Model 400
Operator's Manual
PREFACE

This Operator's Manual has been compiled by the LULL ENGINEERING COMPANY, INC. of St. Paul, Minnesota, to give instructions for the operation and maintenance of Lull High-Lift Loaders.

NOTE: This book belongs to the machine and should always be AVAILABLE TO THE OPERATOR.

Read the operator's Manual carefully to become familiar with the operation and preventive maintenance for this machine. It is very important that the operator know the DO'S and DON'TS for safety sake and to prolong the life of the machine.

Maintenance instructions must be carried out conscientiously for the machine to give good service. If prescribed maintenance is not carried out, performance may be adversely affected and warranty claims may be rejected by LULL ENGINEERING or its Distributor/Dealer.

When replacement parts are required, insist on genuine LULL parts from your Dealer as extensive damage could occur from the use of inferior quality parts.

When contacting your Distributor/Dealer about your machine - always give Machine Model and Serial Numbers.

In accordance with the Company's policy of continuous improvement to its machines, alterations in specifications of machines may be made at any time without notice and the Company does not accept responsibility for any discrepancies, which may occur between the specifications of its machines and the description contained thereof in its publication.

The machine you are about to operate should serve you well, if you adhere to the guidance given in the Operator's Manual.

We are proud to have you as a customer and feel you will be proud to be a LULL owner.
CAUTION

INSTRUCTIONS FOR OPERATING LULL MODELS

7C2-31', 7C2-40', "400", AND 400-LS HIGH-LIFT LOADERS

1. Lower lift arm and mast when traveling with or without a load.

2. Keep work area clear of blocks, lumber, and other debris for safe operation.

3. Do not operate on side slopes with lift arms and mast raised.

4. Keep load limit within capacity of the machine.

5. When lifting on a down slope with front end lower, a lesser load should be lifted.

6. Keep hands, arms, etc. away from moving mechanisms.

7. Bring machine to a complete stop before changing direction of travel.

8. If the above instructions are not followed accidents incurred while operating these machines will not be the responsibility of the manufacturer.

9. ACCIDENTS ARE CAUSED BY CARELESS OPERATION OR FAILURE TO COMPLY WITH INSTRUCTIONS.
CAUTION

INSTRUCTIONS FOR OPERATING SIDE TILT

LULL MODEL 400-34' HIGH-LIFT LOADER

1. Twice daily extend and retract side tilt cylinders fully and slowly until the by pass valve releases to get and trapped air out of the cylinders. Trapped air in side tilt cylinders can cause the machine to lean to one side or the other.

2. Always have lift arm and mast in lowered position when turning or moving on side slopes and use the side tilt feature to level the machine.

3. Use tilting mechanism in lifting loads on lateral slopes. Always level machine before lifting.

4. When traveling laterally on side slopes, use tilting feature with or without a load.

5. This machine should not be operated on more than a 10 degree side slope.

6. This machine may become unstable if above instructions are not followed. ACCIDENTS ARE CAUSED BY CARELESS OPERATION OR FAILURE TO COMPLY WITH INSTRUCTIONS.

The side tilt control lever is located centrally on the floorboard. The lever, by actuating hydraulic cylinders on either side of the front oscillation frame, will keep the main frame level and enable the operator to utilize the fullest height of the machine while on ground which is not level.

CAUTION: ON 400 MODEL MACHINES WITH THE SIDE HILL LEVELING FEATURE, LEVEL THE MACHINE AT THE GROUND. DO NOT ATTEMPT TO CORRECT THE LEVEL AT HEIGHTS. IF ON RAISING THE LOAD, THE OPERATOR FINDS HIS MACHINE OFF LEVEL, LOWER THE ARMS SUFFICIENTLY TO SAFELY CORRECT BEFORE LIFTING UP AGAIN.

Twice a day the side tilt cylinder should be extended and retracted fully and slowly until the by pass valve releases to get any trapped air out of these cylinders. Trapped air in side tilt cylinders can cause the machine to lean to one side or the other. Raise the lift arms only when the level indicator shows the machine to be level, (0 degrees on indicator.)

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MAINTENANCE

This machine was checked and tested before shipment, but due to jolts and vibrations during shipment it should be rechecked upon delivery. A thorough inspection should be made of all nuts, bolts, and hose connections. Tighten where necessary. Check all parts for breakage, and check for oil leaks. Oil levels should be replenished if necessary, and should be maintained at check plug levels at all times.

Upon delivery, lubricate all points as shown on the lubrication chart, and follow the lubrication chart instructions thereafter.

Be certain that the tires are inflated properly. The left front tire should be inflated to 50 psi, while the right front tire should be inflated to 48 psi. The left front tire contains more air because of the extra weight on the left side due to the platform, controls and operator. The two rear tires should be inflated with air to 40 psi.

Special attention should be given to the hydraulic system. It could result in danger to the load and to persons and property in the immediate area. Any oil leak should be repaired and all worn hoses should be replaced. It is essential that these parts are replaced with Lull Engineering Company parts, and no other.

CAUTION

DO NOT USE STANDARD HARDWARE STORE PIPES AND FITTINGS! VERY FEW HARDWARE STORES OR PLUMBERS STOCK EXTRA STRONG PIPES OR AAR FITTINGS.

How to fill the hydraulic tank and system: Fill the tank full of hydraulic oil, then have the operator raise and lower the hoist cylinders, fully extend and retract every cylinder on the entire system. This also includes the two steering cylinders. Turn them from extreme right to extreme left position and back to center. After all cylinders in the hydraulic system are full of oil, fill the supply tank to upper check level plug. Never run the machine with oil below the low level check plug in the supply tank.

Never run the engine unless the hydraulic tank and the complete hydraulic system is full of oil.

When hydraulic fluid is added to the system, always pour it thru a micron filter. Never filter the hydraulic fluid with cloth because lint particles may be added to the system. If a micron filter is not available, use a funnel with a fine wire screen (at least 200 mesh) inserted in the small end.

Be certain that the hydraulic fluid meets the specifications as listed in the lubrication chart.
Never operate the control levers when the engine is not running. This causes an air pocket above the piston and results in momentary drifting action.

If an air pocket should occur, the oil can be replaced by working the control lever until by-pass flutter is heard in full forward or full back position.

OPERATING INSTRUCTIONS

With the engine running, the operator should familiarize himself with the Revers-O-Matic transmission. He should make sure that the tractor will operate in all four speeds. Depending on the position of the Revers-O-Matic lever, all four gears become either forward or reverse gears.

The hydraulic levers, just to the right of the seat, operate all the functions of the lifting mechanism. The function of each individual lever is noted on the dashboard.

A rear wheel disconnect lever is conveniently located in the cab; 4-wheel drive is only used when ground conditions require it and must be disconnected at all other times.

A good loader operator is constantly on the alert to avoid wheel spinning as it causes excessive tire wear. Be especially alert when operating in 4-wheel drive.

CAUTION

The 4-wheel drive must not be engaged when machine is being driven over hard surfaces or at high speeds.

INSTRUCTIONS FOR OPERATION OF LULL 4-WHEEL DRIVE HIGH-LIFT LOADERS.

1. The rear wheel disconnect (the clutch that disconnects the rear axle propeller shaft from the front axle propeller shaft) must be disengaged at all times when the unit is being operated on hard and unyielding surfaces around the job site and also when being driven on the highways from job to job. This is very necessary because windup will develop in the drive line and the weakest point will break—usually the axle shaft. When one axle shaft is broken, is very likely the other shafts may have been weakened because of windup and could possibly fail in a short time. Again we caution—use Four Wheel Drive only when conditions are necessary—mud, snow, ice, soft sand and other yielding ground conditions.
2. Whenever possible, when the machine is in Four Wheel Drive on difficult ground conditions, attempt to have the rear wheels follow the path of the front wheels. This is necessary because the machine needs only to break one set of tracks, and each wheel turns the same number of revolutions as the other wheel on the same side. By this we mean, both the front and rear right wheel and the front and rear left wheel turn the same number of revolutions if the wheels track. This prevents windup when in Four Wheel Drive.

3. When the machine is being operated in difficult ground conditions, especially sand and mud, the tire pressure can be lowered down to as low as about 20 lbs. of air pressure. However, when you are operating with low air pressure, the loads in the pallet forks should be lighter as a tire can be ruptured if heavy loads are carried with low air pressure. This lower air pressure flattens out the tires, thereby giving them a better grip on the terrain. Slippage is minimized and the windup is considerably less. Be sure to reinflate the tires after the ground conditions become normal again.

4. Do not use the reversing gear as a brake. Come to a complete halt by using the foot brake before moving the forward and reverse lever from one position to the other. This relieves the strain on the drive line. The torque converter then can pick up the load without a snapping effect that would otherwise occur.

5. Remember this is not a towing tractor. We advise against towing heavy vehicles, especially heavy trucks, ready-mix trucks and other heavy vehicles. We definitely advise once again—to use Four Wheel Drive only when working on slippery, sandy surfaces that require the use of Four Wheel Drive.

6. The above instructions must be followed carefully. Lull Engineering Company, Inc. will not otherwise be responsible for axle breakage. Axle shafts and gears will be considered expendable items if the machine is operated in a careless manner not in accord with the above instructions.

All hydraulic valves are balanced and spring-loaded to return to neutral when the operator's hand is removed from the lever. The valves are of the throttling type and regulate the speed of the movements, i.e., a load can be raised or lowered faster or slower by the amount that the lever is moved.

The operator should make sure that all of the individual functions, the lift, the transverse motion, the tilt, the tower and the accessory valve (if a hydraulic accessory is used), function properly before the machine is put into service.
CAUTION

DO NOT ATTEMPT TO LIFT MORE THAN 4000 LBS. THIS IS THE MAXIMUM LOAD THAT THE MACHINE IS MEANT TO HANDLE.

CAUTION

THE 400 LOADER LIFTS ITS MAXIMUM LOAD TO 34 FEET IN THE RETRACTED POSITION. WHEN EXTENDING THE LIFT ARMS, BE SURE THE WEIGHT BEING LIFTED DOES NOT EXCEED THE CAPACITY OF THE MACHINE OR IT WILL TIP FORWARD.

CAUTION

WHEN EXTENDING A CAPACITY OR NEAR CAPACITY LOAD THE MACHINE SHOULD BE ON LEVEL GROUND, NOT SLOPING DOWN AT THE FRONT WHEELS. IF THE MACHINE IS FACING DOWN SLOPE IT WILL TIP FORWARD MORE EASILY AND LIGHTER LOADS MUST BE ELEVATED.

CAUTION

BE ESPECIALLY AWARE OF THE TERRAIN AND YOUR LOAD WEIGHT WHEN LIFTING AND EXTENDING CAPACITY OR NEAR CAPACITY LOADS.

Extreme care must be used when lifting a load to a great height. With a load in a high position, and with transverse extended, the hoist cylinder valve should not be opened fully or suddenly so that the load can drop rapidly. If the operator happens to allow too much speed coming down, he must SLOWLY AND GENTLY return the valve to neutral (center position) and let the throttling valve gradually stop the load. If the lever is pulled back suddenly, reversing the action of the cylinders, a heavy load may tip forward with possible dire results.

NOTE

GOOD OPERATORS NEVER JERK THE CONTROLS OR USE FAST MOVEMENTS. FOR SAFETY ALWAYS USE GOOD JUDGEMENT. ACCIDENTS ARE CAUSED BY CARELESSNESS.

When lifting a 4000 lb. load, the center of the load must not be more than 24 inches from the heel of the fork. The operator must also be very careful to have the load divided evenly between the forks, so that he does not lift the load with one fork.
If the pallet is overloaded or frozen down, the operator must not attempt to break the load loose or tilt it back with the tilting cylinder, as this may bend the forks.

The operator must be careful not to extend the forks so far under a load, that he gets into the next pallet in the stack. This may result in a temporary overload and also bend the forks.

When approaching a scaffold with a load to be raised a considerable height, the lowest gear and low engine r.p.m. must be used. Forward travel must be slow while the hoist is raising or when the load is high, since the possibility of tipping increases as the load is raised.

**CAUTION**

**DO NOT TRAVEL MORE THAN A FEW FEET WITH LIFT ARMS FULLY RAISED.**

When the operator is transporting a load from one point to another, the load should be carried in the retracted position. This will prevent sway and lessen the possibility of spilling the load.

The transverse movement of the Lull High-Lifts is used to place a load on a scaffold when obstructions are in front of the wheels and it is advantageous to gain forward reach without moving the tractor.

The transverse motion is also very handy to the operator when the machine is operating in mud, sand or on slippery ground. By extending the forward reach, weight is transferred to the front drive wheels.

The Lull lift arm and transverse cylinder provide power both up and down. This enables the operator to crib under the tower mast and by retracting the hoist cylinders, lift the front of the machine off the ground. This is a big time saver for changing tires or adjusting brakes.

The rear steering wheels can be raised by reversing this procedure. With transverse extended, place the forks under a fixed object and raise the lift arms. This will allow the rear of the machine to raise up enough so that blocking can be put under it for tire changing, etc.

**CAUTION**

**DO NOT KEEP PRESSURE ON LIFT ARMS! ALWAYS PUT BLOCKING UNDER THE MACHINE AND TAKE THE PRESSURE OFF THE LIFT ARMS. DO NOT USE THE TIP OF THE FORKS FOR RAISING THE MACHINE.**
SERVICING ELECTRICAL SYSTEM

CAUTION

FOLLOW THE INSTRUCTIONS LISTED BELOW CAREFULLY WHEN SERVICING ELECTRICAL SYSTEMS, OR MAKING ADJUSTMENTS, OR RECHARGING BATTERIES, ON ALL UNITS EQUIPPED WITH ALTERNATORS.

1. Remove battery ground strap before applying any battery charging equipment.

2. When using a booster battery or booster starting unit, be sure to connect positive to positive, and negative to negative; even to momentarily touch positive to negative will possibly burn out the diodes. A diode is to electricity as a check valve is to fluid control. Electricity can go only one way through a diode, a reverse surge from any source on the battery side will burn it out.

3. Before attempting to make any adjustments to any part of the electrical or ignition system, be sure to remove the battery ground strap.

4. If a new or repaired alternator is re-installed on an engine, do not attempt to polarize it, as is general practice with a generator.

5. When installing new parts, or rewiring the system, be sure to check all connections thoroughly to make sure no wires are connected incorrectly before the battery is grounded.

The Delco-Remy alternator on the Lull High-Lift is a negative ground system.
<table>
<thead>
<tr>
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<th>SERVICE</th>
<th>CHANGE</th>
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<td>Oscillation Frame</td>
<td>Super Permalube Grease</td>
<td>Daily</td>
<td>---</td>
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<tr>
<td>2</td>
<td>Lift Arm, Tilt Linkage, Toggle &amp; Cyl. Pivots</td>
<td>Super Permalube Grease</td>
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<td>3</td>
<td>Transverse Frame Rollers</td>
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<td>4</td>
<td>Tower</td>
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<tr>
<td>6</td>
<td>Engine: Below 32° F.</td>
<td>AMOCO 200 SAE 10W</td>
<td>Daily</td>
<td>100 Hrs.</td>
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<td></td>
<td>Above 32° F.</td>
<td>AMOCO 200 SAE 30</td>
<td>Daily</td>
<td>100 Hrs.</td>
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<td>Oil Filter Element</td>
<td>Dump Dust Cover</td>
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<td>As Req.</td>
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<td></td>
<td>Air Cleaner: Dry</td>
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<td>7</td>
<td>Battery</td>
<td>AMOCO Dextron ATF</td>
<td>Daily</td>
<td>300 Hrs.</td>
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<td>8</td>
<td>Torque Converter (See Note)</td>
<td>Rykon Oil No. 21</td>
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<td>Shuttle Gear Linkage</td>
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<td>Emergency Brake</td>
<td>Super Permalube Grease</td>
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<td>15</td>
<td>Front &amp; Rear Steering</td>
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<td>16</td>
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<td>19</td>
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<td>Weekly</td>
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<tr>
<td>20</td>
<td>Tie Rod Ends</td>
<td>Super Permalube Grease</td>
<td>Weekly</td>
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<td>Axles-Diff. &amp; Planetary Hubs: Below 32° F.</td>
<td>American MP Gear SAE 80</td>
<td>Monthly</td>
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<tr>
<td></td>
<td>Above 32° F.</td>
<td>American MP Gear SAE 90</td>
<td>Monthly</td>
<td>Yearly</td>
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<td>Drop Transmission: Below 32° F.</td>
<td>American MP Gear SAE 80</td>
<td>Monthly</td>
<td>Yearly</td>
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<tr>
<td></td>
<td>Above 32° F.</td>
<td>American MP Gear SAE 90</td>
<td>Monthly</td>
<td>Yearly</td>
</tr>
</tbody>
</table>

TIRE PRESSURES - RIGHT FRONT 48# - LEFT FRONT 50# - REAR 40#

NOTE: USE AMERICAN OIL COMPANY LUBRICANTS SHOWN OR EQUAL

CHANGE TORQUE CONVERTER OIL AFTER FIRST 20 HOURS OPERATION ON NEW MACHINES. AFTER THAT CHANGE EVERY 300 HOURS OPERATION. CHANGE CONVERTER OIL FILTER AT SAME INTERVAL.
(GASOLINE) - NAPCO AXLES

CAPACITIES

HYDRAULIC SYSTEM & RESERVOIR --------------- 25 GAL.
RADIATOR COOLING SYSTEM ------------------- 12 QTS.
CRANKCASE (WITH FILTER) ------------------- 6 QTS.
TORQUE CONVERTER -------------------------- 11 QTS.
DROP TRANSMISSION ------------------------- 5 QTS.
AXLES (DIFFERENTIAL) - SAE 90 -------------- 11 PTS.
   (PLANETARY HUB) - SAE 90 -------------- 2 1/2 PTS.
FUEL TANK ---------------------------------- 20 GAL.
TIRES (CALCIUM CHLORIDE) ------------------ 375 LBS. PER TIRE 
   (3/4 FULL)
GREASE ALL FITTINGS DAILY

TOWER LUBRICATION POINTS
WAUKESHA DIESEL (NAPCO AXLES)

CAPACITIES

Hydraulic System & Reservoir --------------- 25 Gal.
Radiator Cooling System ---------------------- 24 Qts.
Crankcase ----------------------------------- 7 Qts.
Torque Converter ----------------------------- 11 Qts.
Drop Transmission --------------------------- 5 Qts.
Axles (Differential) ------------------------- SAE90- 11 Pts.
(Planetary Hub) ----------------------------- SAE90- 2 1/2 Pts.
Fuel Tank ----------------------------------- 20 Gal.
Tires (Calcium Chloride) --------------------- Per Tire 375 Lbs.
(3/4 Full)
TOWER LUBRICATION POINTS

GREASE ALL FITTINGS DAILY

8 FITTINGS

2 FITTINGS

1 FITTING

4 FITTINGS

2 FITTINGS

1 FITTING

2 FITTINGS
FORK SAFETY CHECKLIST

1 ABRASION — Forks are constantly subjected to abrasion, coming into contact with concrete floors, steel shelving, etc. This abrasion reduces the thickness of a fork to a point where it is not capable of lifting the capacity it was designed for. Contact your local dealer for inspection.

2 BENT FORKS — Forks are bent out of shape for various reasons. Depending on the degree of distortion and the resulting fatigue factors, some forks can be straightened. The fork manufacturer is best qualified to correct this. Your local dealer can make the arrangements.

3 CRACKS — Cracks may appear on forks where (a) attachments are welded on or (b) in the inside radius of the bend area. These cracks can be discovered by periodic inspection using Magnaflux or dye penetrant. These blemishes may be ground out and polished by approved grinding methods, depending on the depth of the crack. Contact your dealer as to the amount of material that can be removed safely and the correct method of grinding.

4 OVERLOADING — Persons operating lifting devices utilizing forks should be cognizant of the capacity of the device as well as the capacity of the forks. Overloading may cause permanent deformation or serious fatigue conditions. Periodic inspection as mentioned in items 2 and 3 should be carried out.

5 USE THE PROPER FORK — Working environments such as spark-free atmosphere, high heat furnace charging, corrosion resistance, unusual lifting conditions require custom-designed forks. Special forks are as important as the special devices they are used with. Contact your dealer for assistance in this area.

6 REPAIR — The repair of forks should not be undertaken by anyone other than the manufacturer. A seemingly inexpensive good repair might end in a very costly problem.

7 MODIFICATION — No modification should be made to forks without consulting with your local dealer.

8 REPLACE WITH QUALITY FORKS — When you order or reorder forks, make sure you’re getting high-quality forks that will perform your lifting jobs in a safe and dependable manner. Insist on forks that are forged or have an upset heel.

FORK INSPECTION SCHEDULE

For normal operating conditions, the following inspection schedule is suggested:

DAILY . . . . Visual inspection of forks should be a daily requirement for each operator, with special attention to permanent deformation and cracks.

SIX MONTHS . . Thorough inspection of forks for cracks and deformation should be performed at least two times per year or more, depending on the use of the equipment.

This fork safety list is intended to help reduce fork problems and is not to be interpreted as a guarantee under any circumstances.
SAFETY PRECAUTIONS FOR MOUNTING & DEMOUNTING TIRES

WARNING

Failure to comply with the following procedures may result in faulty positioning of the tire and/or rim parts and can cause the assembly to burst with explosive force sufficient to cause serious physical injury or death. Only experienced tire mechanics should undertake to service multi-piece truck rims.

SAFETY PRECAUTIONS

DEFLATION AND DISASSEMBLY

1. Always check rim/tire assembly for proper component seating prior to removing from vehicle.

2. Always deflate tire by removing valve core prior to dismounting from vehicle or disassembly of components. It is recommended that safety goggles be worn to prevent the calcium chloride from making contact with the eyes.


4. Always follow assembly and disassembly procedures outlined in the manufacturer's instruction manual or other recognized industry instructions manuals.

5. Never use a steel hammer to assemble or disassemble rim components - use a lead, brass, or plastic type mallet. Proper tools are available through rim/wheel distributors.

RIM INSPECTION

1. Always select the proper tire size and construction to match the manufacturer's rim or wheel rating and size.

2. Never use damaged, worn, or corroded rims/wheels or mounting hardware.

3. Always clean and repaint lightly rusted rims.

4. Never use a rim/wheel component you cannot identify.

ASSEMBLY AND INFLATION

1. Always double check to see that removable rings are properly seated before inflating.

2. Always inflate tire in safety cage or use a portable lock ring guard. Use a clip-on type air chuck with remote valve so that operator can stand clear during tire inflation.

3. Never attempt to seat rings while tire is totally or partially inflated.
4. Never re-inflate or add inflation pressure to a tire that has been run flat or seriously underflated without removing and checking for ring seating and rim damage.

5. Never use an assembly with excessive side ring play, wide gaps between ring ends or butting ring ends.

6. Never hammer on components of an inflated or partially inflated assembly.

NOTE: Various types of tires on LULL forklifts are filled with a calcium chloride and water solution at the factory. This weight is necessary for proper machine counterweight when used in tires. NEVER operate a machine with un-weighted tires.

ADDITIONAL INSTRUCTIONS WITH MOUNTING AND DEMOUNTING PROCEDURES AVAILABLE FREE FROM:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

1728-A
FORKLIFT SIGNALS

1. STOP
2. RAISE LOAD
3. LOWER LOAD
4. TILT FORKS RIGHT
5. TILT FORKS LEFT
6. TILT FORKS UP
7. TILT FORKS DOWN
8. MOVE LOAD BACKWARD
9. MOVE LOAD FORWARD

INSTRUCTIONS TO SIGNAL MEN

1. Only one person to be signalman
2. Make sure the operator can see you
   and is able to acknowledge the
   signal given
3. Signalman must watch the load—
   the operator is watching you
4. Never raise or lower the load over other
   workmen, warn them to keep out of the way

WATCH FOR OVERHEAD LINES OR OTHER OBSTRUCTIONS.
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