
Service Manual

Model(s):

6BRU18

6BRU23

6BDRU15

6BSU20

6BSU25

Serial No. 20,001 to 29,999 - 24 volt models

Serial No. 30,001 to 39,999 - 36 volt models

00700-CL220

Issued: 10/01/98

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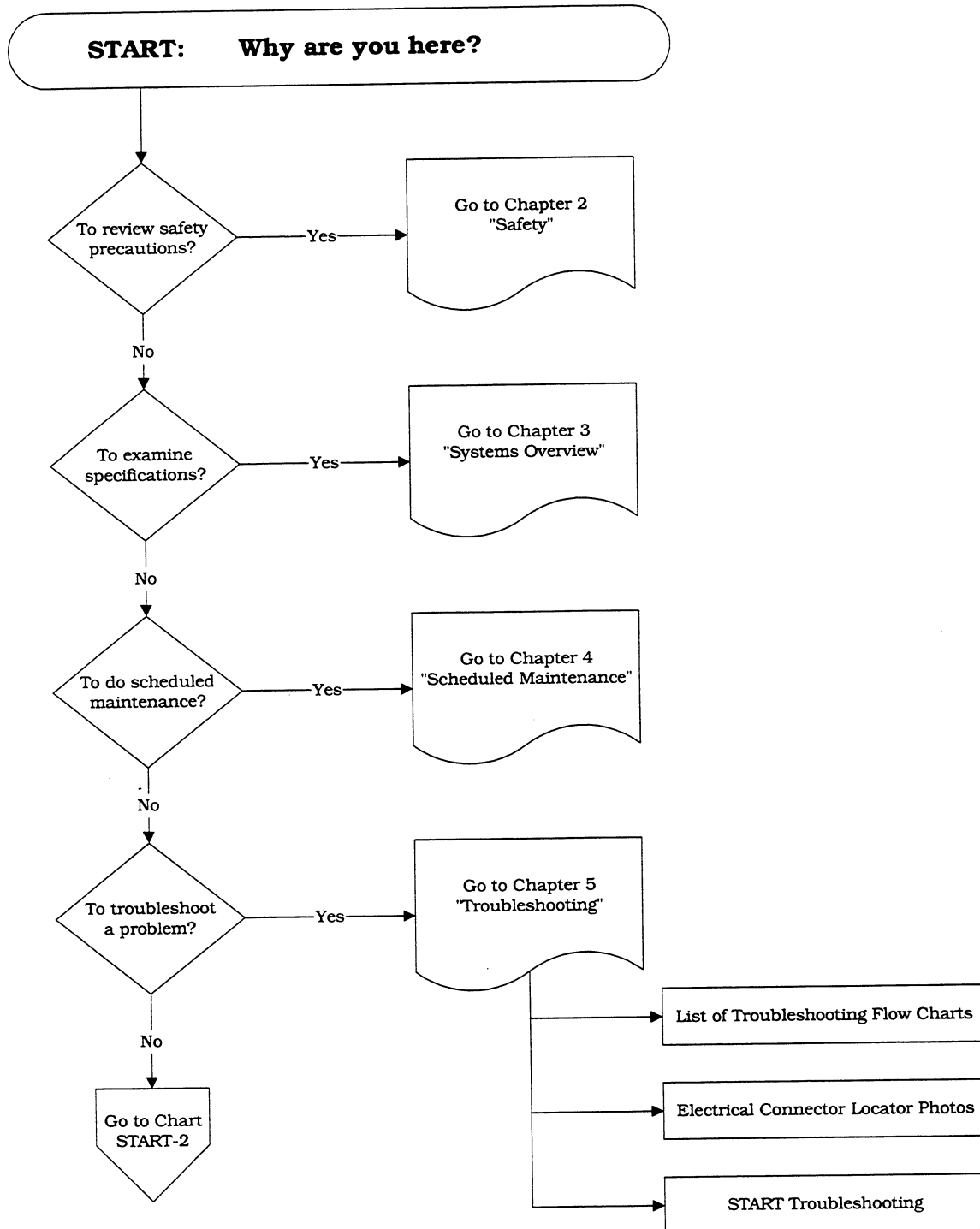
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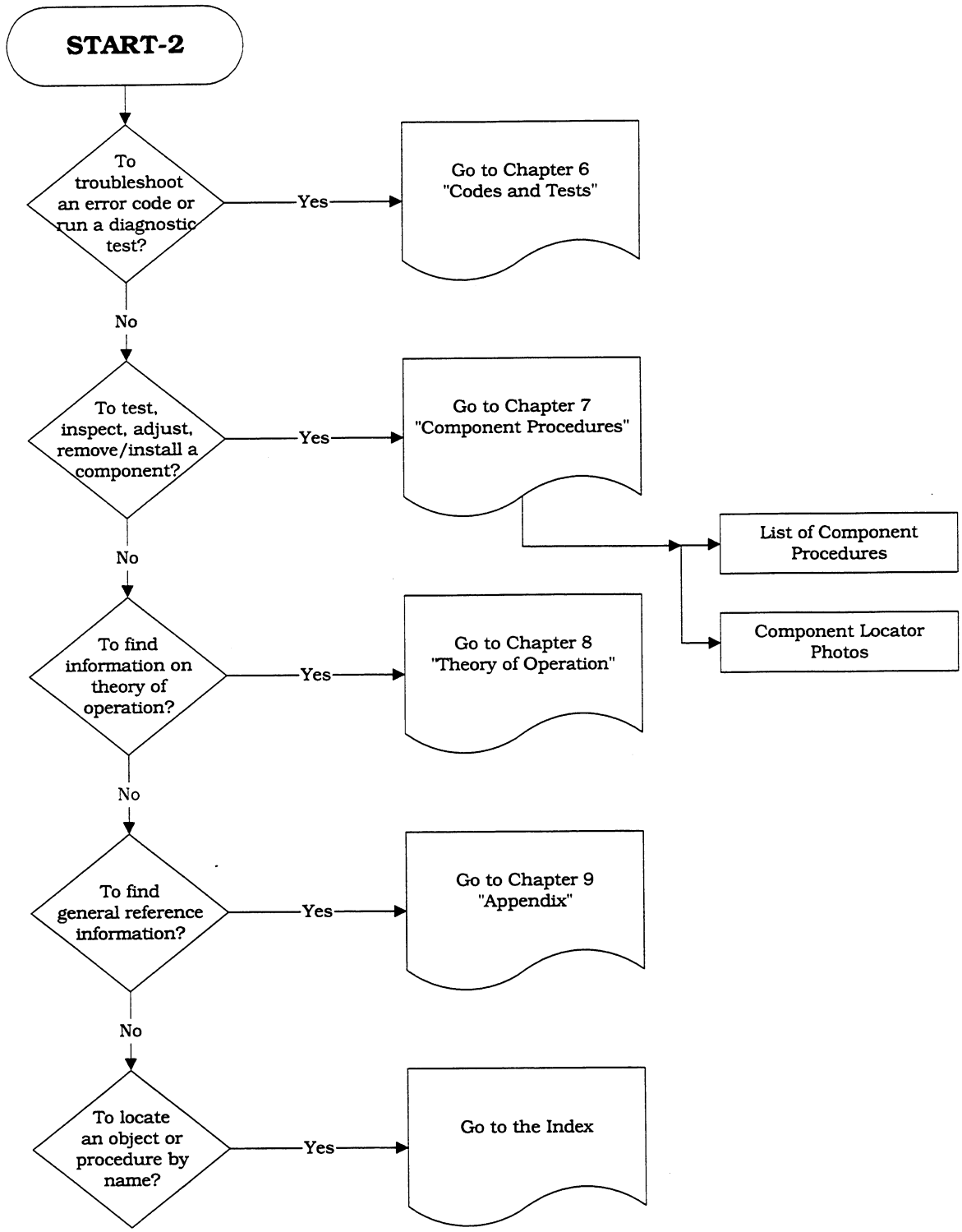
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START Page



START Page



Safety

Definitions

Definitions

Throughout this manual, you will see two kinds of safety reminders:

▲WARNING

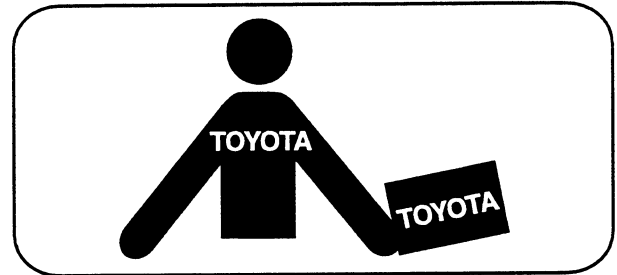
Warning means a potentially hazardous situation exists which, if not avoided, could result in death or serious injury.

▲CAUTION

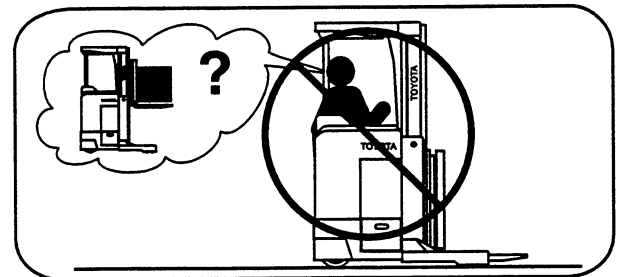
Caution means a potentially hazardous situation exists which, if not avoided, could result in minor or moderate injury or in damage to the lift truck or nearby objects.

General Safety

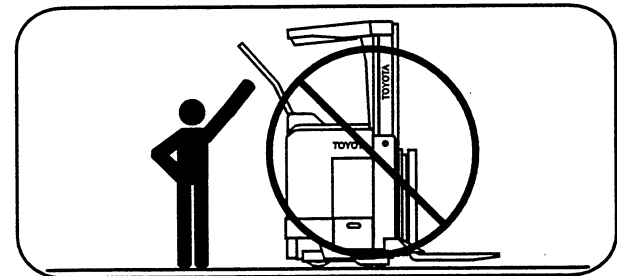
Do not operate or work on this lift truck unless you have read the operator's manual and are trained, qualified, and authorized to do so.



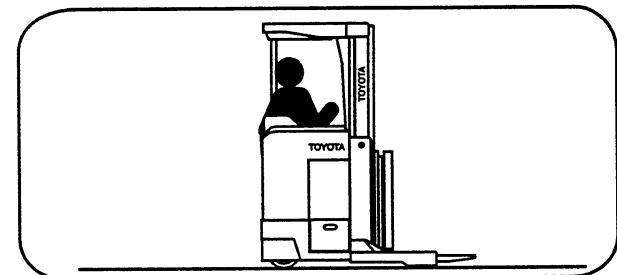
Know the lift truck's controls and what they do.



Do NOT operate this lift truck if it needs repair or if it is in any way unsafe.

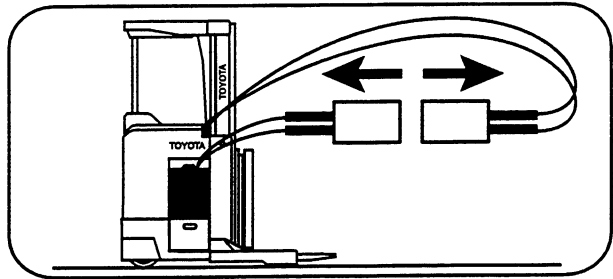


Operate this lift truck only from the operator's position.

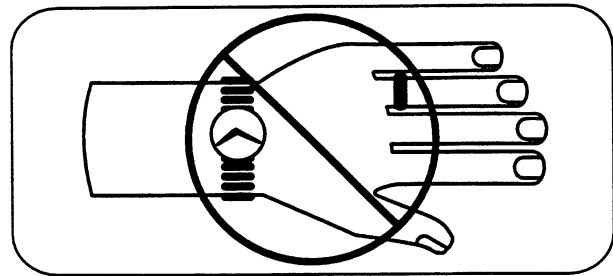


General Safety

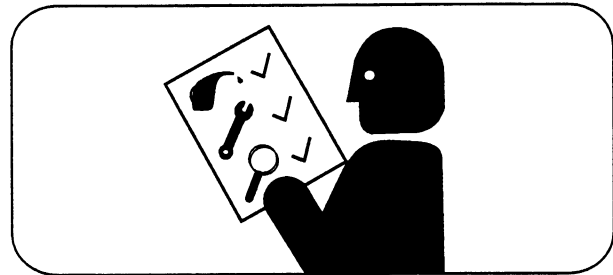
Before working on this lift truck, always turn the key switch to OFF and disconnect the lift truck's battery connector (unless this manual tells you otherwise).



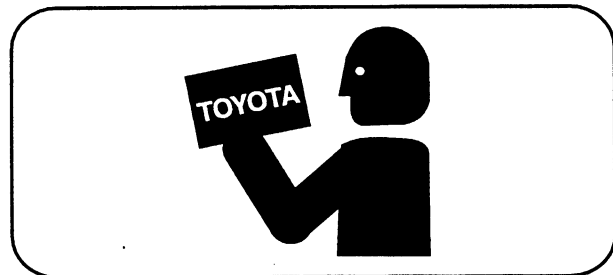
Do NOT wear watches, rings, or jewelry when working on this lift truck.



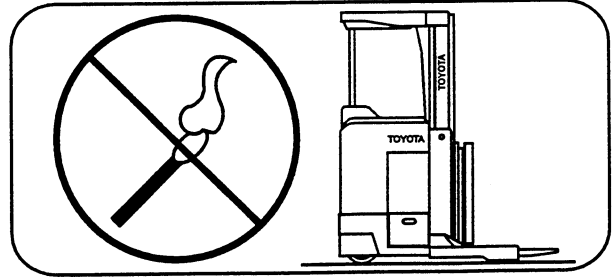
Follow the scheduled lubrication, maintenance and inspection steps.



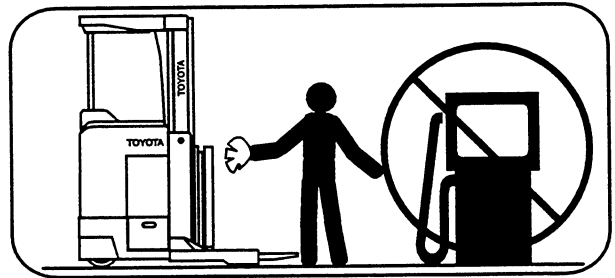
Follow exactly the safety and repair instructions in this manual. Don't take "shortcuts".



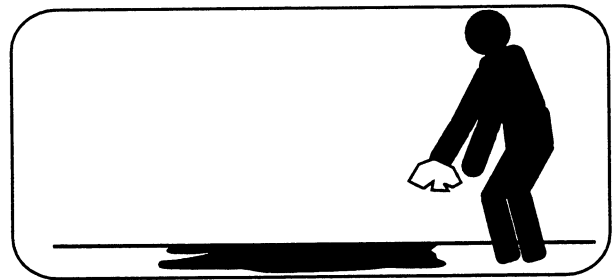
Do NOT use an open flame near the lift truck.



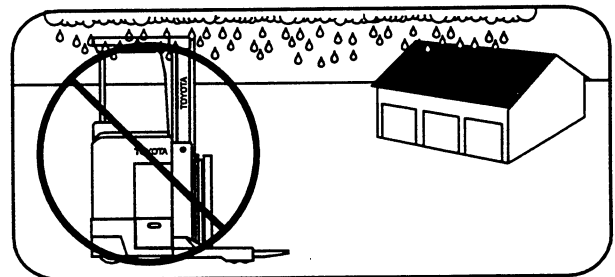
Do NOT use gasoline or other flammable liquids for cleaning parts.



Clean up any hydraulic fluid, oil or grease that has leaked or spilled on the floor.

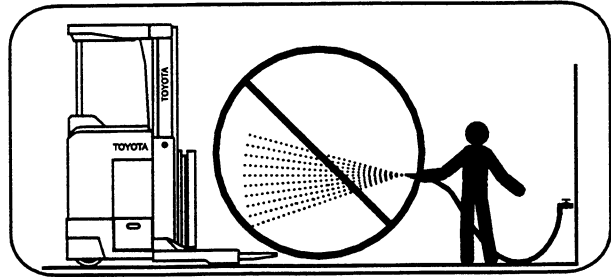


Always park this lift truck indoors.

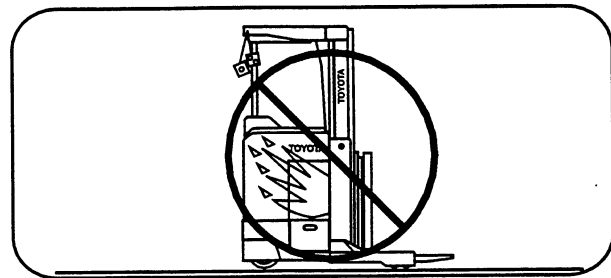


General Safety

Do NOT wash this lift truck with a hose.



Do NOT add to or modify this lift truck until you contact your local Dealer to receive written manufacturer approval.



Do NOT park this lift truck in a cold storage area overnight.

Battery Safety

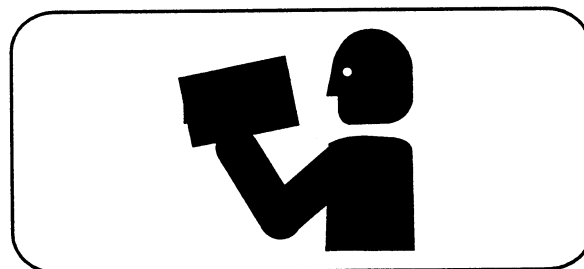
▲WARNING

As a battery is being charged, an explosive gas mixture forms within and around each cell. If the area is not properly ventilated, this explosive gas can remain in or around the battery for several hours after charging. Be sure there are no open flames or sparks in the charging area. An open flame or spark can ignite this gas, resulting in serious damage or injury.

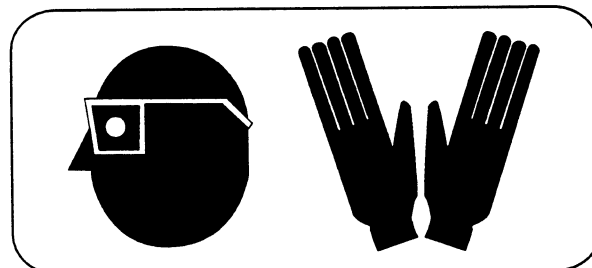
▲WARNING

Battery electrolyte is a solution of sulfuric acid and water. Battery acid causes burns. Should any electrolyte come in contact with your clothing or skin, flush the area immediately with cold water. Should the solution get on your face or in your eyes, flush the area with cold water and get medical help immediately.

Read, understand and follow procedures, recommendations and specifications in the battery and battery charger manufacturer's manuals.

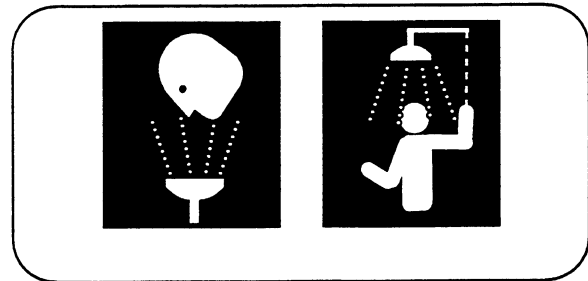


Wear personal protective equipment to protect eyes, face and skin when checking, handling or filling batteries. This equipment includes goggles or face shield, rubber gloves (with or without arm shields) and a rubber apron.

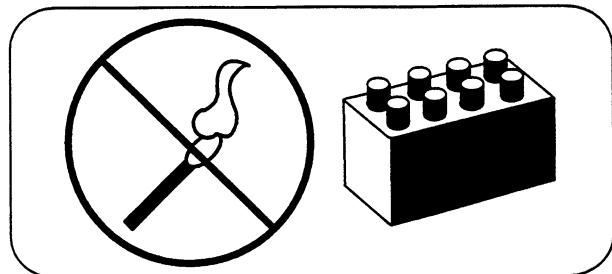


Battery Safety

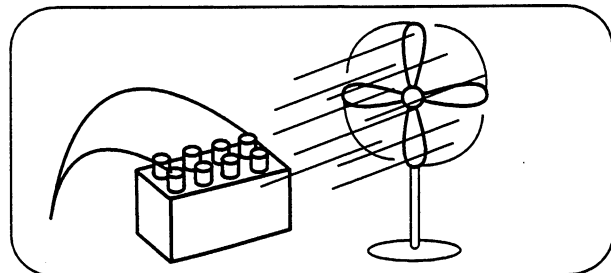
Make sure a shower and eyewash station are nearby in case there is an accident.



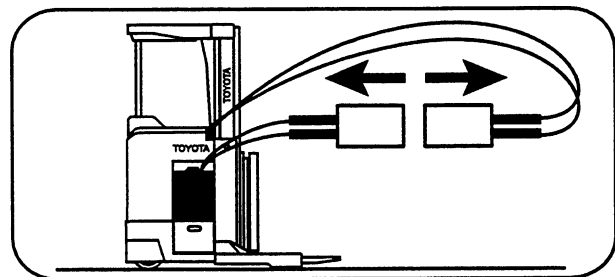
A battery gives off explosive gases. NEVER smoke, use an open flame, or use anything that gives off sparks near a battery.



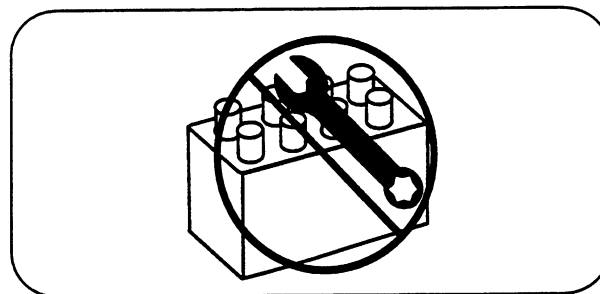
Keep the charging area well-ventilated to avoid hydrogen gas concentration.



Turn the key switch off *before* disconnecting the battery from the lift truck at the battery connector. Do not break live circuits at the battery terminals. A spark often occurs at the point where a live circuit is broken.

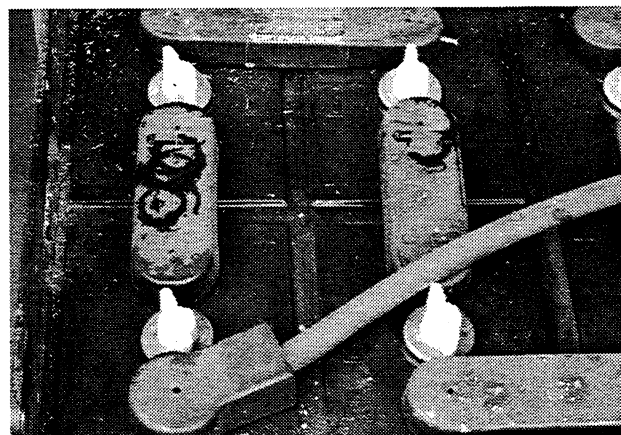


Do not lay tools or metal objects on top of the battery. A short circuit or explosion could result.



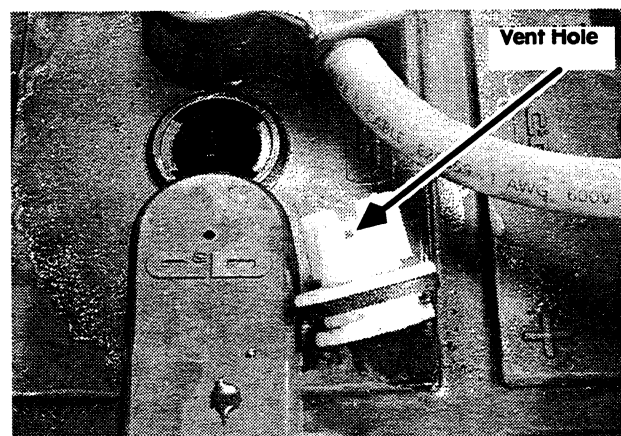
Keep batteries clean. Corrosion causes shorts to the frame and possibly sparks.

Keep plugs, terminals, cables and receptacles in good condition to avoid shorts and sparks.



Keep filler plugs firmly in place at all times *except* when the electrolyte level is checked, when water is added to the cells or when the specific gravity is checked.

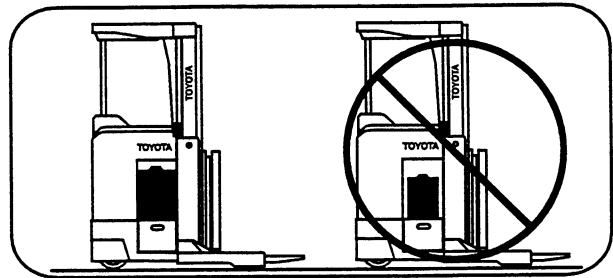
Make sure the vent holes in the filler plugs are open to allow the gas to escape from the cells.



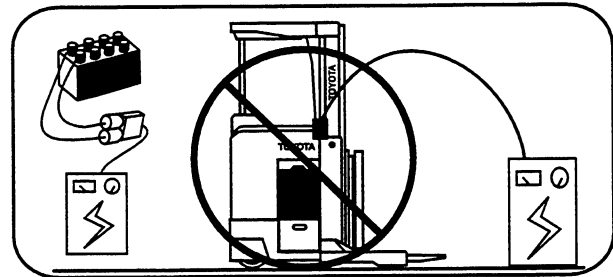
Battery Safety

Do not allow cleaning solution, dirt or any foreign matter to enter the cells.

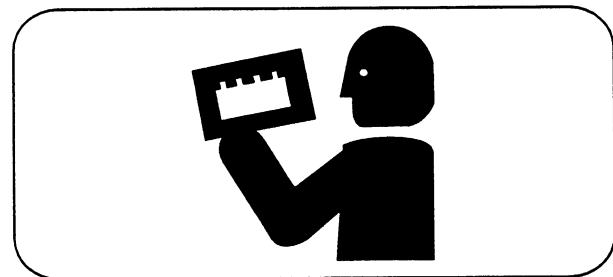
Make sure you install the correct size battery. A smaller or lighter weight battery could seriously affect lift truck stability. See the lift truck's specification plate for more information.



Never plug a battery charger into the lift truck's battery connector. Plug the battery charger only into the battery connector from the battery.



Follow the charging procedures in the Battery Instruction Manual and in the Battery Charger Instruction Manual.



Static Safety

Electronic circuit boards and devices used on the Toyota lift truck can be damaged by the discharge of static electricity, called electrostatic discharge.

Static charges can accumulate from normal operation of the lift truck as well as movement or contact between non-conductive materials (plastic bags, synthetic clothing, synthetic soles on shoes, styrofoam coffee cups, etc.)

Accumulated static can be discharged through human skin to a circuit board or component by touching the parts. Static discharge is also possible through the air when a charged object is placed close to another surface at a different electrical potential. **Static discharge can occur without your seeing or feeling it.**

Whenever working on or near static-sensitive electronics, always use static discharge precautions.

1. Place a static discharge wrist strap around your wrist. Connect the ground lead to the wrist strap connector.
2. Connect the ground clamp to an unpainted, grounded surface on the lift truck frame.
3. If you will be removing or installing static-sensitive components, place them on a properly grounded static mat.
4. To transport static-sensitive components, including failed components being returned, place the components in an antistatic bag or box (available from your dealer).

The wrist strap and associated accessories should be tested monthly to verify they are working properly. A defective static discharge wrist band will not alert you that it is bad.

Static Safety

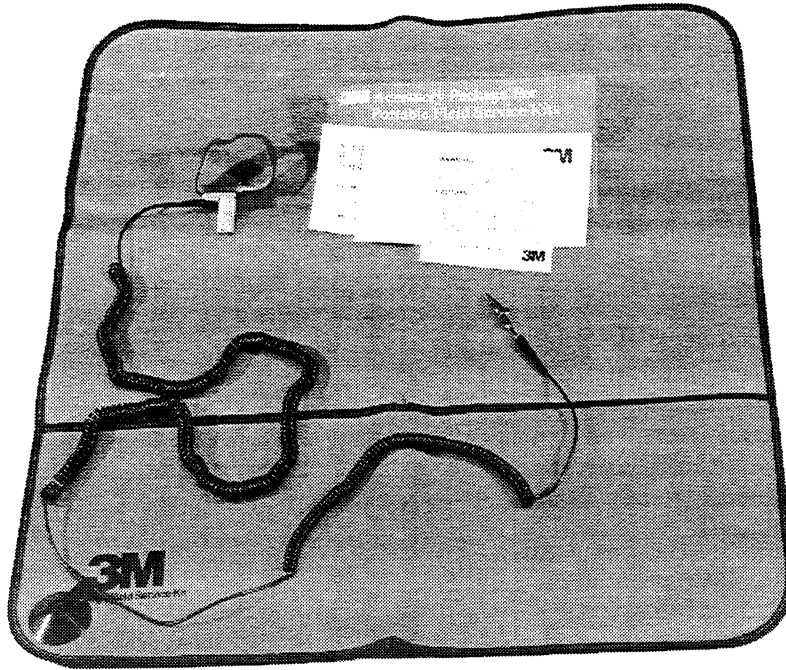


Figure 2-1: Anti-Static Kit with Wrist Strap and Mat

Figure 2-1 shows the components of the Toyota antistatic field service kit, part number 00590-04849-71. The kit includes a wrist strap, ground cord and static-dissipative work surface (mat). Follow the instructions packaged with this kit.

Wrist straps are available in quantities of 25, as part number 00590-04848-71.

A wrist strap tester is available as part number 00590-04850-71.

Contact your local Dealer for information.

Jacking Safety

Sometimes you may need to jack up the lift truck off the floor to perform maintenance procedures. When doing so, observe the proper safety precautions:

1. Lower the forks completely. Remove any load.
2. Place all controls in neutral.
3. Block the wheels to prevent movement of the vehicle.
4. Disconnect the battery connector.
5. Place the jack under the designated jacking points. See Figure 2-2.

⚠WARNING

Use extreme care whenever the lift truck is jacked up. Keep hands and feet clear from vehicle while jacking the lift truck. After the lift truck is jacked, place solid blocks beneath it to support it. **DO NOT** rely on the jack alone to support the lift truck.

Tractor

1. Place the jack in the designated jacking position. See Figure 2-2.
2. Jack the rear of the lift truck so that the drive tire is off the floor no more than 2" (50 mm).
3. Block the lift truck in place.

Mast

1. Place the jack in the designated jacking position. See Figure 2-2.
2. Jack the side of the truck so that the load wheel is off the floor no more than 1/2" (13 mm).
3. Block the lift truck in place.

NOTE: After working on a vehicle, test all controls and functions to assure proper operation.

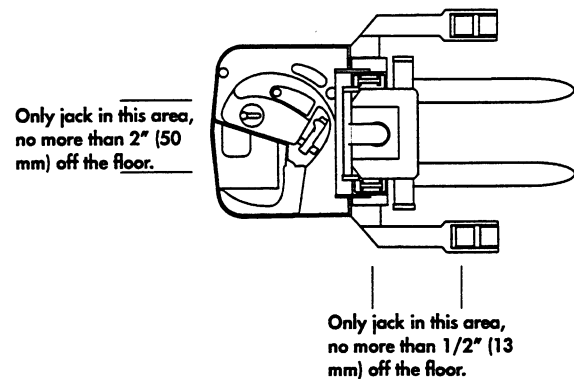


Figure 2-2: Correct Jacking Locations

Tie-down for Transport

Tie-down for Transport

To transport your Toyota lift truck in an over-the-road vehicle or rail car, follow these steps:

1. Lower the forks and locate the lift truck in the center of the transport vehicle.
2. Using a suitable lifting device, remove the battery. See "Battery Safety" on page 2-7.
3. Position the adjustable chain over and through the battery compartment.
4. Position an additional adjustable chain over and through the battery compartment.
5. Position the chain ends of one chain toward the front of the vehicle bed and the chain ends of the other chain to the back of the vehicle bed and draw taut.

NOTE: This will secure the lift truck to the vehicle bed and prevent tip-over and forward or backward movement.

6. Secure the battery according to the battery manufacturer's instructions.

Welding Safety

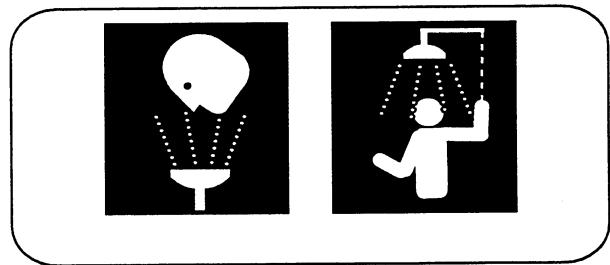
▲WARNING

Flame cutting or welding on painted surfaces may produce potentially harmful fumes, smoke and vapors. Prior to performing flame cutting or welding operations, it is recommended that the coating be removed in the vicinity where the operation(s) will be performed.

Coating removal may be by mechanical methods, chemical methods or a combination of methods. Flame cutting and/or welding operations should be carried out only in well ventilated areas using local exhaust if necessary.

Before working on this lift truck, make sure that:

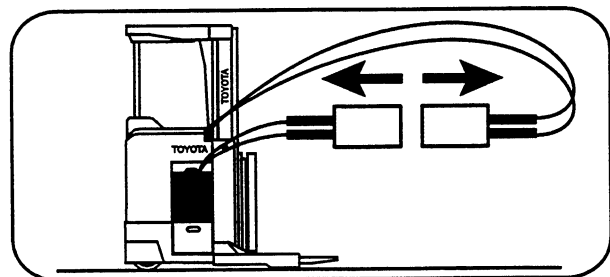
- Fire protection equipment is nearby.
- You know where the nearest eyewash station is.



▲CAUTION

Disconnect the battery before you attempt to inspect, service or repair the lift truck.

- Check for shorts to frame as described in "Shorts to Frame Test" on page 5-4. If any shorts are detected, remove them before you proceed with the welding operation.
- Clean the area to be welded.
- Protect all lift truck components from heat, weld spatter and debris.
- Attach the ground cable as close to the weld area as possible.



Welding Safety

- Disconnect all electrical cards before any type of electric resistance welding is done.
- Do not perform any welding operations near the electrical components.
- If welding must be done near the battery compartment, remove the battery from the lift truck.
- When you are finished welding, perform all ground tests and electrical inspections before the vehicle is operated.

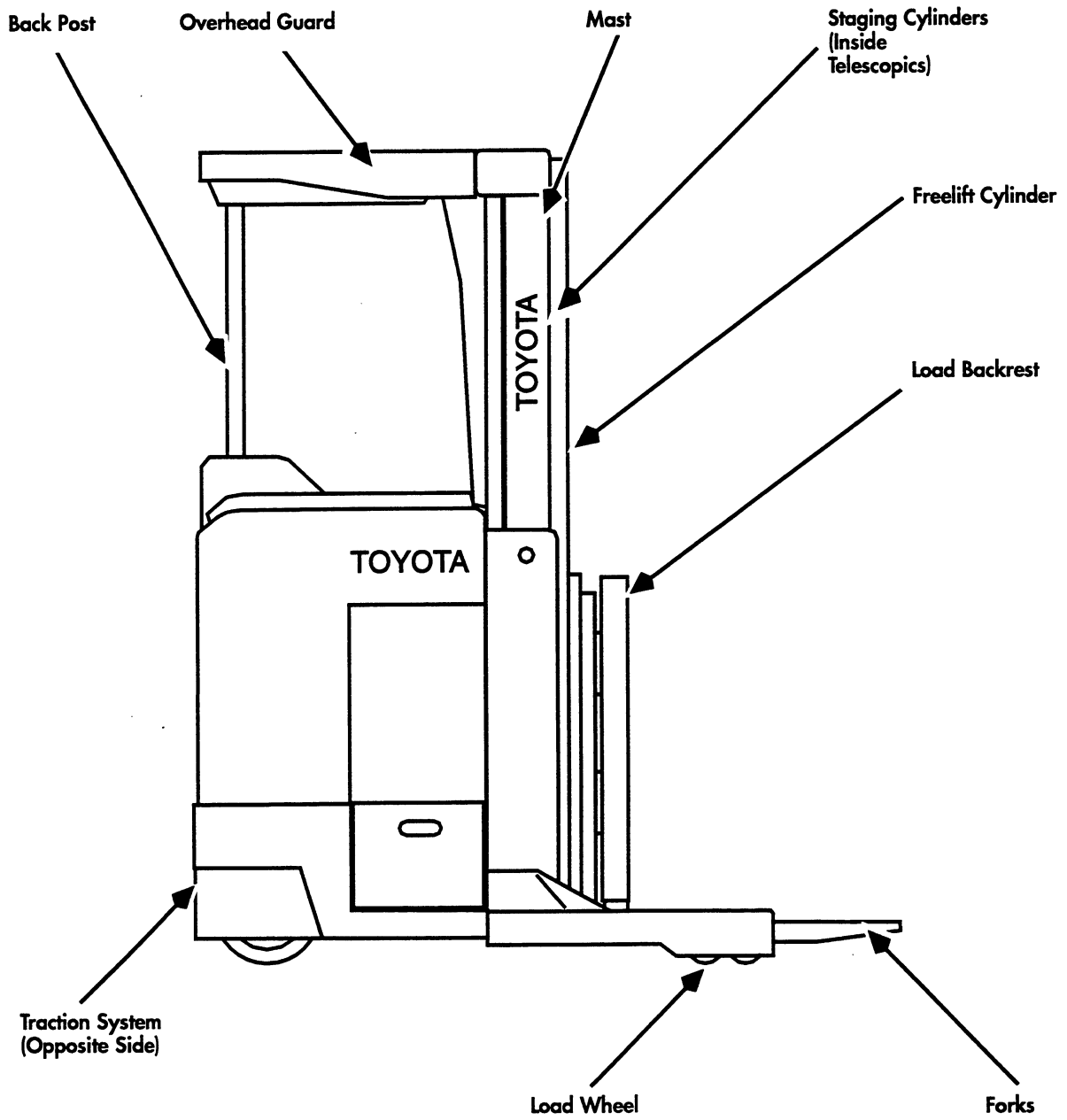
Systems Overview

Vehicle Specifications

Vehicle Specifications

Category	Single Deep Reach Specification			Double Deep Reach Specifications	Straddle Specifications			
	6BRU18	6BRU18	6BRU23	6BDRU15	6BSU20	6BSU20	6BSU25	
Model Designation	6BRU18	6BRU18	6BRU23	6BDRU15	6BSU20	6BSU20	6BSU25	
Maximum Load Capacity (w/BLO = 41")	3500 lbs. to 270"	3500 lbs. to 270"	4500 lbs. to 270" 3500 lbs. to 330"	3000 lbs. to 300" 2700 lbs. to 330"	4000 lbs. to 270"	4000 lbs. to 270"	5000 lbs. to 330"	
Lift Height, Maximum (EH)	270"	270"	330" - 16.4" 360" - 21" bc	330" - 16.4" bc 360" - 21" bc	270"	270"	330" - 16.4" 360" - 21" bc	
Lift Speed (in fpm)	Loaded	40	60	60	40	60	60	
	Empty	60	80	95	95	60	80	95
Lowering Speed (in fpm)	Loaded	80	80	95	95	80	80	95
	Empty	80	80	90	90	80	80	90
Reach/Retract Speed (in seconds)	Loaded	5.0	4.5	4.0	5.0	n/a	n/a	n/a
	Empty	4.0	3.5	3.0	4.0	n/a	n/a	n/a
Travel Speed (in mph)	Loaded	5.5	6.0	6.8 < 300" 6.0 > 300"	6.8 < 300" 6.0 > 300"	5.5	6.0	6.8 < 300" 6.0 > 300"
	Empty	6.0	6.5	6.8 < 300" 6.5 > 300"	6.8 < 300" 6.5 > 300"	6.0	6.5	6.8 < 300" 6.5 > 300"
Acceleration, Empty (max., seconds)	5.5	5.3	5.0	5.0	5.5	5.3	5.0	
Overall Length (without Forks)	70.5" (14.4") 72.5" (16.4")	72.5"	75.0" (16.4" bc) 79.5" (21" bc)	75.0" (16.4" bc) 79.5" (21" bc)	72.5" (14.4") 74.5" (16.4")	74.5"	77.0" (16.4" bc) 81.5" (21" bc)	
Base Leg Opening (inside)	32" - 50"							
Reach Distance (in inches)	23	23	22	39.7	n/a	n/a	n/a	
Battery Compartment	14.4" or 16.4"	16.4"	16.4 or 21"	16.4 or 21"	14.4" or 16.4"	16.4"	16.4 or 21"	
Battery Voltage (in volts)	24	36	36	36	24	36	36	
Minimum Battery Weight	1600 lbs.	2000 lb.	2600 lbs. ≥330" 2400 lbs. <330"	2000 lbs. (16.4" bc) 2600 lbs. (21" bc)	1600 lbs.	2000 lb.	2000 lbs. (16.4" bc) 2400 lbs. (21" bc)	

General System Data



Brake

Brake**System Overview**

The braking system meets all requirements of ANSI B56.1 and is the recommended system for stopping the vehicle in an emergency. Plugging is the recommended procedure for stopping the lift truck under normal operating conditions. The brake assembly is mounted on top of the drive motor. The brake assembly consists of a rotor mounted on the drive motor armature shaft and a stationary friction disc. The brake is electrically applied and released.

Steering

System Overview

The steering system consists of the following:

- steering wheel
- electric steer tach
- electric steer controller
- electric steer motor

The electric steer controller supplies electrical voltage for the steering system. The electric steering motor receives direction commands from the operator through steering wheel turns. The electric steer motor turns the drive unit. The steer tach monitors the rotations of the steering wheel, sending + or - voltage to the steer controller.

Lift/Lower System

Lift/Lower System

System Overview

All inputs and outputs related to the lift/lower system are controlled by the Display card. The Display card determines what actions are required based on inputs from the operator and from system feedback.

As VR2 is moved by the operator, a voltage, proportional to the position of the control, is sent through the Tractor Interface card to the Display card where it is processed.

When the Lift/Lower control is moved to lift, voltage from VR2 increases; when it is moved to lower, the voltage from VR2 decreases. As the lift/lower control is moved, VR2 voltage is sensed by the Tractor Interface card. This data is then transmitted to the Display card, which determines whether to lift or lower. This is accomplished by the Display card comparing the present voltage to the learned voltage value.

Remember that the neutral value for VR2 is learned and stored for future reference by the Display card during Calibrate mode.

Unique System Features

All coils used for the lift/lower system are 24 volt, even on 36 volt lift trucks. This is accomplished by the Display card pulsing the appropriate coil driver located on the Tractor Interface card. If a lift truck is 36 volts, the coil driver will be pulsed at a rate of 66% ($66\% \times 36 \text{ volts} = 24 \text{ volts}$).

The Display card monitors lift pump motor rotation (back EMF) at JP8-9. If the control is moved from lift to lower, the Display card will not allow the carriage to lower until the lift pump motor has stopped. This allows smooth, controlled movement of the carriage without a "bump." The length of the delay will depend on the oil viscosity, pump/motor tightness, temperature, and the load on the carriage.

Auxiliary System

System Overview

The auxiliary system consists of auxiliary controls and cylinder(s) for reach, tilt or sideshift. The auxiliary and lift systems share the same reservoir, motor and pump.

Reach/Retract

Reach extends the forks away from the mast assembly when the reach button on the multi-function control handle is depressed. Inputs for reach are received by the Tractor Interface card at JP10-1.

Retract moves the forks toward the mast assembly when the retract button on the multi-function control handle is depressed. Inputs for retract are received by the Tractor Interface card at JP10-2.

If the lift truck is configured for two speed reach and retract, the sequence in which the Reach/Retract buttons are depressed determines the speed and direction the reach mechanism travels.

- Depressing and holding the Reach button, then depressing the Retract button activates high speed reach.
- Depressing and holding the Retract button, then pressing the Reach button activates high speed retract.

Sideshift

Sideshift allows the operator to move the fork carriage to the left or right in relation to the mast. The amount of sideshift will be 2 or 4 inches (5 or 10 cm) in either direction depending on the base leg opening (BLO). Inputs for sideshift right are received by the Tractor Interface card at JP10-3. Inputs for sideshift left are received by the Tractor Interface card at JP10-4.



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