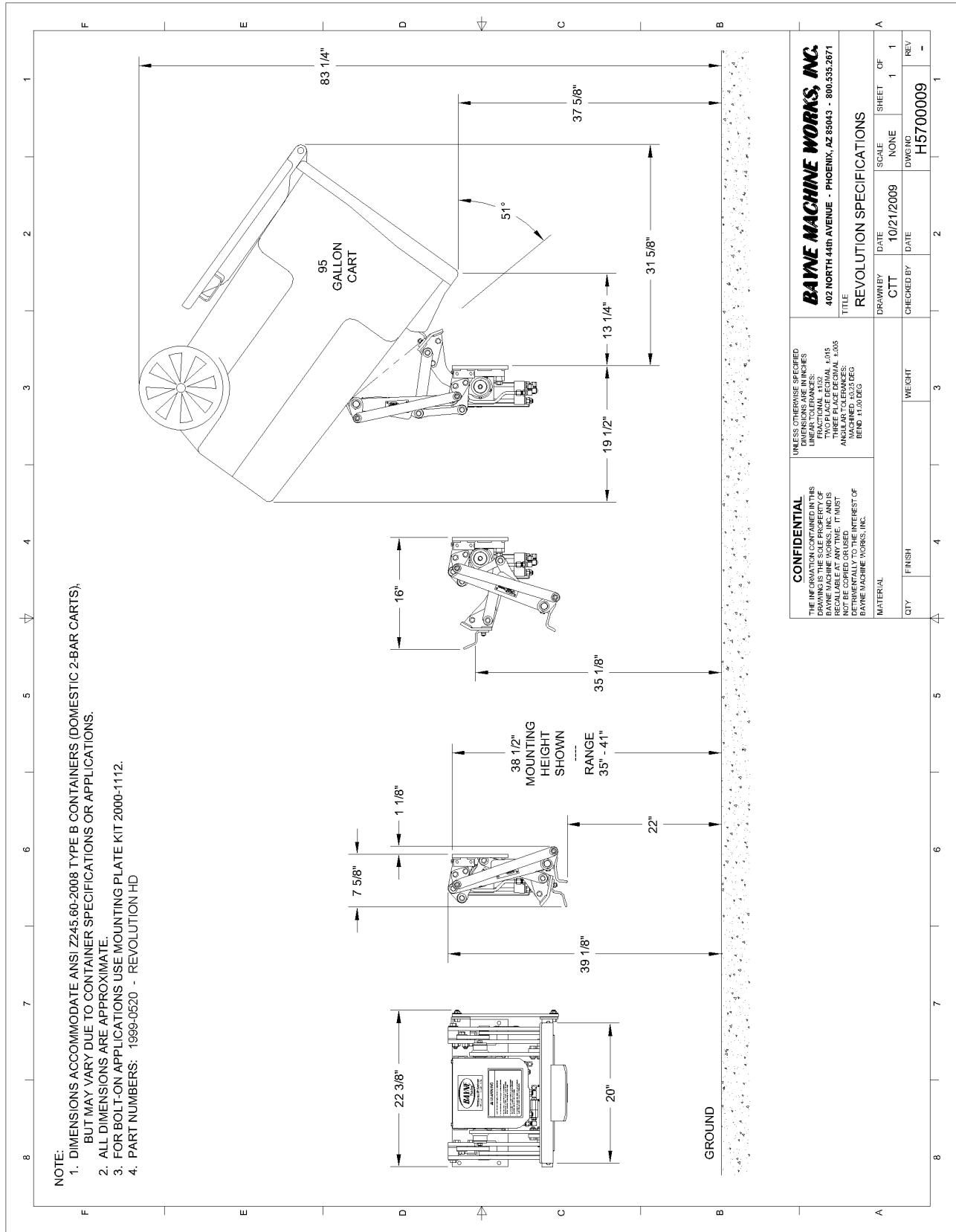
Appendix A - Assembly Drawings and Part Numbers



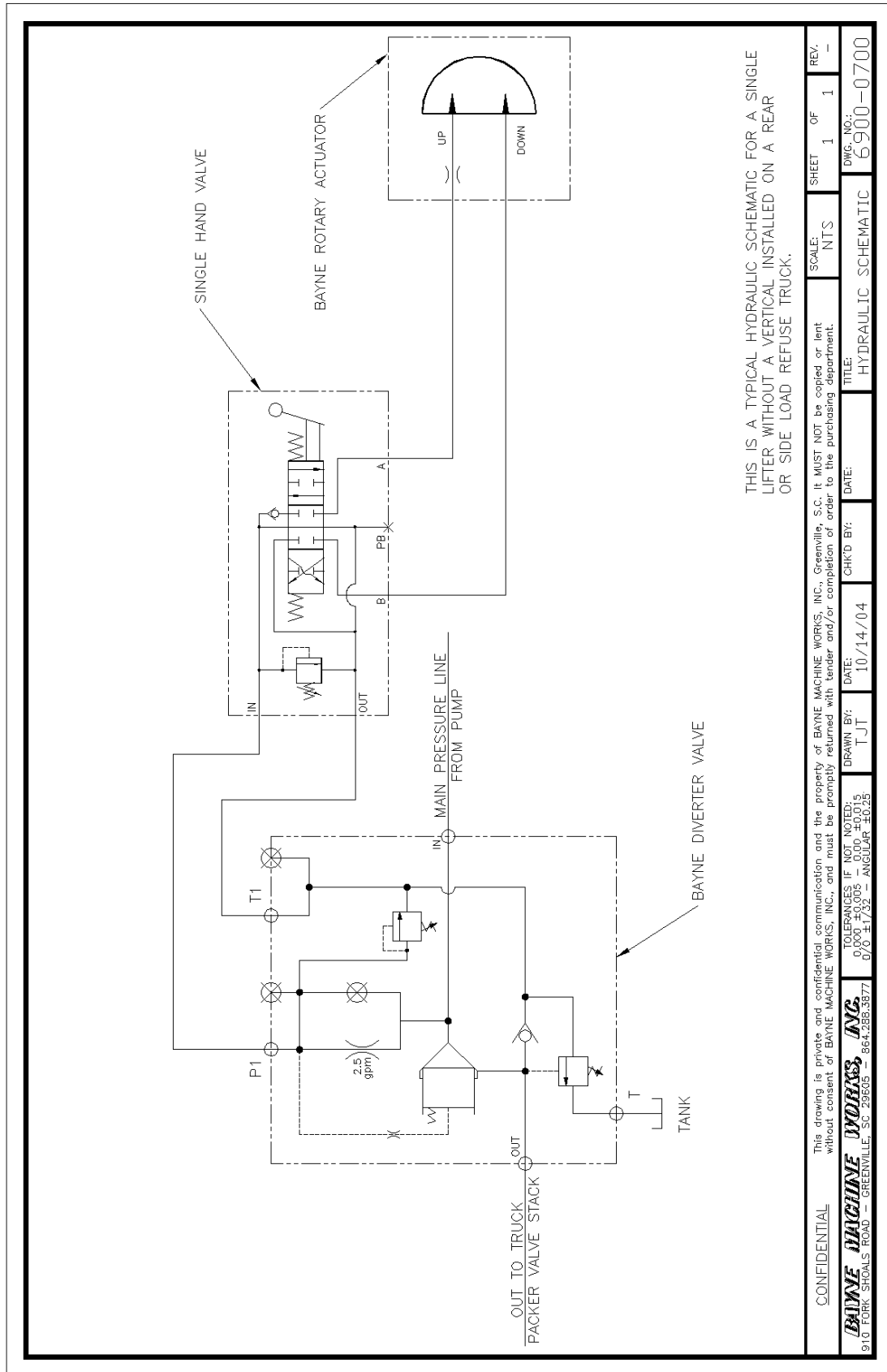
Appendix A - Assembly Drawings and Part Numbers



Appendix A - Assembly Drawings and Part Numbers



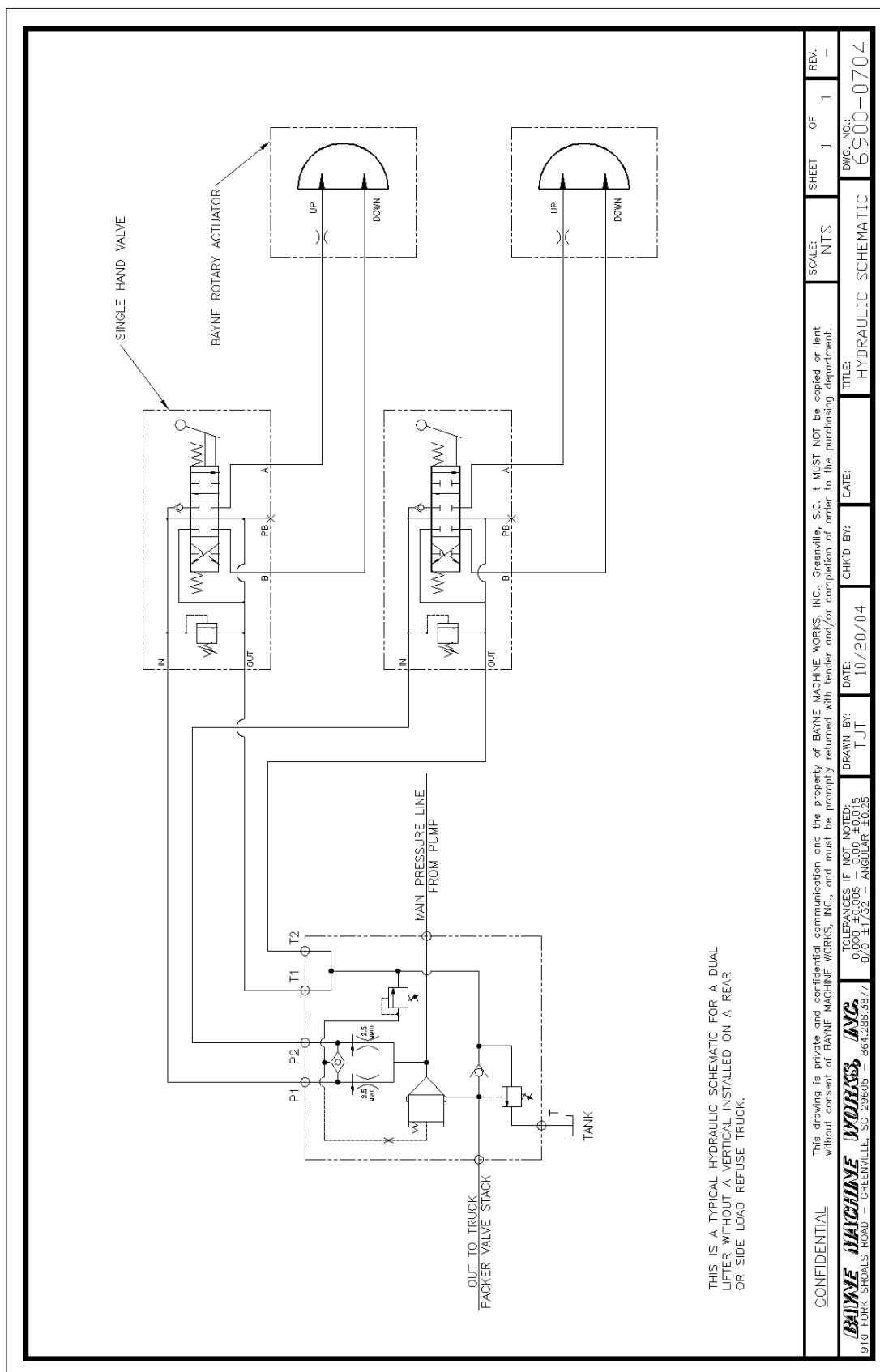
Appendix A - Assembly Drawings and Part Numbers



Single Lift Hydraulic Schematic

27.

Appendix A - Assembly Drawings and Part Numbers



Double Lift Hydraulic Schematic

Appendix A - Assembly Drawings and Part Numbers

NOTE:

- 1. MAXIMUM WORKING PRESSURE 3000 PSI
- 2. MAXIMUM WORKING FLOW 50 GPM
- 3. TEMPERATURE RANGE = 160° MAXIMUM
- 4. PORT SIZES
IN & OUT = #16 SAE
T = #10 SAE
- 5. T2 & P2 ARE PLUGGED USING #6 SAE PLUGS IN SINGLE LIFTER APPLICATIONS

SERVICE PARTS

| ITEM | PORT | PART NO. | DESCRIPTION | SEAL KIT | APPLICATIONS |
|------|------|-----------|------------------------------|-----------|-------------------|
| 1 | JPS | 6091-0716 | DIFF. PRESSURE SENSING VALVE | 8000-0782 | ALL |
| 2 | RV | 6091-0712 | RELIEF VALVE | 8000-0784 | ALL |
| 3 | PSV | 6091-0713 | PRESSURE SEQUENCE VALVE | 8000-0781 | ALL |
| 4 | FR-1 | 6091-0710 | FLOW REGULATOR | | ALL |
| 5 | FR-2 | 6091-0710 | FLOW REGULATOR | 8000-0784 | FDR DUAL LIFTERS |
| 6 | | 6091-0715 | CAVITY PLUG | | FDR SINGLE LIFTER |
| 7 | DSV | 6091-0720 | SHUTTLE VALVE | 8000-0783 | FDR DUAL LIFTERS |
| 8 | | 6246-0008 | IND. 8 SAE SOCKET HEAD PLUG | - | FDR SINGLE LIFTER |
| 9 | CV | 6091-0714 | CHECK VALVE | 8000-0784 | ALL |
| 10 | DR | 6066-0028 | Ø.028" DRIFTE | - | ALL |

6091-0700 COMPLETE DIVERTER VALVE (SINGLE LIFTER)

6092-0700 COMPLETE DIVERTER VALVE (DUAL LIFTERS)

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| BAYNE MACHINE WORKS, INC. 910 FOUR SIGNALS ROAD - GREENVILLE, SC 29605 - 864-288-3377 | TOLERANCES IF NOT NOTED: 0.000 +0.005 -0.0015 0.015 ±0.002 - ANGULAR ±0.25 | DATE: 09/24/04 CHK'D BY: TJT DRAWN BY: CTT | DATE: 10/11/04 TITLE: SINGL-E/DUAL DIVERTER VALVE PARTS | DWG. NO.: M3500005 |

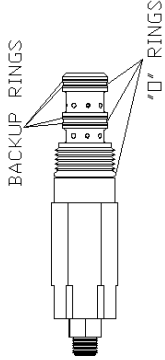
Single/Dual Diverter Valve Parts
29.

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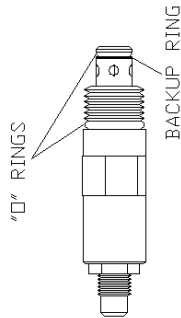
Issued June 2017
Revision No: 001

Appendix A - Assembly Drawings and Part Numbers

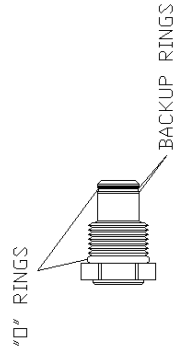
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|----------|-----------|---------------------------------|-----|
| 1 | 8000-0781 | PRES. SEQUENCE VALVE SEAL KIT | 1 |
| 2 | 8000-0782 | PRESSURE SENSING VALVE SEAL KIT | 1 |
| 3 | 8000-0783 | SHUTTLE VALVE SEAL KIT | 1 |
| 4 | | RELIEF VALVE SEAL KIT | 1 |
| 5 | | FLOW REGULATOR SEAL KIT | 1 |
| 6 | 8000-0784 | FLOW REG. CAVITY PLUG SEAL KIT | 1 |
| 7 | | CHECK VALVE SEAL KIT | 1 |



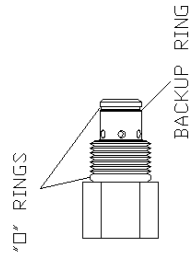
PRESSURE SEQUENCE VALVE SEAL KIT



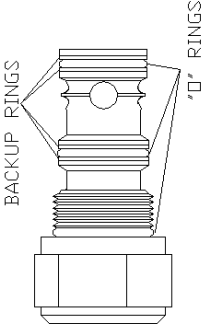
RELIEF VALVE SEAL KIT



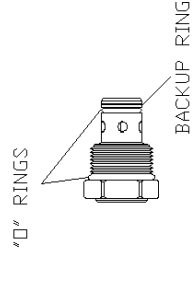
FLOW REGULATOR CAVITY PLUG SEAL KIT



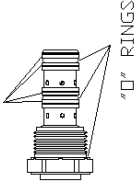
FLOW REGULATOR SEAL KIT



DIFFERENTIAL PRESSURE SENSING VALVE SEAL KIT



CHECK VALVE SEAL KIT

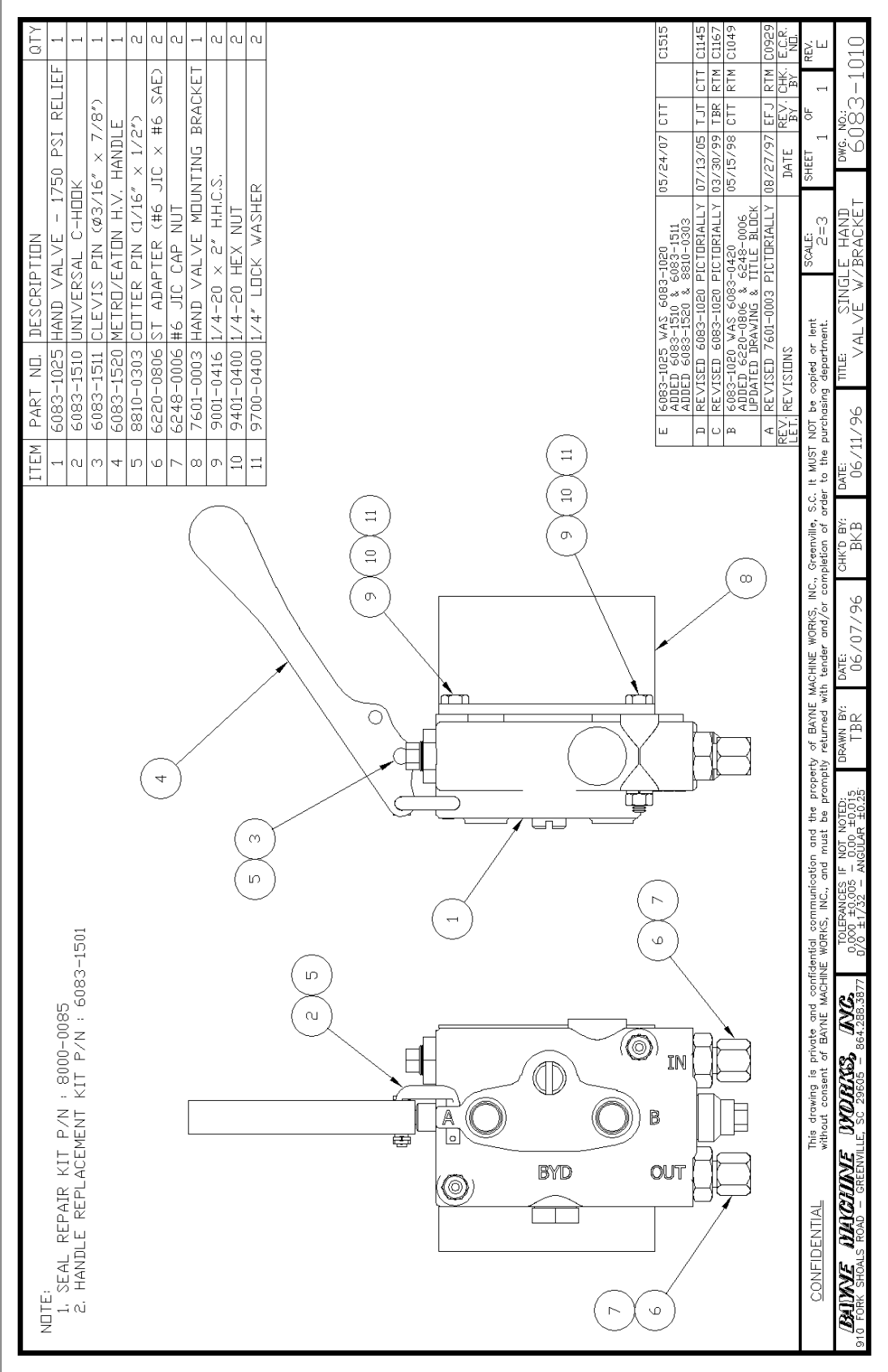


SHUTTLE VALVE SEAL KIT

Diverter Valve Seal Kit

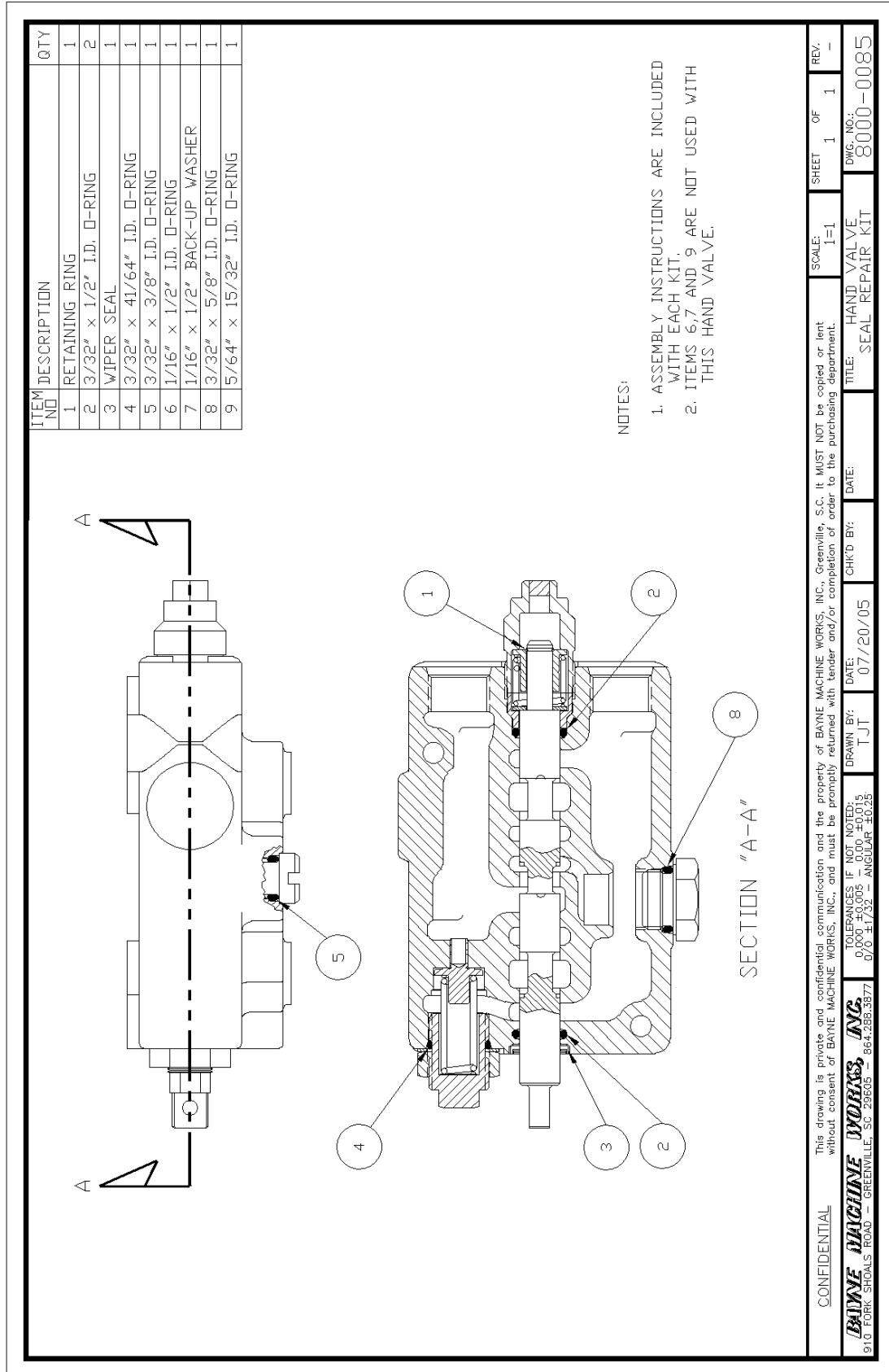
30.

Appendix A - Assembly Drawings and Part Numbers



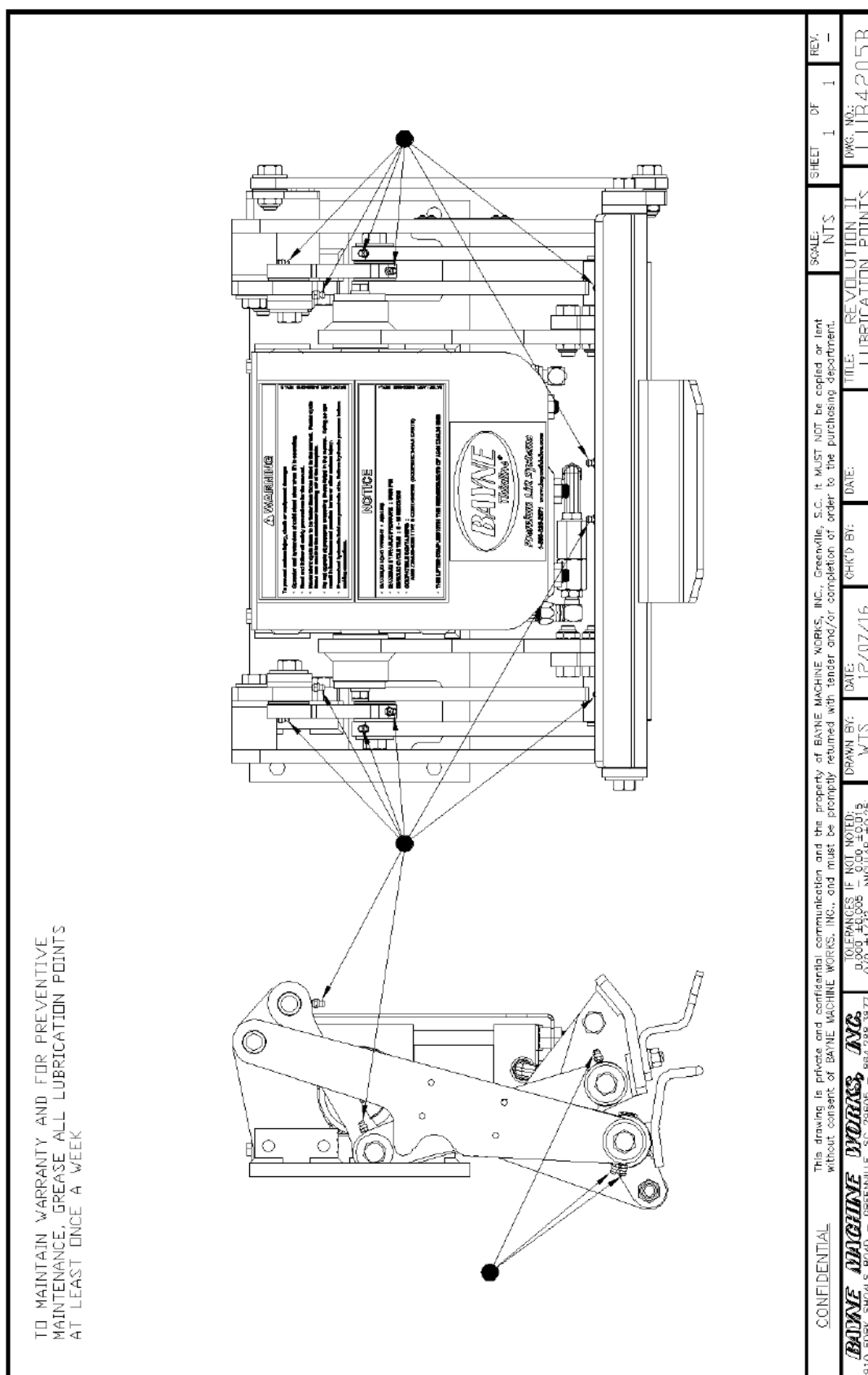
Single Hand Valve with Bracket
31.

Appendix A - Assembly Drawings and Part Numbers



Hand Valve Seal Repair Kit
32.

Appendix A - Assembly Drawings and Part Numbers



Lubrication Guide

33.

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Revolution™ HD

INDEX

A

adjusting relief valve settings 4

D

diverter valve information
operation and installation information 13
possible problems 13

F

final operation and mounting 4

I

installation instructions 4
instructions
actuator assembly 16
slowdown assembly 16

L

lower hook adjustment 10

M

maintenance instructions 15
making hydraulic connections 4
mounting 4

O

operation instructions 10

S

safety 2
safety zones 10
specifications 3

T

troubleshooting chart 24

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BAYNE THINLINE® REVOLUTION HD™ UNITS

THREE-YEAR LIMITED WARRANTY

BEFORE ANY WARRANTY CAN BE ALLOWED ON ANY NEW EQUIPMENT, THE APPLICABLE REGISTRATION FORM MUST BE ON FILE WITH BAYNE MACHINE WORKS, INC.

BAYNE MACHINE WORKS, INC. warrants its THINLINE® REVOLUTION HD™ UNITS to be free from defects in material and workmanship under normal use for a period of three (3) years (36 Months) from the date of delivery to the first purchaser.

This warranty is expressly limited to the repair or replacement of any component or part thereof of any such unit manufactured by BAYNE MACHINE WORKS, INC., that is proven to Bayne's satisfaction to have been defective in material or workmanship. BAYNE MACHINE WORKS, INC. is not responsible for labor and transportation charges in connection with the replacement or repair of defective parts, nor shall this warranty apply to a product upon which repairs or alterations have been made unless such repairs or alterations were authorized by BAYNE MACHINE WORKS, INC. in writing. No employee or any other representative of BAYNE MACHINE WORKS, INC. is authorized to change this warranty in any way or to grant any other warranty.

Any service parts sold by BAYNE MACHINE WORKS, INC. shall carry a ninety (90) day warranty for replacement only. The warranty item must be returned to BAYNE MACHINE WORKS, INC. for evaluation upon its request. Labor to replace or repair such part shall be the responsibility of the owner. There is no warranty on used parts.

BAYNE MACHINE WORKS, INC. makes no warranty of products manufactured by others and supplied by Bayne, the same being subject to warranties, if any, provided by their respective manufacturers. BAYNE MACHINE WORKS, INC. will not warranty wear items used for anti-friction purposes. BAYNE MACHINE WORKS, INC. will not warranty wear items used for sealing purposes.

BAYNE MACHINE WORKS, INC. ASSUMES NO LIABILITY FOR LOSS OF PROFITS, PRODUCT, TIME OR ANY OTHER DIRECT, INDIRECT OR CONSEQUENTIAL LOSSES, DAMAGES OR DELAYS. Any improper use, operation at an actuator cycle time of less than six (6) seconds, substitution of parts not approved by Bayne, modifications other than those done at the factory or as authorized by the factory in writing, or any alteration or repair by others in such manner that, in Bayne's judgment, affects the product materially and adversely shall void this warranty. Actuator cycle time does not include vertical travel.

This warranty shall not apply to any product that has been subject to misapplication, negligence, modification, or accidental damage.

BAYNE MACHINE WORKS, INC., whose policy is one of continuous improvement, reserves the right to improve its products through changes in design or materials as it may deem desirable without obligation to incorporate such changes in products of prior manufacture.

THE ABOVE WARRANTY SUPERSEDES AND IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. BAYNE MACHINE WORKS, INC. SPECIFICALLY DISAVOWS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Bayne Premium Lift Systems | 402 North 44th Avenue, Phoenix, AZ 85043

PHONE TOLL-FREE: 800.535.2671

E-MAIL: insidesales@baynethinline.com | WEBSITE: www.baynethinline.com

VER. 091211



www.baynethinline.com

Customer Care:
800.535.2671

Fax:
256.585.6762

Bayne Premium Lift Systems
402 North 44th Avenue
Phoenix, AZ 85043