

CD 3



Adams® Model CD 3 Continuous Duty Winch and Rope Winder

Installation, Operation and Maintenance



TOOLS BUILT TO GO THE DISTANCE

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Serial Number _____

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SCOPE - This document contains information pertinent to the Installation, Operation and Maintenance of the Adams® Model CD3 Continuous Duty Winch. The CD3 winch manufactured by General Machine Products (KT), LLC commencing in January 1, 1995 differ significantly from prior generations of Adams CD Winches in equipment design and components. To obtain information on earlier model CD, LCD or UG winches, please contact the factory for the appropriate manual.

1. GENERAL - The information contained in this revision pertains exclusively to the Adams® Model CD3 Continuous Duty Winches manufactured after January 1, 1995 which have serial numbers of 95-1100 and higher.

1.01 WINCH APPLICATION - The winch has been specifically designed for placing communication cable and electrical conductors. However, its robust construction and SAE Continuous Duty rating makes the CD3 suitable for most applications where a long, continuous pull is required.

 **CAUTION -THE WINCH WAS NOT DESIGNED FOR, NOR INTENDED TO BE USED FOR THE MOVEMENT OF PEOPLE. NEVER USE THE WINCH FOR MOVING PEOPLE.**

In the typical automotive application, the winch is driven hydraulically. The truck engine provides the prime source of power connected through a split shaft or side mount power take-off to a hydraulic pump. The pump provides hydraulic pressure and flow sufficient to drive the winch hydraulic motor that is mounted to the full load brake that is coupled directly to the winch gearbox.

1.02 WINCH MAJOR COMPONENTS

- | | |
|----------------------------|------------------------|
| ◆ Gearbox | ◆ Hydraulic Motor |
| ◆ Wire Rope Drum | ◆ Hanger |
| ◆ Clutch Assembly | ◆ Mounting Brackets |
| ◆ Free Spool Control Brake | ◆ Drum Guard |
| ◆ Level Wind Assembly | ◆ Drum Shaft Extension |
| ◆ Full Load Brake | |

1.03 WINCH CLUTCH GENERAL INFORMATION - The clutch provides a means of transferring the torque from the drum shaft to the winch drum. The clutch plate is actuated by an air cylinder. (This air shift mechanism replaces the mechanical linkage used on older models for clutch actuation.) When the winch clutch is disengaged, the drum will rotate freely on the drum shaft. Power can still be transmitted through the drum shaft to the drum shaft extension to drive a capstan or reel while the clutch is disengaged. To help determine clutch position, engaged or disengaged, electronic clutch position sensing is an available option. See section 3.03.

1.04 CALIPER TYPE, FREE SPOOL CONTROL (DRAG) BRAKE - Under rapid winch line payout conditions, it is extremely important to operate the caliper brake properly, taking care to maintain sufficient tension on the wire rope. This will enable the level-wind assembly to operate properly, minimize over-spinning of the drum, and help to prevent erratic lays of winch line on the drum.

All CD3 units are factory equipped with a caliper type drag brake assembly. The caliper brake is controlled by a hydraulic actuator (supplied) that is intended to be mounted with the winch controls.

The purpose of the caliper brake is to control the speed of the winch drum when in the free spool mode. Movement of the actuator lever will force the brake pads together, applying friction to the drum brake rotor thereby reducing the drum speed. Continued movement of the control lever will eventually force drum rotation to stop.

CAUTION THE DRAG BRAKE IS USED TO CONTROL THE DRUM SPEED ONLY. IT IS NEVER TO BE USED TO HOLD THE LOAD.

The brake assembly is mounted at the factory on two studs attached to the hanger on the right side of the



winch. The brake disc rotor is mounted at the factory on the clutch end drum flange.

The remote actuator, reservoir, and flexible hose section are shipped loose with other winch mounting hardware in the parts box. These components are to be installed by the dealer or truck body builder. The closed circuit hydraulic system is shipped void of any fluid. Prior to operation, fill the system with only the exact type of fluid that was originally specified for your winch. This will be so designated on the caliper brake components and will be *brake fluid only* on specific units or *hydraulic oil only* on specific units. Bleed and replenish with additional fluid of the correct formulation, as required. Refer to section 3.04 of this manual.

1.05 FULL LOAD BRAKE - The full load brake, which is mounted on the gearbox, is an automatic device designed to hold the rated load of the winch, 24,000 lbs. (106,8 kN), on a bare drum. The full load brake assembly is spring-loaded and requires hydraulic pressure to release the brake. The hydraulic pressure is applied on the piston, which exerts the force on the primary disc compressing the springs into the brake housing. When the disc stack (comprised of both rotating and stationary discs) is not compressed, the rotating discs are free to turn and the brake is released. The pressure to release the brake is sensed at the hydraulic motor. The pressure from either side of the motor can release the brake. This feature enables the winch to pull in as well as power out, i.e. the brake is not direction sensitive. Hydraulic pressure passes through three cartridge type shuttle valves diverting pressure to release the brake as well as relieving the pressure on the brake after the system pressure is ported to the tank. The plumbing for both the shuttle valves and the brake is completed at the factory. Refer to section 3.05.

1.06 TRI-DRIVE THREE-SPEED TRANSMISSION - The three-speed transmission consists of a hydraulic motor with two unequal size gear sections. The larger section has a 2-inch wide gear face and the smaller section has a 1¼-inch wide gear face. A two-spool control valve activates each section independently or in tandem to achieve three distinct ranges of speed and pull. The motor is mounted to the full load brake, which in turn is mounted to the gearbox. Therefore, the enclosed drive requires no maintenance of a silent chain drive. For more information on speed and pull values, please refer to the specification sheet.

The same transmission is used in both overwind and underwind applications. The only change is the plumbing connections to the control valve. There is a case drain on the motor with a ¼ NPT fitting and it should be connected to tank. For more information, see section 3.02 Hydraulic Requirements.

The control valve is considered an integral part of the engineered winch package and is shipped with each winch. The control valve has an internal relief valve set at 2500 psi (17238 kPa). (Isolated protection of the winch motor to 2000 psi is no longer required.) The open center control valve has the ability to be used in a "power beyond" function.

There are several optional methods to command the control valve remotely using pendant or wireless control panels. Contact the factory for more specific information.

1.07 LEVELWIND MECHANISM - The levelwind assembly is a derivative of Bell System specification 8414 and is a familiar sight on Adams CD winches. The levelwind distributes the wire rope onto the drum with tight, even lays. The tight, compact layers help to extend wire rope life by eliminating the upper layers from pulling down into lower layers. The strain and damage to the wire rope from this action can lead to premature wire rope failure. The levelwind also helps in maximizing the drum storage capacity. The even and compact layers allow for more efficient wire rope storage.

The levelwind is mounted at the factory and can be configured to support either overwind or underwind applications.

1.08 ACCESSORIES - The drum shaft extension is an accessory that makes the CD3 winch even more versatile. The shaft extension has a diameter of 2 ⁷/₁₆ inch (Bell System standard) and is mounted on the winch drum shaft by means of a coupling secured by a connecting pin. Designed with the conventional bayonet type of connection, it is ideally suited for driving a power reel or capstan. To mount a device onto the shaft extension, slide the device spindle over the shaft extension, push all the way in, turn counter clockwise and pull out into the locked position.

The drum shaft extension projects from the right side of the winch only. The required shaft length is determined by the width of the body.

The maximum allowable pull of the standard drum shaft extension is 1,500 pounds (6,7 kN) using a standard 7 in. (18 cm) diameter capstan (GMP P/N 10727). Allowable pulls will be less when using a larger diameter accessory and/or using a longer drum shaft extension. See the table below.

Table: Maximum allowable pulls on a standard drum shaft extension equipped with a 7" diameter capstan and corresponding body widths:

Body Width		Allowable Pull	
in.	m	lbs.	kN
92	2,34	1500	6,7
94	2,38	1425	6,4
96	2,44	1350	6,0
98	2,49	1275	5,7
100	2,54	1200	5,4

Note: An outboard hanger bearing is an available factory option that increases the allowable pull to 4000 lbs. (17,8 kN) on the drum shaft extension. For more information on the additional versatility of winch drum shaft extension accessories such as fiber optic capstans and reels, communicate with GMP at the address shown on the back of this manual.

Note: Do not exceed allowable pulls outlined above. To help maximize bushing life, the drum should rotate along with the shaft. Engage the clutch and pull the cable end to the drum and tie off to a lower wrap. See addendum at rear of manual.



2. IMPORTANT PRECAUTIONS

2.01 You must read, understand and observe the following precautions at all times when operating the winch:

CAUTION -THE WINCH WAS NOT DESIGNED FOR, NOR INTENDED TO BE USED FOR THE MOVEMENT OF PEOPLE. NEVER USE THE WINCH FOR MOVING PEOPLE.



CAUTION -THE DRAG BRAKE IS USED TO CONTROL THE DRUM SPEED ONLY. IT IS NEVER TO BE USED TO HOLD THE LOAD.



CAUTION - SHIFTING OF THE CLUTCH SHOULD ONLY BE DONE WHEN THE DRUM ROTATION HAS STOPPED.



As required by OSHA, it is imperative, and the responsibility of the employer, to properly instruct the winch operator and the crew relative to the safe working capabilities and operational limitations of the winch, its accessories and especially the winch controls. *The operator should never leave his position at the controls while the winch is in operation or the winch line is under load.*

Maintain complete coordination with other members of the crew, giving them clear instructions by hand signal or reliable radio communication.



Stand clear of loads suspended by the winch line.

Do not stand inside of angles formed by the winch line.



As much as possible, do not stand where there is the danger of being struck by the wire rope if it should fail or snag.



Never place hands on a moving winch line. Always stand clear of moving winch line.



When working around the winch, wire rope and the tail sheave, do not wear loose fitting clothing that may become entangled with moving parts and cause possible serious injury.



Make certain that the wire rope is properly attached to the drum and that no less than one-half of the first lay remains on the drum at all times.





Make certain that the eye at the end of the winch line is properly spliced or swaged.




Precautions continue on next page





 Wire rope (winch line) may be old, damaged or weakened by such defects as kinks, cuts, extreme bends or loops. Such conditions are potentially dangerous and detrimental to safe operation of the winch. The wire rope must be routinely inspected at regular intervals and replaced when worn. See Maintenance Section 6.01 for replacement criteria.

 Make certain that the winch clutch is positively engaged before starting the pull.

 Operate the winch as smoothly as possible. Sudden jerking pulls can place extreme loads on equipment, causing damage or injury.

Do not operate the winch at speeds faster than necessary.

 When pulling in, do not allow the wire rope to build up in one location on the drum. This can cause wire rope "roll-over" and possible erratic, damaging pulls.

 Loads on the winch, winch line or extension shaft must not exceed their rated capacity.

3. INSTALLATION

3.01 GENERAL - The following procedures are recommended to assure safe, trouble-free operation:

For typical automotive applications, the winch is normally mounted behind the chassis cab in the forward section of the body load area, directly to the chassis frame. The two SAE rated mounting brackets supplied with the Adams® Model CD3 Continuous Duty Winch are of a "bolt-on" design with no welding required.

For standard installations, orient the winch assembly on the chassis frame so that the level-wind is facing rearward and the drum shaft is projecting toward the right (curb) side as viewed from the rear of the vehicle looking forward. The winch must be positioned on the truck chassis with the centerline of the drum upon the centerline of the chassis. Sufficient clearance should be allowed between the front body panel or other restrictive members and the winch to permit normal maintenance.

The direction of drum rotation for pulling in when the winch is an over-wind unit is clockwise when viewed from the right side of the vehicle. The wire rope is wound onto the drum from the top.

Attach the mounting brackets to the bottom of the winch frame on each side using the quantity ten (10) $\frac{3}{4}$ - 10 x 2 $\frac{3}{4}$ HHCS grade 8 bolts with disc spring washers and two (2) 1 - 8 SHCS bolts with disc spring washers and steel backup plates. Finger tighten only.

Clamp the mounting brackets to each side of the truck chassis, then tighten the ten (10) $\frac{3}{4}$ - 10 bolts one half turn so the bracket is tight against the bottom of the winch frame. NOTE: Do not torque to required specifications at this time.

Using the $\frac{7}{16}$ in. diameter pilot holes, transfer the hole locations onto the truck chassis. The clearance drill diameter of $\frac{21}{32}$ in. is recommended for the $\frac{5}{8}$ in. diameter bolts supplied in the bolt kit from the factory. After the clearance diameter is drilled, install the bolts in each hole and hand tighten with a lock washer and nut.

When all of the bolts, lock washers, and nuts are in place, torque to 180 ft.-lbs. all twenty (20) $\frac{5}{8}$ - 18 grade 8 bolts. Then torque to 380 ft.-lbs. (515 N·m) all ten (10) $\frac{3}{4}$ - 10 bolts. Then torque to 450 ft.-lbs. (610 N·m) both 1 - 8 bolts. A special $\frac{3}{4}$ in. hex key P/N 26288 is supplied for use with a $\frac{3}{4}$ in. socket and $\frac{3}{4}$ in. drive torque wrench to properly tighten the 1 - 8 bolts.

When using Huckbolt® fasteners instead of the factory bolts, drill the mounting brackets and truck chassis with the manufacturer's recommended clearance drill.

It is recommended that the winch be directly mounted only to the truck chassis frame. It is not recommended to mount the winch to any other structural member, as on a sub-frame, without first contacting the factory for specific application engineering support.



CAUTION - DO NOT WELD THE MOUNTING BRACKETS TO THE CHASSIS FRAME.

All of the mounting hardware and the drum shaft extension are shipped in a parts box attached to the winch or shipping crate.

IMPORTANT - To avoid corrosion problems when storing winches outside the parts boxes **MUST** be removed and stored in an indoor area.

To protect the entire winch assembly against rust, various parts are sprayed with a rust inhibitor and both drive housings are filled with oil when shipped from the factory.

IMPORTANT - If the winch will be placed in outdoor inventory for an indefinite period, care should be taken to prevent oil contamination or rusting of internal components due to condensation.

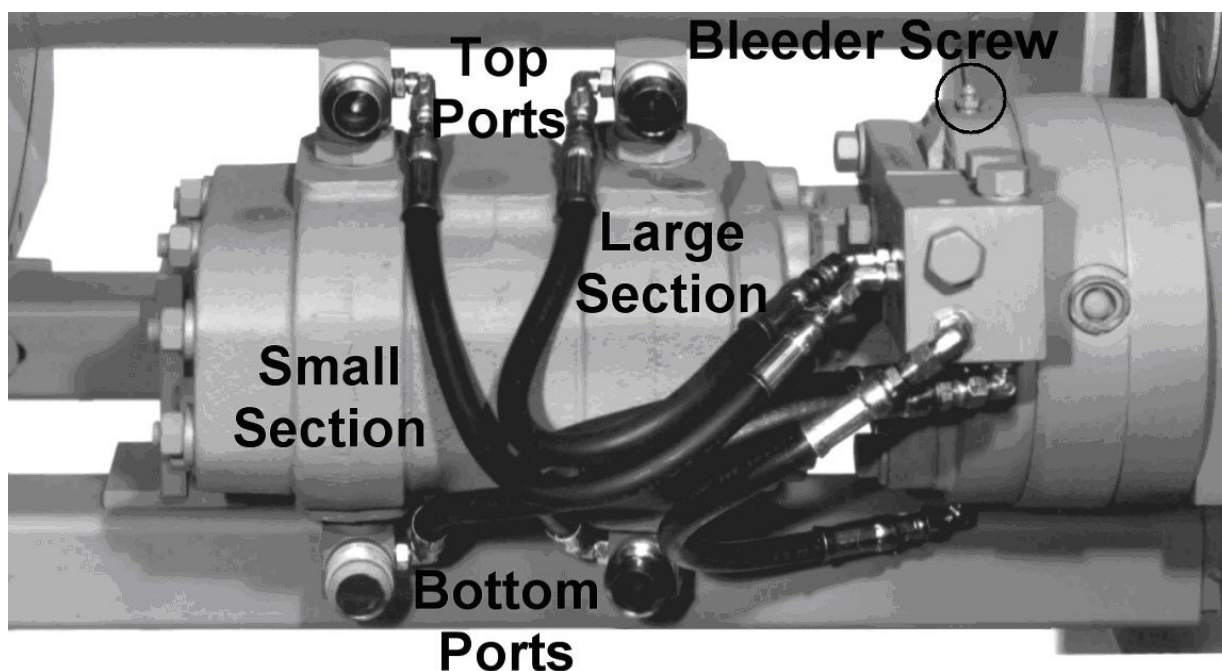
IMPORTANT - BEFORE THE WINCH IS ACTUATED, THE "FULL LOAD BRAKE" MUST BE BLED. See the instructions in Section 3.04 under the heading for "FULL LOAD BRAKE".

CONTROLS - When the winch has been mounted, consideration must be given to the control of:

- | | | |
|------------------------------|-------------------------------|---------------------|
| ◆ Drum direction of rotation | ◆ Winch clutch control | |
| ◆ Drum speed | ◆ Drag brake caliper/actuator | Because of the wide |

variation in the type of controls available, it is the responsibility of the dealer to furnish and install the controls in conformance with the customer's specifications. Proper sizing of each hydraulic component, and by extension the complete hydraulic system, will avoid potential problems such as overheating, and will provide for economical operation throughout the service life of the system.

3.02 HYDRAULIC REQUIREMENTS - To obtain the maximum rated pull and line speed using the Tri-Drive three speed transmission supplied with the CD3, the hydraulic system shall have a rated flow of 30 GPM (114 l/min.) maximum. Hydraulic system pressure shall be 2400 psi (16548 kPa) operating with 2500 psi (17238 kPa) maximum relief valve setting. The recommended hydraulic oil reservoir capacity for the Tri-Drive transmission is 60 gallons (227 liters) of petroleum-based hydraulic fluid. For additional details and information concerning the Tri-Drive transmission, refer to the illustration below and drawing no. 30430 at the end of this manual.



Recommended hydraulic line diameters are:

- ◆ Pump to control valve: 1¼ in. (32 mm)
- ◆ Control valve to tank: 1¼ in. (32 mm)
- ◆ Control valve through power beyond to hydraulic system: 1¼ in. (32 mm)
- ◆ Control valve work ports to Tri-Drive motor ports: 1 in. (25 mm)

Suggested Filtration, based on the hydraulic motor requirements, is 20 to 30 micron (nominal) filters. Consult the filter supplier for specific filter recommendation.

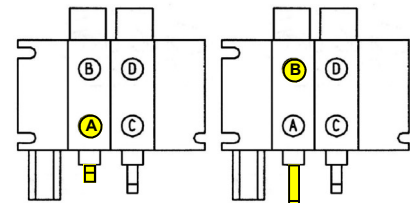
The hydraulic motor case drain (¼ NPT) should be ported to tank.

There are four connections from the control valve to the motor ports. The connections to these ports are dependent upon the configuration of the winch: either overwind or underwind: For an *overwind* configuration, the top ports are the inlet ports and the bottom ports are the outlet ports. For an *underwind* configuration, the top ports are the outlet ports and the bottom ports are the inlet ports. One valve spool with its two ports will control one section on the motor. Therefore, one port of the valve spool should be connected to the top port of one motor section and the other port of the same valve spool should be connected to the bottom port of the same motor section.

In either overwind or underwind configurations the section of the control valve with the anti-cavitation check valves should be connected to the larger section of the motor.

Identification of connections from the individual valve ports to the motor ports is shown in drawing no. 30430 and the illustration shown above.

The full load brake requires a certain minimum amount of backpressure to release. Backpressure may have to be induced dependent upon system pressure.



Note: Spool in "in" position pressurizes A port while spool in "out" position pressurizes B port

3.03 WINCH CLUTCH - The clutch plate is motivated by an air cylinder assembly that is mounted to the hanger assembly. A fork is connected to the piston rod in the air cylinder and the fork contains 2 cam followers which ride in a groove on the clutch plate. The air cylinder is plumbed to a two-position four-way directional control valve. The directional control valve is electrically operated, and is rated for 12 volts DC with a continuous duty rating of 100%. A regulator is provided for maintaining a normal setting of 30-psi (207 kPa) supply pressure to the directional control valve. The regulator is equipped with a Schrader valve stem to attach a pressure gauge (not provided) to monitor input pressure to the cylinder as required.

The regulator has a 1/8 in. PTF port for the incoming air supply. The directional control valve and the cylinder are plumbed at the factory. At the time of installation, the only connection required is the air supply line to the aforementioned regulator port. Refer to drawing 25686.

A terminal strip is provided for the electrical connection to the directional control valve. The terminal strip is located on the hanger assembly. A two-position switch should be used to energize the solenoids in the directional control valve. The solenoids control the positioning of the valve spool thereby directing the airflow to the two ports on the air cylinder. There are three screws on the terminal strip, the center screw is for connection to the ground or common. The other two screws are for the connection to the switch. Each of the two connections from the terminal strip should lead to one side of the two-position switch. Refer to drawing 25687 for additional details.


3.031 OPTIONAL CLUTCH POSITION SENSING

Optional clutch position sensing is available. The electrical output can be wired to a load, such as a coil in a DC relay, and the switch in the DC relay can control a set of lights to provide the operator with an indication of clutch engagement or disengagement.

When the clutch position sensing option is ordered, the air cylinder that actuates the clutch is equipped with a solid-state digital output limit sensor at each end of the cylinder. When the sensor detects the magnetic piston, the current sinking device completes the circuit by connecting the load to the ground. The sensors

are magnetically activated and while they work on the same principle as Hall effect sensors, they are exceedingly sensitive. The sensors are 100% solid-state devices with no moving parts to wear, break, bounce or stick and they are fully encapsulated in plastic resin.

The sensors must be wired as per drawing no. 25777. Since the sensors detect the magnetic piston in the air cylinder and not the switch used to activate the directional control valve, even manual actuation of the clutch is detected by the sensors.

 **Warning - Reverse wiring will destroy the solid-state electronic components in the sensors.**

3.04 CALIPER TYPE DRAG BRAKE - For reasons of safety and convenience, the drag brake is equipped with a remote actuator. The remote actuator, reservoir and flexible hose section are shipped loose with other winch mounting hardware in the parts box. These components are to be installed by the dealer.

3.041 GENERAL GUIDELINES - Hydraulic brake components are precision built mechanisms and must be treated as such. Certain procedures must be followed at the time of installation to ensure their optimum performance, and a few of the more common procedures are listed below:

To properly locate the brake component or brake line, the installer must consider the following:

- ◆ Make it convenient for the operator.
- ◆ Use the shortest and most protected route.
- ◆ Avoid mounting near the engine, exhaust lines, muffler or anywhere that heat may be generated. NOTE: Excessive heat transferred to the brake fluid may result in damage to the lines or seals.
- ◆ Mount the reservoir higher than the brake component to facilitate bleeding.

To properly mount components and brake lines to withstand the most severe vibration and service conditions, the installer must consider the following:

- ◆ Use the right size bolt for the hole and secure with a steel lock washer.
- ◆ Secure tubing to frame with proper size tube clamps to avoid possible fractures or fittings loosening and leaking.
- ◆ Use good, factory-flared lengths of steel tubing. Hand-made flares, when used, should be double flared. Any flash or loose particles must be removed.
- ◆ Use flexible brake line between frame and body.
- ◆ If tubing passes through frame or firewall, a grommet or some other means should be used to protect line from chafing.
- ◆ Use tubing rated for 1500-psi minimum for the line between the actuator and the caliper brake assembly.

The proper removal of air from the brake system is very important. A common problem occurs when air remains trapped in the system causing a "spongy" actuator and inadequate braking. The bleeder screw in the brake assembly must be toward the top. The air in the system will always seek the highest level.

To properly bleed system:

1. Be certain that fittings are tight to avoid leaking.
2. Depress the actuator and open up the bleeder screw to allow the air to escape.
3. Re-tighten the bleeder screws and allow the actuator to return.
4. Repeat the cycle until actuator is firm.
5. Make several static brake applications and then repeat the cycle once more.

The closed circuit hydraulic system must not leak. Even the smallest leak could defeat what would otherwise be a well operating and effective brake system. It could eventually deplete the reservoir and reduce the braking pressure.

To avoid leaks:

- ◆ Check connections during the bleeding and static brake processes to be sure they are tight.
- ◆ Always re-install new hoses, lines and fittings if they look the least bit questionable.

The importance of cleanliness during installation cannot be over-emphasized.

- ◆ Caliper Drag Brakes on Adams Winches may be specified by the customer for brake fluid only or hydraulic oil only. Installation and service personnel must verify which fluid to use for a specific winch, as the two different fluids are not interchangeable. Always use good, clean, quality fluid that conforms to what is specified on the brake components.
- ◆ Be sure all fittings and seats are clean before making connections.
- ◆ Clean the top of the reservoir before removing filler cap.



CAUTION: As a part of routine maintenance, it is recommended that brake hoses and brake lines be inspected regularly. All damaged or worn parts should be replaced. The reservoir should be checked for sufficient fluid level and clean fluid added as required.

3.042 CALIPER BRAKE ASSEMBLY - The caliper brake assembly is mounted at the factory on two studs attached to the hanger (steps 1- 4 have already been performed if the brake assembly was mounted at the factory).

1. Screw in brake module assembly (item 7) until a total clearance of approximately .012 in. (0,3 mm) is obtained between the disc and lining.
2. Back off brake module assembly as required to position ports in vertical alignment.
3. Tighten lock screw with 1/8 in. Allen wrench.
4. Move bleeder screw to higher of 2 ports for ease of bleeding (both ports $\frac{1}{8}$ - 27 NPTF).
5. Install hydraulic line from hydraulic actuator in lower port. The line should be rated for 1500-psi minimum.
6. Bleed the system making sure all air is eliminated. Apply hydraulic pressure and check for leaks.

3.043 RESERVOIR AND ACTUATOR - The remote actuator is normally mounted at the rear of the body, under the tail shelf. Find a location that is safe and convenient to the operator and within sight of the winch operation. Alternate mounting would be in accordance with end user specifications.

The reservoir should be mounted above, and as close as possible to the inlet fitting of the actuator. Both the inlet and outlet fittings of the actuator are $\frac{1}{2}$ - 20 UNS.

The reservoir should be mounted higher than the caliper brake assembly to facilitate bleeding. The flexible hose should be connected to the outlet fitting of the actuator.

1. Mount actuator assembly, using four $\frac{5}{16}$ in. diameter bolts, lock washers and locking nuts, as required. Note: bracket may be used as template for drilling mounting holes.
2. Make necessary hydraulic connections to reservoir and caliper brake.
3. The closed circuit hydraulic system is shipped void of any oil. Fill the system with the correct fluid *as specified on the brake components*: Brake Fluid or Hydraulic Oil. Note: Caliper Drag Brakes on Adams Winches may be specified by the customer for brake fluid only or hydraulic oil only. Installation and service personnel must verify which fluid to use for a specific winch, as the two different fluids are **not interchangeable**.
4. Bleed the system making sure all air is removed from the system. Apply hydraulic pressure and check for leaks. Make several applications to be sure actuator is working properly.
5. After bleeding is complete, check reservoir for sufficient fluid level and add correct type fluid if necessary.

3.05 FULL LOAD BRAKE - Although the full load brake is factory installed, procedures must be followed during installation of the winch to ensure proper brake operation.

Bleeding the full load brake is required anytime air has been introduced into the system, and must always be performed by the dealer during the winch installation, in order to assure proper release of the brake for winch drum rotation. Bleeding is accomplished by pressurizing the system and loosening the bleeder screw on the top of the brake. To avoid fluid loss or spillage, a hose should be connected to the top of the bleeder screw and the outlet of the hose directed to a can or similar container. The brake should be bled until all the air is removed from the brake. Several cycles of pressure bleeding may be required to remove all of the air from the brake.

The pressure from either side of the motor can release the brake. This feature enables the winch to pull in as well as power out. The brake is not direction sensitive.

The maximum pressure rating is 3000-psi including spikes or surges.



WARNING - SURGE PRESSURE IN EXCESS OF 3000 PSI GENERATED BY PUMP SURGE OR RAPID OPENING OR CLOSING OF THE CONTROL VALVE WILL CAUSE THE PISTON TO FRACTURE.

The O-rings (Buna "N" material) in the piston are only compatible with petroleum-based fluid. DO NOT USE NON-PETROLEUM BASED FLUID.

The brake is provided with a case drain. Should fluid leak into the brake housing, the case drain will open to let the fluid escape. If fluid leaks from the case drain, contact the factory for assistance.

WARNING - THE FULL LOAD BRAKE MAY NOT HOLD THE RATED LOAD IF THE CASE DRAIN IS LEAKING FLUID.



Any backpressure in the tank return line may reduce the holding power of the brake. The brake is spring applied and hydraulically released. The backpressure may start to release the brake, thus reducing the holding power of the brake.

CAUTION - BENCH TESTING IS NOT RECOMMENDED BECAUSE IT MAY CAUSE DISTORTION OF COMPONENTS OR BOLT FAILURE.



3.06 WIRE ROPE INSTALLATION – When installing the wire rope, observe the following recommendations:

It is important to select the correct winch and wire rope for a particular application. Wire rope is specified in terms of diameter, length, number of strands, number of wires per strand, composition of center core and direction of lay.

There is a definite advantage in applying wire rope of the proper direction of lay when spooling onto the smooth surface of the winch drum. Wire rope with an improper lay will permit the coils to spread apart each time the load is removed. Using wire rope with the proper lay will tend to keep the coils together when tension is removed. The correct lay will develop tight coils and even layers.

It is important to install the wire rope onto the winch drum with care. Kinking of the rope, caused by the rope taking a spiral shape as a result of an unnatural twist, should be avoided.

When removing wire rope from the reel and spooling onto the winch drum, the reel must be supported on its horizontal axis and free to rotate. Spool the rope onto the drum with the natural bend in the same direction as it comes off the reel.

If wire rope is received in a coil, it should be unwound with the coil in the vertical plane. Again, spool the rope onto the winch drum with the natural bend in the same direction as it was on the coil. Reverse bending of the wire rope should always be avoided or kept to a minimum.

IMPORTANT! WIRE ROPE MUST ALWAYS BE UNDER CONSTANT TENSION WHEN SPOOLING ONTO THE WINCH DRUM.

When the winch drum is in free spool and only the drum shaft extension is being used with a capstan or reel, pass the winch line through the tail shelf sheave and hook the pulling eye to a fixed section of the chassis. This will prevent the rope from unwinding or "clock-springing."



Likewise, when the winch is not in operation, attach the winch line quick hook to a solid member on the tail shelf and slowly take up the slack. This will best maintain the rope under a slight amount of tension until its next use and will prevent the rope from unwinding or "clock-springing."

3.07 WINCH DRUM DIRECTION OF ROTATION - Depending upon customer specifications, the wire rope will either be over-wound or underwound.

OVER-WINDING - is the term used when the winch drum is rotating in the clockwise direction (viewing from the right side) and the wire rope is spooled onto the winch drum at the top. Model CD3 winches have two rope clamps, one located inside of each drum flange, for compatibility with wire rope of either right or left hand lay. It is imperative, however, that the wire rope be attached to the specific side of the drum that is consistent with the lay of the rope and the direction of drum rotation. When the drum will be **over-winding** as the wire rope is spooled in, use the rope clamp on the side of the drum that is the **same** as the lay of the wire rope. For example, if using *right lay* rope on an *over-wind* drum attach the wire rope to the *right side* rope clamp.

UNDER-WINDING – refers to the winch drum that rotates in a counterclockwise direction (viewing from the right side) and the wire rope is spooled onto the winch drum at the bottom. Once again, it is imperative that the wire rope be attached to the correct side of the drum for the specific direction of the lay of the rope given the direction of drum rotation. When the drum will be **underwinding** as the wire rope is spooled in, use the rope clamp on the side of the drum which is **opposite** of the lay of the wire rope. For example, if using *right lay* rope on an *under-wind* drum attach the wire rope to the *left side* rope clamp.

For underwind applications, the wire rope must be guided and maintained as it is routed forward under the body deck to the winch drum. This can be done by using a trough or tube with sufficient width at the front section to allow the wire rope to freely traverse the width of the drum. As the wire rope travels to the drum, and depending on the angle of incline combined with the body cross-member configuration, a floating sheave or roller may be required. Application engineering assistance is available from the factory.

WARNING - THE CABLE CLAMP ALONE IS NOT DESIGNED TO HOLD THE RATED LOAD. ½ OF THE FIRST LAYER OF WINCH LINE MUST BE LEFT ON THE DRUM TO ACHIEVE THE RATED LOAD AND AVOID CABLE CLAMP FAILURE.



3.08 WINCH IDENTIFICATION – Assistance from the manufacturer or dealer is available to help resolve unique problems. When contacting your local dealer or the factory, the model and serial number of the winch in question should be specified so that proper assistance can be offered. This information is stamped on a nameplate affixed to the front of the gearbox.

4. PRE-OPERATIONAL CHECKS

IMPORTANT - BEFORE PLACING THE WINCH IN SERVICE, THE FOLLOWING CHECKS MUST BE MADE:



- ◆ Make certain that the winch assembly is properly secured to the chassis frame.
 - ◆ The operator must have a complete understanding of all winch functions and the location and operation of all controls.
 - ◆ The winch line should be spooled onto the drum under tension with tight, even, coils and lays.
 - ◆ It is not necessary to have the drum filled with winch line. Additional pulling capability can be obtained by only installing a slight excess of the maximum length required for the job, while also improving the laying of winch line on the drum.
 - ◆ Refer to the operating manual for the vehicle for specific operational instructions on the hydraulic system.
- This list continues on the next page**

- ◆ Check the hydraulic system reservoir to make certain that it is filled to the correct level with the proper grade of oil.
- ◆ Make certain that the reservoir shut-off valve is OPEN.
- ◆ Check the hydraulic system for the correct pressure and flow.
- ◆ Check all winch and winch accessory gear housings for the correct oil level and grade. See Section 6.02 LUBRICATION.
- ◆ Engage the hydraulic pump drive and allow the oil to circulate and warm up for a few minutes before operating the winch. This is particularly important during extremely cold weather.
- ◆ Check the operation of the drag brake.
- ◆ Check the truck body load area in a triangular section between the tail shelf sheave and both drum flanges to see that there are no obstructions that could restrict the travel of the winch line or levelwind.
- ◆ Make sure the full load brake and drag brake have been bled to assure positive activation of the brakes. See Section 3 for procedures.



IMPORTANT - BEFORE THE WINCH IS ACTUATED, THE FULL LOAD BRAKE MUST BE BLED. See Section 3.05, INSTALLATION.

5. WINCH OPERATION

The following procedures must be observed to assure safe and efficient winch operation:

- ◆ Refer to operating manual for the vehicle for specific operational instructions on the hydraulic system.
- ◆ Check the body load area to make certain there are no tools or equipment to restrict winch line travel or level wind movement.
- ◆ Check the lay of the winch line on the drum and check for uneven build-up of the winch line.
- ◆ Check to be certain that the winch clutch is fully engaged, as described in Section 2, Precautions. With rotation stopped, place the winch clutch control switch in the desired position for either paying out or winding in.
- ◆ Operate the directional control valve to achieve the desired direction of drum rotation.
- ◆ Pull the load steadily and evenly.
- ◆ To stop the winch, release the directional control valve lever.
- ◆ When free spool is required, stop the drum rotation completely and disengage the clutch by moving the control switch to the free-spool position.
- ◆ To control the drum speed in free spool use the caliper brake actuator lever and apply pressure according to the amount of braking required to keep the drum from over-spooling.

CAUTION - THE DRAG BRAKE IS USED TO CONTROL THE DRUM SPEED ONLY. IT IS NEVER TO BE USED TO HOLD THE LOAD.



- ◆ When finished using the winch, stow the free end of the winch line by passing the winch line through the tail shelf sheave and hooking the pulling eye onto a fixed section of the chassis. A slight amount of tension should be maintained in the winch line to help prevent the formation of loose wraps on the drum.

6. MAINTENANCE

6.01 GENERAL - Inspection of the winch and related components should be a continuing procedure. The operator should be constantly alert to detect clues to a potential problem such as unusual noises, excessive oil leakage or overheating. The operator should report immediately any changes in the normal characteristics of the winch, winch accessory or the hydraulic system.

If the winch has not been used for an extended period of time, inspect the interiors of the drive housing and final drive housing for water deposits and rust due to the elements or condensation. Particular attention should be given to any damaged bearings, seals or gaskets. The oil should be checked for contamination, abrasive foreign particles and lubrication qualities. As required, oil should be added or completely drained and filled.

The wire rope should be inspected visually for kinks, bends, cuts or broken strands while operating. Wire rope that does not meet OSHA criteria must be replaced.

Depending on the total length of the wire rope versus the length most often used, it is possible that the top lays will show the most wear. To obtain additional life, subject to the proper conditions, the rope can be rotated end for end.

The hydraulic system should be checked periodically for:

- ◆ Overheating
- ◆ Abnormal noise
- ◆ Maintaining a clean, sufficient, quantity of hydraulic oil of the proper grade.
- ◆ Keeping all connections sufficiently tight to prevent oil leakage and air from entering the system.
- ◆ Changing the hydraulic system oil filter at the frequency recommended by the filter manufacturer.

IMPORTANT - BEFORE THE WINCH IS ACTUATED, THE FULL LOAD BRAKE MUST BE BLED. See Section 3.05 Full Load Brake.



WARNING - THE FULL LOAD BRAKE MAY NOT HOLD THE RATED LOAD IF THE CASE DRAIN IS LEAKING FLUID.

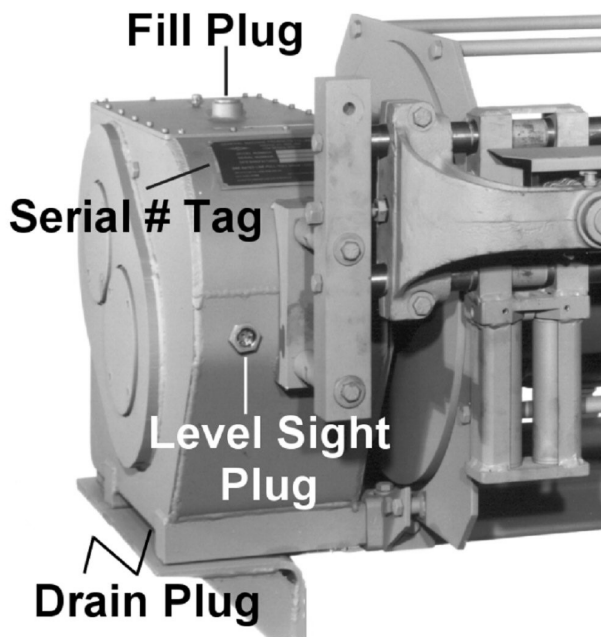


IMPORTANT - THE LOAD HOLDING ABILITY OF THE FULL LOAD BRAKE SHOULD BE TESTED ON A PERIODIC BASIS.



6.02 LUBRICATION - An ongoing routine for assuring proper lubrication should be a part of the overall maintenance program.

The gearbox oil reservoir must be checked and maintained. To check for the proper oil level, examine the sight gauge. To add oil, remove the filler plug in the gearbox cover. Add 80W 140 oil as required to bring the oil level up to the middle of the sight gauge. Do not overfill! Screw the filler plug back into the gearbox cover.



The gearbox oil level should be checked every seventy-five (75) hours of operation and should be completely drained and filled with new oil at least every other year. The drain plug is located on the underside of the gearbox. To drain the gearbox, remove the oil drain plug located on the underside of the gearbox. Remove the filler plug in the gearbox cover. After the gearbox is completely drained, reinstall the oil drain plug. Add six (6) U.S. gallons (22,7 ℓ) of fresh 80W140 oil as described above and reinstall filler plug.

Grease fittings and oil cups on the levelwind should be serviced every seventy-five (75) hours of operation.

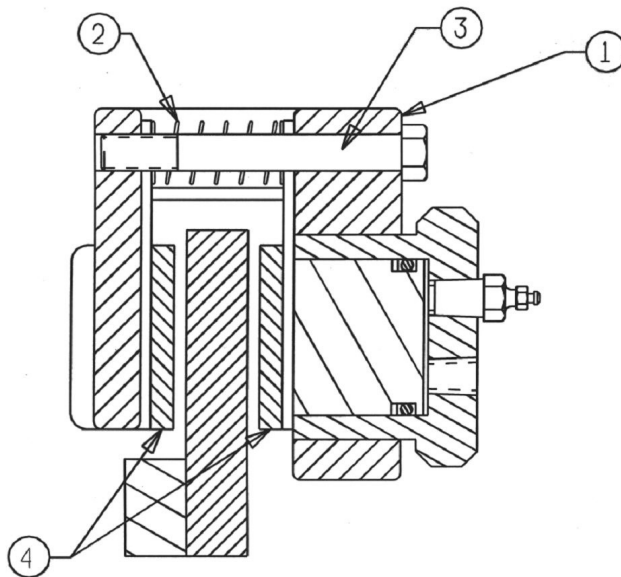
Apply a coat of engine oil to all chain drives every seventy-five (75) hours of operation. The lubricant should be applied on the inside surface of the roller or silent chain by means of a spray or brush.

When the winch is not in operation, pass the winch line through the tail shelf sheave and hook the pulling eye onto a fixed section of the chassis. Slowly take up the slack. This will best maintain the rope under a slight amount of tension until required again. Wire rope is considered to be a machine, having many moving parts. Each time the rope bends or flexes, the various wires and strands slide over each other. Lubricating the wire rope periodically will minimize friction and extend life expectancy. The type of lubricant, method and frequency of application are dependent on each particular circumstance. For specific lubrication details, contact the wire rope manufacturer.

6.03 WINCH IDENTIFICATION - Assistance from the manufacturer or dealer is available to help resolve unique problems. When contacting your local dealer or the factory, the model and serial number of the winch in question should be specified so that proper assistance can be offered. This information is stamped on a nameplate affixed to the front of the gearbox.

6.04 CALIPER BRAKE - It is recommended that brake hoses and brake lines be inspected regularly. All damaged or worn parts should be replaced. The reservoir should be checked for sufficient fluid level and clean fluid of the correct formulation added as required. See Section 3.04 Caliper Brake for special instructions on bleeding and determining whether to use brake fluid or hydraulic oil for a specific winch.

NOTE: Linings can be replaced without retracting (unscrewing) the brake module assembly.



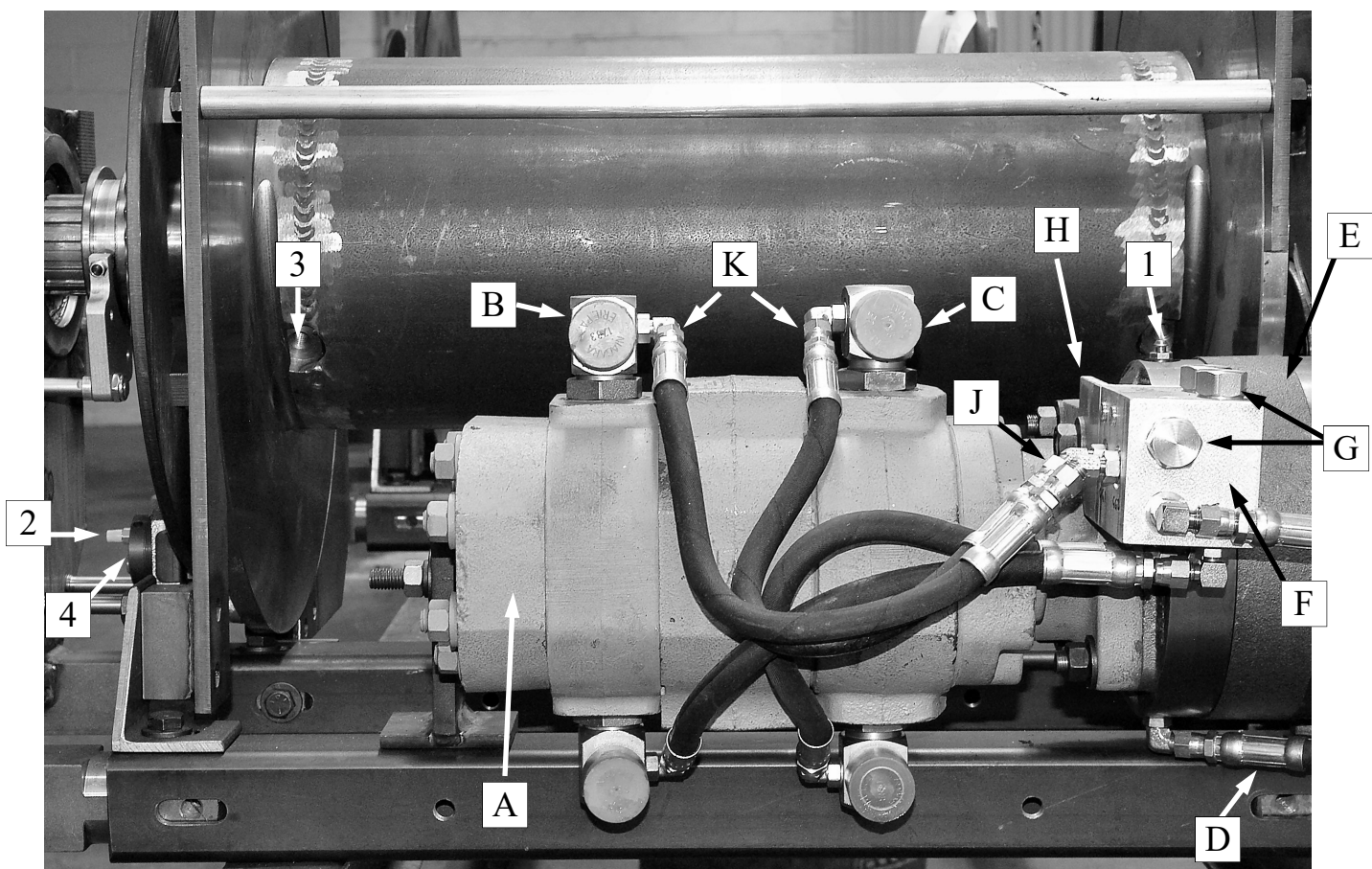
1. Remove cap screw 3 and spring 2; allow linings 4 to drop out of housing 1.

2. Push piston back into brake module bore.

3. Install new lining assembly 4 on piston side of housing.

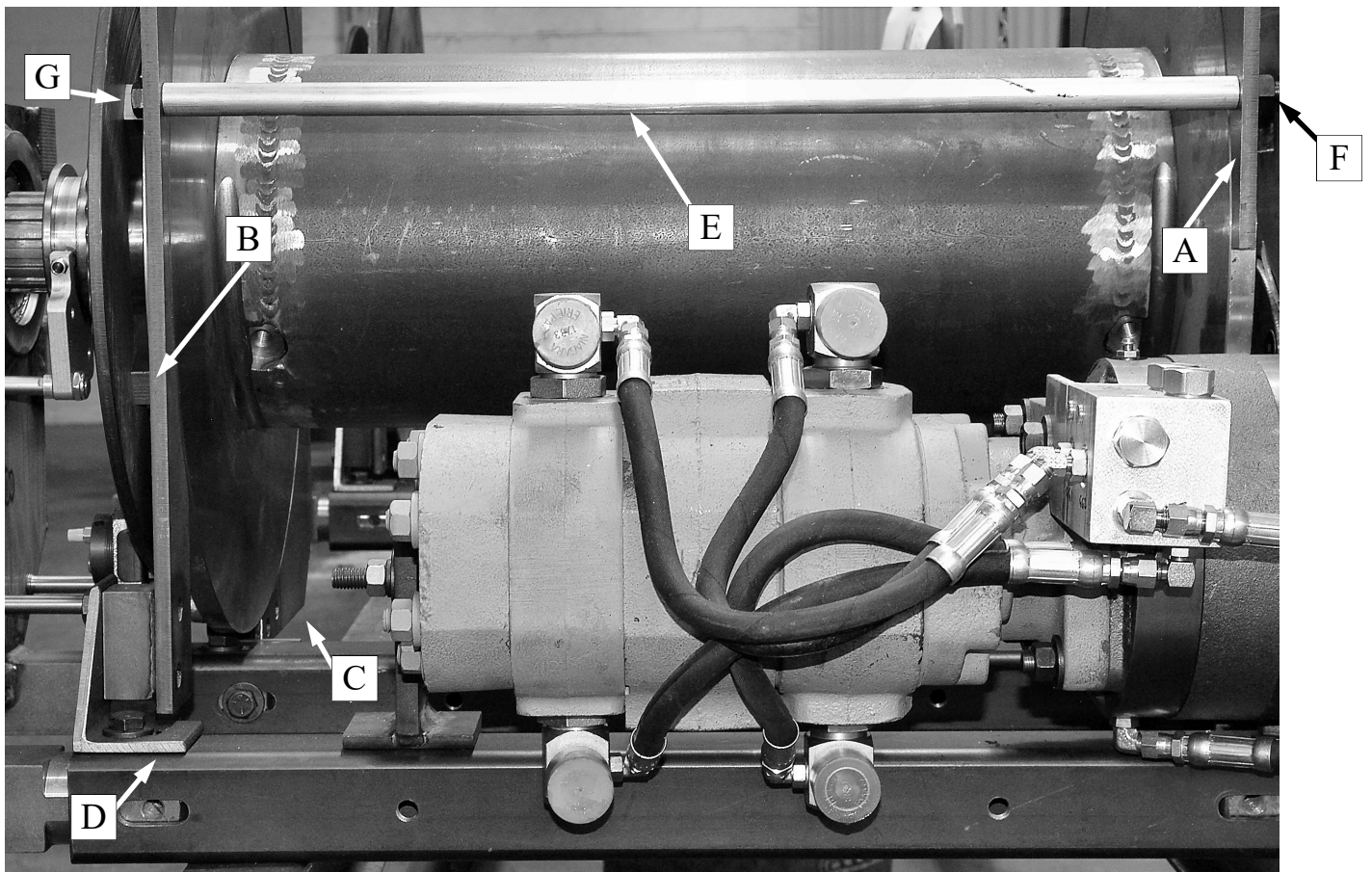
4. Install spring 2; then install second new lining assembly 4 on housing.

5. Install cap screw 3 and torque 10-12 ft. lbs. (14-16 N · m)



Motor/Full Load Brake / Shuttle Valve

Locator	Item #	Description	Qty.
A	26100	Motor, Two-section Hydraulic	1
B	25654	Fitting, Left Hand	2
C	25658	Fitting, Right Hand	2
D	25369	Hose, Assembly	5
E	26099	Brake, Full Load	1
F	26281	Block, Shuttle Valve	1
G	25363	Cartridge, Shuttle Valve	3
H	26534	Bracket, Shuttle Valve (not shown)	1
J	25695	Fittings, 45° SAE	2
K	25365	Fittings, 90° SAE	8
Note 1	Location of Bleeder Screw for Full Load Brake		
Note 2	Location of Bleeder Screw for Caliper Brake		
Note 3	Rope Clamp-Order to match Cable Size		2
Note 4	Inlet Port for Caliper Brake from Actuator		

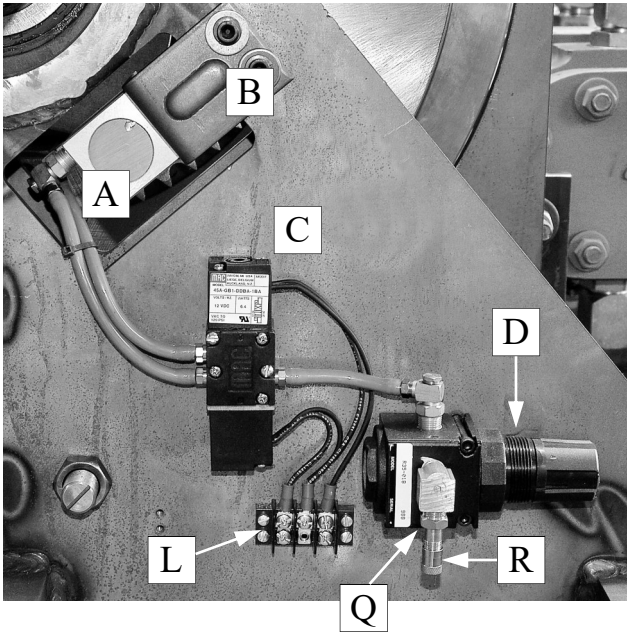


Drum Guard

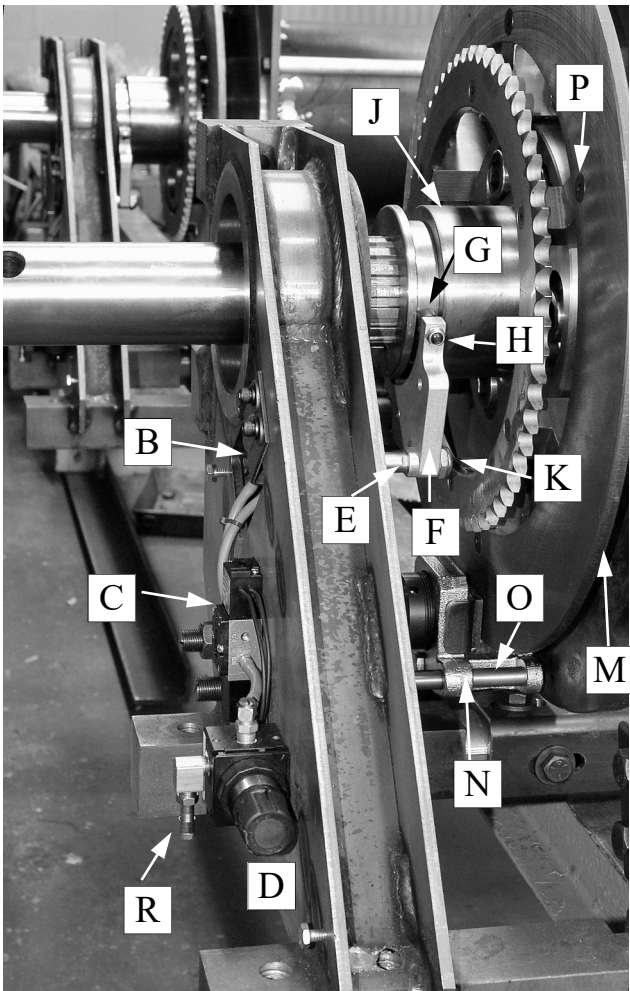
Locator	Item #	Description	Qty.
A	26262	Guard, Drum (Gear Box Side)	1
B	26263	Guard, Drum (Hanger Side)	1
C	26264	Bracket, Drum Guard	2
D	26265	Bracket, Drum Guard	1
E	26105	Bar, Cross	4
F	26273	Rod, Threaded	1
G	16967	SCAP .50-20 x 1.25 HHCS GR5	7

Details of Air Shift Clutch and Caliper Brake Mechanisms

Cover Removed for Visibility

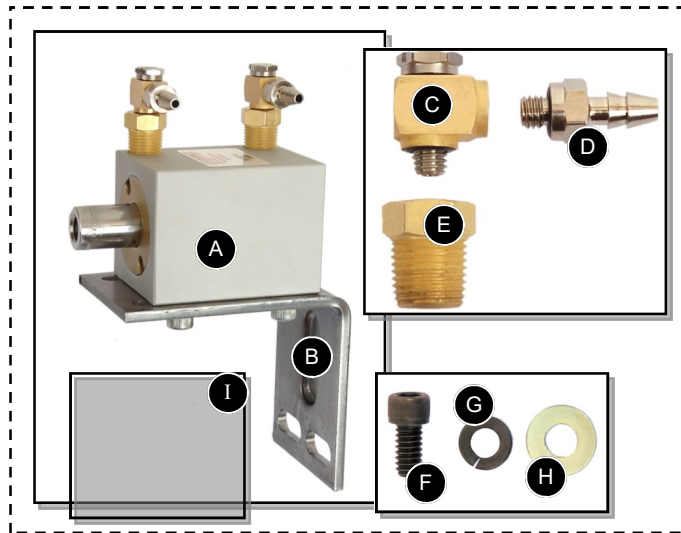


more detail of above photo found on next page

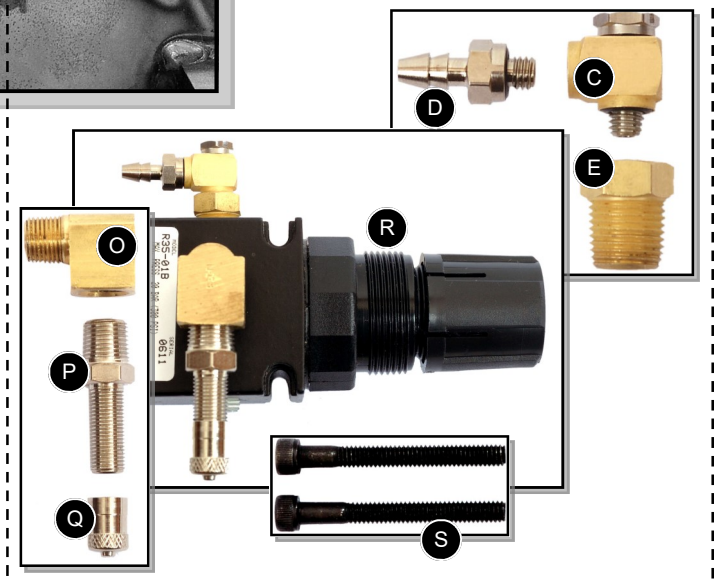
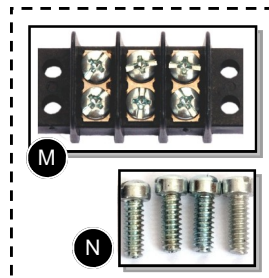
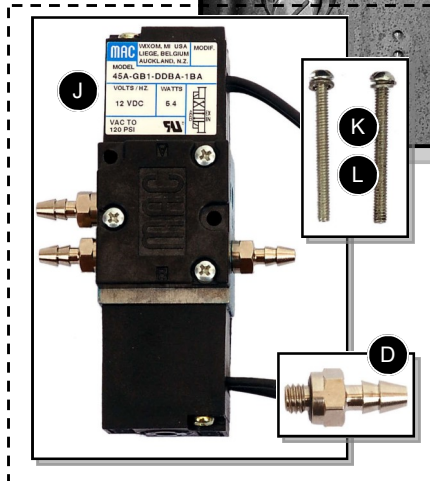
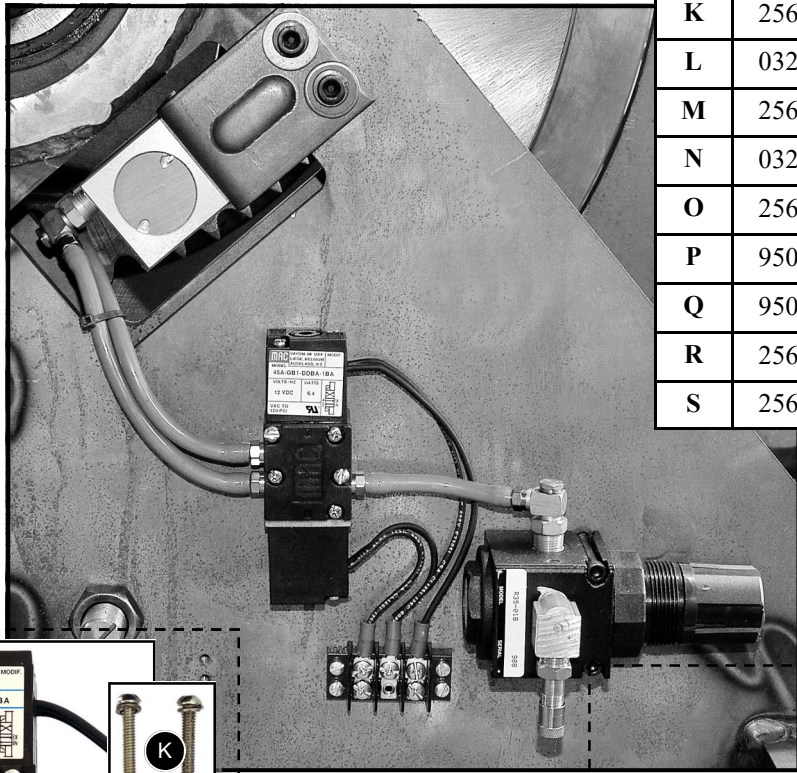


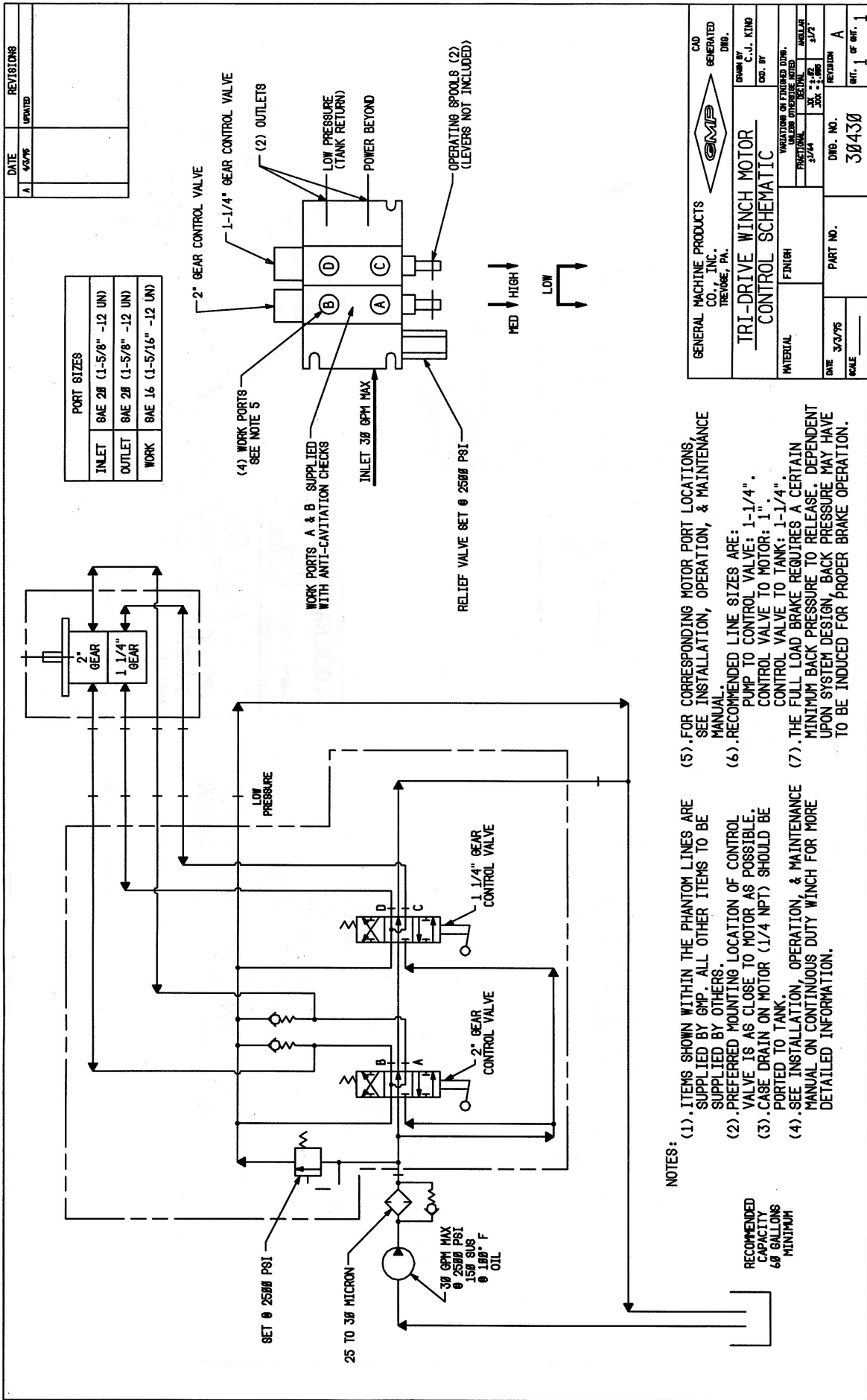
Key	P/N	Description	Qty
A	25677	Air Cylinder	1
B	27447	Air cylinder Mounting Bracket	1
C	25678	Air Directional Valve	1
D	25675	Regulator w/Schrader Valve	1
E	25767	Shifter Fork Stud	1
F	26243	Shifter Fork	1
G	25601	Bearing	2
H	25332	1/4—20 Elastic Stop Nut	2
J	25817	Clutch Plate	1
K	25333	1/2—20 Elastic Stop Nut	1
L	25634	3—Pair Terminal Block	1
M	25828	Caliper Brake Ring	1
N	17134	Caliper Brake	1
O	26199	Caliper Brake Stud	2
P	25453	5/16—18x1 Flathead Hex Cap Screw	6
Q	Location of air inlet port to regulator		
R	Schrader valve for test gauge connection		
	25237	Replacement Brake pads	1 pr
	17135	Actuator *	1
	17136	Reservoir *	1
	17137	Hose *	1
* Caliper Brake items ship in parts box for installation by the vehicle body builder.			

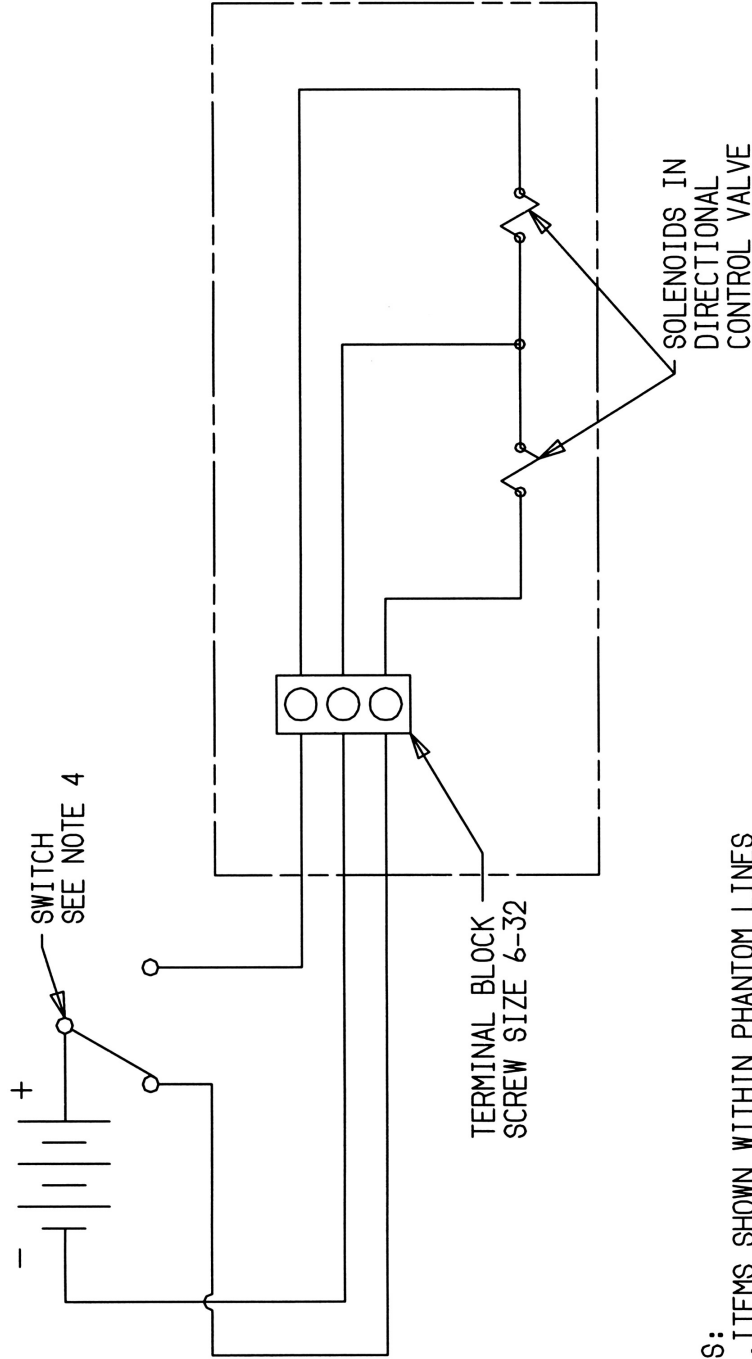
Details of Air Shift Clutch for CD 3



Loc	P/N	Description	Qty
A	25677	Air cylinder	1
B	27447	Bracket	1
C	27443	Elbow	3
D	27337	Barb	6
E	27444	Adaptor	3
F	09035	Screw	2
G	03267	Lock Washer	2
H	17520	Flat Washer	2
I	03343	Screw	4
J	25678	Valve	1
K	25691	Screw	2
L	03261	Lock Washer	2
M	25634	Terminal Strip	1
N	03293	Screw	4
O	25626	Elbow	1
P	95039	Valve Stem	1
Q	95044	Cap	1
R	25675	Regulator	1
S	25690	Screw	2







- NOTES:
1. ITEMS SHOWN WITHIN PHANTOM LINES ARE SUPPLIED BY GMP. ALL OTHER ITEMS TO BE SUPPLIED BY OTHERS.
 2. SPECIFICATIONS ON THE DIRECTIONAL CONTROL VALVE ARE:
VOLTAGE SELECTION - 12V DC
CONTINUOUS DUTY RATING - 100%
COIL LEADS - 22 AWG
 3. TERMINAL STRIP CONNECTIONS ARE 6-32.
 4. RECOMMENDED SWITCH TYPE IS 2 POSITION, (ON/OFF).

GENERAL MACHINE PRODUCTS
CO., INC.
TREVORE, PA.



CAD
GENERATED
DWG.

AIR SHIFT CLUTCH ELECT. CONTROL SCHEMATIC

DRAWN BY
C.J. KING

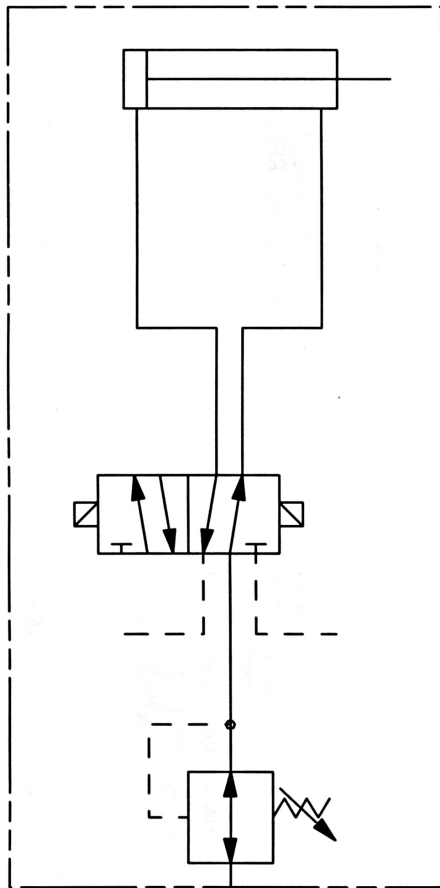
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VARIATIONS ON FINISHED DIMS.
UNLESS OTHERWISE NOTED

FRACTIONAL	DECIMAL	ANGULAR
$\pm 1/64$	$\pm .005$	$\pm 1/2^\circ$

MATERIAL	FINISH	DWG. NO.	REVISION
		25687	B
DATE 1/11/93	PART NO.	SHT. 1	OF 8HT. 1
SCALE -----			

REGULATOR
PORT
ATTACHMENT



NOTES:

1. ITEMS SHOWN WITHIN PHANTOM LINES ARE SUPPLIED BY GMP. ALL OTHER ITEMS TO BE SUPPLIED BY OTHERS.
2. SPECIFICATIONS ON THE REGULATOR ARE:
 MAXIMUM PRESSURE - 300 PSI
 ADJUSTMENT RANGE - 0 TO 60 PSI
 NORMAL SETTING - 30 PSI
 INLET PORT SIZE - 1/8" NPT
3. SPECIFICATIONS ON THE DIRECTIONAL CONTROL VALVE ARE:
 OPERATING PRESSURE - 30 TO 120 PSI
 FILTRATION & LUBRICATION:
 40 MICRONS RECOMMENDED
 LUBRICATION IS NOT REQUIRED
 BUT IF USED, A MEDIUM ANILINE POINT OIL (180° F TO 210° F) IS RECOMMENDED.

GENERAL MACHINE PRODUCTS
CO., INC.
TREVOSE, PA.

CAD
GENERATED
DWG.



AIR SHIFT CLUTCH PNEUMATIC CONTROL SCHEMATIC

DRAWN BY
C.J. KING

CKD. BY

MATERIAL	FINISH	VARIATIONS ON FINISHED DIMS. UNLESS OTHERWISE NOTED		
		FRACTIONAL	DECIMAL	ANGULAR
		±1/64	.XX = ±.02 .XXX = ±.005	±1/2°

DATE
1/8/93

SCALE

PART NO.

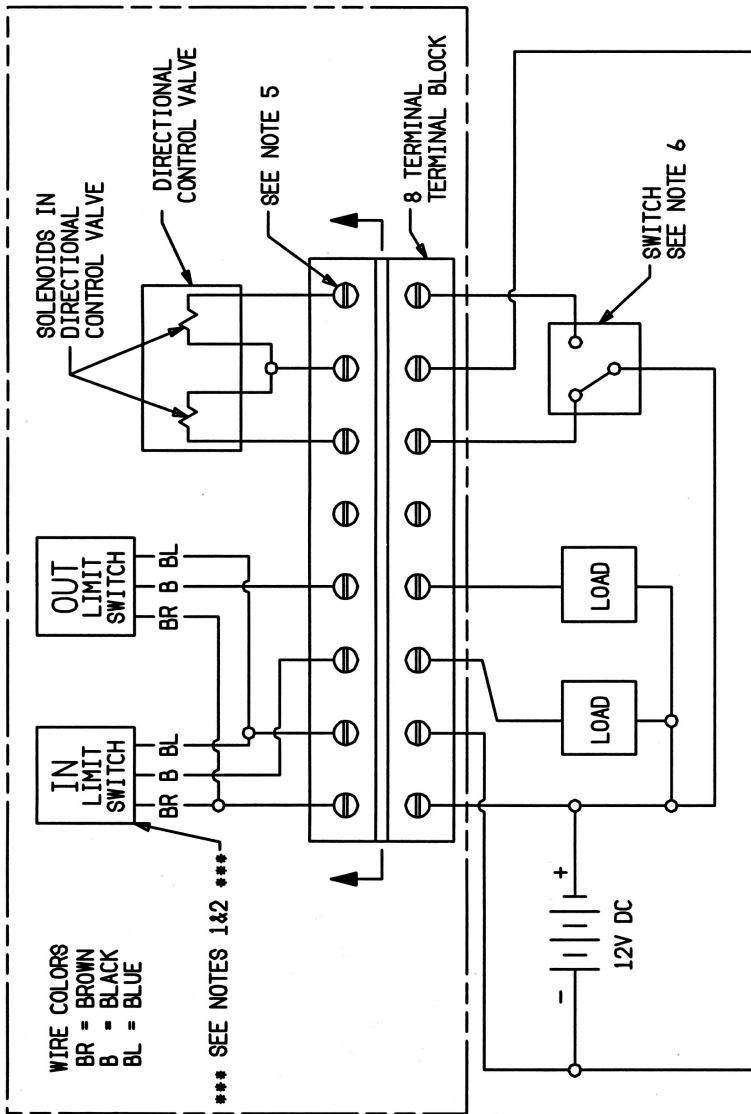
DWG. NO.

25686

REVISION

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SHT. 1 OF 8HT. 1

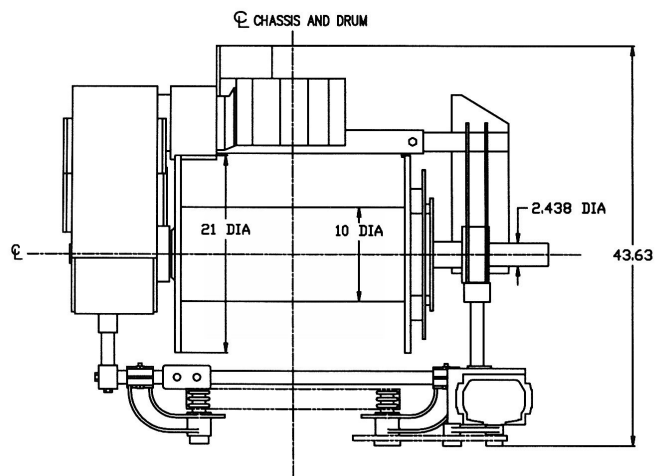
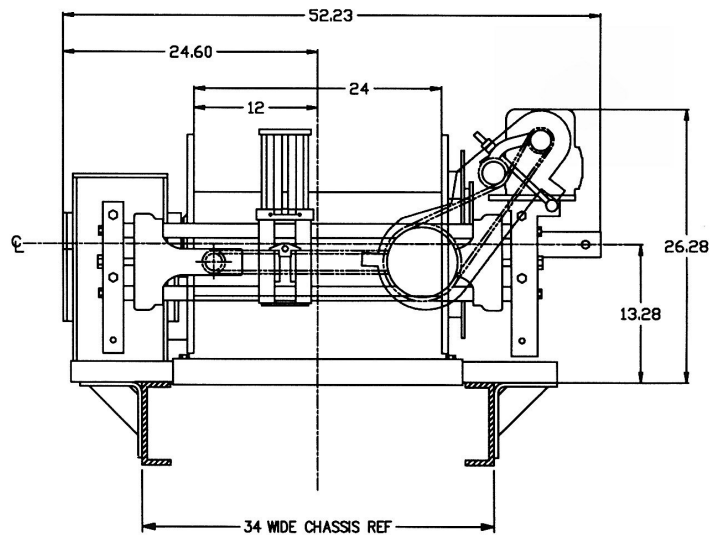
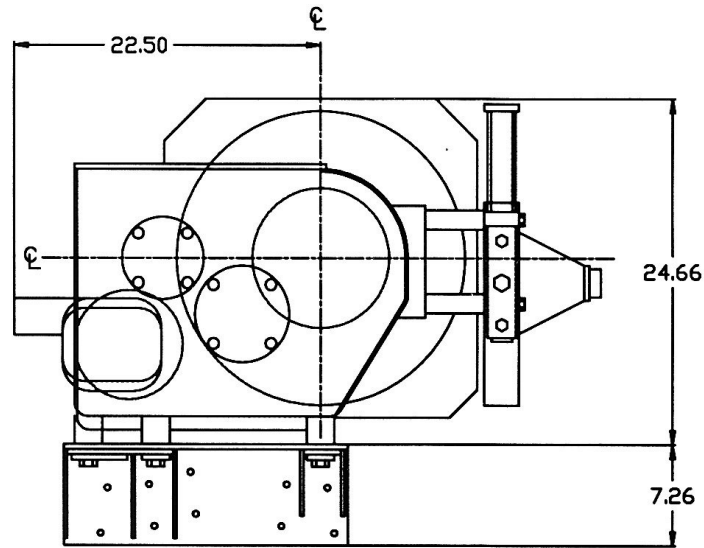


NOTES:

1. CONTACT GMP FOR APPLICATION ENGINEERING SUPPORT.
2. *** WARNING *** REVERSE WIRING WILL DESTROY SOLID STATE ELECTRONIC COMPONENTS.
3. ITEMS SHOWN WITHIN PHANTOM LINES ARE SUPPLIED BY GMP. ALL OTHER ITEMS TO BE SUPPLIED BY OTHERS.
4. SPECIFICATIONS ON THE DIRECTIONAL CONTROL VALVE ARE:
VOLTAGE SELECTION - 12V DC
CONTINUOUS DUTY RATING - 100%
COIL LEADS - 22 AWG
5. TERMINAL BLOCK CONNECTIONS ARE 6-32 SCREW TERMINALS. CONNECTIONS ON THIS SIDE OF THE BLOCK ARE MADE AT THE FACTORY.
6. RECOMMENDED SWITCH TYPE IS A 2 POSITION, (ON/ON).

7. LOAD IS TYPICALLY A DC COIL IN A RELAY. THE SWITCH IN THE RELAY THEN CONTROLS THE LIGHTS.

GENERAL MACHINE PRODUCTS CO., INC. TREVOSE, PA.				CAD GENERATED DNG.	
AIR SHIFT CLUTCH WITH SENSORS WIRING DIAGRAM		DRAWN BY D. BORISH		CRO. BY	
DATE 07/29/93		PART NO.		DNG. NO.	
SCALE NONE				25777	
				REVISION C	
				SHT. 1 OF SHT. 1	



Model CD3 Winch Specifications

No other winch available anywhere offers you the same time-tested, rugged performance as the Adams Continuous Duty. Now the best cable pulling winch your money can buy comes loaded with new performance features, and its more compact design takes up less than 25 in. of space on either side of the drum centerline *with no sacrifice in capacity*. What's more, we've simplified the installation to give the Adams CD3 the *lowest* installed cost compared to *any* other continuous duty winch in its class!

Rated in compliance with SAE J706 Bare drum pulling capacity: 24,000 lbs. (106.8 kN)

Check Out These Standard Features

- ◆ Highly efficient helical gears
- ◆ 3-speed hydraulic transmission with control valve providing true "shift-on-the-fly"
- ◆ Full load brake - spring applied, hydraulic release
- ◆ Free spool caliper drag brake
- ◆ SAE rated bolt-on mounting brackets
- ◆ Air shift clutch
- ◆ Drum guard

Maximum Rate Line Pull & Line Speeds

Hydraulic Tri-Drive Three Speed Transmission

- ◆ Hydraulic system flow 30 GPM (114 l/min.) maximum; Hydraulic system pressure 2400 psi (16548 kPa)

Control Valve Position	Max Rated Line Pull		Winch Line Speed		Shaft Speed
	Bare Drum lbs. force (kN)	Full Drum lbs. force (kN)	Bare Drum ft./min.(m/min.)	Full Drum ft./min.(m/min.)	
High	7100 (31.6)	3800 (16.9)	113 (34.4)	210 (64.0)	40.8
Intermediate	13500 (60.1)	7300 (32.5)	72 (21.9)	134 (40.8)	26.0
Low	24000 (106.8)	13000 (57.8)	45 (13.7)	84 (25.6)	16.3

erating with 2500 psi (17238 kPa) maximum relief valve setting.

- ◆ Winch line speed is based on 9/16 in. (14.3 mm) diameter wire rope.
- ◆ The line pull ratings shown are for the winch only. Consult the wire rope manufacturer/or wire rope ratings.

Drum Storage Capacities For Typical Wire Rope Diameters ¹

Diameter	Ø in.	7/16	1/2	9/16
	(mm)	(11.1)	(12.7)	(14.3)
Length	feet	2630	1890	1510
	(meters)	(802)	(576)	(460)

Selection of the proper wire rope diameter, with a minimum breaking strength and allowable pull appropriate for use on these winches is the responsibility of the user.

- ◆ For information on wire rope sizes other than those shown, consult the factory.

¹ For SAE rated wire rope capacities, use 90% of the values shown.

GMP reserves the right, without notice, to make changes in equipment design or components as progress in engineering or manufacturing methods may warrant.
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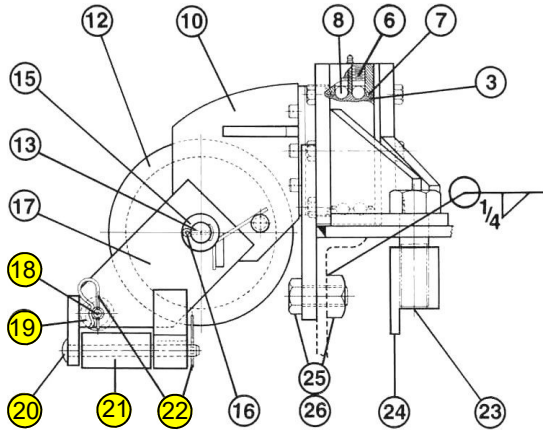
 **Adams**[®]
Proven Quality Winches from GMP

General Machine Products (KT), LLC
3111 Old Lincoln Highway Trevose, PA 19053 USA
TEL: 215-357-5500 FAX: 215-357-6216
E-MAIL: info@GMPtools.com
WEB: <http://www.GMPtools.com>

Addendum: How to secure winch cable to drum

1

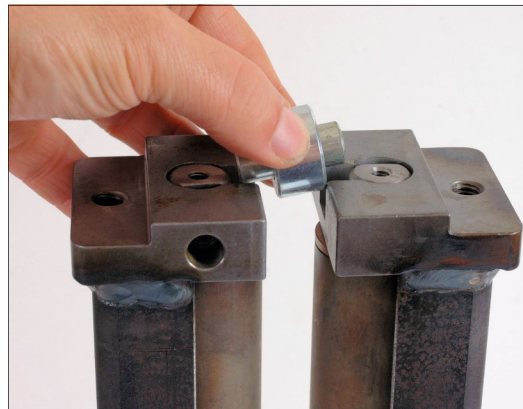
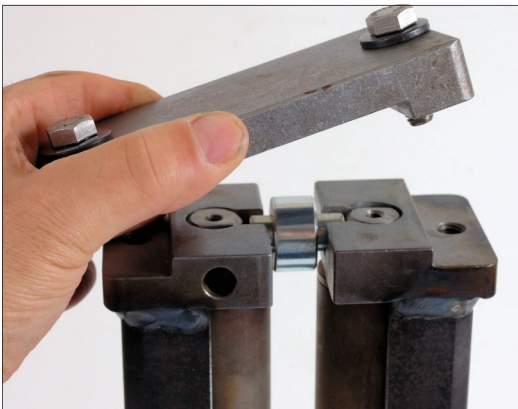
Feed winch line loop thru Swivel Sheave, following directions below.



Remove hitch pins 22 on upper and one lower roller. Pull out pin 20 and remove roller 21. Remove pin 18 releasing roller 19. The cable will now be free to pull thru the Universal Sheave.

2

Remove the top plate and roller on winder and remove cable. Replace parts so as not to loose them.



Wind the cable on the drum tightly and secure loop end to a lower wrap with tie wraps or suitable fastener.



Ensure that the winch clutch is engaged when using an accessory on the shaft extension so that the drum turns with the shaft.

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GMP Warranty

1a. General Machine Products (KT), LLC ("GMP") warrants to the purchaser and/or end user:

(1) that a new product sold and manufactured by GMP will be free from original defects in material and workmanship under normal conditions of use for one year from the date the product was delivered to the purchaser and/or end user;

(2) that a new product sold and not manufactured by GMP will be covered exclusively by the manufacturer's warranty;

(3) that a reconditioned used GMP product sold by GMP, or a non-owned product repaired by GMP, or a new part sold by GMP, will be free from original defects in material and workmanship for ninety days from the date the product was delivered to the purchaser and/or end user;

(4) that consumable items, including, but not limited to, pole hardware, lashing wire, duct swabs, wire clamps, will be free from original defects in material and workmanship when delivered to the purchaser and/or end user.

1b. The above warranties are contingent upon and subject to the condition that: **(1)** the end user substantiates the date it purchased and received delivery of the product or part, and **(2)** the product or part shall have been installed, maintained and used in accordance with GMP's or the manufacturer's written instructions.

2. The end user shall determine the suitability of GMP's product or part for intended use, and the end user assumes all risk and liability whatsoever in connection therewith except to the extent set forth in this Warranty.

3a. GMP reserves the right to request that the product or part be returned to it for examination and shall not be responsible for user charges incurred in the replacement of any product. GMP's agreement to repair or replace is also subject to its inspection of the product and verification of the nonconformity.

3b. Subject to immediate written notification of a nonconformance to this Warranty, GMP will, at GMP's option, repair, replace, or refund the purchase price of that product or part, returned freight prepaid to GMP in Trevoze, PA.

3c. To obtain repair or replacement service under this Warranty, the purchaser must contact the factory for a Return Material Authorization (RMA). Once obtained, send the RMA along with the defective part or product, transportation prepaid to:

General Machine Products (KT), LLC

3111 Old Lincoln Highway
Trevoze, PA 19053 USA
Tel: 215.357.5500

3d. The field labor and material charges incurred by an authorized GMP dealer or an end user to disassemble, inspect, repair and reassemble our product or part at their respective prime locations will not be reimbursed unless GMP has first reviewed and approved those charges.

3e. Incidental repair charges incurred by an authorized dealer or an end user for items such as labor, transportation, tolls, lodging and meals at a location remote from its prime facility, or to demount our product or part from its remote location and forward to its prime facility, are not the responsibility of GMP, and are not covered by this Warranty.

3f. Incidental repair charges incurred by an authorized GMP dealer or end user to remove construction hardware, modify a vehicle or otherwise gain access to GMP's product or part, is a condition beyond GMP's control, and is not covered by this Warranty.

4a. GMP products or parts which become part of a total assembly which has been designated and/or manufactured by others, are not covered by this Warranty unless GMP reviews the total assembly and expressly extends its warranty.

4b. Design, material and workmanship furnished by others to install or operate a GMP product or part are not covered by this Warranty with respect to GMP's products or parts which are used in that particular assembly.

4c. Hydraulic, pneumatic, electrical or mechanical control equipment which is not manufactured by GMP and which becomes a part of a GMP assembly, is not covered by this Warranty.

4d. This warranty does not cover damage from abuse, misuse, improper installation, improper operation, alteration, lack of maintenance, negligence in storage or handling, or normal wear and tear of the product.

5a. THE ABOVE WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTIES OR GUARANTEES OF ANY KIND OR DESCRIPTION, EXPRESS OR IMPLIED.

5b. IN NO EVENT SHALL GMP BE LIABLE FOR ANY INJURY, LOST PROFITS, LOSS OR DAMAGE IN CONNECTION WITH THE INSTALLATION OR USE OF THIS PRODUCT OR PART, EXCEPT AS STATED IN THIS WARRANTY. GMP WILL IN NO EVENT BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE SALE, HANDLING, USE OR INABILITY TO USE THE PRODUCT OR PART, WHETHER SUCH CLAIM IS BASED UPON BREACH OF CONTRACT, BREACH OF WARRANTY, STRICT LIABILITY, TORT, NEGLIGENCE OR ANY OTHER THEORY.

5c. GMP'S SOLE LIABILITY AND THE PURCHASER'S SOLE REMEDY FOR A FAILURE OF A PRODUCT OR PART UNDER THIS WARRANTY, AND FOR ANY AND ALL CLAIMS ARISING OUT OF THE PURCHASE AND USE OF THE PRODUCT OR PART SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF THE PRODUCT OR PART THAT DOES NOT CONFORM TO THIS WARRANTY.

6. GMP reserves the right, without notice, to make changes in equipment design or components as progress in engineering or manufacturing methods may warrant.

7. This Warranty shall be construed in accordance with the laws of the State of Pennsylvania, of The United States of America.

8. This Warranty may not be modified, in whole or in part, except by writing signed by an authorized officer of GMP.