

alum-a-lift

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



Lift Serial Number: _____
Tug Owner's Manual

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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 Tug

The Alum-A-Lift is shipped to you on a wooden pallet. Larger tugs or those going overseas will be shipped inside a crate. Before unpacking the tug, 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 tug has not been damaged, carefully remove the wrapping and check the condition of the unit. Tugs 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 tug will be secured with banding or boards which can be removed with the appropriate tooling. Taped to the Alum-A-Lift will be a manila envelope containing: an owner's manual, a tool set, and the final check list. The tug weight will vary according to the application; therefore care should be exercised in removing the tug from the pallet. Install the batteries and follow the operating procedures in the following sections.



Palletized Lift



Crated Lift

Providing Power to the Tug

The tug could potentially be very heavy and care should be exercised in removing the lift.



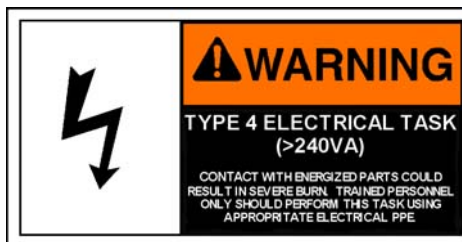
If available, a makeshift ramp would allow the tug to be driven out of the crate (or off the pallet) once the batteries are connected (instructions provided below).

Providing Power to the Lift

The tug features a 24VDC battery operated system. This is accomplished by connecting two 12V, 31.5Ah gel cell batteries in series. For safety reasons, the batteries are shipped outside the tug compartment and therefore, installation is required.



Each battery weighs about 24 pounds. Position the batteries on the floor as close to the rear of the lift as possible. Raise the front cover of the tug to gain access to the battery compartment.



Note that this is a Type 4 Electrical Task (>240VA). 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 "1" and the other battery as "2". 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. **Refer to the Section 3, Safety, for a listing of the appropriate PPE for installing the batteries.** Carefully lift the batteries onto the battery tray using proper lifting techniques and secure

using the battery strap. Replace the back cover. See the Electrical System section for more information.

Testing the Tug

Switch the key to the ON position. The strobe light should light up. The controls on the detachable black pendant box (if applicable) should now be active. See the Operational/Controls Section for more detail regarding operation.

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

General Tug Information

Introduction

The handling 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 tug.

Intended Use of the Tug

The tug is designed for a specific application(s). It is intended to move loads and act as a means of transportation. The tug 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:

• Battery	• Circuit Breakers
• Limit Switches (where applicable)	• Relays (where applicable)
• Drive Wheel	• Indicator Light
• Push Button Switches (where applicable)	• Low Voltage Indicator
• Speed Controller (where applicable)	• EMI Filter (where applicable)
• EMO Switches (where applicable)	• Battery Charger

The system operates on 24 volt DC power provided by two 12 volt batteries. The tug 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 (if applicable) helps to monitor the voltage of the batteries. As an additional feature, an audible alert will sound when the battery is low and needs recharging. Ignoring this alert may result in permanent discharge of the batteries. The system can not be operated while the batteries are charging. Whenever the tug is in the off position the batteries can be safely charged.

Static System

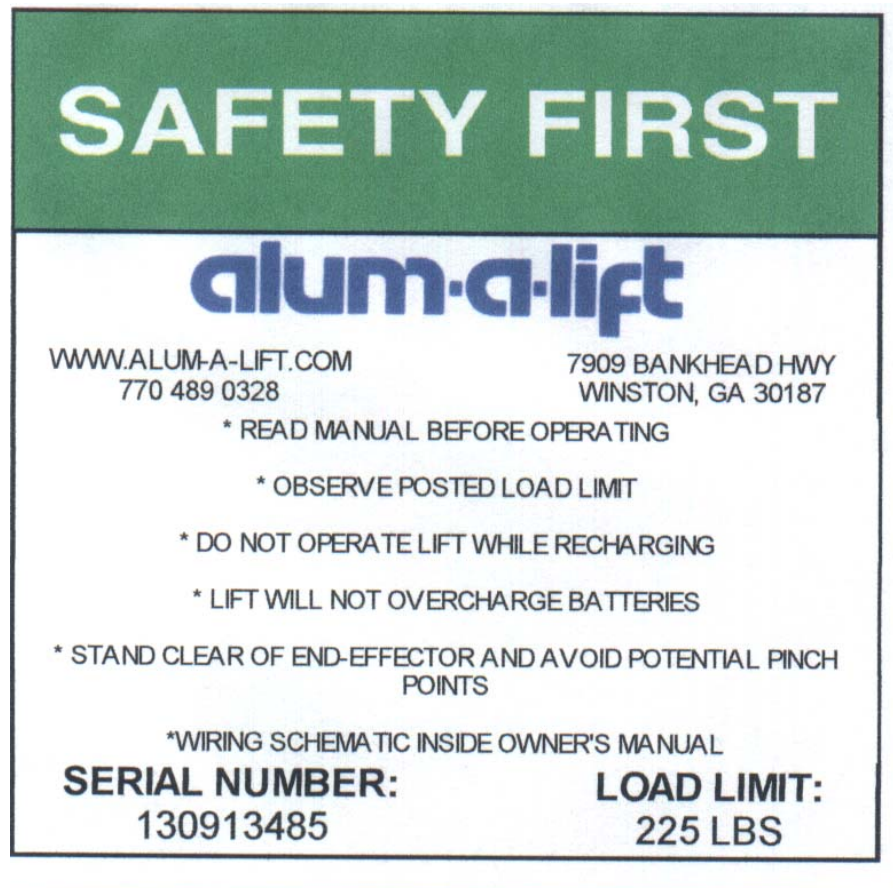
The static (framework) provides structure to which the electrical and drive systems are mounted. Items in this system include:

• Welded Frame

• Leg Assembly

The lift consists of several subassemblies. The most basic framework involves the mounting of a frame assembly to a leg assembly.

Nameplate



Lift Nameplate

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

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

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

Operation/Control System

ON/OFF Key Switch

The Drive Wheel contains a two position key-switch.

- The ON position gives power to the tug. The voltmeter(if applicable) shows the output voltage applied to the circuit. The safety strobe light will light up to indicate the power is on.
- The OFF position turns the tug off and allows the batteries to be charged.

Circuit Breakers

To protect the electrical system, circuit breakers located on the side of the tug serve as overload protection. The tug has four main circuits: a control circuit, an AC in circuit, a DC out circuit, and a tug 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 tug. Different versions are available depending on the operating voltage of the country in which the tug will be sent. An LED (domestic charger) or set of LEDs (international charger) located on the charger alert the operator as to the status of the battery. For information regarding charging the batteries or how to read the LEDs see the Electrical System section.

Operating Procedures

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

Transporting Load

- To enable the drive wheel, make sure the key switch underneath the handle bar is turned ON. When the key switch is ON, the amber light on the tug will flash.
- Drive speed and direction is controlled by either of the two green levers on the handle bar. Press the top of the lever to go FORWARD, and the bottom for REVERSE. Note that the

Red Button is a backup safety stop. A safety plate behind the drive wheel will shut the drive down if it encounters an obstacle. Note that if the safety switch is tripped, the controls must be released for the circuit to reset.

- Move the tug into position using the powered drive system.
- Secure the component.



Drive Power Keyswitch

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-amperes, 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-amperes, 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-amperes 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.

- 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 tug.

DC Power

- Follow Personal Precautions listed above.
- From the front of the tug, lift the 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 key to the OFF position.
- Insert the AC plug on the lift into a compatible AC outlet.

- The charge is complete when the 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

Refer to the following MSDS for hazards associated with battery.

– Material Safety Data Sheet –

Valve Regulated Lead Acid Battery

“Battery Non-Spillable 49 CFR 173.159 (d)”

SECTION I

Manufacturer’s Name: East Penn Manufacturing Co., Inc.
 Deka Road, Lyon Station, PA 19536
Telephone Number for Information: (610) 682-6361
Emergency Telephone Number: CHEMTREC: 1-800-424-9300,
 In Washington D.C. or outside continental U.S., call 1-202-483-7616

Date: March 15, 2002

Trade Name: Gell; Absorbed Electrolyte,
 Sealed Valve Regulated Non Spillable Battery

SECTION II

HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components Specific Chemical Identity (Common Name (s))	OSHA PEL	ACGIH TLV	Range Percent By Weight	Average
Lead, CAS #7439921	0.05 mg/m ³	0.05 mg/m ³	60-75%	67%
Sulfuric Acid, CAS #7664939	1.00 mg/m ³	1.00 mg/m ³	5-15%	10%
Antimony, CAS #7440360	0.50 mg/m ³	0.50 mg/m ³	0-0.1%	<0.1%
Arsenic, CAS #7440382	0.01 mg/m ³	0.01 mg/m ³	0.01 %	<0.1%
Polypropylene, CAS#9003070	N/A	N/A	2-10%	4%
Calcium, CAS#7440702	1.0 mg/m ³	1.0 mg/m ³	0-0.1%	<0.1%
Tin CAS #7440315	2.0 mg/m ³	2.0 mg/m ³	0-0.1%	<0.1%

SECTION III

PHYSICAL/CHEMICAL CHARACTERISTICS

Electrolyte (Sulfuric Acid):
Appearance and Odor: Clear, Odorless, colorless liquid
Boiling Point: 235 – 240° F
Evaporation Rate (Butyl Acetate=1): less than 1.0
Melting Point: N/A

Solubility in Water: 100%
Specific Gravity (H₂O=1): 1.270 – 1.330
Vapor Density (AIR=1): Greater than 1
Vapor Pressure (mm Hg): 10

SECTION IV

FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Non-Flammable
Extinguishing Media: Class ABC extinguisher,
NOTE: CO₂ may be used, but not directly on the cell. The thermal shock may cause cracking of the battery case and/or cases.
 * Hydrogen gas may be generated during battery charging.

Flammable Limits: *Hydrogen Gas
LEL: 4% **UEL:** 74%

SECTION V

REACTIVITY DATA

Stability: Stable **Condition to Avoid:** Prolonged overcharging, sources of ignition

Incompatibility (Materials to Avoid): Sulfuric Acid: Contact with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, strong oxidizers and water. Contact with metals may produce toxic sulfur dioxide fumes and may release flammable hydrogen gas.

Hazardous Decomposition of By-Products: Sulfuric Acid: Excessive overcharging or fire may create Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, and hydrogen.

Lead Compounds: Contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsine gas.

SECTION VI HEALTH HAZARD DATA

Route(s) of Entry: Not Applicable under normal use.

Carcinogenicity:

Sulfuric Acid: The International Agency for Research on Cancer (IARC) has classified “strong inorganic acid mist containing sulfuric acid” as a Category 1 carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid contained within a battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product such as overcharging, may result in the generation of sulfuric acid mist.

Lead Compounds: Lead is listed as a 2B carcinogen, likely in animals at extreme doses. Proof of carcinogenicity in humans is lacking at present.

Arsenic: Listed by National Toxicology Program (NTP), IARC, OSHA and NIOSH as a carcinogen only after prolonged exposure at high levels.

Signs and Symptoms of Exposure: Avoid contact, with absorbed electrolyte (sulfuric acid) may cause irritation of eyes, nose and throat. Contact with eyes and skin causes irritation and skin burns. Absorbed electrolyte is corrosive.

Medical Conditions Generally Aggravated by Exposure: Pregnant women and children must be protected from lead exposure.

Health Hazards (Acute and Chronic): Do not open battery, avoid contact with internal components. Internal components include lead and absorbed electrolyte. Electrolyte is corrosive and contact may cause skin irritation and chemical burns.

Emergency and First Aid Procedures: (contact with electrolyte)

- 1) Flush contacted area with large amounts of water for at least 15 minutes. Remove contaminated clothing and obtain medical attention if necessary. Eye wash and/or emergency shower should be readily available.
- 2) If swallowed, give large volumes of water. **DO NOT** induce vomiting, obtain medical treatment.

SECTION VII PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Electrolyte material is corrosive. Contains sulfuric acid. Neutralize any spilled material. Reference 1996 North American Emergency Response Guidebook, #154.

Waste Disposal Method: Lead-acid batteries are completely recyclable. For information on returning batteries to East Penn for recycling, contact your East Penn Representative. Dispose of any collected material in accordance with local, state or applicable federal regulations.

Precautions to be Taken in Handling and Storing: Store away from reactive material as defined in Section V, Reactivity Data. Place cardboard between layers of stacked batteries to avoid damage and short circuit. Do not allow metallic materials to simultaneously contact both terminals.

Other Precautions: If battery case is broken, avoid direct contact with internal components. Keep away from ignition sources during charging.

SECTION VIII CONTROL MEASURES

Respiratory Protection (Specific Type): N/A

Ventilation: Must be provided when charging in an enclosed area.

Protective Gloves: Recommended

Eye Protection: Recommended

Other Protective Clothing or Equipment: N/A

Work Hygienic Practices: Good Personal hygiene and work practices are recommended.

**SECTION IX
OTHER REGULATORY INFORMATION**

<u>NFPA Hazard Rating</u>	<u>Sulfuric Acid</u>	<u>Lead</u>
Health (Blue)	3	3
Flammability (Red)	0	0
Reactivity (Yellow)	2	0

Note: Sulfuric acid is water-reactive if concentrated.

U.S. DOT: The Non-Spillable lead acid battery complies with the provisions listed in 49CFR173.159(d) therefore must not be marked with an identification number, such as UN2800, or a hazard label, such as corrosive. Also, having passed IATA/ICAAO special provision A67, these batteries are not subject to the air dangerous goods regulations.

RCRA: Spent lead-acid batteries are not regulated as hazardous waste when recycled. Spilled sulfuric acid is a characteristic hazardous waste, EPA hazardous waste number D002 (corrosivity).

CERCLA (Superfund) and EPCRA (Emergency Planning and Community Right to Know ACT)

- a) Reportable Quantity (RQ) for spilled 100% sulfuric acid is 1000 lbs.
- b) Sulfuric acid is a listed "Extremely Hazardous Substance" under EPCRA with a Threshold Planning Quantity (TPQ) of 1000 lbs.
- c) Batteries are subject to EPCRA reporting requirements under sections 302/304, 311/312, and 313.
Reporting quantities are as follows:
 - Lead: section 311/312= 10,000 lbs.
 - Title III section 313 = 100 lbs.
 - Sulfuric Acid: section 311/312 = 500 lbs.
 - Title III section 313 = 500 lbs.

California Prop 65: Battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. **Wash hands after handling.**

For additional information concerning East Penn Manufacturing Co., Inc. products or questions concerning the content of this MSDS please contact your East Penn representative.

This information is accurate to the best of East Penn Mfg. Co.'s knowledge or obtained from sources believed by East Penn to be accurate. Before using any product, read all warnings and directions on the label.

FAQ

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

The light may be blown or simply disconnected. Check to make sure the tug is responsive to the controls. If so, the light is faulty and will need to be replaced.

The Tug 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 Tug 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 Tug 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. Additional possibilities are if the motor is shorted.

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 tug's charger cord plugged into an outlet and the switch in the off position until you need the tug 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 tug charged, 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 gel 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
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 (Where Applicable)	Check limit switches every month .	While driving the tug in reverse, check to see that the limit switch stops travel by applying pressure to the safety kick plate.
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, and motor brake every 6 months .	Use appropriate tightening torque (see appendix) and removable grade thread locking compound.
Tug 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

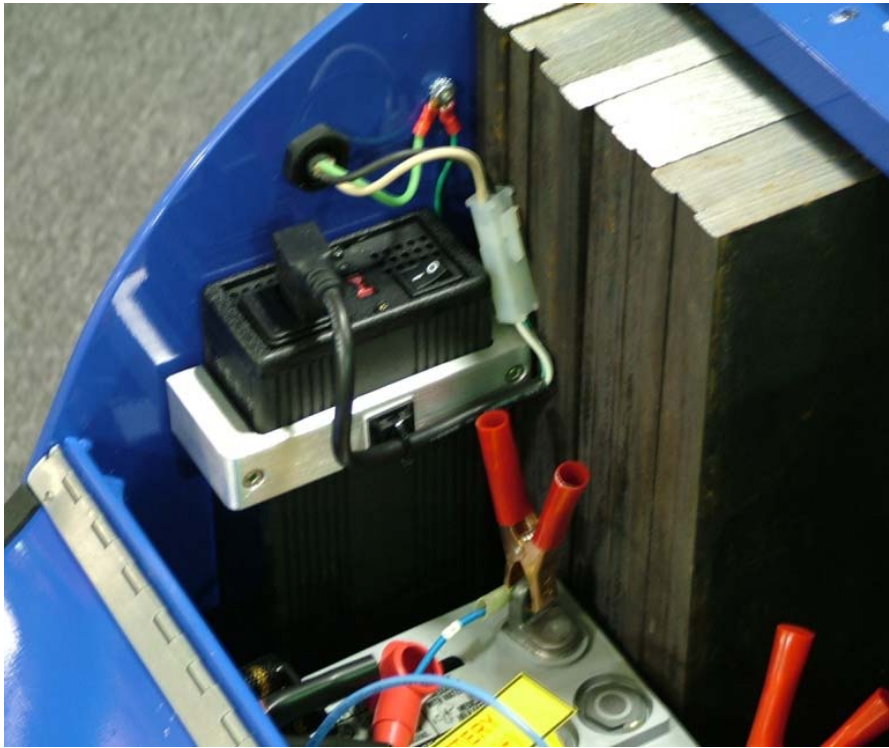
Stainless Steel Fasteners [in-lb]

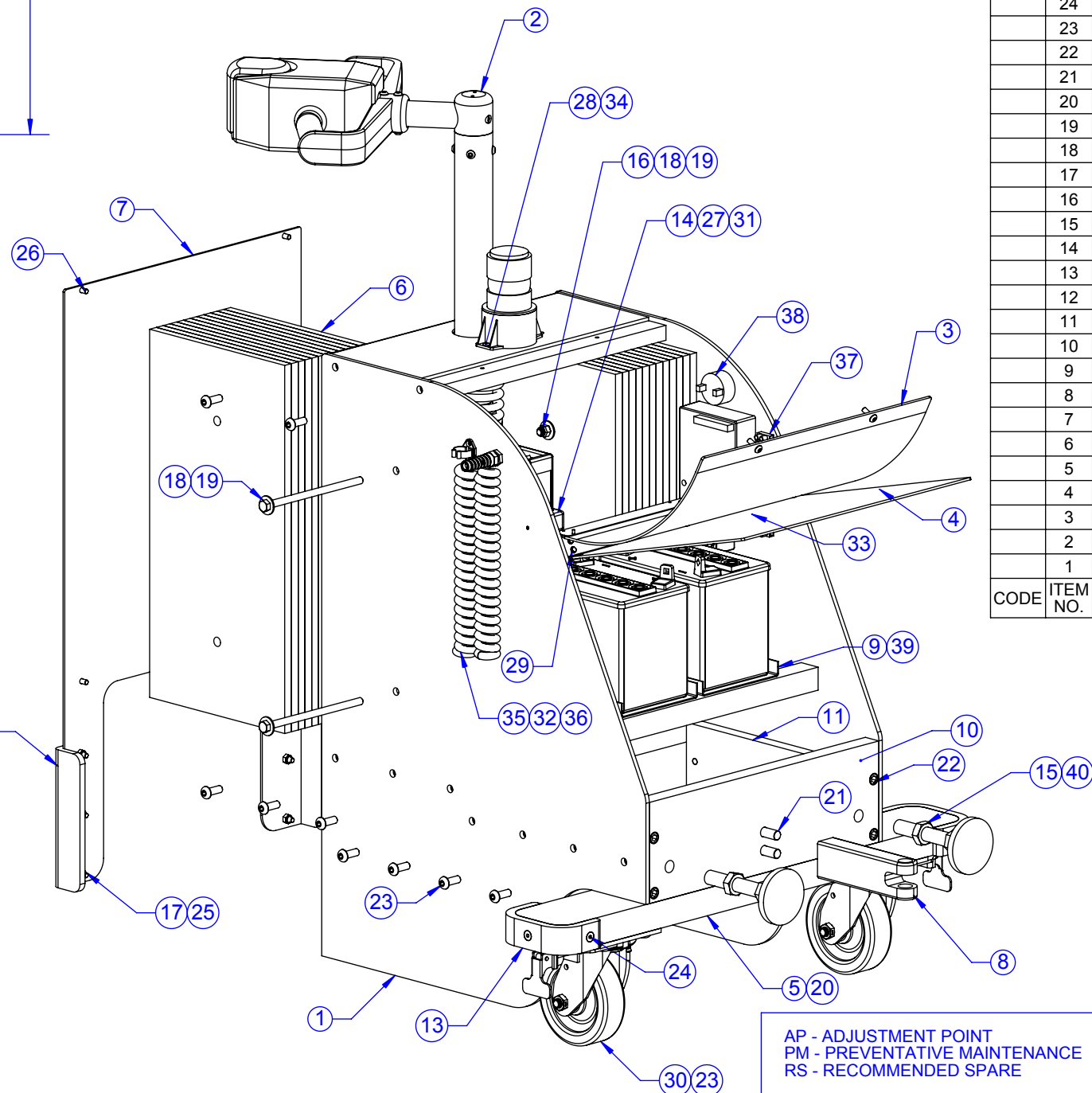
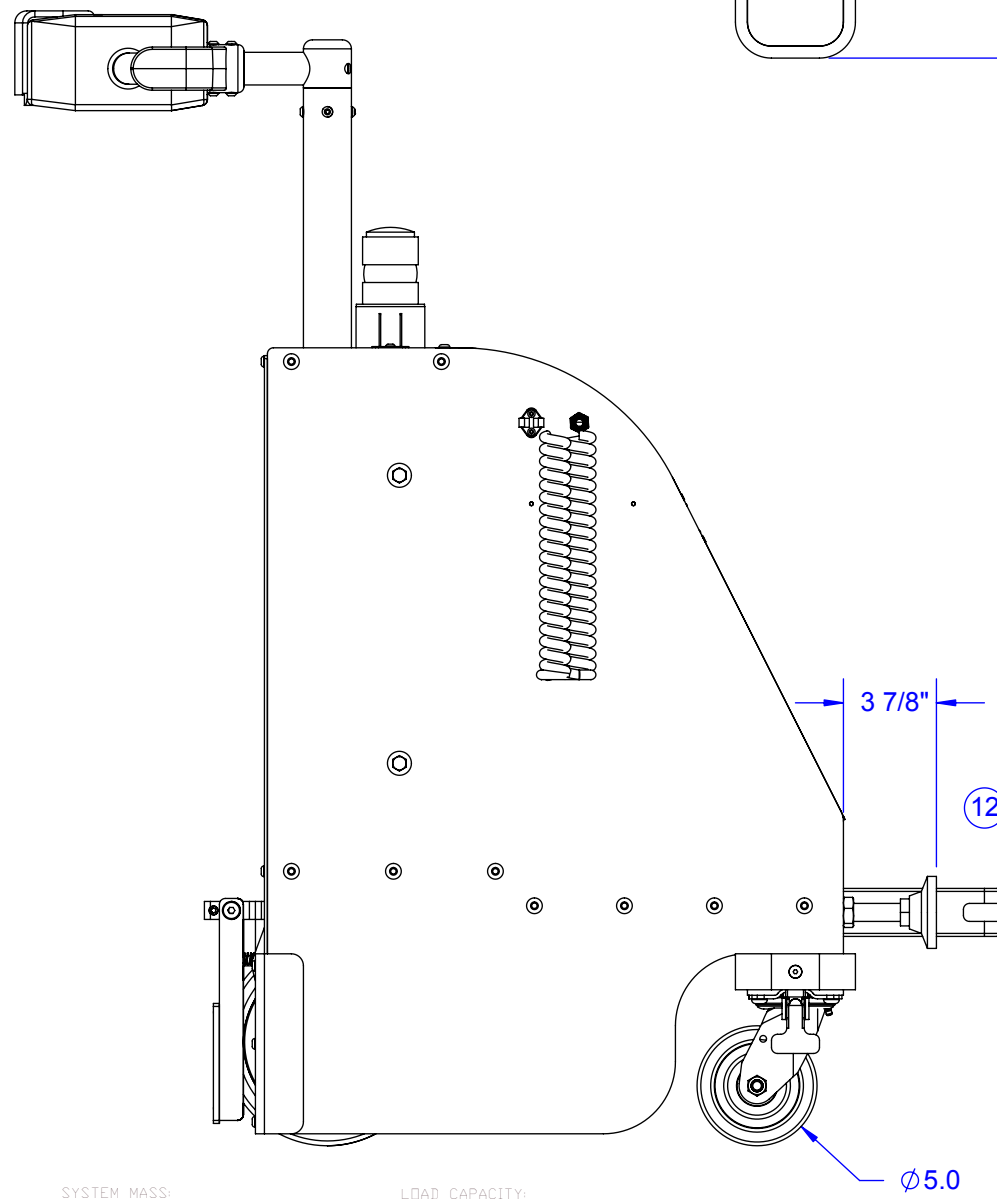
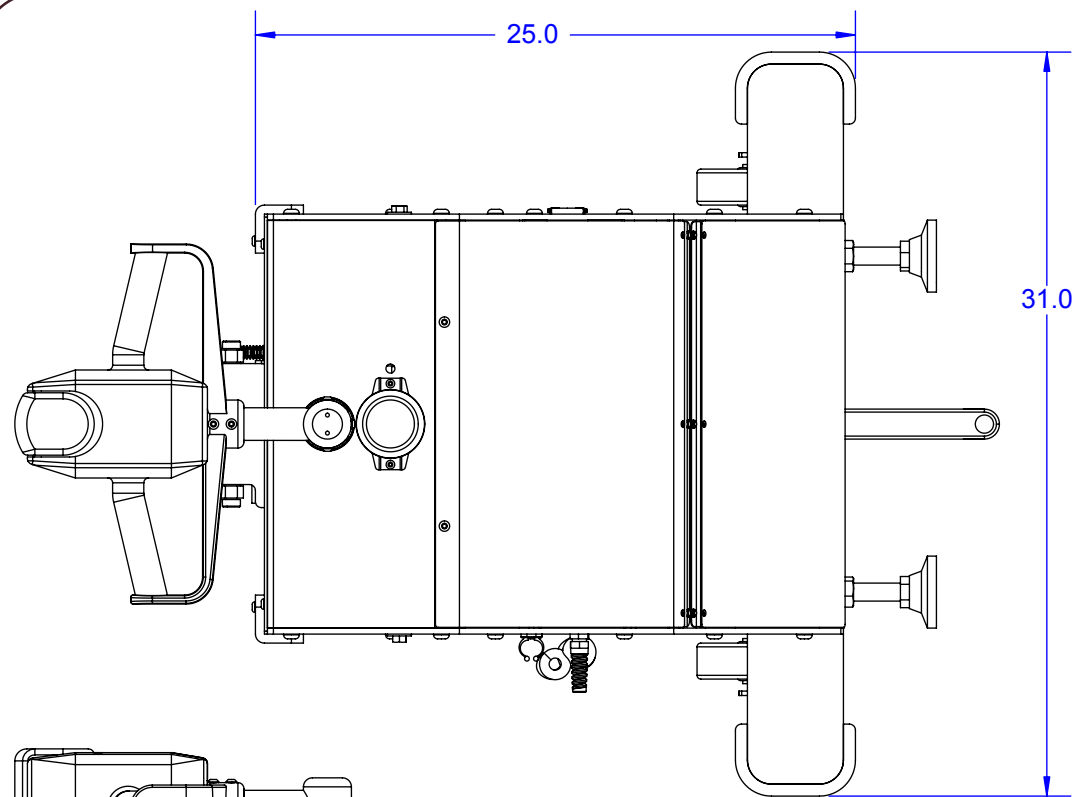
Size	Set Screw	SHCS	BHSCS	FHSCS
#6-32	7	15	11	11
#8-32	16	28	20	20
#10-32	26	40	30	30
1/4-20	70	95	71	71
5/16-18	130	170	123	123
3/8-16	230	300	218	218
1/2-13	500	750	532	532

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

Tug Drawings / Photos







ECO	REV	DESCRIPTION	BY	DATE
	41	2	Circuit Breaker	
	40	2	Bumper Screw	6111K375
	39	2	Battery 31.5 Ah	A40-636
	38	1	Horn	854-65-85
	37	1	TERMINAL STRIP, 12 CONDUCTOR	A40-504
	36	1	Cord Clip	MMC 1171A72
	35	1	Curly Charger Cord	VCORD-11804
	34	1	FLASHING LIGHT	470S-1280
	33	1	AGV Controller	4Q HF 2D
	32	1	PG11 STRAIN RELIEF	A40-657-001
	31	1	SONEIL CHARGER, 24V, 6A	506-2412-R11
	30	2	5.0 HVY DUTY SL	4.05109.339 MTG81
	29	6	6-32 x 3/8 Self Tapping Screw	
	28	2	#10-32 X 0.50 BHSCS	
	27	2	#10-32 X 2.25 SHCS	
	26	4	1/4-20 X 0.50 BHSCS	
	25	6	1/4-20 X 1.00 BHSCS	
	24	6	1/4-20 X 1.00 FHSCS	
	23	26	3/8-16 X 1.00 BHSCS	
	22	4	3/8-16 X 1.25 SHCS	
	21	2	1/2-13 X 2.00 SHCS	
	20	4	1.2-13 X 2.0 SHCS	
	19	4	3.8-16 X 7.0 HEX HEAD	
	18	8	3/8 Flat Washer	
	17	6	1.4-20 NYLOK	
	16	4	0.38 NYLOK	
	15	2	3.4-10 JAM NUT	
	14	1	CHARGER BRACKET	L17552-0017
	13	2	FRONT GUARD	L18463-0013
	12	2	REAR GUARD	L18463-0012
	11	2	SIDEPLATE BRACE	L18463-0011
	10	1	HITCH PLATE	L18463-0010
	9	2	Battery Tray, A800PD Assy	A80-9000PD
	8	1	TUG HITCH	L18463-0008
	7	1	BACK COVER	L18463-0007
	6	24	COUNTERWEIGHT	L18463-0006
	5	1	CASTER MOUNT	L18463-0005
	4	1	FRONT COVER ASSY	L18463-0400
	3	1	TOP COVER ASSY	L18463-0300
	2	1	DRIVE ASSY, SUSP	L18463-0200
	1	1	FRAME WELDMENT	L18463-0100
CODE	ITEM NO.	EXPLODE/QTY.	DESCRIPTION	PART NO.

AP - ADJUSTMENT POINT
 PM - PREVENTATIVE MAINTENANCE
 RS - RECOMMENDED SPARE

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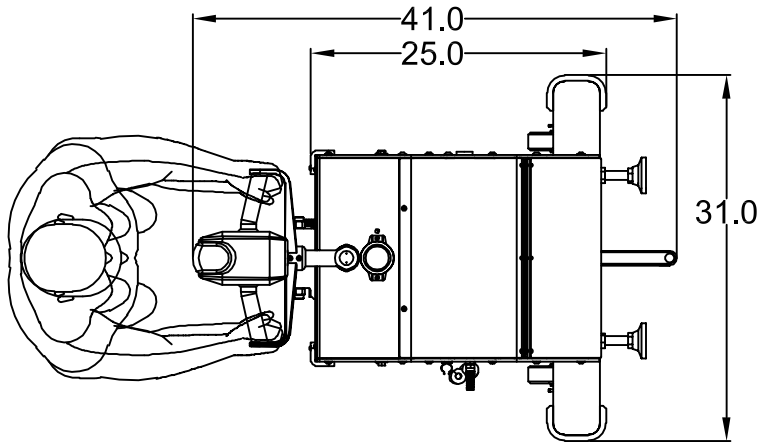
alum-a-lift

SYSTEM MASS: 891.834
 LOAD CAPACITY: XXXXX#

Z:\Apps\R\Route 66 Casino\18463\TUG\

DESIGNED BY CES	TITLE ROUTE 66 TUG	JOB NO. 18463
QTY 1	DATE 10/17/07	SHEET 1 OF 1
FINISH N/A	ASSY NO. L18463-0000	REV. 1

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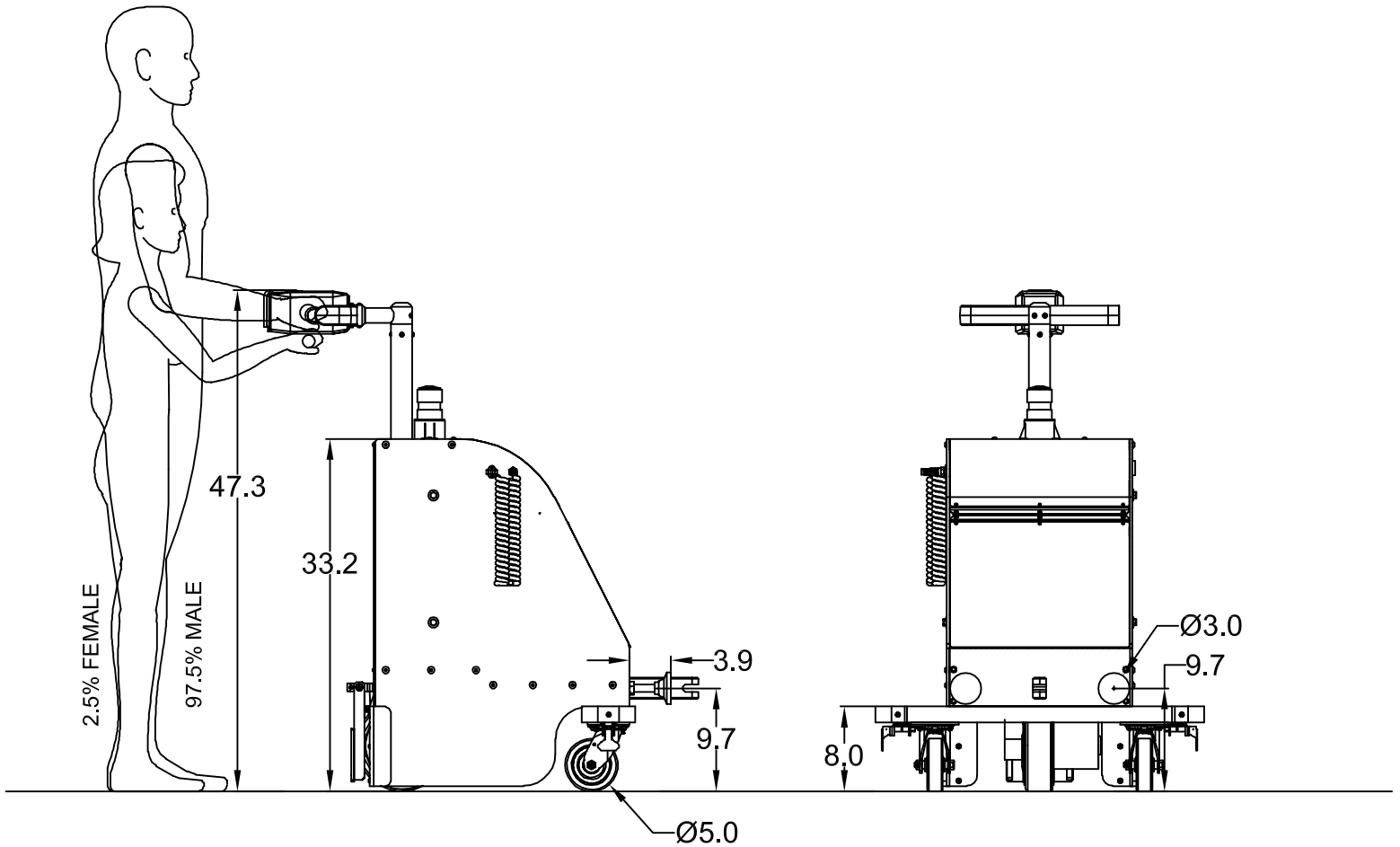
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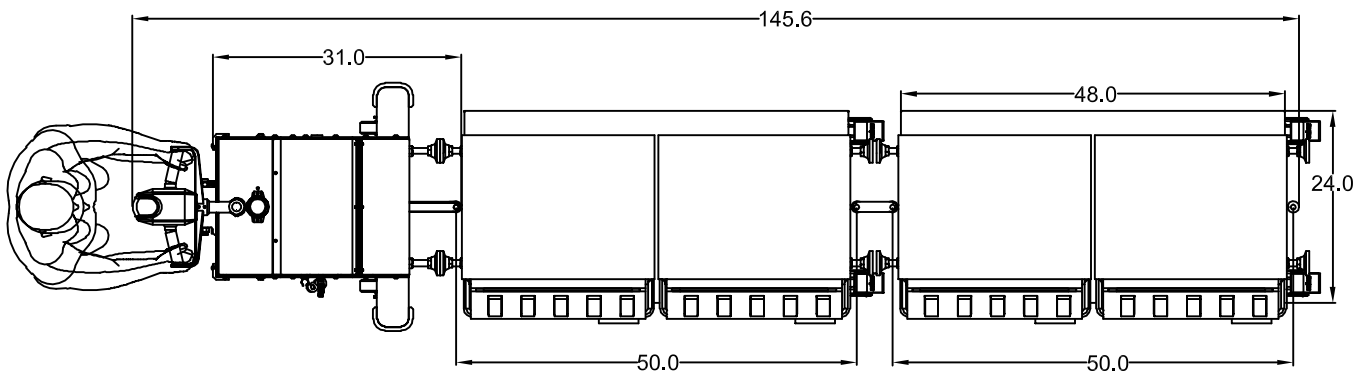
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ROUTE 66 CASINO

ALUM-A-LIFT TUG
FOR TRANSPORTING
DOLLIES

FILE: 18463
23-OCT-2007





alum-a-lift

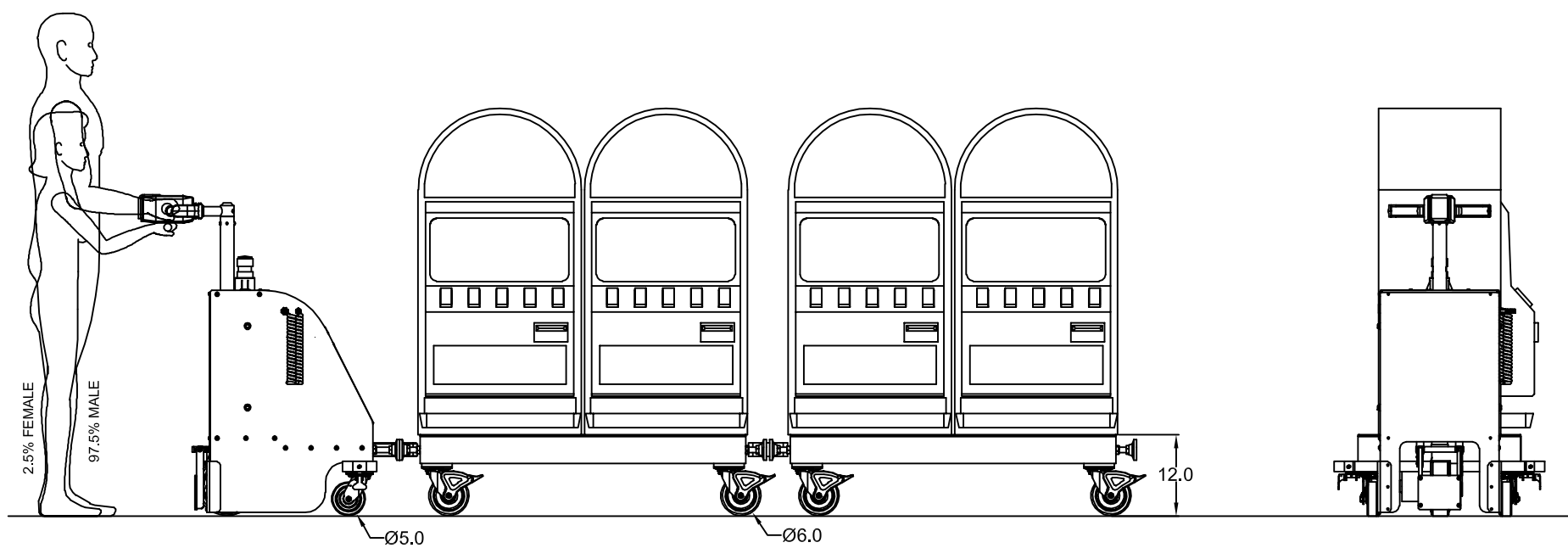
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ROUTE 66 CASINO

ALUM-A-LIFT TUG FOR TRANSPORTING DOLLIES

FILE: 18463
23-OCT-2007



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 tug is certified to ensure the stability and structural integrity of the tug 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.

SUBJECT: Alum-a-lift Build Specifications; Standards 2007

Following are standards or specifications for Alum-a-lift Constructions. This is to certify that these constructions are in compliance with:

ANSI A92.3-2006 Manually-Propelled Elevating Aerial Platforms

ASME B56.1-2000 Safety Standard for Low Lift and High Lift Trucks
ASME B56.10-1992 Safety Std for Manually Propelled High-Lift Industrial Trucks

CAN/CSA-B335-04 Safety Standard For Lift Trucks
CAN/CSA-C22.2 NO. 33-M1984(R2004) Construction and Test of Electric Cranes and Hoists
CAN/CSA-C22.2 NO. 0-M91 (R2006) General Requirements – Canadian Electrical Code, Part II
CAN/CSA-C22.2 NO. 14-05 Industrial Control Equipment
CAN/CSA-Z256-M87 Safety Code for Material Hoists
CAN/CSA-Z432-04 Safeguarding of Machinery

CE; European Compliance

British Standard EN1494 :2001 Mobile or Movable Jacks and Associated Lifting Equipment
EMC Directive (89/336/EEC) EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2, EN 61000-6-2
Low Voltage Directive (73/23/EEC)
Machinery Directive (98/37/IEC) EN292-1, EN292-2, EN60204-1, EN1050
RoHS Directive (2002/95/EC) Lead-Free (Pending)

IEST-STD-CC1246D (MIL-STD-1246) Cleanliness Levels and Contamination Control Program

IPC-A-600 Acceptability of Printed Circuits
IPC-A-610 General Guidelines for the Acceptance of Printed Board Assemblies

ISO Standard 14644 (Class 5, 4) (Fed Std 209E; Class 100, Class 10) Cleanrooms

MIL-STD-1472F Human Engineering

NEMA ICS-2-1993 Industrial Control Devices, Controllers, and Assemblies
NEMA ICS-6-1993 Industrial Control and System Enclosures

NFPA 70 (1999) National Electric Code
NFPA 79 Electric Standard for Industrial Machinery
NFPA 318 Standard for the Protection of Cleanrooms

OSHA 29 CFR 1910.212 General Requirements for All Machines
OSHA 29 CFR 1910.219 Mechanical Power-Transmission Apparatus

SEMI S1-90 Safety Guideline for Visual Hazard Alerts
SEMI S2-93A Safety Guidelines for Semiconductor Manufacturing Equipment
SEMI S8-99 Safety Guidelines for Ergonomics Engineering of Semi. Mfg. Equip.
SEMI S10-1296 Safety Guideline for Risk Assessment

U.L. 583 Electric Battery Powered Industrial Trucks

Eastman Kodak Ergonomic Design for People at Work

Hewlett Packard Specifications for Equipment, 1996

IBM C-S 3-0502-202 Corporate Standard, 1994-03
IBM Equipment Design Standard, 1988 (Includes Mechanical & Electrical)
IBM Ergonomic Guidelines

Intel Ergonomics Requirements, 1986

Kodak/ITT Space Systems Approved Vendor Quality Control "A"

LLNL M-012 Design Safety Standards Lawrence Livermore National Laboratory

Lockheed-Martin Approved Vendor

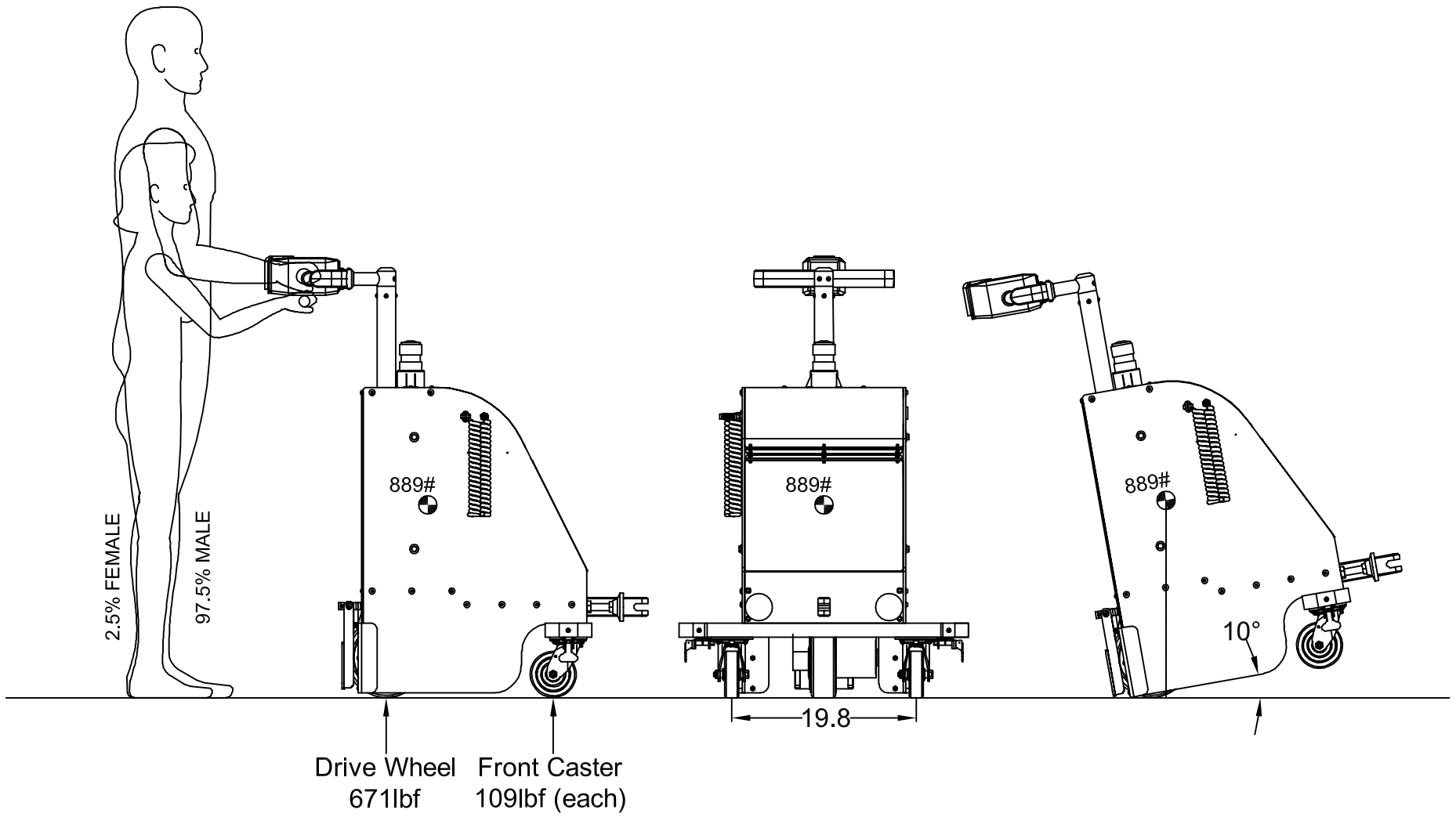
Novellus ESTD

For Alum-a-lift, Inc.

For Alum-a-lift, Inc.

Stan Bressner, President

Eric Bressner, V.P. Engineering



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 tug is used 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

Feb
13,
2007

PART NUMBER	DESCRIPTION	
A40-636	Battery, Gel Cell, 31.5Ah	Tug
A40-309-002	Charger, 8AMP 24V 110/220V	Tug
A40-538	Circuit Breaker, 25A	Tug
A40-404	Switch, Limit, Plunger	Tug
Call	Drive Wheel Circuit Board	Tug

Appendix

5

Electrical Supplement

