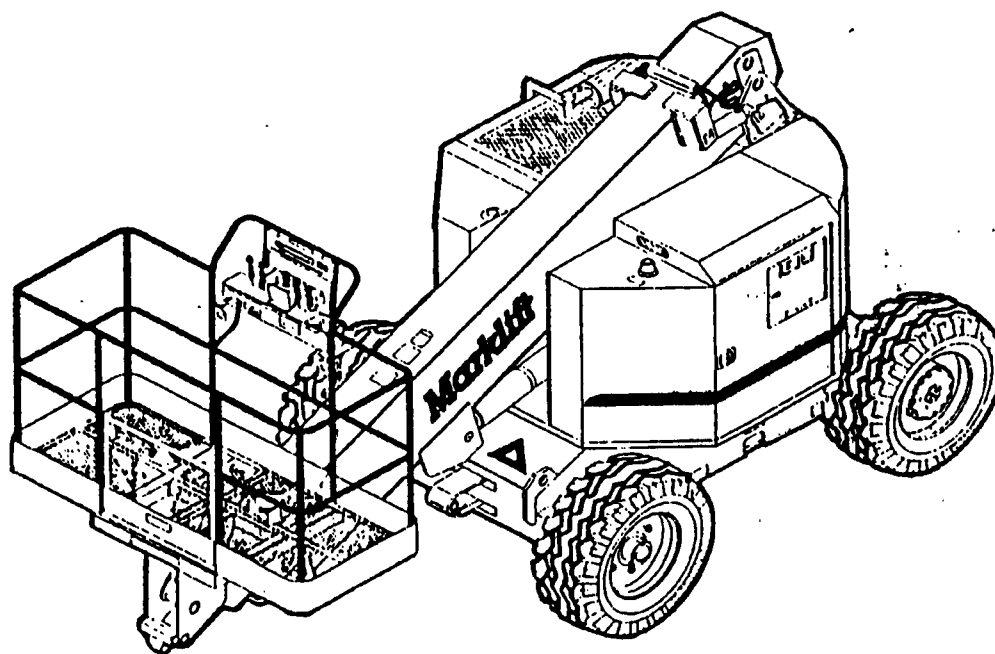


The Marklifts®

A Product of Mark Industries

SELF-PROPELLED BOOM OPERATION MAINTENANCE AND PARTS MANUAL



Model: 60 I

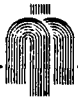
FIRST EDITION: July 1987



Mark Industries

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17109



THIS MARKLIFT SELF PROPELLED INDUSTRIAL BOOM MODEL 60I
OPERATION MAINTENANCE AND PARTS MANUAL IS DESIGNED AS

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- SECTION 2 NISSAN: 60I ENGINE (H20/30-A)
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SERVICE BULLETINS



The purpose of this manual is to provide the customer with operation maintenance and parts information that will enhance the reliable performance of the MARKLIFT. Schematic and vendor information is also furnished.

WARNING: IMPROPER USE OF THIS MACHINE WILL RESULT IN SERIOUS INJURY OR DEATH! TO PROTECT YOURSELF AND THE EQUIPMENT, STUDY THIS MANUAL BEFORE STARTING OPERATIONS.

The model capacity, pressure settings and serial number can be found on the ID Plate mounted on the rear of the base.

The serial number should be used when ordering parts. This will help our parts department in giving prompt and accurate service.

If additional information or service is needed, we urge the customer to contact his local dealer. If this is not possible, please get in touch with the MARK INDUSTRIES Service Department.

All MARKLIFTS are tested and operated to assure their proper operating condition before shipment. At this time, all necessary adjustments are made and an overall physical inspection is conducted. After the unit is delivered, some minor adjustments and inspections must be made before putting the unit in service. These functions are outlined in the INSPECTION AND CHECKOUT INSTRUCTIONS in the operation section of this manual.



MARKLIFT SELF-PROPELLED BOOM
MODEL 60I

<u>DESCRIPTION</u>	<u>ENGLISH</u>	<u>METRIC</u>
HEIGHT	60 ft.	18.2 m
WORKING (MAXIMUM)	66 ft.	20.1 m
PLATFORM (MAXIMUM)	60 ft.	18.2 m
LOWERED (MAXIMUM)	7 ft. 3 in.	2.2 m
WIDTH (MAXIMUM)	5 ft. 11 in.	1.8 m
LENGTH (MINIMUM)	28 ft. 5 in.	8.6 m
LIFT CAPACITY (UNRESTRICTED)	500 lbs.	226.8 kg.
WHEEL BASE	6 ft.	1.8 m
TURNING RADIUS (INSIDE)	8 ft. 2 in.	2.4 m
TURRET ROTATION	CONTINUOUS	
TURRET TAILSWING	NONE	
FUEL CAPACITY (PROPANE)	1-10 GAL. TANK	37.8 L
ENGINE (LIQUID COOLED NISSAN)	60 H.P. (PROPANE)	
TRAVEL SPEED	0-2.3 MPH	0-3.7 KM.HR.
CONTROLS	4 PROPORTIONAL 2 SOLENOID	
HYDRAULIC OPERATING PRESSURE	2800 PSI	2800 PSI
TIRES (MONOFILLED)	12-16.5 ALL GRIP	
WEIGHT	30,000 lbs.	1360.8 kg.
SHIPPING CUBE	1243.8 CU.FT.	35.2 CU.M
PLATFORM DIMENSIONS	48" X 30" X 41"	1.2 X .7 X 1.0 m



MANUFACTURERS' LIMITED WARRANTY

Mark Industries makes no warranty, express or implied, on any product manufactured or sold by Mark Industries except for the following limited warranty against defects in materials and workmanship on products manufactured by Mark Industries.

Mark Industries warrants the products manufactured by Mark Industries to be free from defects in material and workmanship under normal use and service for a period of six (6) months from the date of shipment. This limited warranty does not extend to any product of another manufacturer or to any part, component, accessory or attachment not manufactured by Mark Industries. The warranty, if any, with respect to any product of another manufacturer or to any part, component, accessory or attachment not manufactured by Mark Industries is limited to the warranty, if any extended to mark Industries by the manufacturer of the other product, part, component, accessory or attachment.

This limited warranty does not extend to any product (or any part or parts of any product) which has been subject to improper use or application, misuse, abuse, operation beyond its rated capacity, repair or maintenance except in accordance with the sales and service manuals and special instructions of Mark Industries, or modification without the prior written authorization of mark Industries (whether by the substitution of nonapproved parts or otherwise).

The sole obligation and liability of Mark Industries under this limited warranty (and the exclusive remedy for any purchaser, owner or user of Mark Industries products) is limited to the repair or replacement, at the option of Mark Industries, of any product (or any part or parts of any product) manufactured by Mark Industries which, within six (6) months from the date of shipment, shall have been returned to the mark Industries facility in Carson, California (or any other location within the United States as shall be designated by Mark Industries), at no expense to Mark Industries, and demonstrated to the satisfaction of Mark Industries as being defective in material or workmanship.

To make a claim under this limited warranty, contact Mark Industries or the Mark Industries distributor from whom the product was originally purchased. A statement giving the model and serial number of the allegedly defective product, the date and a description of the alleged defect, the date of the purchase and proof of the purchase and purchase date must accompany the returned product (or any part or parts of any product). Any product (or any part or parts of any product) determined by Mark Industries to be defective will be repaired or replaced, at the option of Mark Industries, free of charge, f.o.b. Carson, California. No credit will be given for any allegedly defective product (or any part or parts of any product) not returned to Mark Industries.

There are no other warranties, express or implied, in addition to this limited warranty. This limited warranty is exclusive and in lieu of all other warranties, express or implied (in fact or by operation of law or otherwise), including the implied warranties of merchantability and fitness for a particular purpose.

Mark Industries shall not be liable for any special, indirect or consequential damages. Further, no representation or warranty made by any person, including any representative of Mark Industries, which is inconsistent or in conflict with, or in addition to the terms of the foregoing limited warranty (or the limitations of the liability of mark Industries as set forth above) shall be binding upon Mark Industries unless reduced to writing and approved by an officer of Mark Industries.

Tires, batteries, filter elements and electrical components are specifically excluded from this limited warranty.



Mark Industries

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WARRANTY REGISTRATION

PURCHASER

COMPANY NAME

ADDRESS

TELEPHONE NUMBER

DATE SHIPMENT RECEIVED

UNIT WILL BE USED _____

DATE OF INVOICE

UNIT WILL BE SOLD _____

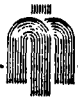
DATE UNIT PUT INTO SERVICE

INSPECTION _____	GEN'L MAINTENANCE _____	PAINING/SANDBLAST _____
MINING _____	HEATING/AIR COND. _____	STEEL FABRICATION _____
WELDING _____	CARPENTRY _____	RIGGING _____
CONSTRUCTION _____	PLUMBING _____	ROOFING _____
SCAFFOLDING _____	ELECTRICAL _____	GLAZING _____
MECHANICAL _____	SPRINKLER _____	OTHER _____

COMMENTS:

INSPECTION COMPLETED BY:

WARRANTY WILL BE VOID UNLESS THIS INSPECTION REPORT IS POSTMARKED
TO MARK INDUSTRIES NOT MORE THAN 14 DAYS FROM DATE SHIPMENT RECEIVED.

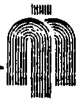


NEW EQUIPMENT CONDITION REPORT

- | | YES | NO |
|--|--------------------------|--------------------------|
| 1. PLATFORM CAPACITY DECAL _____ LBS. _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. ALL WARNING, CAUTION & EMERGENCY DECALS INSTALLED _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. EMERGENCY DESCENT VALVE FUNCTIONS PROPERLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. OPERATION INSTRUCTIONS PROPERLY INSTALLED _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. OPERATION & SAFETY HANDBOOK RECEIVED _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. ELECTRICAL SCHEMATIC RECEIVED _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. ALL CONTROLS (AERIAL & GROUND) ARE IDENTIFIED AND OPERATE CORRECTLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. STOP SWITCHES OPERATE PROPERLY (AERIAL & GROUND) _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. PLATFORM GUARD RAILS, SECURE AND UNDAMAGED _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. PLATFORM ACCESS GATE WORKS PROPERLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. HORN AND BEACON OPERATE PROPERLY (OPTIONAL) _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. BRAKES ADJUSTED AND OPERATE CORRECTLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. CIRCUIT BREAKERS OPERATE PROPERLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. ENGINE R.P.M. _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. ALL HYDRAULIC CYLINDERS FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. ALL HYDRAULIC CYLINDER RODS FREE OF PAINT OR SCRATCHES _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. HYDRAULIC PUMP FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. HYDRAULIC HOSES & FITTINGS TIGHT _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. HYDRAULIC OIL LEVEL _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. HYDRAULIC TANK & FITTINGS FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. DRIVE MOTORS FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. TURRET ROTATION GEAR BOX OIL LEVEL _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. TURRET RING GEAR BOLTS TORQUED TO _____ FT. LBS. _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. WHEEL LUG NUTS TORQUED TO _____ FT. LBS. _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. BATTERY WATER LEVEL _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. ENGINE COOLANT (RADIATOR) LEVEL _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. COOLANT HOSES & FITTINGS FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. ELECTRIC RADIATOR FAN OPERATES PROPERLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. TIRE PRESSURE _____ PSI _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. SYSTEM PRESSURE _____ PSIG _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. PILOT PRESSURE _____ PSIG _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. FUEL TANK & FITTINGS FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. MANUAL OVERRIDES OPERATE PROPERLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. MUFFLER TIGHT AND FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. ENGINE OIL LEVEL _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. ENGINE OIL FILTER, FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. ALL ELECTRICAL CONNECTIONS TIGHT _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. ENGINE ALTERNATOR FUNCTIONS PROPERLY _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. VALVE MANIFOLD & FITTINGS, FREE OF LEAKS _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. DRIVE WHEEL, TORQUE HUB OIL LEVEL _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. RETRACTION CABLE TENSION _____ FT. LBS. _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. 110V GENERATOR OPERATES PROPERLY (OPTIONAL) _____ | <input type="checkbox"/> | <input type="checkbox"/> |

MODEL NUMBER _____ SERIAL NUMBER _____

INSPECTOR _____ OPTIONS _____



MARKLIFT SELF-PROPELLED BOOM

<u>OPTION</u>	<u>TITLE</u>
20104	GROUND AND AERIAL 110 VAC 20 AMP RECEPTACLES TOWING KIT
20106	CLEARANCE, STOP AND TURNING LIGHTS
20107	ROTATING BEACON
20108	TRAVEL HORN
20097	RAISED PLATFORM ROTATION LIFTING LUGS
20113	SPECIAL PAINT
20131	5 FT. PLATFORM
20132	8 FT. PLATFORM
20133	12 FT. PLATFORM
20130	6 FT. PLATFORM
20139	12 V PLATFORM WORK LIGHT
20140	AIR LINE TO PLATFORM (OUTSIDE BOOM)
20141	HYDRAULIC LINE TO PLATFORM
20142	PIPE HANDLING ATTACHMENT
20143	DESCENT HORN
20147	FIBERGLASS BASKET
20164	HEADLIGHTS-TAIL LIGHTS
20165	PLATFORM GROUND SENSOR
20168	PLATFORM HAND GUARDS
20169	AERIAL CONTROL PANEL LIGHTS AIR LINE TO PLATFORM (INSIDE BOOM)



MANUFACTURER'S AUTHORIZED LOADING/UNLOADING PROCEDURE FOR ALL MARKLIFT SELF PROPELLED BOOMS.

FIGURE 1

Tilt - Type Trucks (Any loading or unloading application other than horizontal)

IMPORTANT: All loading/unloading procedures onto and from TILT-TYPE TRUCKS, MUST NOT BE DRIVEN.

LOADING

1. The truck must be fitted with adequate winch to handle the weight of equipment you are going to load/unload.

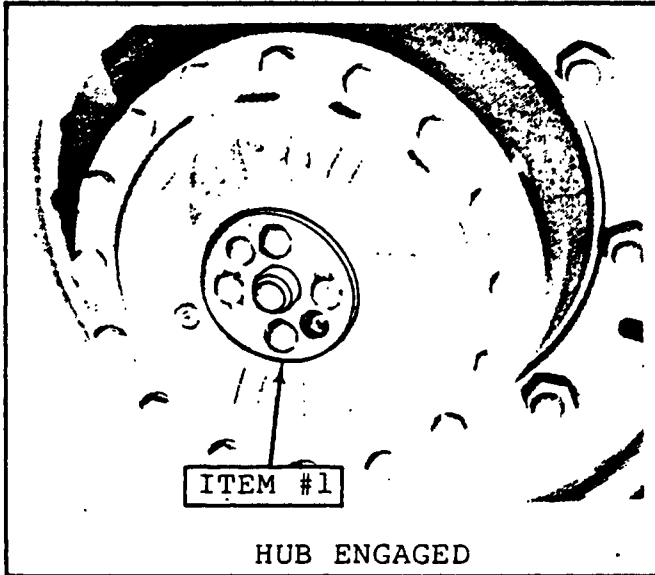
<u>BOOM</u>	<u>GROSS VEHICLE WEIGHT</u>
30I _____	11,670 Lbs.
40I (3-Section Boom) _____	17,000 Lbs.
40I (2-Section Boom) _____	16,700 Lbs.
55I _____	27,000 Lbs.
60I _____	30,000 Lbs.

2. Align the boom with the steering wheels away from the trailer and the platform in a horizontal or slightly higher position.

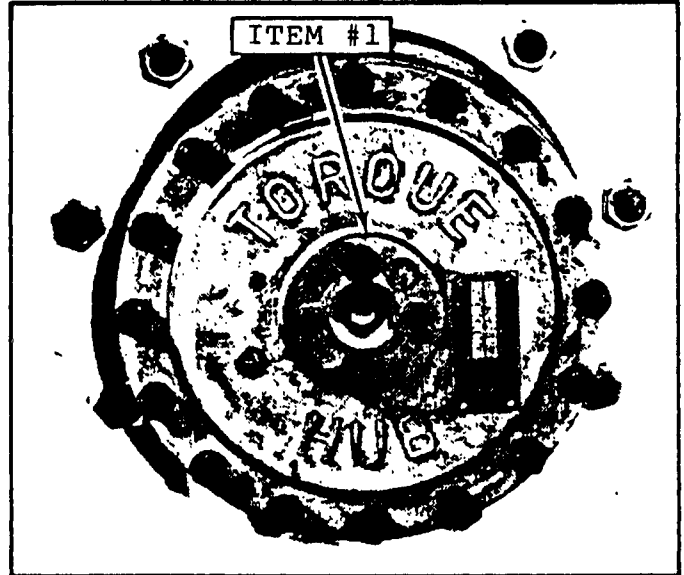


3. Torque hubs must be disengaged for loading/unloading.

* To disengage the torque hub, reverse the disconnect cap (Item #1). (The knob on the cap disengages the drive hub input shaft.)

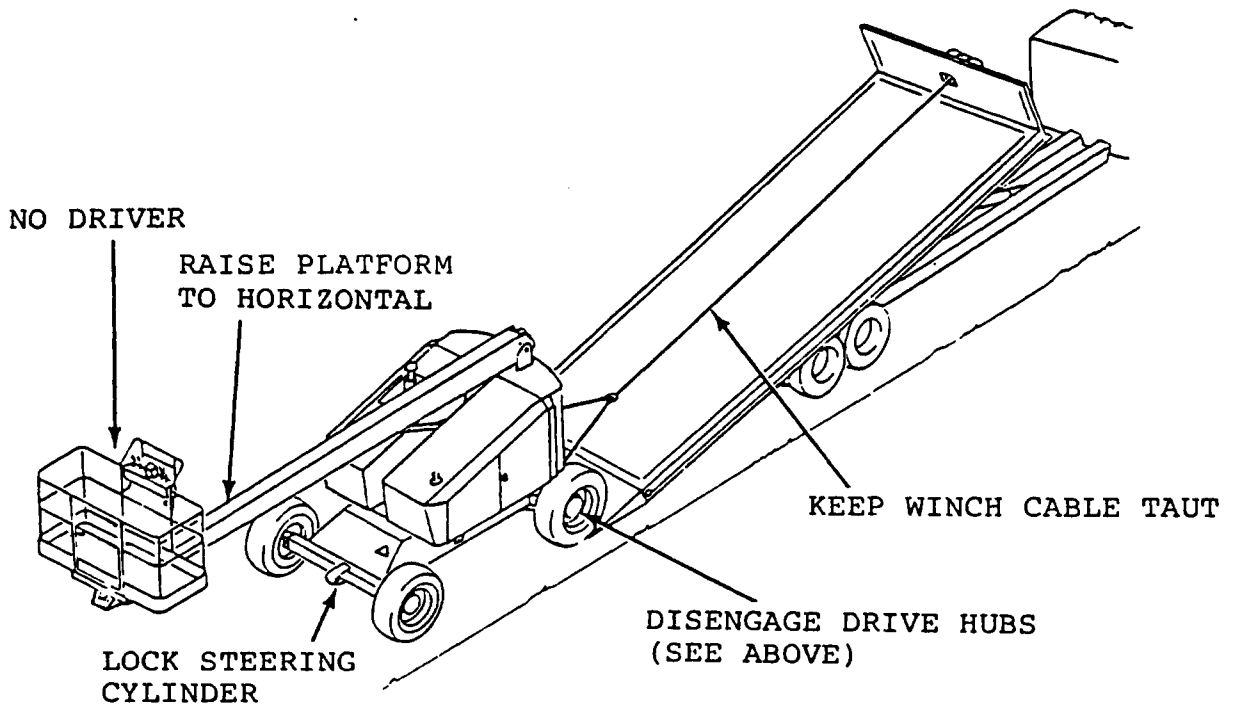


HUB ENGAGED



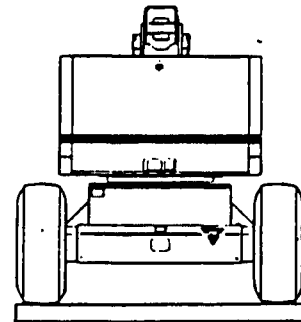
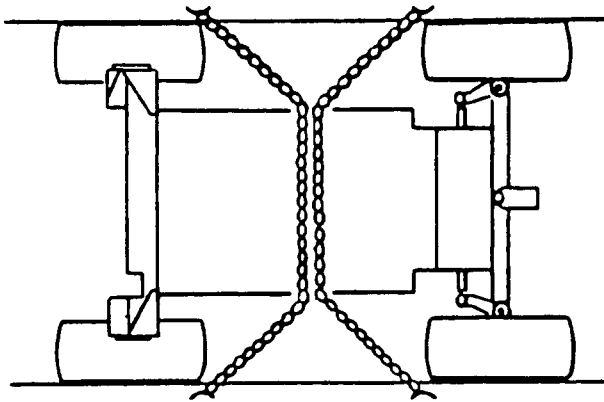
HUB DISENGAGED

CAUTION: BRAKES ARE ALSO AUTOMATICALLY DISENGAGED AT THIS TIME.

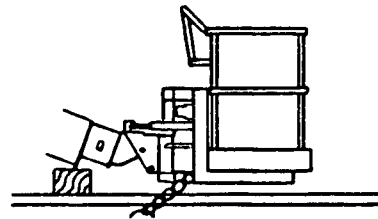




4. Attach winch cable to the boom at the drive wheel end of the base through the twin pad-eyes as shown.
5. When the boom is on the truck in position for proper weight distribution, it is chained down in the manner illustrated by the drawings below.

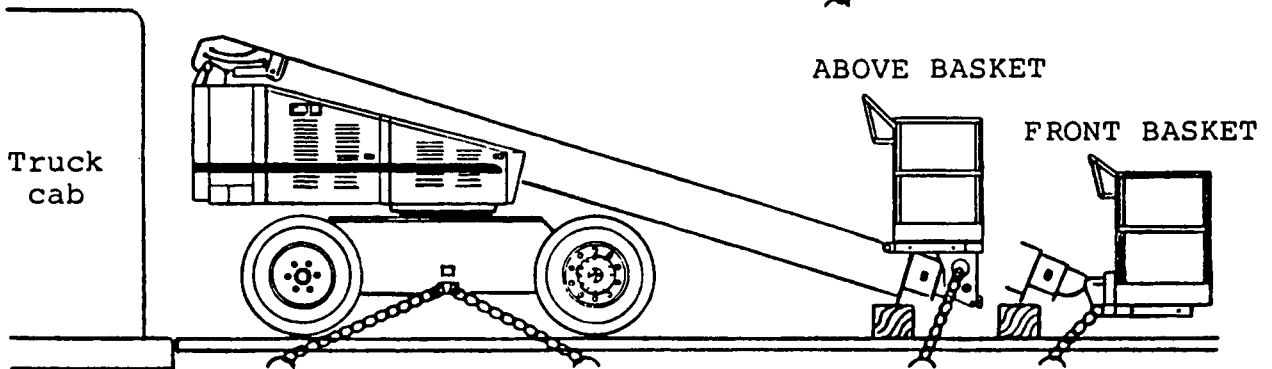


ROTATOR



ABOVE BASKET

FRONT BASKET



NOTE: Bottom of basket fork must not rest on truck bed.



UNLOADING

1. Release the hold down chains and remove the block under the basket end of the boom arm. Lift the boom arm to horizontal or slightly above the horizontal position.
2. Insure that the winch cable is in a taut position and then lower the truck bed.
3. Allow the boom to gradually roll down the truck bed by winching out.
4. When the boom is completely on level ground, engage the torque hubs and remove the winch cable from the boom.
5. Boom is now ready for normal operation.

FIGURE 2

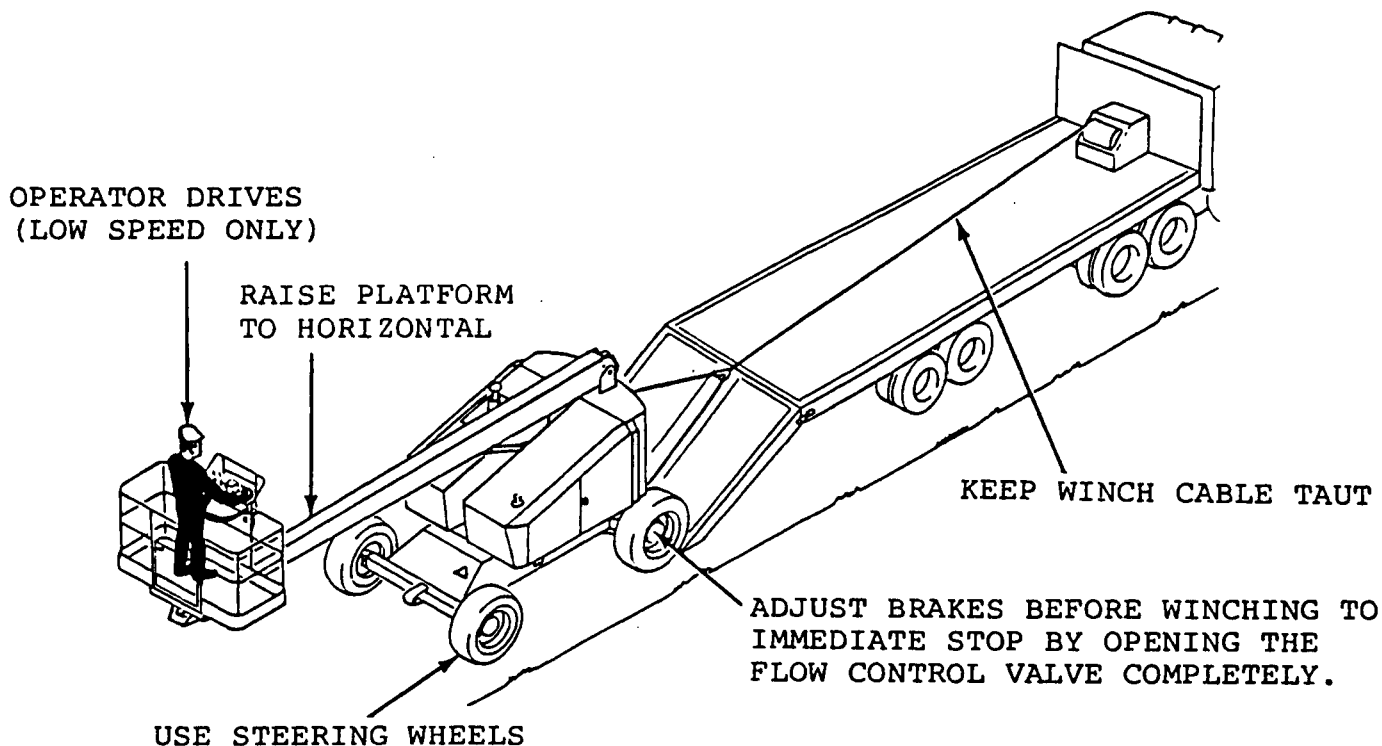
FLATBED WITH HYDRAULIC LIFT/LOWER REAR PORTION

Flatbed Regular

IMPORTANT: Due to the width of the booms and the overall width of the flatbed trailer...extreme caution must be used when loading or unloading.

In loading/unloading booms on flatbed trailers, a combination of winching and driving the boom in low drive speed must be utilized.

1. Insure that the parking brake is set to activate immediately. This is accomplished by opening the flow control valve
2. If the unit has the high/low drive option, it must be in low drive at all times when loading/unloading.



**LOADING**

- * 2 man operation 1 man to operate winch
 1 man to drive boom

 - * 1 man operation Winch unit must be fitted with an extension
 cord or remote control for the control box.
1. With the trailer on level ground, align the boom with the back end of the trailer.
 2. Attach winch cable as described in FIGURE 1 of this instruction.
 3. Using great care while driving and steering the boom up the ramp in low drive, keep all slack out of the winch cable. (If the ramp is too steep of a grade for the boom to climb, the winch will pull the unit up.) You must keep drive function engaged while winching or the brakes will stop the machine from rolling.
 4. When the boom is in the position for the proper weight distribution for transporting, tie down to the trailer using the procedure described in FIGURE 1 of this instruction.

NOTE: Immediate full reversal of controller handle when driving will automatically change the direction of drive and will not stall the engine, even if attempted on a ramp. This procedure is not recommended as standard reversing of drive or any other function, but may be used in emergency situations without damage to the unit.

**MARK INDUSTRIES**2662 East Del Amo Boulevard, Carson, CA 90746
Post Office Box 720, Long Beach, CA 90801



UNLOADING

1. With the trailer on level ground, disconnect the tie-downs from the boom and insure that the winch cable is still properly attached to the boom.
2. Select the low drive speed at the platform control console.
3. Using great care while driving and steering the boom off the trailer, keep all slack out of the winch cable.

WARNING: Do not allow slack in the winch cable when descending the ramp, due to the possibility of snapping the cable if the unit descends too fast in drive.

4. When all wheels are on level ground, disconnect the winch cable from the boom.
5. Re-adjust the boom parking brakes to energize immediately after the dynamic brakes stop the unit. Procedure is as follows:

Place unit on flat surface, about 10' wide x 30' long. Position boom slightly below horizontal and completely retract. Select "High" drive speed and "High" throttle at the platform console. Drive MARKLIFT with controller handle in maximum position, approximately 15 feet letting go of the controller as one wheel is adjacent to a visual marker on the ground. A suitable deceleration and braking distance would be 18" measured from the marker to the center line of same wheel when unit has completely stopped. Adjust needle valve on parking brakes to achieve this dimension. Repeat above procedure, driving in both directions until MARKLIFT completely stops within the 18" to 24".

The deceleration valves have been set at the factory and should not be readjusted without first consulting MARK INDUSTRIES Field Service Department.

It is advisable to completely open the needle valve if the unit is to be used in a facility with severe ramps or inclines. However, very abrupt stops will be experienced with the unit driving on flat surfaces when drive controller is rapidly returned to the neutral position.



BEFORE OPERATING THE MARKLIFT, REVIEW THE FOLLOWING:

1. Visually inspect all exposed parts of the MARKLIFT. Secure any loose bolts and nuts. Replace any damaged hydraulic lines or broken wires. Check for any structural damage, including cut or damaged tires.
2. Check oil level in the engine.
3. Check hydraulic oil level - sight gauge shows full with unit in stowed position.
4. Fill fuel tank - use regular gasoline only or switch to propane.
5. Check battery for 1200 ± 50 reading on hydrometer. Charge battery if reading is below 1100.
6. Check hydraulic valve panel for loose hardware and broken fittings or tubing.
7. The ground control panel is accessible by opening the turret cover opposite the engine side of the machine.
8. Start engine. Allow engine to warm up.
9. After initial warm-up of gasoline engine, press engine stop button making sure stop circuit is operational. The ignition switch may be left in the "ON" position indefinitely if engine stop button has been pressed, without fear of burning distributor points. However, should engine stall, the operator must push the stop button or turn off ignition switch to prevent current path to coil.
10. Position selector switch to ground then operate switches, moving as follows: Boom UP/DOWN, rotation RIGHT/LEFT, and extend OUT/IN. Check for hose leaks.
11. After check-out of ground control functions, position selector switch to AERIAL for operation at work platform. After entering platform, depress foot switch before using any control function switches. This increases engine RPM (if throttle HIGH-LOW selector is positioned to high) and electrically completes circuit to controls.



Your MARKLIFT is equipped with proportional controls. When using any proportional function, press foot switch, raise controller locking device, then gradually move controller in direction selected. The controller handle is spring-centered and self locking to prevent accidental operation. Familiarize yourself with the operation of the controller until you are able to start and stop each function forward and reverse, obtaining a gradual, smooth movement.

12. The travel or drive configuration is with the boom over steering wheels. This provides the best weight distribution for maximum traction. If the boom is rotated 180 , the drive and steer decals read in reverse. The forward triangle decals on each end of the base will show drive direction correctly, regardless of turret position.
13. Brake adjustments may be made by turning a small needle valve. (See chapter parts, section 3, figure 7). This valve is merely a time delay for applying the brakes. With the valve completely open, the time delay for applying the brakes is minimum. Set the delay valve to stop the machine in approximately three feet on level ground driving in high speed.

NOTES: See Chapter General page 8 reduced copy of NEW EQUIPMENT CONDITION REPORT that is sent with each machine.





Every operator of the MARKLIFT must read, understand and follow the safety rules set forth herein.

1. The MARKLIFT self-propelled aerial work platform is a personnel lifting device, and it is essential that it be properly maintained and operated to perform all functions with maximum safety and efficiency.
2. The operation of any new and unfamiliar equipment can be hazardous in the hands of untrained operators. Only trained operators must be assigned to operate the MARKLIFT.
3. It is the responsibility of the operator to read and understand this manual and to follow all recommendations made. Never exceed manufacturer's recommended platform load capacity.
4. Although the MARKLIFT conforms to specified ANSI & OSHA requirements, it is the responsibility of the owner to instruct the operators with safety requirements made not only by MARK INDUSTRIES, but by the various safety boards in your area, as well as requirements set forth by ANSI & OSHA.
5. The MARKLIFT is a non-insulated personnel carrier and **must not** be operated within 10 feet of a 50,000 volt line. (See page 10 & 11 articles.)
6. Remember, the load capacity of the MARKLIFT is total combined weight of personnel and tools, fixtures, accessories, etc.
7. Always distribute load evenly over platform floor area.
8. The MARKLIFT platform is equipped with safety belt rings. A body belt for **each person must be worn attached** with lanyard to anchor points provided.
9. It is recommended that head gear (hard hats) be worn by all personnel in the work platform.
10. Under no circumstances should horseplay be tolerated.



11. The **MARKLIFT** structure must not be used as a welding ground. Disconnect both battery leads prior to performing any welding operations.
12. **DO NOT** lean over platform guard railings to perform work.
13. **DO NOT** use ladders or scaffolding on the platform to obtain greater height.
14. **DO NOT** raise or lower boom into protruding objects.
15. **DO NOT** drive carriage or platform into stationary objects.
16. **DO NOT** store loose material in the work platform such as pipe, rope, extension cords, wire or miscellaneous boxes. If necessary to store such items, they must be positioned in such a way that no one will trip over them when operating or working in the platform.
17. **DO NOT** alter equipment in any fashion.
18. **DO NOT** override any hydraulic, mechanical, or electrical safety devices.
19. **DO NOT** drive on uneven, sloping or soft terrain, as this is hazardous and must be avoided. The **MARKLIFT** must not be operated on more than a 5 degree out-of-plumb condition.
20. **DO NOT** work on platform if your physical condition is such that you feel dizzy or unsteady in any way.
21. **DO NOT** jump start other vehicles using **MARKLIFT** battery.