

**Ergonomic Solutions**

# OWNER'S MANUAL

## TILT MASTER • SERIES TM

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### WARNINGS & SAFETY INSTRUCTIONS

**Read owner's manual completely before operating unit!**

- Not a personnel lift. Stand to right side while operating.
- Never go under forks if there is weight on unit.
- Remove weight & disconnect power before working on unit.
- Use only maintenance parts supplied or approved by the manufacturer.
- Do not change pressure relief valve setting:
- Do not clamp hydraulic cylinder in a vise as you may distort barrel.
- Never operate lift unless you are watching it.
- Load lift as uniformly as possible.
- Consult factory for uneven loading.
- Do not continue to press the UP button if unit is not raising.
- Relieve system pressure by pressing DOWN button after unit has come to rest.
- Consult factory if adding or performing any modification to the original equipment.
- Do not use brake fluids or jack oils. Use AW 32 Hydraulic oil or equal.
- Make sure all operator safety labels are in place.

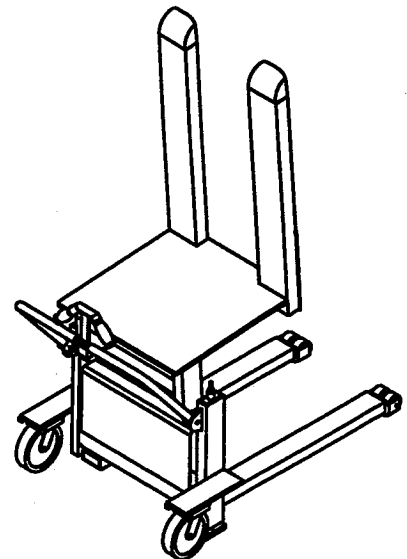
### RECEIVING INSTRUCTIONS

Every unit is thoroughly tested and inspected prior to shipment. However, it is possible that the unit may incur damage during transit. If you see damage when unloading make a note of it on the SHIPPER RECEIVER.

Remove all packing and strapping material, inspect for damage. IF DAMAGE IS EVIDENT, FILE A CLAIM WITH THE CARRIER IMMEDIATELY! Also, check the unit size, type of power unit, etc., to ensure the unit is correct for the intended application.

### ORDERING REPLACEMENT OR EXTRA PARTS

Our company takes pride in using the finest available parts for our equipment. We are not responsible for equipment failure resulting from the use of unapproved replacement parts. To order replacement or extra parts for your equipment contact Customer Service at the factory. In any correspondence with the factory please include the **Serial Number** which is inscribed on the nameplate of the piece of equipment. Use only the part numbers provided in this Owner's Manual. When ordering parts for AC power units please indicate the motor phase and voltage that the equipment is operating on.



**TILT MASTER • Series TM**

## LOADING INSTRUCTIONS

The load capacity rating as inscribed on the nameplate of your unit designates the net capacity, assuming a load centered 20 inches from bulkhead carriage and 20 inches above the tacks. This capacity must never be exceeded, as permanent damage or injury may result.

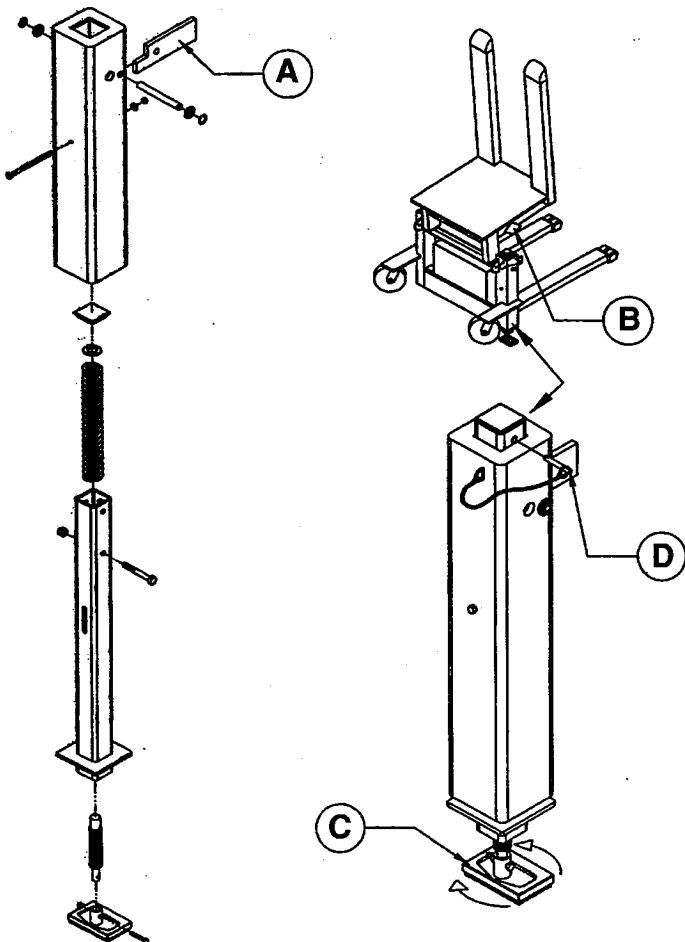
## OPERATION

### Floor Lock

An automatic floor lock is integral to the structure of the Tilt Master. It incorporates a lever arm (A) which is engaged by a bracket (B) on the tilting carriage to pull the friction pad (C) up off the floor with the carriage is nearly fully lowered.

When the unit arrives the operator need do nothing to allow the floor lock to operate. To disable the floor lock, lower the fork carriage all the way to the floor. Locate the detented pin (D) hanging from the machine's right side post, and insert it through the hole at the top of the inner tube in the right side post. Once the pin is inserted, DO NOT try to remove it unless the fork carriage is fully lowered.

The floor pad height can be adjusted to compensate for floor inconsistencies and for pad wear. With the carriage fully lowered so that the floor pad is lifted off the floor, spin the pad counterclockwise to lessen the amount of pressure with which the pad holds the floor. Turn it clockwise if the pad doesn't press on the floor hard enough to securely keep the machine from moving.



### Controls

The unit is furnished with constant pressure pushbutton controls. Depressing the **UP** button starts the motor (see wiring diagram p.4) which in turn runs the hydraulic pump. The cylinder begins to extend and the forks start to raise. Stand to the side when operating. Stay clear of moving parts, the container, and its contents. The forks will rise as long as the **UP** button is pressed.

On releasing either pushbutton control, the forks cease to move and will remain at that particular elevation.

When the **"DN"** button is depressed, the forks will lower. Upon releasing the button, the forks cease to lower and remain at that particular elevation. Be certain all personnel and objects are clear when the unit is descending.

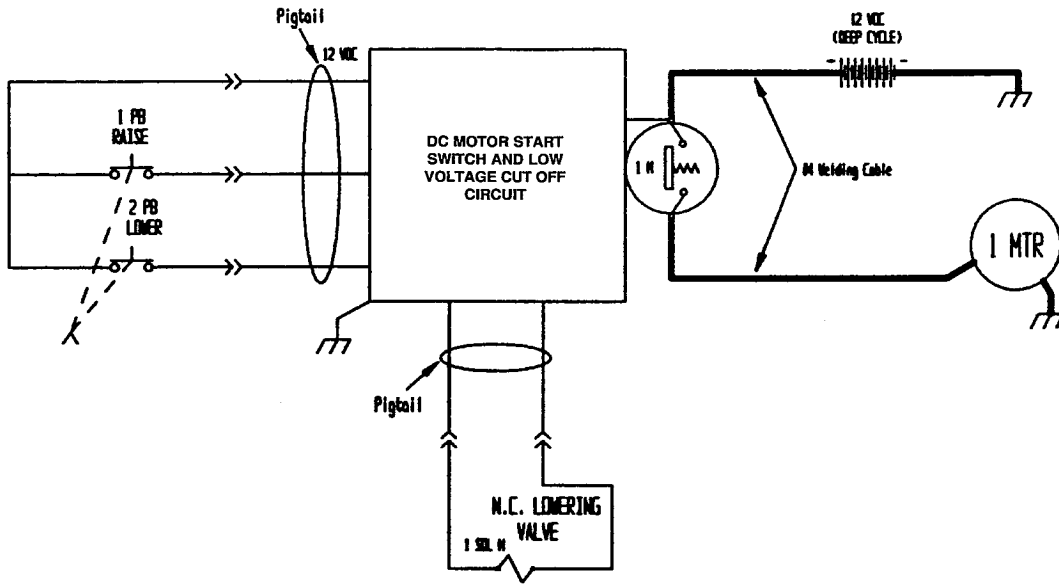
In the event that the forks are overloaded, the relief valve will open because of excessive pressure build up, oil will bypass the hydraulic cylinder, only when running, and return to the reservoir.

Always remember that the motor runs only when the **UP** button is depressed. The forks lower due only to gravity when the **"DN"** button is pressed.

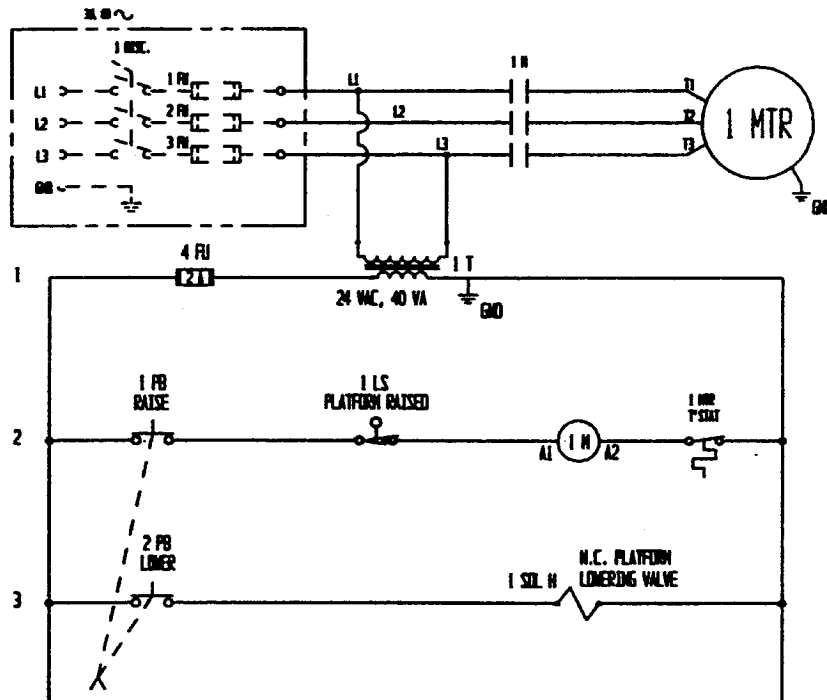
## SAFETY INSTRUCTIONS FOR THE OPERATOR

- 1.) Always load the unit properly. Load tight to the carriage within rated capacity.
- 2.) Never use the Lift if it is in need of repairs or in the case of a malfunction.
- 3.) Notify your maintenance personnel or supervisor in case you notice anything out of the ordinary, such as binding, odd pump noises etc.
- 4.) Do not continue to depress the **UP** button if the unit is not raising. The motor or pump maybe permanently damaged.
- 5.) Charge battery nightly or as needed, even if the unit is not in use. Batteries can discharge completely over a period of several weeks, especially if the unit is equipped with an accessory such as a battery charge indicator. The charger cannot overcharge the battery even if left on all the time.

# DC/AC Lift-Hold-Lower Control Diagrams



OVERCURRENT & SHORT-CIRCUIT PROTECTION, AND DISCONNECT ARE TO BE PROVIDED BY THE END-USER PER THE NEC (NFPA 70) AND LOCAL CODES.



**BE SURE ALL POWER IS BEFORE ATTEMPTING TO WORK ON THIS EQUIPMENT!**  
CAUTION: SERVICE WORK SHOULD BE PERFORMED ONLY BY TRAINED & QUALIFIED PERSONS.

# Operating Instructions for Battery Charger

(for DC models equipped with our Charger)

## WARNING!

Working with or near lead acid batteries is dangerous. Batteries contain sulfuric acid and produce explosive gases. A battery explosion could result in loss of eyesight or serious burns.

Do not smoke or allow a spark or flame near batteries. Charge batteries in locations which are clean, dry, and well ventilated. Do not lay tools or anything metallic on top of any battery. All repairs to a battery must be made by experienced and qualified personnel.

When working with batteries, remove personal items such as rings, bracelets, necklaces, and watches. A battery can produce enough current to weld jewelry to metal causing a severe burn.

Always have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

## Operating Instructions

- 1.) Position lift equipment in a well ventilated area.
- 2.) Check water level in battery and refill if necessary. Water level should be approximately 1/4" above plates. Use only distilled water.
- 3.) Locate and connect the charger clip of the charger to the matching battery clip supplied with your lift equipment.
- 4.) Plug the charger into a receptacle known to have approximately 115V and 60 Hz. If an extension cord must be used, keep it as short, and the wires as large, as possible. A small cord size will decrease the output of the charger due to the voltage drop in the line. This will increase the charging time.
- 5.) When only the RED LED is on, the battery is being charged at a "bulk" rate.  
When the RED & GREEN LEDS are lit the battery is charging at an "absorption" rate. The battery is being "topped off".  
When only the GREEN LED is on, the battery is being charged at a "float" or "maintenance" rate (90% + charged). It is safe to maintain this rate indefinitely.
- 6.) Remember to unplug the charger before moving equipment. Failure to do so could cause damage to cords, receptacles and other equipment.

## Additional Information

An extension cord should be kept as short as possible. Make sure cord is situated to prevent damage to its insulation and ensure that it won't create a tripping hazard.

## Trouble Shooting

- 1.) Make sure battery connections are electrically and mechanically sound.
- 2.) check AC source for power
- 3.) Check fuse. Replace only with a fuse having the same rating as originally supplied.
- 4.) Check battery's state of charge with a voltmeter and/or a specific gravity gauge. A battery is "dead" at 11.9V and with a specific gravity of 1.12.

## Do's and Don'ts

**DO NOT** smoke, strike a match or cause a spark in the vicinity of battery during charging.

**DO** make sure all battery connections are tight and clean.

**DO NOT** expose to rain or adverse conditions.

**DO** replace defective cords and wires immediately.

**DO NOT** use the charger on dry-cell batteries. It is only for use on lead-acid and gel-cell types.

**DO NOT** try to charge a frozen battery.

## HYDRAULIC OPERATION

When the operator wants to raise the unit, he/she depresses the **UP** button. This starts the electric motor which runs the hydraulic pump (Item 6). Oil from the reservoir is drawn in through the suction filter (Item 7) and into the pump. The pump delivers the pressurized oil through the check valve (Item 4) before entering the cylinder.

The function of the check valve is to allow the oil to flow in one direction, i.e. towards the cylinders. It also prevents the flow of oil back into the pump circuit when the pump stops running. This holds the oil in the cylinders and maintains the desired elevation.

If the load is excessive, and the **UP** button is still depressed, pressure will build up in the circuit between the pump and the cylinders. This forces the "ball" or "poppet" in the relief valve (Item 2) to unseat and the pump output returns into the reservoir through the return pipe.

When the operator desires to lower the unit, he depresses the **DOWN** button. This energizes the down solenoid valve (Item 3). The poppet in the solenoid valve is unseated and oil now returns from the cylinders through the solenoid valve, the flow control valve, oil return hose, and into the reservoir.

The flow control valve (Item 5) controls the down speed of the table. It is preset and cannot be changed.

Releasing the **DOWN** button will de-energize the solenoid, closing the valve poppet. This prevents the oil from returning to the reservoir and the cylinders will stop. The unit is now maintained at that particular position.

## Cartridge Valves

The lowering valve, as discussed above, is of cartridge construction and is virtually maintenance-free. If there is a faulty operation, check Troubleshooting Section. To clean the cartridge valve, follow this procedure:

- 1.) Use a sharp object and push poppet in from the bottom to open the valve.
- 2.) Repeat several times while valve is immersed in cleaning fluid. Blow dry.
- 3.) Inspect "O" rings and the teflon extrusion washer.
- 4.) Reinstall. The valve should be tightened to approximately 30 ft. lbs.

## Velocity Fuse

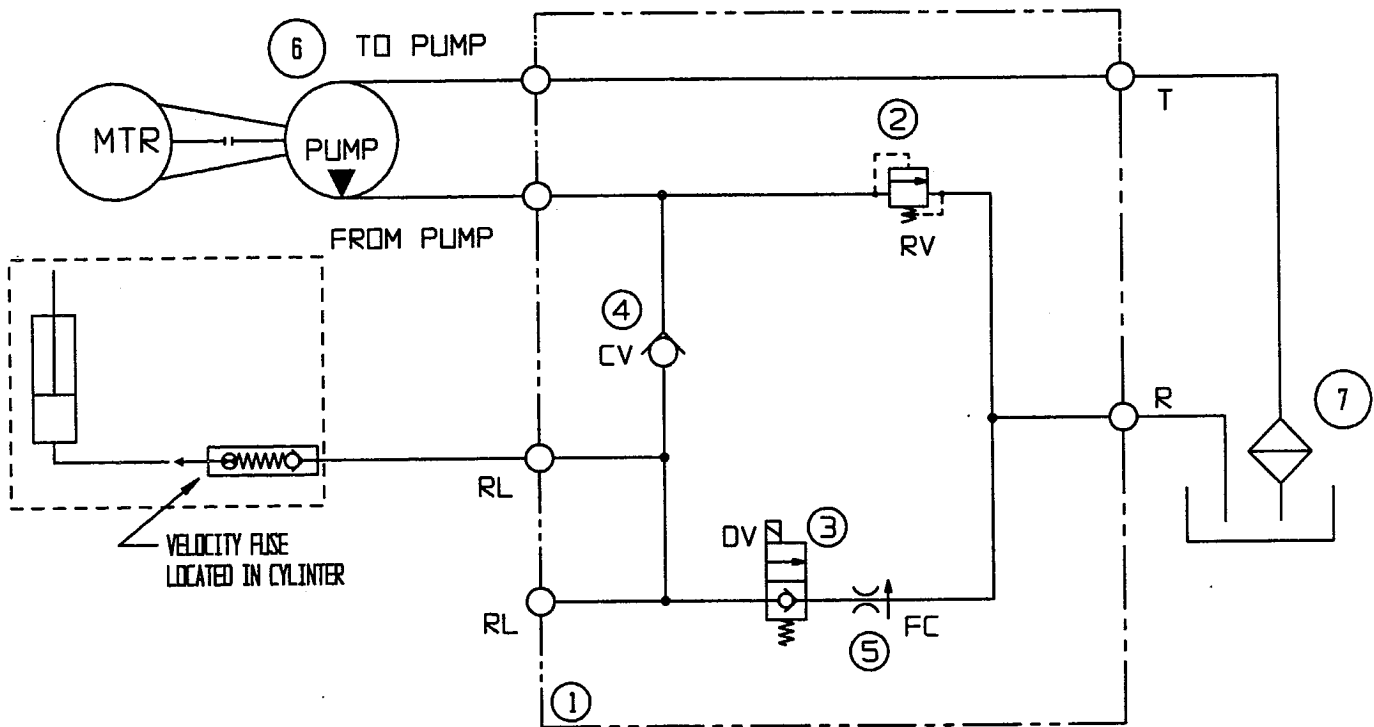
There is a brass velocity fuse with a stainless steel spring in the base of each cylinder. In the event of a hydraulic hose or fitting failure, the platform starts to lower at a fast rate. As soon as the descent travel exceeds the preset rate, the velocity fuse will shut off the oil flow and the platform will remain stationary until pressure is reapplied. This safety feature reduces the possibility of accidental personal injury or damage to the table or contents. After repairs are made reset the velocity fuse by activating the pump by depressing the **UP** button.

## Air Bleed Procedure

If your unit descends very slowly or will not descend at all, air is likely trapped in the hydraulic circuit and must be "bled" from the system. The *TILT MASTER* utilizes a "bleeder" screw at the top of the cylinder near the cross tube. If you experience the above, follow these directions.

- 1.) Remove the load from the forks. Have forks in lowered position.
- 2.) If available, place a 1/4" plastic hose over the cylinder "bleeder" screw, down to a container.
- 3.) Loosen the bleeder screw approximately 1/4 to 1/2 turn which will allow trapped air to escape.
- 4.) Jog power unit "up" button to pressurize the fluid and air in the hydraulic system and allow it to flow from the loosened bleed screw.
- 5.) When "clear" fluid runs from the hydraulic hose, retighten and return to service.

### HYDRAULIC SCHEMATIC



ITEM NO.	DESCRIPTION	ENGINEER NO.	QTY.
1	Manifold Machining Drawing, Lift Hold Lower	99-127-001	1
2	Direct Acting Poppet Type Relief Valve	VM-15	1
3	2-Way Normally Closed Solenoid Valve	SV08-20-D-N-24AG	1
4	Check Valve	CV08-20-04	1
5	Pres Comp Fixed Const Flow Control Valve	FC-1.5 or FC-2.0	1
6	Pump	01-143-006	1
7	Strainer	01-135-036	1

# HYDRAULIC EQUIPMENT

Trouble Shooting Quick Reference Guide  
(For further information, refer to the owners manual, or contact the factory)

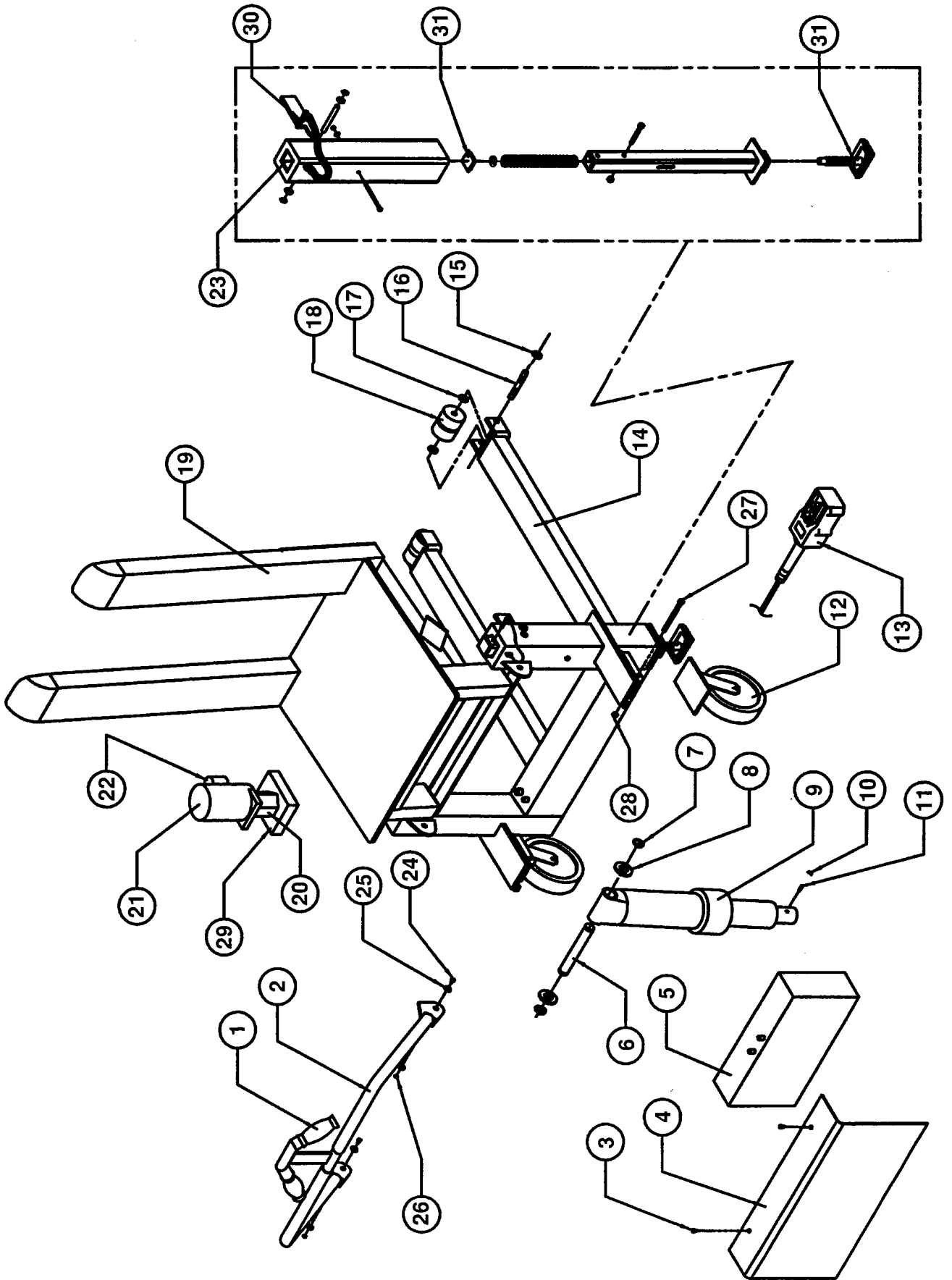
Observation	Possible Cause	Remedy
1.) Forks do not raise but pump is running or humming.	a. Voltage at motor terminals may be too low to run pump at existing load.	a. Measure voltage at motor terminals or as near as possible, while pump is running under load. If voltage is sufficient, check for inadequate or incorrect wiring as this can starve the motor. (Refer to chart in Owner's Manual for recommendations.) Correct as necessary.
	b. Hose or hydraulic line is leaking.	b. Correct as necessary.
	c. Fluid level in reservoir is low.	c. Add fluid. Refer to Owner's Manual for proper fluid levels.
	d. Load exceeds capacity requirements. Relief Valve is bypassing the fluid back into the reservoir.	d. DO NOT CHANGE RELIEF VALVE SETTING. Instead, reduce the load to rated capacity.
	e. Suction filter is clogged, starving pump.	e. Remove and clean.
	f. Suction line may be leaking air, due to loose fittings.	f. Inspect all fittings for proper fit.
	g. Filler/Breather cap on tank may be clogged.	g. Remove and clean.
	h. Down Valve may be energized by faulty wiring or stuck open.	h. Remove Solenoid Valve. Check and clean. (Refer to Hydraulic Section of Owner's Manual.)
	i. Hydraulic pump may be inoperative.	i. Disconnect hydraulic line at power unit. Put pressure line in a large container and cycle pump. If no output, the pump is faulty, consult factory for replacement parts service.
2.) Table raises too slowly.	a. Foreign material stuck in Down Solenoid, causing some fluid to bypass back into tank.	a. Lower the platform. Remove the Solenoid Valve and clean. (Refer to Hydraulic Section of Owner's Manual.)
	b. Foreign material clogging suction filter, breather cap, or a pinched hose.	b. Correct as necessary. (See also, 1(f), (h).)
	c. Low motor voltage.	c. See 1(a).
	d. Table overloaded.	d. See 1(e).
	e. Pump is inoperative.	e. See 1(j).
3.) Motor labors, or is excessively hot.	a. Voltage may be low.	a. See 1(a).
	b. Incorrect wiring.	b. Check that one leg of the motor lines is not connected to ground.
	c. Oil starvation causes pump to bind. High internal heat is developed. If this occurs, pump may be permanently damaged.	c. See 1(d), (f), (g), (h), (j).
	d. Binding cylinders.	d. Align cylinders correctly.
4.) "Spongy" or "Jerky" table operation. Do not confuse spongy operation with small surges caused by foreign material on table wheel roller plate.	a. Fluid starvation.	a. See 1(d), (f), (g), (j).

**Observation****Causa Posible****Remedio**

- | Observation                              | Causa Posible   | Remedio   |
|--|---|---|
| 5.) Table lowers too slowly when loaded. | <ul style="list-style-type: none"><li>a. Down Valve filter clogged.</li><li>b. Pinched tube or hose.</li><li>c. Foreign material in Flow Control Valve.</li><li>d. Binding cylinders</li><li>e. Foreign material in Velocity Fuse.</li></ul>  | <ul style="list-style-type: none"><li>a. Remove Solenoid Valve and clean filter.</li><li>b. Correct as necessary. (In case of pipe, check for obstruction in line.)</li><li>c. Remove and clean Flow Control Valve. (Refer to Hydraulic Section of Owner's Manual.)</li><li>d. Align cylinders correctly.</li><li>e. Remove and clean Velocity Fuse. (Refer to Hydraulic Section of Owner's Manual.)</li></ul>  |
| 6.) Forks lower too quickly.             | <ul style="list-style-type: none"><li>a. Leaking hoses and/or cracked fittings.</li><li>b. Check valve is stuck open. (The combination of a stuck Check Valve and open Solenoid Valve will cause excessive speeds.)</li><li>c. Foreign material stuck in Flow Control Valve. (In this case, table lowers initially at a normal rate then speeds up as the platform descends.)</li></ul>   | <ul style="list-style-type: none"><li>a. Correct as necessary.</li><li>b. Remove and clean Check Valve. (Refer to Hydraulic Section of Owner's Manual.)</li><li>c. Remove Flow Control Valve from the Valve Block and clean. (Refer to Hydraulic Section of Owner's Manual.)</li></ul>  |
| 7.) Forks raise then lower slowly.       | <ul style="list-style-type: none"><li>a. Down Solenoid Valve may be incorrectly wired or is stuck open due to dirt.</li><li>b. Check Valve may be stuck open.</li><li>c. Check for leaking hoses, fittings, pipes, cylinders.</li></ul>   | <ul style="list-style-type: none"><li>a. See 2(a).</li><li>b. Remove and clean Check Valve. (Refer to Hydraulic Section of Owner's Manual.)</li><li>c. Correct as necessary.</li></ul>  |
| 8.) Forks raise, but do not lower.       | <ul style="list-style-type: none"><li>a. Incorrect Down Solenoid Valve wiring.</li><li>b. Down Solenoid Valve is stuck.</li><li>c. Faulty Down Solenoid Coil.</li><li>d. Maintenance safety bar, or some other object blocking down travel.</li><li>e. Binding cylinders.</li><li>f. In case of excessive down speeds, the Velocity Fuse will become operative and shut off the oil flow from the cylinders, thus the platform will remain stationary.</li><li>g. Check if the Limit Switch is inoperative and the platform has raised all the way so that the mechanical stops are engaged. If mechanical stops are engaged, the Velocity Fuse has been locked up.</li></ul> | <ul style="list-style-type: none"><li>a. Correct as necessary. (Refer to Electrical Section of Owner's Manual.)</li><li>b. Lightly tap down the Solenoid Coil body to seat it properly. (DO NOT hit coil hard as it will permanently damage the internal stem). DO NOT remove the Solenoid Valve from the Block as the unit will come down at a dangerous speed.</li><li>c. Remove and replace. (Refer to Electrical Section of Owner's Manual.)</li><li>d. Raise table and remove the safety bar, or whatever object is blocking the down travel, then press the down button.</li><li>e. See 2(e).</li><li>f. To unlock, repressurize the hydraulic system.</li><li>g. Refer to Velocity Fuse Section of the Owner's Manual.</li></ul> |
| 9.) Erratic or uncontrolled operation.   |   | <ul style="list-style-type: none"><li>a. Adequately charge battery before further operation. (Refer to Charging Section of Owner's Manual.)</li></ul>   |



# PARTS IDENTIFICATION



## PARTS LIST

ITEM NO.	DESCRIPTION	ENGINEER NO.	PART NO.	QTY
1	Handle Grips (Ergo Handle)	15-025-006	TM-HDLGRP	2
2	Handle Assembly	15-525-002	TM-HDLASMBY	1
3	Self-Tapping Screw 5/16" x 3/4 Lg.	N/A	N/A	2
4	Guard/Cover Battery Shroud	15-024-011	TM-BATGRD	1
5	Heavy Duty Commercial Battery	N/A	N/A	1
6	Pin Cylinder Bracket 1-1/8" x 4-7/8 S-S	15-112-002	TM-PCBKT	1
7	Snap Ring, 1-1/8" Truare #S100-75	15-117-002	TM-SMPRG	2
8	Washer Flat, 1/2" I.D.	N/A	N/A	2
9	Cylinder, 4K-3 x 10 Heavy Guard	24-021-011	TM-CYL4	1
9	Cylinder, 2K-2-1/2 x 10 Heavy Guard	24-021-005	TM-CYL2	1
10	Nut 1/2" - 13 UNC	N/A	N/A	1
11	Cylinder Retainer Bolt 1/2"-13 UNC	01-118-001	TM-CYLRTBLT	1
12	Caster, Phenolic 2 x 8 Swivel	16-132-034	TM-PHCSTR	2
13	Pendent Assy 2-Button with 4 Pin	01-522-022	TM-PNDASSY	1
14	Frame Weldment	05-514-050	TM-FRMWLD	1
15	E-Clip Truarc #S304-75	15-117-003	TM-ECLP	2
16	Pin, Outer Roller, 3/4" x 4-5/8 Lg.	15-112-001	TM-PNOTRLR	2
17	Washer, Flat	N/A	N/A	4
18	Roller, 3" Phenolic	16-132-001	TM-PHNRLR	4
19	Deck Weldment	15-513-005	TM-DKWLDT	1
20	Pump, Hydraulic Gear, Manifold Style	01-143-001	TM-PMPHYD	1
21	Motor, 12 Volt DC with Tang Drive	01-135-036	TM-MTRDC	1
22	Switch, Motor Start 12V DC	15-022-004	TM-SWMTR	1
23	Automatic Brake Assembly	38-537-001	TM-ASBRK	1
24	Bolt, 1/2"-16 UNC x 1-1/2" Lg.	N/A	N/A	2
25	Washer, Flat 1/2" ID	N/A	N/A	4
26	Nut, Nylock 1/2"	N/A	N/A	2
27	Bolt, 3/8" - 16 UNC x 5" Lg.	N/A	N/A	2
28	Nut, Hex 3/8" - 16 UNC	N/A	N/A	2
29	Manifold, Hydraulic (LHL)	15-127-013	TM-MFDHYD	1
30	Detented Lock Pin	38-037-001	TM-DLPIN	1
31	Plastic Cap	38-024-002	TM-PLSCP	1
32	Floor Friction Pad Weldment	38-537-002	TM-FFPW	1

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## PERIODIC MAINTENANCE INSTRUCTIONS

### (A) Before Each Use Check For The Following:

- 1.) Frayed wires
- 2.) Oil leaks
- 3.) Pinched or chafed hoses
- 4.) Structural deformation of forks or frame
- 5.) Unusual noise or binding

**Do not use if there are any of the above!**

### (B) Monthly Inspections

- 1.) Check oil level. Oil should be 1" to 1-1/2" below the top of the tank with the lift in the fully lowered position. Add as necessary.
- 2.) Check for oil leaks. See Troubleshooting Section and correct as necessary.
- 3.) Check clevis and pivot points for wear.
- 4.) Check for worn or damaged hydraulic hoses, electrical wires, and cords. Repair as necessary.
- 5.) Check rollers for looseness and wear. See Troubleshooting.
- 6.) Check retaining rings at load rollers and clevis.
- 7.) Check for unusual noise. See Troubleshooting section.
- 8.) Make sure all warning labels are in place and in good condition.
- 9.) Clean off dirt and debris.

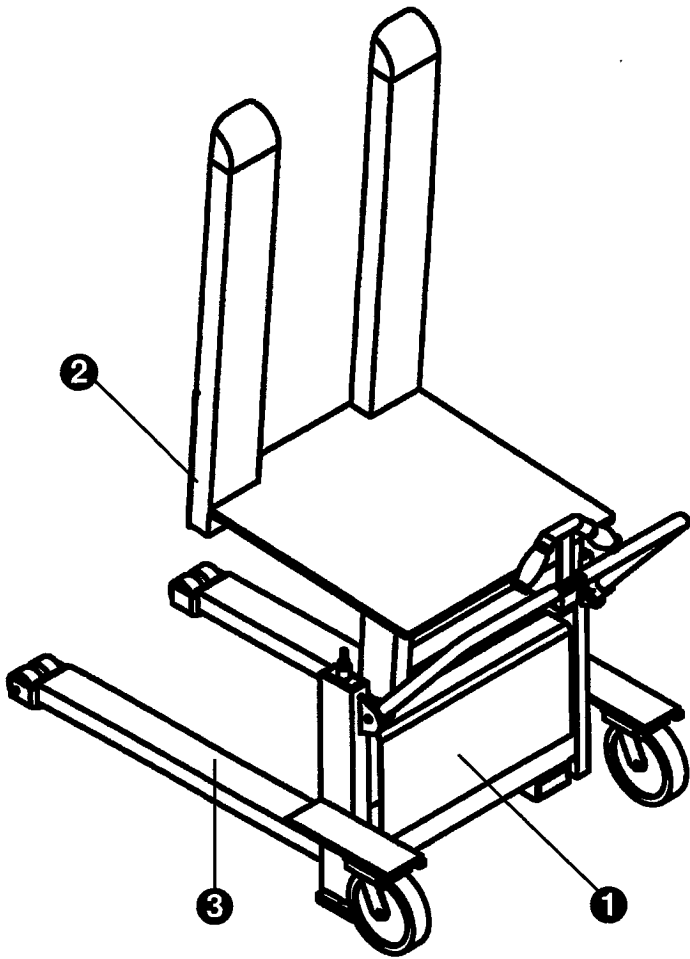
### (B) Yearly Inspection

Hydraulic oil should be changed at least once a year, or sooner if the oil darkens or becomes gritty. Flush reservoir before refilling. Presence of water is indicated if the oil turns milky. Recommended oil: AW-32 Hydraulic fluid or equal.

All maintenance work must be performed by qualified personnel with training in the repair of electrical and hydraulic components.

# WARNING LABEL IDENTIFICATION

MAKE SURE ALL WARNING LABELS ARE IN PLACE!



**1**

**DANGER**  
CORROSIVE  
MATERIAL

**PELIGRO**  
MATERIAL  
CORROSIVO

**DANGER**  
MATIÈRES  
CORROSIVES

T & S Equipment Company  
Ph (219)665-9521  
Fax (219)665-1339

295

\*Product safety signs or labels should be periodically inspected and cleaned by the product users as necessary to maintain good legibility for safe viewing distance . . . ANSI 535.4 (10.21)  
Contact manufacturer for replacement labels if needed.

<b>2</b>	<b>▲ WARNING</b> KEEP CLEAR PINCH POINT	<b>▲ AVISO</b> MANTENGASE ALEJADO DEL PUNTO DE CORTE	<b>▲ AVERTISSEMENT</b> SETENIR À DISTANCE DU POINT DE PINCEMENT 208
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<b>3</b>	<b>▲ WARNING</b> KEEP CLEAR WHEN IN USE	<b>▲ AVISO</b> MANTENGASE ALEJADO CUANDO SE ESTA OPERANDO	<b>▲ AVERTISSEMENT</b> SE TENIR À DISTANCE LORS DU FONCTIONNEMENT 220
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**U.S. DEPARTMENT OF LABOR**  
Occupational Health and Safety Administration  
**MATERIAL SAFETY DATA SHEET**

Required under USDL Safety and Health Regulations for Ship Repairing,  
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

**SECTION I**

MANUFACTURER'S NAME <b>CROWN BATTERY MANUFACTURING COMPANY</b>		EMERGENCY TELEPHONE NUMBER <b>(800) 645-8265 OR (800) OIL-TANK</b>	
ADDRESS <b>1445 MAJESTIC DRIVE, P.O. BOX 990, FREMONT, OHIO 43420</b>		TELEPHONE NUMBER (FOR INFORMATION) <b>(419) 334-7181</b>	
CHEMICAL NAME AND SYNONYMS <b>BATTERIES, WET, FILLED WITH ACID</b>		TRADE NAME AND SYNONYMS <b>N/A</b>	

**SECTION II - MATERIAL IDENTIFICATION AND INFORMATION**

COMPONENTS - Chemical Name and Common Names (Hazardous Components 1% or greater; Carcinogens 0.1% or greater)	%	OSHA PEL	OSHA PEL	OTHER LIMITS RECOMMENDED
LEAD/LEAD OXIDE/LEAD SULFATE CAS# 7439-92-1	60%	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	N/A
ANTIMONY CAS# 7440-36-0	1-5%	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	N/A
ARSENIC CAS# 7440-38-2	< 1%	0.50 mg/m <sup>3</sup>	0.50 mg/m <sup>3</sup>	N/A
SULFURIC ACID CAS# 7664-93-9**	3-12%	1.00 mg/m <sup>3</sup>	1.00 mg/m <sup>3</sup>	N/A
OTHERS				
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				
**Note: ELECTROLYTE (water plus 25-40% sulfuric acid by weight) CONSTITUTES 3-12% OF TOTAL BATTERY WEIGHT				

**SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS**

BOILING POINT (°F)	203°	SPECIFIC GRAVITY (H <sub>2</sub> O = 1)	1.245-1.295 BATTERY ELECTROLYTE
VAPOR PRESSURE (mm Hg)	14@37%@80°F	MELTING POINT	-35°F TO +10.6° F
VAPOR DENSITY (AIR = 1)	>1	WATER REACTIVE	YES, PRODUCES HEAT
SOLUBILITY IN WATER	100%		
APPEARANCE AND ODOR	CLEAR LIQUID WITH SHARP PUNGENT ODOR		

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

FLASH POINT (Method used) <b>NOT COMBUSTIBLE</b>	FLAMMABLE LIMITS IN AIR % BY VOLUME <b>N/A</b>	AUTO IGNITION TEMPERATURE <b>N/A</b>	Let/Uel <b>NOT COMBUSTIBLE</b>
EXTINGUISHING MEDIA For fires in area, Dry chemical, water fog, water, carbon dioxide			
SPECIAL FIREFIGHTING PROCEDURES Sulfuric acid fume, sulfur dioxide gas or carbon monoxide may be released when acid decoposes: Wear NIOSH approved self-contained breathing apparatus.			
UNUSUAL FIRE AND EXPLOSION HAZARDS Water applied to sulfuric acid generates heat and causes acid to spatter: wear full-cover sulfuric acid resistant clothing. Sulfuric acid reacts violently with metals, nitrates, chlorates, carbides, fulminates, picrates and other organic materials. Reacts with most metals to yield explosive/flammable hydrogen gas: this reaction is intensified when sulfuric acid is diluted with water, to form battery electrolyte.			

### SECTION V - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY INHALATION: YES    SKIN: YES    INGESTION: YES	
HEALTH HAZARDS ACUTE: EYES, SKIN, RESPIRATORY SYSTEM AND DIGESTIVE SYSTEM	
CHRONIC: EYES, SKIN, RESPIRATORY SYSTEM AND DIGESTIVE SYSTEM	
SIGNS AND SYMPTOMS OF EXPOSURE IRRITATION OF EXPOSED AREA, BURNS, AND RESPIRATORY PROBLEMS. NO POSSIBILITY OF OVER EXPOSURE OF LEAD WILL OCCUR UNLESS BATTERY IS DESTROYED.	
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE EXPOSURE TO MIST MAY CAUSE LUNG DAMAGE AND AGGRAVATE PULMONARY CONDITION	
EMERGENCY AND FIRST AID PROCEDURES SEEK MEDICAL ASSISTANCE FOR FURTHER TREATMENT, OBSERVATION AND SUPPORT IF NECESSARY	
EYE CONTACT - WASH WITH COPIOUS QUANTITIES OF COOL WATER FOR AT LEAST 15 MINUTES.	
SKIN CONTACT - FLUSH AREA WITH LARGE AMOUNTS OF COOL WATER FOR AT LEAST 15 MINUTES.	
INHALATION - REMOVE TO FRESH AIR, IF BREATHING IS DIFFICULT - GIVE OXYGEN	
INGESTION - GIVE MILK TO DRINK, DO NOT INDUCE VOMITING, CALL PHYSICIAN	

### SECTION VI - REACTIVITY DATA

STABILITY	STABLE	X	CONDITIONS TO AVOID N/A
	UNSTABLE		
INCOMPATIBILITY (Materials to avoid) AVOID COMBUSTIBLES, ORGANIC MATERIALS, AND STRONG REDUCING AGENTS			
HAZARDOUS DECOMPOSITION PRODUCTS SULFUR TRIOXIDE, CARBON MONOXIDE, SULFURIC ACID FUMES, AND SULFUR DIOXIDE			
HAZARDOUS POLYMERIZATION	MAY OCCUR	X	CONDITIONS TO AVOID N/A
	WILL NOT OCCUR		

### SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED CONTAIN SPILL USING NONCOMBUSTIBLE MATERIALS; VERMICULITE, DRY SAND, AND EARTH. NEUTRALIZE WITH LIME, SODA ASH, SODIUM BICARBONATE, ETC.			
WASTE DISPOSAL METHOD CONSULT STATE ENVIRONMENTAL AGENCY. INDIVIDUAL STATE REGULATIONS VARY.			
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE SEPARATE FROM INCOMPATIBLE MATERIALS, KEEP AWAY FROM FIRE, SPARKS AND HEAT			
OTHER PRECAUTIONS AND/OR SPECIAL HAZARDS CONTACT WITH METALS MAY PRODUCE TOXIC SULFUR DIOXIDE FUMES AND MAY ALSO RELEASE FLAMMABLE HYDROGEN GAS. THIS REACTION IS INTENSIFIED WHEN DILUTED.			
NFPA RATING: HEALTH: 3    FLAMMABILITY: 0    REACTIVITY: 2    SPECIAL: 0			
HMIS RATING: HEALTH: 3    FLAMMABILITY: 0    REACTIVITY: 2    PERSONAL PROTECTION: X			

### SECTION VIII - CONTROL AND PROTECTIVE MEASURES

RESPIRATORY PROTECTION (Specify type) ABOVE P.E.L.: NIOSH APPROVED, FITTED, FULL FACE RESPIRATOR		
VENTILATION	LOCAL EXHAUST VENTILATED AREA PREFERRED	SPECIAL MUST BE ACID AND EXPLOSIVE RESISTANT
	MECHANICAL (General) IF BELOW P.E.L.	OTHER MUST BE ACID AND EXPLOSIVE RESISTANT
PROTECTIVE GLOVES ACID RESISTANT	EYE PROTECTION FULL FACE PROTECTION	
OTHER PROTECTIVE EQUIPMENT ACID RESISTANT CLOTHING AND BOOTS		

# MATERIAL SAFETY DATA SHEET

DR. LUBRICANTS, INC.

24 HOUR EMERGENCY ASSISTANCE  
(219) 485-0118

GENERAL MSDS ASSISTANCE  
(219) 484-0301

CODE: 0

HAZARD RATING> LEAST-0 SLIGHT-1 MODERATE-2 HIGH-3 EXTREME-4

DR. LUBRICANTS, INC.  
4611 NEWAYGO ROAD, SUITE D  
FORT WAYNE, IN 46808

DATE: 03/15/96

TELEPHONE NUMBER (219) 484-0301

## SECTION I - PRODUCTION IDENTIFICATION

PRODUCT: **HO 150**

## SECTION II - COMPOSITION AND HAZARDOUS INFORMATION\*

CHEMICAL NAME	CAS NUMBER	WEIGHT PERCENT IS LESS THAN	OCCUPATIONAL EXPOSURE LIMITS (TLV-TWA) (TLV-STEL)
PETROLEUM HYDROCARBON	64742-54-7	98.0 5MG/M3 IN AIR	10MG/M3 IN AIR

\* ITEMS NOT SHOWN ARE NOT LISTED IN THE OSHA - T.S.C.A HAZARDOUS CHEMICALS LISTING.

## SECTION III - PHYSICAL DATA

BOILING RANGE .....	NA	VAPOR .....	NA
ODOR .....	PETROLEUM ODOR	EVAPORATION RATE .....	NA
APPEARANCE .....	AMBER LIQUID	SOLUBILITY .....	INSOLUBLE
VOLATILE BY WEIGHT .....	<0.1%	PRODUCT DENSITY .....	0.865-0.895
VOLATILE BY VOLUME .....	<0.1%		

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION	NA	FLASH POINT (CLEVELAND OPEN CUP)	>360F	LEL:	NA
DOT - NOT REGULATED				UEL:	NA
EXTINGUISHING MEDIA: CARBON DIOXIDE, DRY CHEMICAL, FOAM					

UNUSUAL FIRE AND EXPLOSION HAZARDS: DO NOT DIRECT A SOLID STREAM OF WATER ONTO BURNING PRODUCT. THIS MAY CAUSE SPREADING AND INCREASE FIRES INTENSITY. COMBUSTION MAY PRODUCE: OXIDES OF CARBON, AND INCOMPLETELY BURNED HYDROCARBONS IN THE FORM OF FUMES AND SMOKE.

SPECIAL FIREFIGHTING PROCEDURES: WEARING A SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN HE POSITIVE PRESSURE DEMAND MODE WHEN FIGHTING FIRES.

## SECTION V - HEALTH HAZARD DATA

EFFECTS OF OVER EXPOSURE: MAY CAUSE MILD EYE IRRITATION AND REDNESS. PROLONGED OR REPEATED EXPOSURE TO THE SKIN MAY RESULT IN LOSS OF NATURAL OILS ACCOMPANIED BY DRYNESS, CRACKING AND DERMATITIS. INGESTION MAY RESULT IN NAUSEA, DIARRHEA AND GASTROINTESTINAL IRRITATION, OVEREXPOSURE TO MIST MAY CAUSE UPPER RESPIRATORY TRACT IRRITATION AND DIFFICULTY BREATHING.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: NON KNOWN.

PRIMARY ROUTE(S) OF ENTRY: DERMAL INHALATION INGESTION.

EMERGENCY AND FIRST AID PROCEDURES: IN CASE OF EYE CONTACT IMMEDIATELY FLUSH EYES WITH CLEAN WATER FOR AT LEASE 15 MINUTES. IF EYE IRRITATION PERSISTS, CONTACT A PHYSICIAN. IN CASE OF PROLONGED SKIN CONTACT, REMOVE ANY CONTAMINATED CLOTHING AND RINSE KIN THOROUGHLY WITH WATER FOR AT LEASE 15 MINUTES. IF SKIN IRRITATION PERSISTS, CONTACT A PHYSICIAN. IN CASE OF OVEREXPOSURE TO MIST, REMOVE VICTIM TO FRESH AIR: IF BREATHING IS DIFFICULT ADMINISTER OXYGEN: AND CONTACT A PHYSICIAN IMMEDIATELY, IF PRODUCT IS INGESTED DO NOT INDUCE VOMITING: GIVE TWO GLASSES OF WATER AND CONTACT A PHYSICIAN.

## SECTION VI - REACTIVITY DATA

STABILITY: THIS PRODUCT IS STABLE UNDER NORMAL STORAGE CONDITIONS. HAZARDOUS POLYMERIZATION: WILL NOT OCCUR UNDER NORMAL CONDITIONS. HAZARDOUS DECOMPOSITION PRODUCTS: THERMAL DECOMPOSITION MAY RESULT IN THE FORMATION OF: OXIDES OF CARBON, AND INCOMPLETELY BURNED HYDROCARBONS IN THE FORM OF FUMES AND SMOKE.

CONDITIONS TO AVOID: AVOID CONTACT WITH STRONG OXIDIZING AND REDUCING AGENTS AND STRONG ALKLI. INCOMPATIBILITY: AVOID CONTACT WITH STRONG OXIDIZING AND REDUCING AGENTS AND STRONG ALKLI.

## SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED FOR SMALL SPILLS: SOAK UP SPILL WITH ABSORBENT MATERIAL. FOR LARGE SPILLS: DIKE SPILL AND PUMP INTO DRUMS FOR PROPER DISPOSAL.

WASTE DISPOSAL METHOD: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL STATE AND FEDERAL REGULATIONS.

## SECTION VIII - SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION: NORMALLY NOT REQUIRED, HOWEVER, WHEN THE TLV IS EXCEEDED WEAR THE APPROPRIATE MSHA/NIOSH APPROVED RESPIRATOR.

VENTILATION: PROVIDE ADEQUATE VENTILATION (SUCH AS MECHANICAL OR LOCAL) TO ASSURE TLV IS NOT EXCEEDED.

PROTECTIVE GLOVES: NORMAL NOT REQUIRED, HOWEVER, IF HANDS ARE FREQUENTLY IN FLUID WEAR OIL AND CHEMICAL IMPERVIOUS GLOVES.

EYE PROTECTION: SAFETY GLASSES REQUIRED FOR NORMAL USAGE, WEAR CHEMICAL GOGGLES WHEN EXCESSIVE SPLASHING MAY OCCUR.

OTHER PROTECTIVE EQUIPMENT: NORMALLY NOT REQUIRED, HOWEVER, WHEN REPEATED CONTACT OCCURS WEAR IMPERVIOUS CLOTHING AND BOOTS.

HYGIENIC PRACTICES: FOLLOW STANDARD INDUSTRIAL HYGIENE PRACTICES. LAUNDRY ANY CONTAMINATED CLOTHING BEFORE REUSE.

## SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: DO NOT STORE IN THE PRESENCE OF HEAT, SPARKS, FLAME OR ANY OTHER SOURCES OF IGNITION.

STORE AWAY FROM STRONG OXIDIZING AGENTS. EMPTY DRUMS MAY CONTAIN PRODUCT RESIDUES. ALL SAFETY PRECAUTIONS TAKEN WHEN HANDLING THIS PRODUCT SHOULD BE TAKEN WHEN HANDLING EMPTY DRUMS AND CONTAINERS.

OTHER PRECAUTIONS: NONE

## SECTION X - HMIS/NFPA RATINGS

HMIS: HEALTH: 0	FLAMMABILITY: 1	REACTIVITY: 0	PERSONAL PROTECTION: B
NFPA: HEALTH: 0	FLAMMABILITY: 1	REACTIVITY: 0	SPECIFIC HAZARD: B

## SECTION XI - OTHER REGULATORY INFORMATION

DOT HAZARDOUS NATURAL DESCRIPTION: NONE

THE INFORMATION CONTAINED HEREIN IS, TO THE BEST OF OUR KNOWLEDGE AND BELIEF, ACCURATE. HOWEVER, SINCE THE CONDITIONS OF HANDLING AND USE ARE BEYOND OUR CONTROL, WE MAKE NO GUARANTEE OF RESULTS, AND ASSUME NO LIABILITY FOR DAMAGES INCURRED BY USE OF THIS MATERIAL. IT IS THE RESPONSIBILITY OF THE USER TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.

### TYPICAL PROPERTIES

	<u>TEST METHOD</u>
API GRAVITY @ 60F	D-287
VISCOSITY SUS @ 100F: SEC	D-2161
VISCOSITY cSt @ 100F: SEC	D-445
VISCOSITY INDEX	D-2270
COLOR	D-1500

	<u>GRADE</u>			<u>GRADE</u>	
	<u>150</u>	<u>200</u>		<u>300</u>	<u>500</u>
API GRAVITY @ 60F	30-33	28-31.5	API GRAVITY @ 60F	29-31	28-30
VISCOSITY SUS @ 100F: SEC	149-182	214-262	VISCOSITY SUS @ 100F: SEC	317-389	468-575
VISCOSITY cSt @ 100F: SEC	28.8-35.2	41.4-50.6	VISCOSITY cSt @ 100F: SEC	61.2-74.8	90-110
VISCOSITY INDEX (MIN)	95 MIN	95 MIN	VISCOSITY INDEX (MIN)	95 MIN	95 MIN
COLOR (MAX)	2	3	COLOR (MAX)	3	3
FLASH POINT F (MIN)	380+410		FLASH POINT F (MIN)	420+440+	
POUR POINT C (MAX) (F)	-20 (0)	-20 (0)	POUR POINT C (MAX) (F)	-20 (0)	-10 (15)



# LIMITED WARRANTY

**ONE YEAR LIMITED WARRANTY.** The manufacturer warrants for the original purchaser against defects in materials and workmanship under normal use one year after date of purchase. (Not to exceed 15 months after date of manufacture.) Any part which is determined by the manufacturer to be defective in material or workmanship and returned to the factory, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at our option. Labor costs for warranty repairs and/or modifications are not covered unless done at manufacturer's facilities. Any modifications performed without written approval of the manufacturer may void warranty. This limited warranty gives purchaser specific legal rights which vary from state to state.

**LIMITATION OF LIABILITY.** To the extent allowable under applicable law, the manufacturer's liability for consequential and incidental damages is expressly disclaimed. The manufacturer's liability in any event is limited to, and shall not exceed, the purchase price paid. Misuse or modification may void warranty.

**WARRANTY DISCLAIMER.** Our company has made a diligent effort to illustrate and describe the products shown accurately; however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustrations or descriptions.

The provisions of the warranty shall be construed and enforced in accordance with the UNIFORM COMMERCIAL CODE and laws as enacted in the State of Indiana.

**DISPOSITION.** Our company will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within the Limited Warranty. Warranty claims must be made in writing within said year.

## SERVICE RECORD

DATE OF SERVICE: ___ / ___ / ___
WORK DONE BY: _____
SERVICE PERFORMED: _____
_____
_____

DATE OF SERVICE: ___ / ___ / ___
WORK DONE BY: _____
SERVICE PERFORMED: _____
_____
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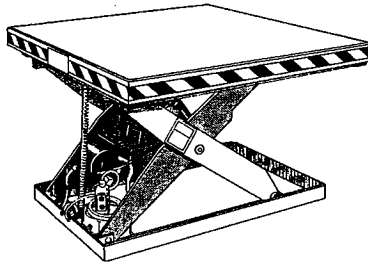
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WORK DONE BY: _____
SERVICE PERFORMED: _____
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**NOTES**

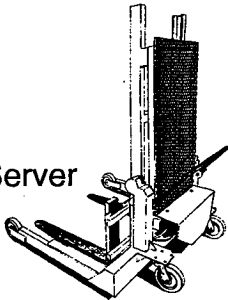


# Material Handling Problem Solvers

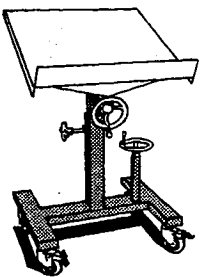
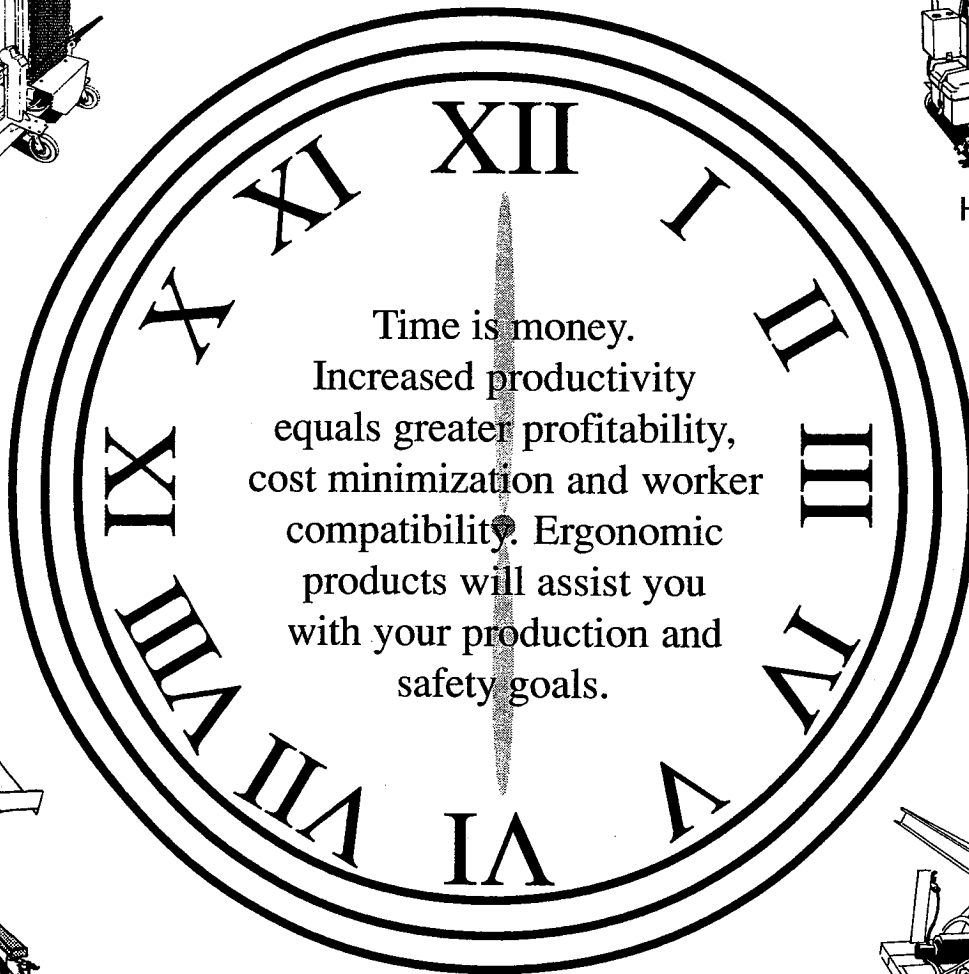
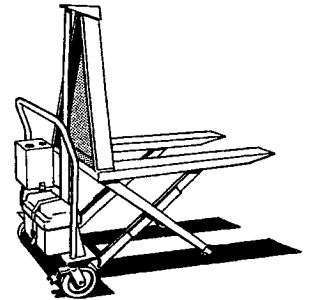
Scissor Lift Table



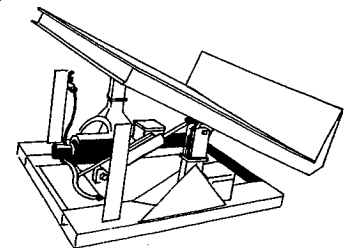
Pallet Server



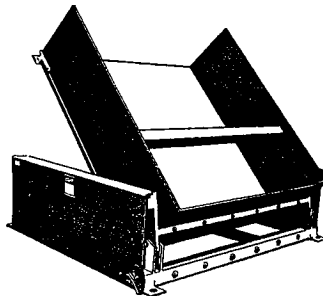
High Rise Lift



Mobile Lift & Tilt Work Stand



45° Container Tilter



Ground Lift Tilter