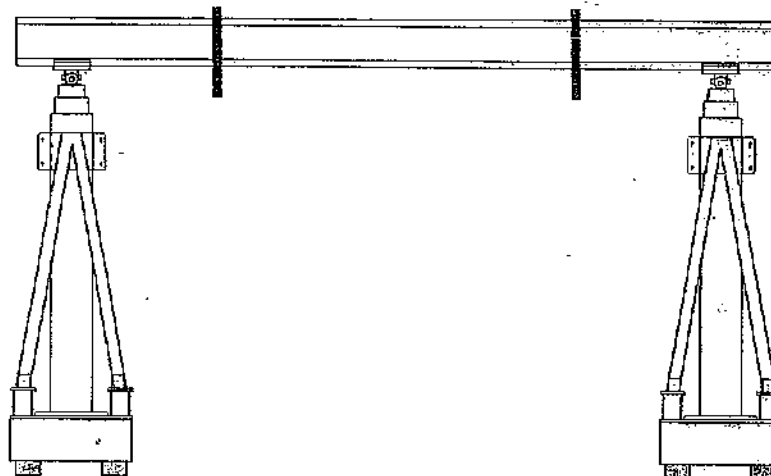




# SERVICE, OPERATION AND PARTS MANUAL FOR 2033SC



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# **4 POINT LIFT SYSTEMS MACHINE MANUAL**

## **IMPORTANT MACHINE INFORMATION**

**MODEL NUMBER: 2033SC**

**SERIAL NUMBER/S: 2033SC-3**

**RATED CAPACITY: 33 TON**

**POWER OPTION: 220 VOLT ELECTRIC**

**MACHINE SHIP DATE: SEPTEMBER 2004**

**OPTIONAL EQUIPMENT: INTEGRAL DRIVES**

**MANUAL TYPE: 1**

- (1) COMBINATION; OPERATION, SERVICE, AND PARTS**
- (2) OPERATION**
- (3) MAINTENANCE**



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## **SECTION 1 GENERAL INFORMATION**

### **Introduction**

The lift system consists of two or more bases. Standard equipment consists of:

- Maneuvering Dolly
- Self-contained power unit
- Double-acting telescopic cylinder
- High capacity, low friction wheels
- Lifting beam attachment assembly
- Remote Control

Some units may have optional equipment such as:

- Power drive
- Hard poly type tires
- European style power system

This manual will concentrate on standard equipment usage and safety procedures. Optional equipment is discussed in separate inserts to this manual.

### **Design**

This lift system is designed for accurate precise lifting and smooth movement of loads specified by the load chart. It is designed to be very stable when used in accordance with good and safe rigging practices by competent rigging and maintenance personnel. All procedures set forth in this manual are based on the safe operation of this lift system under proper operating conditions and without deviations from the system as it was originally intended to be used.

### **Operating Characteristics and Limitations**

Personnel should receive training prior to operating this system. Do not rely on past experiences with similar types of lifting devices. Learn the strengths and limitations of this system.

## **SECTION 1 GENERAL INFORMATION**

### **Capacities and Stabilization**

This lift system must be located on a firm level surface. All safety devices must be engaged prior to operation. This lift system must be operated only within the capacities specified by the manufacturers load chart.

### **Maintenance Records and Equipment Utilization Logs**

Accurate records of the use and maintenance of this system are advised. Authorized personnel must update the records each time the system is operated, or maintenance duties are performed. See the maintenance section of this manual for more information.

The operating condition of this hydraulic system depends upon your compliance with the procedures and precautionary measures set forth in this safety and operations manual.

### **Safety Information**

It is very important for the safe operations of this system that authorized personnel are trained to operate this lift system and demonstrate knowledge and understanding of:

- Good and safe rigging practices
- Rigging safety factor requirements
- Proper maintenance procedures
- Troubleshooting techniques

Personnel operating this system should advise proper authorities immediately when a malfunction occurs.

# Section 1 General Information

## Warnings and Cautions

The safety of all personnel through the proper use of this system is paramount. Warnings and cautions have been used throughout this manual to emphasize the areas of concern. They are defined as follows.

**Warning!!!** – If not followed, could end in injury or death to personnel.

**Cautions!!!** – If not followed, could end in damage or loss of system.

## Always Do the Following

- Perform a complete prestart inspection of each unit before each use.
- Be alert to any space requirements and clearances including overhead before starting any system movement.
- Use trained personnel who understand all system operations and safety procedures regarding operating or maintenance responsibilities.
- Use accurate levels to determine whether the system is level and plumb.
- Check to make sure lifting units and lift beams are completely level and plumb. Check often during the lifting and when traveling to make sure that the system remains level and plumb.
- Verify the capacity of rigging equipment or gear being used to handle the specific load for proper size and safety factors (shackles, chokers, etc.).

## Section 1 General Information

- Check lifting beams and the track for structural verification of capacities based upon lifting points and load distribution. A qualified professional engineer may be required. Check for deflection as well as stress in both.
- Use caution at all times to prevent anything from interfering with operating procedures.
- Use the load chart before lifting any load. Plan for the lift including the exact pressure needed to lift the load in the cylinder stages use.

Caution!!!

- Always shut off the power unit when the system will be unattended for any length of time.

### Never Do the Following

- Never leave the system control stations when a load is suspended.
- Never operate a malfunctioning system. Shut down and seek qualified assistance.
- Never take for granted the weight of a load. Check the pressure gauge readings against your load chart.
- Never use the sight method of determining whether or not the system is level or plumb. Use accurate measurements (tape measures or level-lift system).

Caution!!!

- Be careful and always take any necessary precautions to insure safe operating conditions.

Warning!!!

- Do not adjust any factory-preset valves without the express permission and technical instructions from the manufacturer.

## Section 1 General Information

- Never allow people to do any work under a suspended load unless safety cribs or stands are installed beneath the suspended load.
- Never allow anyone to walk under a load for any reason.
- Never use runway track sections to cross pits, basement areas, tunnels, etc. unless track capacity and foundation loading capacity have been verified by a professional engineer, or where the track's rating is unknown.

### Notes:



## **Section 2 Set-up and Operations**

### **Prestart Inspection**

It is the user's responsibility to inspect the lift system before operation begins. It is recommended that inspection of the system take place though other personnel recently operated the lift system.

The walk-around inspection, or visual inspection, is the most efficient method of checking your system. The purpose of the inspection is to insure that the system is in good operating order before it is used.

### **Overall Cleanliness**

Check all system surfaces to be sure they are cleared of any oil, or foreign objects (rags, papers, tools, etc.).

### **Hydraulics**

Check for fluid leaks or any signs of physical damage or wear in the hydraulic system.

### **Lubrication**

Check the maintenance record to see if lubrication is necessary before operation. A lubrication chart is provided with details on specifications.

Check the oil level in the hydraulic reservoir. With the cylinder fully retracted, it should be at the top of the sight gauge. One inch of air space is required above the sight gauge level for oil expansion.

### **Structural**

Check the entire unit for any signs of physical damage. Look for any signs of failure. Consult the factory if any damage or failure has occurred.

## **Section 2 Set-up and Operation**

### **Maintenance Records**

Update your maintenance records each time the system is serviced. The lift of this system will depend upon its proper care and maintenance.

### **Equipment Utilization Records**

Authorized users should document usage of the system to assist other personnel in operating and maintaining this system properly.

### **Pressure Gauges**

On each power unit is a hydraulic pressure gauge. The gauge shows how evenly the load is distributed. These gauges read when cylinders are extended and retracted. When beginning a lift, as the gauge needle stops and the load begins to lift, check pressure readings against the load chart. Check the gauge on each lifting unit against the other lifting units being used. They should be very close.

The greater the weight of the load, the faster the movement of the load when retracting. When retracting the cylinder the gauge will read full system pressure, when the cylinder is operated empty. This is necessary to retract the cylinder in an unloaded condition, because of the differences of the piston sizes. The retract side of the piston is much smaller than the extend side. Therefore, it requires more pressure to move the piston.

### **How to Use the Pressure Gauges and Load Chart**

The safest method is to use the load chart before lifting the load. Determine how much pressure is required to lift the load. The load figure must include any lift beams or other rigging. If you reach that pressure reading, you are exerting the amount of hydraulic force required to lift the

## Section 2 Set-up and Operation

load. See pages 39 and 40 for load charts and worksheet. If the load is not moving, it may be because:

1. The load could be heavier than calculated.
2. The load is tied or fastened down.
3. The lifting units are not level, plumb causing side loads on cylinders, and more pressure needed to overcome the friction caused by side load.
4. The beam and rigging was not added in.
5. Faulty gauges.
6. Excessive beam deflection, causing cylinder side load.

### **Warning!!! Stop!**

If you continue to lift, you may overload and break chokers and shackles, or over load and cause deflection in the lifting beam, track, cylinders, or foundation support under the lifting units.

### **Preparation and Setup**

#### **If runway track is used . . .**

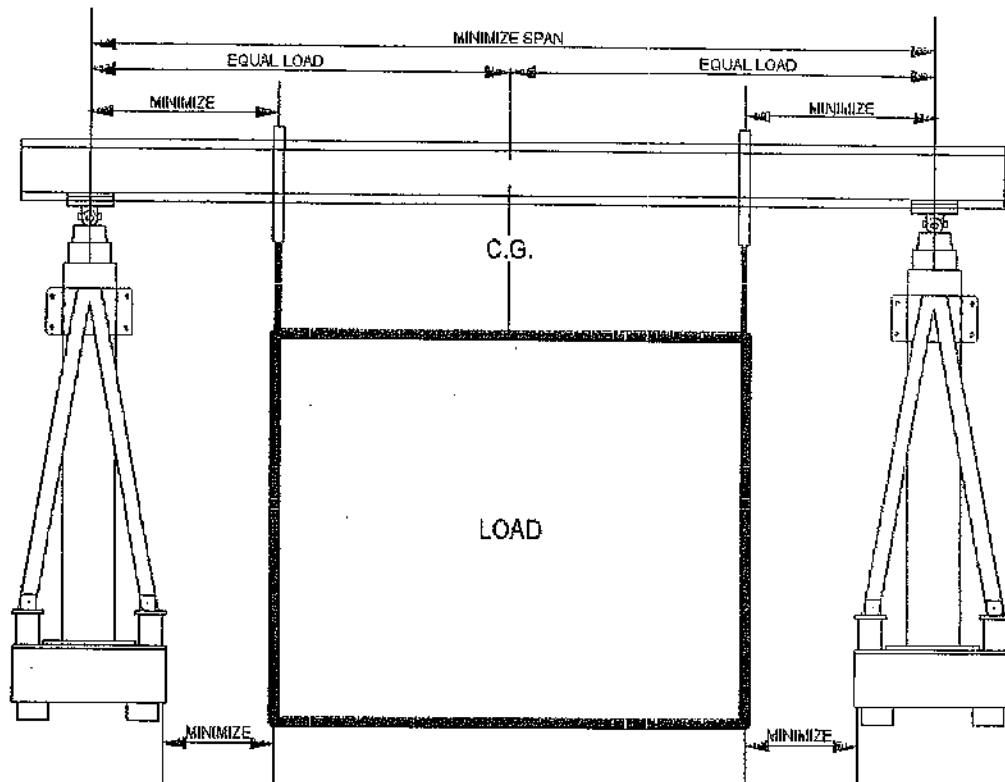
1. Set the track on a support surface. Bolt it together. Runway tracks should be shimmed carefully to insure that the system remains level and plumb while it is traveling. (Consult the factory for track specifications). Make certain that the supporting foundation is adequate to support the total load. If in doubt, the supporting foundation should be verified by a qualified professional engineer.
2. Roll units in position. Lifting units must be level and plumb always. Check the lifting units and correct as needed.
3. The lifting units must be kept as close to the load as possible to minimize deflection in the lifting beams.

## Section 2 Set-up and Operation

4. The lifting points on the beam, where lifting links are placed should be kept as close to the lifting units as possible to minimize deflection.
5. The lifting beam span should be as short as possible to minimize deflection.
6. The load on each lifting unit should be as equal as possible to minimize the chance of overload.

### Caution!

The layout of the lift must consider these critical points. If there is any question about the load, center of gravity, or distribution of the load equally among the lifting units, contact a qualified engineer for verification of the layout.



7. Place beams onto header plates and install safety beam clips. If lifting links are to be used, place links onto the beams before setting them in place and position according to placement of lifting

## Section 2 Set-up and Operation

devices or chokers necessary to lift the load.

8. Attach the load with rigging equipment rated for the full capacity of the lift unit. Rigging equipment should have appropriate safety factors.
9. Upon starting the system, allow it to idle for a few minutes and listen for any unusual noises

### Caution!

If any unusual noises are heard, shut the system down and refer to the troubleshooting section of this manual for possible problems and resolutions.

If the system appears to be operating normally, the cylinders should be tested without a load by extending the cylinders about 6" then retract them.

After testing without a load has been completed, and all operations seem normal, the load may be applied. Check all clearances, clear lifting area of all personnel not required to make the lift, come up tight to the load, and apply a part of the load to the lifting units.

When lifting capacity loads, the user must proceed slowly at all times and continually check to make sure that the lifting units and beams are level and plumb in all directions. Use measuring or leveling devices. Do not rely on eyesight to determine if lifting beams are level.

10. Check the load chart again to determine the amount of hydraulic pressure to lift the load. Do not lift the load completely without knowing, the pressure required.

Jog the control switches to slowly apply pressure in the Cylinder until the pressure gauge reaches the pressure reading you have gotten from the load chart. Applying pressure rapidly may cause a false pressure reading.

## Section 2 Set-up and Operation

### Warning!!!

If the pressure specified on the load chart is reached and the load is not lifting.

- A. The load could be heavier than calculated.
- B. The load is tied or fastened down.
  
- C. The lifting units are not level and plumb, causing side loads on the cylinders and more pressure needed to overcome the friction caused by side load.
  
- D. Faulty gauges.
  
- E. Excessive beam deflection, causing a cylinder side load.

### Stop!!!

Check the lifting units for level and plumb, the beam and track (as required) for deflection. If the lift set-up is proper, the load may be heavier than calculated. If you continue to increase the pressure, you may overload the rigging equipment (chokers and shackles). Make sure the rigging can take the increased load before going to higher pressures.

### Caution!

Recheck the level and plumb in all directions after a substantial part or the entire load is applied to the lift system. Do this often during the lifting.

Lower the load a short distance to make sure that all safety holding valves are operating properly and the load can be lowered.

### Warning!!!

This system is equipped with anti-friction steel bearing wheels and is easily moved under any load conditions. Extreme care should be taken to prevent the system from operating on a downhill condition. The system may move by itself if not held back or blocked properly.

## Section 2 Set-up and Operation

**This system must be level and plumb at all times.**

**Caution!!!**

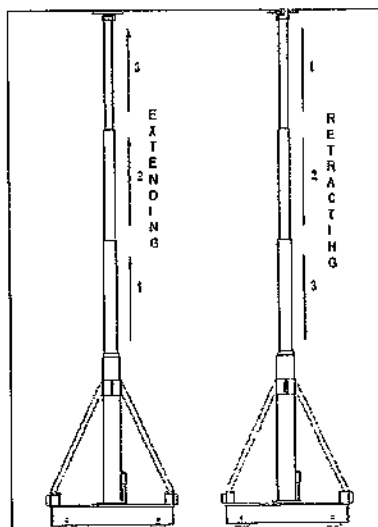
Watch beams constantly for deflection and/or signs of excessive loading. Excessive deflection of beams causes severe side-loading of cylinders.

Cylinders must be extended at equal length with beam level. Use a measuring device (tapes or level lift system). Users must constantly monitor exact cylinder extension.

Cylinder sections should extend in the following sequence:

- Large bottom section first
- Mid section next
- Top section last

Cylinder sections should retract in reverse sequence. The cylinder may sequence incorrectly under no load or rigging load conditions, but restaging will occur when the load strain is put on the lifting beams. If the cylinders mis-stage during set up then slowly come into the load when lifting the load. This should restage the cylinders.



## Section 2 Set-up and Operation

### Warning!!!

Do not come into the load suddenly if the cylinders are in a mis-stage condition. Gently ease into the load so the cylinders can restage using the load to induce the right sequence hydraulically. If the sections do not extend and/or retract in proper sequence with a load, consult the manufacturer immediately.

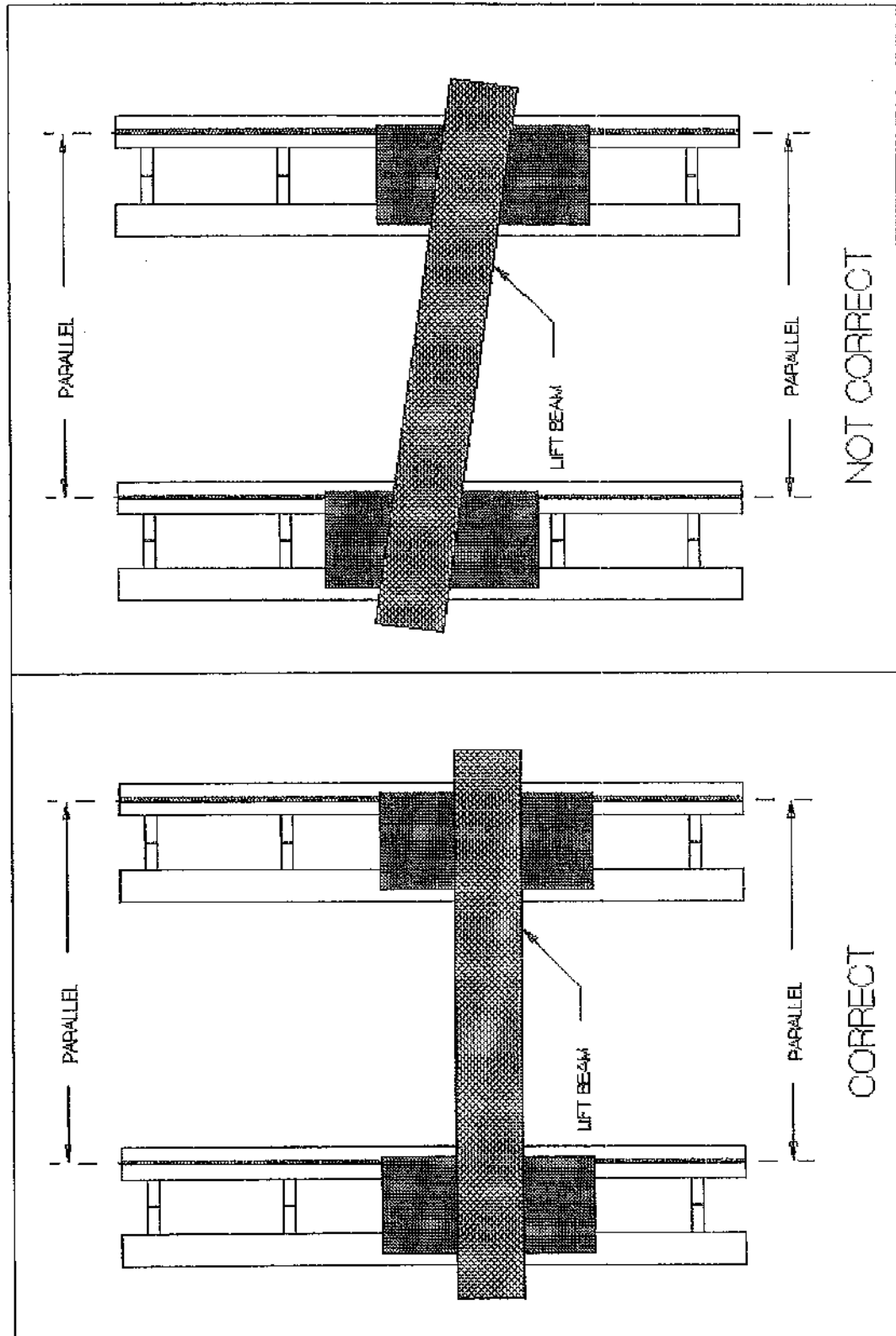
11. Traveling – The system lifting units must be level and plumb at all times during lifting and traveling with loads. When traveling with loads, any track should be level and parallel to line of travel. Shim all low areas to insure that the system units remain level and plumb during travel.

### Caution!!!

The lifting units should always operate parallel to each other. Incorrect relationship between system units, such as allowing one side to get ahead of the other while traveling, will create side loads in extended cylinders creating rapid packing wear and possible damage to the cylinder rods. See following drawing on the next page.



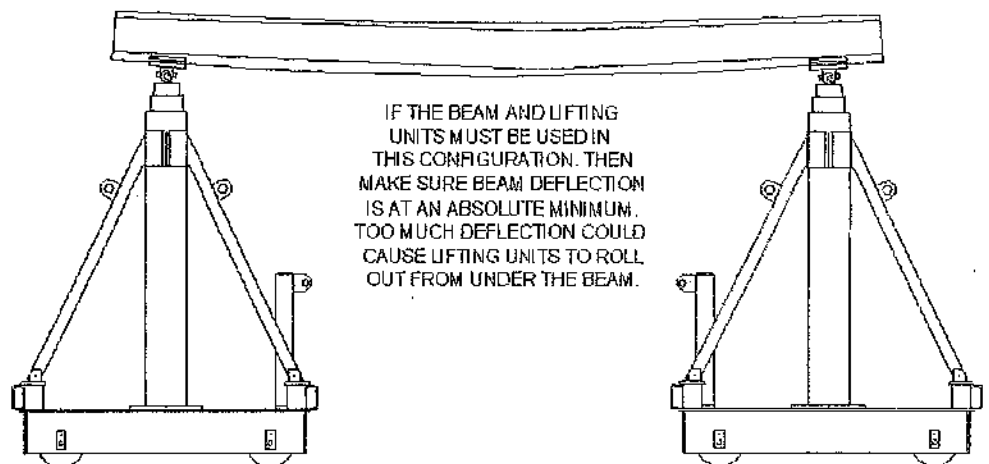
## Section 2 Set-up and Operation



## Section 2 Set-up and Operation

The maneuvering dolly allows the lifting units to be positioned accurately during setup. Never attempt to reposition or steer a lifting unit while loaded.

If the wheels of the lifting units are to be in the same direction as the beam length, then make sure beam deflection is at an absolute minimum. Too much beam deflection may cause the lifting units to roll out from under the beam, causing the load and the lifting units to fall over.



### Warning!!!

The foundation supporting the track (as required) and the lifting units must be firm enough to support the combined weight of the load, lifting units beam and track without settling or sinking. Any change in the support area under the track or lifting units during the lift or while traveling is very dangerous and must be monitored by the personnel operating the system at all times.

Traveling Procedure – Make sure that the connections from the front to back lifting units are tight to maintain the same distance between lifting units while traveling.

## Section 2 Set-up and Operation

Do not move suddenly. It will induce a surging movement to the load.

12. While lowering the load, if the load is heavier on one side, it will come out of level rapidly when retracting the cylinders. Use a level-lift system or measuring tapes. Keep the load level.

### **Warning!!!**

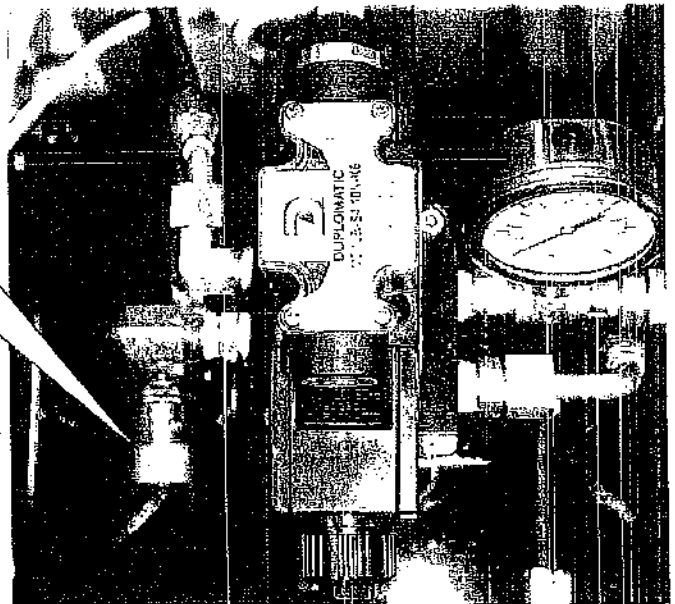
The weight of the load adds to the speed when retracting the cylinders. Be careful!! It may be necessary to jog the control switches to slowly lower the load. Alternatively, the flow control can be adjusted to slow the speed of the system when in a load condition. See the next page for more information.

## Section 2 Set-up and Operation

### Controlling the speed when loaded

The 2020SC system is equipped with flow control valves. Each lifting unit has its own flow control so they can be adjusted accordingly to the load it is carrying. The heavier the load the faster the system will lower. To use the flow controls turn the knob clockwise to slow the cylinder down and counter-clockwise to speed the cylinder up. Each flow control has colored rings to help take the guesswork out of where to adjust them. You can never be too slow when lowering a load so it is better to start out setting them slow. However, use caution when adjusting even with the colored rings it is still possible to have one adjusted faster or slower than the other. In addition, it also depends how the load is centered with the system. If one cylinder is carrying more of the load than the other cylinder then that cylinder will want to lower faster. It is advisable once the controls are adjusted to lower the system slightly to determine if one needs to be slowed down some more. **These are not intended to keep the system level, only to control the speed. It is still the operators' responsibility to make sure the system stays level and plumb.**

Flow control valve can be used to control lowering speed when in a loaded condition.



## Section 2 Set-up and Operation

### Summary

The preceding guidelines are intended for use with hydraulic jack units as supplied by 4 Point Lift Systems, Inc.

### Warning!!!

If there are any other problems, do not attempt to make the lift. Refer to the troubleshooting section or call the manufacturer for further troubleshooting assistance. Failure to follow this safety procedure could result in severely hazardous conditions, injury to personnel, and could cause serious damage to the system.

### Notes:

## **Section 3 System Components & Maintenance**

### **Beams**

Always be certain that beams used are of proper strength to carry the load to be lifted and that the spacing of the lifting links, or other load attachments, is sufficient to ensure proper and safe loadings within the capacity of the beams.

If the gauges read a higher pressure than expected, make another walk-around inspection to make sure that the beam deflection is not excessive. This condition must always be avoided.

Be certain that the load is not tied down. Verify, if possible, the weight of the load, beam, and rigging.

A qualified, professional engineer should verify all lifting beam load capacities before making a lift.

### **Header Plates**

The centerline of the lifting beam must be kept directly over the centerline of cylinders. If using a narrower beam than the header plates are designed for, use spacers on both sides of the beam to keep it centered on the header plates. Header plates are designed to pivot which helps keep the load on the center line of the lifting unit when the beam come slightly out of level.

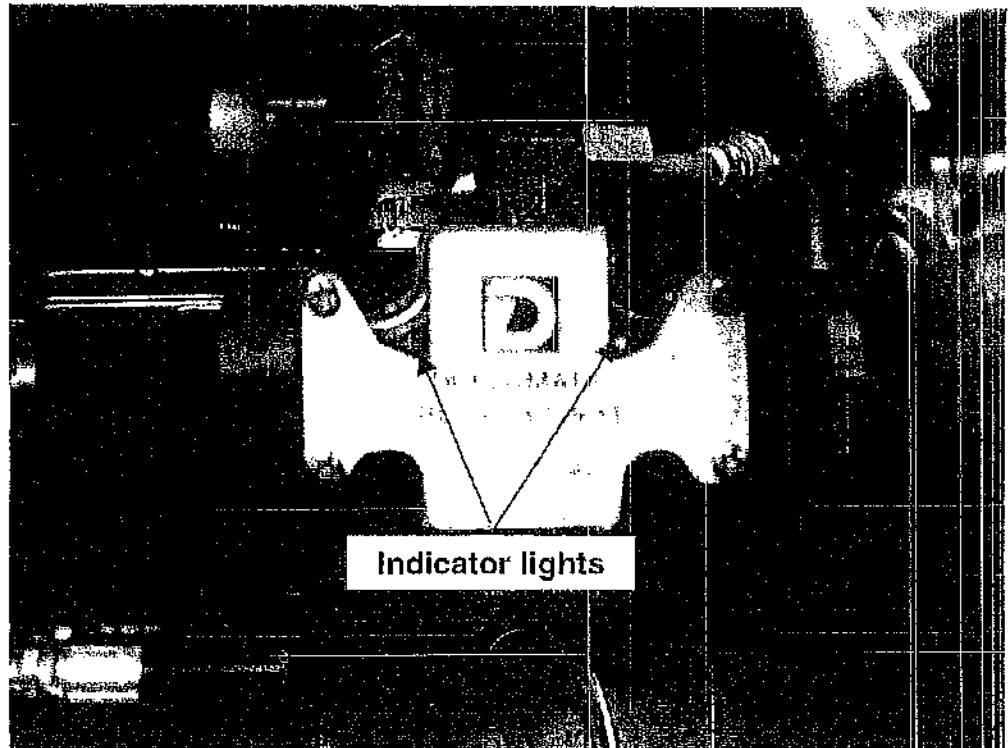
### **Directional Valves for Lift/Lower & Propel**

Electric shift valves for lift and lower or for propel option are mounted on a pedestal on top of the hydraulic reservoir. Propel may be controlled by a manual valve mounted on pedestal on the base top plate. These valves must not be used for a step.

Electric shift valves are spring loaded to the neutral position in case of power or valve failure. If a lifting unit malfunctions, check these valves to make sure they

## Section 3 System Components & Maintenance

are shifting properly. Each valve is equipped with a manual override in the event one should quit working. They are also equipped with an indicator light for each direction to show that they are being energized.



### Hydraulic Oil

Oil in a hydraulic system performs the dual function of lubrication and transmission of power. Careful selection of oil should be made with the assistance of a reputable supplier, helping to ensure the satisfactory operation and life of this system and its components. Some factors important in selecting a good grade of hydraulic oil are:

- The oil must contain additives to insure high anti-wear characteristics.

### Section 3 System Components & Maintenance

- The oil must have proper viscosity to maintain sealing and lubricating qualities at the expected operating temperature of the hydraulic system.
- The oil must have rust and oxidation inhibitors for satisfactory system operation.

The manufacturer recommends the use of Mobil DTE 24 or its equivalent. Specifications for this oil are as follows:

ISO Grade:	32
Viscosity; cst at 40	32
Gravity:	31
Viscosity Index:	90
Flash Point (C.O.C.)	410

Turbine Oil Rust Test (D-665)	
Proc A – Distilled Water	Pass
Proc B – Synthetic Sea Water	Pass
Foam Test (D-892)	Pass
Turbine Oil Oxidation Test (D-943)	
Hours to 2.0 NNA	2000+
Vickers Pump Test (D-2882) (2000 psi, 1200 rpm, 100hr.)	25
Denison T5D HF-O Vane Pump	Pass
Denison P-46 Piston Pump	Pass
Vickers 35 VQ-25	Pass



## Section 3 System Components & Maintenance

### Wheels Lubrication

The wheels on which this lift system moves are equipped with grease fittings on the hub of each wheel, and should be greased bimonthly. Bearings should be filled with a good grade of EP (extreme pressure) grease.

To gain access to the grease fittings, the individual lifting units should be raised with a forklift and blocked up to allow you to move, remove or service the wheels.

#### Caution!!!

Care should be taken not to change the proper placement of any shims when moving or removing the wheel. Wheels must be shimmed snugly in place.

### Oil Level

Oil level must be checked when the cylinder is fully retracted and before the operation of the system. Make sure that the reservoir is filled with a good grade of hydraulic oil.

#### Caution!!!

**Do not operate this unit without oil under any condition.**

When it becomes necessary to add oil to this system, make sure that all oil added to the reservoir is strained through a 10-micron filter. An adequate filter can be purchased at your local fluid power distributor or an industrial supply house. Check parts list for filter replacement numbers.

## Section 3 System Components & Maintenance

### Oil Maintenance

**Cleanliness!!!** Hydraulic components are precision built units. Cleanliness is imperative to the long life and good operating condition of this system.

#### Caution!!!

The major cause of hydraulic system failure is dirt in the oil and related hydraulic components. Keep all systems clean when on the job site and covered when not in use.

### Oil Level & Temperature

The oil level must be checked before operation when the cylinder is fully retracted. Keeping the oil level in the power unit 1 – 1.5" from the top of the tank will insure that the hydraulic pump has oil. The hydraulic oil level gauge is on the side of the hydraulic tank in the front.

The gauge also has a built-in thermometer. The temperature range is 85 F to 175F (29.5C to 79.5C). If the oil is too cold, operation will be slow and pressure readings will be artificially high. If the oil is too hot, it will shorten the life of the oil and cause a buildup of sludge in the system. With proper maintenance and operating temperature, the oil has a life of about 1500 hours.

### Suction Strainer

These systems are supplied with a 100-mesh suction strainer in the reservoir and a 10-micron return line filter. Refer to the Replacement Parts appendix of this manual for the filter element specifications and the instructions for changing elements.

The 100-mesh suction strainer allows the unit to run for a long time before the strainer becomes clogged to the point at which it will affect the operation of this system.

## Section 3 System Components & Maintenance

Periodic inspection and cleaning of the strainer are recommended. To gain access to the strainer, the cylinder should be extended to lower the oil level in the reservoir. Remove the reservoir lid. Drain the remaining oil into a suitable container. Disconnect the suction line of the pump at the reservoir. Unscrew the strainer from the black pipe coupling in the reservoir.

Wash in suitable solvent. Blow out with air from the inside out. When placing strainers back in the reservoir, reverse the procedure above. Replace oil drained with new.

### Hydraulic Filter

The hydraulic filter is located in the top of the hydraulic reservoir. The filter housing is equipped with a filter condition indicator. When the indicator reads 20 inches of vacuum or more the filter should be replaced.

If there is a major failure of the pump, or other system components, the filter element should be replaced, as well as cleaning all of the oil in the system and inside the reservoir.

- Pump the oil out of the reservoir into a suitable container.
- Wipe out the inside of the reservoir to remove all dirt.
- Pump oil back into the reservoir being sure to strain the oil through a 10-micron filter.

### System Maintenance

1. All hydraulic filters should be changed at least once a year.
2. Wheels and all bearings should be greased at least once a month with a good grade of high-pressure grease. This

## **Section 3 System Components & Maintenance**

includes the wheel bearings and the steerable wheel mechanism thrust bearings if equipped.

3. Have an oil sample tested once a year on hydraulic oil (general wear, metal and contaminated tests.) If high water content is suspected (milk in color with low lubricity), ask for the Carl Fischer method of water content tests.
4. Inspect hoses and gaskets for wear monthly and service as needed.
5. The cylinder manufacturer suggests that all cylinders be cycled once per week to keep all seals lubricated.
6. Use the maintenance on page 41 to keep a record of maintenance performed.

### **Cylinder Packing Replacement Procedures**

Lift system has used various cylinders from various suppliers over the years. This is a task should not be attempted it at a job site. It is best to send the system back to the factory where we are fully equipped to service the cylinders. In addition, we are also equipped to load test the system when the re-sealing is complete. If you choose to take the cylinders to someone other than Lift Systems for resealing, make sure they are experienced with this type and are willing to stand behind their work in the event there are problems with the work that they performed.

If you choose to attempt this task, yourself you will first need to contact the factory for the replacement seals and information on the seal locations and procedures. You will need the system model number and serial number. You maybe asked to provide the cylinder serial number.

## Section 3 System Components & Maintenance

### Hydraulic System

#### Bleeding procedures for lifting units

All units have the air bled out of them at the factory before test and shipment and should not need further bleeding once delivered. However, if air is some how introduced into the system the following methods can be used to bleed the system. The more current open cylinder gantries are equipped with bleeder screws in the rod seal glands and the small rod of the cylinders. The most effective method used to bleed these is to leave the cylinders retracted and apply very low pressure to the retract side of the cylinder and hold it there. While the pressure is being applied, turn the screw on the large gland counter-clockwise, just enough to where any air can escape from the screw and continue to do so until you have a steady flow of oil. Continue to do this with each bleed screw. This will eliminate most of the air, you may need to let the power unit set for a few hours to let any air that has mixed with the oil in the reservoir settle out. Otherwise you will pump the air right back into the cylinder. For any air that maybe trapped on the extend side of the cylinder you may need to lay the unit so that the quick disconnects are pointed up. Make sure the rod end of the cylinder is slightly lower that the bottom end. Using the power unit, extend the cylinder out about three foot and then retract it. You will want to do this three or four times. This will eliminate any air on the extend side. When completed, stand the unit back up. However, with a self-contained unit such as a 2020SC, this is not possible. The system will have to work the air out over time.

Some of the older systems have cylinders with cast iron piston rings instead of the soft positive seal type of piston rings and this method can be used on them. Please consult the factory to determine if you have this type of cylinder. Connect the power unit to the base. Extend the cylinder about 6" and then retract it. Once it is fully retracted, continue to hold pressure on it for a few

## Section 3 System Components & Maintenance

minutes. Now reduce the pressure to about 1000psi. This can be accomplished adjusting the relief valve that is on the control valve. Fully extend the cylinders and continue to maintain pressure on it once it has reached the end of its stroke. Maintain the pressure for at least five minutes. When completed, retract the cylinder; you will need to adjust the pressure back to where it originally was. However, make sure not to exceed the maximum pressure on the load chart for that system. This should get the majority of the air out, but it will not get 100 percent of it, but with some time and use, the remainder will work itself out.

### Notes:

## Section 4 Troubleshooting

### General Troubleshooting

- Always check the basic things first.
  1. Is the pump working properly
  2. Are the filters dirty?
  3. Is the hydraulic tank full of oil?
  4. Is the oil clean or contaminated?
  5. Are relief valves set to proper pressures?
- Look for simple problems first.
  1. The system may not be level or plumb.
  2. Load heavier than expected or stuck down in some way.
  3. All bolts may not have been removed.

### Troubleshooting - Lift Units

#### **Problem: Lift cylinder does not extend.**

#### **Causes**

System pressure set to low.

Ruptured hose.

Load is too heavy.

Load is tied down.

Valve is not activating

#### **Solutions**

Adjust relief valve  
Consult factory.

Check for oil in base  
and replace hose.

Verify weight.

Remove bolts

Try manual override to  
determine if problem  
is electrical

## Section 4 Troubleshooting

### Problem: Slow extension

#### Causes

Load is heavy in area  
Closest to that cylinder.

#### Solution

Reposition rigging and  
the load.

#### Causes

Flow adjuster closed.

#### Solution

Open more.

### Problem: Leakage when extending.

#### Causes

Severe side loading.

#### Solution

Check for lifting units  
out of level, beam  
deflection or lifting  
units staging out of  
sequence with each  
other.

Worn packing.

Replace packing.

### Problem: Not staging properly.

#### Causes

**Warning!!!** Severe side loading  
Very dangerous! System is out  
of level, runway track or floor  
could be settling.

#### Solutions

Lower the load and  
reset properly.



## Section 4 Troubleshooting

### Problem: Electric Motor stalls when under load

#### Causes

Pressure set to high

Motor drawing too many amps due to a too long or too small of a cord.

#### Solutions

Set pressure to highest pressure stated on load chart

Use shorter or heavier gauge cord.

### Problem: Circuit breaker keeps tripping

#### Cause

Too, long of cord

Gauge of cord too small

Pressure to high

#### Solutions

Use shorter cord

Use heavier gauge cord

Reset pressure

### Problem: Lift cylinder does not retract.

#### Causes

System pressure set too low.

Ruptured hose.

Safety holding valve at base of cylinder faulty.

#### Solutions

Adjust relief valve. Consult factory.

Check for oil in base and replace hose.

Replace.

## SECTION 4 Troubleshooting

Pilot line from retract line to Safety-holding valve is plugged/restricted.

Replace pilot line

### Problem: Slow retraction.

#### Causes

#### Solutions

System pressure too low.

Adjust relief valve. Consult factory.

Air in upper cylinder area.

Bleed cylinder.

Contamination in system, drain, and flush cylinder and system.

Replace oil.

Bulged or deformed cylinder.

Replace bulged or deformed cylinder section(s).

Flow control set too low

Adjust Flow control

### Problem: Erratic extension or retraction.

#### Causes

#### Solutions

Air in system.

Bleed system.

Pump cavitation, tank low on oil.

Fill with oil and check pump.

Contamination in system.

Drain and flush system. Replace oil.

## Section 4 Troubleshooting

### Testing a Cylinder for Bypass

There are a couple of ways to check for cylinder bypass the, first is the easiest. In addition, someone who has knowledge of hydraulics and how cylinders work should do this test. Done incorrectly, damage to the cylinder and injury may be possible.

1. Extend the cylinder an inch or two.
2. Disconnect the extend side of the twin line hose (**this will be the male coupler on the base or the female on the power unit**) then cap and plug off and pilot line going to the counter balance valve located on the bottom of the cylinder.
3. Take a marker and make a mark on the chrome of the cylinder at the wiper.
4. Try to retract the cylinder and hold it there for one minute.
5. Watch the cylinder while it is in retract mode, if it extends even slightly there is oil bypassing the piston seals. The cylinder will need servicing. (**However, a very small amount could be acceptable so please consult factory to determine what is acceptable. In addition, some brands of cylinders have cast iron piston rings, which will have some bypass and these require a different test. See step number six. Please consult the factory to determine which type you have.**)
6. For cylinders with cast iron piston rings, you will need a flow meter that is good for ten to twenty gallons a minute.
7. Connect the twin line hose to the power unit and the base.
8. Connect the flow meter into the retract line, (this will be the female coupler on the base and the male coupler on the power unit) with the arrow pointing towards the power unit. This will read the return flow while the cylinder is extending.
9. Extend the cylinder.
10. When the cylinder reaches the end of its stroke and its maximum pressure setting, continue to hold it there and check the reading on the flow meter.
11. For the cylinders with cast iron piston rings, the reading should be no more than one gallon per minute. For piston with soft seals, the reading should be zero.
12. Now change the flow meter over to the extend line and make sure the arrow is pointing towards the power unit.
13. Retract the cylinder.
14. When the cylinder is fully retracted, continue to keep full pressure on the cylinder.
15. Check the reading on the flow meter. It should be no more than one gallon per minute for cast iron piston rings and zero for soft piston seals.

## Section 4 Troubleshooting

16. If you are not sure about running these test or have any questions please call the factory and ask for someone in the service department.

### NOTES:

## SECTION 5 OPTIONS

### Level-Lift System

The unique design of the Level-Lift system puts accurate information instantly at the operator's fingertips. The sensor(s) will transfer information on the horizontal level of the load directly to the readout. Load corrections can be made immediately, front to back, as well as side to side.

The Level-Lift system consists of two (2) main components packaged in a handsome carrying case for easy storage and mobility. The interior of the case is custom fit to the Level-Lift components giving durable and safe transport from job to job. All components are calibrated and tested at the factory.

For set-up, calibration, and use of the Level-Lift system, please refer to the instruction manual provided in each carrying case.

### Propels

Lift Systems offers three propel options, Cylinder type, Pin on hydrostatic drive, and Integral. Follow the instructions for the specific propel option with which your lifting units are equipped.

### Warning!!!

Never propel with a load that is raised more than is required for clearance. The higher the load the less stable the system.

### Using the Propels

#### 1) Cylinder type.

a) Pin the cylinder onto the two ears located just below the quick couplers using the 7/8" x 6-1/2" hitch pin supplied.

b) Using the 7/8" and 4 1/2" hitch pin connect the propel shoe to the rod of the cylinder. The runners of the shoe

## SECTION 5 OPTIONS

should sit on the center rail of the track.

c) Connect the hoses of the cylinder to the right hand couplers on the base.

d) To operate the cylinder, shift the valve handle on the base to propel position. You can now extend and retract the cylinders by moving the control valve handles on the power unit. For Model 2020SC with Propel controlled from the remote pendant, move the Lift/Propel switch to the Propel mode then use the lift/lower switches to control lifting unit movement.

e) Now you can lift the load. However, make sure the **cylinders are not pinned** to the center rail. **The bases must center themselves with the load.**

f) If wanting to pull the load extend the cylinders to the furthest hole on the center rail and pin the shoe to the rail with 3/4" x 6- 1/4" hitch pin. Using the control valve retract the cylinders until you reach the desired position. Make sure **you keep the load even.** If the cylinders come to the end of their stroke then unpin and extend them and re-pin them as before and repeat until the desired position is achieved.

g) If you want to push a load, use the above procedure starting with the cylinders retracted and extend to move the load.

h) When you are ready to lower the load, shift the valve handle into the lift position and **make sure the cylinders are not pinned** to the track. **The bases must center themselves with the load.**

### 2) Pin on chain drives with ratchet jacks.

a) Pin the drive housing on to the tangs located just above the wheel boxes.

b) Pin the ratchets to the tangs that are located on the top

## Section 5 Options

of the housings.

- c) Extend the ratchet until you can pin the other end to the tangs located on the base.
- d) Use the ratchets to raise the housing until the tires are no longer making contact. There is a small lever on the ratchets to change the direction of the ratchet.

## Side Shifts

Lift Systems offers four types of side shifts or "Trolley" systems.

- 1) Cylinder type with slider pad dolly.
- 2) Cylinder type with wheeled dolly.
- 3) Continuous Hydrostatic drive with wheeled dolly.
- 4) Continuous chain drive with wheeled dolly.

If you order a side shift system instructions specific to that system will be included at the end of this section.

Side shift or "Trolley" systems allow safe movement of the load latitudinally, or perpendicular to the direction of movement of the lifting units. Due to stability and capacity factors, the capacity of the system is derated by a minimum of 40% when using side shift systems. As with all other phases of the lift plan, a professional engineer should be consulted regarding the use of side shifts or "Trolleys".

## Warning!!!

Always move slowly and smoothly when using side shift or "Trolley" systems. The inertia of a rapidly moving load may exceed the stability

of the lifting units causing loss of the load and possible injury or death to personnel.

**NOTES:**



# Load Chart Check List

**Note:** Lift pressure is the amount of pressure required to lift the load.

**Stop** pressure is the amount of pressure that will apply maximum load to the beams and rigging within safety factors. **Do not exceed!**

## Pressures

### Lifting Unit #1

Approximate lifting weight \_\_\_\_\_ lbs.

Approximate pressure	
To Lift	Stop Limit
Stage 1 _____ psi	_____ psi
Stage 2 _____ psi	_____ psi
Stage 3 _____ psi	_____ psi

### Lifting Unit #2

Approximate lifting weight \_\_\_\_\_ lbs.

Approximate pressure	
To Lift	Stop Limit
Stage 1 _____ psi	_____ psi
Stage 2 _____ psi	_____ psi
Stage 3 _____ psi	_____ psi

### Lifting Unit #3

Approximate lifting weight \_\_\_\_\_ lbs.

Approximate pressure	
To Lift	Stop Limit
Stage 1 _____ psi	_____ psi
Stage 2 _____ psi	_____ psi
Stage 3 _____ psi	_____ psi

### Lifting Unit #4

Approximate lifting weight \_\_\_\_\_ lbs.

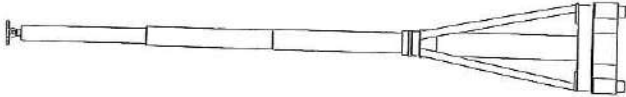
Approximate pressure	
To Lift	Stop Limit
Stage 1 _____ psi	_____ psi
Stage 2 _____ psi	_____ psi
Stage 3 _____ psi	_____ psi

**Note:** To find approximate **to lift** and **stop limit** pressures, use the load chart on the following page

# LIFT SYSTEMS

MODEL 2033SC, 33 (30) TON 2 POINT LIFT SYSTEM  
HYDRAULIC CAPACITY CHART

PRESSURE	2,100 PSI 145 bar	2,000	1,800	1,600	1,400	1,300	1,200	1,000	800	600	400	200
16' 0" (4,877 mm) 3rd STAGE	25 TON (22)	23 TON (20)	21 TON (19)	19 TON (17)	16 TON (14)	15 TON (13)	14 TON (12)	11 TON (9)	9 TON (8)	7 TON (6)	4 TON (3)	2 TON (1)
12' 8" (3,861 mm) 2nd STAGE						29 TON (26)	27 TON (24)	22 TON (19)	18 TON (16)	13 TON (11)	9 TON (8)	4 TON (3)
9' 4" (2,845 mm) 1st STAGE								33 TON (29)	27 TON (24)	20 TON (18)	13 TON (11)	6 TON (5)



6' 0"  
(1,829 mm)

2033LC01



# Maintenance Chart

Date	Hour Meter Reading	Maintenance Performed	Service Performed By

1807 LIFT SYSTEMS  
99-L5132

Invoice  
LIFT SYSTEM -BLUE- A.W. 190-92

95488

24 HOUR EMERGENCY ASSISTANCE  
ILLINOIS OIL PRODUCTS (309) 783-4474  
321 24TH STREET ROCK ISLAND IL 61201  
INFOTRAC (800) 535-5053

#### MATERIAL SAFETY DATA SHEET

The information contained herein is based on data available to us and is believed to be correct. However, Illinois Oil Products makes no warranty, expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Illinois Oil Products assumes no responsibility for injury from the use of the product described herein.

#### HMIS HAZARD RATING

LEAST	0	** HEALTH	1
SLIGHT	1	** FIRE	1
MODERATE	2	** REACTIVITY	0
HIGH	3	** OTHER	0
EXTREME	4	** PERSONAL PROTECTION	0

#### SECTION 1 CHEMICAL PRODUCT & COMPANY IDENTIFICATION

\*\* PRODUCT: Industrial Oil  
\*\* CAS#: Mixture  
\*\* CHEMICAL NAME: NA  
\*\* CHEMICAL FAMILY: Petroleum hydrocarbon  
\*\* MSDS#: 5000

#### SECTION 2 COMPOSITION / INFORMATION OF INGREDIENTS

COMPOSITION	CASE#	%	PEL
** P: Industrial Oil	Mixture	100	5 mg/Cum
** 1: Sol.Ref.Hvy Paraffinic Oil	64742-54-7		5 mg/Cum
** 2: Lt.Naph.Hydrotreated Dist	64742-53-6		5 mg/Cum
** 3: Hvy.Naph.Hydrotreated Dist	64742-67-7		5 mg/Cum
** 4: Deasphalted Residium	64742-95-3		5 mg/Cum
** 5: Sol.Ref.Sat Paraffinic Dist	64742-65-0		5 mg/Cum (as mist)

#### SECTION 3 HAZARDS IDENTIFICATION

##### PRINCIPAL HAZARDS: WARNING

Acute Health: No                      Reactivity: No  
Chronic Health: No                      Fire: Yes  
\*\* See section 11 for complete health hazard information \*\*

#### SECTION 4 FIRST AID MEASURES

##### EYE CONTACT:

As with most foreign materials, if eye contact should occur, flush eyes with plenty of water. If irritation occurs, get medical attention.

##### SKIN CONTACT:

Wash exposed skin with soap and water. Remove contaminated clothing and wash before reuse.

1807 LIFT SYSTEMS  
99-L5132

Invoice  
LIFT SYSTEM -BLUE- A.U.150-02

MS-443

**INHALATION:**

Remove exposed person to fresh air if adverse effects are observed.

**INGESTION:**

Do not induce vomiting. Get medical attention

**SECTION 5 FIRE FIGHTING MEASURES**

**FLASH POINT:**

>220 F

**FLAMMABLE LIMITS:**

UPPER: NE

LOWER: NE

**EXTINGUISHING MEDIA:**

Use water fog, foam, dry chemical or CO2. Do not use a direct stream of water. Material will float on water surface and can re-ignite on the surface of the water.

**SPECIAL FIRE FIGHTING PROCEDURES:**

Do not enter confined fire-space without full bunker gear, including positive pressure SCBA. Cool fire exposed containers with water.

**UNUSUAL FIRE AND EXPOSION HAZARDS:**

None.

**SECTION 6 ACCIDENTAL RELEASE MEASURES**

**SPILL OR LEAK PROCEDURES:**

Remove all sources of ignition. Small spills may be absorbed with inert material such as sand, clay, vermiculite, etc. Large spills should be diked to prevent entry to sewers or waterways. Large spills may be picked up with a vacuum truck, shovels, or other appropriate means and placed in salvage drums or other suitable containers.

**SECTION 7 HANDLING & STORAGE**

**HANDLING PROCEDURES:**

Keep containers closed when not in use. Empty container contains product residue and may exhibit hazards of product.

**STORAGE PROCEDURES:**

Store in a cool, dry, well ventilated area.

**SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION**

**VENTILATION REQUIREMENTS:**

Sufficient mechanical (general) and/or local exhaust ventilation to maintain exposure below PEL.

**PERSONAL PROTECTIVE EQUIPMENT:**

Long sleeve shirt is recommended.

**RESPIRATORY PROTECTION:**

If the recommended exposure limit is exceeded, use respirator with organic vapor & dust/mist cartridges.

**EYE PROTECTION:**

Chemical goggles

**GLOVES:**

Nitrile

**OTHER PROTECTIVE CLOTHING AND EQUIPMENT:**

None normally required.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

BP: >300 deg F MP: ND  
SPECIFIC GRAVITY: 0.88 (appx) % VOL BY VOL: N/A  
VAPOR DENSITY: > Air SOLUBLE IN WATER: Negligibly  
EVAPORATION RATE: NA  
APPEARANCE: Amber to light liquid.  
\*\* Vapor Density of AIR is = 1  
\*\* Evaporation Rate of BUTYL ACETATE is = 1

SECTION 10 STABILITY & REACTIVITY

STABILITY:

Stable

HAZARDOUS POLYMERIZATION:

Will not occur.

CONDITIONS AND MATERIAL TO AVOID:

Avoid heat, open flames and strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition products are highly dependent on the combustion process. By-products of combustion may include: Oxides of carbon, boron, nitrogen, sulfur, phosphorus, zinc, calcium, and/or magnesium.

SECTION 11 TOXICOLOGICAL INFORMATION

EYE CONTACT:

Mild eye irritant.

SKIN CONTACT:

Not expected to be a primary skin irritant.

INHALATION:

Oil mist may cause respiratory irritation.

INGESTION:

LD 50 in rats > 5000 mg/Kg; practically non-toxic.

CARCINOGENICITY:

Not a known carcinogen.

SECTION 12 ECOLOGICAL INFORMATION

FRESHWATER FISH TOXICITY:

Test program is in progress.

FRESHWATER INVERTEBRATES TOXICITY:

Test program is in progress.

SALTWATER FISH TOXICITY:

NE

SALTWATER INVERTEBRATES TOXICITY:

NE

BACTERIAL TOXICITY:

Test program is in progress.

MISCELLANEOUS TOXICITY:

NE

MISCELLANEOUS ENVIRONMENTAL FATE:

Test program for biodegradation is in progress.

SECTION 13 DISPOSAL CONSIDERATIONS

1907 LIFT SYSTEMS  
99-L5132

Invoice  
LIFT SYSTEM -BLUE- A.W.150-32

95453

Dispose of in compliance with all federal, state, and local laws.

SECTION 14 TRANSPORTATION INFORMATION

DOT CLASSIFICATION:

Non-hazardous

PROPER SHIPPING NAME:

NA

SECTION 15 REGULATORY INFORMATION

The components of this product are listed on the TSCA inventory of chemical substances.

SECTION 16 OTHER INFORMATION

Always wash hands and face before eating, drinking, or smoking.

TECHNICAL SERVICE DEPARTMENT: Rex Larson  
DATE: 1-16-95 REVISION #: 1 SUPERSEDES: ALL

ILLINOIS OIL PRODUCTS, INC  
ILLINOIS OIL BUILDING  
321-24TH STREET  
ROCK ISLAND IL 61201-8018



1807 LIFT SYSTEMS  
8255

NO LITHIUM GREASE BULK

Invoice

95452

24 HOUR EMERGENCY ASSISTANCE  
ILLINOIS OIL PRODUCTS (809) 784-4474  
321 24TH STREET ROCK ISLAND IL 61201  
INFOTRAC (800) 535-3053

#### MATERIAL SAFETY DATA SHEET

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#### HMIS HAZARD RATING

LEAST	0	** HEALTH	1
SLIGHT	1	** FIRE	1
MODERATE	2	** REACTIVITY	0
HIGH	3	** OTHER	0
EXTREME	4	** PERSONAL PROTECTION	8

#### SECTION 1 CHEMICAL PRODUCT & COMPANY IDENTIFICATION

\*\* PRODUCT: Lithium Grease  
\*\* CAS#: Mixture  
\*\* CHEMICAL FAMILY: Petroleum Hydrocarbon  
\*\* MSDS#: 8250

#### SECTION 2 COMPOSITION / INFORMATION OF INGREDIENTS

	Composition	CAS#	%	REL.
** P:	Lithium Grease	Mixture	100	Smg/CuH
** 1:	Petroleum Hydrocarbon	64741-95-3	5/20	Smg/CuH
** 2:	Petroleum Hydrocarbon	64742-52-5	50/75	Smg/CuM (as mist)
** 3:	Lithium Tallowate Soap	64742-52-5	5/20	NE

#### SECTION 3 HAZARDOUS IDENTIFICATION

##### PRINCIPAL HAZARDS: WARNING

Acute health: Yes      Reactivity: No  
Chronic health: No      Fire: Yes

\*\*\*See section 11 for complete health hazard information.

#### SECTION 4 FIRST AID MEASURES

##### EYE CONTACT:

Immediately flush eyes with water for at least 15 minutes occasionally lifting the lower and upper lids. If a film or irritation persists, seek medical attention.

##### SKIN CONTACT:

Wash exposed portion with soap and water. Launder soiled clothes before reuse. If injected under skin get immediate medical attention.

##### INHALATION:

If respiratory discomfort or irritation occurs move person to fresh air. If breathing has stopped, give artificial respiration

1807 LIFT SYSTEMS  
8255

HD LITHIUM GREASE BULK

Invoice

95452

and get medical attention immediately.

INGESTION:

Do Not induce vomiting; contact a physician.

SECTION 5 FIRE FIGHTING MEASURES

FLASH POINT:

NE

FLAMMABLE LIMITS:

UPPER: NE

LOWER: NE

EXTINGUISHING MEDIA:

Carbon dioxide, dry chemical or foam.

SPECIAL FIRE FIGHTING PROCEDURES:

Water stream may spread fire. Use water spray only to cool containers not on fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Will not flash spontaneously. May ignite if exposed to open flame.

SECTION 6 ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES:

Pick up and place in container for disposal.

SECTION 7 HANDLING & STORAGE

HANDLING PROCEDURES:

Keep containers closed when not in use.

STORAGE PROCEDURES:

Store in cool dry location. Do not store with strong oxidizers.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION:

Use organic vapor respirator if vapor concentration above PEL.

PROTECTIVE CLOTHING:

None normally required.

OTHER PROTECTIVE EQUIPMENT:

None normally required.

VENTILATION:

Sufficient mechanical (general) and/or local exhaust ventilation to maintain exposure below PEL.

EYE PROTECTION:

Chemical goggles recommended.

GLOVES:

Nitrile or neoprene for long exposures.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

\*\* BP: NE

\*\* MP: NE

\*\* SPECIFIC GRAVITY: 0.93

\*\* % VOL BY VOL: NIL

\*\* VAPOR DENSITY: >1

\*\* SOLUBLE IN WATER: No

\*\* EVAPORATION RATE: <1

\*\* APPEARANCE: Brown Grease

+ Air = 1

\*\* Butyl Acetate = 1

SECTION 10 STABILITY & REACTIVITY

STABILITY:

Stable

HAZARDOUS POLYMERIZATION:

Will not occur

CONDITIONS AND MATERIALS TO AVOID:

Avoid condition that could generate an oil mist. Do not expose to strong oxidizers or excessive heat.

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon, Carbon monoxide, Carbon dioxide, various hydrocarbons, may evolve other toxic gases.

SECTION 11 TOXICOLOGICAL INFORMATION

EYE CONTACT:

Expected to cause minor, if any eye irritation.

SKIN CONTACT:

Under normal conditions, expected to cause no more than minor skin irritation. If injected under skin, necrosis could result.

INHALATION:

NE

INGESTION:

May cause irritation, nausea, or diarrhea. Possible aspiration hazard.

SECTION 12 ECOLOGICAL INFORMATION

FRESHWATER FISH TOXICITY:

NE

FRESHWATER INVERTEBRATES TOXICITY:

NE

ALGAE TOXICITY:

NE

SALTWATER FISH TOXICITY:

NE

SALTWATER INVERTEBRATES TOXICITY:

NE

BACTERIAL TOXICITY:

NE

MISCELLANEOUS TOXICITY:

NE

ENVIRONMENTAL FATE:

NE

SECTION 13 DISPOSAL CONSIDERATIONS

Follow all local, state, and federal regulations.

SECTION 14 TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME:

Non hazardous

PROPER SHIPPING NAME:

NA

1807 LIFT SYSTEMS  
8255

HD LITHIUM GREASE BULK

Invoice

95452

SECTION 15 REGULATORY INFORMATION

Components of this product are listed on the TSCA inventory of chemical substances.

SECTION 16 OTHER INFORMATION

Always wash hands and face before eating, drinking, or smoking.

TECHNICAL SERVICE DEPARTMENT:

Rex Larson

DATE: 12-2-94

REVISION #: 2

SUPERSEDES: 7-1-92

ILLINOIS OIL PRODUCTS INC

ILLINOIS OIL BUILDING

321-24TH STREET

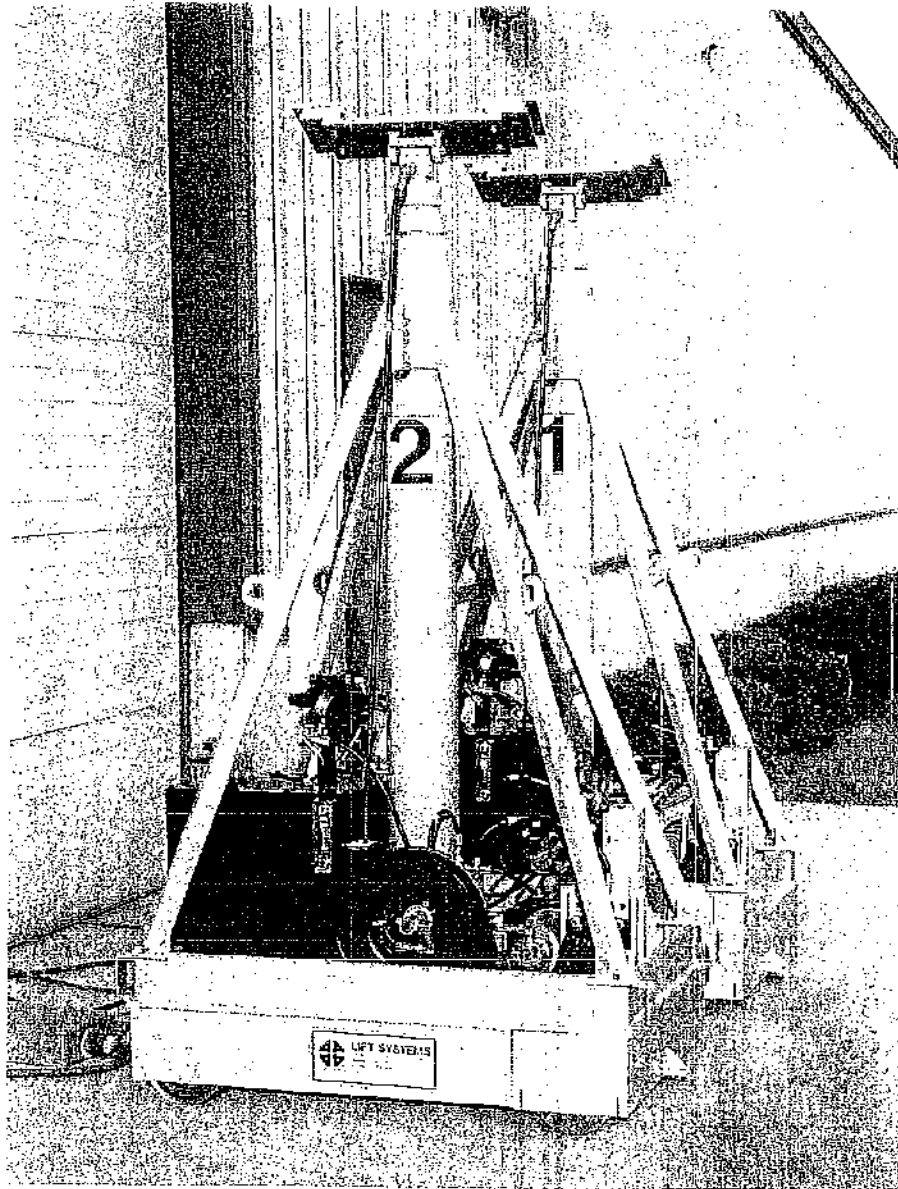
ROCK ISLAND IL 61201-9818

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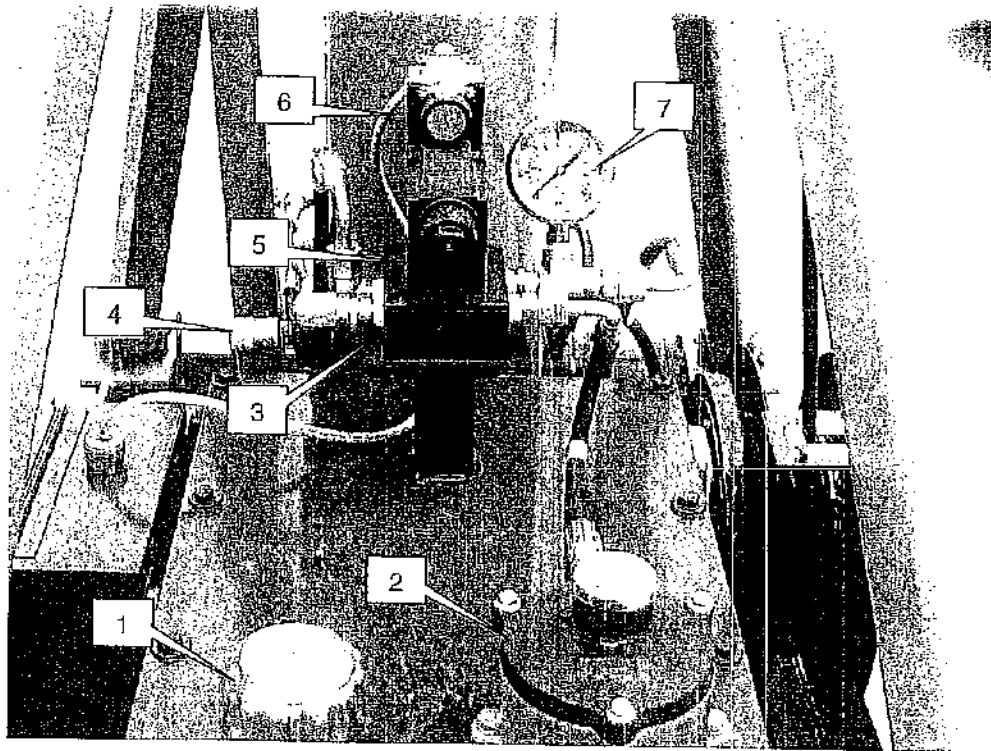
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# Parts Identification and Schematics



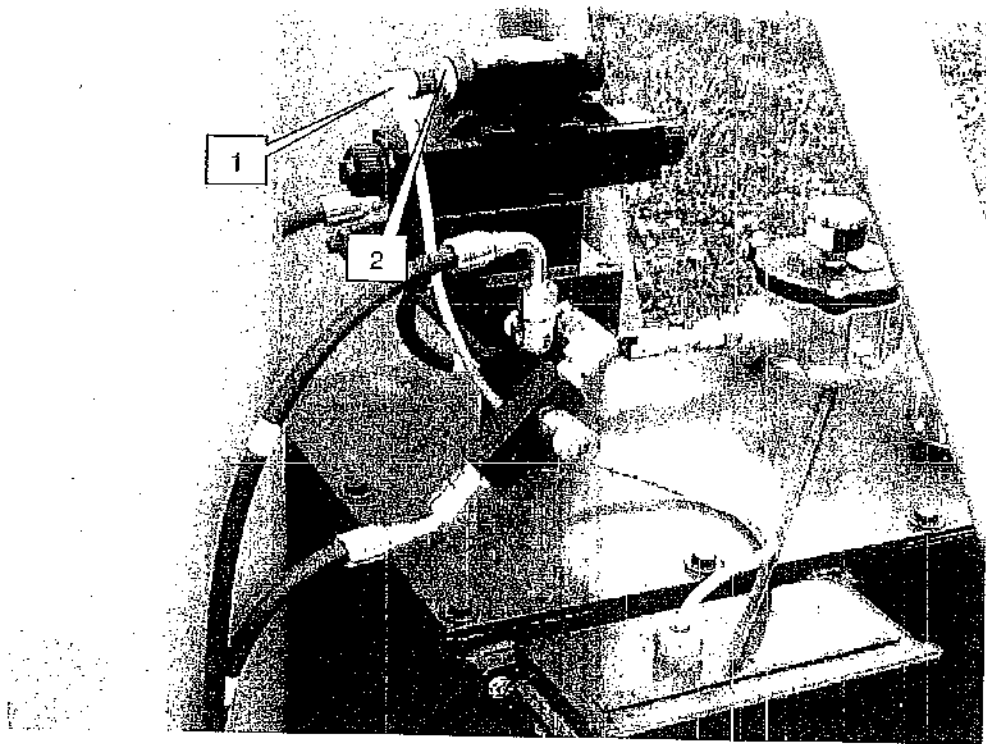
2033SCT WITH INTEGRAL DRIVES

## Parts Identification and Schematics



- |                 |                                       |
|-----------------|---------------------------------------|
| 1. FB02         | BREATHER                              |
| 2. HF22<br>FE24 | RETURN FILTER<br>REPLACEMENT ELEMENT  |
| 3. MVP100       | VALVE ASSEMBLY SUBPLATE               |
| 4. FCV34        | FLOW CONTROL (CONTROLS RETRACT SPEED) |
| 5. RV029        | VALVE ASSEMBLY RELIEF VALVE           |
| 6. DV86         | VALVE ASSEMBLY CONTROL VALVE          |
| 7. MG05         | PRESSURE GAUGE                        |

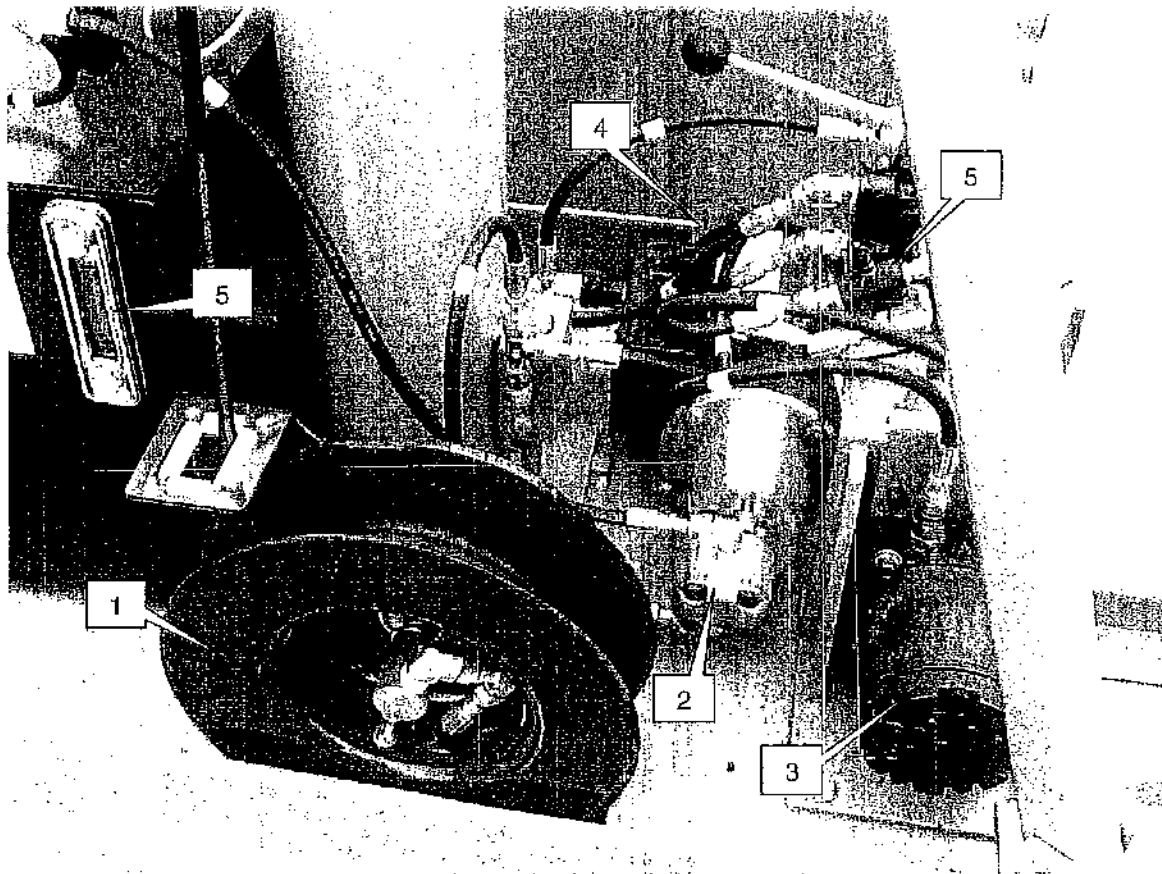
## Parts Identification and Schematics



- |          |                |
|----------|----------------|
| 1. ME639 | CABLE ASSEMBLY |
| 2. ME642 | RECEPTACLE     |

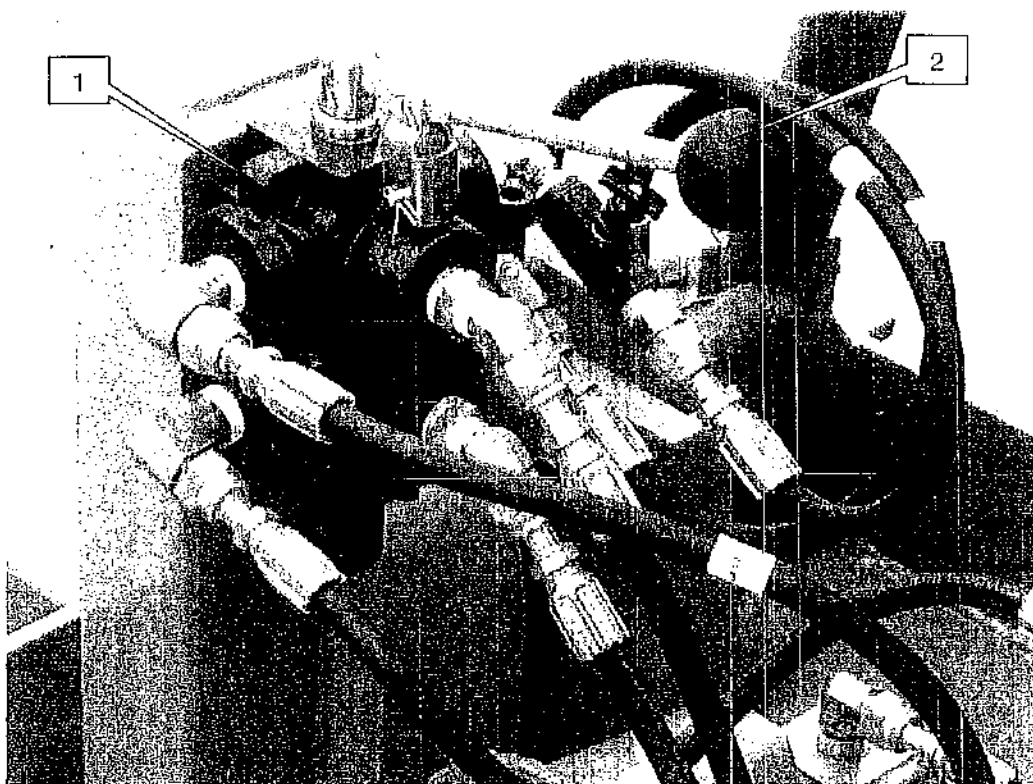


## Parts Identification and Schematics



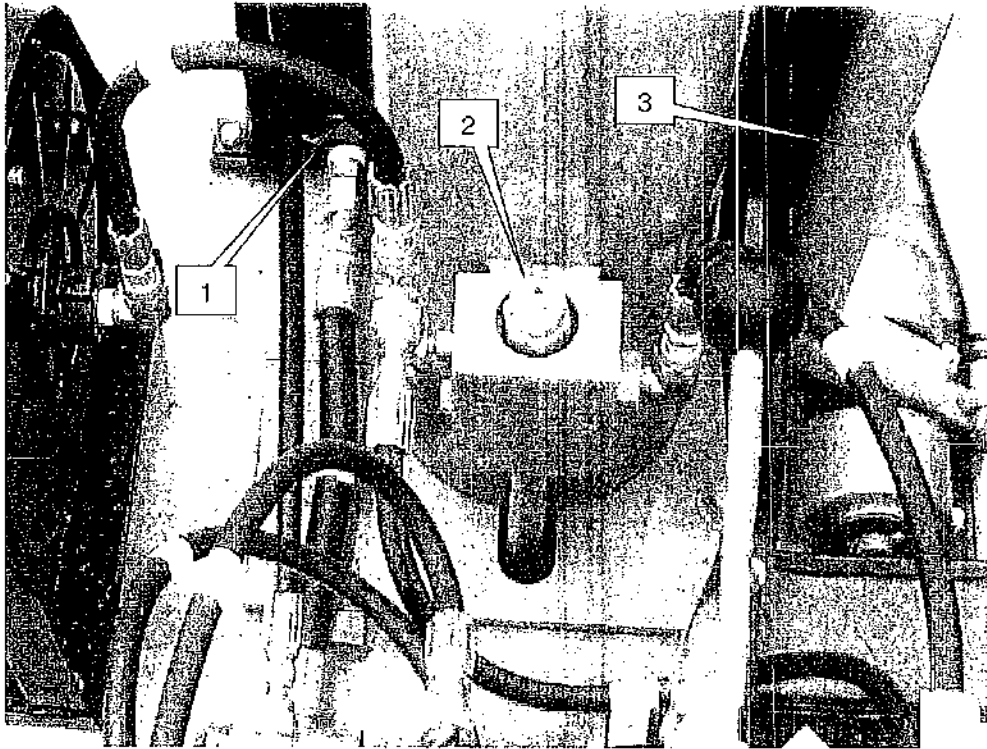
- |          |                                     |
|----------|-------------------------------------|
| 1. HR11  | HOSE REEL                           |
| 2. P63   | GEAR PUMP                           |
| 3. HM22  | DRIVE MOTOR                         |
| 4. EM56  | ELECTRIC MOTOR                      |
| 5. FCV20 | FLOW CONTROL (controls drive speed) |

## Parts Identification and Schematics



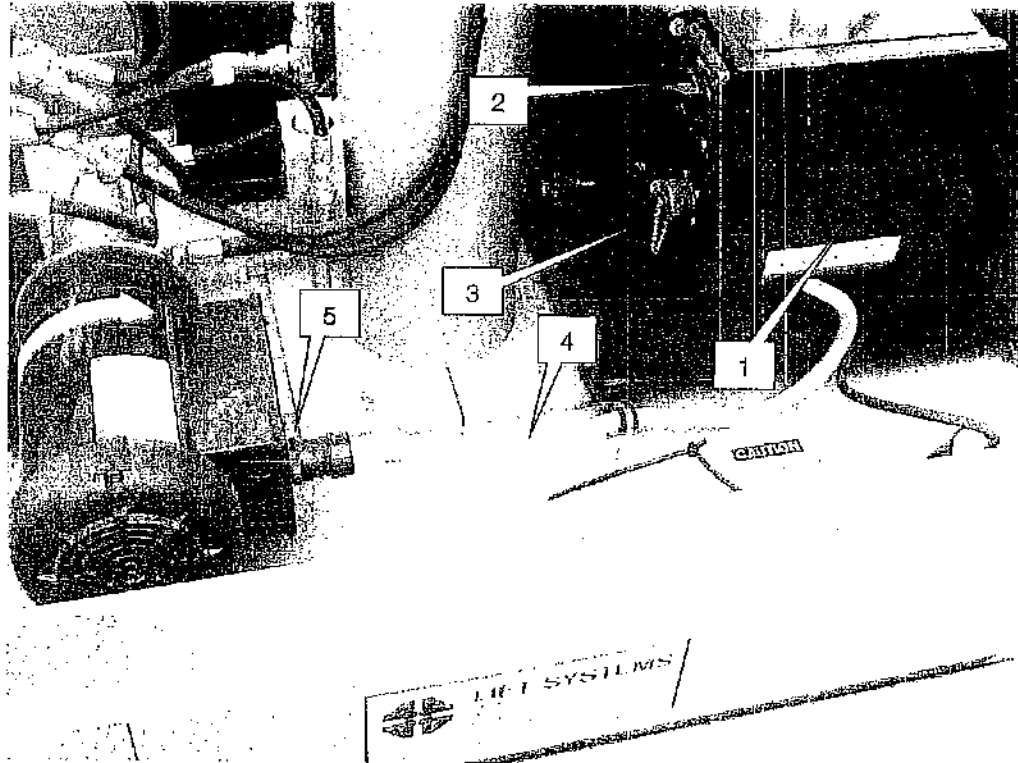
- 1. DV76      LIFT/PROPEL VALVE
- 2. MVPO76    REPLACEMENT HANDLE

## Parts Identification and Schematics



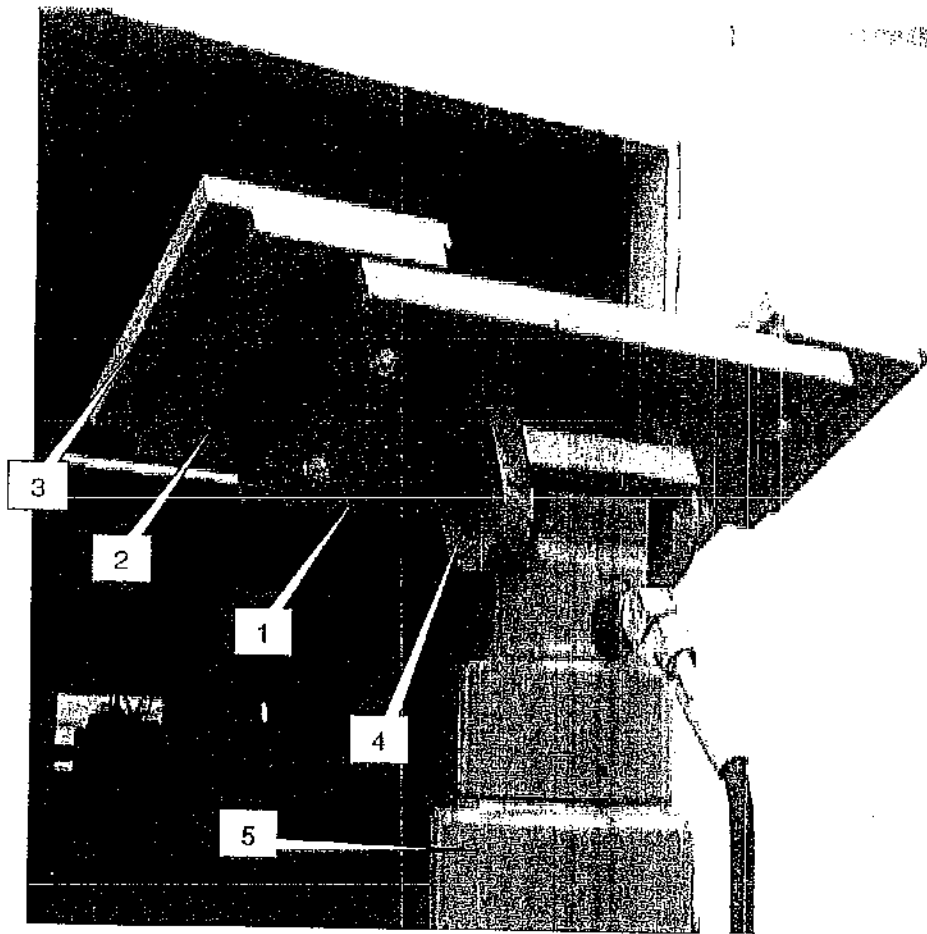
- |           |                                       |
|-----------|---------------------------------------|
| 1. ST12   | SUCTION STRAINER                      |
| 2. CBV11  | COUNTERBALANCE VALVE (SET AT 2730psf) |
| 3. MJA200 | MANEUVERING DOLLY                     |

## Parts Identification and Schematics



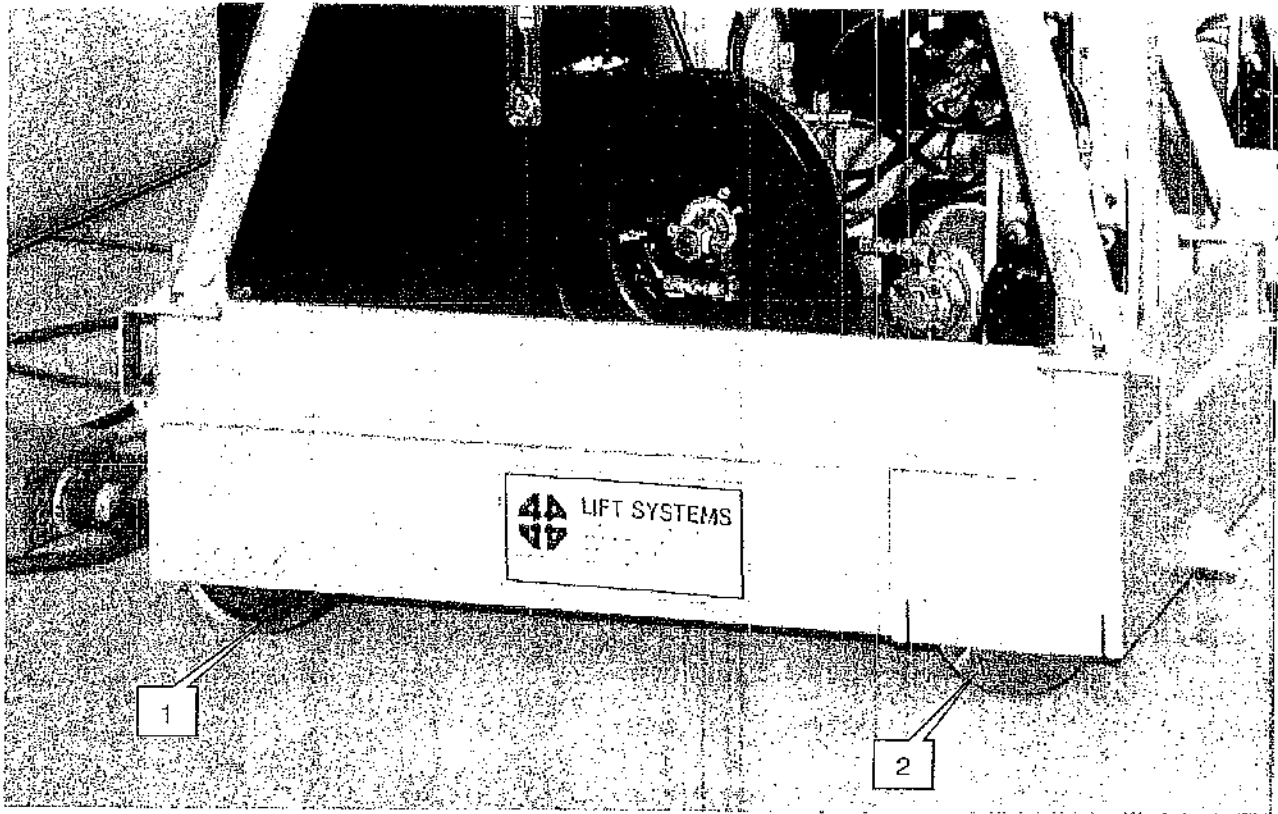
1. MJREM01 CONTROL BOX (CONTAINS ME229 CONTROL RELAY)
2. S50 ON/OFF SWITCH
3. ME229 PENDANT CONNECTOR
4. ME640 CORD
5. ME641 PLUG

## Parts Identification and Schematics



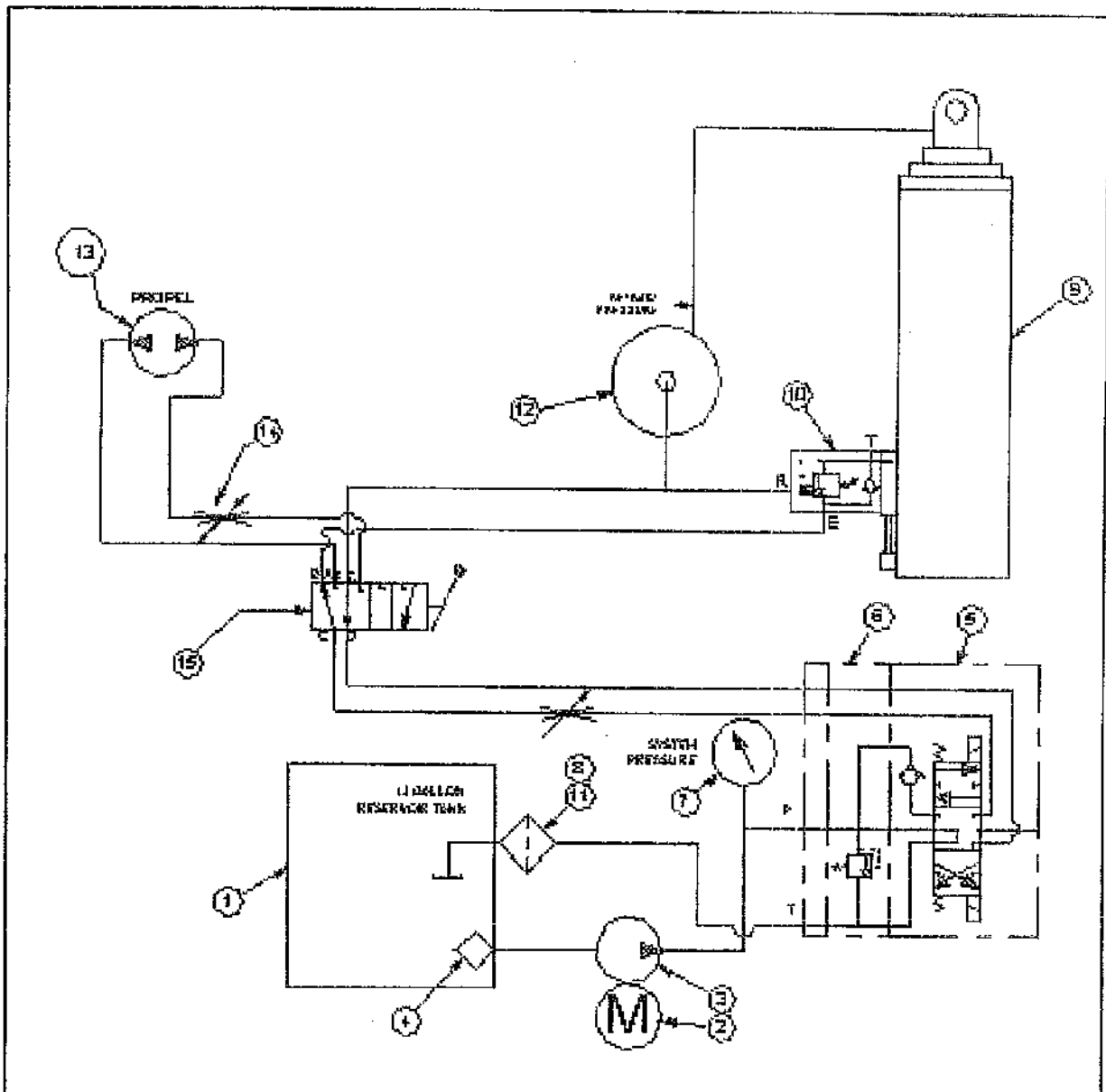
1. #102434 HEADER PLATE
2. #102436 SPACER BLOCK
3. #102437 CLAMP BLOCK
4. #102824 HEADER PLATE PIN
5. CYL156 CYLINDER

## Parts Identification and Schematics



1. WO3      STEEL WHEELS (WHEEL BEARINGS ARE MP178)
2. #102195      DRIVE WHEEL (DRIVE BEARINGS ARE #102829)

# Parts Identification and Schematics



ITEM NOTES:  
 5 SET AT 2100 PSI  
 10 SET AT 2750 PSI

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	11E22Z7	RESERVOIR	9	CYL158	DOUBLE ACTING 3-STAGE CYLINDER
2	EM17	ELECTRIC MOTOR	10	CBV11	COUNTERBALANCE VALVE CARTRIDGE
3	PG3	GEAR PUMP	11	FE2+	FILTER ELEMENT 10 MICRON
4	ST12	SUCTION STRAINER	12	HR11	HOSE REEL
5	DV85	REMOTE CONTROL VALVE	13	HM22	DRIVE MOTOR
6	RV29	RELIEF VALVE	14	FCV20	DRIVE FLOW CONTROL
7	MG05	OIL PRESSURE GAUGE	15	BV76	LIFT/PROPEL VALVE
8	RF22	RETURN FILTER ASSEMBLY	15		



**LIFT SYSTEMS**  
 P.O. BOX 20000  
 WILSON, MISSISSIPPI 39480

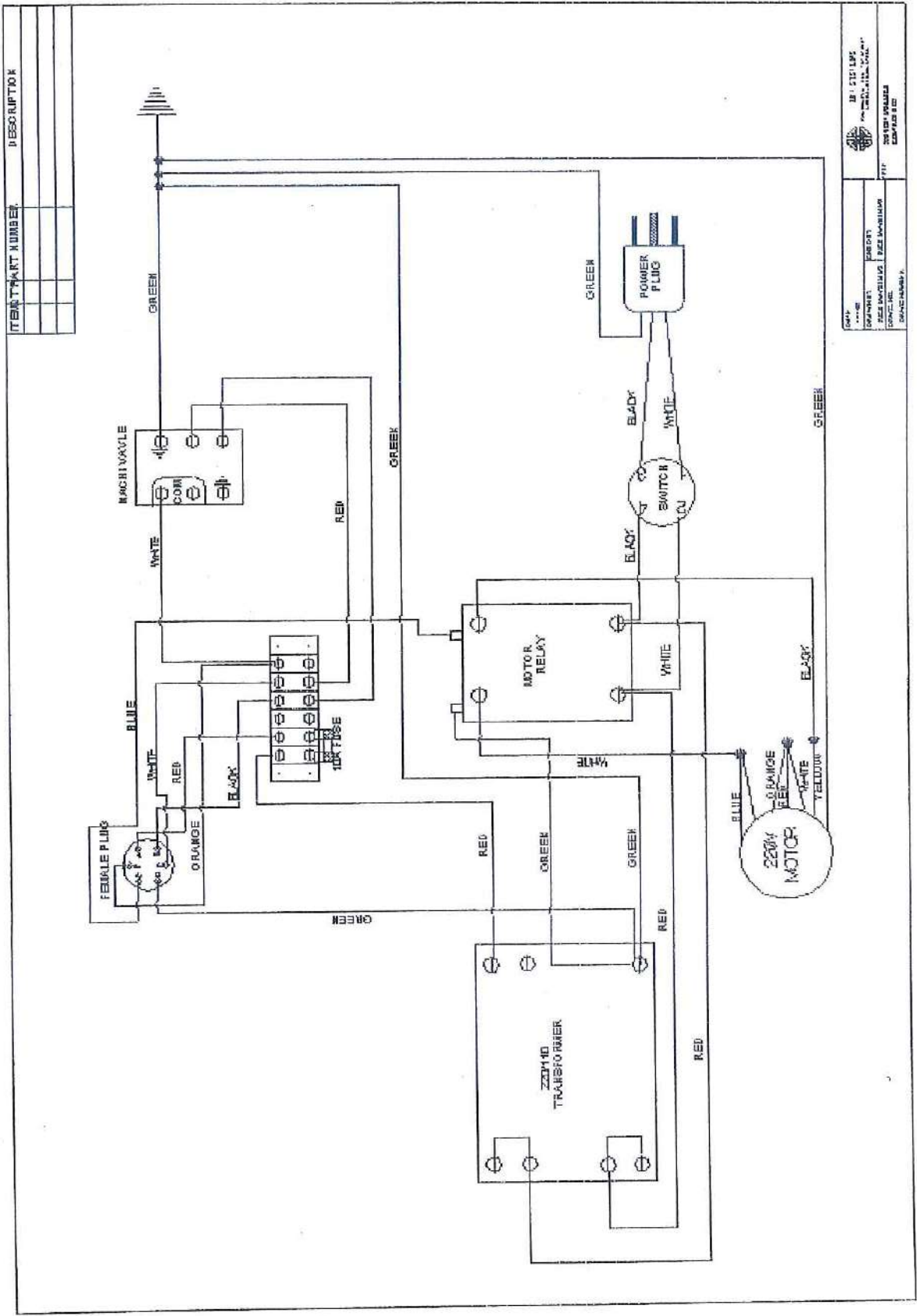


DRAWN BY: RLB DATE: 06-01-05

TITLE: 11 GALLON LIFT ASSEMBLY WITH  
 11 GALLON DRIVE MOTOR AND SYSTEM

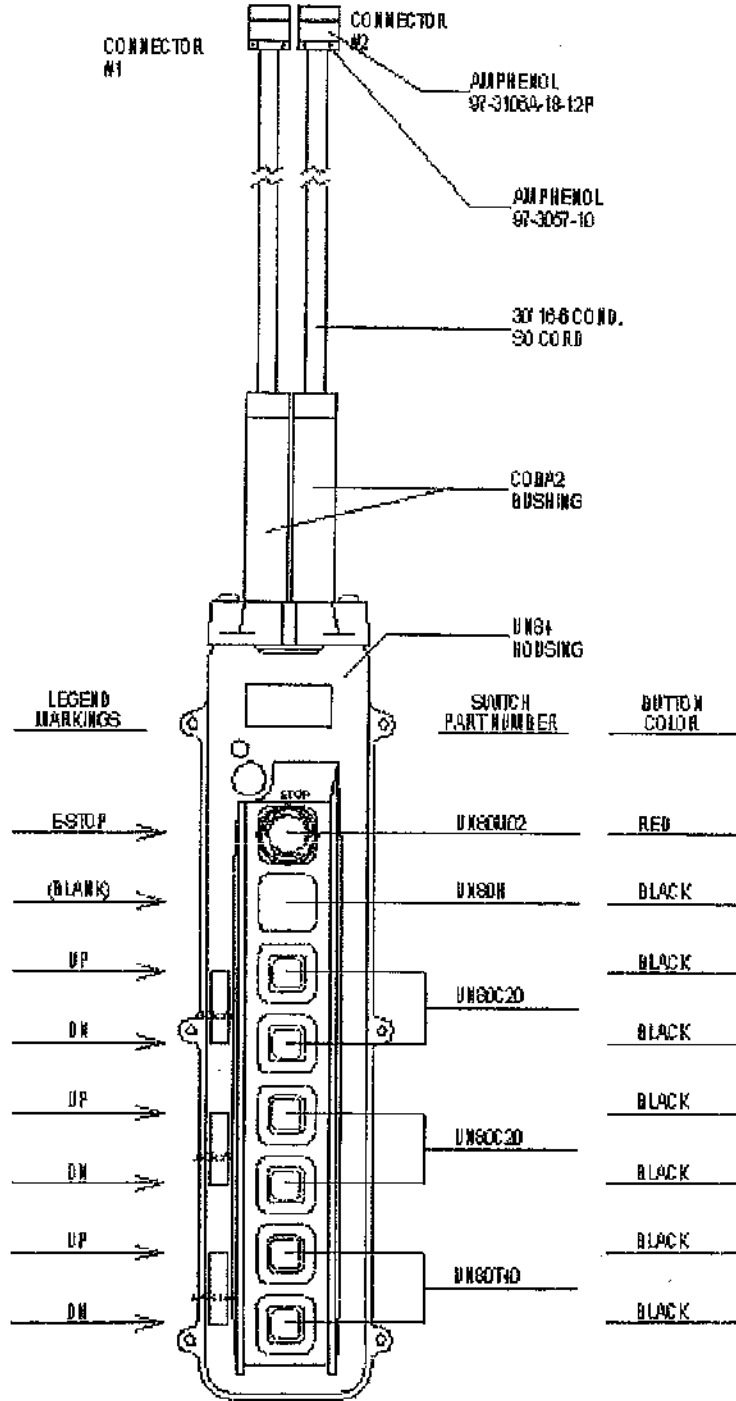
DRAWING NUMBER: XXXXXX


# Parts Identification and Schematics





# Parts Identification and Schematics



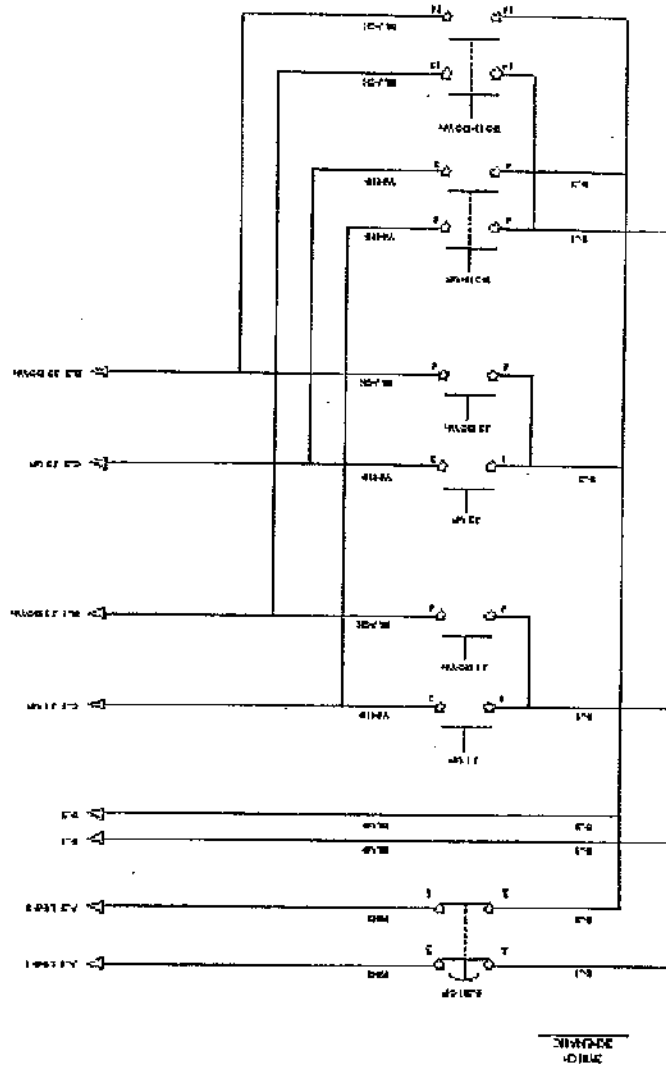
 <b>LIFT SYSTEMS</b> POLYMER MANUFACTURING 100 MILLERS RD WILSONVILLE, OR 97158	TOLEANCE BE: AS SHOWN IN	DRAWN BY: VM APPROVED BY: RMR	SEE B
	D DIMENSION: ± .007	SCALE: X UNIT: X	TITLE: MP707 MINI JACK PENDENT
FRACTIONAL: ± .016	DATE: 02/05/03	X	X
ANNOTATION: ± .02	DATE: 02/05/03	X	X

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ESTIMATED WEIGHT:	X
NEXT ASSEMBLY:	X

# Parts Identification and Schematics



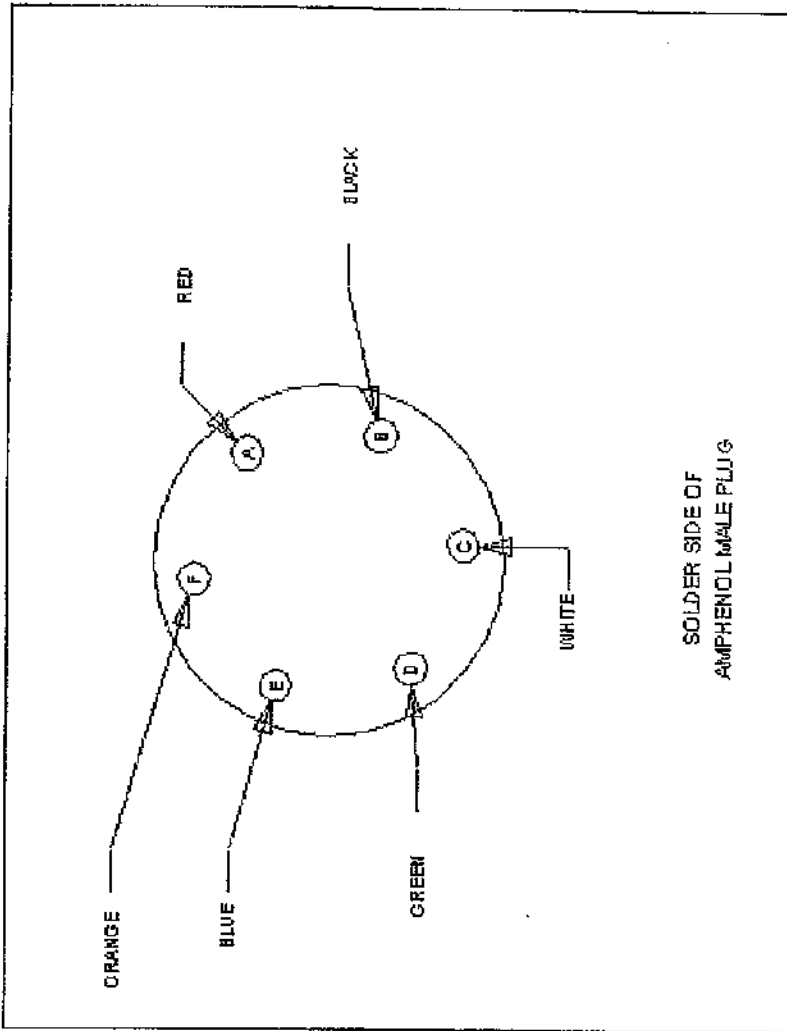
		<b>LIFT SYSTEMS</b> <small>THE LIFT SYSTEMS COMPANY</small>		SERVO-C	
	TELEPHONE 404-381-0100	SCALE: X	DRAWING NO. 84-1072	DATE: 10/77	REV: 0
	DECIMAL 1.000	UNIT: X	TITLE 180°/180° SWITCH - SCP-DATA-12		
	PROJECT NO.	DATE	BY	CHECKED	APPROVED

**CONVENTIONS**  
 LIFT SYSTEMS  
 DRAWING SYMBOLS

Dimensions in feet and inches shown in parentheses  
 Power is supplied through a 120V AC source  
 Grounding is required for all electrical systems  
 All wiring shall be in accordance with the National  
 Electrical Code (NEC) and applicable local codes  
 The manufacturer of the lift system shall be responsible for  
 providing the correct wiring diagram and parts list

ESTIMATED WEIGHT: X	COST ESTIMATE: X
---------------------	------------------

# Parts Identification and Schematics




SWITCH ASSEMBLY  
VIEWED FROM  
BACK SIDE

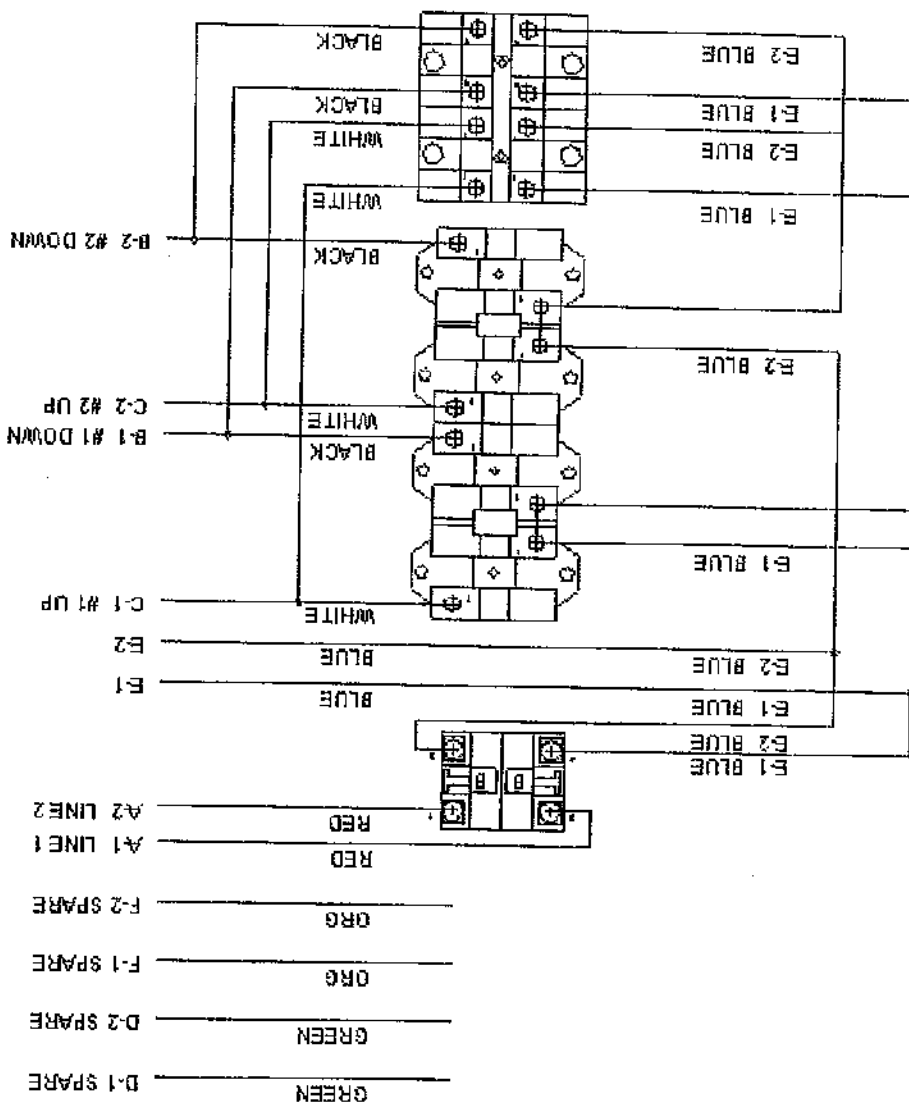
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ESTIMATED WEIGHT:	X
NET ASSEMBLY:	X

TOLERANCES UNLESS OTHERWISE SPECIFIED	LIFT SYSTEMS P.O. BOX 10000 DALLAS, TEXAS 75210			
TYPE: RMA	SCALE: X	DRAWN BY: X	PROPERTY: RLR	SIZE: A
1/8"				
FRONT				
TITLE	AMPHENOL MALE PLUG			
DATE				
1/12				

# Parts Identification and Schematics



 <b>LIFT SYSTEMS</b> <small>MANUFACTURING DIVISION</small>			
TOLERANCES UNLESS OTHERWISE SPECIFIED	SCALE: 1" = 1/8"	DRAWN BY: M1	APPROVED BY: RLM
DESIGN: 1	REV: 1	DATE: 11/81	SIZE: A
FRACTIONAL: 1/16"	TITLE: LIFT WIRING SCHEMATIC		
ANGULAR: 1/16"	DATE: 12/80	PART NUMBER:	2

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ESTIMATED WEIGHT:	X
NET ASSEMBLY:	X