ADVANCE LIFTS

Installation, Operation and Maintenance Manual for the Following Equipment:

All “P” Series Lifts, P-2524 – P-6060
All “P” Series Lifts, P-2536+Z & P-4036+Z
All “LT” Series Lifts, LT-1036 – LT-2036
All “LTD” Series Lifts, LTD-0536 - LTD-1536

☐ This manual contains specific information for your equipment, see options on P 2-1.

In any correspondence with your distributor you will need the following information:

Model Number_____ Serial Number_____

Installation location: _____

_____

_____

CAUTION:

At Initial Installation, determine proper motor/pump rotation by starting the motor in very short intervals to prevent permanent pump damage. Running the pump backwards will damage it. See the Installation Instructions, Section 4, for proper procedure.

Distributor Information: _____

_____

_____

Advance Lifts, Inc.
701 Kirk Road
St. Charles, IL 60174-3428
Toll Free 1-800-843-3625
Sales Fax 1-630-584-9405
Parts and Service Fax 1-630-584-6837
E-mail: Parts@advancelifts.com

*Advance Lifts, Inc. furnishes one manual with each unit. Additional manuals are available for $25.00 each.

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☐ Continuous running power unit: Photo and schematics
☐ Other_____

***Mandatory reading before attempting installation.**

Congratulations, the equipment that you have purchased is of the highest quality available. Your Advance Lift will provide you with many years of trouble free service in return for the minimal maintenance described in this manual.

Please be sure that no individual is allowed to operate the lift until they have been fully familiarized with the operating instructions in this manual. Also, insure that at least one person at the lift site is familiar with the maintenance section of this manual and is assigned responsibility for doing the maintenance on a regular basis.

Please note that the lift has a metal nameplate attached to it that contains information such as the model number, capacities, and serial number. Do not remove the nameplate. Be sure that no operator ever exceeds the capacities shown on the nameplate or they may injure personnel or cause damage to the lift.

Also, be sure to have the serial number of the lift handy if you have to call your distributor. That number identifies your specific lift and will allow your distributors personnel to give you the most thorough and timely assistance possible.

This manual is under constant review and we would appreciate any constructive suggestions that may enhance its usefulness. Please send your suggestions to Advance lifts, Inc. Attn: Customer Service Department.

Thank you for purchasing our product.

SECTION 3. RESPONSIBILITIES OF OWNERS & USERS

Inspection and Maintenance: The lift shall be inspected and maintained in proper working order in accordance with this manual and safe operating practices.

Removal from Service: Any lift not in safe operating condition shall be removed from service until it is repaired to the original manufacturer's standards.

Repairs: Authorized personnel in conformance with the manufacturer's instructions shall make all repairs.

Operators: Only trained and authorized personnel shall be permitted to operate the lift. They must understand to be alert to safety hazards during all operations.

Before Operation: Before using the lift, the operator shall have:

1. Read and understood the manufacturer's operating instructions and safety rules, or been trained by a qualified person.

2. Inspected the lift for proper operation and condition. Any suspect item shall be carefully examined and a determination made by a qualified person as to whether it constitutes a safety hazard. All unsafe items shall be corrected before further use of the lift.

During Operations: The lift shall be used only in accordance with its intended use and within the manufacturer's limitations and safety rules:

1. Do not overload the lift.

2. Insure that all safety devices are operational and in place.

3. Insure that all personnel near the operating lift understand to stand back so that no body parts can be pinched by the mechanism or platform and any items that may fall off the lift will not strike them.

Modifications Or Alterations: Modifications or alteration of industrial scissors lifts shall be made in conformance with all applicable provisions of scissors lift manufacturer's proposed ANSI standards and shall be at least as safe as the equipment was before modification. These changes shall also satisfy recommendations of the original equipment manufacturer for the particular application of the lift.

SECTION 4. INSTALLATION INSTRUCTIONS

Floor mounted units (P, P-Z, LT and LTD Series):

1. Move the lift to the usage area; insuring the floor is clean and level. If slings are used, encircle the entire lift, not just the platform.

Caution! Before securing the unit to the floor, shim or grout the entire baseframe assembly. Continuous baseframe support is essential for proper installation.

2. Using the pushbutton control or footswitch, push the "up" button in short jogs to see if the lift will rise. If the unit does not rise, check the motor rotation. On 3 phase systems, 2 of the 3 power leads may have to be switched so the pump will turn in the proper direction. **Caution!** Operating a hydraulic pump in reverse, even for brief periods, can cause permanent pump damage.

3. Raise the lift halfway several times then fully lower it, holding the down control an extra 10 seconds each time the lift is lowered to bleed air from the unit.

4. Lag the unit in place using ½" x 5", "Rawl-Studs" or wedge anchors in the holes provided.

5. Clean any debris or spilled fluid as they may later be misinterpreted as mechanical trouble or a cylinder leak. Due to the rigors of shipping it may be necessary to tighten some hose fittings. Remove maintenance bars and lower the unit.

6. Instruct user(s) in the proper operation of the lift, safety precautions, and equipment capacity. Supply maintenance personnel with this service manual.

Pit mounted units:

1. Check all pit dimensions for accuracy.

2. Attach a temporary electrical line through the pit conduit to the lift. Check for correct motor rotation; (see paragraph 2 in "floor mounted installation").

3. Using slings, encircle the entire lift, not just the platform and lower the lift into the pit, centering it for 1" minimum clearance on all sides to the pit wall.

4. Raise the lift with the pushbutton or footswitch and remove the slings. Run the unit up and down several times to remove air from the hydraulic system.

5. Level and center the lift by shimming and grouting the entire baseframe, not just the corners. Lag the unit in place using ½" x 5", "Rawl-Studs" or wedge anchors in the holes provided.

Caution! Continuous baseframe support is essential for proper installation

6. With the lift fully elevated, disconnect the main power and complete the permanent electrical wiring.

7. Follow the instructions outlined in paragraphs 5 and 6 under "Floor mounted installation". To complete the installation.

SECTION 5. OPERATING INSTRUCTIONS

Hydraulic scissors lifts have an excellent safety record overall, but as with all moving equipment, they can be dangerous. Operators must use common sense and take responsibility for the safety of everyone near the lift. They must use the safety devices provided and be careful not to surprise anyone in the area with the movement of the lift.

Pre-operational checks:

1. Check all electrical wiring and connections to be sure that they are completed properly and are operational.
2. Check for obstructions or debris that may interfere with the safe operations of the lift.
3. Be sure that all personnel in the area are a safe distance away from the lift and aware that you are about to operate it.
4. If there are any optional safety devices such as bellows or electric toe guards, check them for proper operation.

Test operate the equipment:

1. Station yourself so that you will always see the equipment when it is in operation. Never operate the equipment blind!
2. Raise the equipment and note that the control is a constant pressure, “dead-man” type. When you release the up or down switch the unit should stop moving immediately and maintain its elevation. If it does not, contact your maintenance personnel.
3. Cycle the equipment several times to be sure that it is operating smoothly with no jerking or sudden movement. On initial start up there may be some air in the lines or the cylinders may be dry due to storage so it my take several cycles to smooth out the operation. If the operation is not smooth after several cycles, contact your maintenance personnel. Any evidence of binding or scraping in the operation shall cause you to immediately stop using the lift.
4. Check all safety devices for proper operation.
5. If you elect to test load the equipment be sure that you do not exceed the capacities shown on the nameplate. Overloading may cause structural stresses that may not show up for some time, but will diminish the life and capacity of the unit. If you have any questions about testing the unit, call our customer service department at 1-800-843-3625.

Daily operation:

1. All personnel shall be required to read the entire operating instruction section of this manual prior to operating the lift.
2. Operators must know the capacity of the unit and be aware of any loads that may exceed the capacity.
3. **WARNING!** Operators must be alert to personnel in the vicinity of the lift. Avoid any surprises to these personnel in regard to movement of or the position of the lift. Never operate unit if you cannot see it and the personnel around it.

Daily operation (continued):

4. On the first use of the lift each day, the operator shall check to see that the lift is functioning properly and smoothly. All safety devices shall be in place and operating correctly.

5. If the unit has a traveling electrical cord, the operator must insure that it is kept away from the lift as it raises and lowers.

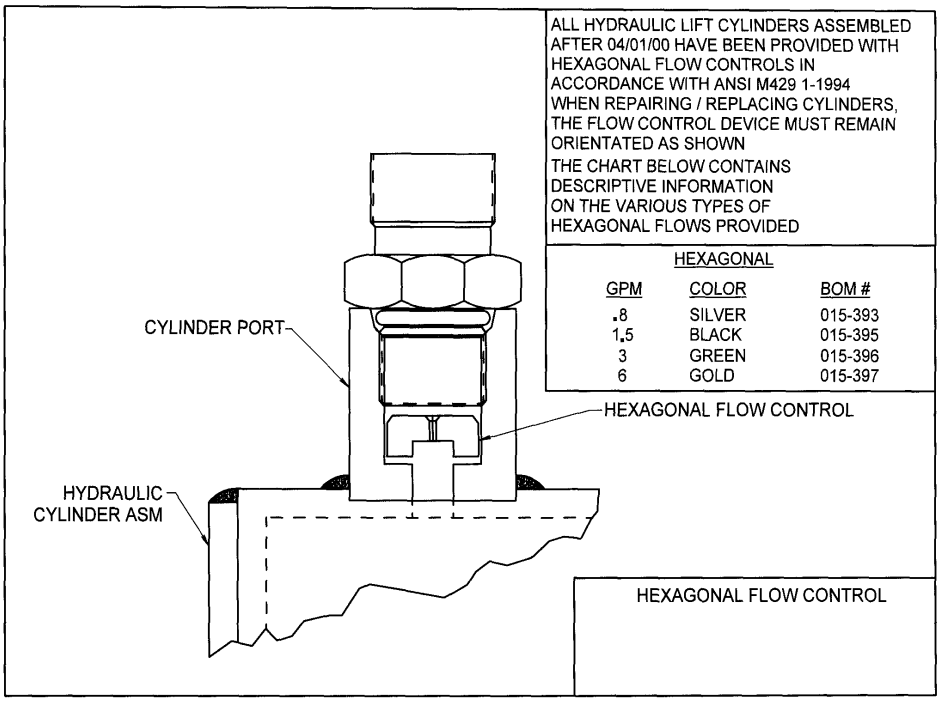
6. Loads shall be centered before raising or lowering the lift as this will help insure even wear on all moving parts

General Information Notes:

1. A special additive has been added to the hydraulic fluid to facilitate the initial break-in period for the tight tolerance, high quality, hydraulic cylinders. If the original fluid is changed, contact the factory for purchasing replacement fluid.

2. The following changes in cylinder construction and flow control design were made on April 1st, 2000. (Illustration 1-1). Proper orientation of the flow control device is critical to the performance of the lift.

3. All units manufactured after April 1st, 2000 contain JIC and O-Ring Boss fittings, units manufactured before this date had NPT fittings. **Caution!** these fittings are <u>not</u> interchangeable, know the difference. Additional fittings could be needed when changing cylinders, call the factory for proper fittings and applications.



(1-1)

SECTION 6. MAINTENANCE INSTRUCTIONS

1. Always remember that machinery with large moving parts can seriously injure you.
2. Read and understand this manual before attempting any service work.
3. **WARNING!** Always use the safety bars or safety leg when working on the unit in the elevated position or reaching under the platform. (See photos 6-1 and 6-2, at the end of this section for proper positioning and engagement of the safety bars).
4. When using the safety bars, adhere to the following rules:
   A. The unit must be unloaded.
   B. Be sure the safety bars are properly engaged.
   C. Hold the down pedal or pushbutton an extra 10 seconds when lowering onto the safety bars to be sure that all the weight of the lift is on the bars.
   D. Disconnect and tag the electricity to the unit to prevent accidental movement of the lift by other personnel.
   E. Spend as little time as possible under the lift.
5. Only use replacement parts recommended by the manufacturer.
6. Do not let the equipment stay in disrepair, fix small problems before they become big problems. A unit in disrepair can become a severe hazard if left unattended.
7. Inspect the equipment on a regular schedule, preferably monthly.
8. Never work on the hydraulics or electrical systems unless the unit is fully lowered or properly sitting on the safety support or wheel block.
9. Never apply a load to the equipment until the baseframe is continuously supported.
10. **WARNING!** Never expect to hold the leg assemblies open by simply lifting one end of a platform.
    A. The roller end of most lifts is not “gibbed” or captured in any way, so lifting on the roller end will simply tilt the platform.
    B. Even if you raise the clevis end of the platform, if the base frame is not firmly lagged to the ground or held down by some other means, the legs will come up with the platform in an unpredictable manner and could cause personal injury.
    C. The only safe way to hold a lift’s legs open is the factory designed safety support.

Routine Maintenance: (All lifts)
Weekly: Once a week or after repetitive operation, the unit shall be raise to its full height. This will get rid of cylinder oil seepage buildup and lubricate the upper cylinder barrel. On all units this fluid will be returned to the reservoir.
Monthly:
1. Check the hydraulic fluid level. Caution! When checking fluid levels, make sure the unit is in the full-up position, with the maintenance bars in place.

WARNING! Be sure a maintenance safety leg or safety bars are properly engaged before performing maintenance checks 2 through 6 or reaching beneath a raised lift. (See instructions 3, 4 and 10 above).

2. Clean all debris from the vicinity of floor and pit mounted units in order to avoid interference with the lift mechanism or rollers.
3. Check for presence and proper seating of all snap rings and clips on all axles, cylinder and rollers.
4. Check rollers, pins and bushings for any signs of wear such as flat spots, missing fasteners, or dislodged bearing material.
5. Check the hydraulic fittings for cracks or leaks and clean up any weepage on or beneath the cylinder.
6. Check hoses and electrical lines for abrasions or other abuse and check for snug connections.
7. Operate the unit and check for any abnormal noise or vibrations.
8. Check all safety devices on the unit such as the condition of the pleated bellows or smooth operation of the electric toe guards.

Seasonal or Semiannual Maintenance: Change hydraulic fluid for ambient temperature change if appropriate or if there is any evidence of accumulated condensation creating water contamination. See page P 5-2, paragraph number 1, under the heading “General Information Notes” for more information on changing fluid.

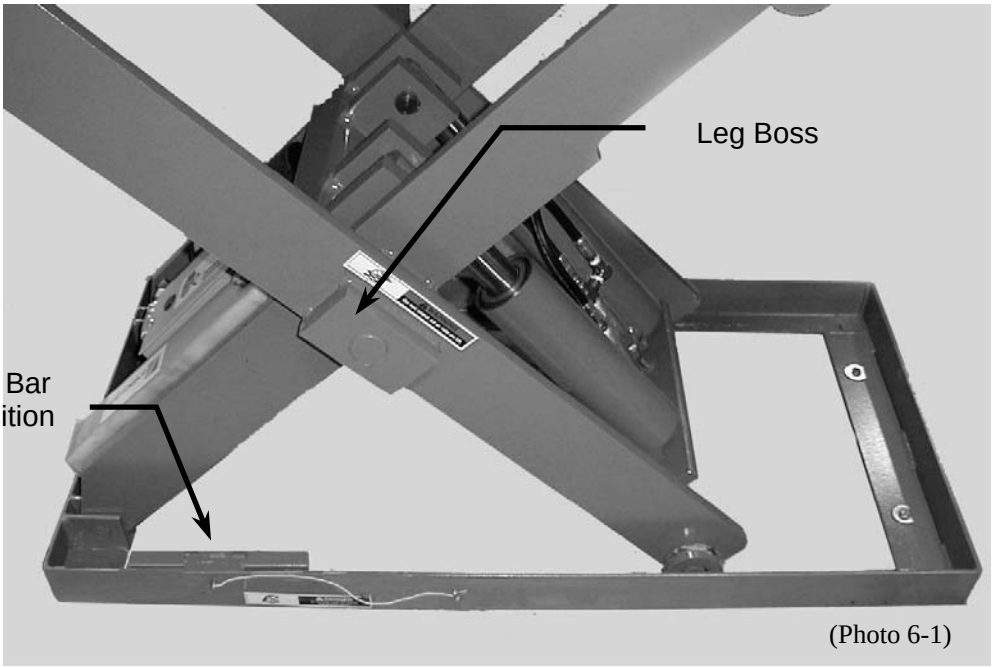
SAFETY MAINTENANCE BAR INSTRUCTIONS

WARNING! Always use the safety bars for any service or maintenance. **Never** go or reach under the lift unless both safety bars are securely in place and the power to the unit has been disconnected to prevent others from operating the lift. **Never** use the safety bars with a load on the platform.

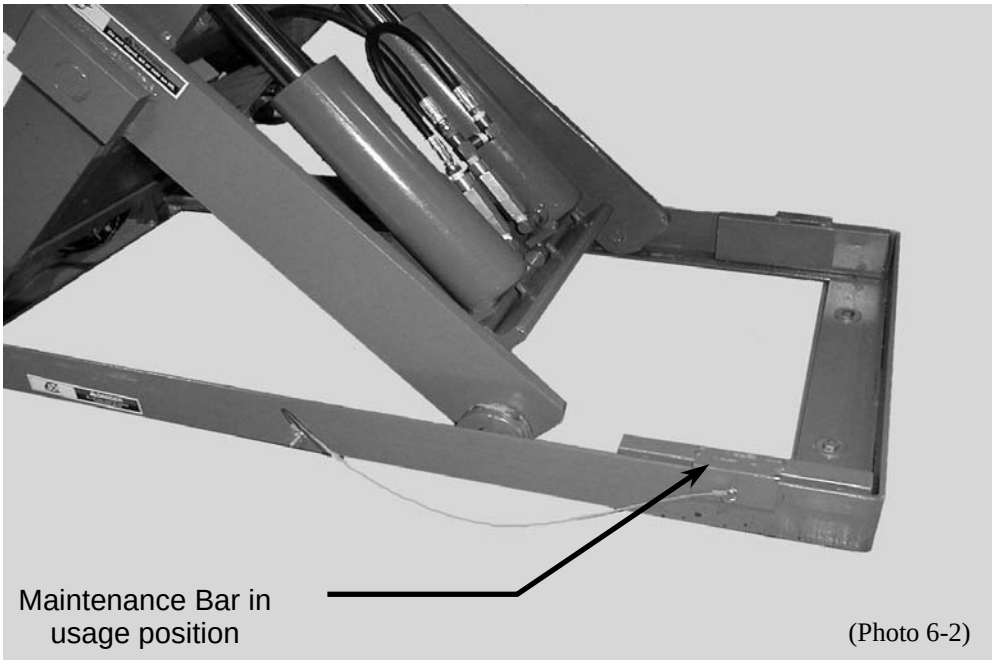
CAUTION! Never use the lift unless the safety bars are properly stored or damage may occur to the equipment.

1. Remove the safety bars from their storage positions by loosening the wing bolts.
2. Raise the lift to full travel, and place a safety bar in front of each roller wheel on the scissors leg. Make sure the safety bar angle captures the baseframe angle (see photos numbered 6-1 and 6-2). **Caution! Do not tighten the wing bolt.**
3. Once **both** safety bars are in place, slowly lower the lift until the roller wheel is engaged with the safety bars and the safety bars rest against the end of the baseframe. Visually inspect both safety bars to insure they are secure.
4. To disengage the safety bars raise the lift to move the roller wheels off the safety bars and make sure lift operates correctly. If assistance is required in removal of the safety bar, lightly tap with a hammer to brake it loose. Store the safety bars in their original position and tighten the wing bolt.

Store the safety maintenance bar as for forward as the retaining wire will allow. Failure to do so would allow the moving leg roller wheel to impact the maintenance bar when the list is full up, or the leg boss when the lift is full down, (see the photograph, 6-1 and 6-2) on page P 6-3 for more information.



Maintenance Bar in Stored Position



Maintenance Bar in Use

Store Safety Maintenance Bar as far forward as the retaining wire will allow. Failure to do so would allow the moving leg roller wheel to impact the Maintenance Bar when the lift is full up, or the leg boss when the lift is full down. Also see page P 6-2 for description of Maintenance Bar Usage.

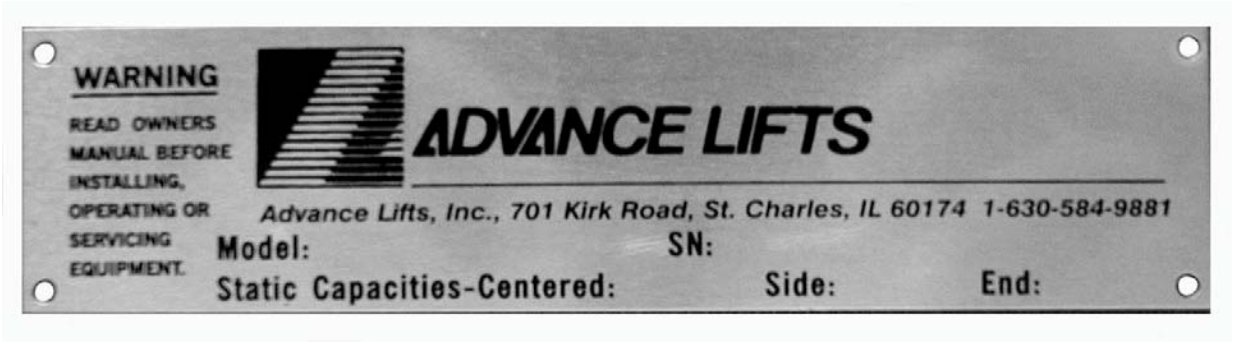
SECTION 7. WARNING LABEL SPECIFICATIONS & LOCATIONS

WARNING LABEL LOCATIONS & SPECIFICATIONS

The warning and informational labels normally attached to P Series, LT and LTD lifts, are shown below and their proper mounting locations are shown on page 7-2. Descriptions of the labels are as follows:

Label 1: This is simply a promotional label identifying the unit as Advance Lifts unit.

Label 2: This is the formal nameplate and it shall never be removed from the unit. The serial number on this nameplate is critical in identifying the specific unit for correct parts and service information. This plate also informs all readers of the proper capacity limits of the unit.

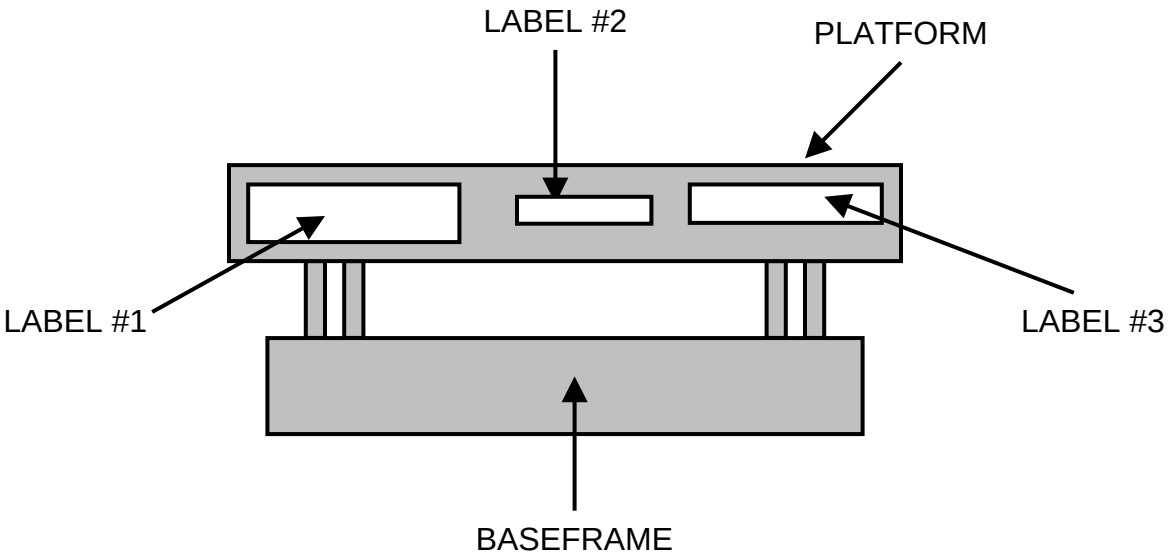


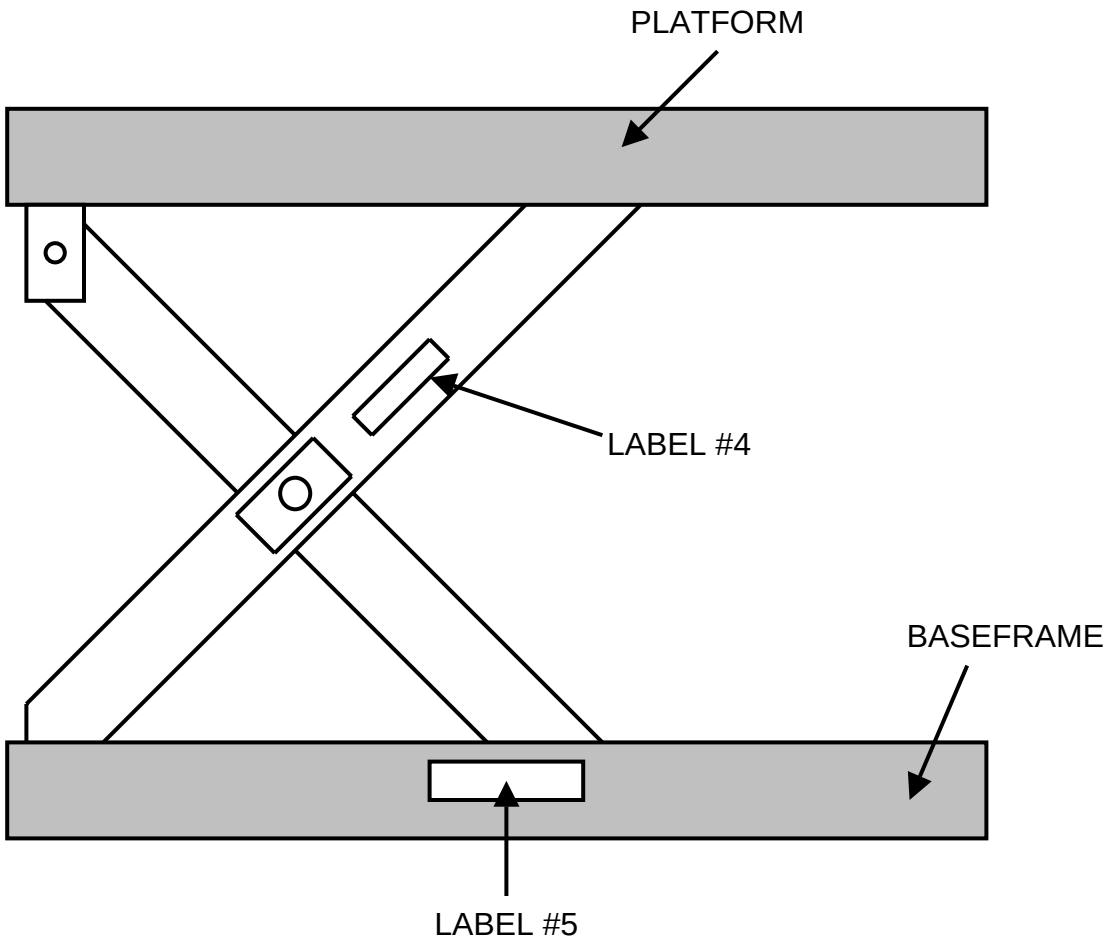
Label 3: This is an important “Danger” label that warns users of the three greatest hazards.

Label 4: This is a “Warning” label to not ride on the unit.

Label 5: This is a “Danger” label reinforcing the need to use maintenance safety legs.

WARNING LABEL LOCATIONS





SECTION 8. HYDRAULIC DETAILS

1. **Weepage and Leakage:**
   A. All hydraulic cylinders will require the replacement of packings and seals after a period of time depending on usage and environmental conditions. It is considered normal maintenance. However maintenance personnel shall recognize the difference between leakage and weepage.
   B. Weepage is the normal accumulation of fluid that passes the seals in the course of operations, as the hydraulic fluid properly performs its lubrication function on cylinder walls and piston rods. It may be occasionally observed squirting from cylinder breathers, but should stop squirting after several cycles of full stroke when the small accumulation is cleared.
   C. Leakage is the fluid, which leaks past worn or cut packings and seals. It too may be observed squirting, but does not stop after several cycles and the lift will probably not hold position under load.
   D. Some units have breather lines that return any weepage or leakage of fluid from the cylinder to the reservoir. It is important to make sure the lines are not full of fluid at all times. Some visible fluid is normal; a unit that will not maintain raised height could have worn or cut packings that need to be repaired. See “Repacking” under cylinder repair procedures in Section 8, page 8-15.
   E. Always be careful when working around cylinders, not to nick the extended rod or dent the cylinder casing, as this may cause damage to cylinder seals or packings.
   F. If you elect to repaint any part of the lift, cover exposed rods with plastic or soluble grease, which can be removed after painting to insure that no paint sticks to the rods and damages the packings or seals.

2. **General precautions:**
   A. **Caution!** Be sure that all pressure is relieved from the hydraulic system before disassembling any components. Continue to hold the “down” control for several seconds after fully lowering the unit on its safety support or the ground, before opening a hose line or hydraulic component.
   B. Always be careful to avoid contamination entering the system. Be especially careful with the ends of hoses, which may fall into oil dry, or dirt. If you suspect contamination, flush the system and components.

3. **Hydraulic fittings, sealant and torque’s:**
   A. Advance Lifts may be equipped with either NPT fittings (tapered), or SAE fittings (with O-ring seals), or JIC fittings (37-1/2˚ tapered). Know the difference.
   B. Be careful when tightening NPT fittings not to over-tighten and crack them. Swivel fittings are especially vulnerable and shall only be tightened enough to stop leaking.
   C. If leakage persists after tightening the fittings fairly hard, inspect fittings for burrs on the mating edges or the possibility of a 37-1/2˚ SAE fitting being mixed with 30˚ NPT fittings or either one being mixed with SAE 45˚ fittings.

D. When using Teflon tape on NPT fittings, be sure the tape is started 1-1/2 threads back from the leading edge and only use 2 wraps to be sure that tape does not break off and contaminate the system. You may substitute pipe sealant with Teflon paste from “Pro Lock” or “Locktite”, but again don’t over apply. Never use sealant or tapes on JIC, O-Ring Boss or swivel fittings.
E. Be extremely careful not to over-tighten ORB fittings, thread the fitting finger tight and then tighten the nut on the fitting.
F. Never reuse old Teflon tape. Once a connection has been opened, remove all tape and apply fresh tape.

OIL RECOMMENDATIONS AND SEAL COMPATIBILITY

Fluids:

1. As of 1/1/03 the current standard hydraulic fluid is a multi viscosity ISO-46 group II base oil hydraulic fluid. This is the fluid normally supplied by the factory and is suitable for a temperature range of –10 to +100 degrees Fahrenheit. When replacing or adding fluid to an Advance Lift, use only ISO 46 hydraulic fluid that is manufactured with a group II base oil. ISO 46 hydraulic fluid can be identified by its purple color.

2. From 3/25/85 until 12/31/02 Dexron ll and Dexron lll automatic transmission fluids were supplied; the pink coloring can identify it.

3. Unless approved by the Advance lifts engineering department do not use any other fluid. Brake fluids and other hydraulic fluids may damage the system’s seals or hoses. If it is required to switch from one fluid to another, drain the reservoir and system completely, and then refill with the new fluid.

4. Biodegradable and fire retardant fluids are available. Contact the factory for specifications. It may be necessary to change some seals and/or hoses for total system compatibility, depending upon the specific model lift and the requested fluid.

Options:

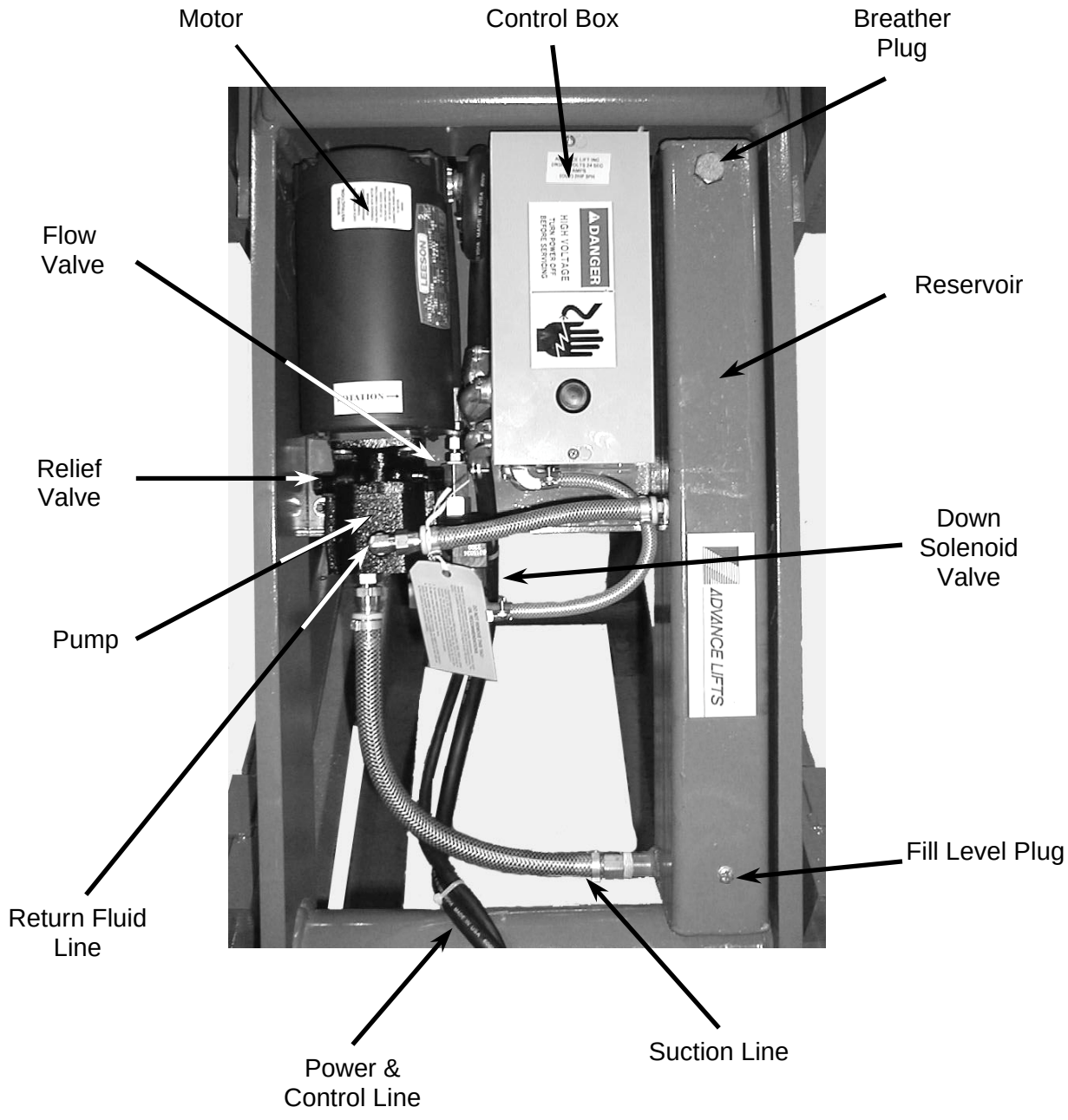
For extremely warm temperature ranges of 120º to 140º degrees Fahrenheit, you may switch to 10W30 motor oil. If ambient temperatures are expected above 140º degrees, consult the factory.

For extremely cold temperature ranges, Advance Lifts recommends the use of a fluid heater, contact your distributor for more information and specifications.

Seals:

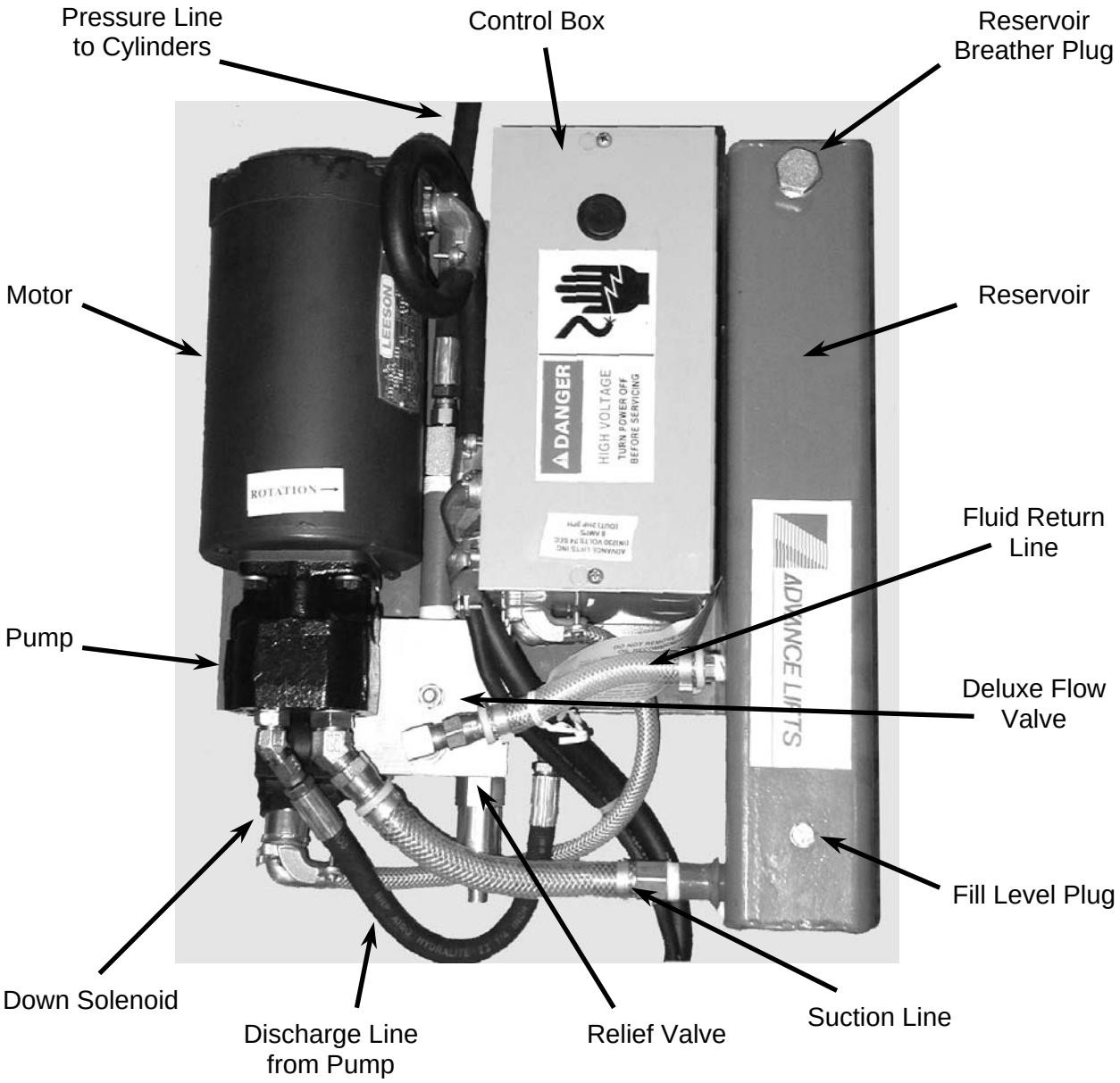
Generally, the seals in the unit are Buna-N-Nitrile and polyurethane. The hoses are either PVC for suction lines or braided wire for pressure lines. Always call the factory about special fluids rather than make assumptions on your own.

STANDARD POWER UNIT

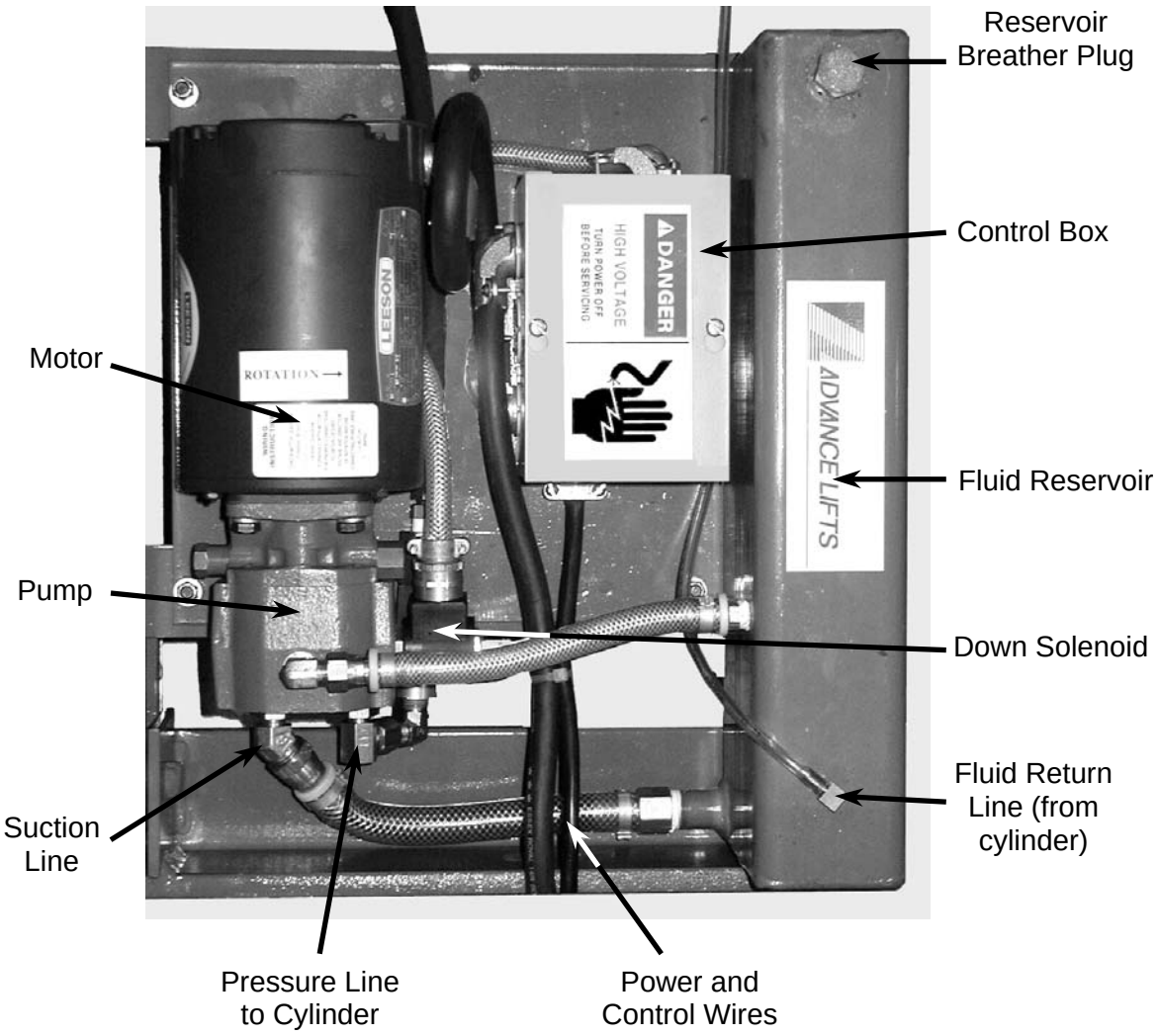


See Page P 8-7 for Hydraulic Diagram and Pages 9-3 & 9-4 for Electrical Diagrams

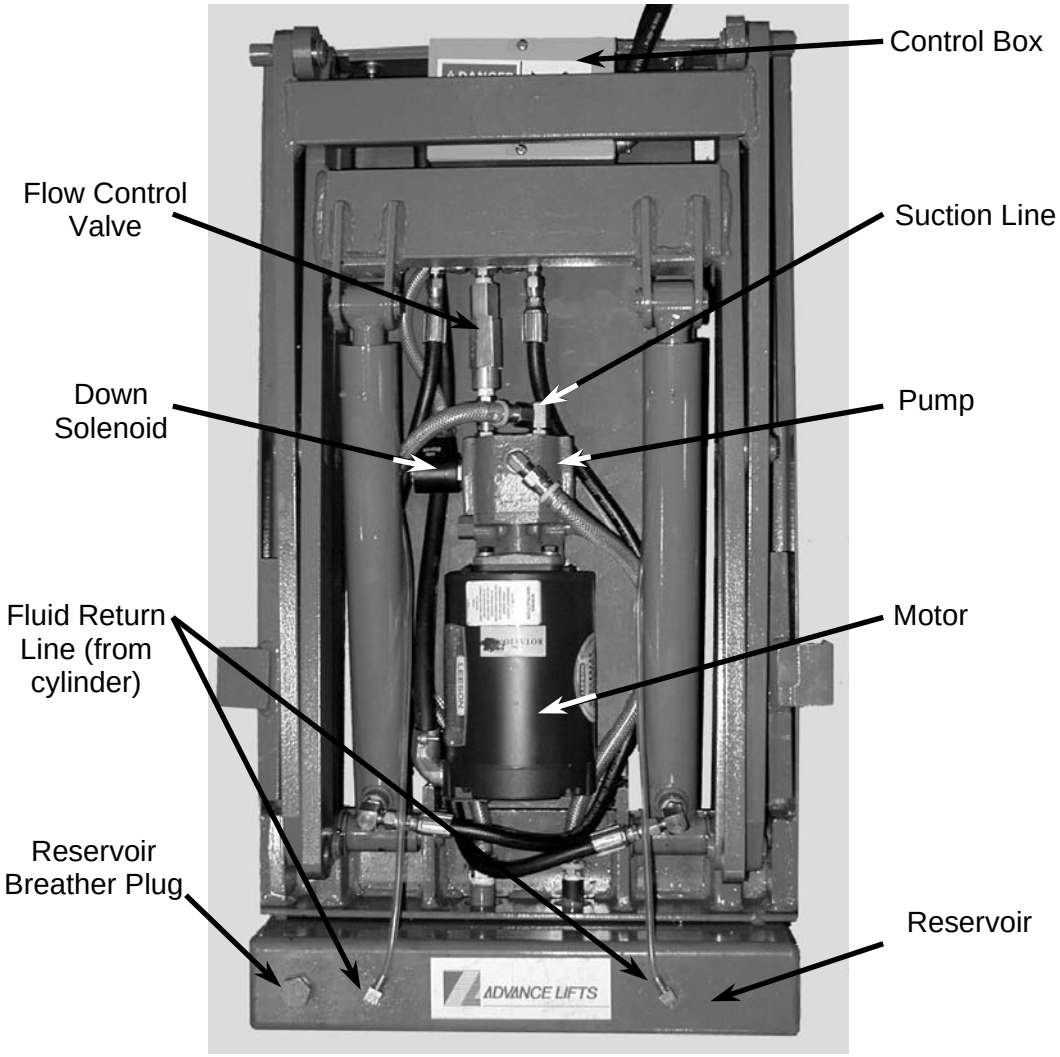
DELUXE POWER UNIT



See Page P 8-8 for Hydraulic Diagram and Pages 9-3 & 9-4 for Electrical Diagrams

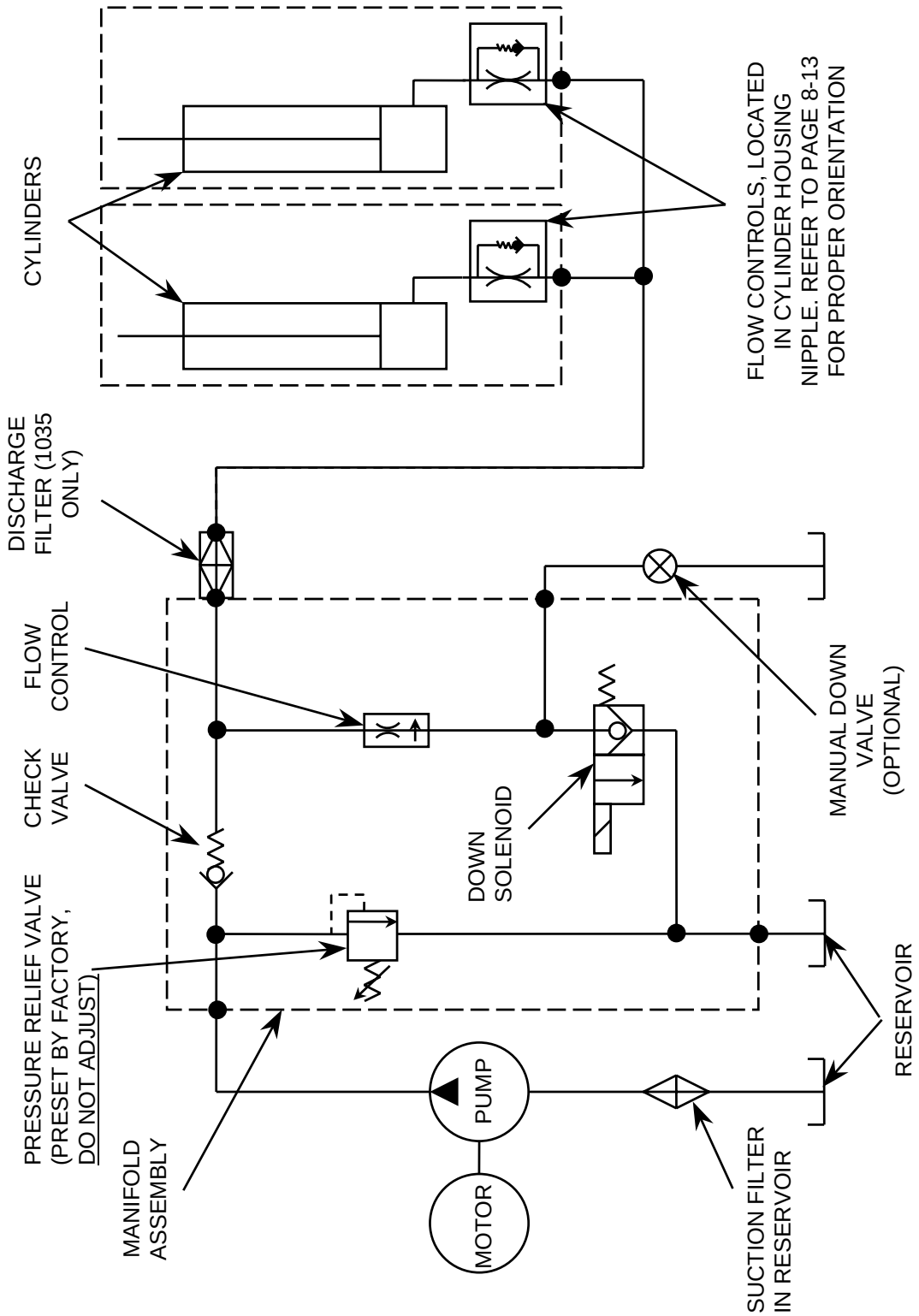


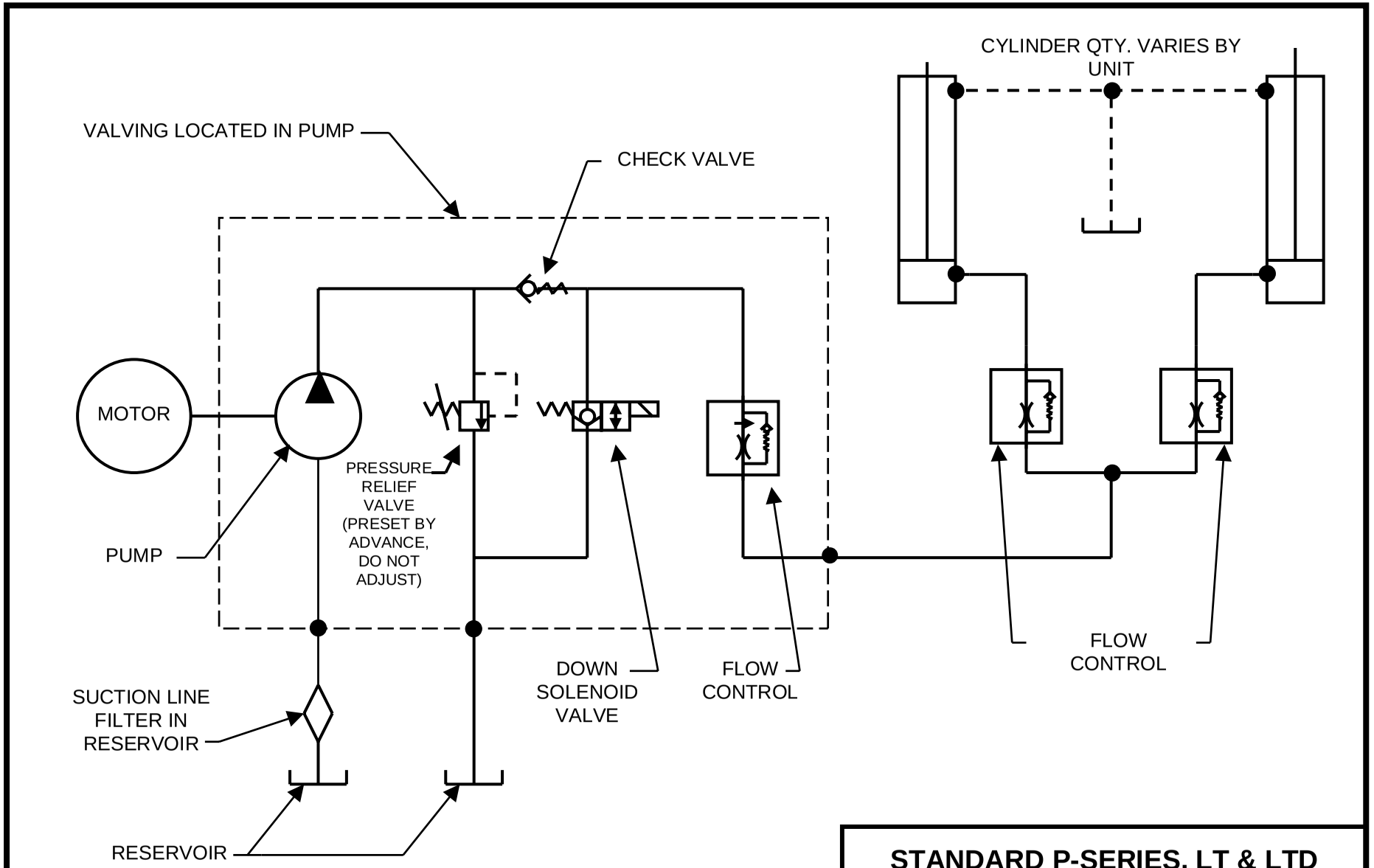
See Page P 8-8 for Hydraulic Diagram and Pages 9-3 & 9-4 for Electrical Diagrams



See Page P 8-8 for Hydraulic Diagram and Pages 9-3, 9-4, 9-5 & 9-6 for Electrical Diagrams

HYDRAULIC DIAGRAM FOR UNITS WITH ONE-PIECE MANIFOLDS

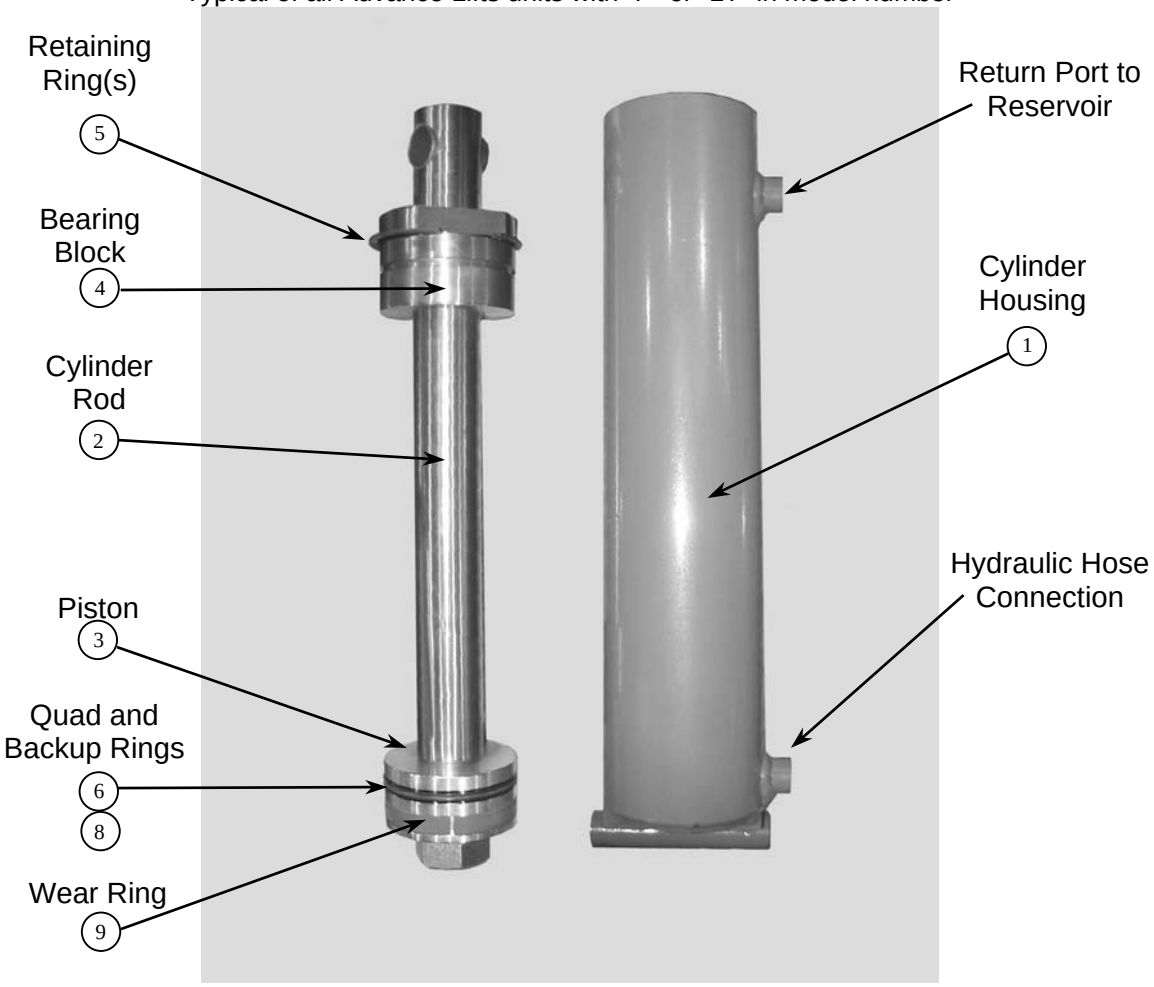




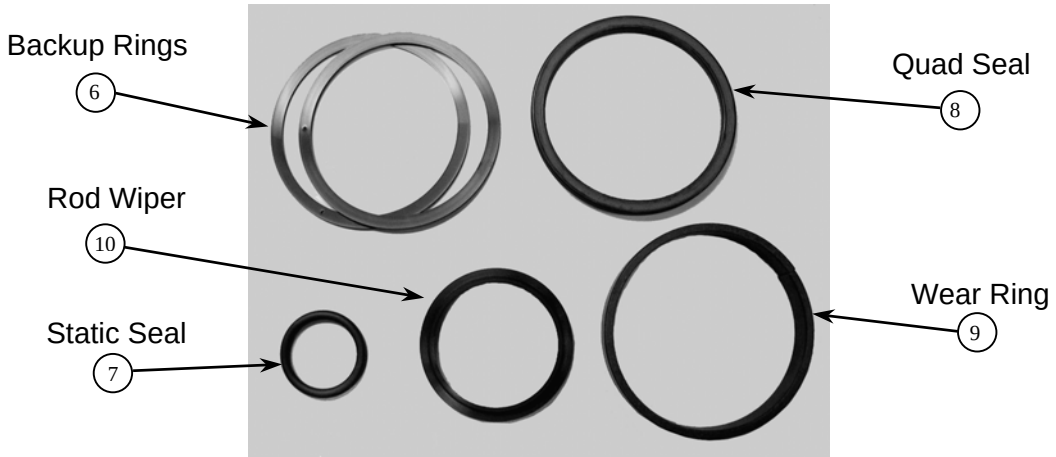
STANDARD P-SERIES, LT & LTD HYDRAULIC SCHEMATIC

P & LT SERIES CYLINDER
(PISTON STYLE)

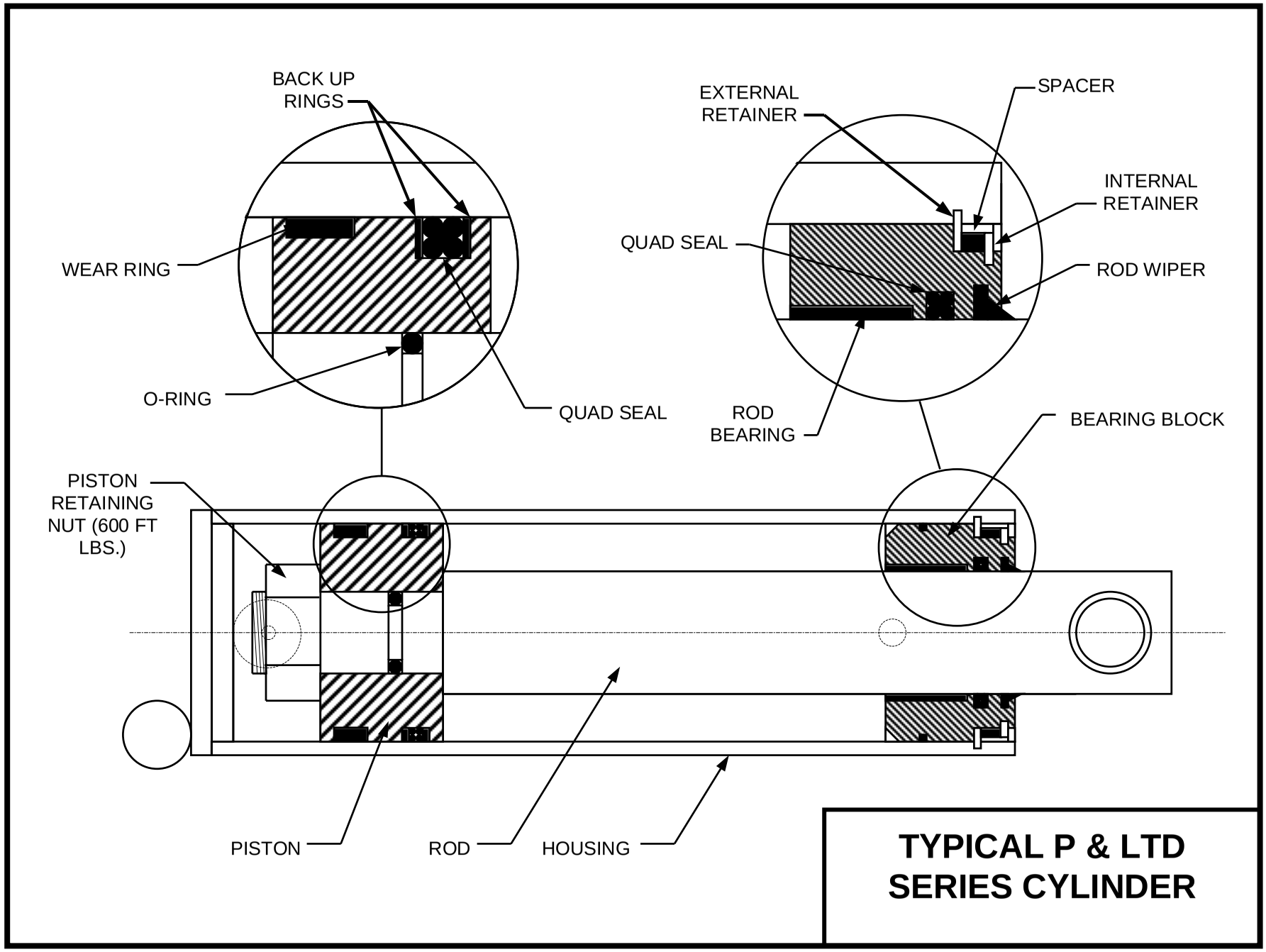
Typical of all Advance Lifts units with “P” or “LT” in model number

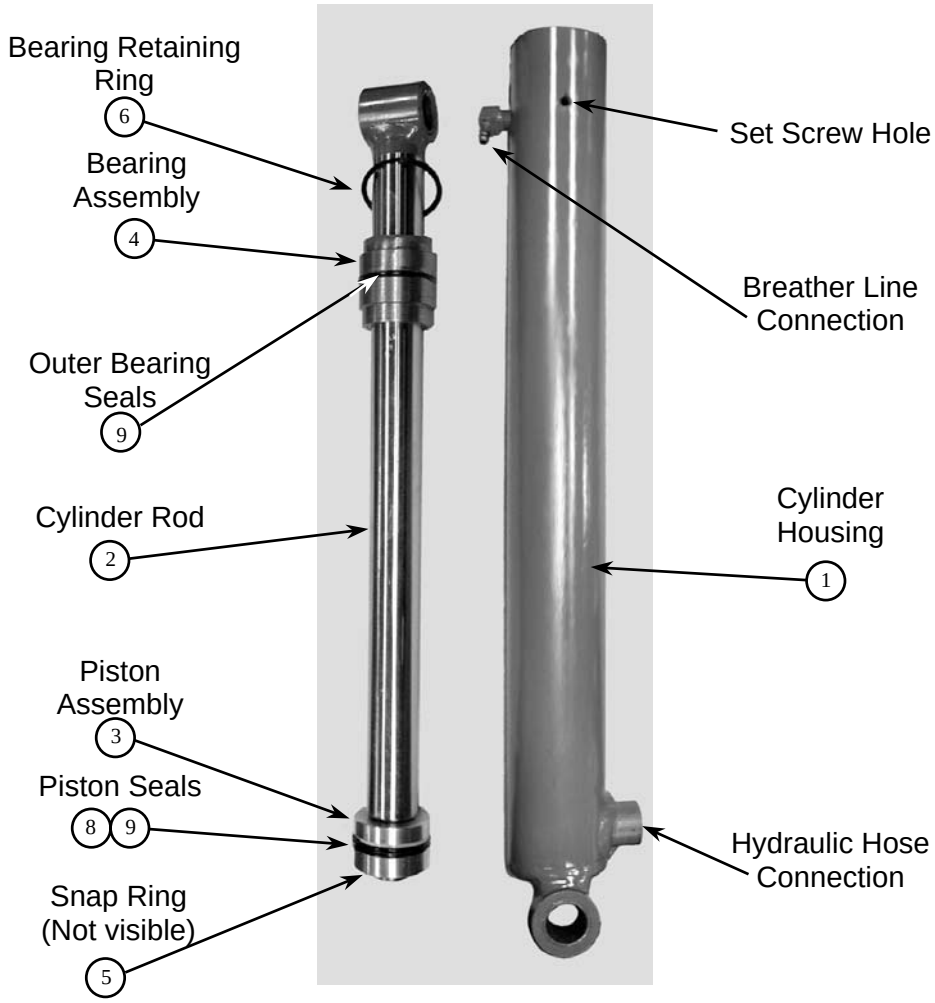


(Reference numbers correspond with drawings on Pages 8-11, 8-12)

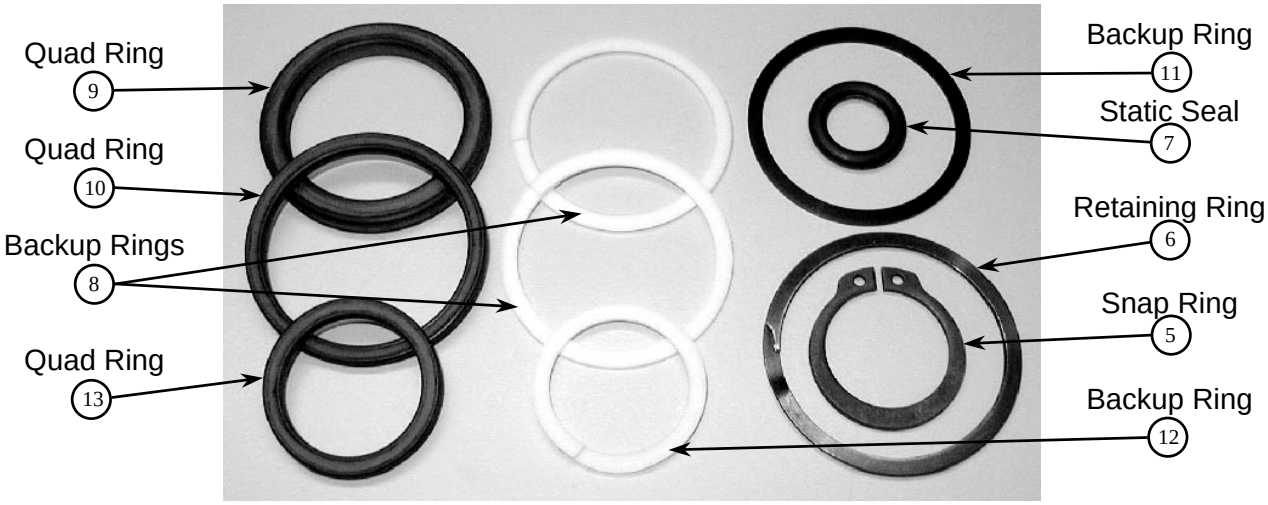


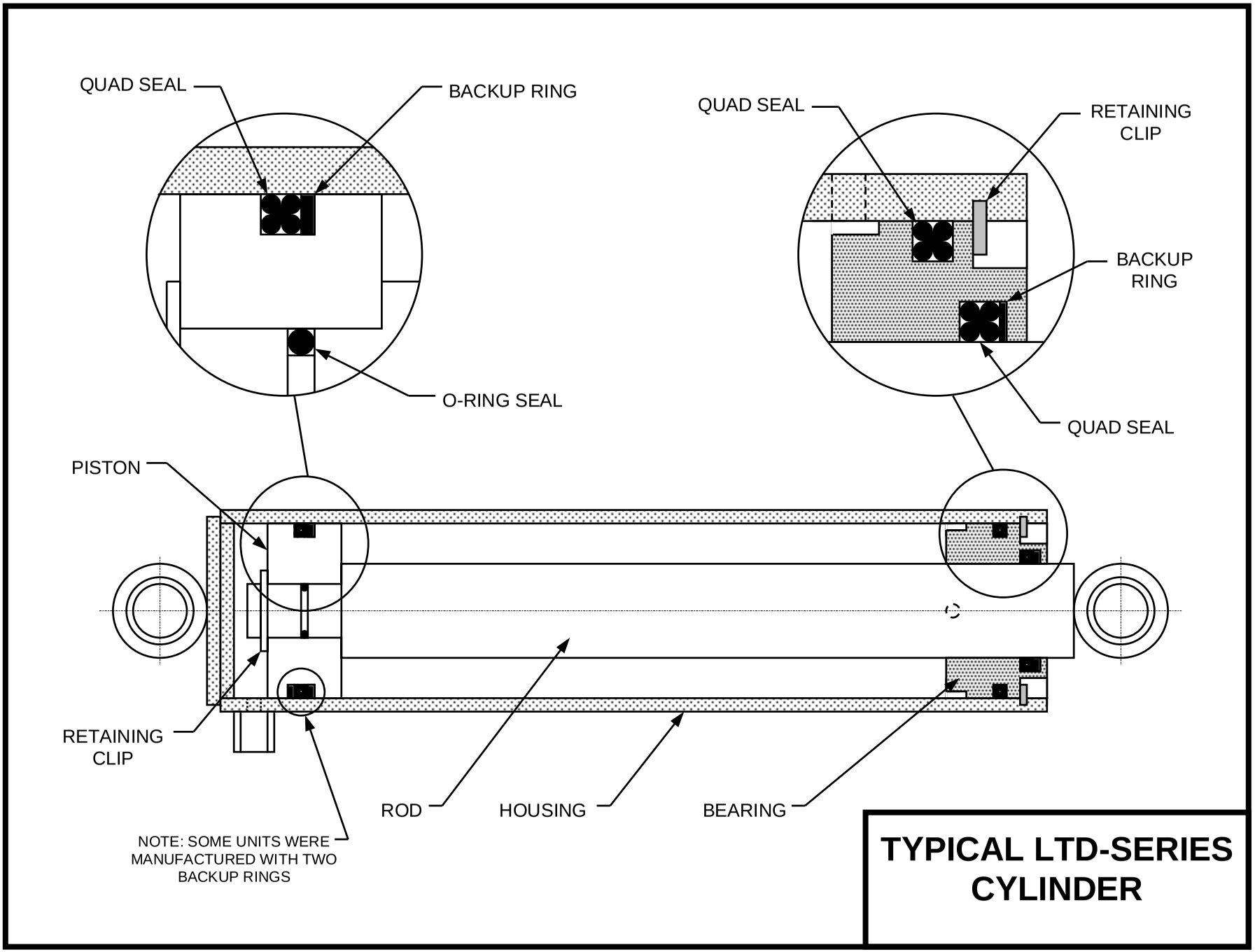
P & LT Series Cylinder Packing Kit Contents
NOTE: LT Models Delete Rod Wiper (10) and Add a Quad Seal (11) and Spacer (12).
See Drawing on P 8-12


BACK UP RINGS
WEAR RING
O-RING
QUAD SEAL
EXTERNAL RETAINER
SPACER
INTERNAL RETAINER
QUAD SEAL
ROD WIPER
ROD BEARING
BEARING BLOCK
PISTON RETAINING NUT (600 FT LBS.)
PISTON
ROD
HOUSING
TYPICAL P & LTD SERIES CYLINDER



(Reference numbers correspond with drawing on Page 8-14)





TYPICAL LTD-SERIES CYLINDER

REPAIR PROCEDURES FOR P, LT AND LTD CYLINDERS

Tools & Supplied required:

"Lubriplate" and hydraulic fluid matching the existing fluid in the system for topping off the reservoir when finished. (**Current standard fluid is Dexron lll**)
A five- (5) gallon bucket to collect fluid from the cylinders.
Wrenches to disconnect hydraulic fittings.
Emery cloth.
Clean lint free cloths and hose caps.
Clean work surface (butcher paper on top of most surfaces works well), with a means of holding the cylinder in a fixed position for disassembly and re-assembly.
Safety legs supplied with each Advance unit.

P& LT Series lifts:

(1) Snap ring tool (Waldes Truarc external type #S-660 or Industrial pliers #P-104.)
Cylinders hone (Craftsman glaze breaker #9K4633 or equivalent.)

LTD Series lifts:

(1) Small screwdriver, (1) 1/8" Allen wrench and a cylinder hone.

Cylinder Removal, P and LT Series units:

1. Raise the empty lift and settle it securely on its safety bars or leg.
2. Once settled securely, depress the down control an additional 20 seconds to relieve any pressure from the hydraulic system. Remove the power connection to the power unit and mark with a warning label or lock the connection out to prevent unintended reconnection. (Check your company lockout and tag Standard Operating Procedures.)
3. Disconnect the hydraulic hose from the cylinder and cap the hose to prevent contamination.
4. Remove the cylinder from the lift by freeing the upper pin and swinging the cylinder into an easily supported position, then lift from the assembly.
5. Place the hose connection end of the cylinder in a 5-gallon bucket and force the cylinder closed to drain the hydraulic fluid from the cylinder. Do not reuse the fluid unless you are sure it is contamination free by careful straining.

Cylinder Removal, LTD Series units:

1. Follow steps 1-4, under "cylinder removal, P and LT Series units.
2. Remove the retaining ring from the outside of the lower cylinder pin.
3. Gently push the pin through the cylinder assembly and remove, being careful not to damage the pin surface.
4. Follow step 5, under "cylinder removal, P and LTD Series units.

P & LT Series (piston style) Cylinder Disassembly:

1. Secure the cylinder with a rod through the clevis or cross tube. Do not use a vise, which will crush or otherwise damage the housing.
2. 3" I.D. Cylinders: Use a small screwdriver to remove the outside retaining ring in front of the cylinder bearing. Remove the spacer ring, slide the front bearing into the cylinder then remove the second retaining ring.

P & LT Series (piston style) Cylinder Disassembly: (Continued)

3. 3-1/2” I.D. Cylinders: Use the snap ring pliers to compress the retaining ring, and continue to hold it compressed.
4. Pull out the rod, bearing and piston assembly. The retaining ring groove in the housing can cut the piston seal upon removal, clean the groove thoroughly before assembly.
5. Remove the hex nut or snap ring adjacent to the piston, then slide the piston and bearing off the rod. The hex nut can be very tight, if difficulty is encountered in removal a small amount of heat can be applied to help break the nut loose. Clean all the parts and place them on a clean surface to avoid contamination.

P & LT Series Re-packing and Inspection:

1. Carefully inspect the entire housing with a flashlight, for any evidence of rust, scratches or surface blemishes. Small blemished may be removed with fine emery cloth and lager faults will require the use of the hone listed on the previous page. Be sure thoroughly clean the housing when you are done to avoid contamination.
2. Do not become the victim of a false economy by using only part of a re-packing kit. Since you have invested in disassembling the cylinder, use all new packing parts and seals or the reused old parts may fail in the near future causing a repeat of the whole exercise.
3. Remove the rod wiper on the bearing by using a screwdriver to bend the seal inward to collapse and remove it. Inspect the groove.
4. Lubricate and insert a new wiper with your fingers, sliding it into its groove. Depending upon temperature, the rod wiper may slide in mush easier if it is warmed in hot water, then dried, lubricated, and inserted. The bearing may now be slid back onto the rod.
5. Begin re-packing the piston by using a screwdriver to carefully remove the old backup rings and seal from the groove. The cylinder is also equipped with a wear ring that shall be removed at this time. Be careful to leave the grooves nick free and clean.
6. Place the static O-ring seal into the clean and dry groove on the cylinder rod. Lubricate the seal surfaces and the I.D. of the piston bore. Slide the piston back into position noting that the flat side, not the chamfered side, shall rest against the retaining ring or nut. Reinstall the retaining ring or nut using Locktite if the fastener is a plain nut; torque the nut to 600ft. /lbs.
7. Clean the grooves on the piston. Place the packing kits and wear ring in place into the clean and dry grooves. Lubricate the OD of the piston seals, wear ring and the housing snap ring grooves, then slide the entire assembly into the housing.
8. Re-assemble the bearing block in the reverse manner that it was disassembled. In all cases, be sure the retaining rings(s) are fully seated into their grooves or the cylinders will come apart when fully extended, causing an accident.

LTD Series Cylinder Disassembly:

1. Secure the cylinder with a rod through the clevis or cross tube. Do not use a vise, which will crush or otherwise damage the housing.
2. Gently pull the cylinder rod out of the housing, when the rod cannot be pulled out any further, push the rod back in approximately 2 inches.

LTD Series Cylinder Disassembly (Continued):

3. Using a quick motion, pull the rod assembly out of the housing by striking the piston against the bearing block assembly. (See page P 8 -13 for descriptions of parts). This process may need to be repeated several times to free a stubborn bearing assembly.
4. Once the rod has been removed from the housing, remove the retaining clip from the end of the rod. The piston may now be removed.
5. Remove all seals and inspect seal groves for debris, take care to clean each groove carefully. Once parts are dissembled and clean, place all parts on a clean surface to avoid contamination.

LTD Series Re-packing and Inspection:

1. Carefully inspect the entire housing with a flashlight, for any evidence of rust, scratches or surface blemishes. Small blemished may be removed with fine emery cloth and lager faults will require the use of a cylinder hone. Be sure to thoroughly clean the housing when you are done to avoid contamination.
2. Do not become the victim of a false economy by using only part of a re-packing kit. Since you have invested the time in disassembling the cylinder, use all the new packing parts and seals. Any used parts may fail in the near future causing a repeat of the whole exercise.
3. Lubricate all seal components before attempting to install them.
4. Install the quad ring and backup rings on the inside and outside of the bearing block. Be certain they are orientated as illustrated on page P 8-13, items # 8 and 9.
5. Lubricate the cylinder rod assembly and insert it into the bearing block assembly as shown on page P 8-13.
6. Install the static O-ring seal in the groove provided on the rod end and install the piston assembly and retaining ring
7. Clean the grooves on the piston. Place the packing kits and wear ring in place into the clean and dry grooves. Lubricate the OD of the piston seals and the housing snap ring grooves then slide the entire assembly into the housing.
8. Re-assemble the bearing block in the reverse manner that it was disassembled. **Warning!** In all cases, be sure the retaining ring is fully seated into the grooves or the cylinder will come apart when fully extended, causing an accident.

SECTION 9. ELECTRICAL DETAILS

General Electrical Information (P-Series Units):

The motor supplied as standard on P-Series units is a 208/230/460v 3-phase motor, with connection diagrams on the outside of the motor for low voltage (230V) or high voltage (460V). This motor is also rated for 208V. As any standard motor is rated for ±10% of voltage variation, this motor will operate properly, within ratings, at 208, 220, 230, 240, 440,460, and 480V, 3-phase supply.

If motor is intended for 208V line usage, some caution is advised, if your motor is a 230 volt motor, and your 208V line voltage drops to 207 volts, (a drop of only ½%), the motor will be operating at –10% in a marginal region. Wiring runs and actual voltage become very important. If you line voltage will be varying (due to loads elsewhere in the system, etc.) you may have an advantage by ordering as an option a 208V +/-10% motor.

To reverse the direction of rotation of a 3-phase motor, reverse any two of the three power leads to the motor. On single-phase motors, see wiring diagram on motor.

General Electrical Information (LT & LTD SERIES UNITS):

The one-half horsepower motor supplied as standard on LT & LTD units is a 115/230V single-phase motor. The 115V single-phase units are designed to be operated from a 15 AMP wall outlet.

General Electrical Information (LT-2036 UNITS ONLY)

The one horsepower motor supplied as standard on LT-2036 units is a 115/230V single-phase motor. It is designed to be operated from a 20 AMP wall outlet.

Field Changes in Voltage, 3-Phase (230V to 460V):

A. Change transformer primary connections to 460V.
B. Change overload protection to proper value as per currents in motor tables. Order new overload; adjust new overload to motor full load current setting. Insure the overload is set to “manual” reset, not “automatic” to insure the equipment cannot re-start automatically.
C. Change motor connections for high (460V).
D. Change plug and receptacle for power, if required.

Field Changes in Voltage, 3-Phase (460V to 230V):

A. Change transformer primary connections to 230V.
B. Change overload protection to proper value as per currents in motor table. Order new overload; adjust new overload to motor full load current setting. Insure the overload is set to “manual” reset, not “automatic” to insure the equipment cannot re-start automatically.
C. Change motor connections for low (230V).
D. Change plug and receptacle for power, if required.

IMPORTANT: When making voltage changes, insure motor rotation is correct.

DC POWERED UNITS

General Information:

1. All DC powered units are shipped fully charged and ready to operate.
2. The battery charger control settings are preset from the factory and shall never need to be changed.
3. The standard settings are (left to right), Switch #1: 12 Volt, 10 Amp, Switch #2: Automatic, Switch #3: 2 Amp, 12 Volt.

DANGER!
Never switch to the "50 Amp-Start" button setting or battery damage could occur.

DANGER!
Overcharging could damage the battery or cause an explosion!

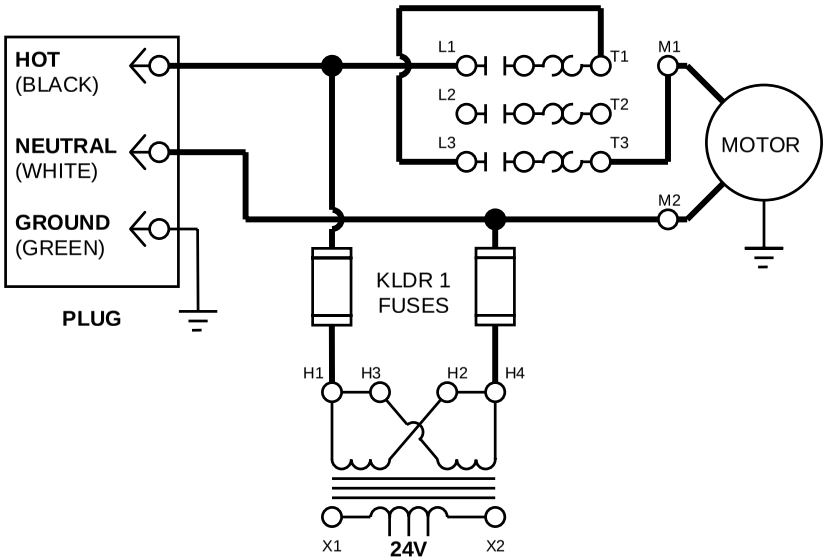
4. If the unit is being used unplugged, it must be plugged in overnight to be recharged.
5. The charging system is completely automatic, and will stop charging when the battery is fully charged.
6. **WARNING!** Never use the charger for any other application.

GENERAL BATTERY SAFETY

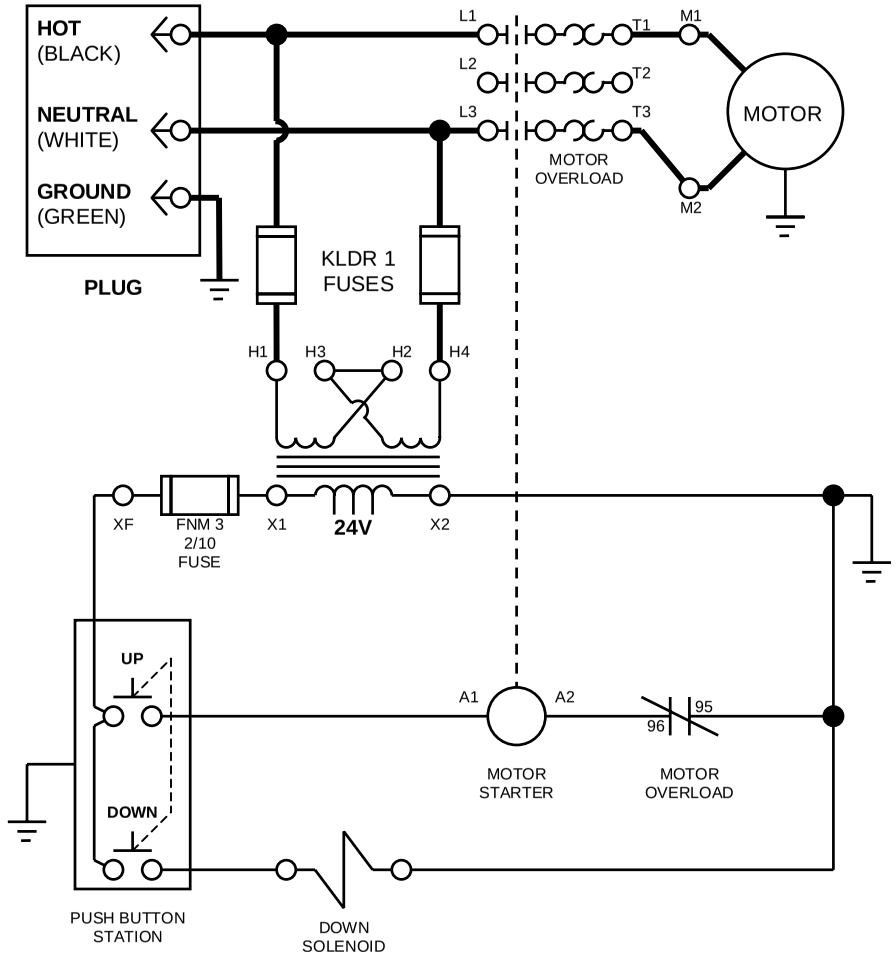
1. Before operating the unit, read all instructions and cautions.
2. Do not operate the unit if the power cord is damaged in any way.
3. Always unplug the unit using the plug, never unplug the unit with the cord or damage to the cord could occur.
4. Place the cord where it is safe from being walked on or where other equipment could damage it.
5. Always unplug the unit before any maintenance is performed.
6. NEVER charge the unit in a confined area. Always use the unit in a well-ventilated area **DANGER!** Risk of explosive gas.
7. NEVER charge the unit if the battery is frozen, allow time to thaw battery before charging.

DANGER! Never smoke or operate charger around sources of ignition. Batteries produce explosive gases when charging.

115V 1Ø OPERATION

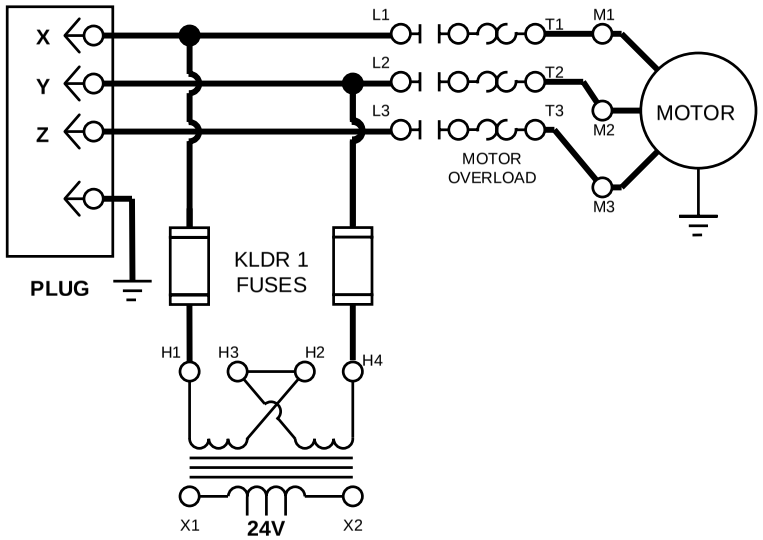


230V 1Ø OPERATION

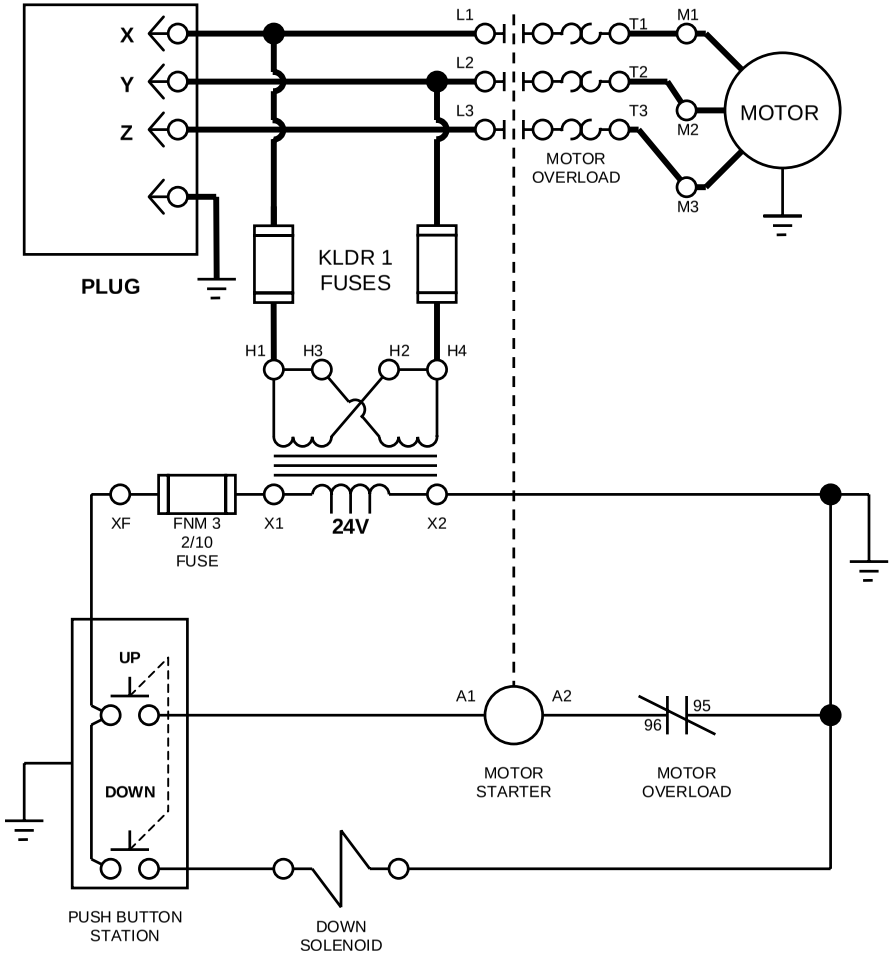


SINGLE PHASE ELECTRICAL DIAGRAM

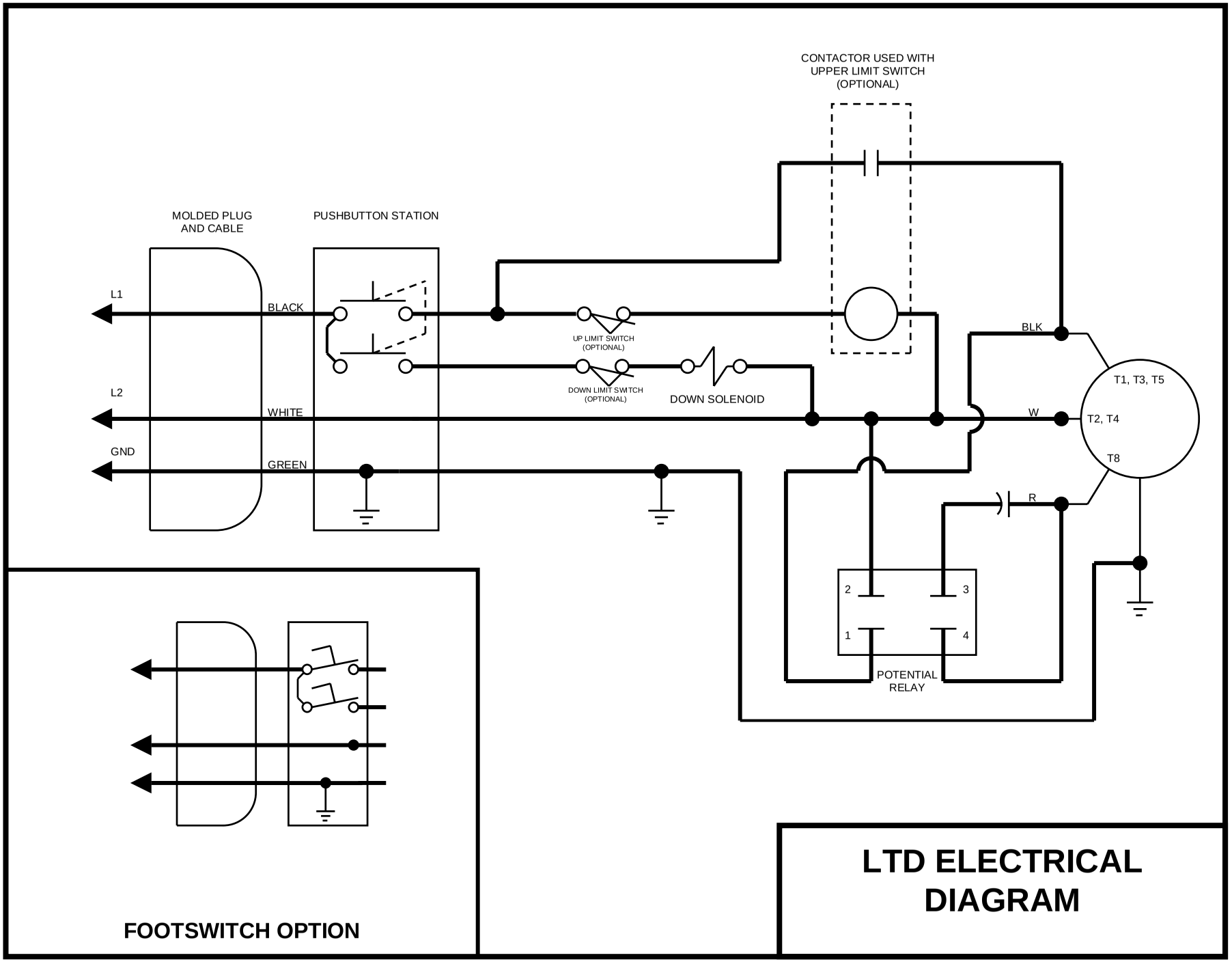
460V 3Ø OPERATION

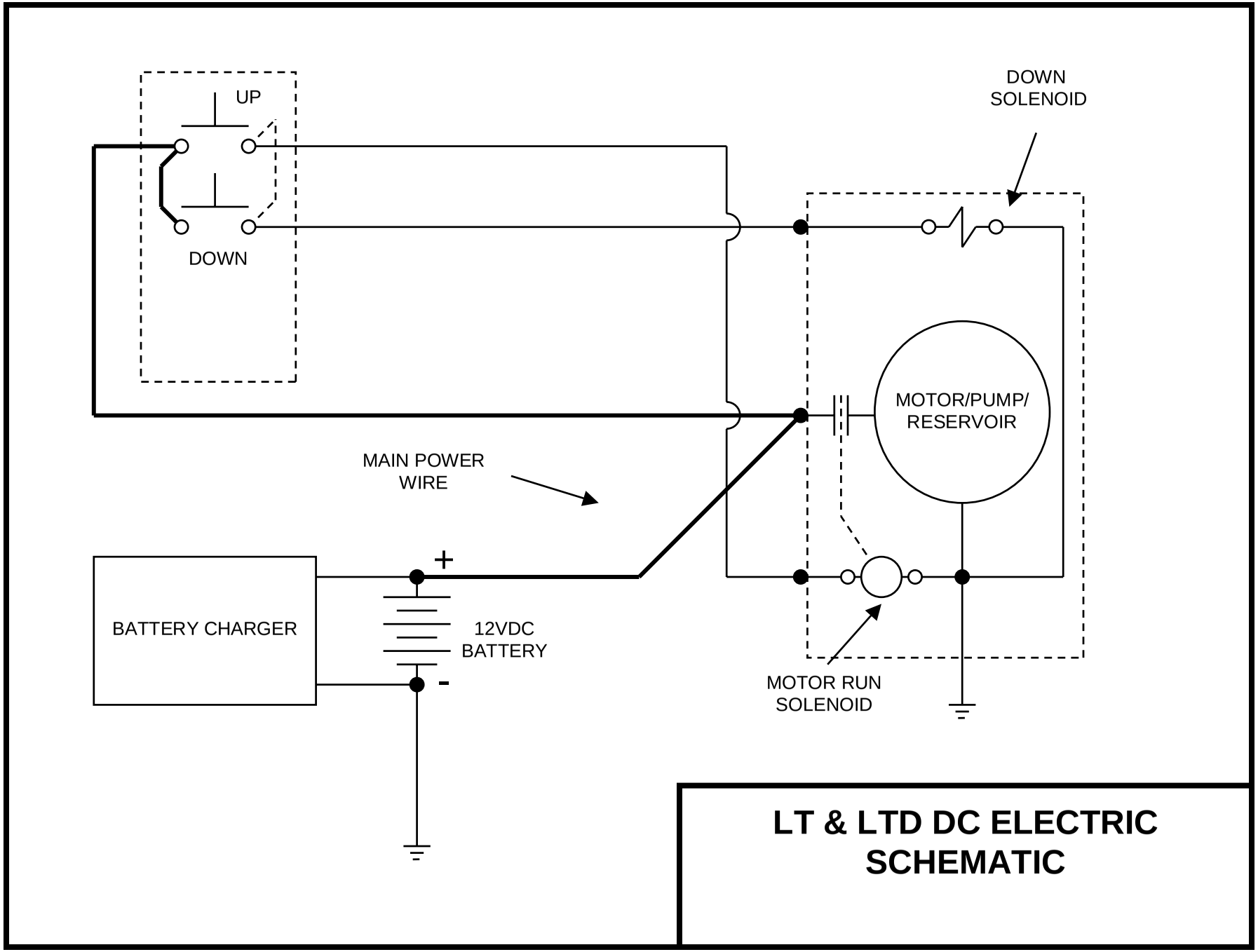


230V 3Ø OPERATION



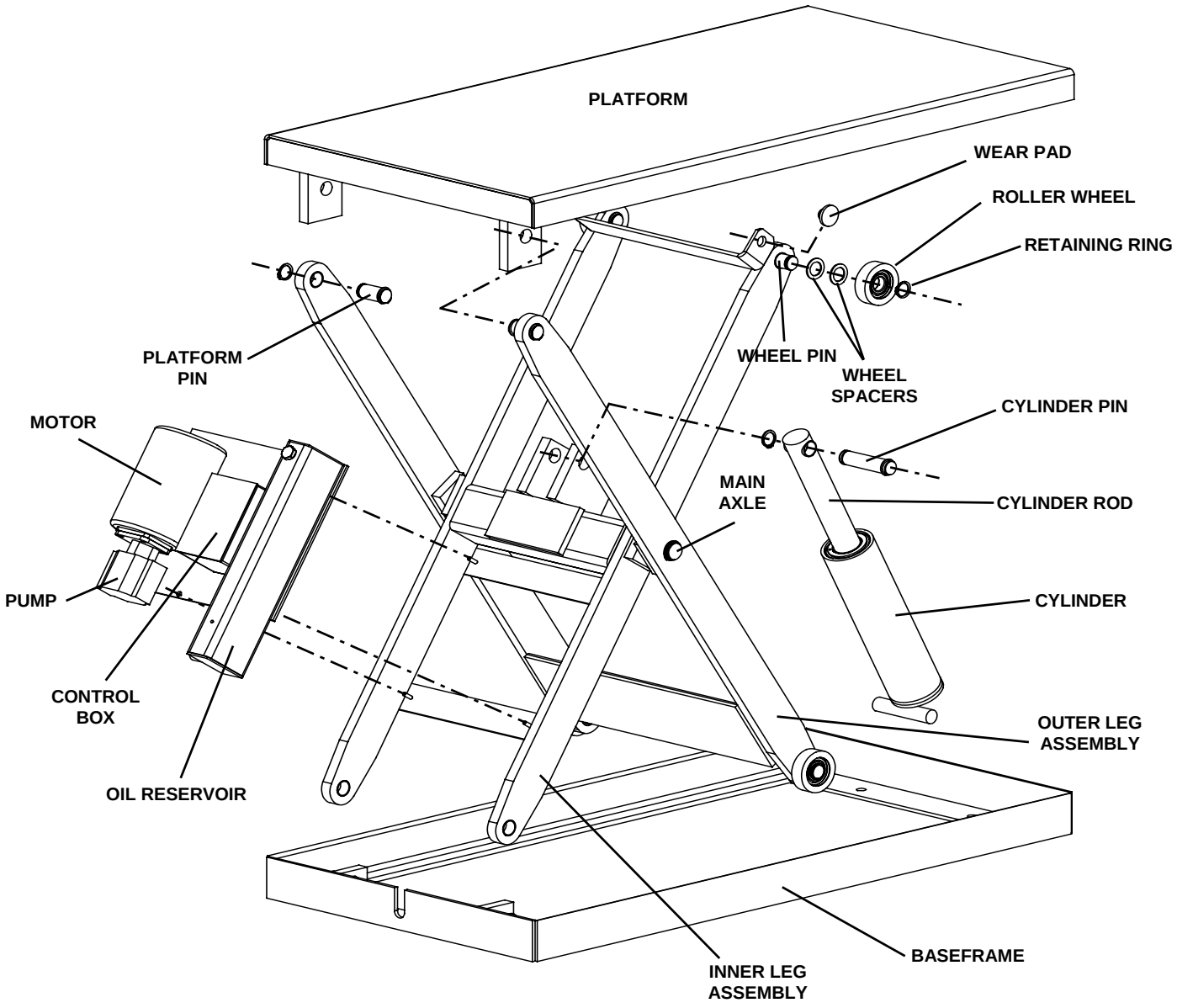
THREE PHASE ELECTRICAL DIAGRAM


CONTACTOR USED WITH
UPPER LIMIT SWITCH
(OPTIONAL)
MOLDED PLUG
AND CABLE
PUSHBUTTON STATION
L1
BLACK
L2
WHITE
GND
GREEN
UP LIMIT SWITCH
(OPTIONAL)
DOWN LIMIT SWITCH
(OPTIONAL)
DOWN SOLENOID
BLK
W
R
T1, T3, T5
T2, T4
T8
2
3
1
4
POTENTIAL
RELAY
FOOTSWITCH OPTION
LTD ELECTRICAL
DIAGRAM



LT & LTD DC ELECTRIC SCHEMATIC

SECTION 10. BASIC PART IDENTIFICATION



SECTION 11. TROUBLESHOOTING HINTS

Warning! Only qualified service personnel shall undertake service work on hydraulic lifts. The service person shall be able to read and understand wiring and hydraulic diagrams, know how to safely troubleshoot live electrical circuits and be familiar with this manual and all safety devices on the lift. Contact your distributor if you need assistance in troubleshooting your equipment.

Warning! No work shall be performed beneath a raised lift platform unless the safety leg is installed in accordance with Section 6 of this manual

Symptom	Probable Cause	Corrective Action
Equipment does not raise, motor is running	Load is too heavy	Reduce weight to rated load
	Motor rotation is reversed	On three phase units, have an electrician reverse any two power leads on the power plug to reverse rotation. (Note: that the hydraulic pump can not be run backwards for more than a few seconds without suffering severe damage).
	Motor may be single-phasing	Check wiring and overloads to determine that all three phase lines are present at the motor.
	Low voltage at motor terminals	Check voltage at motor terminals while unit is under full load. If current is below requirements in Section 9 of this manual, correct the wire size or run length.
	Pinched hydraulic line	Check to see that no lines are pinched. Correct as necessary.
	Low oil level in reservoir	Check oil level and correct as necessary. If oil is low, check for leaks also.
	Clogged reservoir breather	Check that air can pass freely through filter and correct as necessary.
	Clogged suction line	Observe the clear suction line to be sure that it remains full of oil with no air bubbles at anytime. If there are any bubbles, check for a loose fitting, cracked ports or a clogged suction filter.

Symptom	Probable Cause	Corrective Action
Equipment does not raise (continued)	Down solenoid wired Incorrectly to energize with up circuit	Hold screwdriver on down solenoid and press “up” switch. If you feel magnetism correct the lift wiring.
	Down solenoid stuck open	Remove the down solenoid and check for free movement of the plunger.
	Pump failure	Place gauge on pump and if it does not produce 3200 psi., replace pump.
Equipment raises too slowly	Load is too heavy	Reduce weight to rated
	Pinched hydraulic line	Check to see that no lines are pinched. Correct as necessary.
	Dirt in down solenoid	Clean the down so that it may fully close.
	Wrong oil for ambient temperature	See oil recommendations in Section 8 of the manual.
	Dirt in reservoir breather	Clean air breather.
	Low voltage at motor	Check voltage at motor terminals while unit is under full load. If current is below requirements in section 9 of this manual, correct the wire size or run length.

Symptom	Probable Cause	Corrective Action
Equipment raises too slowly (continued)	Clogged suction line.	Observe the clear suction line to be sure it remains full of oil with no air bubbles at anytime. If there are any bubbles, check for loose fittings, cracked ports or clogged suction filter.
Motor heats or labors excessively.	Low voltage at motor terminals.	Check voltage at motor terminals while unit is under full load. If current is below requirements in Section 9 of this manual, correct the wire size or run length.,
	Wrong oil for ambient temperature.	See oil recommendations in Section 8 of manual.
	Load is too heavy.	Reduce load to rated load.
Operation is spongy.	Air in cylinders.	Bleed the cylinders to remove air trapped in them. If this reoccurs, check for air bubbles in the suction line and air leaks.
Equipment lowers too slowly.	Pinched hydraulic line.	Check to see that no lines are pinches. correct if necessary.
	Dirt in flow control valve.	Remove and clean flow control valve.
Equipment lowers too fast.	Dirt in check valve.	Remove and clean check valve.
	Dirt in flow control valve.	Remove and clean flow control valve.

Symptom	Probable Cause	Corrective Action
Lift raises, then Lowers.	Dirt in check valve.	Remove and clean check valve.
	Down solenoid wired Incorrectly.	Hold screwdriver on down solenoid and if you feel magnetism correct the lift wiring.
	Leaking cylinder packings.	Repack cylinders.
Lift raises, but will not lower.	Faulty solenoid valve	Replace valve.
	Down solenoid incorrectly wired.	Rewire per diagram in Section 9 of this manual.
	Faulty solenoid coil.	Replace coil.
	Obstruction in baseframe.	Raise lift to clear obstruction then remove.
Oil spraying out of reservoir.	Clogged air breather.	A dirty breather filter may build up positive pressure which will spray oil. Clean air breather.
Lift will not raise and motor will not run.	Control voltage fuse blown.	Replace fuse.
	Motor starter overload	Reset motor starter.
	Wrong voltage to unit.	Check wiring to confirm wiring is compatible with available power.
	Transformer connections loose.	Check and tighten terminal screws on transformer.
	Transformer defective.	Replace transformer.
	Pushbutton defective	Replace pushbutton
	DC units:	See Battery charging instructions.

SECTION 12. ADVANCE LIFTS INC. WARRANTY

For a period of one year from date of shipment from the Company's plant, the Company agrees to replace or repair, free of charge, any defective parts, material or workmanship on new equipment. This shall include electrical and hydraulic components.

For a period of ten years or 125,000 cycles (whichever occurs first) from date of shipment from Company's plant, the Company agrees to replace or repair any defective structure.

Company authorization must be obtained prior to the commencement of any work. The Company reserves the right of choice between effecting repairs in the field or paying all freight charges and effecting the repairs at the Company's plant. The Company further reserves the right of final determination in all warranty considerations. Evidence of overloading, abuse or field modification of units without Company approval shall void this warranty. No contingent liabilities will be accepted.

SECTION 13. PARTS LISTS
P-SERIES LIFTS

GENERAL DESCRIPTION	DETAIL DESCRIPTION	PART #
MECHANICAL: (COMMON TO ALL UNITS, SELECT BY DATE OF MANUFACTURE)		
WHEEL (BEFORE 1/1/02)	P,SL-232,AL,SAL,WHEEL ASM,3,.875	P-006-223
WHEEL (AFTER 1/1/02)	P,SAL,BALL BRG WHEEL ASM,3,.875	P-023-878
WHEEL PIN (BEFORE 1/1/02)	PIN,1,1.658,GRVD END,BVLD END	P-A-0230
WHEEL PIN (AFTER 1/1/02)	P,BALL BRG RLLR WHL PIN	P-A-9708
WHEEL PIN SNAP RING 1" (ALL)	RR,ROTO-CLIP,SHR-98-1IN	P-001-876
PLATFORM PIN (1" X 2") (ALL)	PIN,1,2.092,GRVD ENDS	P-A-0234
PLATFORM PIN SNAP RING 1" (ALL)	RR,ROTO-CLIP,SHR-98-1IN	P-001-876
LEG TO BASEFRAME PIN (1" X 1-7/8") (ALL)	PIN,1,1.875,BVLD END	P-A-0235
LEG TO BASEFRAME PIN SNAP RING 1" (ALL)	RR,ROTO-CLIP,SHR-98-1IN	P-001-876
COMPLETE CYLINDER: (SELECT BY VOLTAGE, PHASE AND MANUFACTURE DATE)		
Lifts manufactured before 4/1/00 will also require an SAE to NPT elbow part # P-010-219		
NOTE: (Left and right cylinder ports are described as viewed from the roller end of the lift)		
MODEL#		
P-2524 RIGHT PORT (BEFORE 1/1/02)	P-2524,P-6024,CYL ASM,RT,3.5B,1.75R	P-003-478
P-2524 LEFT PORT (BEFORE 1/1/02)	P-2524,P-6024,CYL ASM,LT,3.5B,1.75R	P-003-479
P-2524 RIGHT PORT (AFTER 1/1/02)	P-6024,CYL ASM,RT,3.5B,1.75R,4.5S	P-022-066
P-2524 LEFT PORT (AFTER 1/1/02)	P25/6024,CYL ASM,LT,3.5B,1.75R,4.5S	P-022-068
P-2536 RIGHT PORT (ALL)	P-2536,P-6036,CYL ASM,RT,3.5B,1.75R	P-003-482
P-2548 RIGHT PORT (ALL)	P-2548,P-6048,CYL ASM,RT,3.5B,1.75R	P-003-486
P-2548 LEFT PORT (ALL)	P-2524,P-6048,CYL ASM,LT,3.5B,1.75R	P-003-487
P-2560 RIGHT PORT (BEFORE 1/1/02)	P-2560/6060,CYL ASM,RT,3.5B,1.75R	P-020-231
P-2560 RIGHT PORT (AFTER 1/1/02)	P-2560/6060,CYL ASM,RT,3.5B,1.75R	P-022-017
P-2560 LEFT PORT (AFTER 1/1/02)	P-2560/6060,CYL ASM,LT,3.5B,1.75R	P-022-011
P-4024 RIGHT PORT (BEFORE 1/1/02)	P-4024,CYL ASM,RT,3.0B,1.75R	P-003-480
P-4024 LEFT PORT (BEFORE 1/1/02)	P-4024,CYL ASM,LT,3.0B,1.75R	P-003-481
P-4024 RIGHT PORT (AFTER 1/1/02)	P-4024,CYL ASM,RT,3.0B,1.75R	P-021-984
P-4024 LEFT PORT (AFTER 1/1/02)	P-4024,CYL ASM,LT,3.0B,1.75R	P-021-987
P-4036 RIGHT PORT (ALL)	P-4036,CYL ASM,RT,3.0B,1.75R	P-004-222
P-4036 LEFT PORT (ALL)	P-4036,CYL ASM,LT,3.0B,1.75R	P-004-223
P-4048 RIGHT PORT (ALL)	P-4048,CYL ASM,RT,3.0B,1.75R	P-003-488
P-4048 LEFT PORT (ALL)	P-4048,CYL ASM,LT,3.0B,1.75R	P-003-489
P-4060 RIGHT PORT (BEFORE 1/1/02)	P-4060,CYL ASM,RT,3.0B,1.75R	P-020-343
P-4060 LEFT PORT (BEFORE 1/1/02)	P-4060,CYL ASM,LT,3.0B,1.75R	P-020-344
P-4060 RIGHT PORT (AFTER 1/1/02)	P-4060,CYL ASM,RT,3.0B,1.75R	P-022-006
P-4060 LEFT PORT (AFTER 1/1/02)	P-4060,CYL ASM,LT,3.0B,1.75R	P-022-010
P-6024 RIGHT PORT (BEFORE 1/1/02)	P-2524,P-6024,CYL ASM,RT,3.5B,1.75R	P-003-478
P-6024 LEFT PORT (BEFORE 1/1/02)	P-6024,CYL ASM,LT,3.5B,1.75R	P-003-479
P-6024 RIGHT PORT (AFTER 1/1/02)	P-6024,CYL ASM,RT,3.5B,1.75R	P-022-066
P-6024 LEFT PORT (AFTER 1/1/02)	P2524,6024,CYL ASM,LT,3.5B,1.75R	P-022-068
P-6036 RIGHT PORT (ALL)	P-2536,P-6036,CYL ASM,RT,3.5B,1.75R	P-003-482
P-6036 LEFT PORT (ALL)	P-6036,CYL ASM,LT,3.5B,1.75R	P-003-483
P-6048 RIGHT PORT (ALL)	P-2548,P-6048,CYL ASM,RT,3.5B,1.75R	P-003-486
P-6048 LEFT PORT (ALL)	P-6048,CYL ASM,LT,3.5B,1.75R	P-003-487
P-6060 RIGHT PORT (BEFORE 1/1/02)	P-2560/6060,CYL ASM,RT,3.5B,1.75R	P-020-231
P-6060 LEFT PORT (BEFORE 1/1/02)	P-6060,CYL ASM,LT,3.5B,1.75R	P-020-230
P-6060 RIGHT PORT (AFTER 1/1/02)	P-2560/6060,CYL ASM,RT,3.5B,1.75R	P-022-017
P-6060 LEFT PORT (AFTER 1/1/02)	P-2560/6060,CYL ASM,LT,3.5B,1.75R	P-022-011

CYLINDER PARTS: (SELECT BY MODEL NUMBER)		
CYLINDER PACKING KIT FOR 3" BORE	P-40XX,CYL PKG KIT,3.0B,1.75R	P-004-167
CYLINDER PACKING KIT FOR 3-1/2" BORE	P-XXXX,CYL PKG KIT,3.5B,1.75R	P-003-875
ROD ASM. FOR P 2524, P 4024 AND P 6024	P-XX24,ROD ASM	P-004-331
ROD ASM. FOR P 2536, P 4036 AND P 6036 (ALL)	P-2536,P-6036,ROD ASM	P-003-867
ROD ASM. FOR P 2548, P 4048 AND P 6048 (ALL)	P-XX48,ROD ASM	P-004-082
ROD ASM. FOR P 2560, P 4060 AND P 6060 (BEFORE 1/1/02)	P-XX60,ROD,1.75R,25.125	P-A-9452
ROD ASM. P 2524, P 4024, P 6024 (AFTER 1/1/02)	P-XX24,ROD,1.75,11.875	P-A-9730
ROD ASM. P 2560, P 4060, P 6060 (AFTER 1/1/02)	P-6060,ROD,1.75,25.8125	P-A-9736
BEARING ASSEMBLY 3" BORE (BEFORE 1/1/02)	CYL BRG BLK ASM,3.0B,1.75R,2.44	P-003-923
BEARING ASSEMBLY 3-1/2" BORE (BEFORE 1/1/02)	CYL BRG BLK ASM,3.5B,1.75R,2.44	P-003-874
BEARING ASSEMBLY 3" BORE (AFTER 1/1/02)	CYL BRG BLK,3.0B,1.75R,2.191	P-A-9726
BEARING ASSEMBLY 3-1/2" BORE (AFTER 1/1/02)	CYL BRG BLK,3.5B,1.75R,2.19	P-A-9677
PISTON, 3" BORE	PISTON,3.0B,1.75R,1.5	P-A-1409
PISTON, 3-1/2" BORE	PISTON,3.5B,1.75R,1.75	P-A-1551
CYLINDER PIN (BEFORE 1/1/02)	PIN,1,4.875,GRVD ENDS	P-A-1951
CYLINDER PIN (AFTER 1/1/02)	PIN,1,4.625,GRVD ENDS	P-A-9717
CYLINDER PIN, 6000 LBS. CAP. LIFTS (AFTER 1/1/02)	PIN,1,4.813,GRVD ENDS,140KSI MU	P-A-9707
CYLINDER PIN SNAP RING 1"	RR,ROTOCLIP,SHR-98-1IN	P-001-876
FLOW CONTROL CARTRIDGE, 1.5 GPM (PRE 04/00)	HV,VONBERG,FIXED 1.5,1302-1-1.5	P-001-301
BLACK HEXAGONAL FLOW CONTROL(AFTER 04/00)	HV,HYDRAF,ORIFICE,1.5GPM,BLACK	P-015-395
COMPLETE POWER UNIT WITH PUSHBUTTON: (SELECT BY MODEL, VOLTAGE AND PHASE)		
P-2524, 115 VOLT, 1 PH, 24VA	P-2524,1/1,115,24,PU W/CTL,PB	P-004-723
P-2524, 230 VOLT, 1 PH, 24VA	P-2524,1/1,230,24,PU W/CTL,PB	P-004-725
P-2524, 230 VOLT, 3 PH, 24VA	P-2524,1.5/3,230,24,PU W/CTL,PB	P-004-682
P-2524, 460 VOLT, 3 PH, 24VA	P-2524,1.5/3,460,24,PU W/CTL,PB	P-004-712
P-4024, P-6024, 115 VOLT, 1 PH, 24VA	P-4024,6024,1/1,115,24,PU W/CTL,PB	P-004-726
P-4024, P-6024, 230 VOLT, 1 PH, 24VA	P-4024,6024,1/1,230,24,PU W/CTL,PB	P-004-727
P-4024, P-6024, 230 VOLT, 3 PH, 24VA	P-4024,6024,1.5/3,230,24,PU W/CTL,PB	P-004-683
P-4024, P-6024, 460 VOLT, 3 PH, 24VA	P-4024,6024,1.5/3,460,24,PU W/CTL,PB	P-004-713
P-2536, 115 VOLT, 1 PH, 24VA	P-2536,1/1,115,24,PU W/CTL,PB	P-004-728
P-2536, 230 VOLT, 1 PH, 24VA	P-2536,1/1,230,24,PU W/CTL,PB	P-004-729
P-2536, 230 VOLT, 3 PH, 24VA	P-2536,2/3,230,24,PU W/CTL,PB	P-003-878
P-2536, 460 VOLT, 3 PH, 24VA	P-2536,2/3,460,24,PU W/CTL,PB	P-004-714
P-4036, P-6036, 115 VOLT, 1 PH, 24VA	P-4036,6036,1/1,115,24,PU W/CTL,PB	P-004-730
P-4036, P-6036, 115 VOLT, 1 PH, 24VA	P-4036,6036,1/1,230,24,PU W/CTL,PB	P-004-731
P-4036, P-6036, 230 VOLT, 3 PH, 24VA	P-40/6036,2/3,230,24,PU W/CTL,PB	P-004-430
P-4036, P-6036, 460 VOLT, 3 PH, 24VA	P-40/6036,2/3,460,24,PU W/CTL,PB	P-004-715
P-2548, 115 VOLT, 1 PH, 24VA	P-2548,1/1,115,24,PU W/CTL,PB	P-004-732
P-2548, 230 VOLT, 1 PH, 24VA	P-2548,1/1,230,24,PU W/CTL,PB	P-004-733
P-2548, 230 VOLT, 3 PH, 24VA	P-2548,2/3,230,24,PU W/CTL,PB	P-004-644
P-2548, 460 VOLT, 3 PH, 24VA	P-2548,2/3,460,24,PU W/CTL,PB	P-004-716
P-4048, P-6048, 115 VOLT, 1 PH, 24VA	P-4048,6048,1/1,115,24,PU W/CTL,PB	P-004-734
P-4048, P-6048, 115 VOLT, 1 PH, 24VA	P-4048,6048,1/1,230,24,PU W/CTL,PB	P-004-735
P-4048, P-6048, 230 VOLT, 3 PH, 24VA	P-40/6048,2/3,230,24,PU W/CTL,PB	P-004-645
P-4048, P-6048, 230 VOLT, 3 PH, 24VA	P-40/6048,2/3,460,24,PU W/CTL,PB	P-004-717
MOTOR: (SELECT BY VOLTAGE AND PHASE)		
115/208/230 VOLT, 1 PH	MR,LEESON,1,17,1,092032.00	P-000-330
208/230/460/480 VOLT, 1.5 HP, 3 PH	MR,LEESON,1.5,17,3,092062.00	P-001-450
208/230/460/480 VOLT, 2 HP, 3 PH	MR,LEESON,2,17,3,092139.00	P-001-451

PUMP: (SELECT BY MODEL NUMBER)		
P-2524,4024,6024, WITH 1 PHASE MOTOR	HP,1,.097,17,INT,1003220	P-000-346
P-2524,4024,6024, WITH 3 PHASE MOTOR	HP,1,.161,17,INT,1003219	P-000-344
P-2536,4036,6036 WITH 1 PHASE MOTOR	HP,1,.097,17,INT,1003220	P-000-346
P-2536,4036,6036 WITH 3 PHASE MOTOR	HP,1,.226,17,INT,1003214	P-000-348
P-2548,4048,6048, WITH 1 PHASE MOTOR	HP,1,.161,17,INT,1003219	P-000-344
P-2548,4048,6048, WITH 3 PHASE MOTOR	HP,1,.226,17,INT,1003214	P-000-348
HYDRAULIC: (COMMON TO ALL UNITS)		
MANIFOLD VALVE ASSEMBLY	VALVE MANIFOLD ASM	P-004-420
CHECK VALVE	HV,DELTA,CHECK VALVE,85002355	P-001-262
24V DOWN SOLENOID VALVE AND COIL ASM	HV,DELTA,DOWN SOLENOID W/24V COIL	P-001-259
24V DOWN SOLENOID COIL ONLY	HV,DELTA,24V COIL, 36910038	P-001-260
DOWN SOLENOID VALVE 24V/115V	HV,DELTA,DOWN SOLENOID,85002355	P-001-279
115V DOWN SOLENOID COIL ONLY	HV,DELTA,115V COIL,39670035	P-001-261
24V BARNES DOWN SOLENOID COIL	HV,BARNES,24VAC COIL,6316024	P-015-301
115V BARNES DOWN SOLENOID COIL	HV,BARNES,115V COIL,6315115	P-001-741
BARNES 115V/24V DOWN SOLENOID VALVE	HV,BARNES,SOLNOID CART,SV08-20S0N0	P-003-106
ADJUSTABLE FLOW CONTROL VALVE	HV,DELTA,ADJ FLOW,85002019	P-001-265
CONTROLLER:(SELECT BY UNIT, VOLTAGE AND PHASE)		
P-2524,4024,6024, 115V, 1 PHASE	CT,P,TELE,1/1,115,24,10X8X6	P-004-744
P-2524,4024,6024, 230V, 1 PHASE	CT,P,TELE,1/1,230,24,10X8X6	P-004-752
P-2524,4024,6024, 230V, 3 PHASE	CT,P,TELE,1.5/3,230,24,10X8X6	P-004-684
P-2524,4024,6024, 460V, 3 PHASE	CT,P,TELE,1.5/3,460,24,10X8X6	P-004-719
P-2536,4036,6036, 115V, 1 PHASE	CT,P,TELE,1/1,115,24,10X4X4	P-004-757
P-2536,4036,6036, 230V, 1 PHASE	CT,P,TELE,1/1,230,24,10X4X4	P-004-759
P-2536,4036,6036, 230V, 3 PHASE	CT,P,TELE,2/3,230,24,10X4X4	P-004-083
P-2536,4036,6036, 460V, 3 PHASE	CT,P,TELE,2/3,460,24,10X4X4	P-004-718
P-2548,4048,6048, 115V, 1 PHASE	CT,P,TELE,1/1,115,24,10X4X4	P-004-757
P-2548,4048,6048, 230V, 1 PHASE	CT,P,TELE,1/1,230,24,10X4X4	P-004-759
P-2548,4048,6048, 230V, 3 PHASE	CT,P,TELE,2/3,230,24,10X4X4	P-004-083
P-2548,4048,6048, 460V, 3 PHASE	CT,P,TELE,2/3,460,24,10X4X4	P-004-718
TRANSFORMER: (SELECT BY VOLTAGE AND OPTIONS)		
115-230V,24V, 1 PHASE	CT,XFMR,115/230/24,50VA	P-029-921
240-480V,24V, 3 PHASE	CT,XFMR,240/480/24,50VA	P-029-919
CONTACTOR, MOTOR STARTER: (SELECT BY VOLTAGE, PHASE AND MANUFACTURE DATE)		
115V,1PH CONTACTOR (BEFORE 6/02)	CT,TELE,CONTACTOR,LC1D2510B6	P-000-413
115V,1PH CONTACTOR (AFTER 6/02)	CT,TESYS,CONTACTOR,LC1D25B7	P-000-692
230V,1PH CONTACTOR (BEFORE 6/02)	CT,TELE,CONTACTOR,LC1D2510B6	P-000-413
230V,1PH CONTACTOR (AFTER 6/02)	CT,TESYS,CONTACTOR,LC1D25B7	P-000-692
230V,3PH CONTACTOR (BEFORE 6/02)	CT,TELE,CONTACTOR,LC1D0910B6	P-000-430
230V,3PH CONTACTOR (AFTER 6/02)	CT,TESYS,CONTACTOR,LC1D09B7	P-000-690
460V,3PH CONTACTOR (BEFORE 6/02)	CT,TELE,CONTACTOR,LC1D0910B6	P-000-430
460V,3PH CONTACTOR (AFTER 6/02)	CT,TESYS,CONTACTOR,LC1D09B7	P-000-690
OVERLOAD: (SELECT BY VOLTAGE, PHASE AND MANUFACTURE DATE)		
115V/1PH OVERLOAD (BEFORE 6/02)	CT,TELE,OVERLOAD 17-25,LR2D1322	P-000-419
115V/1PH OVERLOAD (AFTER 6/02)	CT,TESYS,OVERLOAD,17-25,LRD22	P-000-700
230V/1PH OVERLOAD (BEFORE 6/02)	CT,TELE,OVERLOAD 9-13,LR2D1316	P-000-763
230V/1PH OVERLOAD (AFTER 6/02)	CT,TESYS,OVERLOAD,9-13,LRD16	P-000-698
230V/3PH OVERLOAD (BEFORE 6/02)	CT,TELE,OVERLOAD 5.5-8,LR2D1312	P-000-417
230V/3PH OVERLOAD (AFTER 6/02)	CT,TESYS,OVERLOAD,5.5-8,LRD12	P-000-696
460V/3PH OVERLOAD (BEFORE 6/02)	CT,TELE,OVERLOAD 2.5-4,LR2D1308	P-000-415
460V/3PH OVERLOAD (AFTER 6/02)	CT,TESYS,OVERLOAD,2.5-4,LRD08	P-000-694

OPTIONS:		
STROBE LIGHT, 24V	ME,MICROSTROBE,495S-1280,24V	P-000-805
STROBE LIGHT, 110V	ME,MICROSTROBE,495S-120,110V	P-001-422
BLUE SPRAY PAINT, 16 oz	PS,RABBE,BLUE AERO,16OZ,38-398	P-015-173
YELLOW SPRAY PAINT, 16 oz	PS,RABBE,YELLOW AERO,16OZ,54-438	P-015-174
POWER UNIT DECAL KIT	P-XXXX,PU DECAL KIT	P-004-142
COMPLETE DECAL KIT	P-XXXX,HD-XXXX,DETAIL DECAL KIT	P-004-138
OWNERS MANUAL	P-XXXX,OWNERS MANUAL	P-004-143
PLUG 230V, 3 PHASE	ES,LEVITON,PLUG,250V,20A,3PH,2421	P-001-671
PLUG 460V, 3 PHASE	ES,LEVITON,PLUG,480V,30A,3PH,2731	P-000-994
PLUG 115V, 1 PHASE	ES,LEVITON,PLUG,125V,30A,1PH,2611	P-000-998
PLUG 230V, 1 PHASE	ES,LEVITON,PLUG,250V,20A,1PH,2321	P-000-996
PUSH BUTTON SWITCH	ME,CABLEFORM,PB,CFM61	P-000-810
FOOT SWITCH 115V, 1 PHASE	P,FT SWITCH W/PWR CORD 115,1PH	P-004-913
FOOT SWITCH 230V, 3 PHASE	P,FT SWITCH W/PWR CORD 230,3PH	P-004-122
FOOT SWITCH 460V, 3 PHASE	P,FT SWITCH W/PWR CORD 460,3PH	P-004-909
REPLACEMENT NAME/SERIAL NUMBER TAG	SS,NAMEPLATE,ASSY,1-1/2X6-1/4 APT	P-001-598

Material Safety Data Sheet

1. Chemical product and company identification

Product name	CASTROL DUAL RANGE HV 46 HYDRAULIC FLUID
MSDS #	460278
Historic MSDS #:	None.
Code	460278
Product use	Hydraulic fluid For specific application advice see appropriate Technical Data Sheet or consult our company representative.
Supplier	BP Lubricants USA Inc. 9300 Pulaski Highway Baltimore, Maryland 21220-2495
EMERGENCY HEALTH INFORMATION:	1 (800) 447-8735 Outside the US: +1 703-527-3887 (CHEMTREC)
EMERGENCY SPILL INFORMATION:	1 (800) 424-9300 CHEMTREC (USA)
OTHER PRODUCT INFORMATION	1 (866) 4 BP - MSDS (866-427-6737 Toll Free - North America) email: bpcares@bp.com

2. Composition/information on ingredients

Ingredient name	CAS #	% by weight
Distillates (petroleum), hydrotreated, heavy paraffinic (Highly refined mineral oil)	64742-54-7	85 - 90
Lubricating oils (petroleum), C20-50, hydrotreated neutral oil-based, high viscosity (Highly refined mineral oil)	72623-85-9	5 - 15
White mineral oil, petroleum (Highly refined mineral oil)	8042-47-5	1 - 5
Proprietary performance additives.	proprietary	5 - 10

3. Hazards identification

Physical state	Liquid.
Color	Purple.
Emergency overview	CAUTION! MAY CAUSE EYE IRRITATION. MAY CAUSE SKIN IRRITATION. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.
Routes of entry	Skin contact. Eye contact. Inhalation. Ingestion.
Potential health effects	
Eyes	May cause eye irritation.
Skin	Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis. High pressure skin injections are serious medical emergencies. Injury will not appear serious at first; within a few hours, tissue will become swollen, discolored and extremely painful.
Inhalation	Mist : May cause respiratory tract irritation.

Ingestion	Causes gastrointestinal irritation and diarrhea.
Medical conditions aggravated by over-exposure	None identified.

See toxicological information (section 11)

4. First aid measures

Eye contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin contact	Immediately wash exposed skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops. Accidental high pressure injection through the skin requires immediate medical attention.
Inhalation	If inhaled, remove to fresh air. Get medical attention if symptoms appear.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately.

5. Fire-fighting measures

Flammability of the product	May be combustible at high temperature.
Flash point	232 °C (Open cup) Cleveland.
Products of combustion	These products are carbon oxides (CO, CO_2).
Unusual fire/explosion hazards	This material is not explosive as defined by established regulatory criteria.
Fire-fighting media and instructions	In case of fire, use water fog, foam, dry chemicals, or carbon dioxide. Do not use water jet.
Protective clothing (fire)	Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

6. Accidental release measures

Personal precautions	Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (See Section: "Exposure controls/personal protection"). Follow all fire fighting procedures (See Section: "Fire-fighting measures").
Environmental precautions and clean-up methods	If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) scoop up material and place in a sealed, liquid-proof container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Avoid contact of spilled material with soil and prevent runoff entering surface waterways. See Section 13 for Waste Disposal Information.
Personal protection in case of a large spill	Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

7. Handling and storage

Handling	Avoid contact with eyes. Avoid contact with skin and clothing. Wash thoroughly after handling.
Storage	Keep container tightly closed. Keep container in a cool, well-ventilated area. Empty containers may contain harmful, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld, reuse or dispose of containers unless adequate precautions are taken against these hazards.

8. Exposure controls/personal protection

Occupational exposure limits

Ingredient name	Occupational exposure limits
Distillates (petroleum), hydrotreated, heavy paraffinic (Highly refined mineral oil)	**ACGIH (United States).** STEL: 10 mg/m^3 15 minute(s). Form: Oil mist, mineral TWA: 5 mg/m^3 8 hour(s). Form: Oil mist, mineral **OSHA (United States).** TWA: 5 mg/m^3 8 hour(s). Form: Oil mist, mineral
Lubricating oils (petroleum), C20-50, hydrotreated neutral oil-based, high viscosity (Highly refined mineral oil)	**ACGIH (United States).** STEL: 10 mg/m^3 15 minute(s). Form: Oil mist, mineral TWA: 5 mg/m^3 8 hour(s). Form: Oil mist, mineral **OSHA (United States).** TWA: 5 mg/m^3 8 hour(s). Form: Oil mist, mineral
White mineral oil, petroleum (Highly refined mineral oil)	**ACGIH (United States).** STEL: 10 mg/m^3 15 minute(s). Form: Oil mist, mineral TWA: 5 mg/m^3 8 hour(s). Form: Oil mist, mineral **OSHA (United States).** TWA: 5 mg/m^3 8 hour(s). Form: Oil mist, mineral
Proprietary performance additives.	None assigned.

Control Measures Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits.

Hygiene measures Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the work-station location.

Personal protection

Eyes Avoid contact with eyes. Chemical splash goggles.

Skin and body Avoid prolonged or repeated contact with skin. Wear protective clothing if prolonged or repeated contact is likely.

Respiratory None required; however, use of adequate ventilation is good industrial practice. If heated and ventilation is inadequate, use a NIOSH certified respirator with an organic vapor cartridge and P95 particulate filter.

Hands Wear protective gloves if prolonged or repeated contact is likely.

Consult your supervisor or S.O.P. for special handling directions

Consult local authorities for acceptable exposure limits.

9. Physical and chemical properties

Physical state Liquid.

Color Purple.

Pour Point -45 °C

Specific gravity 0.8697

Solubility Insoluble in cold water.

Viscosity Kinematic: 46.5 mm^2/s (46.5 cSt) at 40°C
Kinematic: 7.9 mm^2/s (7.9 cSt) at 100°C
SUS: 216 SUS at 37.7°C

Viscosity Index 141

10. Stability and reactivity

Stability and reactivity	The product is stable.
Conditions to avoid	Keep away from heat, sparks and flame. Keep away from sources of ignition.
Incompatibility with various substances	Reactive with oxidizing agents.
Hazardous decomposition products	Products of combustion: carbon oxides (CO, CO_2).
Hazardous polymerization	Will not occur.

11. Toxicological information

Acute toxicity

Toxicity testing not conducted.

At normal ambient temperatures this product will be unlikely to present an inhalation hazard because of its low volatility. May be harmful by inhalation if exposure to vapor, mists or fumes resulting from thermal decomposition products occurs.

Unlikely to cause harm if accidentally swallowed in small doses, though larger quantities may cause nausea and diarrhea.

Chronic toxicity

Carcinogenic effects	No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH or the International Agency for Research on Cancer (IARC). No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Act (OSHA).
Mutagenic effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a mutagen.
Reproductive effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a reproductive toxin.
Teratogenic effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as teratogenic or embryotoxic.

12. Ecological information

Ecotoxicity No testing has been performed by the manufacturer.

13. Disposal considerations

Waste information Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities.

Consult your local or regional authorities.

14. Transport information

Not classified as hazardous for transport (DOT, TDG, IMO/IMDG, IATA/ICAO)

15. Regulatory information

U.S. Federal regulations

US INVENTORY (TSCA): In compliance.

TSCA 12(b) one-time export notification:: naphthalene; naphthalene; mequinol

This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: CASTROL DUAL RANGE HV 46 HYDRAULIC FLUID: Immediate (Acute) Health Hazard

SARA 313

Form R - Reporting requirements

This product does not contain any hazardous ingredients at or above regulated thresholds.

Supplier notification

This product does not contain any hazardous ingredients at or above regulated thresholds.

CERCLA Sections 102a/103 Hazardous Substances (40 CFR Part 302.4):: naphthalene: 100 lbs. (45.36 kg); Cumene: 5000 lbs. (2268 kg); Benzene: 10 lbs. (4.536 kg); Toluene: 1000 lbs. (453.6 kg); Xylene: 100 lbs. (45.36 kg); naphthalene: 100 lbs. (45.36 kg); phosphorodithioc acid, O,O - di-C1-14- alkyl esters zinc salts ; phenol: 1000 lbs. (453.6 kg); Ethyl acrylate: 1000 lbs. (453.6 kg); Lead: 10 lbs. (4.536 kg); Arsenic: 1 lbs. (0.4536 kg); Cadmium: 10 lbs. (4.536 kg);

State regulations

No products were found.

WARNING: This product contains a chemical known to the State of California to cause cancer. naphthalene; naphthalene; Ethyl acrylate; Arsenic

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.
Lead; Cadmium; Benzene

Inventories

AUSTRALIAN INVENTORY (AICS): Not determined.

CANADA INVENTORY (DSL): In compliance.

CHINA INVENTORY (IECS): Not determined.

EC INVENTORY (EINECS/ELINCS): Not determined.

JAPAN INVENTORY (ENCS): Not determined.

KOREA INVENTORY (ECL): Not determined.

PHILIPPINE INVENTORY (PICCS): Not determined.

16. Other information

Label requirements

CAUTION!

MAY CAUSE EYE IRRITATION.
MAY CAUSE SKIN IRRITATION.

HMIS® Rating :

Health	**1**
Flammability	**1**
Physical Hazard	**0**
Personal protection	**X**

National Fire Protection Association (U.S.A.)

History

Date of issue 07/07/2005.

Date of previous issue 07/02/2005.

Prepared by Product Stewardship

Notice to reader

NOTICE : This Material Safety Data Sheet is based upon data considered to be accurate at the time of its preparation. Despite our efforts, it may not be up to date or applicable to the circumstances of any particular case. We are not responsible for any damage or injury resulting from abnormal use, from any failure to follow appropriate practices or from hazards inherent in the nature of the product.