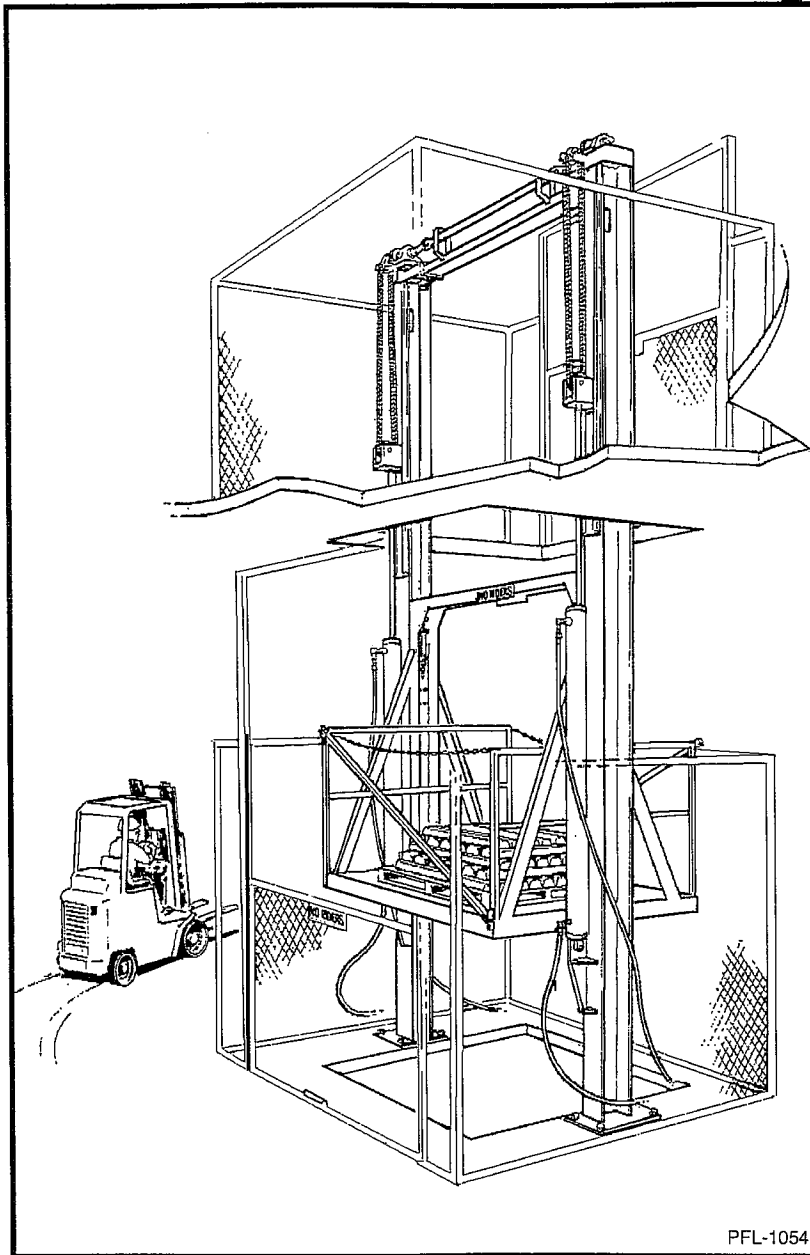


# PFLOW VERTICAL LIFTS

The Nation's Largest Manufacturer of Vertical Lifts



## OWNER'S MANUAL

### SERIES 21

## WITHOUT DECKLOCKS

THE ILLUSTRATIONS IN THIS MANUAL  
ARE NOT TO SCALE OR DETAIL AND  
ARE FOR REFERENCE ONLY

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## INTRODUCTION

Thank you for purchasing a PFLOW INDUSTRIES, INC., Series 21, Vertical Reciprocating Conveyor (VRC). As the nation's largest manufacturer of VRCs, we are confident that your unit will provide you with many years of reliable service.

**CODE REQUIREMENTS** - VRCs are NOT elevators. Your unit is designed for the movement of materials only, up to its rated capacity, from one level to the next. VRCs have their own national code (ANSI/ASME B20.1) and are specifically exempt from the National Elevator Code. All electrical designs and components are in accordance with National Electric Code (NEC) requirements. Local codes may require initial inspection of the installation and periodic inspection and testing of the unit.

Some states require special components and have specific guidelines regarding how the equipment must be installed, inspected, and tested. If we know in which state the equipment will be located, and if we are kept informed of state and local requirements, Pflow will incorporate the components into the order, as approved by the customer, and also provide any pertinent information, as called out on the general arrangement drawing, related to the installation of the equipment. We will not be on site for the testing, but we strongly advise that the installer be there.

If at any time you have questions about your state's requirements, please feel free to call.

## NOTE

*The information and illustrations in this manual are intended only as an aid to understanding the VRC's general installation. It does not cover every possible contingency or circumstance regarding non-standard options or site conditions.*

If you have a problem, call Pflow at (414) 352-9000, between 8:30 A.M. and 5:00 P.M., CST, Monday through Friday. Ask for the Product Support Department and have your serial number ready.

**Parts** - Pflow Industries maintains a complete stock of, or has access to, all replacement components. We keep detailed records of all equipment sold. If something is damaged in shipment, is defective or missing, contact us immediately.

**Service** - Our Product Support Department is available to assist your maintenance personnel with any questions or problems they may have regarding the equipment.

**Warranty** - Our warranty procedures can be found in the back of this manual. Prior authorization must be obtained from Pflow before commencing work of any kind.

**Feedback** - Let us know how we are doing. A questionnaire is included in the installation manual. Please fill it out and return it to us. We can't prevent a problem if we are not aware of it.

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# 21 Series

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## SAFETY

To ensure your safety and the safety of those around you, it is important that you read, understand, and follow ALL the safety precautions relative to a particular task. Safety precautions in this manual are labeled with the alert symbol followed by the word DANGER, WARNING or CAUTION.

### DANGER

When you see this symbol, it means that serious injury or death is likely to occur if the instructions are not followed carefully.

### WARNING

When you see this symbol, it means that the potential for personal injury is high if directions are not followed carefully.

### CAUTION

When you see this, it means that the potential for damage to the equipment is high if directions are not followed carefully.

### NOTE

*This term is used to provide additional information to help clarify instructions.*

### DANGER

**HIGH VOLTAGE.** Failure to follow proper procedures when performing electrical installation or service may result in serious injury or death.

### DANGER

**DO NOT** ride this equipment. Riding may result in injury or death. VRCs ARE NOT ELEVATORS.

### DANGER

**DO NOT** walk or work under a raised platform.

### DANGER

If you can open a gate when the unit is not at that level, or the unit will operate with a gate open, a safety device is not working and could result in serious injury or death.

### WARNING

**DO NOT** operate the unit if either the gates or interlocks are not functioning properly.

### CAUTION

Paint overspray on cylinder rod will damage seals and void warranty.

### CAUTION

**DO NOT** exceed rated capacity.

### WARNING

If your Series 21 VRC is not equipped with decklocks, do not leave the carriage at the upper level when you have finished using the VRC.

## Electrical Safety Precautions

### DANGER

Always assume that a circuit is not safe until you are sure that it is dead. Make sure that it cannot be energized after you start working on it. Follow OSHA procedures for locking out the control panel ANYTIME maintenance or service is being performed on the unit. Put a lock and tag on disconnects, breakers, and/or pulled fuses.

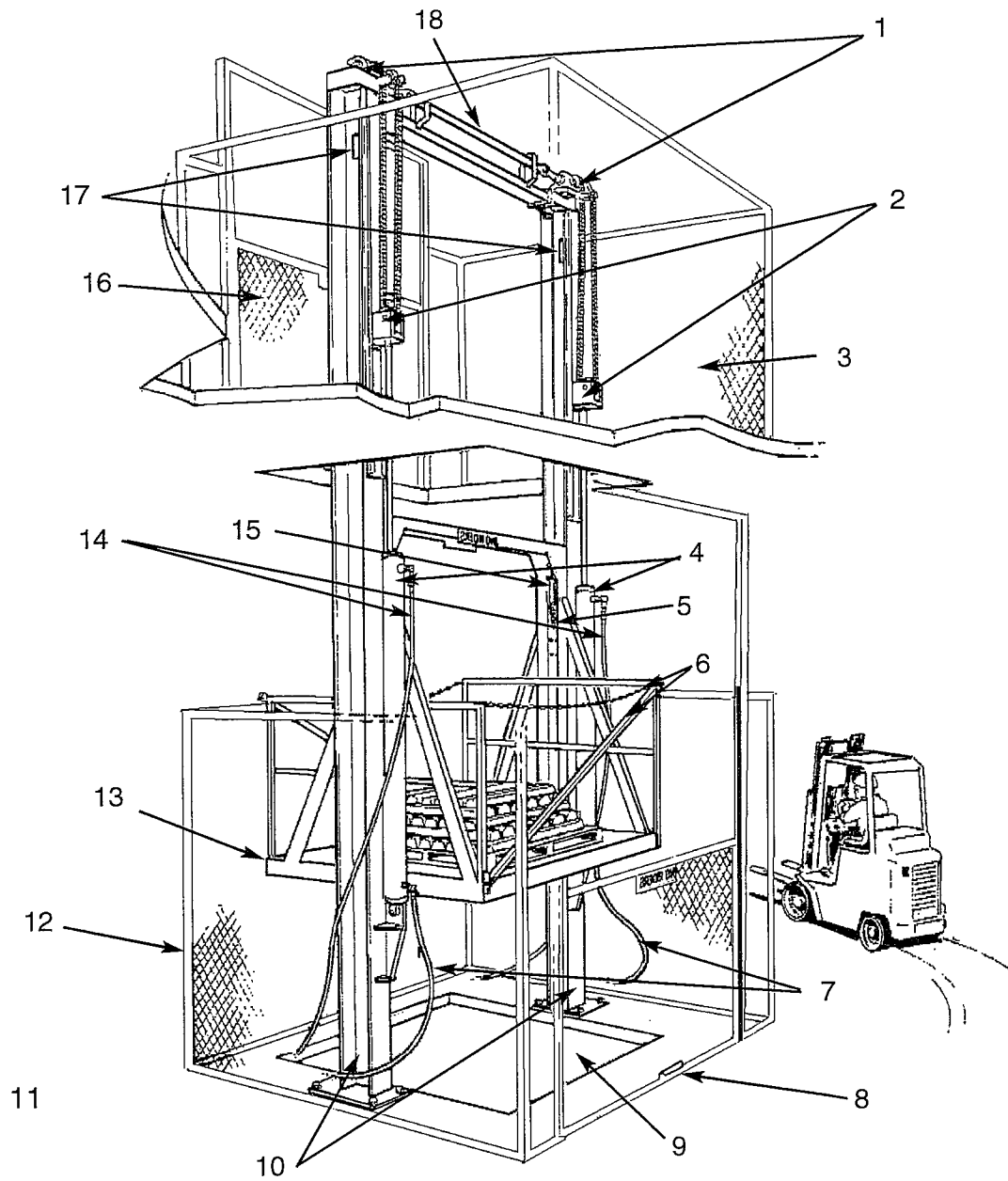
- Use a voltage tester on circuits - **DO NOT USE YOUR FINGERS**. Use fuse pullers to change a fuse; **NEVER** use fingers, pliers or screwdrivers. Covers on exposed electrical devices or wires **MUST** be installed to protect personnel from injury or shock.
- **ALL** metal connection boxes, switch boxes, starting boxes, transformer shells, and motor frames must be grounded to prevent shock to personnel.
- When using a portable electric meter, **DO NOT** connect one wire and leave other wires dangling loose. Anyone touching it will receive a shock through the meter.
- Before powering a circuit on, make sure that all is clear. This is necessary in order to protect personnel from injury and to prevent damage to the equipment.
- Avoid accidental contact with equipment or conductors which are known to be live or are **NOT** known to be dead. If it is necessary to work on equipment while it is hot, extra care must be observed. Always test and repair equipment that indicates a warning of unsafe conditions by giving a nonfatal shock. **NEVER** assume that because the warning shock is nonfatal, the next shock will also be nonfatal.
- **TAKE TIME TO BE CAREFUL!** Following safety precautions and using common sense will prevent injury, mutilation, or death.

## Safety Precautions When Working on Live Circuits or Equipment:

When electrical repair or maintenance work is required that prohibits de-energizing the circuits involved, extreme measures of safety must be used. The work should be accomplished only by well-supervised personnel who are fully aware of the dangers involved. Every care should be taken to protect the person performing the work and to use all practical safety measures. The following precautions **MUST** be taken:

- The person doing the work should not wear a wristwatch, rings, watch chain, metal articles, necklaces or loose clothing which might make accidental contact with live parts or throw some part of his body into contact with live parts.
- Clothing and shoes should be as dry as possible.
- Insulate the worker from ground by covering any adjacent grounded metal, with which he might come in contact, with insulating material. Suitable insulating materials are dry wood, rubber mats, dry canvas, dry phenolic material, or even heavy, dry paper in several thickness. Be sure that it has no holes and no conducting materials embedded in it. Cover sufficient area so that adequate space is permitted for worker movement.
- Cover working metal tools with an insulating rubber tape (not friction tape) as much as is practical.
- **DO NOT** stick a bare screwdriver or other tool into a hot fuse box.

## COMPONENT LAYOUT - STRADDLE



PFL-1054

- |                                 |   |
|---------------------------------|---|
| 1. Drive Sprocket Assembly      | 10. Beam Assemblies                     |
| 2. Clevis Assemblies            | 11. Motor Pump Unit (Not Shown in View) |
| 3. Enclosures                   | 12. Enclosures                          |
| 4. Cylinders                    | 13. Carriage                            |
| 5. Wheelblock                   | 14. Hose Assembly (High Pressure)       |
| 6. Loadsafes                    | 15. SafeDeck Adjustable Stop            |
| 7. Hose Assembly (Low Pressure) | 16. Gate                                |
| 8. Gate                         | 17. SafeDeck Beam Openings              |
| 9. Pit                          | 18. Torsion Bar                         |

Figure 1

## MECHANICAL OVERVIEW

Each unit is a customized application of the product. Individual components will vary according to the capacity of the unit, customer's specification, and options chosen.

The following is an overview of the various components and their purpose. Exploded view illustrations are shown in other sections of this manual.

The **FRAME** consists of two vertical upright beams. These beams are anchored at the base plates to the first level and positioned by the header/torsion bar assembly at the top and bracing at other levels.

The **LEVELDECK** feature consists of a torsion bar and header across the top of the beams.

The **CARRIAGE** consists of a platform, framing, four wheelblocks, and either railings, enclosures, or sides.

**LOADSAFE**, our exclusive safety barrier, is secure, easy-to-position, and self-storing.

A **SAFETY GATE** or door must be provided at each level and opening. Whether a Pflow Industries product or existing door or gate, they must be interlocked, both mechanically and electrically, with the operation of the unit. This is to prevent movement of the platform when a gate is open or opening of a gate or door when the lift is not at that level.

In accordance with ANSI B20.1, Pflow Industries supplies standard **ENCLOSURE PANELS** to be installed around the unit as required by site conditions. Our panels are manufactured of 1 1/2" angle frames and 15 gauge flattened expanded metal which will reject a ball 2" in diameter. Our standard panels are 8 feet high. Total height includes 1 1/2" legs for mounting to the floor. Extended height applications are available.

There are two configuration types available for this model. "Straddle" is when a column is located on each side of the carriage. This is shown in Figure 1.

"Cantilever" is when both columns are at the back. There is no difference in the operation or maintenance of the two models.

Pflow Industries provides a "NO RIDER" sign for each gate and the carriage. A "CAPACITY" sign shows the maximum allowed load that this model is designed to accept. As a reminder, i.e., "SAFETY SYSTEM DOES NOT INCREASE OPERATING CAPACITY" and "DO NOT EXCEED RATED CAPACITY" signs are also provided.

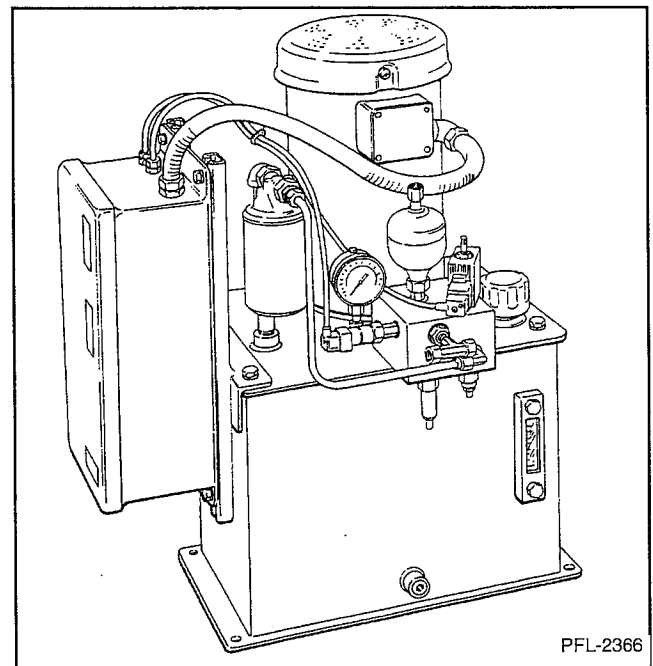
The **HYDRAULIC MOTOR/PUMP UNIT** consists of a motor, gear pump, flow control valve, relief valve, reservoir, accumulator, air and oil filters. This unit is located separately from the lift and connects by hoses to the cylinders mounted on the beam. Recommended placement is within 10' of the unit. See Figure 2.

### NOTE

*For servicing and safety purposes, we recommend locating the pump unit outside of the enclosures.*

### NOTE

*The location of the pump unit may present a problem with the operation. Please consult our Product Support Department before making a change.*



PFL-2366

Figure 2



## 21 Series

The **LIFTING COMPONENTS** consist of two hydraulic cylinders, each with a clevis sprocket assembly attached to the piston of the cylinder. A second drive sprocket assembly is mounted at the top of each beam.

The lift chain is connected at the deadhead, loops around the clevis sprocket, up to the drive sprocket, and connects to a wheelblock assembly bolted to the carriage. See Figure 3.

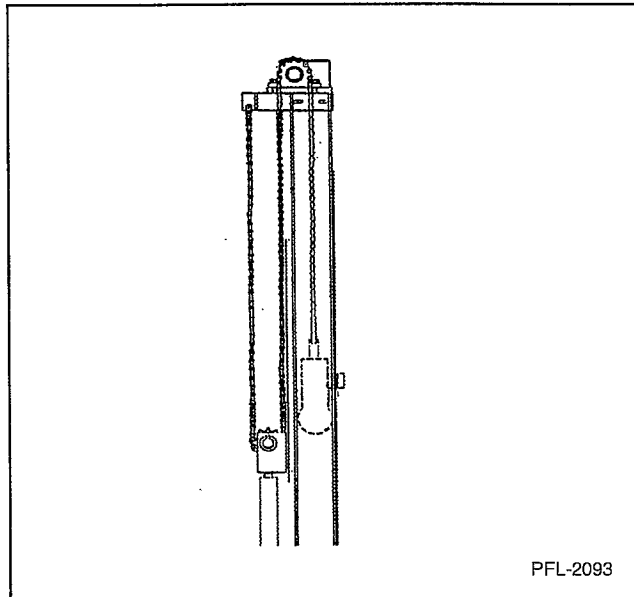


Figure 3

The **WHEELBLOCKS** are bolted to the carriage uprights. During travel the wheels ride inside the beams and guide the carriage. See Figure 4.

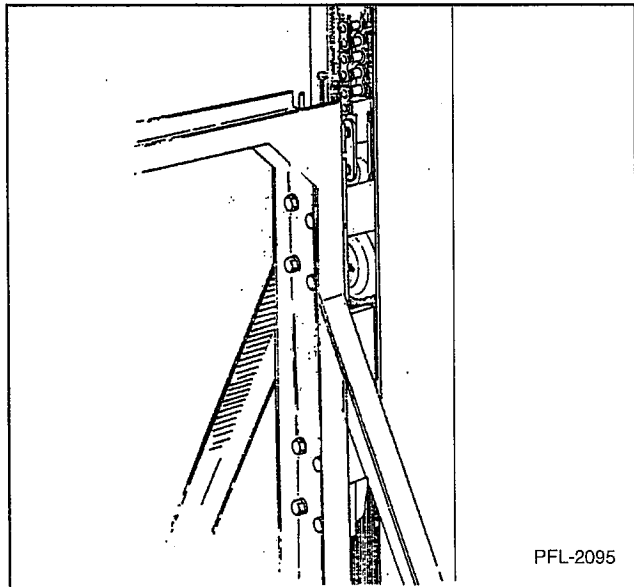


Figure 4

Each wheelblock has a mounting block, a wheel, and two guide rollers. See Figure 5.

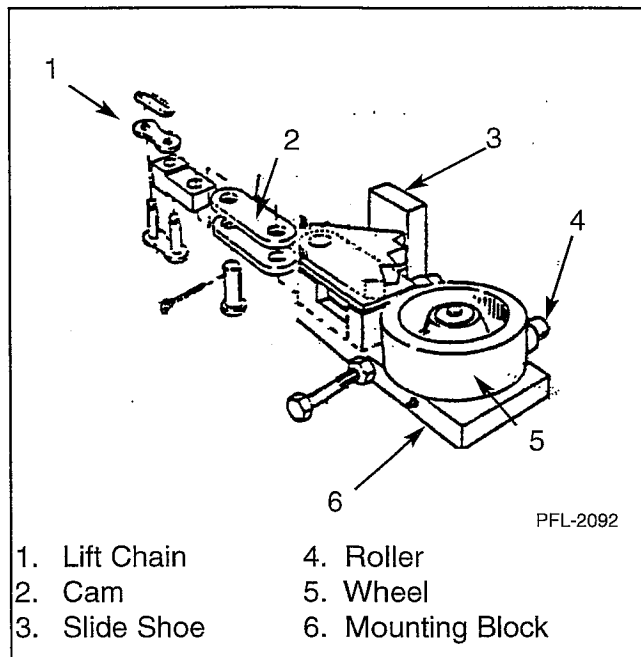


Figure 5

Each upper wheelblock also has a steel **SAFETY CAM** with teeth cut into it and a shoe. This cam is pivoted on the mounting block and is spring loaded. The lift chain connects to this safety cam, and all lifting action is through it. Should the chain break or go slack, the cam will be pivoted by its spring into a jam position with the track to stop the carriage from falling. The guide shoe on the outside of the track helps to wedge the track between the shoe and cam teeth.

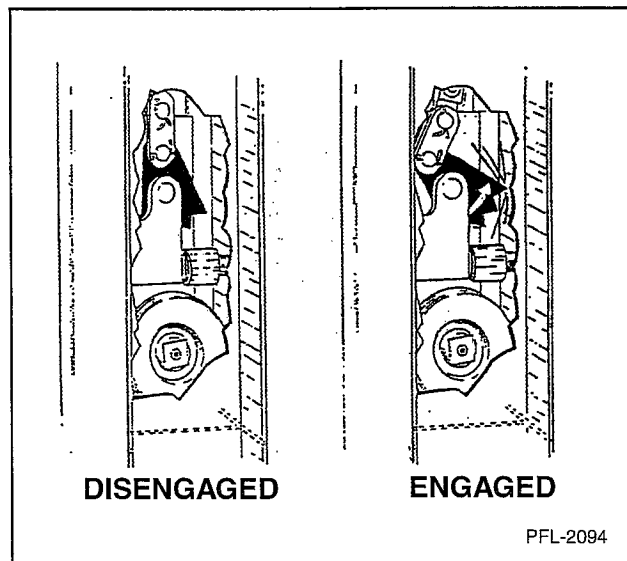
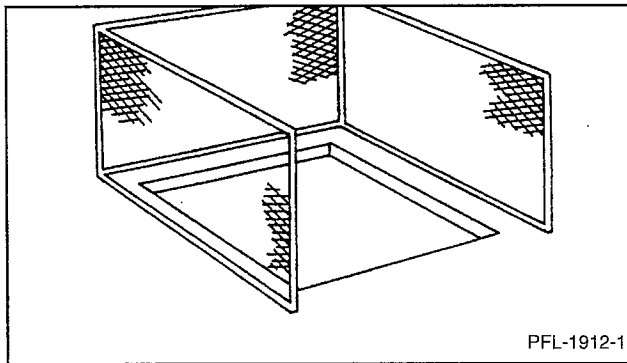


Figure 6

**SAFEDECK** is Pflow Industries, Inc. exclusive design for locking the carriage at an upper level. When the carriage is sent to the upper level, it proceeds past that level and activates the level limit switch. The motor shuts off, the dump valve opens, downward travel begins, and the DeckLocks engage.

When the unit is called to return to the first floor, the carriage will raise to unlock the DeckLocks and proceed to the first floor.

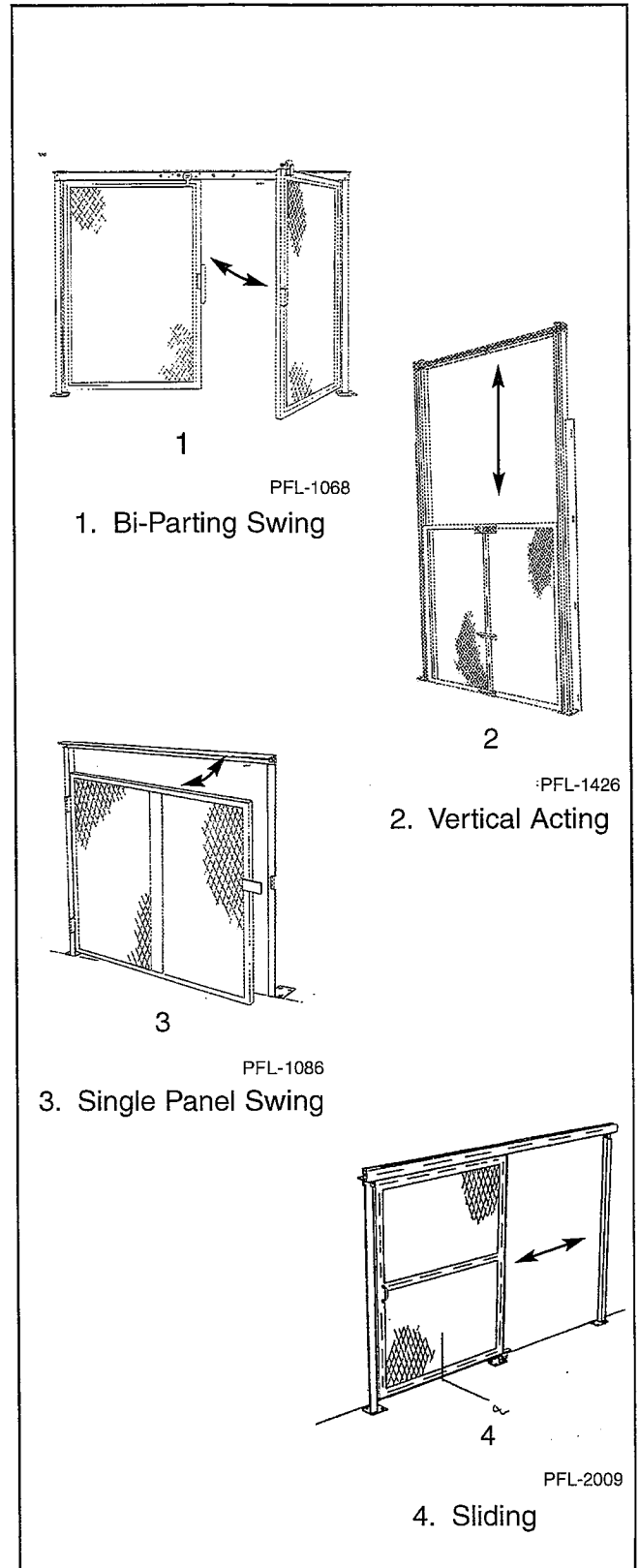
In accordance with ANSI/ASME B20.1, Pflow Industries supplies standard **ENCLOSURE PANELS** to be installed around the unit as required by site conditions. See Figure 7.



**Figure 7**

The panels are manufactured of 1-1/2" angle iron frames and 15-gauge flattened expanded metal which will reject a ball 2" in diameter. Our standard panels are 8' tall.

A safety **GATE** or door must be provided at each opening in the lift area at each level. The gate must be interlocked both mechanically and electrically with the operation of the unit. This prevents movement of the platform when a gate is open and the opening of a gate when the lift is not present at that level. See Figure 8.



**Figure 8**

## 21 Series

Pflow Industries uses various styles of interlocks depending upon the gate type and application. The Parts section of this manual contains views with part numbers. See Figure 9.

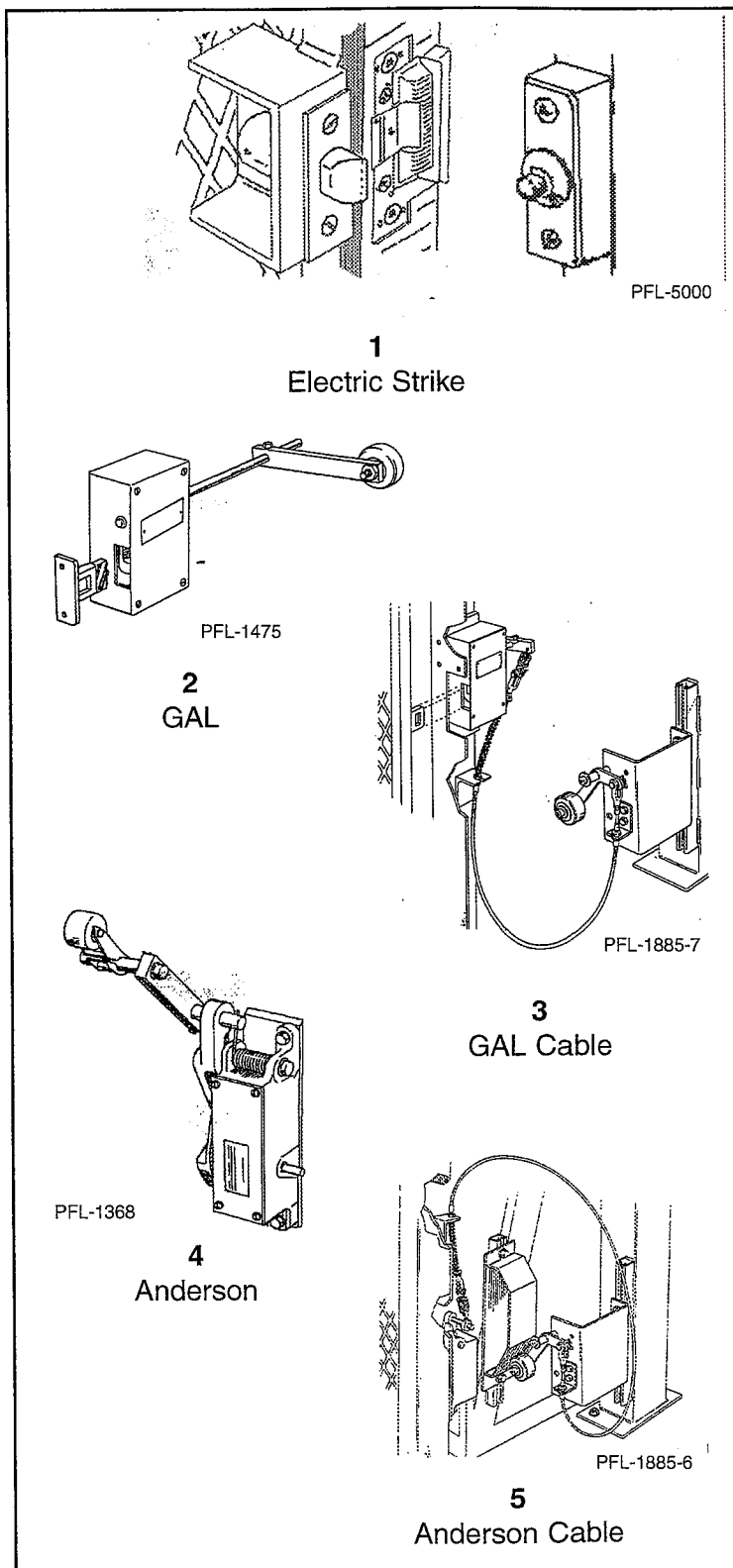


Figure 9

# Electrical Overview Series 21 - Without DeckLocks

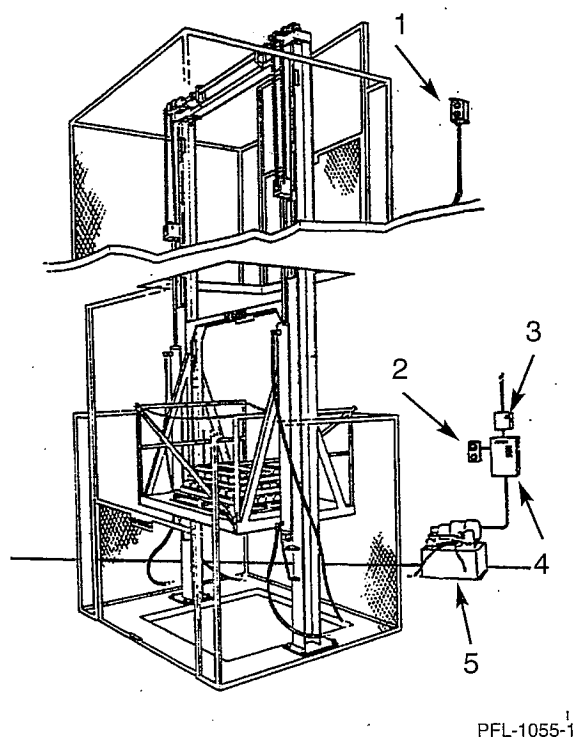
## ELECTRICAL OVERVIEW

### NOTE

*The following is a standard description of the electrical wiring of the VRC ONLY. It DOES NOT include specifics on options available or ordered. A copy of the schematic can be found in a manila envelope in the parts crate.*

All electrical devices are tied into the **MAIN CONTROL PANEL**. It contains a fused transformer, which reduces the high voltage needed for the motor down to the voltage required to operate the control circuit, motor starter and push button stations. Overload heaters are provided to protect the motor should excessive current draw cause overheating. The fixed timing relay is used to time the solenoid to lower the lift to the first level. See Figure 10.

### STRADDLE SHOWN



1. Second Level Push Button Station
2. First Level Push Button Station
3. Disconnect
4. Main Control Panel\*
5. Pump/Motor Unit\*

Figure 10

**PUSH BUTTON STATIONS.** One station is normally supplied for each level. ANSI/ASME B20.1 code requires that they be remotely located so they cannot be activated by someone standing on the carriage. Each station has an UP, DOWN, and EMERGENCY STOP button.

The UP and DOWN switches are momentary contact. This allows the operator to depress the button and let go. The EMERGENCY STOP button is pushed to activate but will stay in and must be pulled back out for the unit to operate.

Required by NEC code, the **MAIN DISCONNECT** should be fused, lockable, and located within line of sight of the control panel. (Not supplied by Pflow.)

The **MOTOR/PUMP** unit has two electrical components: a motor and an electrically actuated solenoid valve. We recommend the pump/motor unit be located within 6' of the unit.

### ⚠ WARNING

**All gates or doors accessing the lift area must be electro-mechanically INTERLOCKED. This requires electrical contacts to prevent the lift from operating if a gate is open when the carriage is at that level and mechanical locks to lock the gate until the carriage is at that landing.**

Different types and styles of interlocks are supplied depending upon the type of gate and on-site conditions. Standard styles incorporate from one to four electrical components per gate.

### \*NOTE

*On Pflow's standard product line, the control panel is mounted to the motor/pump unit stand.*

## OPERATION

BEFORE OPERATING THE LIFT, PLEASE READ, UNDERSTAND AND FOLLOW ALL THE SAFETY PRECAUTIONS LISTED BELOW.

### **⚠ DANGER**

Malfunctioning interlocks may allow the door to be opened when the carriage is not present. **YOU MUST MAKE SURE CARRIAGE IS PRESENT BEFORE WALKING THROUGH DOORWAY.** If the carriage is not present, you could fall into the empty shaftway and be seriously injured or die!

### **⚠ DANGER**

Door must be closed and locked unless carriage is present. Door interlock must be operational. It prevents door from being opened when carriage is not present. Door restricts personnel from falling into opening or from being struck by moving parts that could result in serious injury or death!

### **⚠ DANGER**

DO NOT ride this equipment. Riding may result in serious injury or death! VRCs ARE NOT ELEVATORS.

### **⚠ DANGER**

DO NOT walk or work under a raised platform.

### **⚠ WARNING**

Only trained persons shall be permitted to operate or maintain this equipment. Improper operation or maintenance may cause serious injury or death!

### **⚠ WARNING**

If at any time proper operation or performance of your Pflow VRC is in question, DO NOT USE IT! Notify your supervisor or the proper maintenance people immediately.

### **⚠ WARNING**

Always return the carriage to the lowest level when the VRC is not in use.

### **CAUTION**

DO NOT allow loads to overhang the sides of the carriage. This will result in damage to the equipment and merchandise.

### **CAUTION**

DO NOT exceed the rated capacity.

### **TO OPERATE LIFT**

- Close gate.
- Depress and release the appropriate push button to move the carriage to the desired floor. The carriage will stop when it reaches the appropriate level.
- When the unit has arrived at the appropriate level and comes to a complete stop, open the gate.
- If an emergency occurs when the carriage is moving, push the EMERGENCY STOP button. The button will keep the lift inoperative until the button is pulled back out. See Figure 14.

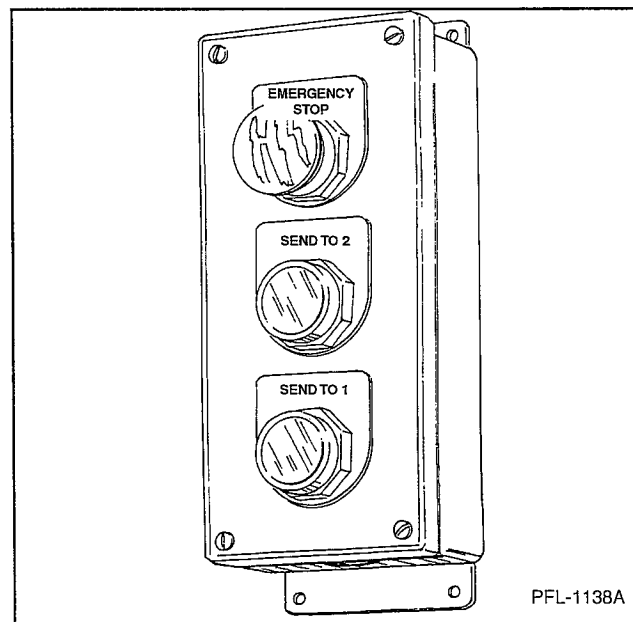


Figure 14

### **NOTE**

*Service must be performed by authorized personnel only. Read the Owner's Manual before operating the equipment. For service, contact your local representative.*

## SERVICE

### Maintenance of Pump Unit

#### NOTE

*The life of the hydraulic components is directly proportional to system cleanliness. If the oil is kept clean, is in good chemical condition, and its viscosity meets the operating temperature range, it will increase unit life.*

### MAINTENANCE CHECK

1. Reservoir - Check the fluid level and make sure it is up to the full mark.
2. Inlet Line - Check for frays and kinks. Make sure the connections are secure and leak-proof.
3. Oil Viscosity - Do not use fluid that is too thick. Heat, high pressure, and contamination all speed up oxidation which results in gum, sludge, plugged valves, and excessive wear on the components.
4. Fluid - If it is cloudy, off-color, contains suspended sediment, or liquid layers, then changing the fluid is recommended.
5. Check and/or change the oil filter. Ten microns or less is recommended.

### FILLING THE RESERVOIR

#### NOTE

*Hydraulic oil with a Saybolt viscosity of between 100 and 150 SSU or ISO 32 at operating temperatures with a non-foaming additive should be used.*

*Extreme temperatures below 32°F or above 100°F and corrosive atmosphere may affect oil requirements. Consult Pflow Industries for assistance.*

1. Wipe off the fill plug and the filler nozzle with a clean, lint-free cloth.
2. Watch for metallic chips, bits of waste, and other contaminants that may cause damage to the system.

3. Use a ten micron filter on the filler nozzle when adding oil.
4. The reservoir should be tightly closed after filling the system.

### CLEANING THE RESERVOIR

#### NOTE

*The reservoir is a settling basin for any contamination. It is important to remove all accumulated sediment from the bottom. Wipe down the interior to remove any further impurities. The inside cover of the reservoir should also be checked. Large reservoirs can be a source of rust contamination due to condensation. The vibration of the pump unit results in the rust flaking off into the fluid.*

### Maintenance Schedule

Your VRC requires consistent minimal and basic periodic attention. It is recommended that you keep a record during inspection and make a periodic evaluation of lubricating needs to reflect any increase in service that may be required. Problems must be addressed immediately as they may affect the safety devices.

#### NOTE

*Observe cycle day's schedule based on whichever comes first. High usage and corrosive environments will require more frequent maintenance and possibly different lubricants. (Check with your lubrication supplier for your particular needs.) Additional options, as ordered by the customer, may require maintenance and are not included in this information.*

If you have any questions or problems, please feel free to contact either your local service representative or our Product Support Department for assistance.

## 21 Series

INSPECT	NO. OF CYCLES/DAYS	ITEM	ACTION	REFERENCE
	1000/90	Bolts	Check for any loose bolts and tighten	Parts
	1000/90	Chains	Inspect for wear and alignment	Parts
	2000/90	Cylinder Fittings/ Hoses	Inspect for leaks	Parts
	2000/90	Wheelblock Wheels	Inspect for wear	Parts
	2000/90	Guide Rollers	Inspect for wear and rotation interference	Parts
	2000/90 6000/360	Hydraulic Oil Filter	Change after first 1000/30 then 6000/360 thereafter	Parts
	1 year	Reservoir	Drain and clean tank; Change oil and filter	Flushing Hydraulic System
	1000/90	Gates/Interlocks	Inspect for proper operation	
	1000/90	Sprockets	Inspect for wear and tighten set screws to 350 in/lbs.	
	1000/90	LevelDeck Bearings	Inspect for wear	

### Manual Release Valve

#### CAUTION

#### For Emergency Use Only!

The down solenoid, also referred to as a dump valve, is equipped with a manual release valve. See Figure 15. This is to be used only in emergency situations when a load is stuck in upward mid-travel and the only way to free the load is to bring the unit down.

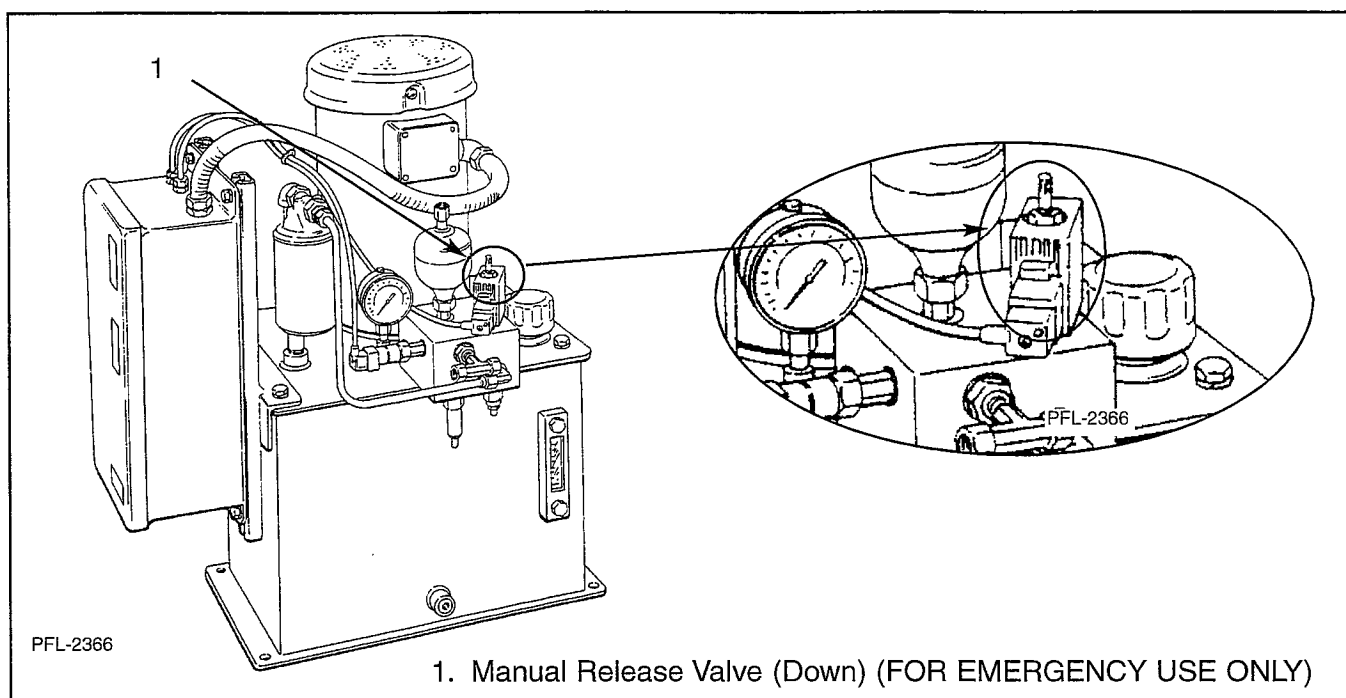
#### WARNING

**Make sure that NO ONE is present in the enclosed area beneath the lift when operating this valve.**

1. To open or operate the manual release valve, turn it counterclockwise. This will allow the unit to descend.

2. Once the platform has reached the floor, turn the valve clockwise and close snugly.

If you have any questions or problems, please feel free to contact either your local service representative or our Product Support Department for assistance.



**Figure 15**

## Flushing Hydraulic System

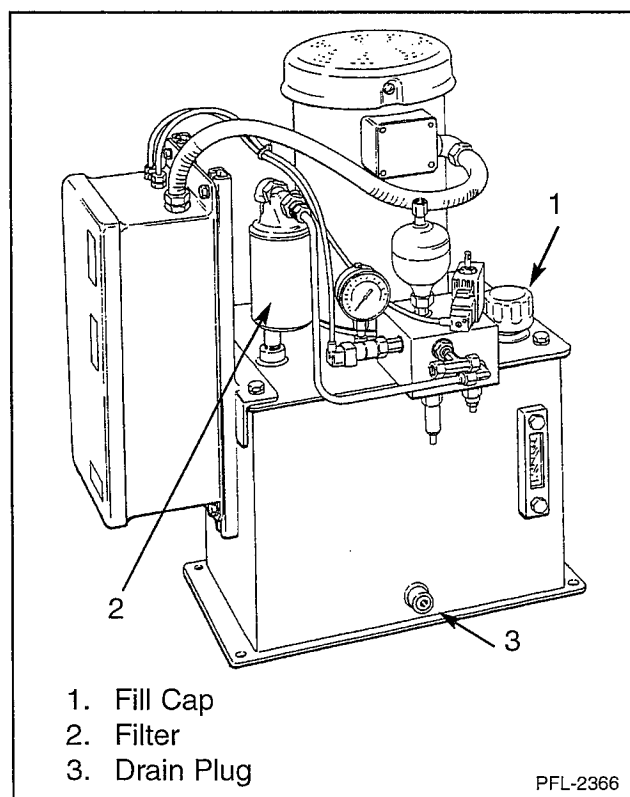
### NOTE

*For prolonged service life, contamination must be periodically removed from hydraulic systems. Taking steps during the installation and daily operations to prevent contaminants from entering the system will help to prevent component failure and system down time.*

If contamination is evident in fluid samples, there is a good chance that accumulation has occurred somewhere within the system "plumbing." These deposits interfere with the operation of the unit and must be flushed with a light viscosity oil containing a rust inhibitor to protect the metal surfaces from rust formation after the hot flushing oil has been drained out.

1. Lower the carriage to the floor. Make sure the cylinders are fully extended.
2. Turn off power and lock out the disconnect.
3. Drain the system by removing plug near bottom of reservoir. See Figure 16. When draining the system, it is desirable to remove ALL of the used oil. Allow sufficient time for thorough draining so that a minimum of the old oil remains in the system. In most cases, bleeding at the lowest point in the system will help. It is also advisable to drain only after the oil is

fully warmed up (about 150°F). By doing this, oil impurities do not have a chance to settle and can be removed with the drained oil. The fluid should then be drained while it is hot.



**Figure 16**



## 21 Series

---

4. Clean out the reservoir.
5. Refill the unit with oil. Before removing the filler cap to add oil to the hydraulic system, wipe off the fill plug and the filler nozzle with a clean, lint-free cloth. The safest way to pour oil from a container into a reservoir is to use a 10-micron filter on the filler nozzle. It is especially important to watch for metallic chips, bits of waste and other contaminants that may cause damage to the hydraulic system. The reservoir should be tightly closed after filling the system.
6. Remove lock and restore power.
7. Flush system. This is done by circulating a small percentage of special petroleum solvent cleaner with the fluid charge long enough to loosen and remove the deposits (10 to 50 hours depending on the condition). A careful watch on the filters will indicate when the system is clean.

### NOTE

*Hydraulic oil with a Saybolt viscosity of 150 SSU or ISO 32 at operating temperatures with a non-foaming additive should be used.*

- Solvents - Fluid suppliers are the best source for solvents. Solvents such as alcohol, kerosene, and carbon tetrachloride are low in viscosity and tend to: a) reduce the viscosity of the new fluid, b) may not hold the washed out contaminants in suspension and may deposit them in another part of the system.
8. Repeat steps 1 to 5.
  9. Replace the oil filter.
  10. Take all necessary steps to put the unit back into operation.

If you have any questions or problems, contact our Product Support Department for further assistance.

## SAFETY CAM INSPECTION

Routine inspection of the safety cams is extremely important as it is one of the major safety devices of our product.

### Visual

The cam should be checked for visual signs of wear. These include, but are not limited to, wear signs on the sides and chips in the teeth.

### Rotation

Rotation is important because it checks the actual operation of the cam.

1. Lower the carriage to the bottom level.
2. Shut off power at the main disconnect.
3. Open the manual release valve. (See Manual Release Valve, Page 16.) If your unit does not have a manual release valve, please contact Pflow Industries for further assistance.
4. Step onto the carriage. Slacken the cable or chain on each cylinder. Pull enough cable or chain to allow the safety cams to engage. Usually one to two feet is sufficient. (This will take considerable force as you are also extending the cylinders.) Check to see that the safety cams rotate freely and they are touching the column without obstructions.
5. Close the manual release valve. Reassemble the caution label with the nut.
6. Check to make sure that the cables or chains are properly aligned on all sprockets and sheaves.
7. Turn main disconnect back on.
8. Cycle lift several times to check for proper operation.

If you have any questions or concerns during the course of the inspection, please feel free to contact the Product Support Department.

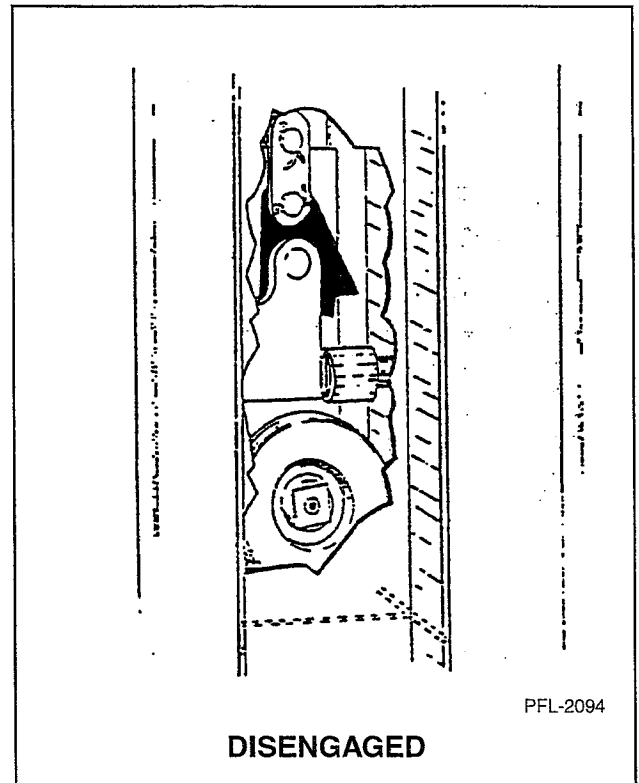


Figure 17

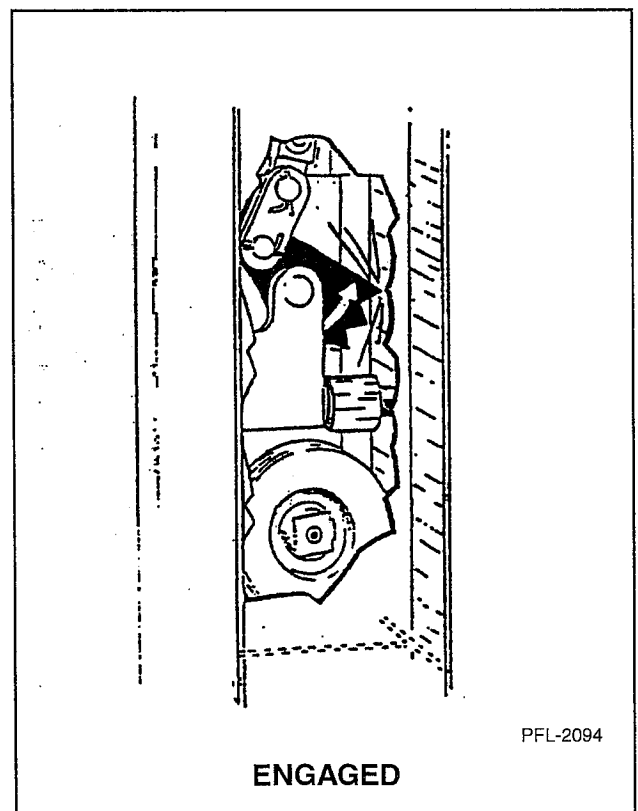


Figure 18

## TROUBLESHOOTING

Before troubleshooting, please observe all of the precautions in the Safety section at the front of this manual.

The following is a list of common problems and solutions:

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Lift doesn't operate when controls (push buttons) are activated.	Gate or door is open or ajar.	Check all gates/doors to make sure they are closed.	Mechanical Overview
	Main disconnect is off.	Check to see if there is a reason before turning on.	
	Thermal overload has tripped.	Press reset button. If it trips again, determine cause. Motor is overheating.	
	Control fuse is blown.	Replace fuse after determining cause.	
	Power circuit between disconnect and starter is dead.	Use a voltmeter to check voltage. Repair as needed.	
Motor starts and carriage raises, but motor stops before second level.	Safety gate has been opened.	Close gate. Check to see why this has happened.	Mechanical Overview
	Object encountered.	Identify the problem. Remove or repair as needed.	
	Piston (cylinder) interference.	Remove object. Repair if needed.	
	Thermal overload has tripped.	Check for pump binding.	
	Carriage is overloaded.	Lower, and remove excess weight.	Parts
Motor/pump runs but carriage does not raise, and there is no pressure shown on gauge.	Oil in reservoir is less than 3/4 full.	Add oil to proper level.	Maintenance and Troubleshooting of Pump Unit
	Motor rotation is incorrect.	Contact your electrician.	
	Relief valve setting is too low.	Increase spring pressure by turning stem clockwise a few times. DO NOT OVER or FULLY TIGHTEN. Damage will result. A few turns should show pressure on the gauge.	
	Pump cavitating.	Oil supply is low. Fill reservoir. Oil is too heavy. Change to proper viscosity oil.	
	Accumulator is plugged.	Open reservoir; inspect pickup tube, clean if required.	
Pump is not working or turning.	Motor/pump coupling broken. Pump impeller not turning.	Call Pflow Industries.	

# Troubleshooting

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Motor/pump runs, but carriage does not raise, and there is erratic or low pressure shown on gauge.	Oil is foaming	Air is leaking into suction line because of loose fittings. Check all fittings. Water or incompatible oils causing foaming. Drain and replace with proper type oil.	Maintenance and Trouble-shooting of Pump Unit
	Low oil level.	Add to proper level.	
Carriage raises but will not lower.	Mechanical interference.	Identify the problem. Remove and repair as needed.	Parts-Hydraulic Layout
	Dump valve not actuating.	Depress the DOWN button and listen carefully. If it does not click, it is not operating. Then proceed with: 1. Using a voltmeter, determine that the solenoid is receiving current when the button is pressed. If it is not, check the operation of the timing relay and then the motor starter (contacts in the control circuit). 2. If the solenoid is receiving current, check the end of the solenoid coil with a screwdriver. When energized, there will be a magnetic pull. If no magnetic pull is present, replace the solenoid.	
	Velocity fuse triggered.	Check for hose break or fitting leak. If none found, attempt to increase pressure in cylinders by pressing UP button.	
Motor/pump keeps running after pressure reaches the relief valve setting	Relief valve set too low.	Readjust relief valve. Consult Product Support Department for instructions.	Parts
	Bad pressure relief valve.	Replace relief valve.	
	Upper limit switch is not activating.	Check for possible adjustment.	
Pump stops suddenly.	Major internal pump has failed.	Examine the pump and rebuild or replace as necessary.	Maintenance and Trouble-shooting of Pump Unit.
Carriage drifts down from raised position. (NOTE: 3-4 inches overnight is normal.)	Internal leakage.	Contamination is keeping the dump valve from seating. Remove solenoid coil and valve spool. clean spool and seat with the recommended solvent or cleaner. Dry with a lint-free cloth. Replace coil and spool. Test. Inspect oil in reservoir.	
		Oil is bypassing the piston seals. Remove and clean seals. If worn, replace. Inspect breather for leakage.	

## 21 Series

SYMPTOM	POSSIBLE CAUSE	SUGGESTED SOLUTION	REF.
Carriage lowers but stops early.	Debris in the pit.	Clean out pit.	Maintenance and Trouble-shooting of Pump Unit
	Dump valve not working properly.	See "Carriage raises but it will not lower" for instructions.	
	Faulty timer	Replace.	
Rough or noisy operation.	Travel interference.	Identify. Remove or repair as needed.	Parts
	Drive component interference.	Identify. Remove or repair as needed.	
	Wheel guide rollers worn.	Inspect, lubricate, and replace as needed. Determine why they wore out.	
	Carriage is not level.	Determine cause and correct.	
Carriage binding.	Cylinders operating out of sequence. Seal bad in one cylinder.	Inspect cylinders and hoses.	
Carriage is spongy or bouncy.	Air in cylinders.	Run unit numerous times to remove air. Bleed cylinders. If you do not know how to do this, contact the Product Support Department, Pflow Industries.	Maintenance and Trouble-shooting of Pump Unit
	Binding	Check mechanical and hydraulic components.	
Excessive temperature and pump noise.	Defective, damaged or worn pump.	Contact Product Support Department, Pflow Industries.	
	Cavitation*	Add hydraulic fluid to reservoir.	
	Aeration**	Air is leaking into suction line because of loose fittings. Check all fittings.	

### NOTE

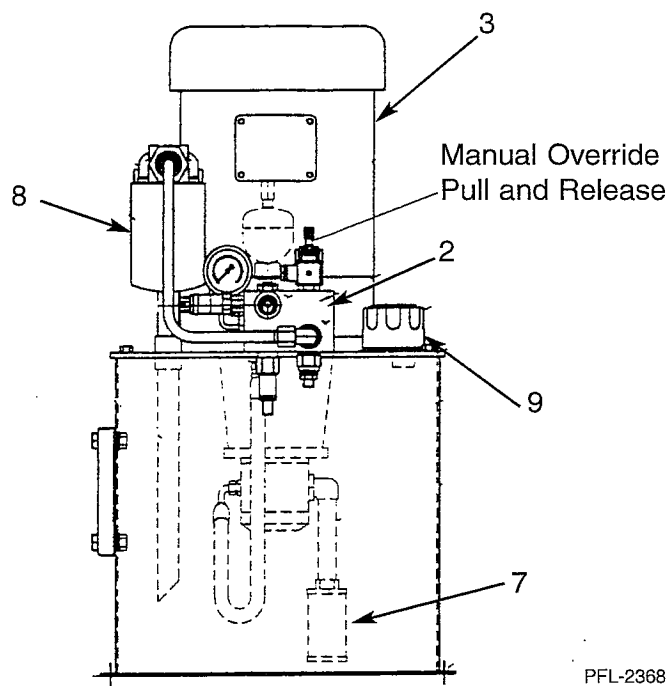
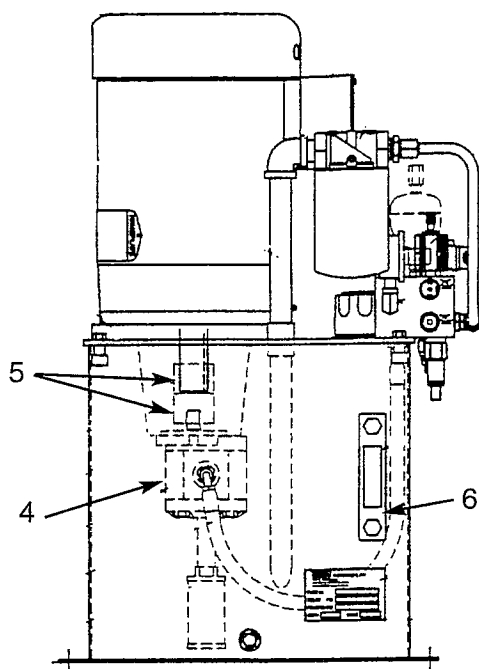
\* **Cavitation** is a vacuum in the fluid caused by a restricted or sharp bend in the inlet line, a clogged filter, or by fluid that is too high in viscosity. The characteristic sound of cavitation is a high-pitched "scream." The noise increases with the degree of cavitation and with increased operating pressure.

\*\* **Aeration** is the presence of excessive air, usually in the form of bubbles, disbursed through the fluid caused by a damaged inlet or return line; a loose or defective fitting(s) or seal(s); damaged or worn cylinder rod, packing, or seals; cracked junction blocks, tees, or piping; fluid level too low; air trapped in filter or excessive air trapped after adding fluid. Overheating or jerky and uneven movement in the pump or cylinders are the obvious symptoms of aeration.

If you need further assistance, please call the Product Support Department of PFLOW INDUSTRIES, INC.; (414) 352-9000.

## PARTS

### Motor Pump and Motor Assembly

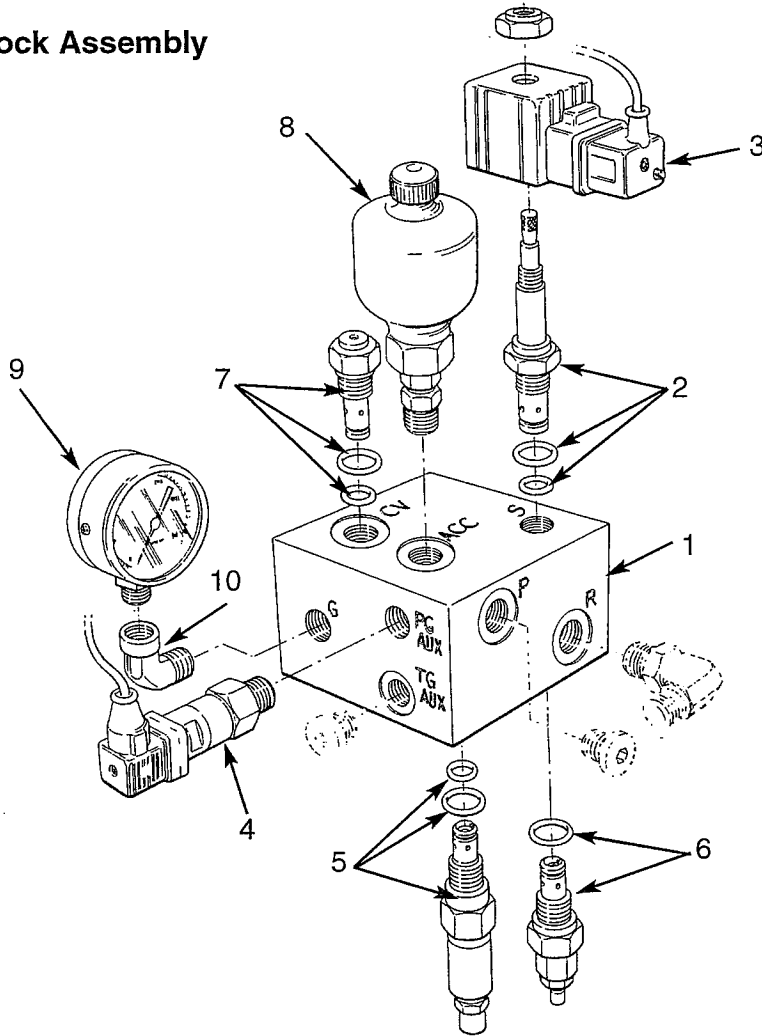


PFL-2368

Item	Qty.	Part No.	Description
1	1	Contact Factory	Hydraulic Pump and Motor Assembly
2	1	11078-0016	Manifold Block Assembly
3	1	Contact Factory	Motor Assembly, Pump
4	1	Contact Factory	Pump Assembly, Hydraulic
5	1	11078-0020	Coupling, Motor Half
		11078-0021	Coupling, Pump Half
		11078-0022	Insert, Coupling
6	1	11078-0013	Gauge, Oil Sight
7	1	11078-0012	Strainer, Hydraulic Oil
8	1	11078-0011	Filter, Hydraulic Oil
9	1	11078-0007	Breather, Oil Fill

# 21 Series

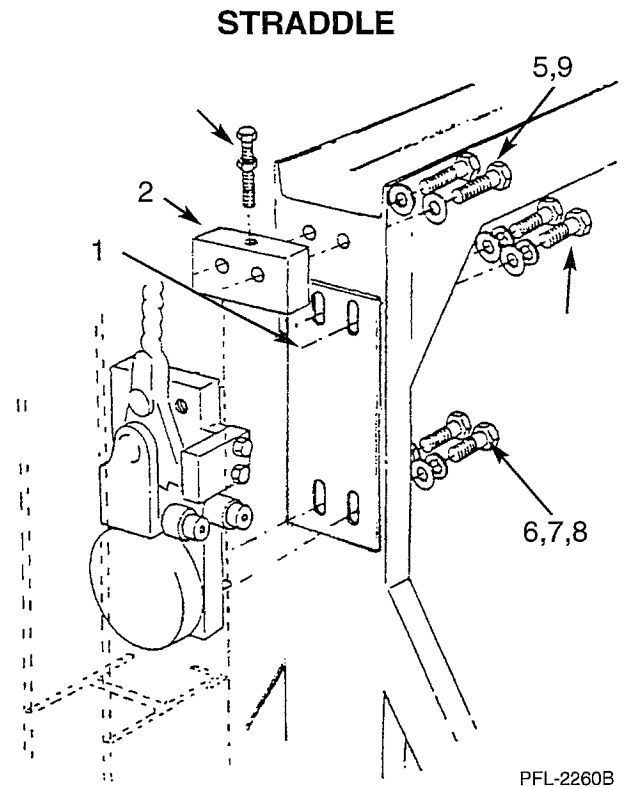
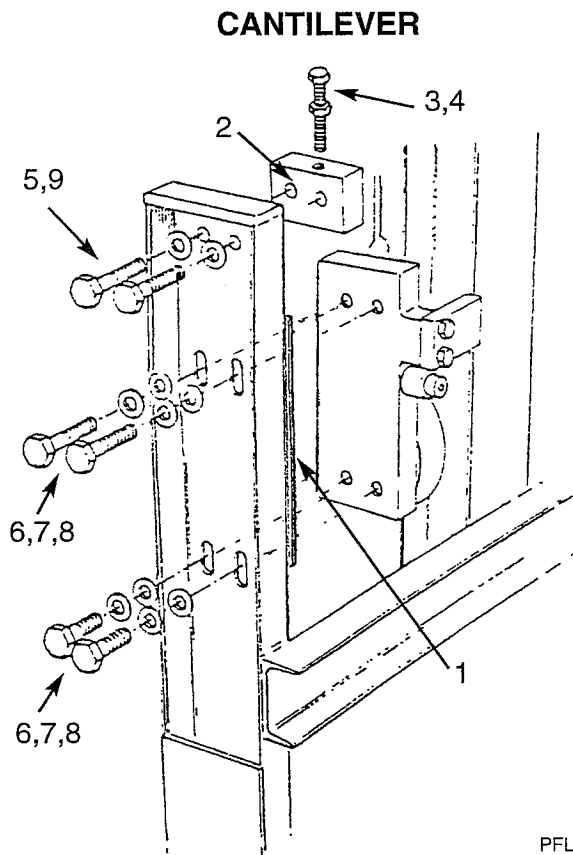
## Parts Manifold Block Assembly



PFL-2372-1

Item	Qty.	Part No.	Description
1	1	11078-0016	Manifold Block Assembly
2	1	11078-0002	Valve, Down with Manual Release
3	1	11078-0005	Coil, Down Valve - 24 V
4	1	11078-0006	Switch, Pressure
5	1	11078-0004	Valve, Relief
6	1	11078-0001	Valve, Flow Control
7	1	11078-0003	Valve, Check
8	1	11078-0014	Accumulator (Optional)
9	1	11078-0015	Gauge, Pressure (Optional)
10	1	Local Item	Elbow, 1/4" NPT Street

## Adjustable Wheelblock Assembly



Item	Qty.	Part No.	Description
1	1	2377-0001	Spacer (welded to carriage), Wheelblock, 1/8" (Not used on 4" upright)
2	1	9677-0000	Block, Adjuster
3	1	8872-0088	Screw, HHC, 1/2-13, UNC 5-1/2
4	1	6358-0013	Nut, Hex, 1/2-13
5	2	9237-0020	Screw, HHCS, 1/2-13
6	4	5858-0015	Lockwasher, STD 5/8
7	4	6296-0015	Washer, Flat, 5/8
8	4	6758-0020	Screw, 5/8-11 UNC x 1 1/4
9	2	5858-0013	Lockwasher, STD 1/2

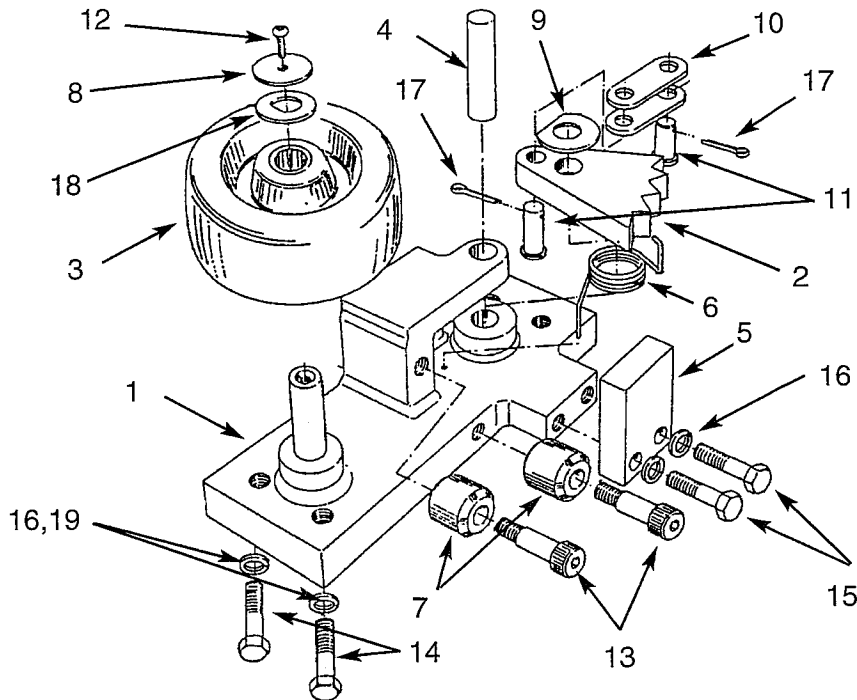


## 21 Series

### Upper Wheelblock Assembly - Phenolic

Complete Assembly (5-1/4) - Part No. 6196-0000 / Part No. 6197-0000

Complete Assembly (5-3/8) - Part No. 6196-1000 / Part No. 6197-1000



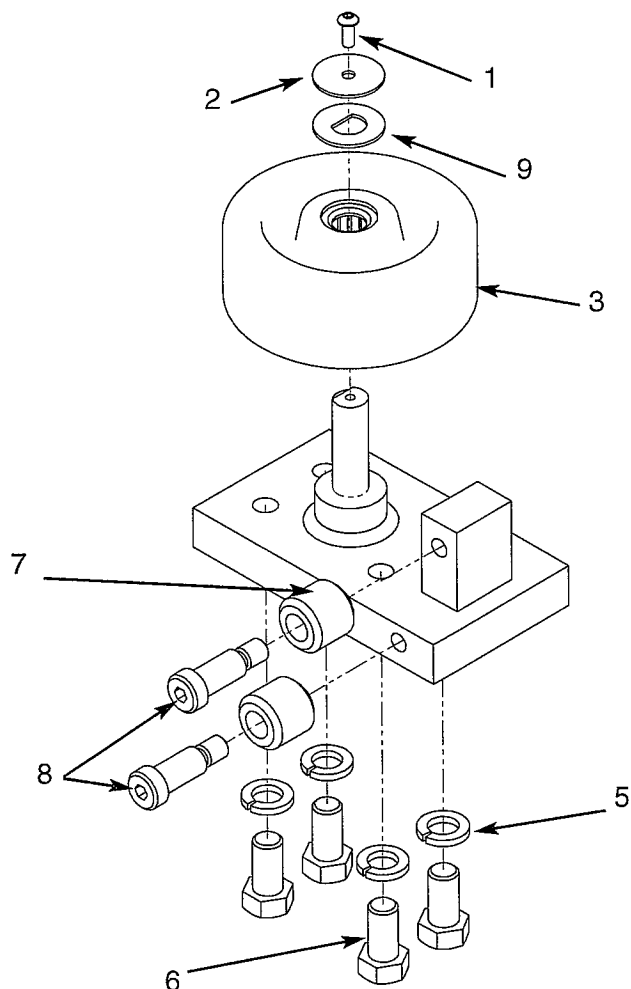
PFL-1605

Item	Qty.	Part No.	Description
1	1	Consult Factory	Wheelblock Weldment, RH or LH
2	1	6186-0000	Cam, Safety
3	1	2591-0000	Wheel, Phenolic (5-1/4)
	1	2591-1001	Wheel, Phenolic (5-3/8)
4	1	5230-0000	Pin, Cam
5	1	2754-0000	Shoe
6	1	2443-0000	Spring, Cam, RH, or
	1	2127-0000	Spring, Cam, LH
7	2	5221-0000	Roller, Guide
8	1	5222-0000	Washer, Flat 9/32 ID x 1-1/2 OD
9	1	8339-0000	Bearing Thrust
10	2	6187-0000	Link, Safety Cam to Toggle
11	2	2521-0000	Pin, Clevis 3/4 x 2
12	1	2888-0010	Screw, BHC, 1/4-20 x 5/8
13	2	5874-0020	Bolt, Shoulder, 5/8 x 1-1/4
14	4	6758-0020	Screw, HHC, 5/8-1 x 1-1/4
15	2	2198-0040	Screw, HHC, 5/8-11 x 2-1/4, Grade 8
16	6	5858-0015	Lockwasher, STD 5/8
17	2	2522-0000	Pin, Cotter
18	1	8774-0000	Washer, D
19	4	7768-0015	Washer, Flat, 5/8 SAE

## Lower Wheelblock Assembly - Phenolic

Complete Assembly (5-1/4) - Part No. 2721-0000 / Part No. 2089-0000

Complete Assembly (5-3/8) - Part No. 2721-1000 / Part No. 2089-1000



2721-0000-XV-N

Item	Qty.	Part No.	Description
1	1	2888-0010	Screw, BH/SC, 1/4-20 x 5/8
2	1	5222-0000	Washer, Flat, 9/32 ID x 1 1/2 OD
3	1	2591-0001	Wheel, Phenolic (5-1/4)
	1	2591-1001	Wheel, Phenolic (5-3/8)
4	1	Consult Factory	Wheelblock Weldment, RH or LH
5	4	5858-0015	Lockwasher, STD 5/8
6	4	6758-0020	Screw, HHC, 5/8-11 x 1 1/4
7	2	5221-0000	Guide Roller, Assembly
8	2	5874-0020	Bolt, Shoulder, SOC HD, 5/8 x 1 1/4
9	1	8774-0000	Washer, D, 3/4 ID x 1 1/2 OD

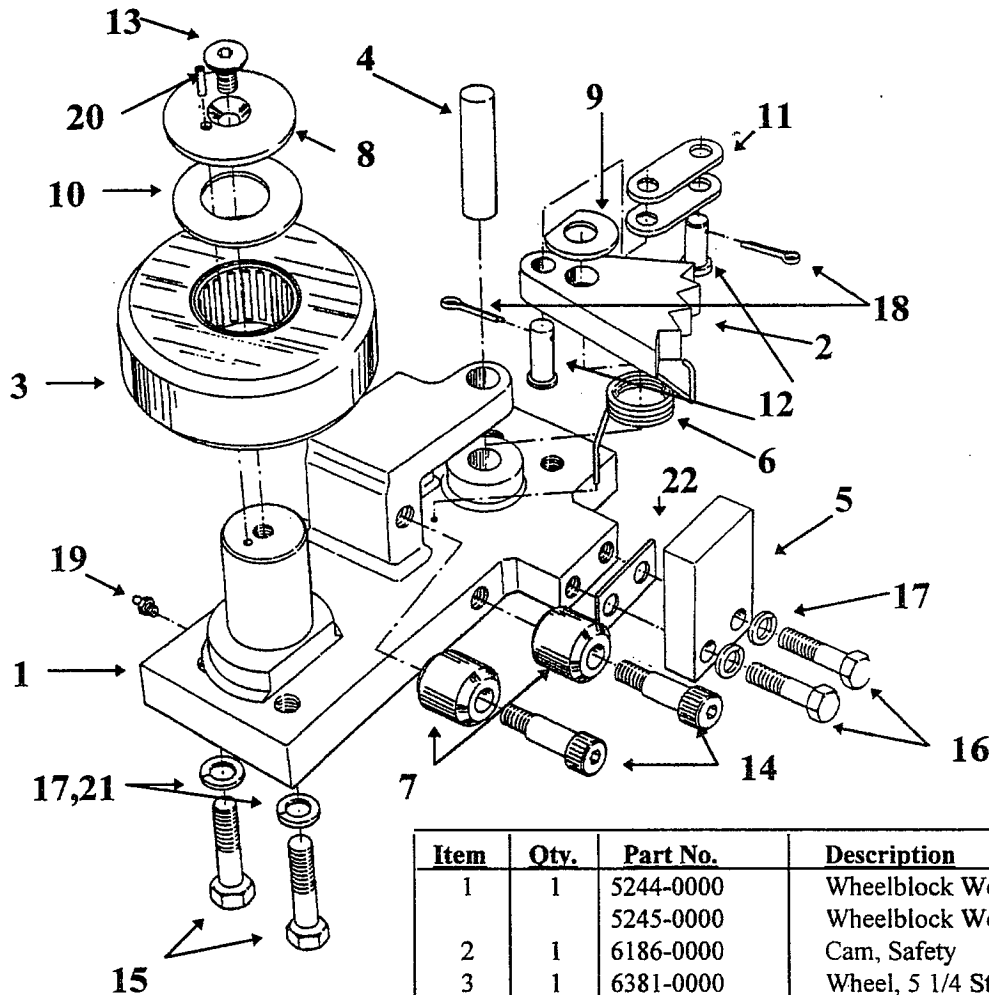
# 21 Series

## Upper Wheelblock Assembly

### 5 1/4 Steel Wheel w/Roller Bearing

Complete Assembly - Part No. 6492-0000, Left Hand

Complete Assembly - Part No. 6491-0000, Right Hand



PFL-2100

\* number of spacers dependent  
on beam size: #15=0; #20=1;  
#25=2;

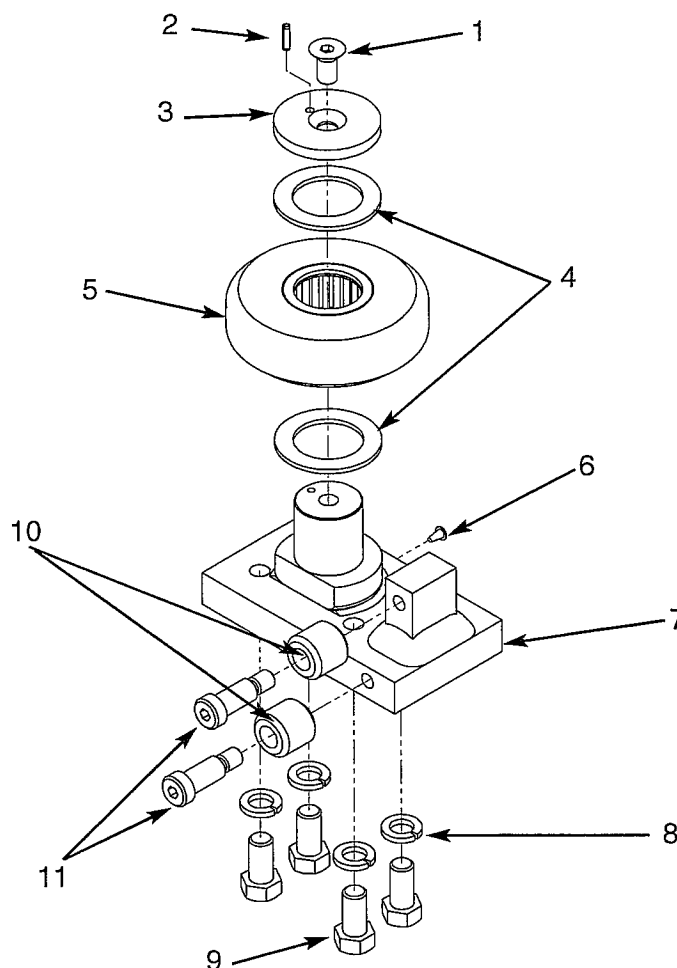
Item	Qty.	Part No.	Description
1	1	5244-0000	Wheelblock Weldment, RH, or
		5245-0000	Wheelblock Weldment, LH
2	1	6186-0000	Cam, Safety
3	1	6381-0000	Wheel, 5 1/4 Steel w/ Roller Bearing
4	1	5230-0000	Pin, Cam
5	1	2754-0000	Shoe
6	1	2443-0000	Spring, Cam, RH, or
		2127-0000	Spring, Cam, LH
7	2	5221-0000	Roller, Guide
8	1	3629-0000	Retainer, Steel Wheel
9	1	8339-0000	Bearing, Thrust
10	1	3622-0000	Washer, Thrust, 1 3/4 Whl Stud
11	2	6187-0000	Link, Safety Cam to Toggle
12	2	2521-0000	Pin, Clevis, 3/4 x 2
13	1	4299-0016	Screw, FHSC, 1/2-13 x 1
14	2	5874-0020	Bolt, Shoulder, 5/8 x 1 1/4
15	4	6758-0020	Screw, HHC, 5/8-1 x 1 1/4
16	2	2198-0040	Screw, HHC, 5/8-11 x 2 1/4, Grade 8
17	6	5858-0015	Lockwasher, STD 5/8
18	2	2522-0000	Pin, Cotter
19	1	2590-0000	Fitting, Zerk, 3/16 Drive Type
20	1	5209-0012	Pin, Roll
21	4	7768-0015	Washer, Flat, 5/8 SAE
22	*	2767-0000	Spacer, Wheelblock Shoe, .08 thick

## Lower Wheelblock Assembly

### 5 1/4 Steel Wheel w/Roller Bearing

Complete Assembly, Part No. 6493-0000, Right Hand

Complete Assembly, Part No. 6494-0000, Left Hand



6493-0000-XV-N

Item	Qty.	Part No.	Description
1	1	4299-0016	Screw, FHSC, 1/2 x 1 LG w/Nylock
2	1	5209-0012	Pin, Roll - 3 1/16 DIA X 3/4 LG
3	1	3629-0000	Retainer, Steel Wheel
4	2	3622-0000	Washer, Thrust
5	1	6381-0000	Wheel, Steel, 5 1/4 w/Roller Bearing
6	1	9975-0006	Plug/Cap, Plastic, Tapered
7	1	2400-0000	Whlblk Wldm, Lower RH
		2453-0000	Whlblk Wldm, Lower LH
8	4	5858-0015	Lockwasher, STD 5/8
9	4	6758-0020	Screw, HHC, 5/8-11 x 1 1/4 LG
10	2	5221-0000	Roller Guide Assembly, 1 1/8 LG
11	2	5874-0020	Bolt, Shoulder, SH, 5/8 x 1 1/4

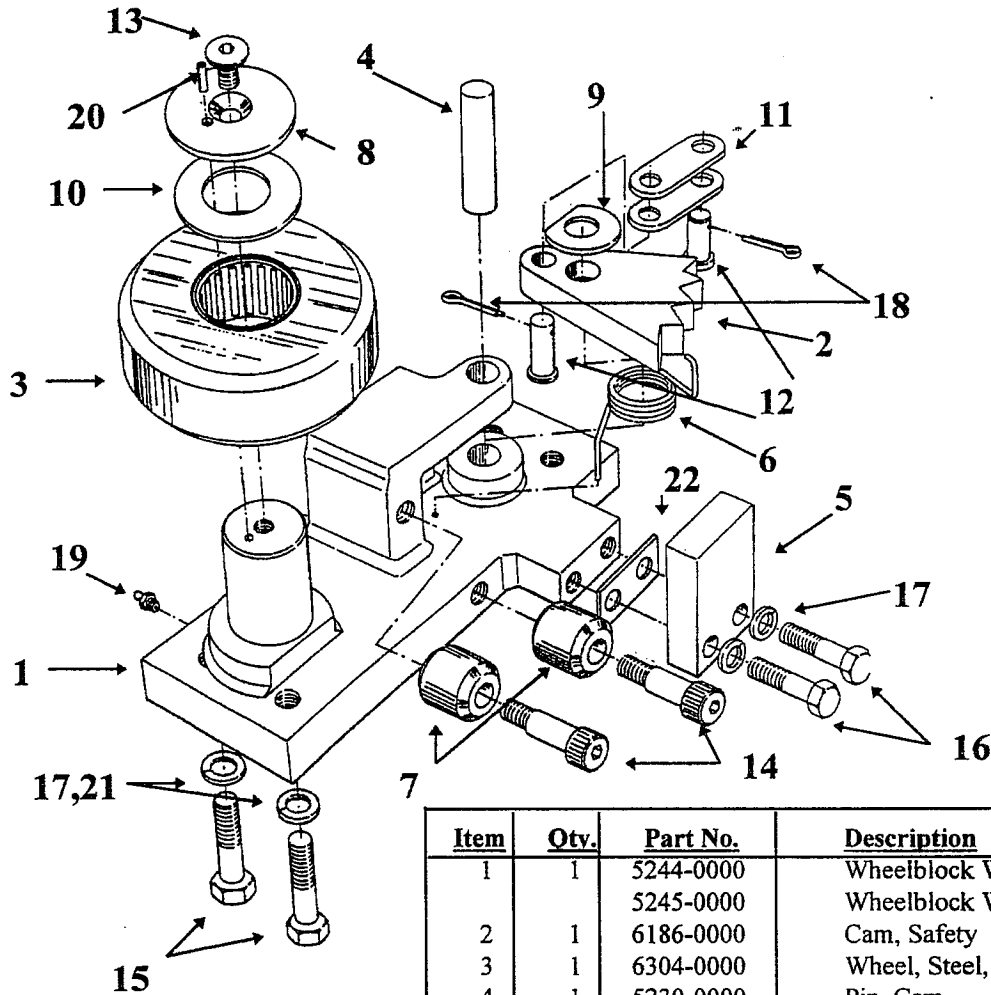
# 21 Series

## Upper Wheelblock Assembly

### 5 3/8 Steel Wheel w/Roller Bearing

Complete Assembly - Part No. 6198-0000, Left Hand

Complete Assembly - Part No. 6199-0000, Right Hand



PFL-2104

\* Number of spacers dependent  
on beam size: #15 = 0; #20 = 1;  
#25 = 2.

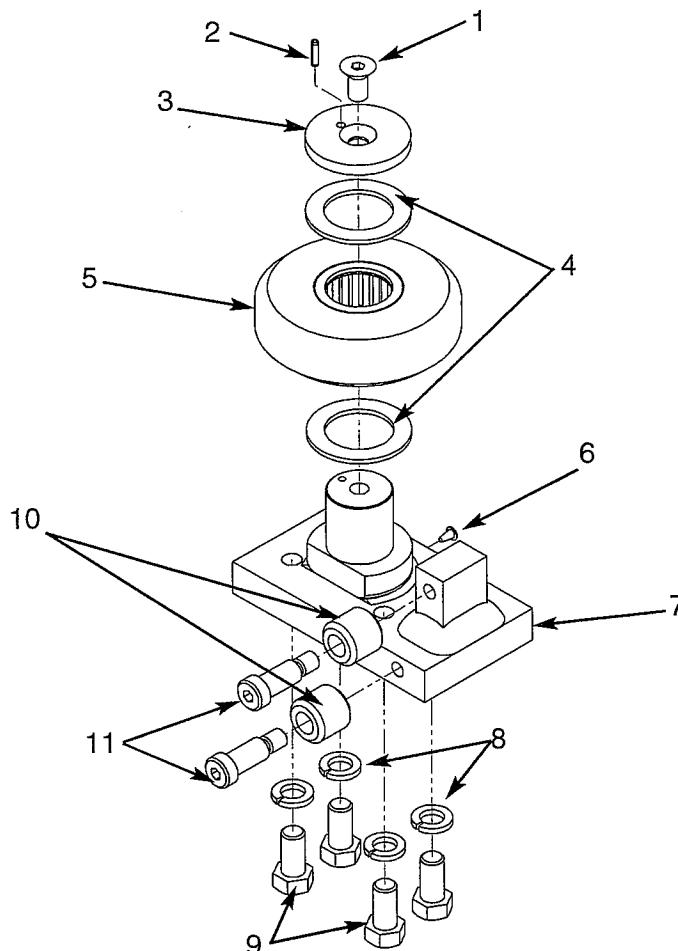
Item	Qty.	Part No.	Description
1	1	5244-0000 5245-0000	Wheelblock Weldment, RH, or Wheelblock Weldment, LH
2	1	6186-0000	Cam, Safety
3	1	6304-0000	Wheel, Steel, 5 3/8 w/ Roller Bearing
4	1	5230-0000	Pin, Cam
5	1	2754-0000	Shoe
6	1	2443-0000 2127-0000	Spring, Cam, RH, or Spring, Cam, LH
7	2	5221-0000	Roller, Guide
8	1	3629-0000	Retainer, Steel Wheel
9	1	8339-0000	Bearing, Thrust
10	1	3622-0000	Washer, Thrust, Wheel Stud
11	2	6187-0000	Link, Safety Cam to Toggle
12	2	2521-0000	Pin, Clevis, 3/4 x 2
13	1	4299-0016	Screw, FHSC, 1/2-3 x 1
14	2	5874-0020	Bolt, Shoulder, 5/8 x 1 1/4
15	4	6758-0020	Screw, HHC, 5/8-1 x 1 1/4
16	2	2198-0040	Screw, HHC, 5/8-11 x 2 1/4, Grade 8
17	6	5858-0015	Lockwasher, STD 5/8
18	2	2522-0000	Pin, Cotter
19	1	2590-0000	Fitting, Zerk, 3/16 Drive Type
20	1	5209-0012	Pin, Roll
21	4	7768-0015	Washer, Flat, 5/8 SAE
22	*	2767-0000	Spacer, Wheelblock Shoe, .08 thick

## Lower Wheelblock Assembly

### 5 3/8 Steel Wheel w/Roller Bearing

Complete Assembly - Part No. 2403-0000, Right Hand

Complete Assembly - Part No. 2474-0000, Left Hand



2403-0000-XV-N

Item	Qty.	Part No.	Description
1	1	4299-0016	FHSMS, 1/2-13 x 1
2	1	5209-0012	Pin, Roll 3/16 x 3/4
3	1	3629-0000	Washer, Retainer STL
4	2	3622-0000	Washer, Thrust, 2-3/4 STL
5	1	6304-0000	Wheel Assy, STL, 5 3/8
6	1	9975-0006	Plug/Cap, Plastic
7	1	2400-0000	Whlblk Wldm, Lower RH
		2453-0000	Whlblk Wldm, Lower LH
8	4	5858-0015	Lockwasher, STD 5/8
9	4	6758-0020	Screw, HCS, 5/8-11 x 1 1/4 GR 2
10	2	5221-0000	Roller, Guide, Plastic 1
11	2	5874-0020	Bolt, Shoulder, SH, 5/8 x 1 1/4 x 1/2-13

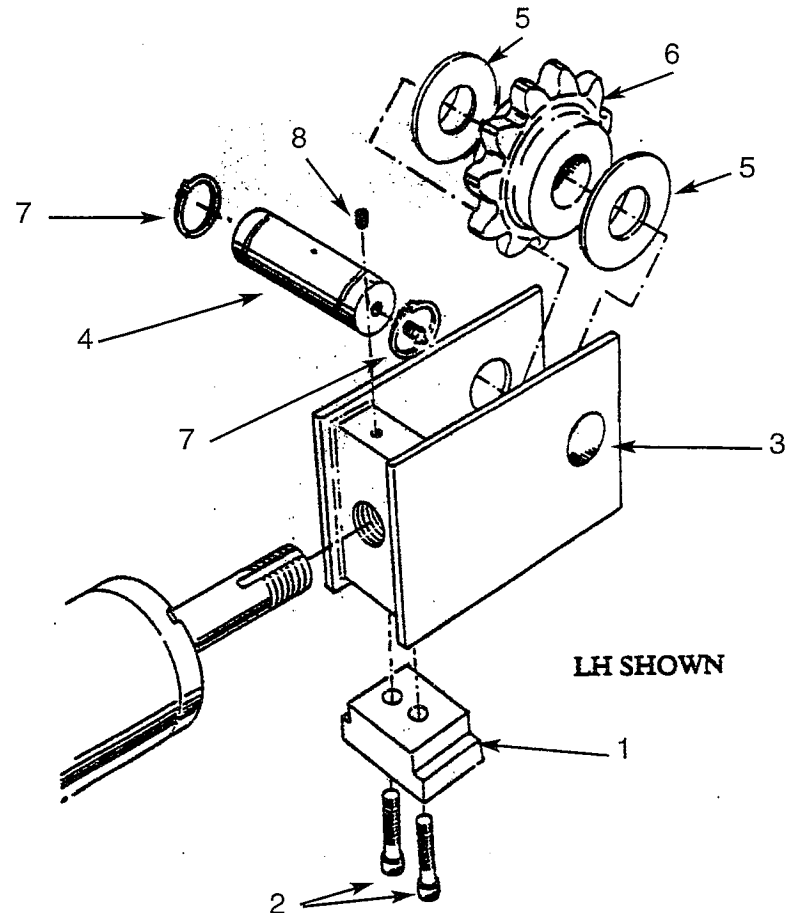
## 21 Series

### Clevis Assembly

Complete Assembly - Part No. 9380-0000, Right Hand, #80 Chain

Complete Assembly - Part No. 9380-0001, Left Hand, #80 Chain

Complete Assembly - Part No. 9381-0000, Right Hand, #100 Chain

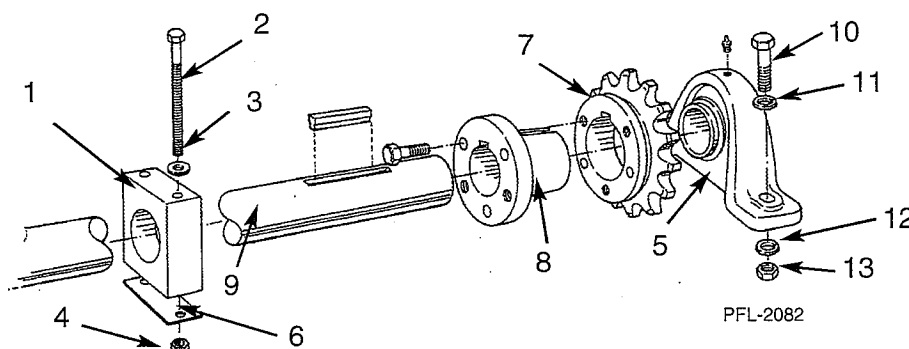


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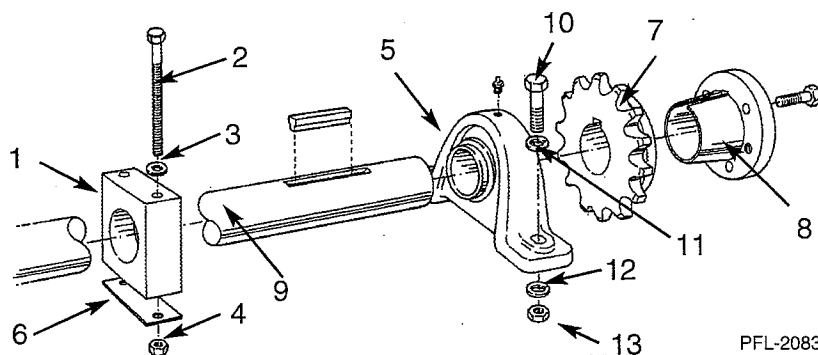
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	8761-0000	Slide Block, UHMW
2	2	3666-0024	Screw, SHC, 5/16-18 x 1 1/2" LG
3	1	9376-0000	Clevis Weldment, Right Hand
3	1	9376-0001	Clevis Weldment, Left Hand
4	1	9375-0000	Clevis Pin, 1 3/4" Dia.
5	2	8760-0000	Thrust Washer, UHMW
6*	1	8823-0000	Sprocket, #80 Chain
6*	1	8824-0000	Sprocket, #100 Chain
7	2	7993-0028	Snap Ring, 1 3/4" Dia.
8	1	8399-0016	Screw, BHSCS 3/8-16 x 1

\*Applicable to lift chain size.

## LevelDeck Shaft Assembly - Straddle



## LevelDeck Shaft Assembly - Cantilever



### CAUTION

- Confirm sprocket is aligned correctly in field.
- Verify the tapered surfaces of the sprocket and bushing are clean and dry.
- **DO NOT USE LUBRICANT ON THE CAPSCREWS.**
- Confirm all capscrews are tightened evenly and in rotation to 348 in-lbs.
- **DO NOT OVER TORQUE. DO NOT ATTEMPT TO CLOSE GAP BETWEEN BUSHING FLANGE AND SHEAVE HUB.**

Items	Qty.	Straddle Part No.	Cantilever Part No.	Description
1	1	9537-0000		Support Shaft, 2-3/16" Dia.
1	1		9541-0000	Support, Shaft, 2-3/8" Dia.
2	2	5927-0088	5927-0088	Screw, HHC, 3/8-16 UNC 5-1/2" LG
3	2	6296-0011	6296-0011	Washer, Flat, Std, 3/8"
4	2	6708-0011	6708-0011	Nut, Lock, Nylon, 3/8-16 UNC
5	2	9555-0000		Bearing, Pillow Block 2-3/16 Set Screw Type
5	2		5653-0000	Bearing, Pillow Block 2-3/8 Std. Duty Brg.
5	2		9520-0000*	Bearing, Pillow Block 2-3/8 Med. Duty Brg.
6	1+	9554-0000	9554-0000	Shim, Shaft Support, (2 Standard)
7	2	9546-0000		Sprocket, 80Q15
7	2	9548-0000	9548-0000	Sprocket, 100Q12
8	2	9547-0000		Bushing, Split Taper, Type 2, 2-3/16" Bore
8	2		9547-0001	Bushing, Split Taper, Type 2, 2-3/8" Bore
9	1	9560-1000		Shafting, 1144 G&P, 2-3/16 x "Shaft Length
9	1		9560-2001	Shafting, 1144 G&P, 2-3/8 x "Shaft Length
10	4	6758-0040	6758-0040	Screw, HHC, 5/8-11 x 2-1/2" LG
10	4		6772-0040	Screw, HHC, 3/4-10 x 2-1/2" LG
11	4	6296-0015	6296-0015	Washer, Flat, Std, 5/8"
11	4		6296-0017	Washer, Flat, 3/4"
12	4	5858-0015	5858-0015	Lockwasher, Std, 5/8"
12	4		5858-0017	Lockwasher, 3/4"
13	4	6358-0015	6358-0015	Nut, Hex, 5/8-11 UNC
13	4		6358-0016	Nut, Hex, 3/4-10 UNC

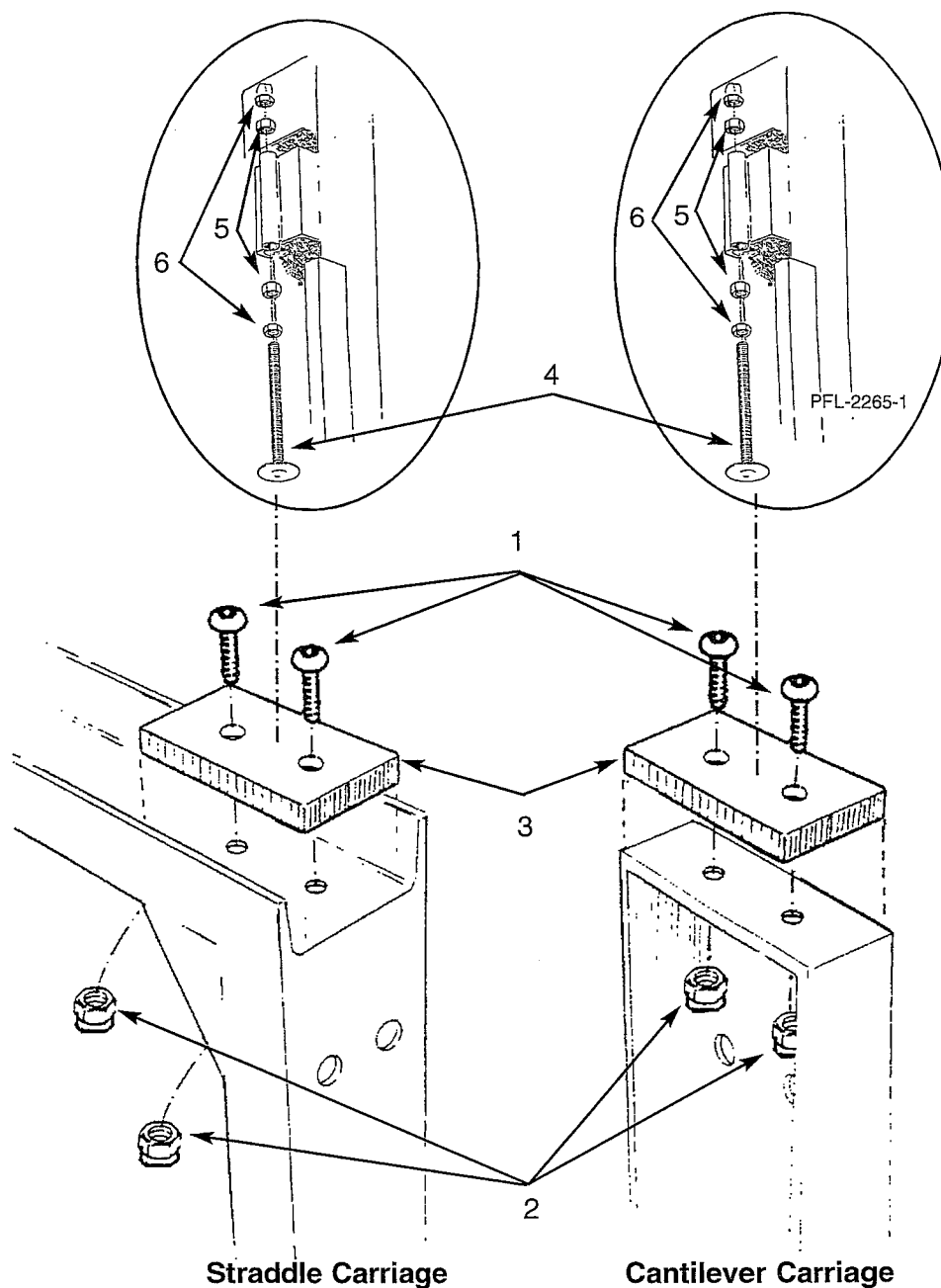
NOTE: \*1/4" additional shims required with medium bearing.

Items 8 and 9 are supplied as an assembly with a special key and screws.



# 21 Series

## Adjustable Carriage Stop



PFL-1301-1

Item	Qty.	Part No.	Description
1	1	8399-0016	Screw, BHSC 3/8-16 UNC 1"
2	2	6708-0011	Nut, Lock, Nylon, 3/8
3	1	10414-0000	Pad, UHMW
4	1	6140-0000	Jackscrew, Adjustable Carriage Stop
5	2	6358-0018	Nut, Hex, 1-8 UNC
6	2	8326-0018	Nut, Hex, Jam, 1-8 UNC

## Cylinder Assembly

ITEM NO.	H	H	H	H	2	2	2	Model Used (typical)
1	1	3	5	2	1	1	1	
2								
3	H	4	6	3				
4	P	/	/	H				
5		5	7	P				
6		H	5					
7		P	H					
8								
9								
10								
11								
12								

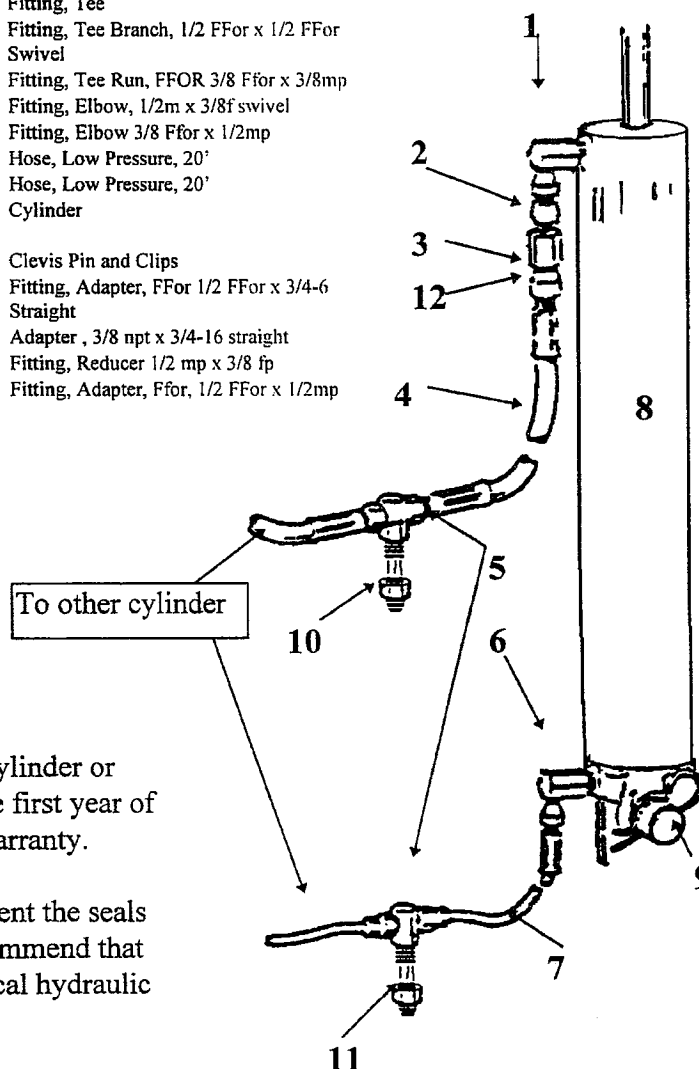
Part Numbers
2576-0000
8988-0010
2573-0000
8893-0010
2574-0000
8877-0013
2575-0000
8877-0009
3436-0000
8892-0009
8623-0000
2577-0000
2579-0024
8625-0024
2580-0000
9679-0008
8629-0000
2581-0000
8628-0000
8626-0020
2578-0020
Consult Factory
4544-0000
9266-0008
7216-0006
7260-0006
8624-0000

Velocity Fuse  
 Fitting, Elbow #10 O-ring x 1/2 fp  
 Fitting, Elbow, 1/2m x 1/2f swivel  
 Fitting, Elbow, STR THD 7/8-14  
 Velocity Fuse  
 Velocity Fuse  
 Velocity Fuse  
 Velocity Fuse  
 Velocity Fuse  
 Velocity Fuse  
 Fitting, Coupling, Hex 1/2fp x 1/2fp  
 Fitting, Reducer 1/2 x 3/8 f swivel  
 Hose, High Pressure, 24'  
 Hose, High Pressure, 24'  
 Fitting, Tee  
 Fitting, Tee Branch, 1/2 FFor x 1/2 FFor Swivel  
 Fitting, Tee Run, FFOR 3/8 Ffor x 3/8mp  
 Fitting, Elbow, 1/2m x 3/8f swivel  
 Fitting, Elbow 3/8 Ffor x 1/2mp  
 Hose, Low Pressure, 20'  
 Hose, Low Pressure, 20'  
 Cylinder  
 Clevis Pin and Clips  
 Fitting, Adapter, FFor 1/2 FFor x 3/4-6 Straight  
 Adapter, 3/8 npt x 3/4-16 straight  
 Fitting, Reducer 1/2 mp x 3/8 fp  
 Fitting, Adapter, Ffor, 1/2 FFor x 1/2mp

**WARNING**

**DO NOT DISCONNECT  
OR SERVICE HYDRAULIC  
HOSES OR FITTINGS  
unless platform is fully  
secured or lowered**

DS5

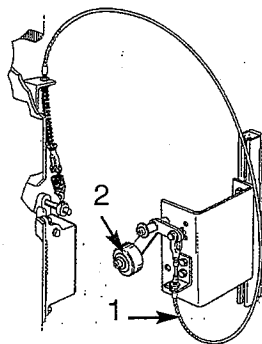


Note: Tampering with the cylinder or changing the seals within the first year of operation may void your warranty.

After the first year, in the event the seals need to be replaced, we recommend that you take the cylinder to a local hydraulic repair shop.

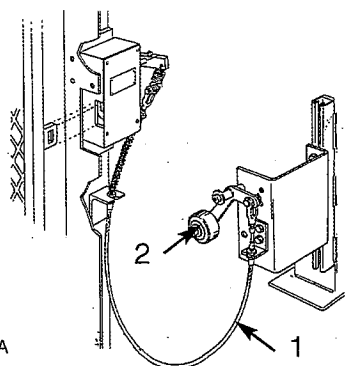
The **INTERLOCK** is a device used to mechanically prevent the gate from opening. Below are the standard types of interlocks supplied. As this is a safety device, replacement components are only available as shown below. Some configurations may vary by application.

## ANDERSON CABLE



PFL-1885-6A

## GAL CABLE

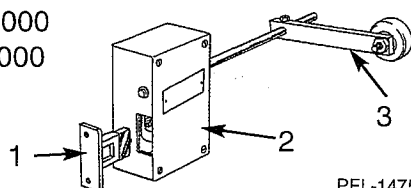


PFL-1885-7A

1. Control Cable Assembly  
 10' - #9292-0120  
 15' - #9292-0180  
 25' - #9292-0300  
 30' - #9292-0360
2. Roller Arm Assembly #9280-0000  
 Wheel Only #9284-0040

## GAL (Left Hand Shown)

RH #2690-0000  
 LH #2691-0000

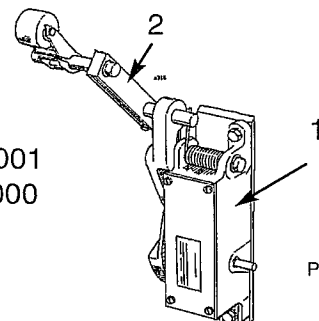


PFL-1475

1. Keeper #3838-0000
2. Contact Block (inside) #3832-0000
3. Arm w/Roller #4342-0000

## ANDERSON (Right Hand Shown)

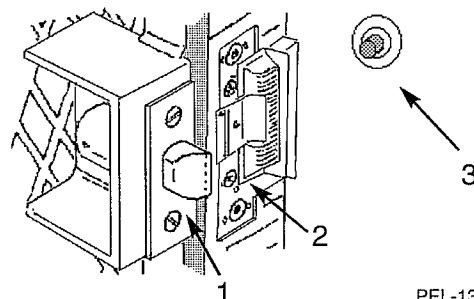
RH #2678-0001  
 LH #2678-0000



PFL-1368

1. Contact Block (inside)
2. Arm #6950-0000

## ELECTRIC STRIKE

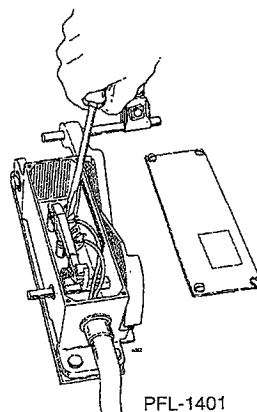


PFL-1389

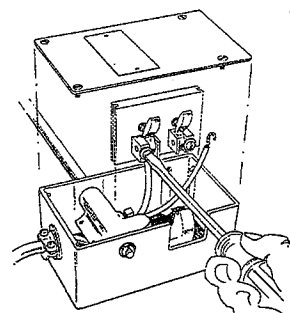
1. Spring Latch #7566-0000
2. Strike #9169-0000
3. Button #9096-0000

## ANDERSON

## GAL



PFL-1401

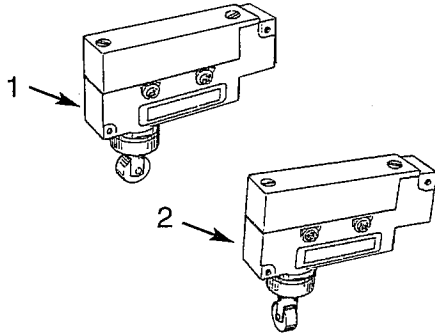


PFL-1250

See schematic for proper wiring instructions.

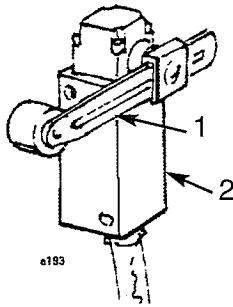
## 21 Series

A **GATE STATUS SWITCH** is supplied when the contacts are not being used. If required, it will be mounted to the gate post or header. Normally the GAL and Anderson interlocks do not use this switch. Specific order requirements may dictate otherwise.



PFL-1293

1. Roller Plunger (parallel) #6220-0000
2. Roller Plunger (perpendicular) #6216-0000



PFL-1205

1. Adjustable Roller Arm #2891-0005
2. Switch #2893-0005

# Recommended Storage Requirements

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## RECOMMENDED STORAGE REQUIREMENTS

### ENVIRONMENT

All components should be stored indoors. The area of storage should be kept at a constant temperature above 55 degrees and relative humidity of approximately 40%, free from heavy dust and contaminants. Outdoor storage is NOT recommended.

### STACKING

Except for placing the parts container and bracing on the empty carriage, stacking of the various gate components is strictly forbidden. Enclosure and gate panels will warp. Objects on top of the columns may cause severe damage.

**LONG-TERM STORAGE**, more than two months after shipment, will require that the following maintenance procedures be performed every sixty days from date of shipment:

1. If CHAINS are stored for an extended period of time or in a corrosive environment, they may need to be dipped in a non-detergent oil to retain their original condition.
2. SPROCKETS should be coated lightly with a non-detergent oil to prevent corrosion.
3. SAFETY CAMS are a part of the WHEEL-BLOCK ASSEMBLY and should be lubricated with a non-detergent oil and rotated to ensure free operation.
4. The MOTOR PUMP UNIT must remain full of oil to prevent rusting of the reservoir.
5. CYLINDERS must be stored horizontally in a constant environment with all ends and ports capped and rotated 180 degrees every two months.
6. ELECTRICAL COMPONENTS should be plugged to prevent moisture and other contaminants from entering them. Store in a dry place to prevent corrosion.
7. PARTS CRATE must remain sealed and dry.

For units stored longer than six months, it is recommended that you contact the Product Support Department of Pflow Industries for additional information that may be available prior to starting up your unit.

Our warranty policy does not cover damage as a result of improper storage.

## ELECTRICAL TERMINOLOGY AND APPLICATIONS

### Ruling Bodies:

NEMA - National Electrical Manufacturers Association - (National testing and manufacturing standards body of electrical apparatus.)

UL - Underwriters Laboratories, Inc. - (Independent testing laboratory - some cities require UL control panels and electrical apparatus.)

JIC - Joint Industry Council - (Advisory group to provide standards for production equipment, safety and dependability.)

NFPA - National Fire Protection Association - (Ruling board of NEC - sets national fire/safety standards for equipment/plants.)

CSA - Canadian Standards Association - (Regulatory agency of Canada - CSA required stamp on electrical devices in Canada.)

ANSI - American National Standards Institute - (Adopts code; sets committees.)

ASME - American Society of Mechanical Engineers - (Writes codes - Secretariat for ANSI.)

NEC - National Electrical Code - (Advisory board to NFPA - their recommendation/codes are usually adopted throughout the USA.)

OTHERS - GM, Ford, Dupont, etc.  
Customers may have special plant specifications incorporating several ruling bodies or their own electrical code specifications.

### Pflow's Standard

NEMA type 1 classification is a general purpose, indoor only, usage. Only COMMERCIAL users generally accept this type: i.e., retail stores, mini storage, warehouses, etc.

#### NOTE

*INDUSTRY does not accept (this NEMA type 1): i.e., auto manufacturing, chemical manufacturing, and paper manufacturing.*

All other Pflow units are NEMA 12 classification in regard to the controls, push button stations, and electrical design built under the following standards:

JIC: EMP-1 Electrical standards for mass production equipment.

JIC: Electrical standards for general purpose machine tools.

NFPA 79: Electrical standard for industrial machinery

NEMA type 12 classification is an indoor only usage with gasket protection from dust, dirt, fiber flyings, dripping water, and external condensation of non-corrosive liquids.

#### NOTE

*If JIC is to be strictly adhered to, they require that all devices be minimum NEMA 12, rigid conduit, specific wire coloring, etc. (controls and field wiring).*

#### NOTE

*You should note that the NEMA rating of equipment is based on the electrical device(s) with the lowest NEMA type.*

EXAMPLES: 1) If we provide a JIC NEMA 12 standard control package with an Anderson or VA gate interlock, our NEMA rating goes to NEMA type 1; and we lose our JIC rating. 2) If we provide a GAL interlock, which has exposed electrical contacts, we rate no NEMA rating and lose our JIC rating. 3) If we provide EMT conduit or don't provide the proper JIC electrical field wiring techniques, we lose our JIC rating.

### Outdoor Application

Outdoor units or electrical devices exposed to severe weather conditions should not be rated less than NEMA type 4. This is a watertight, dust-tight indoor-outdoor classification that will provide protection against splashing water, seepage of water, falling or hose-directed water, and severe external condensation.

### Corrosive Application

The Chemical Industry on the whole usually specifies a minimum NEMA type 4X. A NEMA 4X rating is similar to a NEMA 4 with added corrosion resistance.

## Hazardous Locations

Hazardous locations are an extremely specialized electrical classification. Few electrical experts exist in this field. All explosion-proof hazardous locations must be handled on an individual job site condition.

The NEC has three classes (I, II, III), - two divisions, (1 and 2) and seven group designations (A, B, C, D, E, F, and G).

### Class Definitions:

**CLASS I Locations:** Those in which flammable gasses or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

**CLASS II Locations:** Those where the presence of combustible dust presents a fire or explosion hazard.

**CLASS III Locations:** Those where easily ignitable fibers or flyings are present but not likely to be suspended in the air in quantities sufficient to produce ignitable mixtures.

### Division Definitions:

**DIVISION 1** is an extremely dangerous explosive condition that exists normally.

**DIVISION 2** is a dangerous explosive condition that could exist but usually does not.

**GROUP** designations are given by the NFPA, State Fire Marshals, insurance companies or consulting engineering firms according to the gasses/dust, etc. in the area and the spark or temperature needed to produce an explosion.

Currently, in order to provide competitive pricing in the hazardous location area, we are producing "intrinsically safe" control packages. Intrinsically safe is defined as: electrical devices provided cannot produce a spark or temperature hot enough to ignite the surrounding gasses/dust, etc.

## Optional Control Packages and Devices for Hazardous Locations

NEMA type 7, Class I, Division 1 and 2, Group A, B, C, or D enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gas and shall contain such an explosion sufficiently so that an explosive gas mixture existing in the atmosphere will not be ignited.

NEMA type 9 is similar to NEMA type 7 but is rated for dust ignition-proof - Class II, Division 1 and 2, Groups E, F, or G.

# Warranty

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**PARTS**  
Structure .....Lifetime  
Manufactured Components.....One Year  
Purchased Components .....One Year

**LABOR**  
Structure .....Lifetime  
Manufactured Components .....One Year  
Purchased Components .....90 Days

## The Small Print

The warranty period begins 30 days after shipment. All warranty work must be pre-authorized by Pflow Industries' Product Support Department prior to starting work. All billing must be in accordance with our Warranty Procedures. Replacement of defective parts will be handled in accordance with Pflow's Return Goods Authorization policy. If Pflow Industries determines that equipment failures were caused by abuse, improper installation, or lack of maintenance, they will not be covered. Pflow Industries will not accept consequential losses (missed production, etc.), premium time labor, or air freight charges. Manufactured items are defined as those components manufactured and/or assembled by Pflow. Structure is defined as columns and carriage (excluding carriage side guards). Purchased items are those components that are used as supplied by vendors. Gates and enclosures are excluded and covered for 90 days parts and labor. This warranty applies to all models and may not be modified or extended except by written authorization from Pflow Industries, Inc.

We, the manufacturer, sincerely hope that you do not experience problems with the equipment. If you do, the following procedures should be followed:

## Pre-Authorization

Pflow Industries must be notified of the problem before we can authorize the repair. We need to determine the cause of the problem, who should be doing the work, and what is involved. If it is our decision to have your organization or your subcontractor do the work, you will be given an authorization number which must be referenced on all subsequent paperwork. During our non-working hours, we ask that you notify us by phone or FAX during the next business day.

Issuance of an authorization number does not guarantee approval and/or payment.

## Invoices

1. You have 30 days from the date the work was completed to submit an invoice for approval. If approved, payment is made 30 days from the date of approval.
2. A deduction from outstanding payments to Pflow for warranty is NEVER authorized and will result in a 10% processing fee.
3. Invoices received without sufficient information will be returned. They will be reconsidered for approval when complete documentation is received. All invoices must include, in detail, the following:
  - Description of problem;
  - Pflow serial number;
  - Labor hours per problem;
  - Rate per hour;
  - Travel time incurred;
  - Date work was performed;
  - Copies of receipts for materials purchased locally or labor subcontracted.

## Comments

Pflow Industries is not responsible for payment made on claims prior to our approval.

Local purchase of components must be pre-authorized.

Where distance and/or experience may be more cost-effective, Pflow Industries reserves the right to use alternate organizations.

Labor is defined as a maximum of two hours travel per call, plus reasonable on-site repair time as determined by Pflow Industries.



# Installation Questionnaire

*We want to provide equipment that is built correctly and shipped complete. To achieve that, we need to know what errors are being made or what field problems you are experiencing. Please answer the following questions and return this form to the Product Support Department at Pflow Industries, Inc. If more space is required for comments, please use the reverse side.*

1. Was the unit received in good condition? Yes / No

If not, please describe damage: \_\_\_\_\_

2. Was the unit received complete? Yes / No

If not, what was missing? \_\_\_\_\_

3. Was the lift manufactured correctly? (Did it match the GA drawing?) Yes / No

If not, please describe the errors: \_\_\_\_\_

4. Did the unit (i.e., lift, gates, enclosures) fit? Yes / No

If not, please describe in detail the problem areas: \_\_\_\_\_

5. Did you return after the electrical was completed for final adjustments, testing, and training?

Yes / No

If No, were you able to hook up temporary power to test the unit and make all final adjustments?

Yes / No

If Yes, were there electrical problems that you were aware of?

Was there a problem with the components? Yes / No

If yes, please describe: \_\_\_\_\_

Was there a problem with the field wiring? Yes / No

If yes, please describe: \_\_\_\_\_

6. Did you test the unit to full capacity? Yes / No

7. Did you test all gates to make sure that the unit does NOT operate if they are open? Yes / No

8. At each level, when the carriage is NOT present, can you open the gate? Yes / No

Comments: \_\_\_\_\_

Pflow Job #: \_\_\_\_\_ Customer/User: \_\_\_\_\_

Questionnaire Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_ Phone: \_\_\_\_\_

PFLOW INDUSTRIES, INC., 6720 North Teutonia Avenue, Milwaukee, WI 53209  
Phone (414) 352-9000; Fax (414) 352-9002; 040199

# Acceptance Certification

*We accept this equipment as being properly installed, tested, and performing to our satisfaction. This form covers both the mechanical and electrical installation of the equipment and is for the purpose of quality assurance by Pflow Industries, and in no way releases either Pflow Industries, Inc. or the installing contractor(s) of their warranty obligations. If there are any exceptions or unresolved items, please note.*

**JOB NO.:** \_\_\_\_\_ **JOB NAME:** \_\_\_\_\_

Site Mailing Address: \_\_\_\_\_

City, State, Zip Code: \_\_\_\_\_

On-Site Contact for future follow-up:

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Phone: (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Ext. \_\_\_\_\_

**Tests Successfully Performed:** \_\_\_\_\_ Load test at \_\_\_\_\_ % of capacity \_\_\_\_\_ Operation  
\_\_\_\_\_ Gate/Interlock Operation Other: \_\_\_\_\_

## Personnel Instructed on the Operation:

Name: \_\_\_\_\_ Company: \_\_\_\_\_

Name: \_\_\_\_\_ Company: \_\_\_\_\_

## ACCEPTED BY:

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Company: \_\_\_\_\_

Phone: \_\_\_\_\_

Phone: \_\_\_\_\_

## PFLOW PERSONNEL / REPRESENTATIVE / INSTALLER PRESENT:

Name: \_\_\_\_\_ Company: \_\_\_\_\_

Please return a copy of this form to the Product Support Department.

PFLOW INDUSTRIES, INC., 6720 North Teutonia Avenue, Milwaukee, WI 53209  
Phone (414) 352-9000; Fax (414) 352-9002; 040199



FROM: SANDY

MATERIAL SAFETY DATA SHEET - COMPLIES WITH 29 CFR 1910-1200

FORMAT A/GP

\*\*\*\*\* SECTION I \*\*\*\*\* DATE PRINTED-03/06/01 REVISED-11-23-99

MANUFACTURERS NAME: CUSTOM-PAK PRODUCTS, INC.  
N115 W19150 EDISON DRIVE  
GERMANTOWN, WI 53022

MANUFACTURERS CODE I.D.: 13E032N-12

PRODUCT CLASS: AEROSOL PAINT

HMIS INFORMATION:

HEALTH.....2

FLAMMABILITY...4

REACTIVITY.....1

PROTECTIVE EQ..

INFORMATION TELEPHONE: (262) 251-6180

PRODUCT DESC: 00002871-0003-N

PFLOW BLUE

ENAMEL

24 HR EMERGENCY TELEPHONE: 1-800-688-4005

FOR EMERGENCY SITUATIONS REFERENCE 13E032N-12

PACKAGE FOR:

12TM/C C1113

PFLOW INDUSTRIES, INC.

14TM/C

MILWAUKEE, WI 53209

12TM/C

\*\*\*\*\* SECTION II - HAZARDOUS INGREDIENTS \*\*\*\*\*

INGREDIENT	CAS #	VOLATILE		VAPOR PRESSURE	OSHA	ACGIH	SARA 313	LISTED CARCINOGEN	
		%	LEL	mm Hg. @20C	PEL-PPM	TLV-PPM	LISTED	NTP	IARC OSHA
		BY WEIGHT							
ETHYL ACETATE	141-78-6	28.0	2.2	29.30	400	400	N	N	N
PROPANE	74-98-6	14.0	2.2	110.0	1000	1000	N	N	N
N-BUTANE	106-97-8	6.0	1.8	17.0	800	800	N	N	N
XYLENE	1330-20-7	5.0	1.0	5.1	100	100	Y	N	N
PM ACETATE	108-65-6	3.0	1.5	3.7	N/A	N/A	N	N	N
VM&P NAPHTHA/NAPHTHA	64742-89-9	3.0	.9	10.2	300	300	N	N	N
*TOLUENE	108-88-3	2.45	1.2	22.0	100	50	Y	N	N
ISOBUTYL ALCOHOL	78-93-1	2.0	1.7	8.0	100	50	N	N	N
ETHYLBENZENE	100-41-4	1.0	1.0	7.1	100	100	Y	N	N

\* SEE WARNING SECTION V

\*\*\*\*\* SECTION III - PHYSICAL DATA \*\*\*\*\*

BOILING RANGE: -43F to 340F      % VOLATILE BY VOLUME: 90.33      VAPOR DENSITY: Heavier than Air      APPEARANCE: Opaque Spray

WEIGHT PER GALLON: 11.83      WATER SOLUABILITY: Negligible      ODOR: Solvent Odor      EVAPORATION RATE: Faster than Ether

\*\*\*\*\* SECTION IV - FIRE AND EXPLOSION HAZARD DATA \*\*\*\*\*

DOT PROPER SHIPPING NAME: CONSUMER COMMODITY      ID NO.: UN1950      HAZARD CLASS: ORM-D-AIR

PACKAGE GROUP:      LABEL REQUIREMENT:

EXTINGUISHING MEDIA: Use (NFPA) CLASS B extinguisher, CO2 or foam.      FLASH POINT: <12F      LEL: See Section II

UNUSUAL FIRE AND EXPLOSION HAZARDS: Pressure build up due to heat exposure may cause containers to explode.  
Water may be used to cool ruptured containers.

SPECIAL FIRE FIGHTING PROCEDURES: Fight fire from safe distance. Wear full protective equipment,  
including self-contained breathing gear.

LEVEL 3 AEROSOL (NFPA 30B)

\*\*\*\*\* SECTION V - HEALTH HAZARD DATA \*\*\*\*\*

EFFECTS OF OVEREXPOSURE: (ACUTE) Anesthetic effect. Irritation of the respiratory tract or acute nervous system depression characterized by headache, dizziness, staggering gait, confusion, unconsciousness or coma. EYE.....Contact may cause redness, irritation, tearing and blurred vision. SKIN.....Contact may dry skin causing cracks and irritation. INGESTION..... May be harmful or fatal if swallowed.

(CHRONIC) Reports have associated repeated and prolonged occupational overexposure to solvents with liver, kidney, brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: Asthma and other respiratory ailments. Chemical sensitization.

PRIMARY ROUTE(S) OF ENTRY: (X) DERMAL (X) INHALATION ( ) INGESTION ( ) EYES

EMERGENCY AND FIRST AID PROCEDURES: VAPORS.....Remove from exposure. Administer oxygen if necessary. Call a physician. EYES.....Immediately flush eyes with water for at least 15 minutes. Get medical attention. SKIN.....Remove contaminated clothing and shoes. Wash contact area with soap and water. Wash clothing and shoes before reuse. INGESTION.....Drink 1 or 2 glasses of water to dilute. Do not induce vomiting. Consult a physician or Poison Control Center immediately.

\* WARNING: Product contains a chemical(s) known to the State of California to cause cancer, birth defects or other reproductive harm.

\*\*\*\*\* SECTION VI - REACTIVE DATA \*\*\*\*\*

STABILITY: STABLE (X) UNSTABLE ( ). HAZARDOUS POLYMERIZATION; MAY OCCUR ( ) WILL NOT OCCUR (X)  
CONDITIONS TO AVOID: High temperatures and open flames. INCOMPATIBLE MATERIALS TO AVOID: Unknown  
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon Dioxide.....Carbon Monoxide.

\*\*\*\*\* SECTION VII - SPILL OR LEAK PROCEDURE \*\*\*\*\*

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED: Eliminate all ignition sources. Provide ventilation. Collect spills with absorbent materials and non-sparking tools. See Section VIII for protective equipment.  
WASTE DISPOSAL METHOD: Dispose of in accordance with Federal, State and Local regulations. Do not incinerate containers.

\*\*\*\*\* SECTION VIII - SPECIAL PROTECTION INFORMATION/CONTROL MEASURES \*\*\*\*\*

RESPIRATORY PROTECTION: In open areas with unrestricted ventilation, an OSHA approved respirator to remove solid airborne particles of overspray may be used if prolonged and repeated exposure is likely. In areas with restricted ventilation, the use of OSHA approved chemical/mechanical filter designed to remove both particles and vapors is recommended.  
VENTILATION: Supply sufficient ventilation to keep air contaminant concentration below current OSHA (PEL) or ACGIH (TLV).  
PROTECTIVE GLOVES: Use protective gloves if contact with product is likely.  
OTHER PROTECTIVE EQUIPMENT: Safety glasses to prevent eye contact.  
HYGIENIC PRACTICES: Wash hands before eating or using washroom.

\*\*\*\*\* SECTION IX - SPECIAL PRECAUTIONS \*\*\*\*\*

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not store in areas above 100F or near fire or open flame. When storing large quantities, storage conditions should comply with OSHA 1910.106.  
OTHER PRECAUTIONS: Prevent prolonged or repeated breathing of vapor or spray mist. Do not take internally. Keep out of reach of children. Use with adequate ventilation.

FROM: SANDY

MATERIAL SAFETY DATA SHEET - COMPLIES WITH 29 CFR 1910-1200

FORMAT A/GP

\*\*\*\*\* SECTION I \*\*\*\*\* DATE PRINTED-03/06/01 REVISED-06-28-00

MANUFACTURERS NAME: CUSTOM-PAK PRODUCTS, INC.  
N115 W19150 EDISON DRIVE  
GERMANTOWN, WI 53022

MANUFACTURERS CODE I.D.: 18E025N-12

PRODUCT CLASS: AEROSOL PAINT

INFORMATION TELEPHONE: (262) 251-6180

PRODUCT DESC: 00002871-0004-N  
PFLOW PRIMER

24 HR EMERGENCY TELEPHONE: 1-800-688-4005  
FOR EMERGENCY SITUATIONS REFERENCE 18E025N-12

HMS INFORMATION:

HEALTH.....2  
FLAMMABILITY...4  
REACTIVITY.....1  
PROTECTIVE EQ..

PACKAGE FOR: 12TM/C C1113  
PFLOW INDUSTRIES, INC. 14TM/C  
MILWAUKEE, WI 53209 12TM/C

\*\*\*\*\* SECTION II - HAZARDOUS INGREDIENTS \*\*\*\*\*

INGREDIENT	CAS #	VOLATILE		VAPOR PRESSURE	OSHA	ACGIH	SARA 313	LISTED CARCINOGIN	
		%	LEL	mm Hg. @20C	PEL-PPM	TLV-PPM	LISTED	NTP	IARC OSHA
		BY WEIGHT							
ACETONE	67-64-1	30.0	12.8	181.0	750	750	N	N	N
PROPANE	74-98-6	16.0	2.2	110.0	1000	1000	N	N	N
N-BUTANE	106-97-8	8.0	1.8	17.0	800	800	N	N	N
VM&P NAPHTHA/NAPHTHA	64742-89-8	5.0	.9	10.2	300	300	N	N	N
XYLENE	1330-20-7	3.0	1.0	5.1	100	100	Y	N	N
*TOLUENE	108-88-3	2.20	1.2	22.0	100	50	Y	N	N
ISOBUTYL ALCOHOL	78-83-1	1.0	1.7	8.0	100	50	N	N	N
GLYCOL ETHER EB	111-76-2	1.0	1.1	0.88	25	25	Y	N	N

\* SEE WARNING SECTION V

\*\*\*\*\* SECTION III - PHYSICAL DATA \*\*\*\*\*

BOILING RANGE: -43F to 340F % VOLATILE BY VOLUME: 99.90 VAPOR DENSITY: Heavier than Air APPEARANCE: Opaque Spray  
WEIGHT PER GALLON: 11.89 WATER SOLUABILITY: Negligible ODOR: Solvent Odor EVAPORATION RATE: Faster than Ether

\*\*\*\*\*SECTION IV - FIRE AND EXPLOSION HAZARD DATA \*\*\*\*\*

DOT PROPER SHIPPING NAME: CONSUMER COMMODITY ID NO.: UN1950 HAZARD CLASS: ORM-D-AIR  
PACKAGE GROUP: LABEL REQUIREMENT:

EXTINGUISHING MEDIA: Use (NFPA) CLASS B extinguisher, CO2 or foam. FLASH POINT: <12F LEL: See Section II

UNUSUAL FIRE AND EXPLOSION HAZARDS: Pressure build up due to heat exposure may cause containers to explode.  
Water may be used to cool ruptured containers.

SPECIAL FIRE FIGHTING PROCEDURES: Fight fire from safe distance. Wear full protective equipment,  
including self-contained breathing gear.

LEVEL 3 AEROSOL (NFPA 30B)

\*\*\*\*\* SECTION V - HEALTH HAZARD DATA \*\*\*\*\*

EFFECTS OF OVEREXPOSURE: (ACUTE) Anesthetic effect. Irritation of the respiratory tract or acute nervous system depression characterized by headache, dizziness, staggering gait, confusion, unconsciousness or coma. EYE.....Contact may cause redness, irritation, tearing and blurred vision. SKIN.....Contact may dry skin causing cracks and irritation. INGESTION..... May be harmful or fatal if swallowed.

(CHRONIC) Reports have associated repeated and prolonged occupational overexposure to solvents with liver, kidney, brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: Asthma and other respiratory ailments. Chemical sensitization.

PRIMARY ROUTE(S) OF ENTRY: (X) DERMAL (X) INHALATION ( ) INGESTION ( ) EYES

EMERGENCY AND FIRST AID PROCEDURES: VAPORS.....Remove from exposure. Administer oxygen if necessary. Call a physician.  
EYES.....Immediately flush eyes with water for at least 15 minutes. Get medical attention. SKIN.....Remove contaminated clothing and shoes. Wash contact area with soap and water. Wash clothing and shoes before reuse. INGESTION.....Drink 1 or 2 glasses of water to dilute. Do not induce vomiting. Consult a physician or Poison Control Center immediately.  
\* WARNING: Product contains a chemical(s) known to the State of California to cause cancer, birth defects or other reproductive harm.

\*\*\*\*\* SECTION VI - REACTIVE DATA \*\*\*\*\*

STABILITY: STABLE (X) UNSTABLE ( ). HAZARDOUS POLYMERIZATION; MAY OCCUR ( ) WILL NOT OCCUR (X)  
CONDITIONS TO AVOID: High temperatures and open flames. INCOMPATIBLE MATERIALS TO AVOID: Unknown  
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon Dioxide.....Carbon Monoxide.

\*\*\*\*\* SECTION VII - SPILL OR LEAK PROCEDURE \*\*\*\*\*

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED: Eliminate all ignition sources. Provide ventilation. Collect spills with absorbent materials and non-sparking tools. See Section VIII for protective equipment.  
WASTE DISPOSAL METHOD: Dispose of in accordance with Federal, State and Local regulations. Do not incinerate containers.

\*\*\*\*\* SECTION VIII - SPECIAL PROTECTION INFORMATION/CONTROL MEASURES \*\*\*\*\*

RESPIRATORY PROTECTION: In open areas with unrestricted ventilation, an OSHA approved respirator to remove solid airborne particles of overspray may be used if prolonged and repeated exposure is likely. In areas with restricted ventilation, the use of OSHA approved chemical/mechanical filter designed to remove both particles and vapors is recommended.  
VENTILATION: Supply sufficient ventilation to keep air contaminant concentration below current OSHA (PEL) or ACGIH (TLV).  
PROTECTIVE GLOVES: Use protective gloves if contact with product is likely.  
OTHER PROTECTIVE EQUIPMENT: Safety glasses to prevent eye contact.  
HYGIENIC PRACTICES: Wash hands before eating or using washroom.

\*\*\*\*\* SECTION IX - SPECIAL PRECAUTIONS \*\*\*\*\*

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not store in areas above 100F or near fire or open flame. When storing large quantities, storage conditions should comply with OSHA 1910.106.  
OTHER PRECAUTIONS: Prevent prolonged or repeated breathing of vapor or spray mist. Do not take internally. Keep out of reach of children. Use with adequate ventilation.



Division of Prime Leather Finishes  
1002 Hickory St. • Pewaukee, WI 53072  
(414) 691-1930 • FAX (414) 691-3892

## TECHNICAL INFORMATION

COATING NUMBER: 170GY023

DATE: September 24, 1999

DESCRIPTION: Grey H.S. Primer

WEIGHT PER GALLON, LBS: 11.99

TOTAL SOLIDS, % BY WEIGHT: 71.8

TOTAL SOLIDS, % BY VOLUME: 50.22

VISCOSITY: 21 " Zahn 3

VOC, AS SUPPLIED (LBS/GAL): 3.40

FLASHPOINT, CLOSED CUP (SETAFLASH): 70° F

APPLICATION METHOD: Spray

REDUCTION FOR APPLICATION: None

CURE SCHEDULE: Air Dry

GLOSS:

VOC AT APPLICATION, LBS/GAL: 3.40



M A T E R I A L   S A F E T Y   D A T A   S H E E T

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : GREY H S PRIMER  
 IDENTIFICATION NUMBER: 170GY023  
 PRODUCT USE/CLASS : Air dry primer

DATE PRINTED: 08/21/00

SUPPLIER:  
 Prime Coatings  
 1002 Hickory Street  
 Pewaukee WI 53072

MANUFACTURER:  
 Prime Coatings  
 1002 Hickory Street  
 Pewaukee WI 53072

EMERGENCY TELEPHONE: 414-691-1930  
 7:30 am - 4:00 pm

EMERGENCY TELEPHONE: 414-691-1930  
 7:30 am - 4:00 pm

PREPARER: Lori Schneider, PHONE: 262-691-1930, PREPARE DATE: 08/21/00

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

ITEM	CHEMICAL NAME	CAS NUMBER	WT/WT % EQUAL TO
01	VM&P Naphtha	8032-32-4	11.1 %
02	Xylene	1330-20-7	6.7 %
03	Toluene	108-88-3	5.0 %
04	Isobutanol	78-83-1	3.2 %
05	Ethyl benzene	100-41-4	1.7 %

ITEM	EXPOSURE LIMITS					SKIN
	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-TWA	OSHA PEL-CEILING	COMPANY TLV-TWA	
01	300 ppm	N.E.	300 ppm	N.E.	N.E.	NO
02	100 ppm	150 ppm	100 ppm	150 ppm	N.E.	NO
03	50 ppm	N.E.	100 ppm	150 ppm	N.E.	YES
04	50 ppm	N.E.	50 ppm	N.E.	N.E.	NO
05	100 ppm	125 ppm	100 ppm		N.E.	NO

(See Section 16 for abbreviation legend)

SECTION 3 - HAZARDS IDENTIFICATION

\*\*\* EMERGENCY OVERVIEW \*\*\*: Flammable liquid! May cause eye irritation on contact. Overexposure to vapors may cause dizziness or headache. The International Agency for Research on Cancer has evaluated ethylbenzene and classified it as a possible human carcinogen (Group 2B) based on sufficient evidence of carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans.

(Continued on Page 2)

**SECTION 3 - HAZARDS IDENTIFICATION**

EFFECTS OF OVEREXPOSURE - EYE CONTACT: Can cause eye irritation, redness, tearing.

EFFECTS OF OVEREXPOSURE - SKIN CONTACT: Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis (rash).

EFFECTS OF OVEREXPOSURE - INHALATION: Excessive inhalation of vapors can cause nasal and respiratory irritation, and central nervous system effects such as dizziness, fatigue, nausea, headache.

EFFECTS OF OVEREXPOSURE - INGESTION: Can cause gastrointestinal irritation, nausea, vomiting, or diarrhea.

EFFECTS OF OVEREXPOSURE - CHRONIC HAZARDS: Possible reproductive hazard. Overexposure may cause kidney damage. May cause liver disorder (e.g., edema, proteinuria) and damage. May cause cardiovascular disorder and damage. May cause brain cell damage from deliberate and abusive inhalation of vapors. May affect the blood, causing anemia. Toluene and xylene have been found to be orotoxins, that is, exposure to these solvents may cause hearing loss. More severe effects can result when chemical exposure is combined with noise exposure, even if these exposures are below the recommended limits.

PRIMARY ROUTE(S) OF ENTRY: SKIN CONTACT INHALATION

**SECTION 4 - FIRST AID MEASURES**

FIRST AID - EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

FIRST AID - SKIN CONTACT: Wash with soap and water. Get medical attention if irritation develops or persists. Wash contaminated clothing before reuse.

FIRST AID - INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

FIRST AID - INGESTION: If swallowed, do NOT induce vomiting. Give victim a glass of water or milk. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. Aspiration of this material into the lungs may cause chemical pneumonitis, which may be fatal.

**SECTION 5 - FIRE FIGHTING MEASURES**

FLASH POINT: 70 F  
(TAGLIABUE CLOSED CUP)

LOWER EXPLOSIVE LIMIT: 0.9 %  
UPPER EXPLOSIVE LIMIT: 7.0 %

(Continued on Page 3)

SECTION 5 - FIRE FIGHTING MEASURES
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AUTOIGNITION TEMPERATURE: N.D.

EXTINGUISHING MEDIA: ALCOHOL FOAM CO2 DRY CHEMICAL FOAM

UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors can travel along the ground to a source of ignition and flashback. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures at or above the flashpoint.

SPECIAL FIREFIGHTING PROCEDURES: Containers can build up pressure if exposed to heat (fire). As in any fire, wear self-contained breathing apparatus pressure-demand (MSHA/NIOSH approved or equivalent) and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Use water with caution. Since this material may be lighter than water and insoluble, use of water may spread the fire.

SECTION 6 - ACCIDENTAL RELEASE MEASURES
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STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Avoid runoff into storm sewers and ditches which lead to waterways. Absorb small spills with inert material and place in chemical waste container. For a large spill: dike area of spill and pump to salvage container. Collect remainder on inert material and place in chemical waste container. Wear organic vapor respirator. Remove all sparks, flames, and other sources of ignition from the area and allow any hot surfaces to cool. Use non-sparking tools only. Ventilate area thoroughly.

SECTION 7 - HANDLING AND STORAGE
----------------------------------

HANDLING: "Empty" containers retain product residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed of. Wash thoroughly after handling. Use with adequate ventilation. Follow all MSDS/label precautions even after container is emptied because it may retain product residues. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment.

STORAGE: Keep away from heat, sparks and flame. Keep container closed when not in use.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION
---

ENGINEERING CONTROLS: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

(Continued on Page 4)

**SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION**

**RESPIRATORY PROTECTION:** NIOSH/MSHA approved respirator should be worn to avoid inhalation. Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Ventilation rates must be maintained to keep exposure below the TLV or PEL. Otherwise, an approved organic vapor respirator must be used. A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**SKIN PROTECTION:** Gloves should be worn to avoid prolonged skin contact. Chemically resistant gloves should be worn if contact is likely.

**EYE PROTECTION:** Wear safety glasses with side shields or goggles.

**OTHER PROTECTIVE EQUIPMENT:** Where splashing is possible, an impermeable apron and boots should be worn.

**HYGIENIC PRACTICES:** Wash hands before eating. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Avoid contact with eyes, skin, and clothing.

**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

BOILING RANGE	: 226 - 285 F	VAPOR DENSITY	: Is heavier than air
ODOR	: Solvent	ODOR THRESHOLD	: N.D.
APPEARANCE	: Liquid	EVAPORATION RATE:	Is faster than Butyl Acetate
SOLUBILITY IN H2O	: None	SPECIFIC GRAVITY:	1.4457
FREEZE POINT	: N.D.	pH @ 0.0 %	: N.D.
VAPOR PRESSURE	: N.D.	VISCOSITY	: N.D.
PHYSICAL STATE	: N.D.		
WEIGHT % SOLIDS	: 71.80		

(See Section 16 for abbreviation legend)

**SECTION 10 - STABILITY AND REACTIVITY**

**CONDITIONS TO AVOID:** Hazardous polymerization will not occur.

**INCOMPATIBILITY:** Avoid contact with oxidizing agents.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Burning may produce carbon dioxide and carbon monoxide. Products containing nitrocellulose produce oxides of nitrogen if burned.

**HAZARDOUS POLYMERIZATION:** Will not occur under normal conditions.

**STABILITY:** This product is stable under normal storage conditions.

(Continued on Page 5)

**SECTION 11 - TOXICOLOGICAL PROPERTIES**

No product or component toxicological information is available.

Toxic section 11B: No Information.

**SECTION 12 - ECOLOGICAL INFORMATION**

ECOLOGICAL INFORMATION: No Information.

**SECTION 13 - DISPOSAL CONSIDERATIONS**

DISPOSAL METHOD: This material is a RCRA hazardous waste due to ignitability. Some components may be listed wastes or on the land ban form. Comply with all applicable federal, state, and local regulations when disposing of this material. This material may be fuel blended. This material may be sent to a recycler for solvent recovery.

**SECTION 14 - TRANSPORTATION INFORMATION**

DOT PROPER SHIPPING NAME: Paint

DOT TECHNICAL NAME:

DOT HAZARD CLASS: 3

HAZARD SUBCLASS:

DOT UN/NA NUMBER: UN 1263

PACKING GROUP: II

RESP. GUIDE PAGE: 127

**SECTION 15 - REGULATORY INFORMATION**

U.S. FEDERAL REGULATIONS: AS FOLLOWS -

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200)

CERCLA - SARA HAZARD CATEGORY:

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE HEALTH HAZARD FIRE HAZARD

(Continued on Page 6)

SECTION 15 - REGULATORY INFORMATION
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## SARA SECTION 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

----- CHEMICAL NAME -----	CAS NUMBER	WT/WT %
Xylene	1330-20-7	6.7 %
Toluene	108-88-3	5.0 %
Ethyl benzene	100-41-4	1.7 %
Cobalt compounds		0.1 %

INTERNATIONAL REGULATIONS: AS FOLLOWS -

CANADIAN WHMIS: This MSDS has been prepared in compliance with Controlled Product Regulations except for use of the 16 headings.

CANADIAN WHMIS CLASS: No information available.

SECTION 16 - OTHER INFORMATION
--------------------------------

HMIS RATINGS - HEALTH: 1      FLAMMABILITY: 3      REACTIVITY: 0

PREVIOUS MSDS REVISION DATE: 09/21/99

VOLATILE ORGANIC COMPOUNDS (VOCS): 3.40 lbs/gal,    407 grams/ltr

LEGEND:    N.A. - Not Applicable, N.E. - Not Established,  
          N.D. - Not Determined

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The information contained on this MSDS has been checked and should be accurate. However, it is the responsibility of the user to comply with all Federal, State, and Local laws and regulations.

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<END OF MSDS>



Division of Prime Leather Finishes  
1002 Hickory St. • Pewaukee, WI 53072  
(414) 691-1930 • FAX (414) 691-3892

## TECHNICAL INFORMATION

**COATING NUMBER:** 170BE031

**DATE:** 27 September 1999

**DESCRIPTION:** High-Solids Blue Enamel

**WEIGHT PER GALLON, LBS:** 11.86

**TOTAL SOLIDS, % BY WEIGHT:** 71.4

**TOTAL SOLIDS, % BY VOLUME:** 51.5

**VISCOSITY:** 19 Seconds Zahn 3/ 74° F

**VOC, AS SUPPLIED (LBS/GAL):** 3.4

**FLASHPOINT, CLOSED CUP (SETAFLASH):** Per MSDS

**APPLICATION METHOD:** Conventional spray

**REDUCTION FOR APPLICATION:** None Required

**CURE SCHEDULE:** Dry to touch 30- 1 hour

**GLOSS:** 12-16 (60°)

**VOC AT APPLICATION, LBS/GAL:** 3.40

# M A T E R I A L   S A F E T Y   D A T A   S H E E T

## SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : BLUE ENAMEL  
 IDENTIFICATION NUMBER: 170BE031  
 PRODUCT USE/CLASS :  
 DATE PRINTED: 08/21/00

SUPPLIER: Prime Coatings  
 1002 Hickory Street  
 Pewaukee WI 53072

MANUFACTURER: Prime Coatings  
 1002 Hickory Street  
 Pewaukee WI 53072

EMERGENCY TELEPHONE: 414-691-1930  
 7:30 am - 4:00 pm

EMERGENCY TELEPHONE: 414-691-1930  
 7:30 am - 4:00 pm

PREPARER: Lori Schneider, PHONE: 262-691-1930, PREPARE DATE: 08/21/00

## SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

ITEM	CHEMICAL NAME	CAS NUMBER	WT/WT % EQUAL TO
01	Xylene	1330-20-7	9.3 %
02	VM&P Naphtha	8032-32-4	5.2 %
03	Toluene	108-88-3	4.9 %
04	Isobutanol	78-83-1	3.4 %
05	Methoxy propyl acetate	108-65-6	2.6 %
06	Ethyl benzene	100-41-4	2.3 %

ITEM	EXPOSURE LIMITS				COMPANY TLV-TWA	SKIN
	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-TWA	OSHA PEL-CEILING		
01	100 ppm	150 ppm	100 ppm	150 ppm	N.E.	NO
02	300 ppm	N.E.	300 ppm	N.E.	N.E.	NO
03	50 ppm	N.E.	100 ppm	150 ppm	N.E.	YES
04	50 ppm	N.E.	50 ppm	N.E.	N.E.	NO
05	N.E.	N.E.	N.E.	N.E.	N.E.	NO
06	100 ppm	125 ppm	100 ppm		N.E.	NO

(See Section 16 for abbreviation legend)

## SECTION 3 - HAZARDS IDENTIFICATION

\*\*\* EMERGENCY OVERVIEW \*\*\*: Flammable liquid! May cause eye irritation on contact. Overexposure to vapors may cause dizziness or headache. The International Agency for Research on Cancer has evaluated ethylbenzene and classified it as a possible human carcinogen (Group 2B) based on sufficient

(Continued on Page 2)



SECTION 3 - HAZARDS IDENTIFICATION
------------------------------------

evidence of carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans.

EFFECTS OF OVEREXPOSURE - EYE CONTACT: Can cause eye irritation, redness, tearing.

EFFECTS OF OVEREXPOSURE - SKIN CONTACT: Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis (rash).

EFFECTS OF OVEREXPOSURE - INHALATION: Excessive inhalation of vapors can cause nasal and respiratory irritation, and central nervous system effects such as dizziness, fatigue, nausea, headache.

EFFECTS OF OVEREXPOSURE - INGESTION: Can cause gastrointestinal irritation, nausea, vomiting, or diarrhea.

EFFECTS OF OVEREXPOSURE - CHRONIC HAZARDS: Possible reproductive hazard. Overexposure may cause kidney damage. May cause liver disorder (e.g., edema, proteinuria) and damage. May cause cardiovascular disorder and damage. May cause brain cell damage from deliberate and abusive inhalation of vapors. May affect the blood, causing anemia. Toluene and xylene have been found to be orotoxins, that is, exposure to these solvents may cause hearing loss. More severe effects can result when chemical exposure is combined with noise exposure, even if these exposures are below the recommended limits.

PRIMARY ROUTE(S) OF ENTRY: SKIN CONTACT INHALATION

SECTION 4 - FIRST AID MEASURES
--------------------------------

FIRST AID - EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

FIRST AID - SKIN CONTACT: Wash with soap and water. Get medical attention if irritation develops or persists. Wash contaminated clothing before reuse.

FIRST AID - INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

FIRST AID - INGESTION: If swallowed, do NOT induce vomiting. Give victim a glass of water or milk. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. Aspiration of this material into the lungs may cause chemical pneumonitis, which may be fatal.

(Continued on Page 3)

**SECTION 5 - FIRE FIGHTING MEASURES**

FLASH POINT: 70 F  
(TAGLIABUE CLOSED CUP)

LOWER EXPLOSIVE LIMIT: 0.9 %  
UPPER EXPLOSIVE LIMIT: 13.1 %

AUTOIGNITION TEMPERATURE: N.D.

EXTINGUISHING MEDIA: ALCOHOL FOAM CO2 DRY CHEMICAL FOAM WATER FOG.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors can travel along the ground to a source of ignition and flashback. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures at or above the flashpoint.

SPECIAL FIREFIGHTING PROCEDURES: Containers can build up pressure if exposed to heat (fire). As in any fire, wear self-contained breathing apparatus pressure-demand (MSHA/NIOSH approved or equivalent) and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Use water with caution. Since this material may be lighter than water and insoluble, use of water may spread the fire.

**SECTION 6 - ACCIDENTAL RELEASE MEASURES**

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Avoid runoff into storm sewers and ditches which lead to waterways. Absorb small spills with inert material and place in chemical waste container. For a large spill: dike area of spill and pump to salvage container. Collect remainder on inert material and place in chemical waste container. Wear organic vapor respirator. Remove all sparks, flames, and other sources of ignition from the area and allow any hot surfaces to cool. Use non-sparking tools only. Ventilate area thoroughly.

**SECTION 7 - HANDLING AND STORAGE**

HANDLING: "Empty" containers retain product residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed of. Wash thoroughly after handling. Use with adequate ventilation. Follow all MSDS/label precautions even after container is emptied because it may retain product residues. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment.

STORAGE: Keep away from heat, sparks and flame. Keep container closed when not in use.

(Continued on Page 4)

**SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION**

**ENGINEERING CONTROLS:** Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**RESPIRATORY PROTECTION:** NIOSH/MSHA approved respirator should be worn to avoid inhalation. Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Ventilation rates must be maintained to keep exposure below the TLV or PEL. Otherwise, an approved organic vapor respirator must be used. A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**SKIN PROTECTION:** Gloves should be worn to avoid prolonged skin contact. Chemically resistant gloves should be worn if contact is likely.

**EYE PROTECTION:** Wear safety glasses with side shields or goggles.

**OTHER PROTECTIVE EQUIPMENT:** Where splashing is possible, an impermeable apron and boots should be worn.

**HYGIENIC PRACTICES:** Wash hands before eating. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Avoid contact with eyes, skin, and clothing.

**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

BOILING RANGE	: 226 - 285 F	VAPOR DENSITY	: Is heavier than air
ODOR	: Solvent odor	ODOR THRESHOLD	: N.D.
APPEARANCE	: Blue liquid	EVAPORATION RATE:	Is faster than Butyl Acetate
SOLUBILITY IN H2O	: None	SPECIFIC GRAVITY:	1.4248
FREEZE POINT	: N.D.	pH @ 0.0 %	: N.D.
VAPOR PRESSURE	: N.D.	VISCOSITY	: N.D.
PHYSICAL STATE	: N.D.		
WEIGHT % SOLIDS	: 71.36		

(See Section 16 for abbreviation legend)

**SECTION 10 - STABILITY AND REACTIVITY**

**CONDITIONS TO AVOID:** Hazardous polymerization will not occur.

**INCOMPATIBILITY:** Avoid contact with oxidizing agents.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Burning may produce carbon dioxide and carbon monoxide. Products containing nitrocellulose produce oxides of nitrogen if burned.

**HAZARDOUS POLYMERIZATION:** Will not occur under normal conditions.

**STABILITY:** This product is stable under normal storage conditions.

(Continued on Page 5)

**SECTION 11 - TOXICOLOGICAL PROPERTIES**

No product or component toxicological information is available.

Toxic section 11B: No Information.

**SECTION 12 - ECOLOGICAL INFORMATION**

ECOLOGICAL INFORMATION: No Information.

**SECTION 13 - DISPOSAL CONSIDERATIONS**

DISPOSAL METHOD: This material is a RCRA hazardous waste due to ignitability. Some components may be listed wastes or on the land ban form. Comply with all applicable federal, state, and local regulations when disposing of this material. This material may be fuel blended. This material may be sent to a recycler for solvent recovery.

**SECTION 14 - TRANSPORTATION INFORMATION**

DOT PROPER SHIPPING NAME: Paint

DOT TECHNICAL NAME:

DOT HAZARD CLASS: 3

HAZARD SUBCLASS:

DOT UN/NA NUMBER: UN-1263

PACKING GROUP: II

RESP. GUIDE PAGE: 127

**SECTION 15 - REGULATORY INFORMATION**

U.S. FEDERAL REGULATIONS: AS FOLLOWS -

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200)

CERCLA - SARA HAZARD CATEGORY:

This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE HEALTH HAZARD FIRE HAZARD

(Continued on Page 6)

SECTION 15 - REGULATORY INFORMATION
-------------------------------------

## SARA SECTION 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

----- CHEMICAL NAME -----	CAS NUMBER	WT/WT %
Xylene	1330-20-7	9.3 %
Toluene	108-88-3	4.9 %
Ethyl benzene	100-41-4	2.3 %
Cobalt compounds		0.1 %

INTERNATIONAL REGULATIONS: AS FOLLOWS -

CANADIAN WHMIS: This MSDS has been prepared in compliance with Controlled Product Regulations except for use of the 16 headings.

CANADIAN WHMIS CLASS: No information available.

SECTION 16 - OTHER INFORMATION
--------------------------------

HMIS RATINGS - HEALTH: 1      FLAMMABILITY: 3      REACTIVITY: 0

PREVIOUS MSDS REVISION DATE: 09/29/99

VOLATILE ORGANIC COMPOUNDS (VOCs): 3.40 lbs/gal,    407 grams/ltr

LEGEND: N.A. - Not Applicable, N.E. - Not Established,  
N.D. - Not Determined

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The information contained on this MSDS has been checked and should be accurate. However, it is the responsibility of the user to comply with all Federal, State, and Local laws and regulations.

---

&lt;END OF MSDS&gt;



# HYDRAULIC OIL AW

MOORE FLO HYDRAULIC OIL AW is formulated for use in industrial and mobile equipment hydraulic systems. It exceeds the requirements of hydraulic equipment manufacturers such as Cincinnati Milacron P68, P69, P70; Denison HF-1, HF-2, HF-0, Vickers 35VQ25, Sperry Vickers I-286-S, and Ford M6C32.

## MOORE FLO FEATURES

- . Contains a premium anti-wear additive.
- . Includes a demulsifying additive to separate water rapidly.
- . Combats rust corrosion and oxidation.
- . Contains zinc-type anti-wear agents to help minimize wear in high-speed, high-pressure vane, gear and piston pumps.
- . Remains stable even when exposed to moisture or extreme temperatures.
- . Contains anti-foam agents for controlled release of entrained air.
- . Compatible with common filter media.

## BENEFITS

- . Prolongs hydraulic system life.
- . Reduces maintenance costs.
- . Available in five grades to meet requirements for most hydraulic systems.

## TYPICAL PROPERTIES

## ISO GRADE

	32	46	68
Density, kg/m <sup>3</sup> @ 15°C	865	868	870
Kinematic Viscosity (D445)			
cSt @ 40°C	33	46	70
@ 100°C	5.2	6.4	8.2
Viscosity Index (D2270)	95	95	95
Flash Point (COC), °C	190	200	214
Pour Point, °C	-36	-33	-30
Color (ASTM)	2.5	3.0	3.5
Vickers 35VQ25	Pass	Pass	Pass
Denison HF-O	Pass	Pass	Pass
Rust Protection			
Distilled Water	Pass	Pass	Pass
Syn. Sea Water	Pass	Pass	Pass
Oxidation, (D943), hr	2100+	2100+	2100+
Demulsibility (D1401)			
oil/water/cuff (minutes)		40/37/3(20)	
Copper Corrosion (D130)	1	1	1

## HOMAN AW HYDRAULIC OILS

### **DESCRIPTION**

Homan AW Hydraulic Oils contain the latest thermally stable zinc antiwear additive system. They are non-foaming and provide superior protection against rust and oxidation. Their temperature performance is excellent.

### **BENEFITS**

Homan AW Hydraulic Oils will provide long-term, trouble-free service in high output hydraulic systems operating at high temperatures, pressures, and speeds.

### **APPLICATIONS**

Homan AW Hydraulic Oils may be used in general purpose lubricant applications where straight mineral oils and conventional rust and oxidation inhibited oils are recommended.

### **Properties**

### **Typical Values**

<b><u>ISO GRADE</u></b>	<b><u>32</u></b>	<b><u>46</u></b>	<b><u>68</u></b>	<b><u>100</u></b>	<b><u>150</u></b>
API Gravity	31.4	30.2	29.8	29.4	28.4
Flash Point, °F	403	420	450	490	478
Viscosity, cSt @ 100°	5.35	6.54	8.35	11.8	14.4
Viscosity, SUS @ 210°F	44.2	48.1	54.3	64.4	77.1
Viscosity, cSt @ 40°C	32.2	44.4	65.2	101	149
Viscosity, SUS @ 100°F	164	227	338	526	782
Viscosity Index	98	97	96	95	94
Color, ASTM	1.0	1.0	3.0	3.0	3.5
Pour Point, °F	-25	-30	-15	-10	-5

Homan AW Hydraulic Oils exceed the following requirements:

Cincinnati Milacron Specifications: P-68, P-70, and P-69

Denison Requirement: HF-0

Vickers Requirements: I-286-S Data Sheet & M2950-S

spec132

**MOORE OIL COMPANY, INC.**

4033 W. CUSTER AVENUE  
MILWAUKEE, WI 53209-9247

**MATERIAL SAFETY DATA SHEET NUMBER 122**

**IDENTITY: HOMAN AW32 HYDRAULIC**

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**SECTION I**

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MANUFACTURER NAME: Homan Corporation  
ADDRESS: 3650 South Homan Avenue  
Chicago, Illinois 60632  
  
TELEPHONE NUMBER: (773) 523-0250  
EMERGENCY NUMBER: Chemtrac 24 Hours (800) 424-9300  
  
DATE PREPARED: JANUARY 7, 2001

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**SECTION II-HAZARDOUS INGREDIENTS/IDENTITY INFORMATION**

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HAZARDOUS COMPONENTS: Not applicable for this product.

National Fire Protection Association (NFPA) - Hazard Identification

<u>Health</u>	<u>Flammability</u>	<u>Reactivity</u>	<u>Basis</u>
1	1	0	Recommended Homan Corp.

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**SECTION III-PHYSICAL/CHEMICAL CHARACTERISTICS**

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BOILING POINT: IBP Approximately 555 F

SPECIFIC GRAVITY (H2O-1): 0.87-0.88

VAPOR PRESSURE (mm Hg): Less than 0.1 mm @ 20 C

MELTING POINT: Pour Point approximately -36°C

VAPOR DENSITY (AIR-1): Greater than 5

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EVAPORATION RATE: (Butyl Acetate=1) Less than 0.01

SOLUBILITY IN WATER: Negligible; less than 0.1% @ 1 atmosphere and 25 C

APPEARANCE AND ODOR: Light yellow liquid nil to bland odor

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#### SECTION IV-FIRE AND EXPLOSION HAZARD DATA

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FLASH POINT: 410° F Cleveland Open Cup

FLAMMABLE LIMITS: Estimated Values LEL: 0.7% UEL: 7.0%

EXTINGUISHING MEDIA: Foam water spray (fog), dry chemical carbon dioxide

SPECIAL FIRE FIGHTING PROCEDURES: Use water spray, dry chemical foam or carbon dioxide. Use water to keep fire-exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Treat as a petroleum oil fire.

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#### SECTION V-REACTIVITY DATA

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STABILITY: \_\_\_\_\_ Unstable \_\_\_\_\_ X \_\_\_\_\_ Stable  
Conditions to Avoid:

INCOMPATIBILITY: Strong Oxidizing agents-liquid Chlorine, Concentrated oxygen, Sodium & Calcium Hypochlorites.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Combustion may yield fumes, smoke, oxides of sulfur & nitrogen carbon monoxide & HC1.

HAZARDOUS POLYMERIZATION: \_\_\_\_\_ May Occur X \_\_\_\_\_ Will Not Occur  
Conditions to Avoid:

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#### SECTION VI-HEALTH HAZARD DATA

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HEALTH HAZARDS (ACUTE OR CHRONIC): Minimal Toxicity.

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ROUTES OF ENTRY/SIGNS AND SYMPTOMS:

EYE CONTACT: May cause slight irritation but does not cause permanent damage.

SKIN CONTACT: Contact with hot material may cause thermal burns.

INHALATION: Exposure to high oil mist concentrations may lead to oil pneumonia.

INGESTION: May cause nausea and vomiting. May act as a laxative. May irritate gastrointestinal tract. Does not cause permanent damage.

CARCINOGENICITY: Non-carcinogenic

WTP?:

IARC MONOGRAPHS?:

OSHA REGULATED?:

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None Known

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**SECTION VII-PRECAUTIONS FOR SAFE HANDLING AND USE**

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STEPS TAKEN FOR RELEASE OR SPILL OF MATERIAL: Contain spill, absorb, pump or wipe up. Remove remainder with solvent or detergent and water. Keep out of sewers and waterways.

WASTE DISPOSAL METHOD: May be given to an approved waste hauler. Observe local, state, and federal regulations for disposal of petroleum lubricant.

PRECAUTIONS IN HANDLING AND STORING: Do not store near heat, sparks, flame or strong oxidants.

OTHER PRECAUTIONS: If misting occurs, control of exposures to 5 mg/m<sup>3</sup> or less is recommended.

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**SECTION VIII-CONTROL MEASURES**

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RESPIRATORY PROTECTION: Use supplied-air protection in confined or enclosed spaces, if needed.

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VENTILATION:

LOCAL EXHAUST: Use to capture vapor/mist if necessary.

SPECIAL: No smoking or open lights.

MECHANICAL: Use in confined areas.

OTHER: Use explosion-proof machinery.

PROTECTIVE GLOVES: Use chemical-resistant gloves.

EYE PROTECTION: Use splash goggles or face shield.

PROTECTIVE CLOTHING OR EQUIPMENT: Use chemical-resistant apron or impervious clothing.

WORK/HYGIENIC PRACTICES: Minimize breathing mists. Practice good personal hygiene.