

alum-a-lift

**Devices For:
Lifting, Lowering, Moving, Positioning, and Holding
Objects Too Heavy For the Unaided Human**



Lift Serial Number: _____

A800 Owner's Manual

A800 GORILLA LIFT

Lift And End Effector Guide

NOTE: END-EFFECTORS TO BE USED IN ACCORDANCE WITH
ALUM-A-LIFT APPROVED PROCEDURES



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Setting Up Your Alum-A-Lift

NOTE: Read this section in its entirety before using your Alum-A-Lift.

Unpacking the Lift

The Alum-A-Lift is shipped to you on a wooden pallet. Larger lifts or those going overseas will be shipped inside a crate. Before unpacking the lift, check to see if there is any damage to the unit. If there is any damage, please contact the freight carrier, your traffic person, and our office at once. If it has been ascertained that the lift has not been damaged, carefully remove the wrapping and check the condition of the unit. Lifts are shipped completely assembled except for the installation of the battery which is shipped in a box fastened to the pallet. Some exceptions may apply in cases where the end-effector is removed due to shipping restrictions. In general, the lift will be secured with banding or boarding which can be removed with the appropriate tooling. Taped to the Alum-A-Lift is a manila envelope containing: an owner's manual, a tool set, "Good Stuff" ballscrew lubricant, and the final check list. The lift weight will vary according to the application; therefore care should be exercised in removing the lift from the pallet. It will usually require two people to do this safely.



Palletized Lift

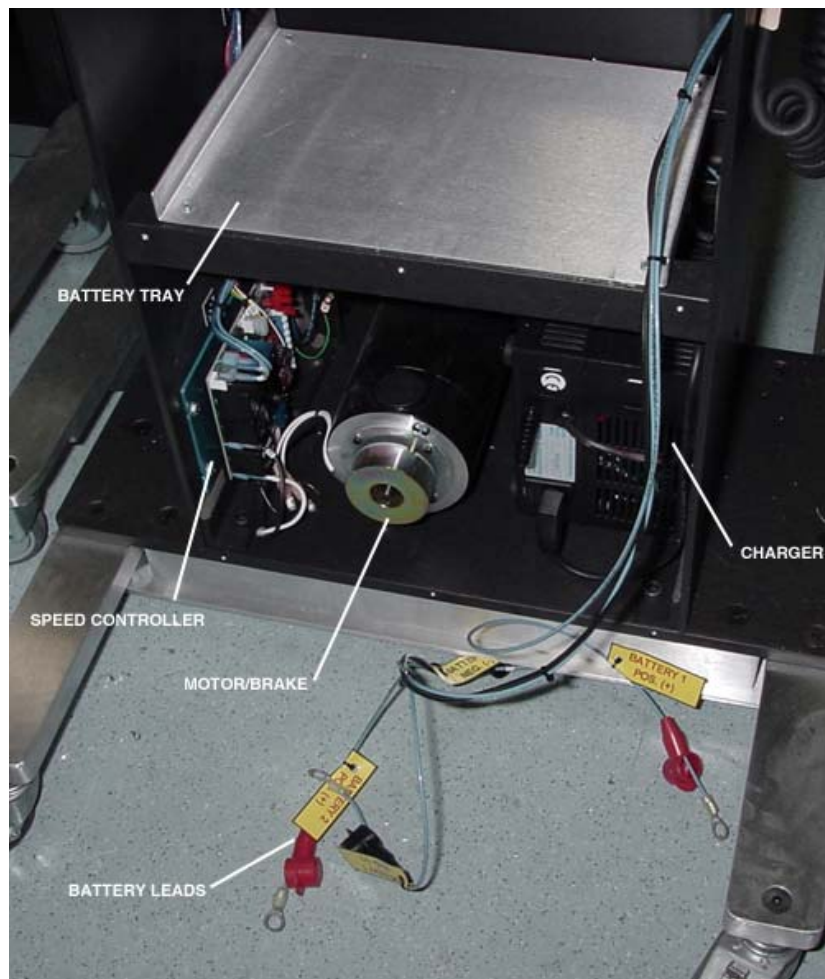


Crated Lift

SETTING UP YOUR ALUM-A-LIFT

Providing Power to the Lift

The lift features a 24VDC battery operated system. This is accomplished by connecting two 12V, 31.5Ah gel cell batteries in series. These come packed in a separate box. Remove the batteries from the box and position them on the floor as close to the rear of the lift as possible. Remove the back cover from the rear of the lift using the captive thumbscrews. Inside the battery compartment you will find four leads with ring connectors. Each lead is labeled to aid connection and should be long enough to reach the batteries. Designate one battery as "A" and the other battery as "B". Connect each lead to the appropriate battery and secure using the hardware accompanying the batteries. A battery strap is included in every lift which can be used to secure the batteries once they are in place. Loosen the strap so that the battery tray is clear. Each battery weighs about 24 pounds. Note, use SEMI Type 4 protection when installing the batteries. Carefully lift the batteries onto the battery tray and secure using the battery strap. Replace the back cover. See the Electrical System section for more information.



Battery Compartment
(Battery Strap Not Shown)

SETTING UP YOUR ALUM-A-LIFT

Testing the Lift

Move the ON/OFF/CHARGE switch to the ON position. The voltmeter should now register 24 volts or more and a green LED by the switch should light up. The controls on the detachable black pendant box should now be active. Press the UP/DOWN controls on the lift pendant box and the carriage should raise and lower. Run the carriage up and down throughout the preset range. The motor and brake will make a clicking sound when the UP/DOWN button is initially depressed; this sound is normal. See the Operational/Controls Section for more detail regarding operation.

If your lift is equipped with a powered end-effector a second pendant box will be included with the lift. Test each powered function to verify that the lift is working properly.

General Lift Information

Introduction

The lifting device described in this manual is designed to assist personnel in safely removing and installing equipment while complying with SEMI S2 safety guidelines. This manual describes the operation, maintenance and use of the lift.

Intended Use of the Lift

The lift is designed around a specific application. It is intended to raise and lower loads and to act as a means of transportation where necessary. The lift is designed to work in conjunction with unique end-effectors intended for the individual components present in each system.

The Alum-A-Lift design features three integrated systems: electrical, static, and dynamic.

Electrical System

The electrical system provides power and control to the drive system and end effector. The system is comprised of:

- Batteries
- Limit Switches
- Voltmeter
- Rocker and Push Button Switches
- Speed Controller (where applicable)
- EMO Switches (where applicable)
- Circuit Breakers
- Relays
- Indicator Lights
- Low Voltage Indicator
- EMI Filter (where applicable)
- Battery Charger

The system operates on 24 volt DC power provided by a pair of 12 volt batteries connected in series. The lift contains a built in AC powered battery charger that can be plugged into an AC outlet through the use of the integrated AC power cord. A voltmeter located on the top cover helps to monitor the voltage of the batteries. As an additional feature, an audible alert will sound when the battery needs recharging. Ignoring this alert may result in discharging the batteries. The system should not be operated while the batteries are charging.

GENERAL LIFT INFORMATION

Static System

The static (framework) provides structure to which the electrical and drive systems are mounted. This system is comprised of:

- Welded Frame
- Base Assembly
- Top Channel Assembly
- Leg Assembly
- Ergonomic Handles
- Struts

The lift is comprised of numerous subsystems. The most basic framework involves the mounting of a frame assembly to a base assembly. Mounted to the base assembly are two leg assemblies. These subassemblies make up a very stable and mechanically strong system.

Dynamic System

The dynamic system (drive) provides motion and power in the form of upward and downward movements of the carriage. The carriage is designed to accommodate a variety of end-effectors. The dynamic system includes:

- Gear Motor
- Alignment Couple
- Ball Nut Assembly
- Carriage Assembly
- Brake
- Ball Screw
- Pillow Block Bearings

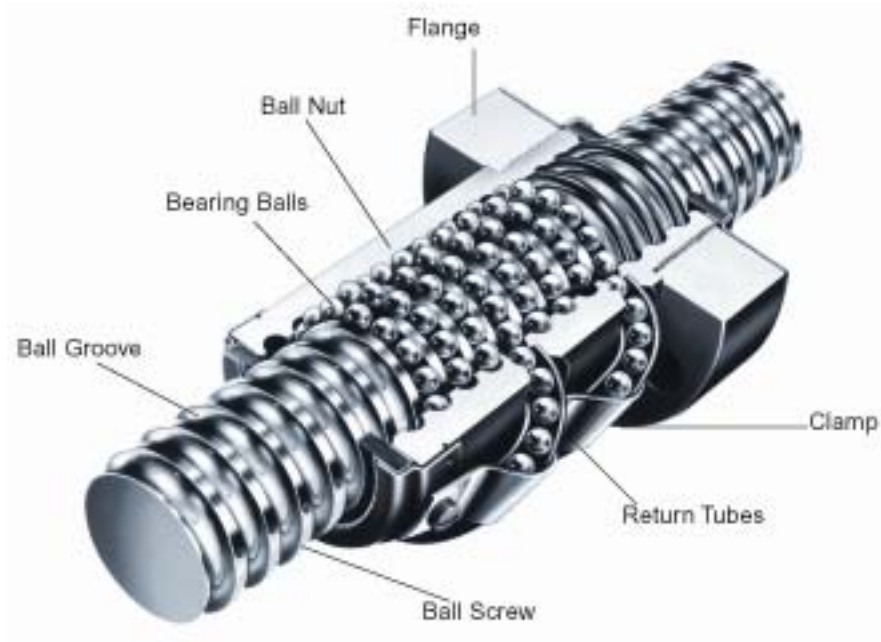
The lift's carriage is driven up and down by a DC gear motor driven ball screw that runs vertically along the inside of the structure.

Ball Screw Design Advantages ¹

"A ball bearing screw is well described by its name; it's a screw that runs on ball bearings. The balls provide the only physical contact between screw and nut, replacing the sliding friction of a conventional screw with a free and smooth rolling motion. In a ball bearing screw the return tubes carry the ball bearings from the end of their travel, over the screw and back to the start of the circuit to form a continuously recirculating path. A ball bearing screw is extremely energy efficient, about 90% – three times more efficient than conventional screws. The primary function of a ball bearing screw is to convert rotary motion to linear motion – or torque to thrust." In the case of the lift, this linear motion is accomplished by rotating the screw and having the nut travel up or down. A load locking spring is featured on the Alum-A-Lift. This spring is a coil turned into the inactive portion to the nut that conforms to the ball tract. During normal operation, the spring is inactive and not in contact with the screw. In the event the ball bearings are lost from the nut, the load locking spring will not allow the load carrying nut to free-fall down the screw.

1. (http://www.uslinear.com/config/BSHelp/Balscrew/Design_Advantages_of_Ball_Bearing_Screws.htm)

GENERAL LIFT INFORMATION

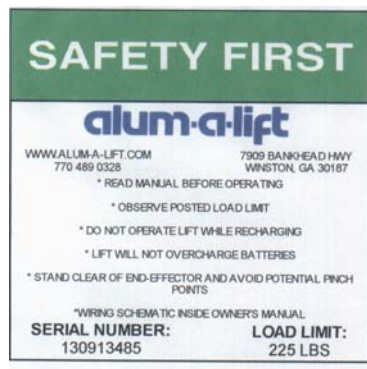


Ball Bearing Screw

(http://www.uslinear.com/config/BSHelp/Balscrew/Design_Advantages_of_Ball_Bearing_Screws.htm)

Nameplate

Located on the operator side of each lift, a nameplate or placard gives general information regarding the specifications for that specific lift. Notable items include serial number, vendor contact information, and load limit. A sample nameplate follows.



Lift Nameplate

Operation/Control System

Pendant Box

The Alum-A-Lift's vertical travel is controlled via a detachable pendant box. The pendant box allows for vertical adjustment of the lift's carriage. Up and Down push buttons are located on the front edge of the box. Only one button will function at a time. If equipped, a speed control knob located on the side of the pendant box allows for fine vertical adjustment of the lifting speed. The pendant box is attached to the lift by a flexible curly cord. This cord allows the user freedom of movement while operating the lift.

ON/OFF/CHARGE Button

The top cover contains an ON/OFF/CHARGE button. This button is a three-position toggle switch.

- The ON position gives power to the lift. The voltmeter shows the output voltage applied to the circuit. A green LED will light up to indicate the power is on.
- The OFF position turns the lift off.
- The CHARGE position switches input voltage via the charging cord to the built in charger. Do not run the lift while in charge mode.

Circuit Breakers

To protect the electrical system, circuit breakers located on the top cover serve as overload protection. The lift has four main circuits: a control circuit, an ac in circuit, a dc out circuit, and a lift main circuit. A fifth circuit will be present if the end-effector is powered. If the labeled amperage is exceeded, the circuit breaker will pop out and can be reset by pressing it back down. In the event a circuit breaker is tripped, the cause should be examined immediately.

Charger Status

A built in charger is included in every lift. The charger is CE approved and switchable between 110/220V as needed. Either charger is located in the battery compartment. A set of LEDs located on the top cover alert the operator as to the status of the battery. To charge the batteries, plug the charger cord (located on the lift's right side plate) into a standard

outlet and turn the ON/OFF/CHARGE switch to the CHARGE position. **The charger will not overcharge the batteries.**

Fixed Limits

The Alum-A-Lift is equipped with end-of-travel limit switches. These limit switches stop the movement of the carriage when depressed. The switches are fixed and initially set at the factory. Optional redundant limits serve as safety back ups in the event of over travel. This option is standard for CE lifts and optional for domestic use.

Operating Procedures

The basic operation of the lift is to move loads up and down. The following instructions summarize how to perform this operation. It is recommended that all lifting operations be conducted with fully charged batteries and that the battery charger is plugged in when the lift is not in use. See the Electrical System section for details on charging the batteries.

Lifting Load

- Switch the three-position ON/OFF/CHARGE switch to the ON position.
- If necessary, attach the appropriate component specific end-effector.
- Move the lift into position.
- Using the up or down buttons on the detachable pendant box, move the carriage up or down to the desired height.
- Secure the component and lower load to a safe height before moving the lift.

End Effector

Features

The Alum-A-Lift is capable of being configured for multiple applications. A custom end effector is supplied based on the needs of the application. This end-effector has been designed around specific reach, weight and structural integrity requirements. The posted load limit of the lift is based on lift stability and end-effector requirements and should not be exceeded. This could result in lift instability and/or damage to equipment and personnel.

End-effector drawings can be seen on the following page(s).

Installing the End Effector

Most of the time the end-effector will come already mounted to the lift. The attachment method may vary depending on design. In general, eight 3/8-16 flat head socket cap screws are used to mount the end-effector to the lift's carriage. Before changing out an end-effector, first make sure it is Alum-A-Lift approved and correct for the intended application.

Load Test and Tilt Test

Each end effector is tested and certified to ensure lift stability and structural integrity of the end effector in accordance with Machinery Directive 98/37/EC. See Appendix 3 for Test Documentation.

Electrical System

Electrical Safety Concerns

SEMI S2 safety guidelines define electrical tasks as Type 1-5 based upon the level of electrical exposure involved.

Type 1 – Equipment is fully de-energized (electrically “cold”)

Type 2 – Equipment is energized. Live circuits are covered or insulated. Work is performed at a remove location to preclude accidental shock.

Type 3 – Equipment is energized. Live circuits are exposed and accidental contact is possible. Potential exposures are less than 30Vrms, 42.2 Vpeak, 240 volt-amps, and 20 Joules.

Type 4 – Equipment is energized. Live circuits are exposed and accidental contact is possible. Voltage potentials are greater than 30Vrms, 42.2 Vpeak, 240 volt-amps, 20 Joules, or radio frequency (rf) is present.

Type 5 – Equipment is energized and measurements and adjustments require physical entry into the equipment, or equipment configuration will not allow the use of clamp-on probes.

All electrical tasks described in this manual are Type 4 or less. The Type 4 assignment is required because of the presence of power levels greater than 240 volt-amps associated with the batteries. The batteries cannot be turned off and personnel will be exposed to them when they lockout DC power and/or change the batteries. The presence of the energy from the batteries could result in an accidental electrical short circuit resulting in hazardous arcs or flashes. Arcs and flashes may create high intensity flashes of bright light and discharge sparks or molten material that could injure personnel and/or damage equipment.

Lockout Instructions

The system has two power circuits, AC and DC. To properly achieve a lockout condition, both of these circuits must be locked out.

AC Power

- Remove the AC plug from the power outlet.

ELECTRICAL SYSTEM

- Replace the plug into the receptacle on the side of the lift.

DC Power

- Put eye protection on (Type 4 task).
- From the back of the lift, remove the back cover to expose the battery.
- Remove the negative wire from the terminals of the battery. Be careful not to short circuit the positive and negative terminals of the battery, as this could generate hazardous arcs and flashes.

Battery Basics

A 12-volt battery is not a 12-volt battery. Twelve volts is just a nominal, convenient term used to distinguish one battery from another. A fully-charged 12-volt battery, allowed to "rest" for a few hours (or days) with no load being drawn from it (or charge going to it), will balance out its charge and measure about 12.6 volts between terminals.

When a battery reads only 12 volts under the above conditions, it's almost fully depleted. Actually, if a battery's resting voltage is only 12.0 to 12.1 it means only 20 to 25% of its useful energy remains. It's either dead or it has been deep cycled, and a battery can only be deep-cycled a limited number of times before it is indeed dead.

Batteries should be charged if the open circuit voltage drops below 12.4 volts.

Twelve volt batteries supply useful energy only through a limited range -- from over 14 volts (when fully charged) down to 10.5 volts in use/under load.

% Charge	Lead Acid	Gel Cell
100	12.7-12.6	12.95-12.85
75	12.4	12.65
50	12.2	12.35
25	12.00	12.00
0	11.8	11.8

Charging the Battery

- Switch the three-position ON/OFF/CHARGE switch to the OFF position.
- Insert the AC plug on the lift into a compatible AC outlet.
- Switch the three-position ON/OFF/CHARGE switch to the CHARGE position. The Charging LED will turn on and the battery will begin to charge.
- The charge is complete when the Charge Complete LED turns on.
- In the event that the batteries do not charge following an extended charging cycle, the batteries will likely need to be replaced.

ELECTRICAL SYSTEM

Battery Specs



The batteries accompanying the lift are valve-regulated, gelled-electrolyte batteries designed to offer reliable, maintenance-free power, for renewable energy applications where frequent deep cycles are required and minimum maintenance is desirable.

- 12 volts nominal, 31.5 Ah
- Weighs 24 pounds
- Element, post = Threaded stud of “flag” terminal, forged bushing
- Charge voltage = Cycle 2.30 to 2.35; Float 2.25 to 2.30
- Gelled-Electrolyte
- Rated non-spillable by ICAO, IATA, and DOT

FAQ

I Ordered an A800 But The Load Limit Sticker Says 350 Pounds. Did I Get the Wrong Lift?

It is common for the lift to be rated at a load less than the lift model. Each lift is rated based on the load being 18" off the front of the carriage. Exceeding this distance usually requires a higher rated lift. The weight of the end-effector and stability of the lift also have to be considered.

I Turn the Lift On, But the Light Doesn't Come On. What's Wrong?

The LED may be blown or simply disconnected. Check to make sure the lift is responsive to the pendant box controls. If so, the LED is the problem and will need to be replaced.

I Turn the Lift On, I press the Up / Down Buttons and Nothing Happens. What's Wrong?

As simple as this sounds, first check to make sure the On/Off/Charge switch is actually in the on position. A green LED should light up. If not, check to make sure the leads are correctly connected to the battery. Push the up and down buttons, check to see if the relays are clicking. You should be able to audibly tell.

The Lift Vibrates and / or Makes Noises When Going Up / Down. What's Wrong?

This is likely the result of misalignment between the lift motor and the ballscrew. Check the motor couple located at the front of the lift to see if the couple is misaligned.

The Lift is Making a High Pitched Noise. Is There Something Wrong?

The noise is likely coming from the Low Voltage Indicator (LVI). This audible alarm is to alert the operator that the batteries need to be charged.

Why is the Lift Tripping the 3A AC Circuit Breaker?

When batteries are excessively low, the charger will pull more amps in an attempt to charge the batteries. This will trip the breaker. First try removing the batteries and charging them with an offline charger. You can also try replacing the circuit breaker, it may be bad. If the problem persists, the charger may be defective and will need to be replaced.

Why is the Lift Tripping the 10A Circuit Breaker?

When batteries are excessively low, the charger will pull more amps in an attempt to charge the batteries. This will trip the breaker. First try removing the batteries and charging them with an offline charger. You can also try replacing the circuit breaker, it may be bad. If the problem persists, the charger may be defective and will need to be replaced.

Why is the Lift Tripping the 25A Circuit Breaker?

In general, the 25A breaker will trip if the motor begins to draw an excessive amount of amperage. This can be for several reasons. The most common cause is that the motor brake is not releasing, thus the motor is fighting the brake. Reset the breaker and remove the back cover so that you can see the brake, which is mounted to the rear of the motor. You should be able to see the brake move slightly as you press the up or down buttons. If not, check your brake connections. If the motor is shorted or you are lifting too heavy a load the breaker will trip as well. Also check to see if the lift's carriage seems to be binding or hitting an obstacle causing extra strain on the motor.

How Long Does It Take to Recharge My Battery?

A specific time is difficult to determine because of many variables:

- Temperature
- Degree of discharge
- Charger
- Age and condition of battery

It will take about 60% of the charging time to bring a battery from 0% charged (10.5V) to 90% charged. It will take the remaining 40% of the total charging time to add the last 10% of charge to the battery. In general we recommend that a good overnight charge should be sufficient.

Will The Charger Overcharge My Battery?

No. We recommend that, when possible, you leave the lift's charger cord plugged into an outlet and the switch in the charge position until you next need the lift for use. Once the charging cycle is complete the charger switches to a constant voltage float/standby mode (trickle charge), nominally at 2.3 Volts per cell. At this voltage, the battery will not out gas so any electrolyte loss is minimal. The charge current drops exponentially to a very low level, sufficient to maintain a fully charged battery. This will actually tend to equalize charge imbalance between the battery cells over time, which can extend battery life. By leaving the charger switched on, you will actually prevent any risk of battery damage from sulphation which results from allowing a battery to remain in a discharged state.

My Charger Isn't Charging the Battery. Do I Need A New Charger?

Probably not. The chargers feature short circuit and reverse polarity shutdown, so they don't produce any output voltage unless they are actually connected to a battery. This is a safety measure to keep an operator from being shocked if they are holding the leads. If the battery is excessively discharged then the battery may not start because it can't detect that the battery is there. Try putting the battery on an offline charger until it has been charged to around 11 volts. At this time, it can be placed back in the lift and the onboard charger can take over.

F A Q

Why Won't My Battery Hold A Charge?

If the battery won't hold a charge it is likely due to a damaged battery. This usually is the result of a damaged cell resulting from the discharge of the battery. If a battery is well maintained, it will generally last 2-3 years before replacement is needed.

Preventative Maintenance

	Schedule	Comments
Ball Screw	Lubricate the ball screw every 2 months or 500 hours of operation .	Use only Lithium or Teflon grease to lubricate the ball screw and linear guides. NO OIL . A supply of "Good Stuff" lubricant is supplied with the lift and free replacement bottles are available by contacting Alum-A-Lift. Manually apply grease up and down the screw and run the lift up and down to help spread the lubricant over the length of the screw.
Casters	Check the caster fastener for tightness every 2 months .	Verify that caster is not loose. Refer to tightening specifications for torque settings.
Limit Switches	Check limit switches every month .	While jogging the lift up or down, check to see that the limit switches stop travel or perform the intended function. Be careful not to "crash" the carriage at the extremes of travel. See the Operational/Controls System Section.
Battery	Charge often, at least once a week .	The charger will not over charge the battery. The battery should always be fully charged when the lift is not in use.
Set Screws	Check set screws in bearings, couple, and motor brake every 6 months .	Use appropriate tightening torque (see appendix) and removable grade thread locking compound.
Lift Cleaning	Frequently	Dirty or dusty environments may require a more frequent cleaning schedule.
Fasteners	Every 12 months	Inspect for damaged or loose fasteners. Tighten fasteners according to recommended torque settings.

RECOMMENDED TORQUE SETTINGS

Alloy Steel Fasteners [in-lb]

Size	Set Screw	SHCS	BHSCS	FHSCS
#6-32	10	34	15	17
#8-32	20	59	30	31
#10-32	36	77	40	45
1/4-20	87	200	100	100
5/16-18	165	425	200	
3/8-16	290	750	350	
1/2-13	620	1850	850	83

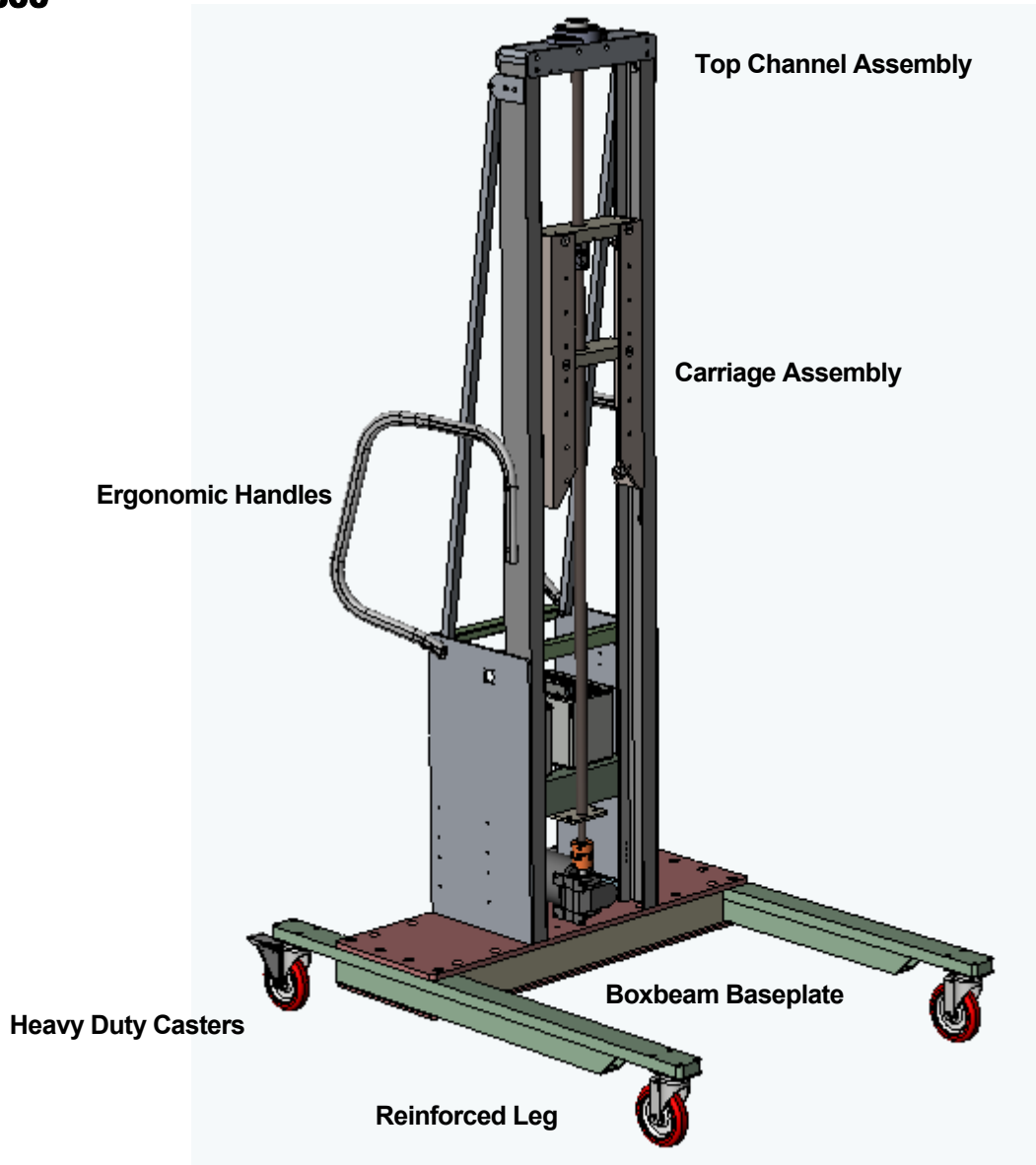
Stainless Steel Fasteners [in-lb]

Size	Set Screw	SHCS	BHSCS	FHSCS
#6-32	7	15	11	11
#8-32	16	28	20	20
#10-32	26	40	30	30
1/4-20	70	95	71	71
5/16-18	130	170	123	123
3/8-16	230	300	218	218
1/2-13	500	750	532	532

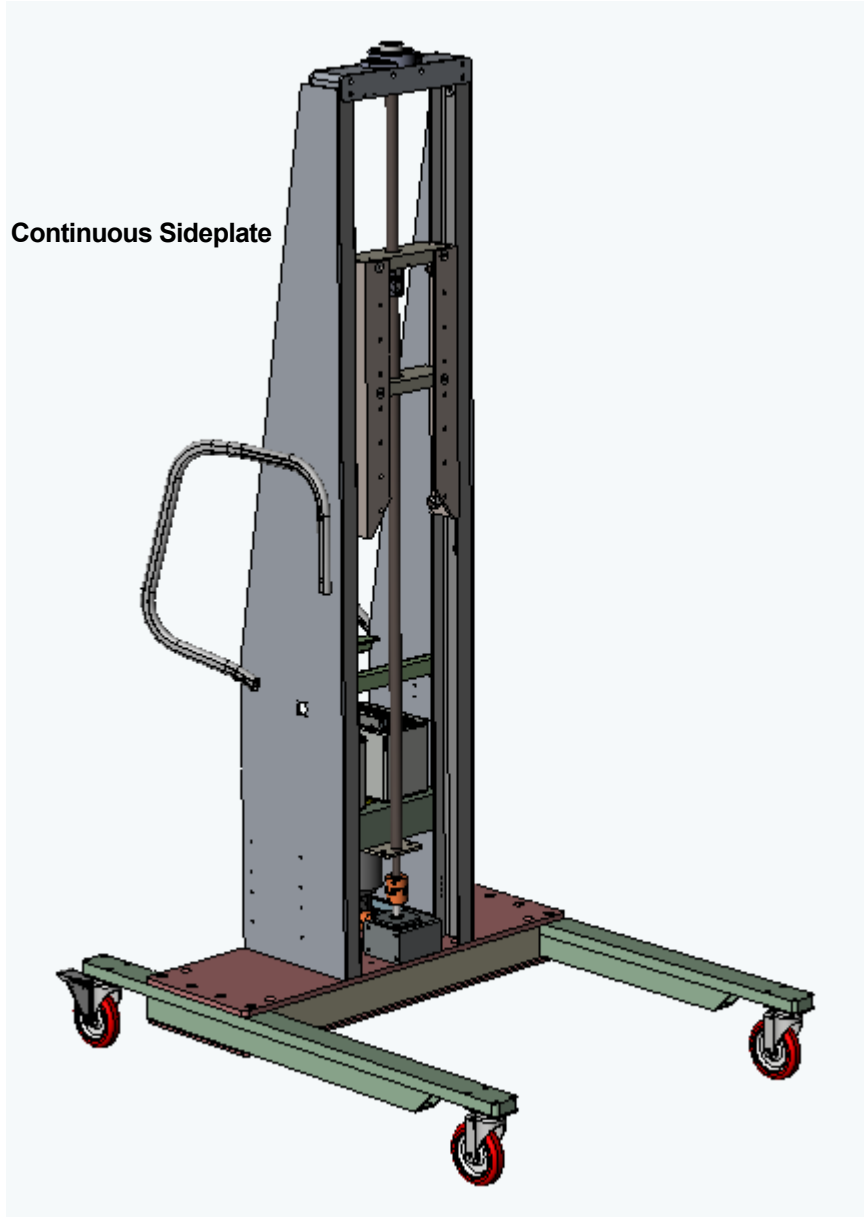
SHCS - Socket Head Cap Screw
 BHSCS - Ball Head Socket Cap Screw
 FHSCS - Flat Head Socket Cap Screw
 ref: Unbrako Engineering Guide, Form 5519 REV. A 20M 697
 SPS

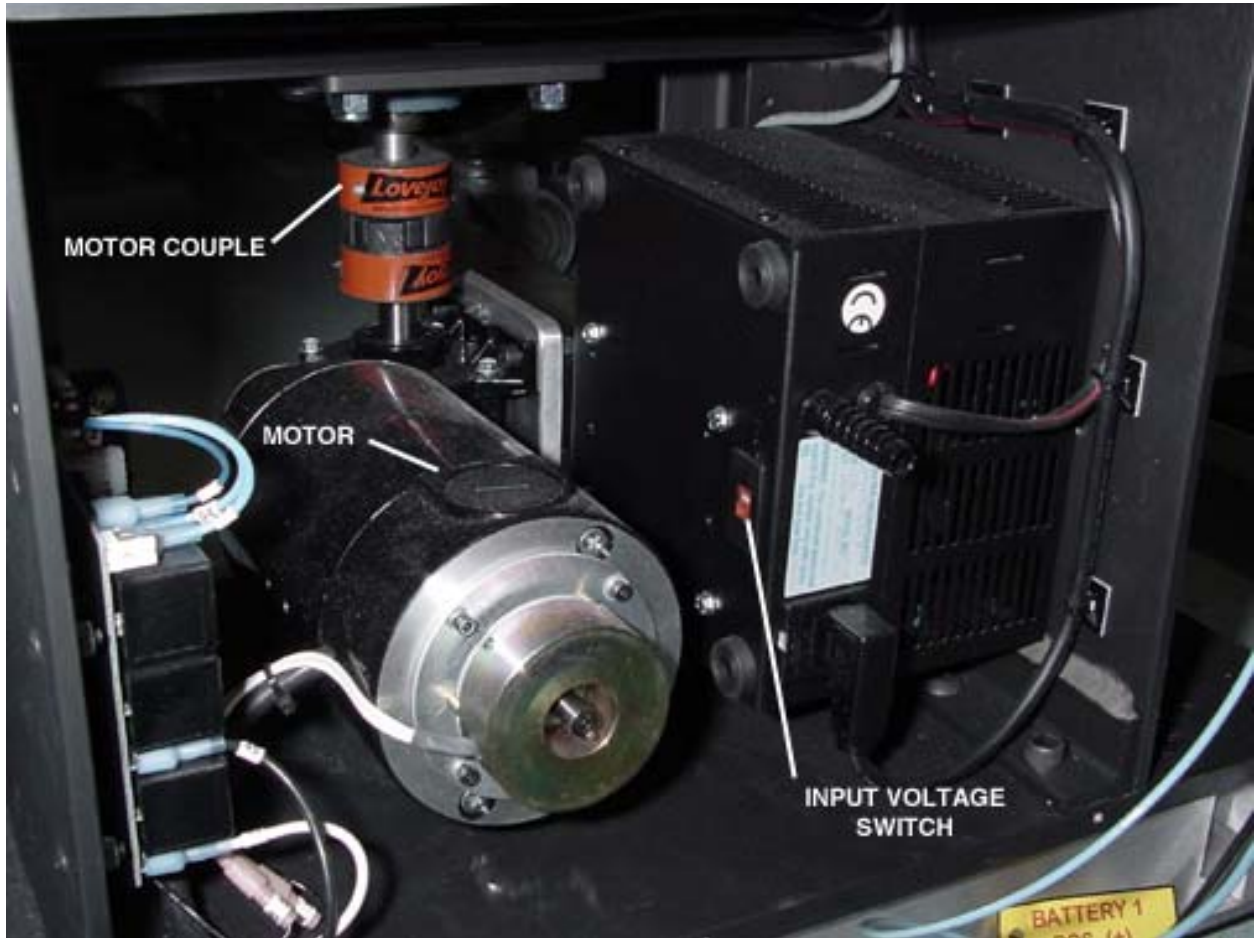
Lift Drawings / Photos

A800



A800CS





Test Certification

Build Standards

Alum-A-Lifts are assessed against all available build standards in order to ensure a fully functional, yet safe and ergonomic solution to general lifting requirements. If it is desired that the lift be built to a certain specification this should be discussed during the quotation stage. Most assessments are done on a self certifying basis. Formal third part testing for each lift is available upon request.

Load Test and Tilt Test

Each lift is certified to ensure the stability and structural integrity of the lift in accordance with Machinery Directive 98/37/EC. This was done two ways. First, theoretical tilt diagrams were generated based on data collected from wire frame and solid models. Second, the theoretical data was verified through actual tilt tests when necessary.



DECLARATION OF CONFORMITY

Manufacturer: Alum-A-Lift, Inc.
7909 Bankhead Hwy
Winston, GA 30187, U.S.A.

Product: Ergonomic Lifting Equipment

Serial Number: _____

Complies with Directives: 98/37/EC Machinery Directive (previously
9/392/EEC)
89/336/EEC Electromagnetic Compatibility
Directive, as amended
73/23/EEC Low Voltage Directive

Harmonized Standards Reference: EN 292, Part 2, Appendix A, Safety of machinery -
Basic concepts, general principles for design, Part
2. Technical principles and specifications

EN 61010-1, Part 1, Safety requirements for
electrical equipment for measurement, control, and
laboratory use

EN 61000-6-2, Generic standards-Immunity for
Industrial environment

EN 60204-1, Part 1, Safety of machinery-Electrical
equipment of machines

EN 55014-1:1997 - Electromagnetic compatibility.
Conducted Disturbance Emissions-Voltage
Terminal Disturbance Power Emissions
Underwriters Laboratories, Inc.
File : MC1385

Contact Person: Eric Bressner
Vice President, Alum-A-Lift, Inc.

This product, which bears the CE Marking, has been assessed against the Machinery Directive (98/37/EC) and complies with the Essential Health and Safety Requirements therein. This product also complies with the Principal Elements of Safety Objectives of the Low Voltage Directive (73/23/EEC).

As the manufacturer of the above apparatus, we declare that the product conforms with the protection requirements of Council Directive 89/336/EEC on the approximation of the laws relating to electromagnetic compatibility.

This Declaration of Conformity is based on the results of analysis, testing and evaluation performed by Alum-A-Lift.

Design Engineer

This Declaration of Conformity and Marking on the equipment signifies compliance to all applicable CE Marking Directives, as noted above, at the time of initial shipment by Alum-A-Lift, Inc. For products initially installed outside of the European Union (EU), it is the Importer of Record's responsibility to ensure that the product remains in conformance with all applicable Directives upon first entry into the EU.

Recommended Spares

Recommended Spare Parts

With the exception of battery replacement, the system doesn't have any parts that will require replacement short of failure. Vended items which will require replacement in the event of failure are carried in stock by Alum-A-Lift and are available on a next day basis. A list of recommended spare parts follows on the next page if internal policies require that an in house inventory be carried. If repairs are required, contact an Alum-A-Lift representative.

Battery Replacement

The battery will occasionally need to be replaced. The frequency of replacement will depend on how often the lift is used, the load being lifted, and how often the battery is charged. When replacing the battery, keep in mind that it is critical that the battery be replaced with one that has the same specifications as the one currently installed. See the Electrical System for more information on the battery. The battery appears on the recommended spares list for reference. It may be considered unwise to carry a spare battery as it will discharge over time unless maintained.

RECOMMENDED SPARES**RECOMMENDED SPARES**

FEB-5-2003

PART NUMBER	DESCRIPTION	MODEL
A40-636	Battery, Gel Cell, 31.5Ah	A800
V-BRK-24VDC	Brake, Electric - 24VDC	A800
A40-309-002	Charger, 8AMP 24V 110/220V	A800
A40-534	Circuit Breaker, 10A	ALL
A40-538	Circuit Breaker, 25A	ALL
A40-531	Circuit Breaker, 3A	ALL
A70-128	Grips, Sponge	ALL
A40-101/B	Motor, 500rpm, 24V	A800
A40-535	Pendant Box Assembly, Up/Down	ALL
A40-090	Speed Controller, 12/24VDC	A800
A40-519/N	Switch, Rocker, 3 Position - ON/OFF/CHARGE	ALL
A40-665	Relay, 40amp	ALL

CASTER SET-SELECT APPROPRIATE SET ONLY

A70-530/S	Caster Set, HW, 3-1/2" - 4 Sw	A800
A70-530/T	Caster Set, HW, 3-1/2" - 2 Sw, 2 Br	A800
A70-540/T	Caster Set, HW, 4" - 2 Sw, 2TL	A800
A70-550/T	Caster Set, HW, 5" - 2 Sw, 2TL	A800

Electrical Supplement