

alum-a-lift

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



Lift Serial Number: _____

MODEL 4000 Owner's Manual

MODEL 4000 CASINO 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 boards 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



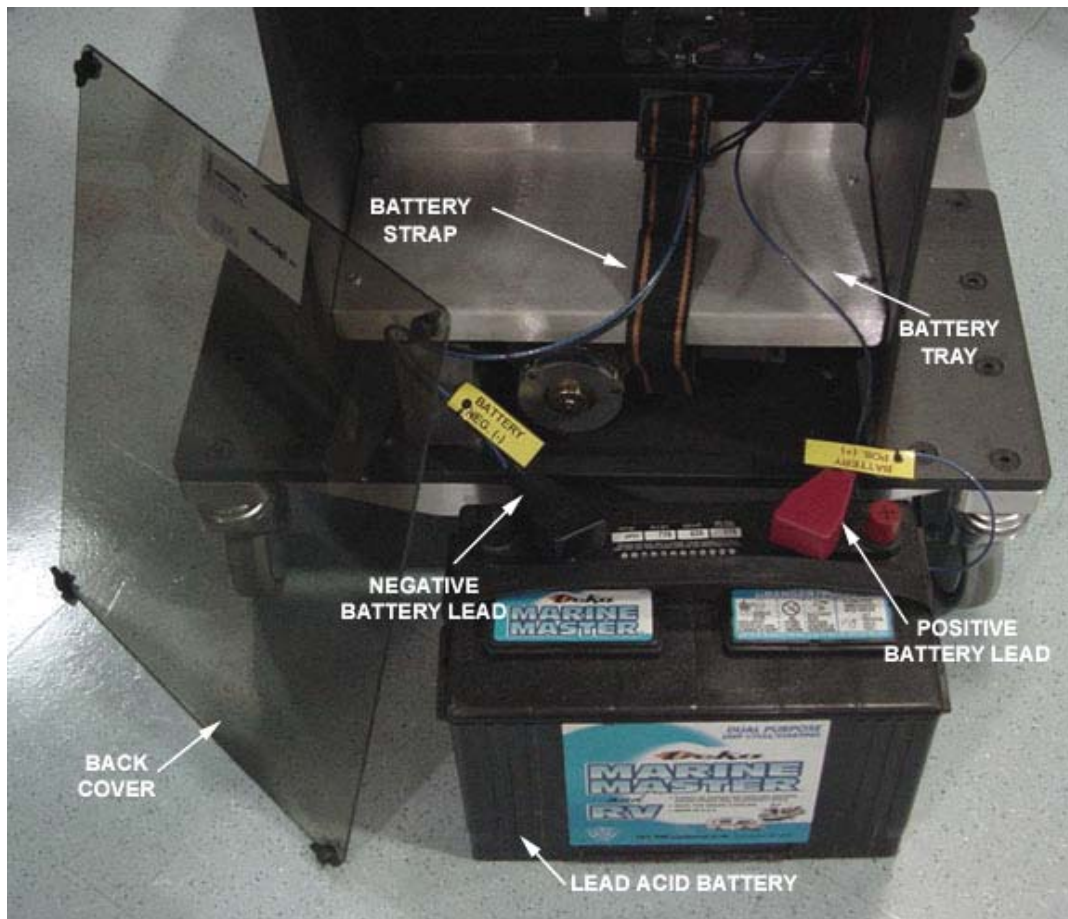
Crated Lift

Providing Power to the Lift

The lift features a 24VDC battery operated system. The batteries come already installed.

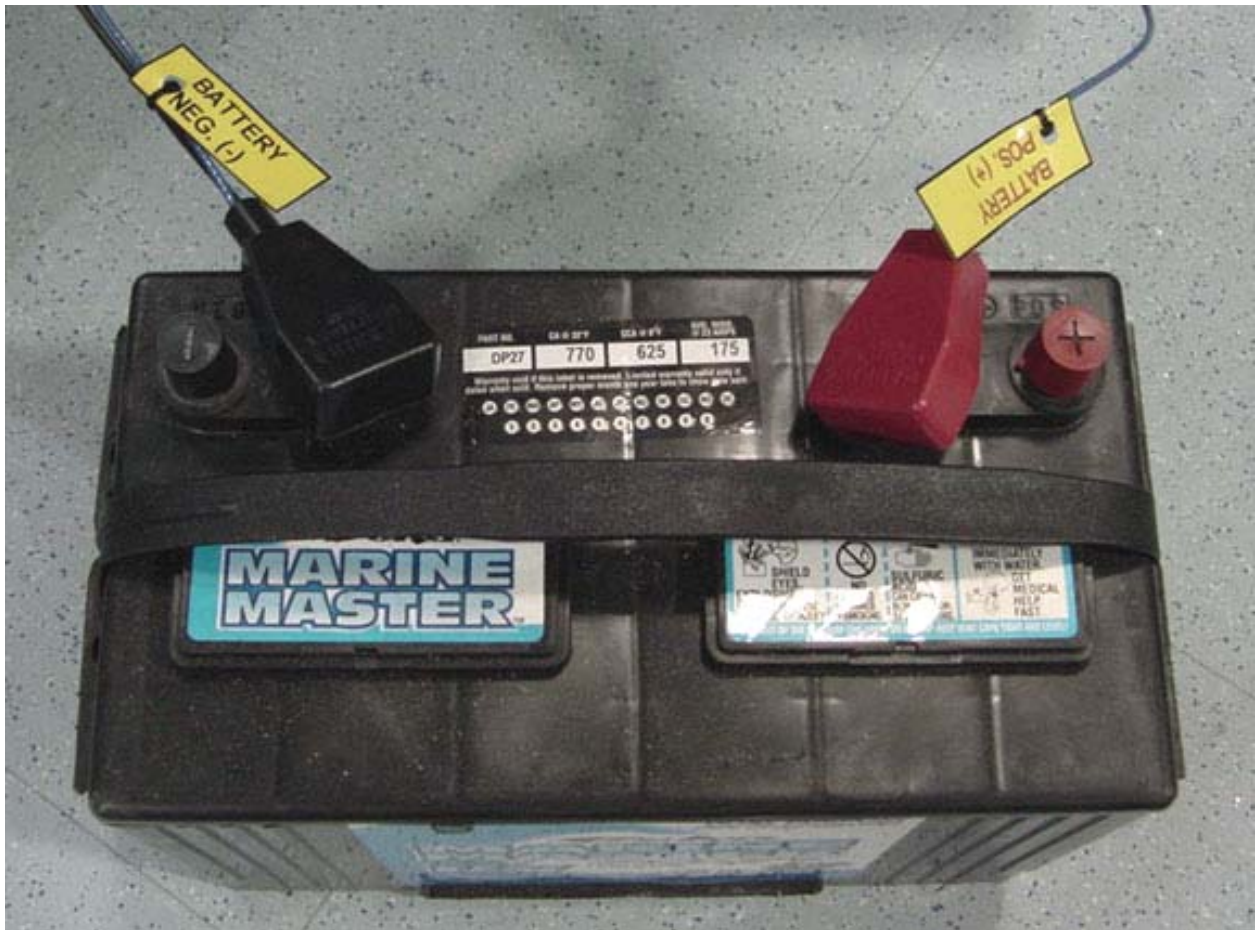
Replacing the Batteries

Remove the back cover from the rear of the lift using a 5/32 allen wrench to remove the captive fasteners. Make sure the ON/OFF/CHARGE switch is in the off position. OSHA 1926.441 dictates that face shields, aprons, and rubber gloves be used for handling unsealed batteries. Loosen the battery straps used to retain the batteries and pull each battery out and set it on the ground. Note that the battery leads should be long enough to reach the ground and each battery weighs approximately 24 pounds. Disconnect the old batteries and position the new batteries on the floor as close to the rear of the lift as possible. Each lead is labeled indicating whether it is to be connected to the positive or negative terminals. Connect each lead to the battery and secure using the hardware accompanying the battery. Using safe lifting measures, carefully lift the battery onto the battery tray and secure using the battery strap. Replace the back cover. See the Electrical System section for more information.



Battery Compartment
(12V Application Shown with Single Battery)

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Sample Battery Connection

(Lead Acid Battery Shown)

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.

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 known safety guidelines. This manual describes the operation, maintenance and use of the lift.

Intended Use of the Lift

The lift is designed for a specific application(s). 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. Items in this system include:

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

The system operates on 24 volt DC power provided by two 12 volt batteries. 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 batteries are low and need recharging. Ignoring this alert may result in permanent discharge of the batteries. The system can not be operated while the batteries are charging.

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Top Cover

(Note Green LED indicating lift power is ON)

Static System

The static (framework) provides structure to which the electrical and drive systems are mounted. Items in this system include:

<ul style="list-style-type: none">• Welded Frame• Base Assembly• Top Channel Assembly	<ul style="list-style-type: none">• Leg Assembly• Ergonomic Handles
---	--

The lift consists of several subassemblies. The most basic framework involves the mounting of a frame assembly to a base assembly. Mounted to the base assembly are two leg assemblies.

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. Items in this system include:

<ul style="list-style-type: none">• Gear Motor• Alignment Couple• Ball Nut Assembly• Carriage Assembly	<ul style="list-style-type: none">• Brake• Ball Screw• Pillow Block Bearings
---	--

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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.

Nameplate



Lift Nameplate

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

Serial Number: Referencing the serial number when consulting the factory will expedite your request as it provides an effective way of tracking your specific lift back to its original build specs.

Load Limit: The load limit is another very important item listed on the lift nameplate. This load limit is based not only on lift capacity. Factors such as reach, end-effector weight, and stability also have to be examined.

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.



Up/Down Pendant Box

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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. The lift will not run with the switch in this position.



Top Cover

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. An additional circuit is used for the end-effector when it 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. Consult the FAQ section of this manual for potential causes. If the problem persists, discontinue lift use and consult either Alum-A-Lift (770.489.0328) or your representative.

Charger Status

A battery charger is built into every lift. Different versions are available depending on the operating voltage of the country in which the lift will be sent. An LED (domestic charger) or set of LEDs (international charger) located on the top cover alert the operator as to the status of the battery. For

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information regarding charging the batteries or how to read the LEDs see the Electrical System section.

Fixed Limits

The Alum-A-Lift is equipped with end-of-travel limit switches. These limit switches stop the movement of the carriage when tripped. The switches are not adjustable and are initially set at the factory.

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 a fully charged battery and that the battery charger be 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.
- Move the lift into position.
- Using the push buttons on the 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.

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 remote 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.

Personal Precautions

- Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eyes, immediately flood eyes with running cold water for at least 10 minutes and get medical attention immediately.
- Never smoke or allow a spark or flame in the vicinity of the battery.

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- Be cautious to reduce risk of dropping a metal tool onto the battery. It might spark or short-circuit the battery or another electrical component.
- Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead acid battery. A lead acid battery can produce a short circuit current high enough to weld an object to metal, causing a severe burn.

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.
- Replace the plug into the cord clip located on the side of the lift.

DC Power

- Follow Personal Precautions listed above.
- 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 generated 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.

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- Switch the three-position ON/OFF/CHARGE switch to the CHARGE position. The appropriate LED will turn on and the battery will begin to charge.
- The charge is complete when the green led begins to blink (domestic charger) or the Charge Complete LED turns on (international charger).
- In the event that the batteries do not charge following an extended charging cycle, the batteries will likely need to be replaced.

How to Read Charger Status LEDs

Domestic Lift (110V-60Hz)

Constant Green ► Charging

Blinking Green ► Charge Complete

International Lift (115V/220V)

Red ► Charger On

Yellow ► Charging

Green ► Charge Complete

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 a B350 But The Load Limit Sticker Says 300 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. Therefore, the load rating is based more on moment (load x distance). The weight of the end-effector and stability of the lift must also 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 faulty 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 in the on position. A green LED should turn on. If not, check to make sure the leads are correctly connected to the battery. Push the up and down buttons on the pendant box controls, and check to see if the relays are clicking. The relays should make an audible noise.

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 coupling 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, remove the batteries and charge them with an offline charger. Second, replace 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, remove the batteries and charge them with an offline charger. Second, replace 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. One potential reason 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. Additional possibilities are if the motor is shorted or if you are lifting too heavy a load. 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:

<ul style="list-style-type: none">• Temperature	<ul style="list-style-type: none">• Degree of discharge
<ul style="list-style-type: none">• Charger	<ul style="list-style-type: none">• 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 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 equalize charge imbalance between the battery cells over time, which can extend battery life. By leaving the charger switched on, you will 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 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 to charge because the charger can't detect that the battery is there. If this is the case, put 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 will take over.

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, a gell cell battery will last approximately 9-12 months and a lead acid will last approximately 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 (where applicable). 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. In cleanroom applications, use Krytox™.



Casters	Check the caster fastener for tightness every 2 months .	Verify that caster is not loose. Refer to tightening specifications for torque settings.
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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. Most lifts have internal limit switches and the only way to check them is to run the lift through its range of motion. Be careful not to “crash” the carriage at the extremes of travel. See the Operational/Controls System Section. However, some lifts will have fixed or redundant limit switches which may be tested by simply engaging them by hand.
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Battery	Charge often, at least once a week. Check the fluid level in lead acid batteries every 2 months.	The charger will not over charge the battery. The battery should always be fully charged when the lift is not in use. Water should be added when the plates in the battery have become exposed.
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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.
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Lift Cleaning	Frequently	Dirty or dusty environments may require a more frequent cleaning schedule.
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Fasteners	Every 12 months	Inspect for damaged or loose fasteners. Tighten fasteners according to recommended torque settings.
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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]

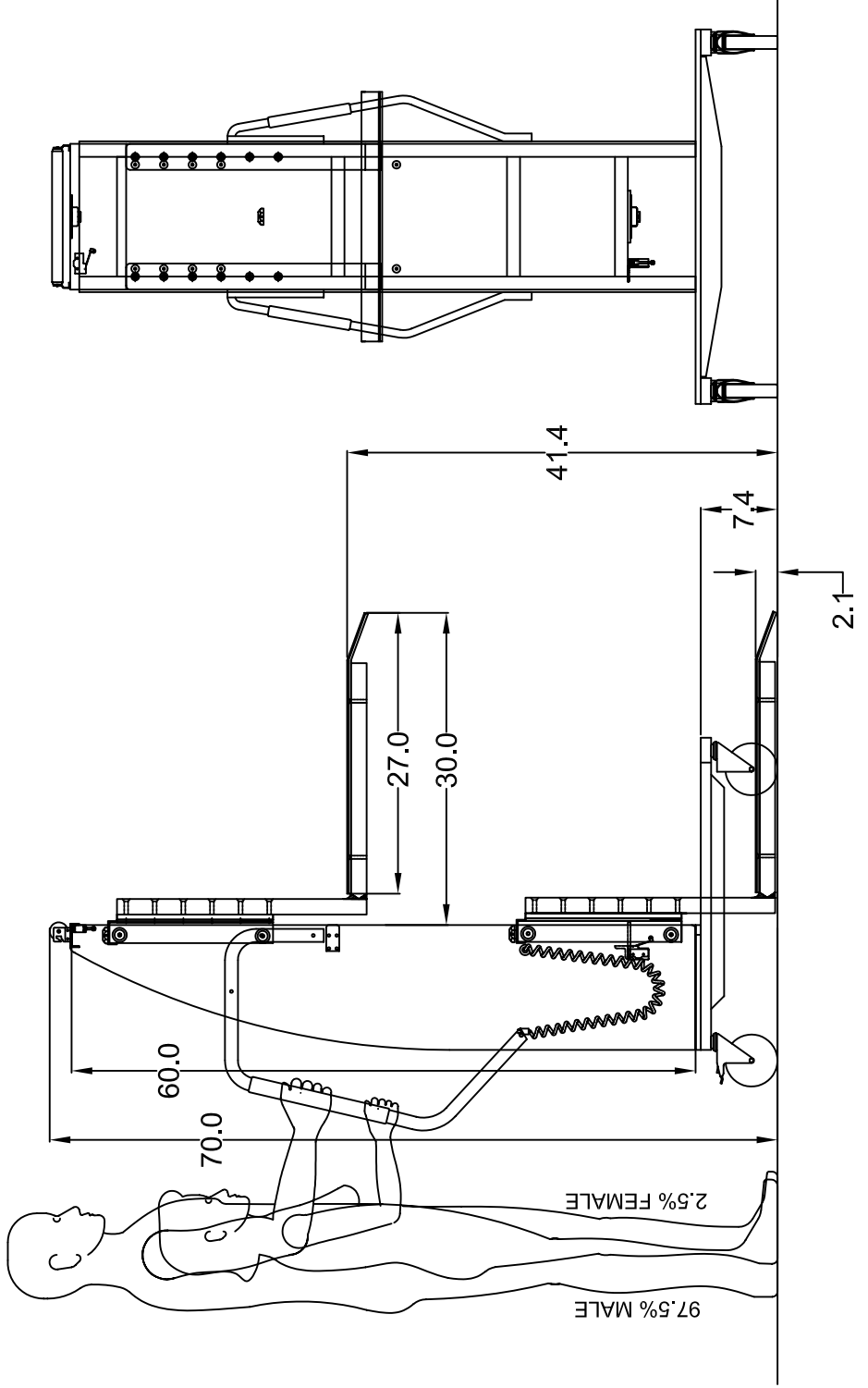
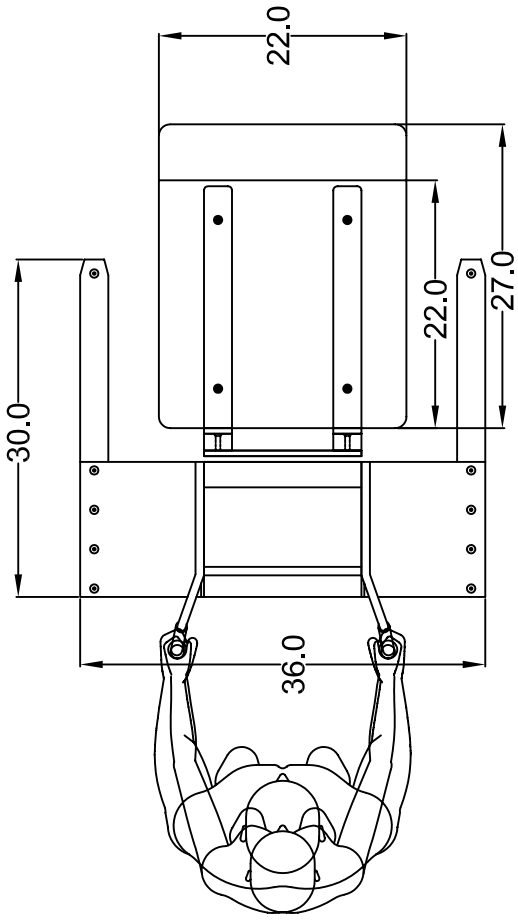
Size	Set Screw	SHCS	BHSCS	FHSCS
#6-32	7	15	11	11
#8-32	16	28	20	20
#10-32	26	40	30	30
1/4-20	70	95	71	71
5/16-18	130	170	123	123
3/8-16	230	300	218	218
1/2-13	500	750	532	532

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

MODEL B450-60CS WITH
PLATFORM FOR HANDLING
400# GAMING MACHINES

FILE: 17578D



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 are generated based on data collected from wire frame and solid models. Second, the theoretical data is verified through actual tilt tests when necessary.

150-250-350 LOAD TEST SHEET

CUSTOMER: _____ MODEL: B450-60CS
 FILE #: _____ S/N: _____
 DATE: _____

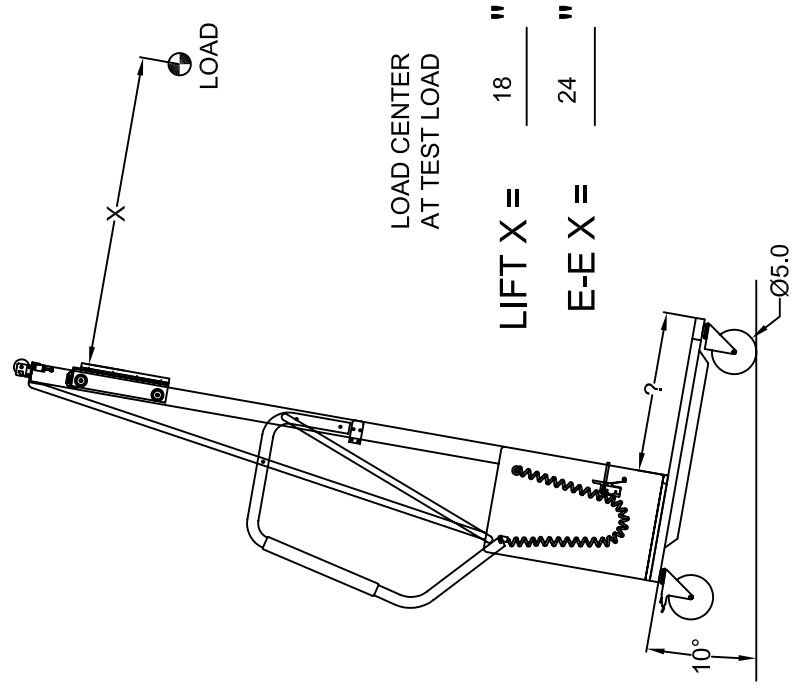
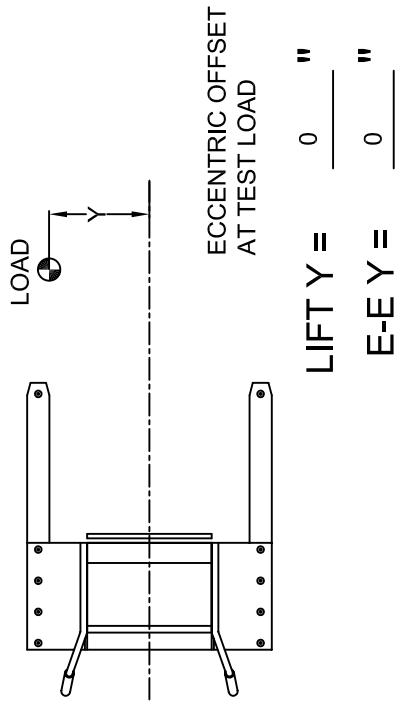
LIFT LOAD TEST:
 LIFT RATING (MODEL): 450 # _____
 LIFT TEST LOAD: 675 # _____
(RATING X 1.50)
 TESTED BY: _____ CHECKED BY (ENG): _____

END EFFECTOR LOAD TEST:
 TEST LIFT WITH END EFFECTOR
 UNDER LOAD CONDITIONS FOR 2 MINUTES
 END EFFECTOR RATING: 400 # _____
 END EFFECTOR TEST LOAD 500 # _____
(RATING X 1.25)
 OBJECT TO BE TESTED: Pb
 TESTED BY: _____ CHECKED BY (ENG): _____

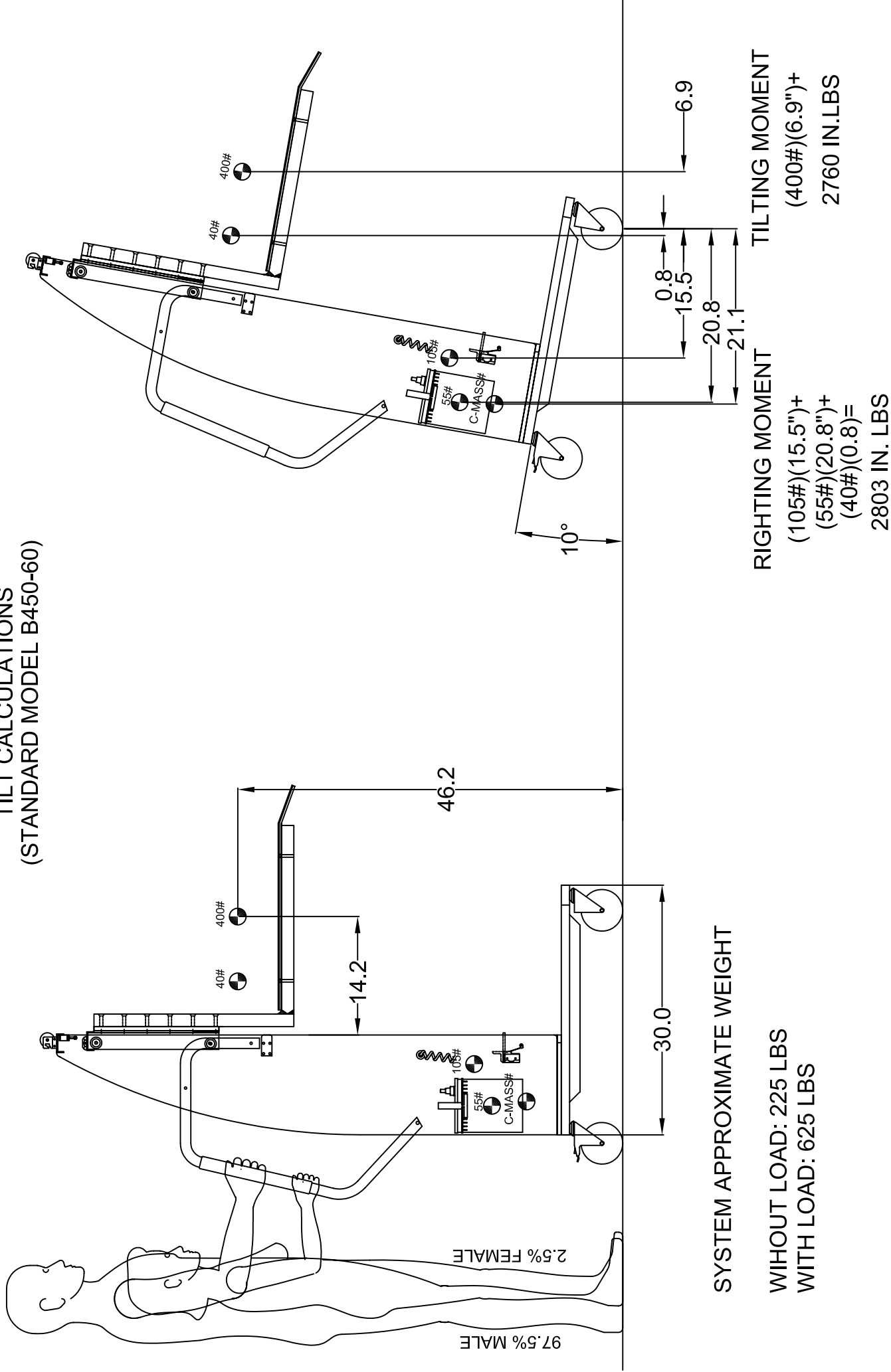
CYCLIC TESTING:
 CYCLIC TEST: 440# @ 25 CYCLES
(RATING X 1.10)
 ONE CYCLE = LIFT UP & DOWN TEST LOAD
 TESTED BY: _____

LIFT 10° TILT TEST:
 TESTED BY: _____ CHECKED BY (ENG): _____

LOAD LIMIT STICKER:
 NOT TO EXCEED: 400 LBS.



LIFT STABILITY
TILT CALCULATIONS
(STANDARD MODEL B450-60)



Recommended Spares

Recommended Spare Parts

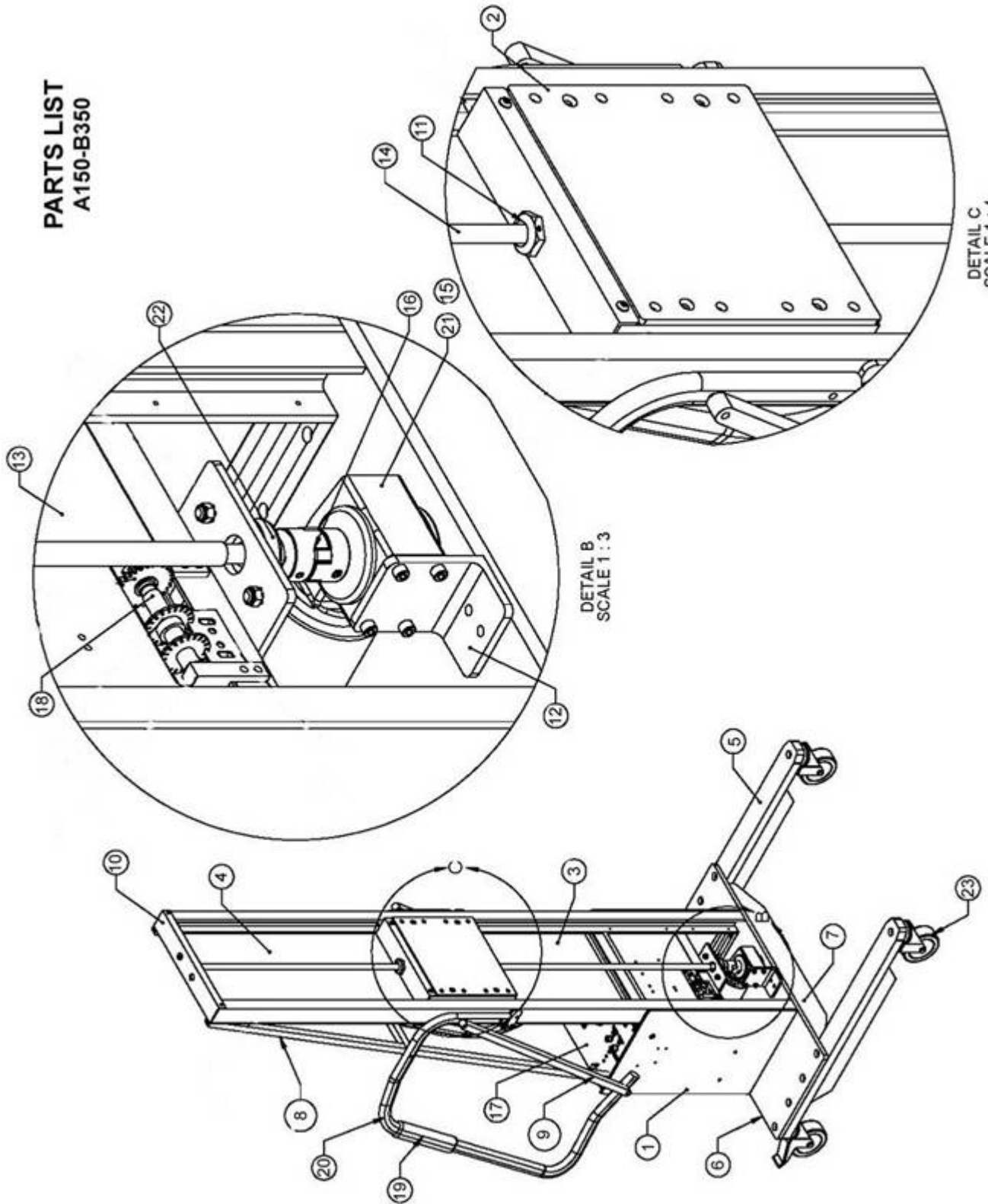
With the exception of battery replacement, the system doesn't have any parts that will require replacement short of failure. Vended items which will require replacement in the event of failure are carried in stock by Alum-A-Lift and are available on a next day basis. A parts list along with spares recommendations follows 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, how often 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.

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PARTS LIST
A150-B350



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PARTS LIST

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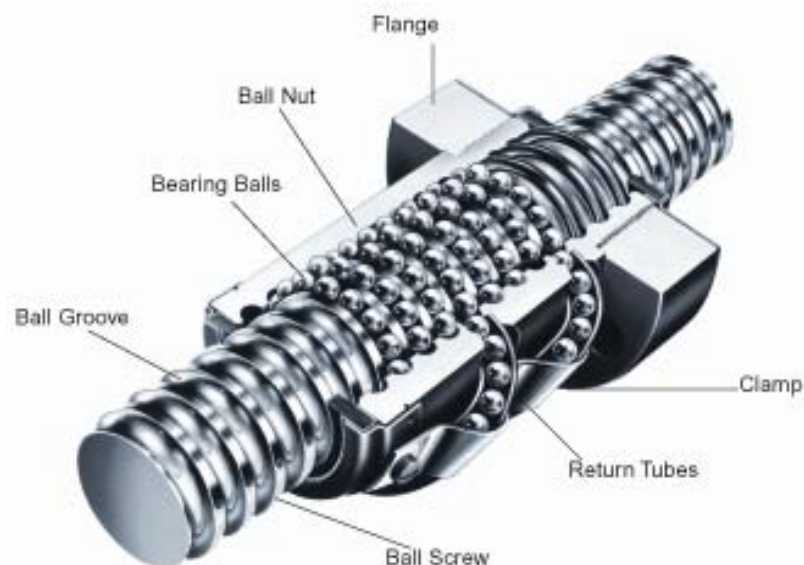
ITEM	PART NUMBER	DESCRIPTION	MODEL	SPARE?
1	A15-100/H	FRAME/Height		
2	B35-200/20	CARRIAGE ASSEMBLY		
3	A15-329	WINDOW, LOWER		
4	A15-330	WINDOW, UPPER		
5	A25-302/L	LEG ASSEMBLY/Length		
	A15-302/L	-LEG		
	A25-302R/L	-LEG REINF		
6	A15-301/L	BASE PLATE		
7	A25-301R	REINF, BASE PLATE		
	A15-108	CROSS BAR STRAP		
	A15-109	CROSS BAR, MAST		
10	A15-305	TOP CHANNEL		
	A35-305	TOP CHANNEL, REINF	B350+	
11	A25-311	RETAINING NUT		
12	A15-334	MOTOR MOUNT ANGLE		
13	A15-314	FRONT (INSIDE) COVER		
	V-BN-3/4	Ball Nut, 3/4" dia, High Speed		
14	A70-113/60HS	Ball Screw, 3/4 x 60, High Speed		
	A70-109	Battery Strap Kit	ALL	
	A40-636	Battery, Gel Cell 12V		
15	V-BRK-12VDC	Brake, Electric (Rev. Logic),	A150+	YES
	A40-100/2	Brushes, Motor	L150+	YES
	V-CFSTD	Cam Follower, STD	L100+	
	A40-309	Charger, Battery, 5A, 110/220v		YES IF USED
	A40-534	Circuit Breaker, 10A	ALL	YES IF USED
	A40-535	Circuit Breaker, 15A	ALL	YES IF USED
	A40-538	Circuit Breaker, 25A	ALL	YES IF USED
	A40-531	Circuit Breaker, 3A	ALL	YES IF USED
	A40-526	Cord, Charger, Plug-in, 18"	ALL	
16	A70-126	Coupling, L070, 5/8 bore	A200+	
	A15-315	Cover, Back, STD	A150+	
	A15-313	Cover, Top, Standard		
	A40-508/4	Curly Cord - 4 Conductor , Pendant		
	A40-501	Diode, Brake	ALL	
	A40-652	Indicator, Green Light - 12V	ALL	
	A40-539	Low Voltage Indicator, LVI	ALL	
21	CALL	Motor, 625rpm, 24VDC High Speed		YES IF USED
	A40-535	Pendant Box Assembly, Up/Down	ALL	
22	A70-102	Pillow Block, 5/8" Bore	L200+	
	A40-665	Relay, 40amp	ALL	YES
	A40-530-40	Relay, Base 40amp	ALL	
	A70-203/1-001	Screw Shield - Clear, 60"	OPTION	
	A40-090	Speed Controller, 12/24VDC	OPTION	YES IF USED
	A40-402-001	Switch, Limit - Arm/Roller		
	A40-404E	Switch, Limit, Extended Plunger		
	A40-518/G	Switch, Push Button, Green	ALL	YES
	A40-518/R	Switch, Push Button, Red	ALL	YES
	A40-519/N	Switch, Rocker, 3 Position - ON/OFF/CHARGE	ALL	YES
23	VARIES	Caster Set	ALL	YES

Electrical Supplement

Ball Screw Advantages

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.



Ball Bearing Screw

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