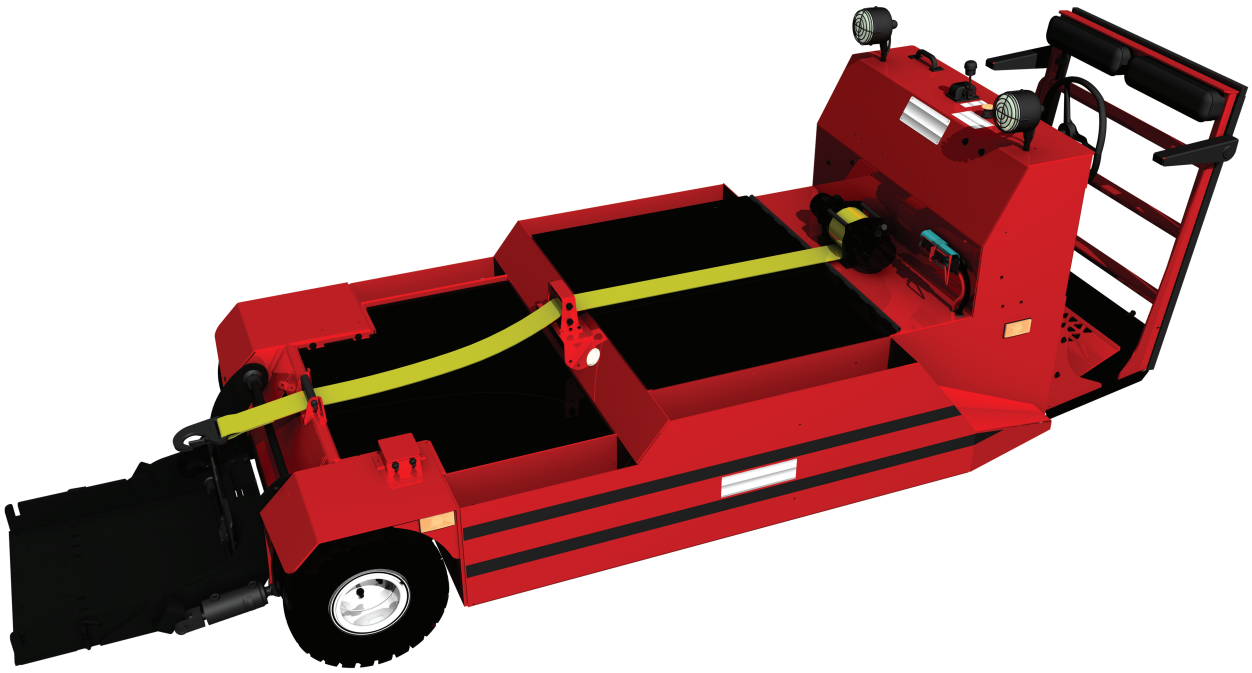
LEKTRO 86/87 SERIES

AIRCRAFT TOWING VEHICLE



OPERATION MANUAL

LEKTRO

AUTHORED BY ANTHONY HERNANDEZ -- (415)786-2081 -- anthony94122@outlook.com

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JBT LEKTRO Inc.
1190 S.E. Flightline Drive
Warrenton, Oregon
97146-9692, U.S.A.

THIS MANUAL DESCRIBES STANDARD LEKTRO TRACTOR FEATURES AND EQUIPMENT ONLY. WHEN REQUESTED BY A CUSTOMER, JBT LEKTRO, INC. WILL PROVIDE NON-STANDARD FEATURES AND EQUIPMENT ON A PER-ORDER BASIS. THESE NON-STANDARD ITEMS MAY BE PROVIDED IN ADDITION TO AND/OR INSTEAD OF THE STANDARD ITEMS.

TRACTORS EQUIPPED WITH NON-STANDARD ITEMS WILL INCLUDE SUPPLEMENTAL DOCUMENTATION AS NEEDED. ALL INFORMATION AND INSTRUCTIONS CONTAINED IN ANY SUPPLEMENTAL DOCUMENTATION THAT CONFLICTS WITH THIS MANUAL WILL SUPERSEDE THIS MANUAL UNLESS SPECIFICALLY NOTED OTHERWISE.

LIST OF REVISIONS

Change Date	Edition/ Revision	List of Effective Pages	Change Description
April, 2020	1.00	ALL	Align with 86/87 feedback

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Change Date	Edition/ Revision	List of Effective Pages	Change Description

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TABLE OF DANGER, WARNING, AND CAUTION STATEMENTS

DANGER

A DANGER STATEMENT INDICATES A SITUATION THAT MUST BE AVOIDED. FAILURE TO COMPLY WITH THE DANGER STATEMENT WILL RESULT IN SERIOUS BODILY INJURY, DEATH OR PROPERTY DAMAGE, INCLUDING DAMAGE TO THE VEHICLE!

WARNING

A WARNING INDICATES A PROCEDURE THAT MUST BE FOLLOWED OR A CONDITION THAT MUST BE OBSERVED. FAILURE TO COMPLY WITH THE WARNING MAY RESULT IN SERIOUS BODILY INJURY, DEATH OR PROPERTY DAMAGE, INCLUDING DAMAGE TO THE VEHICLE!

CAUTION

A CAUTION INDICATES A PROCEDURE THAT MUST BE FOLLOWED OR A CONDITION THAT MUST BE OBSERVED. FAILURE TO COMPLY WITH THE CAUTION MAY RESULT IN DAMAGE TO VEHICLE AND VOID WARRANTY, OR DAMAGES TO OTHER PROPERTY, INCLUDING THE AIRCRAFT!

The following statements of danger, warnings and cautions are used in this manual. Read all of them and follow the instructions when performing the procedures.

DANGER

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WARNING

CAUTION

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CHAPTER 1

INTRODUCTION

This chapter introduces JBT Lektro, Inc. and this *Operation Manual*, and provides safety information.

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1.1 WELCOME

Welcome to the JBT LEKTRO, Inc. Family! Thank you for entrusting the safety and ground handling of your aircraft to JBT LEKTRO, Inc. by purchasing and taking delivery of your new LEKTRO Model 86/87 Series tractor. LEKTRO tractors have earned a worldwide reputation as the safest, most efficient, best designed, and highest quality tow vehicles available. We hope you will agree that your new 86/87 Series tractor is one of the best purchases you have ever made.

Some of the compelling benefits and savings of LEKTRO 86/87 Series tractors include:

- Replacing the standard tow bar with an adjustable ramp and winch offers unparalleled control and safety.
- The smooth and quiet battery-powered motor emits no pollution and provides safe, gentle, and exceptionally maneuverable towing that your employees and customers will appreciate.
- Optional draw bar pull adjusts to varying traction requirements under different aircraft nose weights.
- The electronic drive system reduces energy and maintenance costs while meeting present and future emission control requirements.

Complete customer satisfaction has been a policy of LEKTRO's since we opened for business in 1945, and that commitment continues following our acquisition by JBT. We welcome and encourage your questions, comments, and suggestions about our current and future products and services. Please feel free to contact us anytime.

- **Toll-free phone:** 1-800-535-8767 (U.S. and Canada)
- **Worldwide phone:** 503-861-2288
- **Fax:** 503-861-2283

Operator and aircraft safety come first at JBT LEKTRO, Inc. It is vital that all personnel involved with the operation and servicing of your new LEKTRO be fully trained and qualified. This manual contains detailed operations procedures for the LEKTRO 86/87 Series. All personnel who are involved with operating and/or servicing LEKTRO 86/87 Series tractors should read and understand this *Operation Manual* before using or working on the vehicle. Service personnel should also read both the 86/87 Series *Service Manual* and *Parts & Schematics Manual*. In addition, the *Aircraft Towing Procedures Manual* describes detailed capture procedures for a wide variety of aircraft. Personnel involved with towing aircraft must be familiar with the capture methods specific to each model aircraft they tow. JBT LEKTRO, Inc. will issue update notices and/or updated manuals when needed, thereby ensuring that your documentation remains current.

Thank you for placing your confidence with JBT LEKTRO, Inc. We will strive to ensure your continued satisfaction.

Eric W. Paulson
JBT LEKTRO, Inc.

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1.2 ABOUT THIS MANUAL

This section describes the formatting and general organization of this 86/87 Series *Operation Manual*. It also describes the additional documentation supplied with your LEKTRO tractor.

1.2.1 FORMATTING CONVENTIONS

This manual uses several formatting conventions to present information of special importance.

Lists of items, points to consider, or procedures that do not need to be performed in a specific order appear in bullet format:

- Item 1
- Item 2

Procedures that must be followed in a specific order appear in numbered steps:

1. Perform this step first.
2. Perform this step second.

This manual also contains safety callouts where appropriate, as described in *"TABLE OF DANGER, WARNING, AND CAUTION STATEMENTS" on page xi*.

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1.2.2 ORGANIZATION

This manual contains the following chapters:

- **CHAPTER 1: INTRODUCTION:** Introduces you to LEKTRO 86/87 Series aircraft tractors with a welcome letter from JBT LEKTRO Inc. and descriptions of both this manual and related 86/87 Series manuals. This chapter also includes information for contacting LEKTRO. See *"INTRODUCTION" on page 1-1*.
- **CHAPTER 2: 86 SPECIFICATIONS:** Lists the specifications for select models in the LEKTRO 86 Series. See *"86 SPECIFICATIONS" on page 2-1*.
- **CHAPTER 3: 87 SPECIFICATIONS:** Lists the specifications for select models in the LEKTRO 87 Series. See *"87 SPECIFICATIONS" on page 3-1*.
- **CHAPTER 4: COMPONENTS & CONTROLS:** Lists and describes the key components and controls of LEKTRO 86/87 Series tractors. See *"COMPONENTS & CONTROLS" on page 4-1*.
- **CHAPTER 5: BASIC OPERATION:** How to safely operate a LEKTRO 86/87 Series aircraft tractor, including routine and emergency operations. See *"BASIC OPERATIONS" on page 5-1*.
- **CHAPTER 6: DRIVING:** How to safely drive a LEKTRO 86/87 Series aircraft tractor, including startup and shut down procedures and moving the vehicle. See *"DRIVING" on page 6-1*.
- **APPENDIX A: OPERATOR PRE-USE SAFETY CHECKLIST:** Contains a pre-formatted Operator Pre-Use Safety Checklist form to use when documenting vehicle actions, such as inspections and repair requests. See *"OPERATOR PRE-USE SAFETY CHECKLIST" on page A-1*.
- **APPENDIX B: RECEIVING:** Describes the procedures to follow when receiving a new LEKTRO 86/87 Series aircraft tractor before placing that vehicle into service. These procedures will help ensure safe operations, minimize maintenance and repair, and prolong the life of your aircraft tractor. This chapter also contains the LEKTRO Gold Seal Limited Warranty.
  See *"RECEIVING" on page B-1*.

1.2.3 RELATED DOCUMENTATION

The following additional documentation is available for your LEKTRO tractor:

- **Aircraft Towing Procedures:** Describes aircraft capture, towing, and release operations, including procedures by aircraft type.
- **Service Manual:** Describes preventive and corrective maintenance procedures to keep your LEKTRO tractor running reliably.
- **Parts Manual:** Lists the parts included in your LEKTRO tractor should you ever need to order replacements.

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1.3 GENERAL SAFETY

DANGER

FAILURE TO FOLLOW ALL OF THE GENERAL SAFETY PRECAUTIONS IN THIS SECTION PLUS THE OTHER SAFETY WARNINGS AND CAUTIONS IN THIS MANUAL MAY CAUSE DEATH, PERSONAL INJURY, AND/OR PROPERTY DAMAGE.

1.3.1 RESPONSIBILITY

The tractor operator, tractor owner, and LEKTRO have the following responsibilities:

- **Operator:** The tractor operator has overall responsibility for the safe operation of the tractor and aircraft under tow, as well as the safety of all personnel affected by the towing operation. Where required, the driver will assign wing walkers and/or signaling personnel to assist in the safe movement of the tractor and aircraft. This responsibility extends to performing and documenting pre-use safety checks before first use of the tractor on each work shift, as described in this manual.
- **Owner:** The tractor owner is responsible for ensuring the following:
  - > Operating personnel are formally trained and qualified to operate the tractor.
  - > The tractor is maintained and serviced only by qualified and authorized personnel as prescribed in both this manual and the accompanying *Service Manual*, unless specifically directed otherwise by LEKTRO.
- **LEKTRO:** LEKTRO is responsible for ensuring that all information pertinent to safe tractor operation, maintenance, and service is both current and available to the owner or owner's agent on a timely basis.

1.3.2 PRECAUTIONS

- Always report any tractor damage or serviceability issue to a supervisor immediately.
- Always understand all operating instructions before using the tractor.
- Always comply with all published operating instructions and airport traffic safety regulations while using the tractor.
- Always drive the tractor only while properly positioned completely within the Operator Compartment, with the arm rests in the horizontal deployed position.
- Always ensure that all loads being moved are secured.

- Always ensure that the tractor is moving at a speed of 2 mph (3 km/h) or greater before applying maximum drive power.
- Always avoid sudden stops.
- Always apply the brake gradually when towing aircraft.
- Always reduce speed and increase braking distance when driving in wet or slippery conditions.
- Always remain completely within the Operator Compartment until the tractor is completely stopped and properly secured.
- Always turn the Motive Power Switch to the OFF position before leaving the tractor unattended.
- Always leave the corresponding battery compartment deck cover(s) open while charging the Motive Power and/or GPU Batteries.
- Never transport any passengers on any portion of the tractor other than in the passenger position in the Operator Compartment. The passenger must use the Passenger Safety Handle on the Control Console and place the right arm rest in the horizontal deployed position for security.
- Never exceed the rated maximum towing capacity of the tractor.
- Never tow aircraft at speeds exceeding the maximum safe towing speed for the specific LEKTRO tractor model.
- Never initiate turns at high speed.

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1.4 CONTACTING JBT LEKTRO, INC.

LEKTRO is proud to offer the finest customer service in the industry. Need to buy a tractor, obtain a part, or have a support question? We are here to help! You may contact LEKTRO via any of the following methods:

- **Mailing Address:**
  1190 S.E. Flightline Drive
  Warrenton, Oregon 97146-9692
- **Phone:**
  1-800-535-8767 (U.S. and Canada)
  503-861-2288 (worldwide)
- **Fax:**
  503-861-2283
- **Email**:
  - > **Tractor sales:** sales.lektro@jbtc.com
  - > **Tractor parts:** parts.lektro@jbtc.com
- **Website:**
  http://www.LEKTRO.com

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CHAPTER 2

86 SPECIFICATIONS

This chapter provides the specifications for the following selected LEKTRO 86 Series tractors:

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2.1 86 SERIES MODELS

This chapter lists the specifications for the following models in the LEKTRO 86 Series of aircraft tractors. See the following sections:

Note

The illustrations in this section may show some optional equipment.

Note

LEKTRO reserves the right to change these specifications at any time without notice or obligation.

Note

LEKTRO 86/87 Series aircraft tractors are protected by U.S. patent numbers 5,151,033 / 5,302,075 / 9,067,691. Additional patents are pending.

LEKTRO OFFERS ADDITIONAL 86 SERIES TRACTORS FOR GENERAL, AIRLINE, AND MILITARY USE THAT ARE NOT DESCRIBED IN THIS MANUAL.

PLEASE CONTACT LEKTRO FOR DETAILS.

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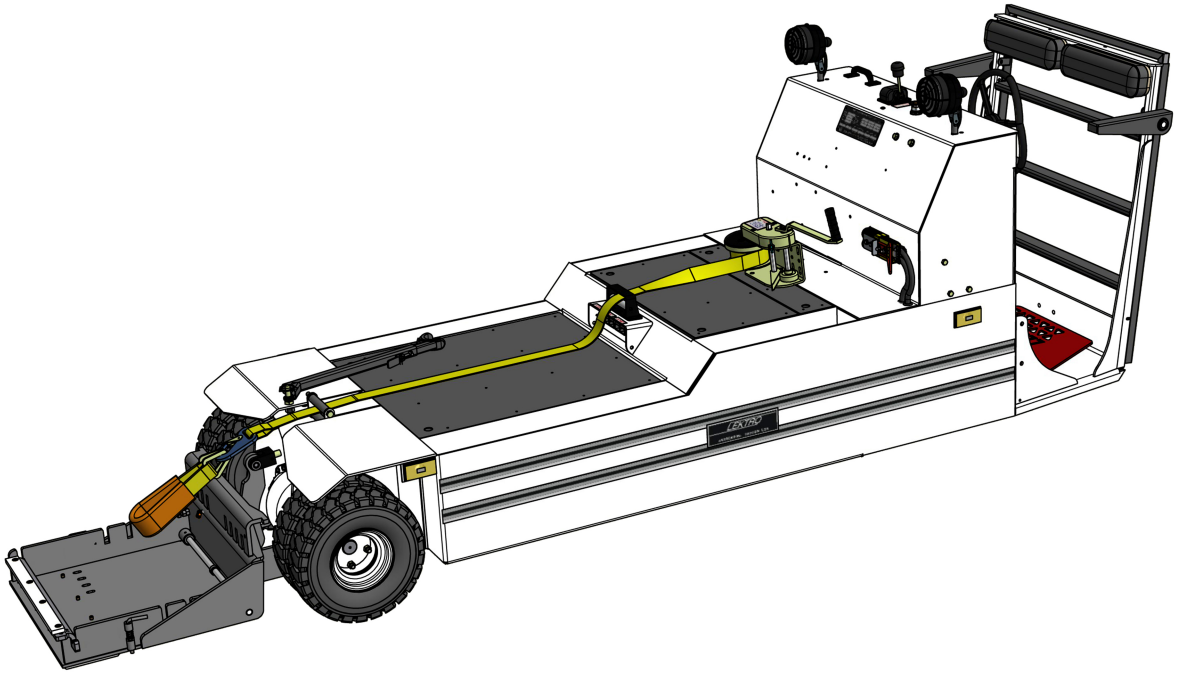
2.2 8600A

The LEKTRO 8600A is designed to tow aircraft up to 30,000 lbs/13,608 kg.



2.2.1 FEATURES

- **Vehicle Drive:** 6.8 HP/5.1 kW, 36 VDC traction motor mated with a Dana 44 differential. 11.8 HP/8.8 kW traction motor and limited-slip differential are optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Six 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in independent 12/24/30 VDC / 1374 CCA motive/GPU batteries. Independent 1175 CCA GPU battery and charging system is optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 120-230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, and aircraft selection system are optional.
- **Winch:** Two-speed manual winch. Winch and strut straps included. Hydraulic winch with automatic safety cutoff is optional.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake acting at the differential pinion shaft.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 4.80/4.00 x 8 8-ply pneumatic highway tread. Traction tread, poly foam, tire socks, and chains are optional.

- **Steer Tires:** Dual 4.80/4.00 x 8 6-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.
- **Lighting:** Dual 360-degree rotating spotlight mounted on cowl. One rear LED spotlight mounted on rear of operator platform, and four flashing amber LED running lights. Brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

2.2.2 SPECIFICATIONS

- **Length:** .....151.4 in / 384.6 cm
- **Width:** .....41.2 in / 104.6 cm
- **Height (at lowest steering tilt setting):** .....48.8 in / 123.9 cm
- **Turning Radius:** .....127.5 in / 323.9 cm
- **Wheelbase:** .....79.2 in / 201.1 cm
- **Vehicle Speed (empty):** .....6.6 MPH / 10.6 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** .....4.5 MPH / 7.2 KPH
- **Lift Cradle Capacity:** .....3,000 LBS / 1361 KG**
- **Nose Gear Cradle Lifting Height:** .....9.0 in / 23.0 cm
- **Ground Clearance:** .....3.5 in / 9.0 cm
- **Shipping Weight (w/ motive batteries & charger):** ..... 2,750 LBS / 1247 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using a 14 in / 36 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 18.5 in / 47 cm from the drive tire center line.

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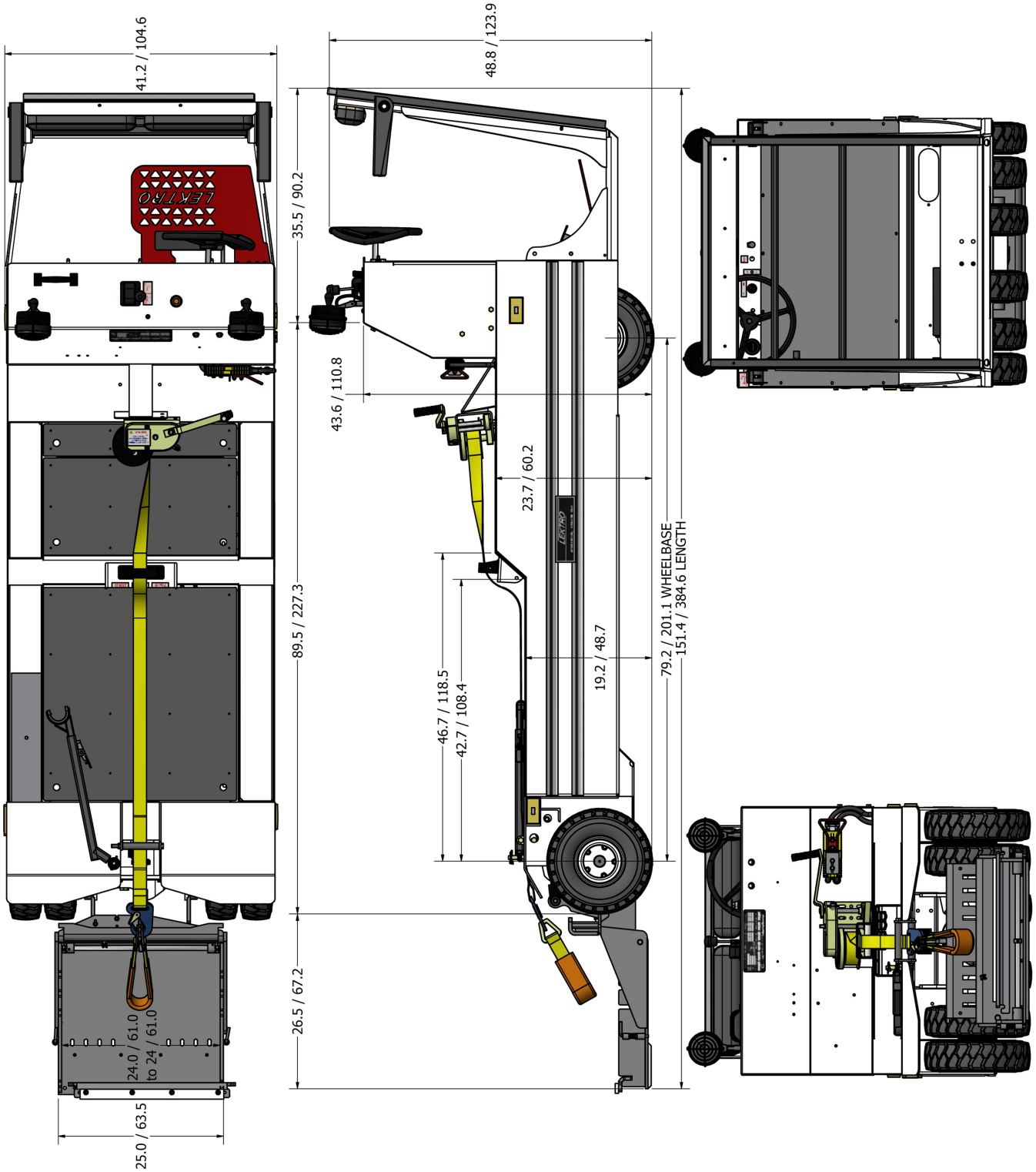
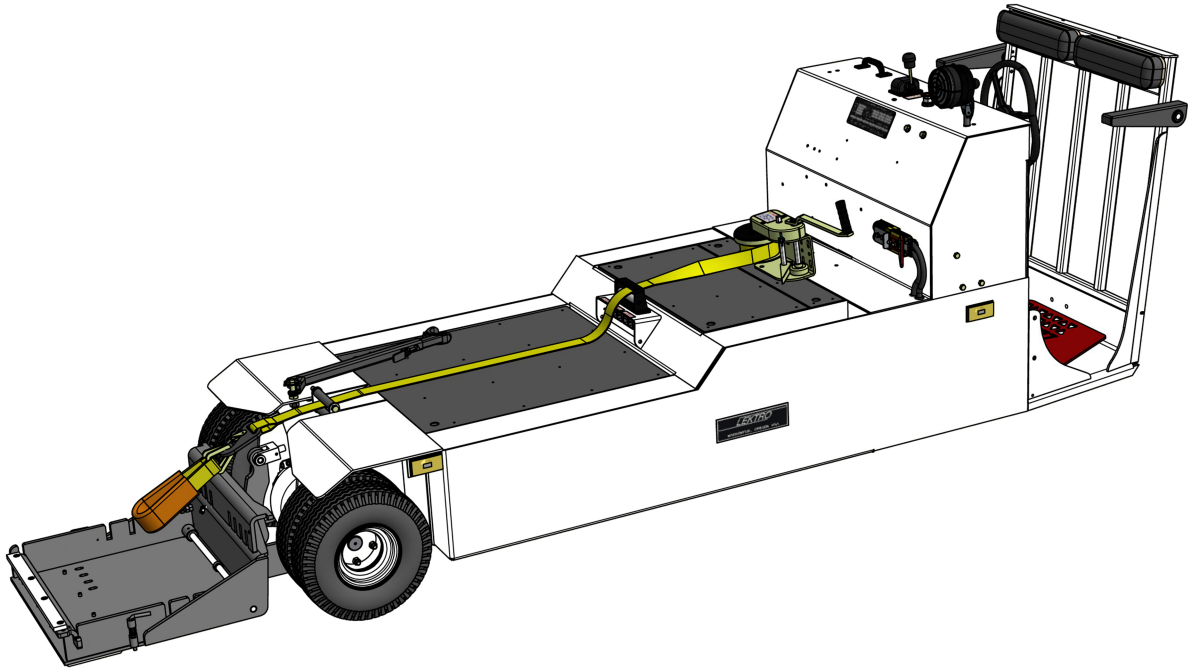
2.2.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8600A tractor.



2.3 8600A-EZ

The LEKTRO 8600A-EZ is designed to tow aircraft up to 30,000 lbs/13,608 kg.



2.3.1 FEATURES

- **Vehicle Drive:** 6.8 HP/5.1 kW, 36 VDC traction motor mated with a Dana 44 differential. 11.8 HP/8.8 kW traction motor and limited-slip differential are optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Six 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in independent 12/24/30 VDC / 1374 CCA motive/GPU batteries. 12/24/28 VDC optional. Independent 1175 CCA GPU battery and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 120-230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, and aircraft selection system are optional.
- **Winch:** Two-speed manual winch. Winch and strut straps included. Hydraulic winch with automatic safety cutoff is optional.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake acting at the differential pinion shaft.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 4.80/4.00 x 8 6-ply pneumatic highway tread. Traction tread, poly foam, tire socks, and chains are optional.

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- **Steer Tires:** Dual 4.80/4.00 x 8 6-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.
- **Lighting:** Single 360-degree rotating spotlight mounted on cowl and five amber reflectors. Second spotlight, rear LED spotlight, four flashing amber LED running lights, and brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest is optional.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

2.3.2 SPECIFICATIONS

- **Length:** ..... 150.2 in / 381.5 cm
- **Width:** ..... 41.2 in / 104.6 cm
- **Height (at lowest steering tilt setting):** ..... 48.6 in / 123.6 cm
- **Turning Radius:** ..... 127.5 in / 323.9 cm
- **Wheelbase:** ..... 79.2 in / 201.1 cm
- **Vehicle Speed (empty):** ..... 6.6 MPH / 10.6 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 4.5 MPH / 7.2 KPH
- **Lift Cradle Capacity:** ..... 3,000 LBS / 1361 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.0 in / 23.0 cm
- **Ground Clearance:** ..... 3.5 in / 9.0 cm
- **Shipping Weight (w/ motive batteries & charger):** ..... 2,700 LBS / 1225 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using a 14 in / 36 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 18.5 in / 47 cm from the drive tire center line.

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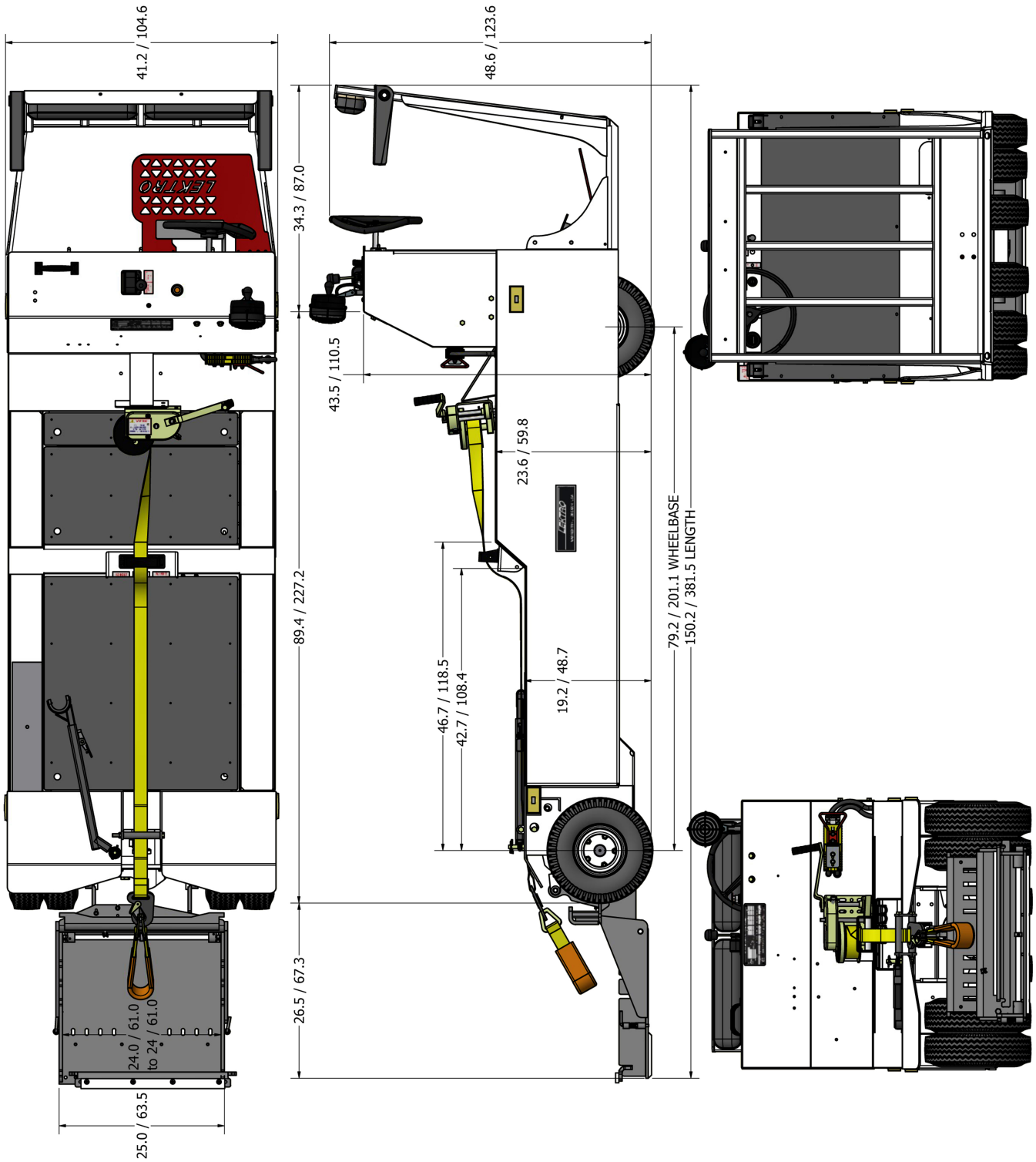
2.3.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8600A-EZ tractor.



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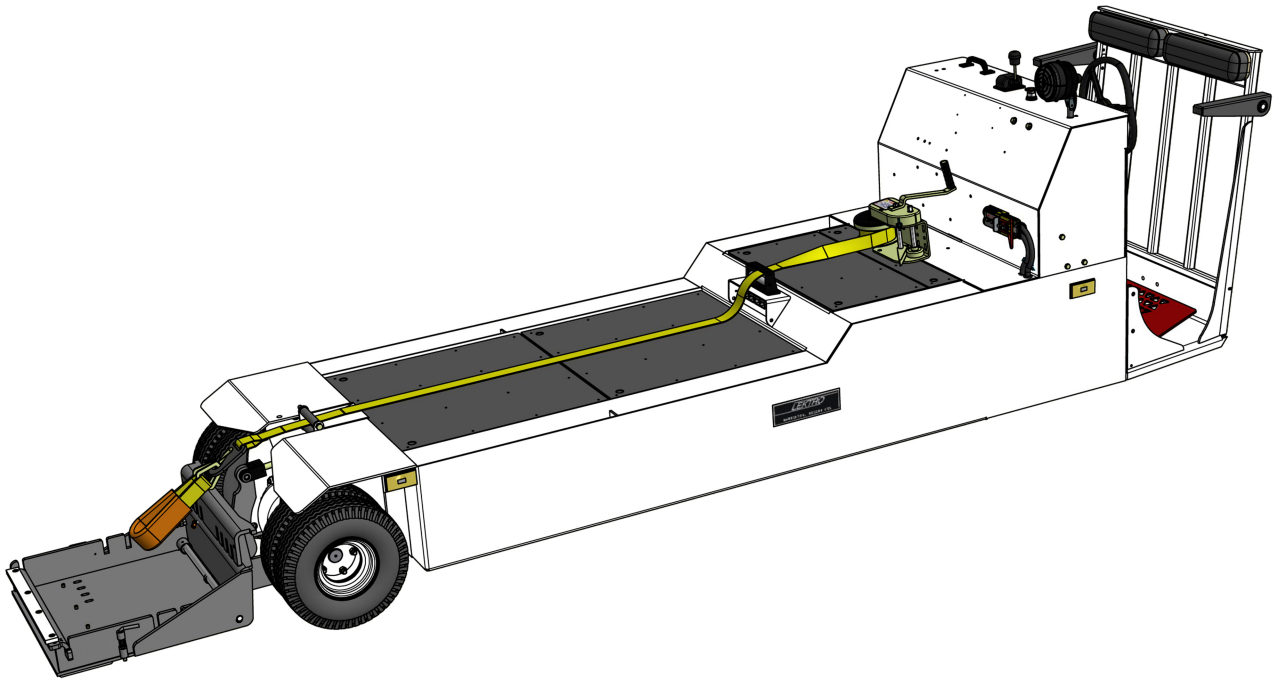
2.4 8650AX-EZ

The LEKTRO 8650AX-EZ is designed to tow aircraft up to 40,000 lbs/18,143 kg.



2.4.1 FEATURES

- **Vehicle Drive:** 11.8 HP/8.8 kW, 36 VDC traction motor mated with a Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Six 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in independent 12/24/30 VDC / 1374 CCA motive/GPU batteries. 12/24/28 VDC optional. Independent 1175 CCA GPU battery and charging system is optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 120-230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, and aircraft selection system are optional.
- **Winch:** Two-speed manual winch. Winch and strut straps included. Hydraulic winch with automatic safety cutoff is optional.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake acting at the differential pinion shaft.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 4.80/4.00 x 8 6-ply pneumatic highway tread. Traction tread, poly foam, tire socks, and chains are optional.

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- **Steer Tires:** Dual 4.80/4.00 x 8 8-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.
- **Lighting:** Single 360-degree rotating spotlight mounted on cowl and five amber reflectors. Second spotlight, rear LED spotlight, four flashing amber LED running lights, and brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest is optional.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

2.4.2 SPECIFICATIONS

- **Length:** .....174.2 in / 442.4 cm
- **Width:** .....41.0 in / 104.1 cm
- **Height (at lowest steering tilt setting):** .....48.8 in / 123.9 cm
- **Turning Radius:** .....151.5 in / 384.8 cm
- **Wheelbase:** .....103.2 in / 262.2 cm
- **Vehicle Speed (empty):** .....6.8 MPH / 10.9 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** .....4.1 MPH / 6.6 KPH
- **Lift Cradle Capacity:** .....4,000 LBS / 1814 KG**
- **Nose Gear Cradle Lifting Height:** .....9.0 in / 23.0 cm
- **Ground Clearance:** .....3.5 in / 9.0 cm
- **Shipping Weight (w/ motive batteries & charger):** ..... 2,870 LBS / 1302 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using a 14 in / 36 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 18.5 in / 47 cm from the drive tire center line.

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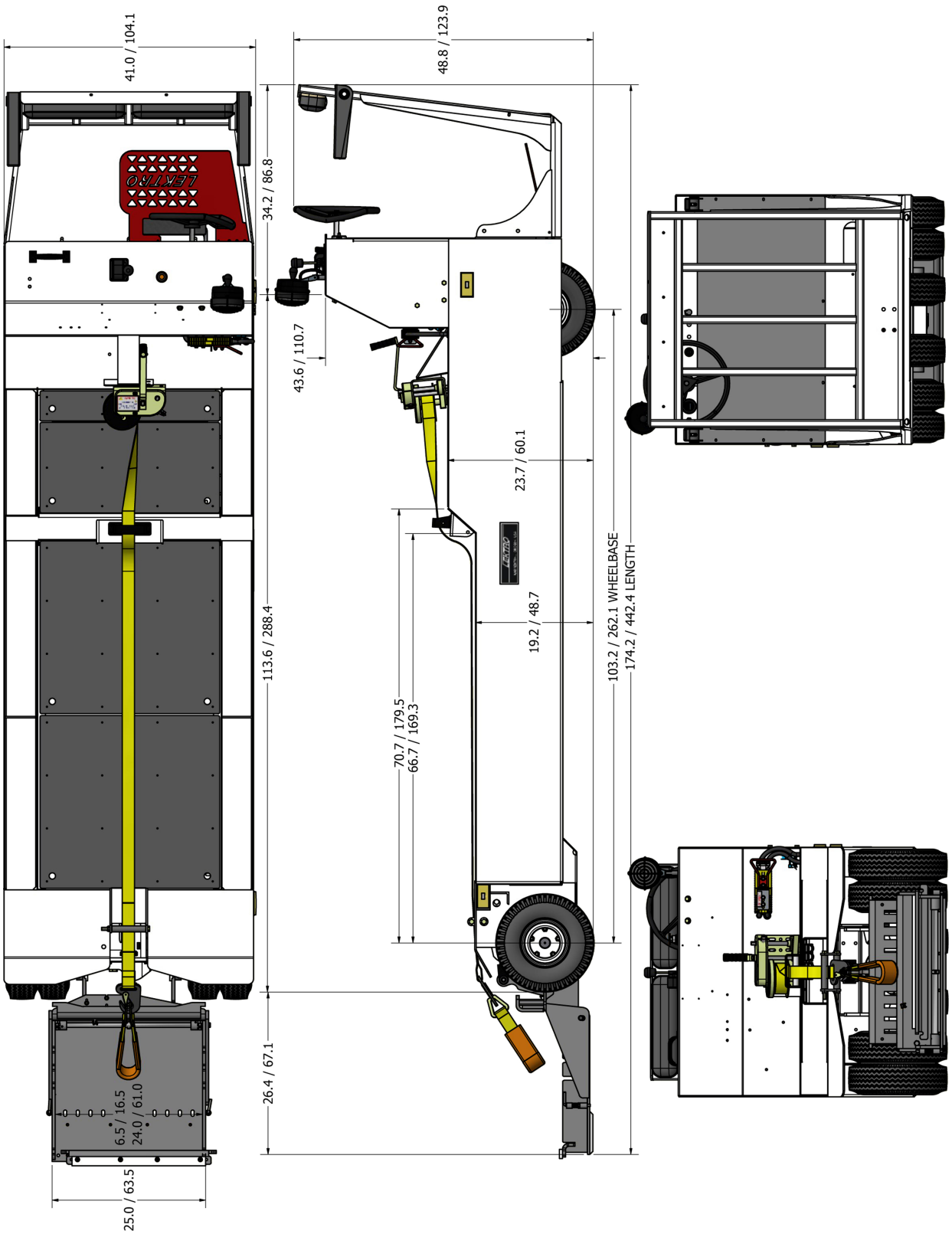
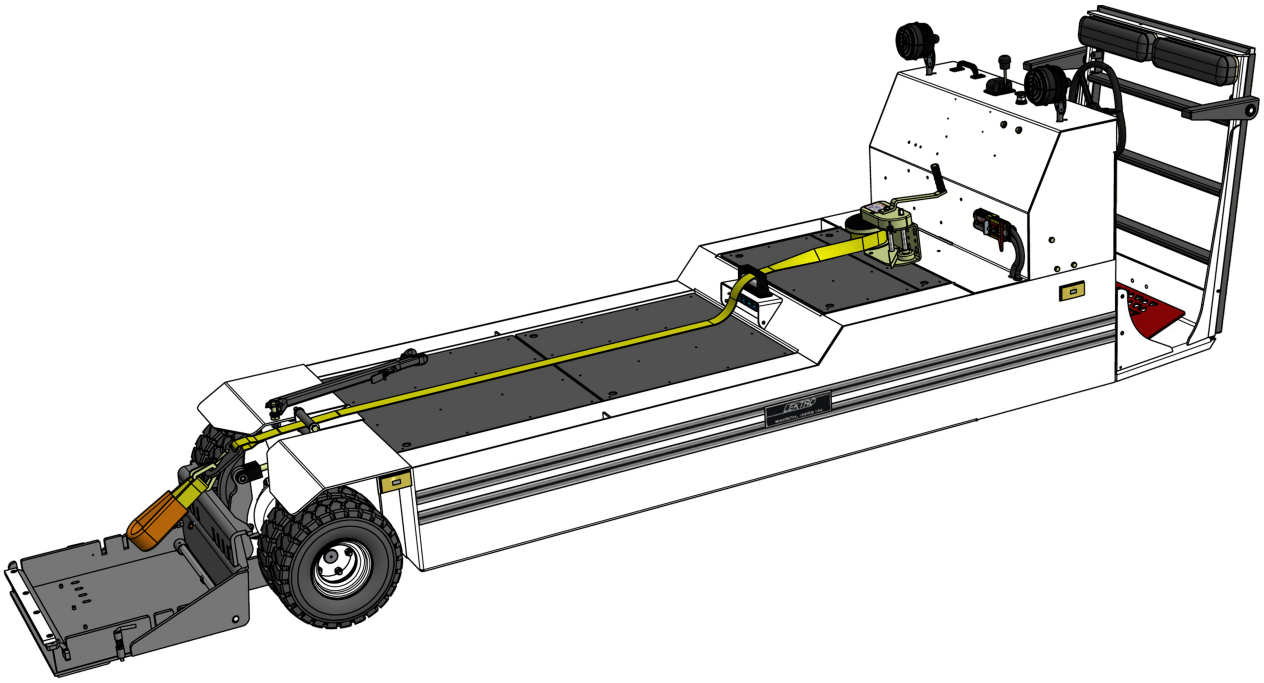
2.4.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8650AX-EZ tractor.



2.5 8650AX

The LEKTRO 8650AX is designed to tow aircraft up to 40,000 lbs/18,143 kg.



2.5.1 FEATURES

- **Vehicle Drive:** 11.8 HP/8.8 kW, 36 VDC traction motor mated with a Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Six 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in 12/24/28 VDC / 1374 CCA motive/GPU batteries. Independent 1175 CCA GPU battery and charging system is optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 120-230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, and aircraft selection system are optional.
- **Winch:** Two-speed manual winch. Winch and strut straps included. Hydraulic winch with automatic safety cutoff is optional.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake acting at the differential pinion shaft.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 4.80/4.00 x 8 8-ply pneumatic highway tread. Traction tread, poly foam, tire socks, and chains are optional.

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- **Steer Tires:** Dual 4.80/4.00 x 8 8-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.
- **Lighting:** Dual 360-degree rotating spotlight mounted on cowl. One rear LED spotlight mounted on rear of operator platform. Four flashing amber LED running lights. Brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

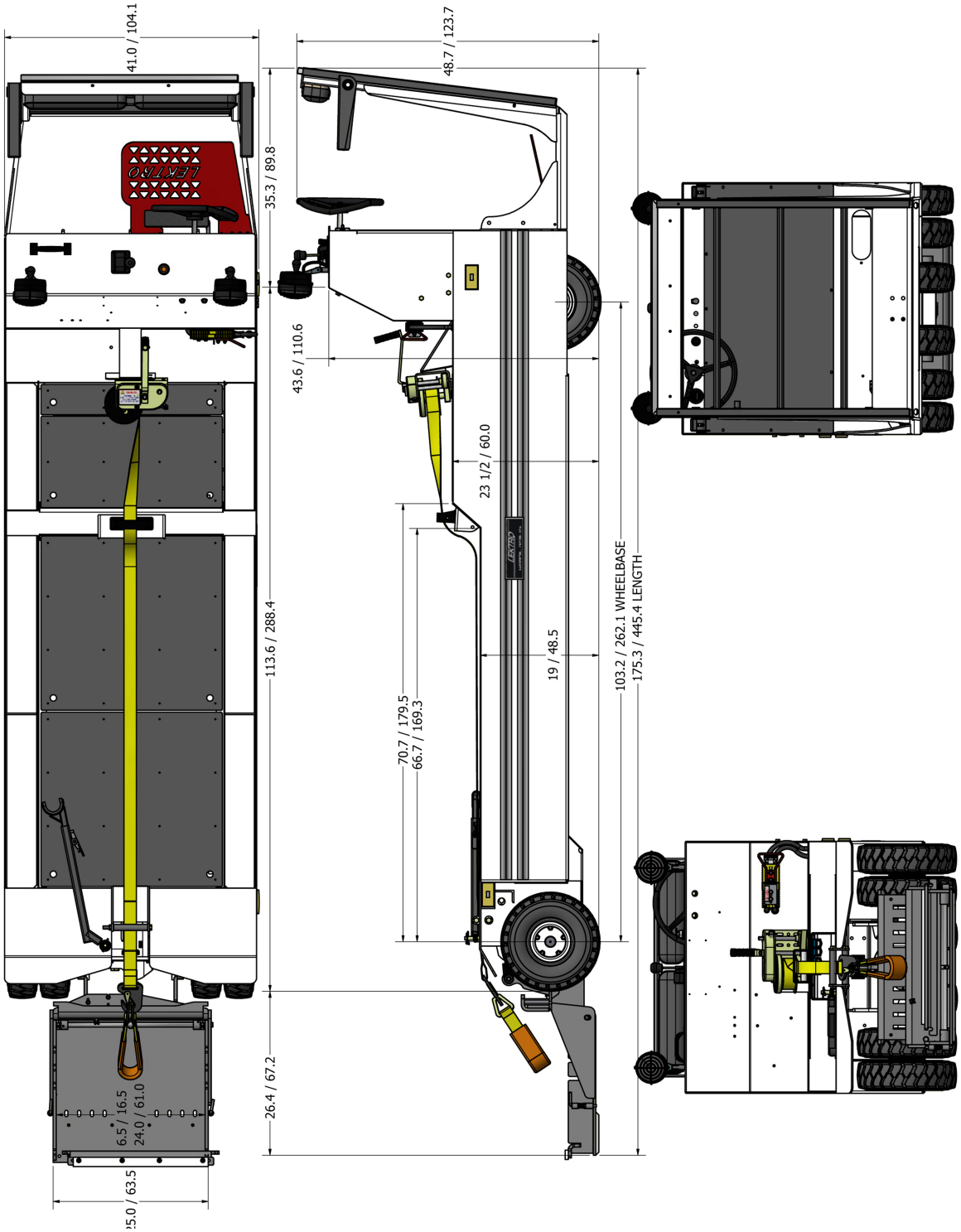
2.5.2 SPECIFICATIONS

- **Length:** .....175.3 in / 445.4 cm
- **Width:** .....41.0 in / 104.1 cm
- **Height (at lowest steering tilt setting):** .....48.7 in / 123.7 cm
- **Turning Radius:** .....151.5 in / 384.8 cm
- **Wheelbase:** .....103.2 in / 262.1 cm
- **Vehicle Speed (empty):** .....6.8 MPH / 10.9 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** .....4.1 MPH / 6.6 KPH
- **Lift Cradle Capacity:** .....4,000 LBS / 1814 KG**
- **Nose Gear Cradle Lifting Height:** .....9.0 in / 23.0 cm
- **Ground Clearance:** .....3.5 in / 9.0 cm
- **Shipping Weight (w/ motive batteries & charger):** ..... 2,960 LBS / 1343 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using a 14 in / 36 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 18.5 in / 47 cm from the drive tire center line.

2.5.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8650AX tractor.



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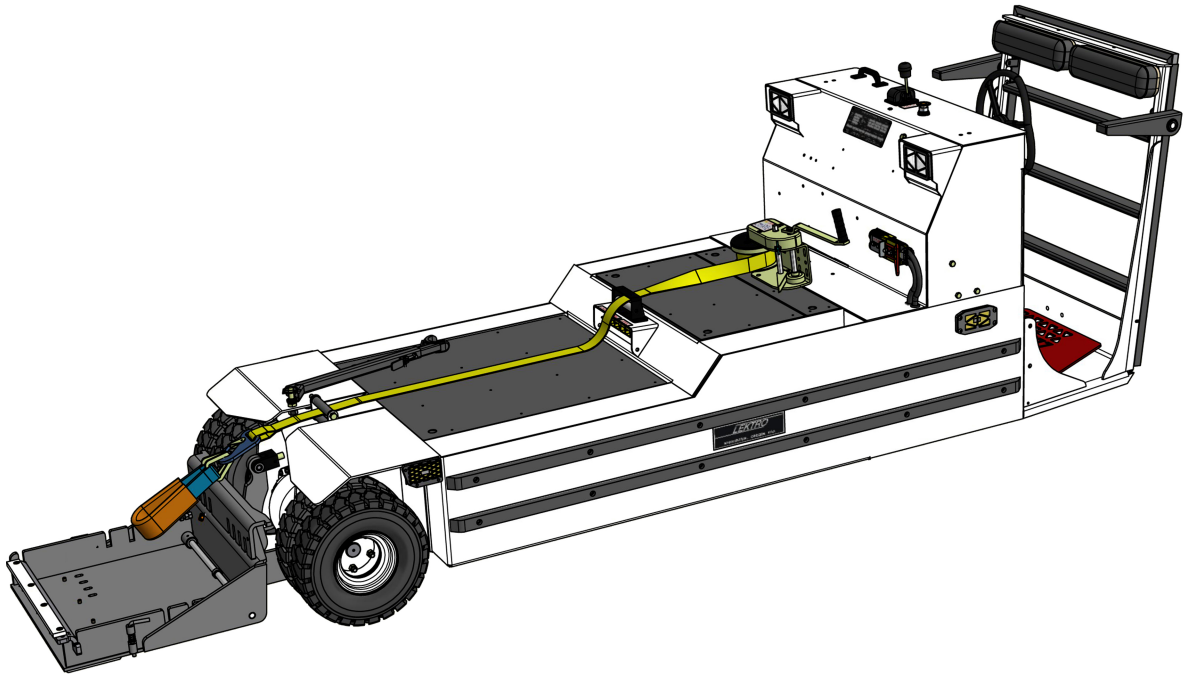
2.6 8600A-M

The LEKTRO 8600A-M is designed to tow aircraft up to 30,000 lbs/13,608 kg.



2.6.1 FEATURES

- **Vehicle Drive:** 11.8 HP/8.8 kW, 36 VDC traction motor mated with a Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Six 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in independent 12/24/28 VDC / 1374 CCA motive/GPU batteries. Independent 1175 CCA GPU battery and charging system is optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 120-230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, and aircraft selection system are optional.
- **Winch:** Two-speed manual winch. Winch and strut straps included. Hydraulic winch with automatic safety cutoff is optional.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake acting at the differential pinion shaft.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 4.80/4.00 x 8 8-ply pneumatic highway tread. Traction tread, poly foam, tire socks, and chains are optional.

- **Steer Tires:** Dual 4.80/4.00 x 8 6-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.
- **Lighting:** Dual built-in forward and aft LED headlights and five flashing amber LED running lights. Brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

2.6.2 SPECIFICATIONS

- **Length:** ..... 151.4 in / 384.6 cm
- **Width:** ..... 42.6 in / 108.3 cm
- **Height (at lowest steering tilt setting):** ..... 48.8 in / 123.9 cm
- **Turning Radius:** ..... 127.5 in / 323.9 cm
- **Wheelbase:** ..... 79.2 in / 201.1 cm
- **Vehicle Speed (empty):** ..... 5.9 MPH / 9.4 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 3.5 MPH / 5.7 KPH
- **Lift Cradle Capacity:** ..... 3,000 LBS / 1361 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.0 in / 23.0 cm
- **Ground Clearance:** ..... 3.5 in / 9.0 cm
- **Shipping Weight (w/ motive batteries & charger):** ..... 2,750 LBS / 1247 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using a 14 in / 36 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 18.5 in / 47 cm from the drive tire center line.

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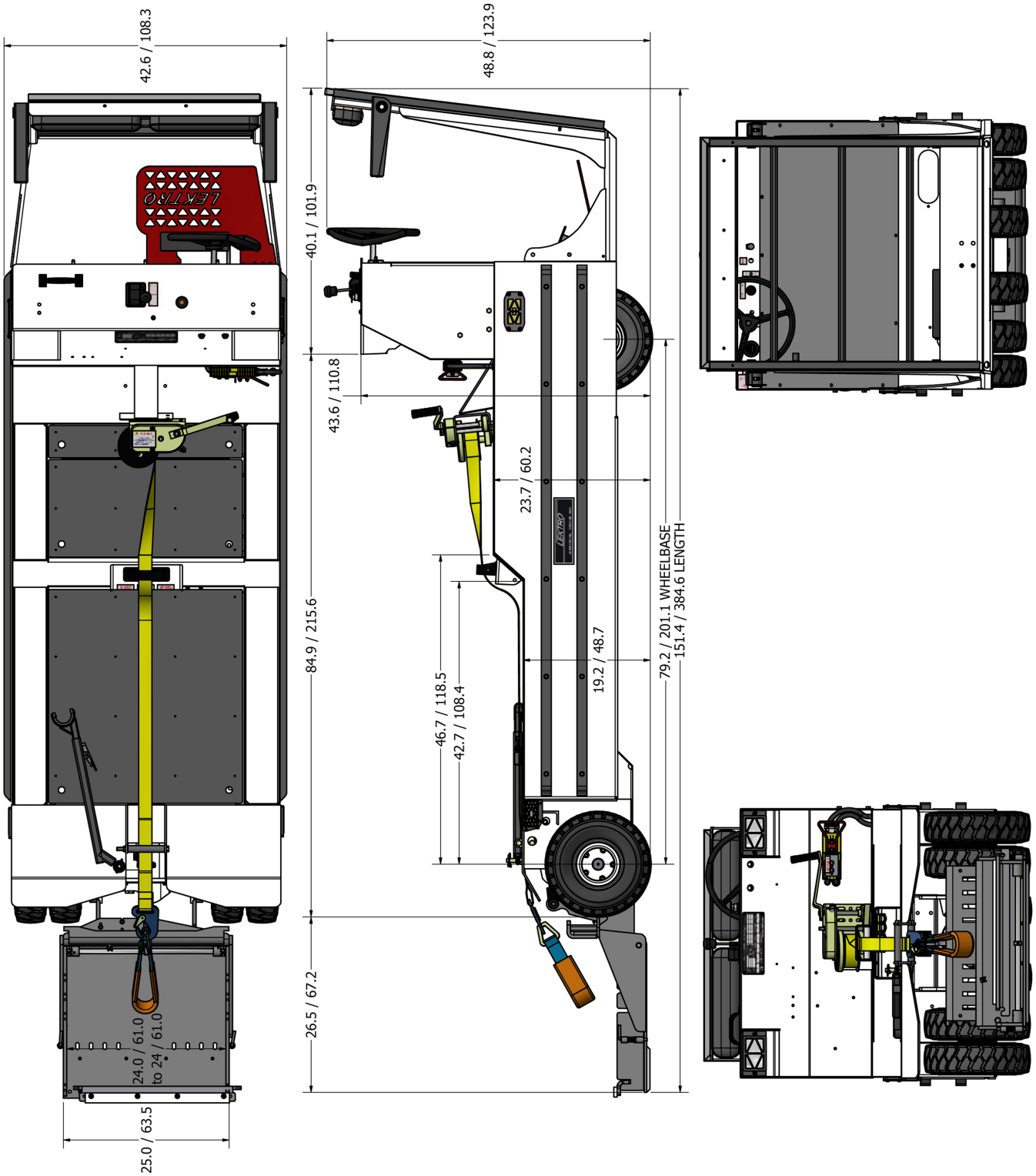
2.6.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8600A-M tractor.



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CHAPTER 3

87 SPECIFICATIONS

This chapter provides the specifications for the following selected LEKTRO 87 Series tractors:

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3.1 87 SERIES MODELS

This chapter lists the specifications for the following models in the LEKTRO 87 Series of aircraft tractors. See the following sections:

Note

The illustrations in this section may show some optional equipment.

Note

LEKTRO reserves the right to change these specification at any time without notice or obligation.

Note

LEKTRO 86/87 Series aircraft tractors are protected by U.S. patent numbers 5,151,033 / 5,302,075 / 9,067,691. Additional patents are pending.

LEKTRO OFFERS ADDITIONAL 87 SERIES TRACTORS FOR GENERAL, AIRLINE, AND MILITARY USE THAT ARE NOT DESCRIBED IN THIS MANUAL.

PLEASE CONTACT LEKTRO FOR DETAILS.

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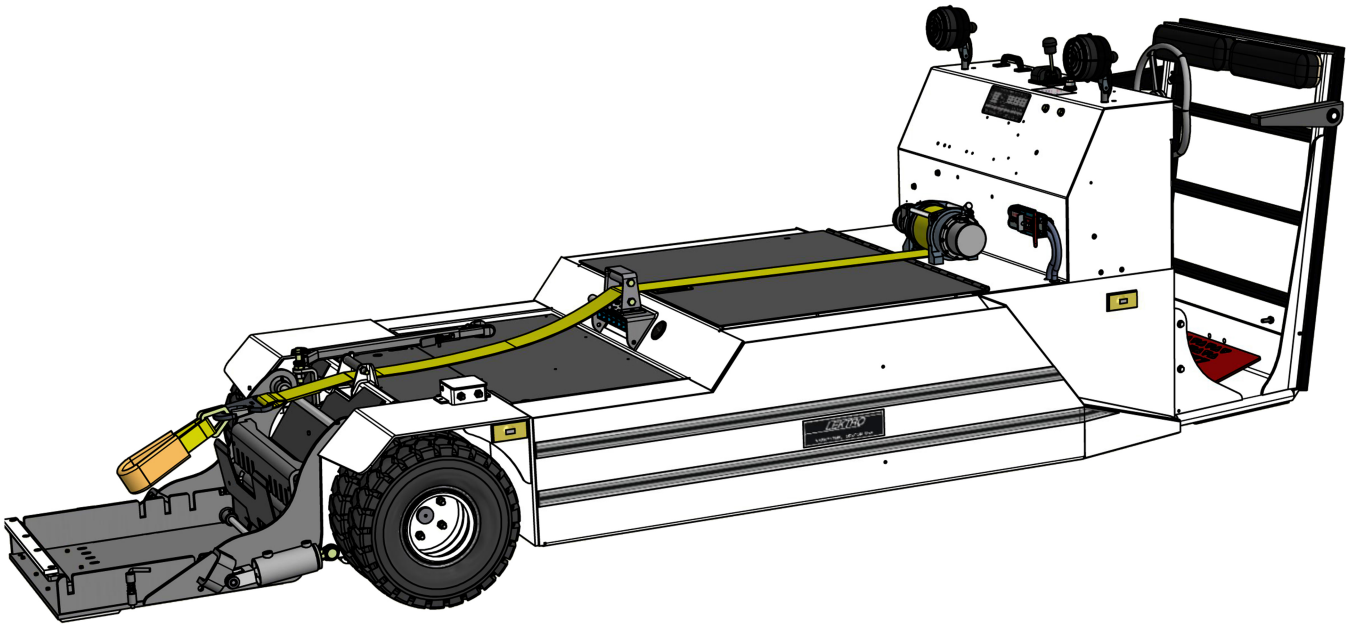
3.2 8700C

The LEKTRO 8700C is designed to tow aircraft up to 55,000 lbs/24,948 kg.



3.2.1 FEATURES

- **Vehicle Drive:** 30.9 HP/23.1 kW, 48 VDC traction motor mated with an Auburn/Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Eight 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in 12/24/28 VDC / 1374 CCA motive/GPU batteries, optional. Independent 1175 CCA GPU battery and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 50 AMP DC / 230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, patented torque-sensing turntable, and aircraft selection system are optional.
- **Winch:** Hydraulic winch with automatic safety cutoff. Winch and strut straps included.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake at each drive wheel.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 5.00 x 8 10-ply pneumatic traction tread. Poly foam, tire socks, and chains are optional.
- **Steer Tires:** Dual 5.00 x 8 8-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.

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- **Lighting:** Dual 360-degree rotating spotlights mounted on cowl. One rear LED spotlight mounted on operator platform. Four flashing amber LED running lights. Brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

3.2.2 SPECIFICATIONS

- **Length:** ..... 159.7 in / 405.8 cm
- **Width:** ..... 54.5 in / 138.4 cm
- **Height (at lowest steering tilt setting):** ..... 49.9 in / 126.6 cm
- **Turning Radius:** ..... 139.0 in / 353 cm
- **Wheelbase:** ..... 81.1 in / 205.9 cm
- **Vehicle Speed (empty):** ..... 7.0 MPH / 11.2 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 3.0 MPH / 4.8 KPH
- **Lift Cradle Capacity:** ..... 5,500 LBS / 2495 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.0 in / 23.0 cm
- **Ground Clearance:** ..... 5.0 in / 12.7 cm
- **Shipping Weight (w/o batteries & charger):** ..... 2,970 LBS / 1347 KG
- **Shipping Weight (w/ motive batteries & charger):** ..... 4,250 LBS / 1928 KG
- **Shipping Weight (w/o motive & GPU batteries & charger):** ..... 4,650 LBS / 2109 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using an 18 in / 46 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 20.5 in / 52 cm from the drive tire center line.

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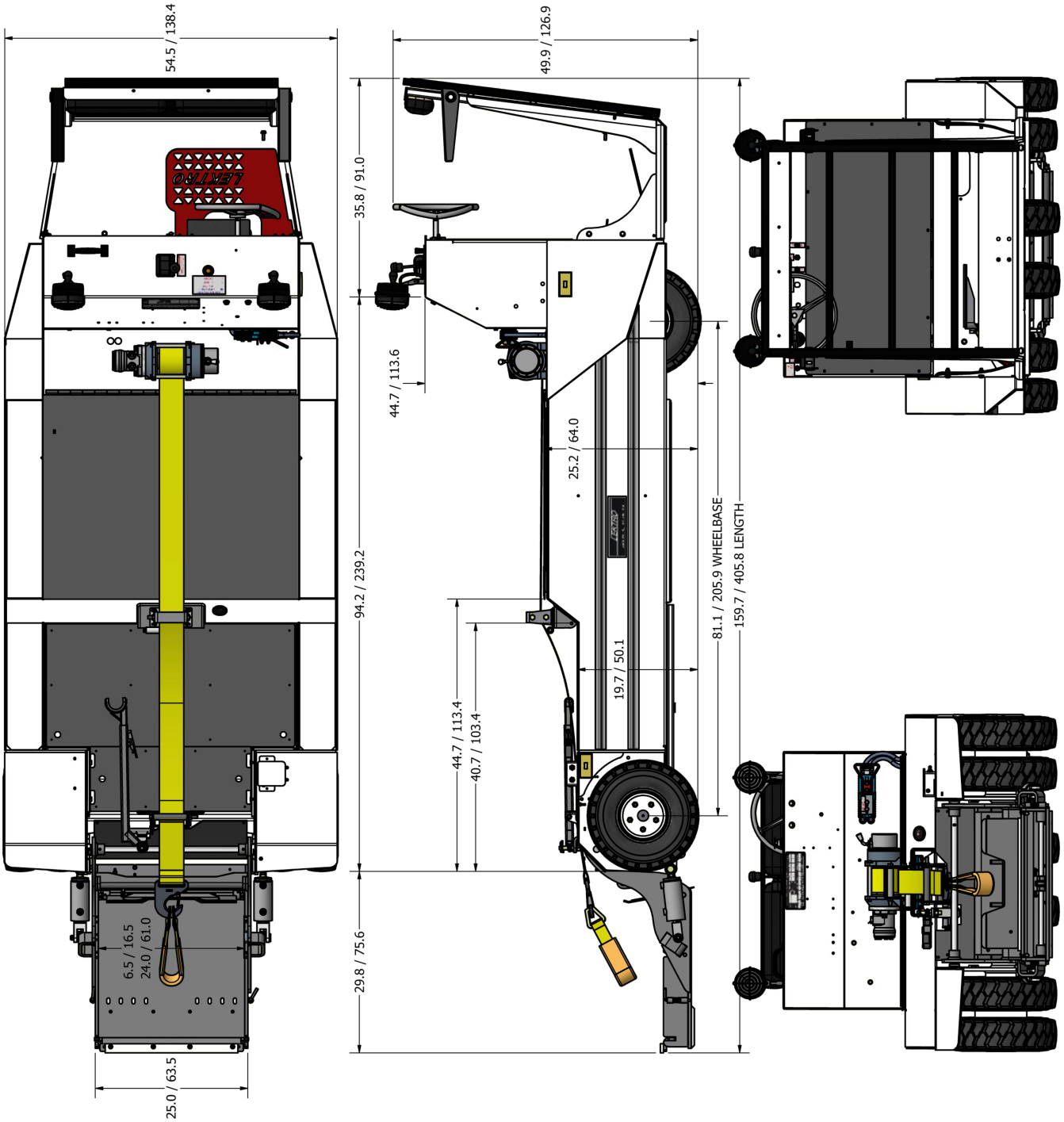
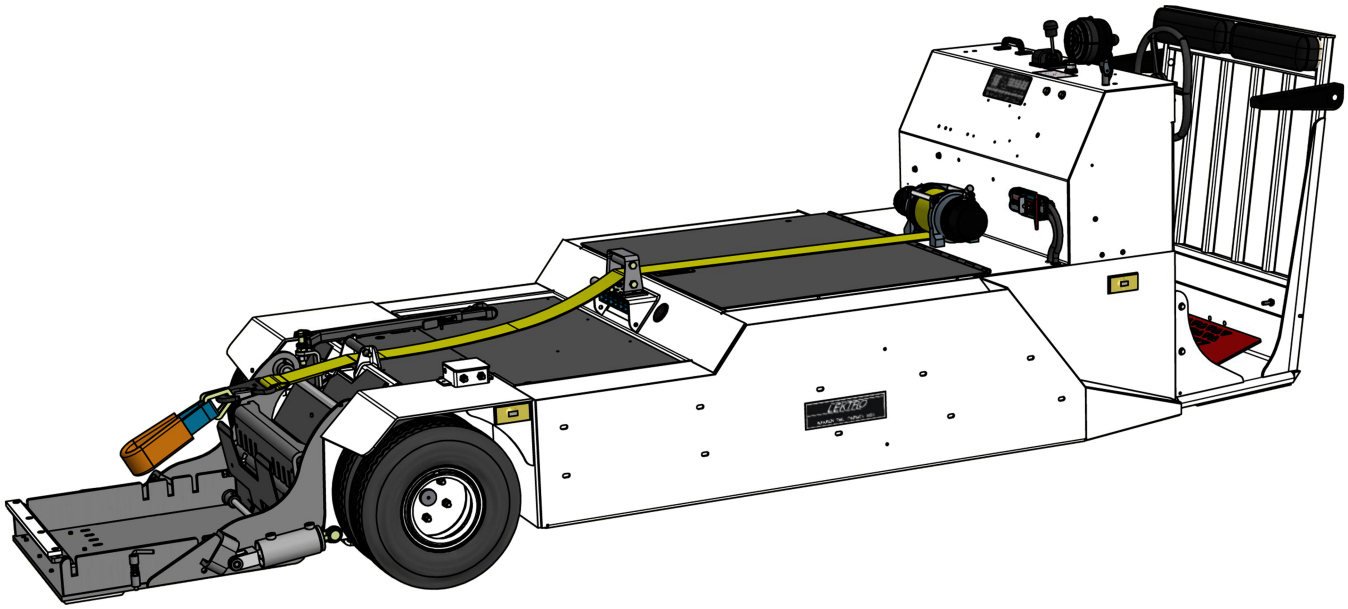
3.2.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8700C tractor.



3.3 8700C-EZ

The LEKTRO 8700C-EZ is designed to tow aircraft up to 55,000 lbs/24,948 kg.



3.3.1 FEATURES

- **Vehicle Drive:** 30.9 HP/23.1 kW, 48 VDC traction motor mated with an Auburn/Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Eight 6 VDC, 328 AMP-HR batteries (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in 12/24/28 VDC / 1374 CCA motive/GPU batteries, optional. Independent 12/24/28 VDC / 1175 CCA GPU battery and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 50 AMP DC / 230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, patented torque-sensing turntable, and aircraft selection system are optional.
- **Winch:** Hydraulic winch with automatic safety cutoff. Winch and strut straps included.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake at each drive wheel.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 5.00 x 8 8-ply pneumatic highway tread. Traction tread, poly foam, tire socks, and chains are optional.
- **Steer Tires:** Dual 5.00 x 8 8-ply pneumatic highway tread. Poly foam and steer axle suspension are optional.

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- **Lighting:** Single 360-degree rotating spotlight mounted on cowl and five amber reflectors. Second spotlight, rear LED spotlight, four flashing amber LED running lights, and brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest is optional.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

3.3.2 SPECIFICATIONS

- **Length:** ..... 158.2 in / 401.9 cm
- **Width:** ..... 54.5 in / 138.4 cm
- **Height (at lowest steering tilt setting):** ..... 49.9 in / 126.6 cm
- **Turning Radius:** ..... 139.0 in / 353.0 cm
- **Wheelbase:** ..... 81.1 in / 205.9 cm
- **Vehicle Speed (empty):** ..... 7.0 MPH / 11.2 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 3.0 MPH / 4.8 KPH
- **Lift Cradle Capacity:** ..... 5,500 LBS / 2495 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.0 in / 23.0 cm
- **Ground Clearance:** ..... 5.0 in / 12.7 cm
- **Shipping Weight (w/o batteries & charger):** ..... 2,970 LBS / 1347 KG
- **Shipping Weight (w/ motive batteries & charger):** ..... 4,250 LBS / 1928 KG
- **Shipping Weight (w/o motive & GPU batteries & charger):** ..... 4,600 LBS / 2087 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using an 18 in / 46 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 20.5 in / 52 cm from the drive tire center line.

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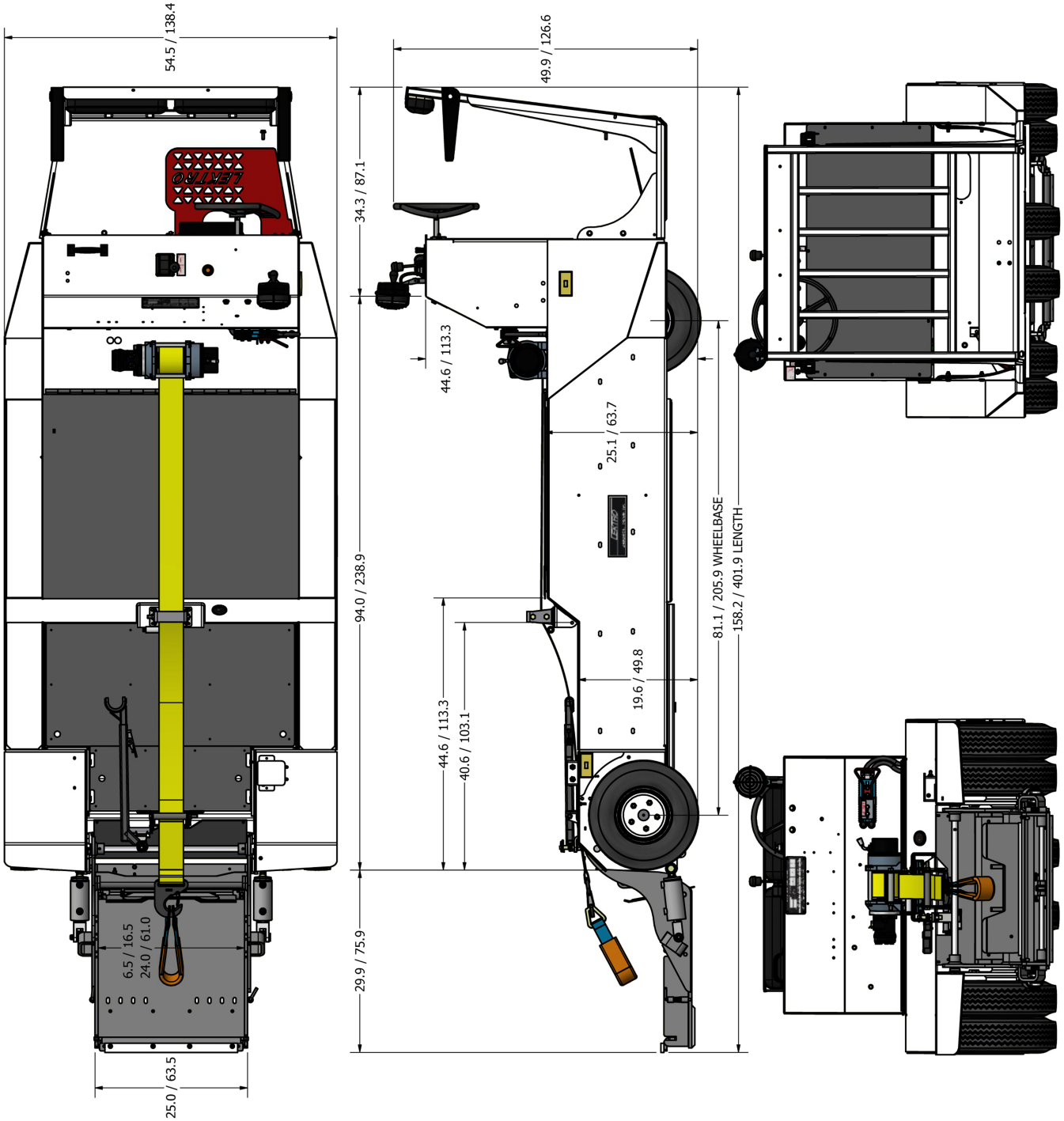
3.3.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8700C-EZ tractor.



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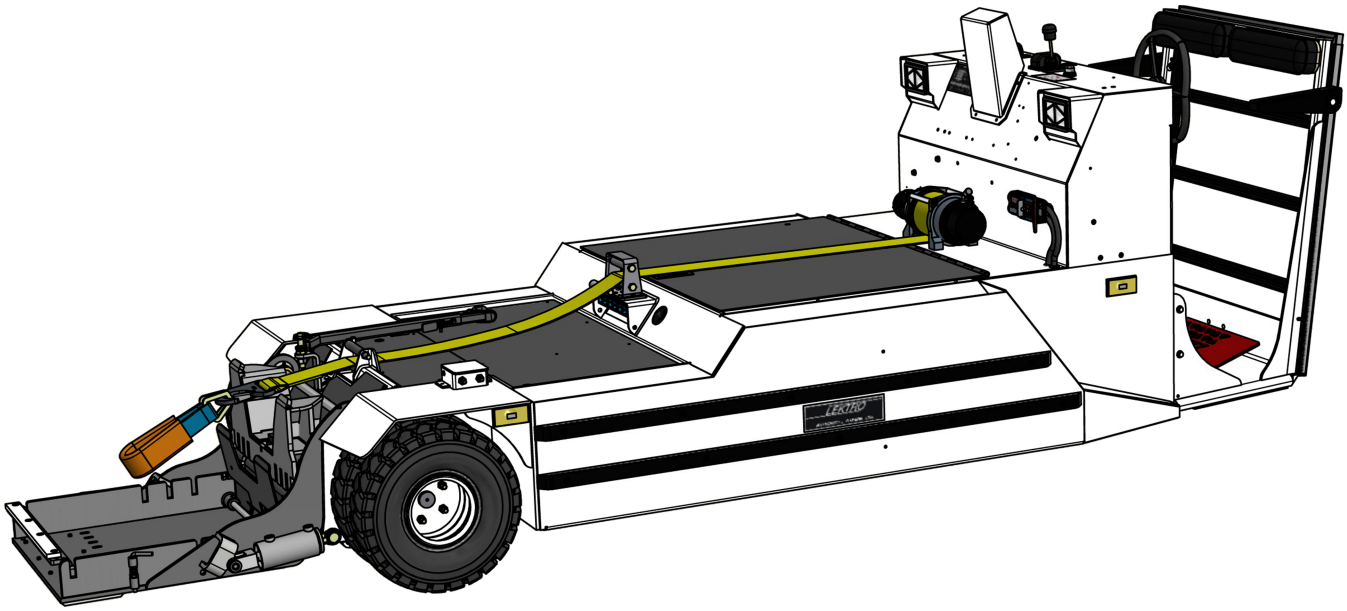
3.4 8700C-ALM

The LEKTRO 8700C-ALM is designed to tow aircraft up to 80,000 lbs/36,287 kg.



3.4.1 FEATURES

- **Vehicle Drive:** 33.1 HP/24.8 kW, 72 VDC traction motor mated with an Auburn/Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** 72 VDC industrial, 275 AMP-HR battery (6-hour rate), with single-point watering system. 375 AH is optional.
- **GPU:** Built-in 12/24/28 VDC / 1175 CCA GPU battery and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 50 AMP DC / 230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, patented torque-sensing turntable, and aircraft selection system are optional.
- **Winch:** Hydraulic winch with automatic safety cutoff. Winch and strut straps included.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake at each drive wheel.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 5.00 x 8 10-ply poly foam-filled pneumatic traction tread. Tire socks and chains are optional.
- **Steer Tires:** Dual 5.00 x 8 10-ply poly foam-filled pneumatic traction tread. Steer axle suspension is optional.
- **Lighting:** Dual built-in forward and aft LED headlights and five flashing amber LED running lights. Brake/turn signal lights are optional.

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- **Extension Ladder:** Step ladder attached to the operator back rest.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

3.4.2 SPECIFICATIONS

- **Length:** ..... 159.9 in / 406.2 cm
- **Width:** ..... 56.5 in / 143.4 cm
- **Height (at lowest steering tilt setting):** ..... 50.0 in / 126.9 cm
- **Turning Radius:** ..... 139.0 in / 353.0 cm
- **Wheelbase:** ..... 81.1 in / 205.9 cm
- **Vehicle Speed (empty):** ..... 8.0 MPH / 12.6 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 3.5 MPH / 5.6 KPH
- **Lift Cradle Capacity:** ..... 8,000 LBS / 3629 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.75 in / 24.8 cm
- **Ground Clearance:** ..... 5.0 in / 12.7 cm
- **Shipping Weight (w/o batteries & charger):** ..... 2,970 LBS / 1347 KG
- **Shipping Weight (w/ motive batteries & charger):** ..... 5,300 LBS / 2404 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using an 18 in / 46 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 20.5 in / 52 cm from the drive tire center line.

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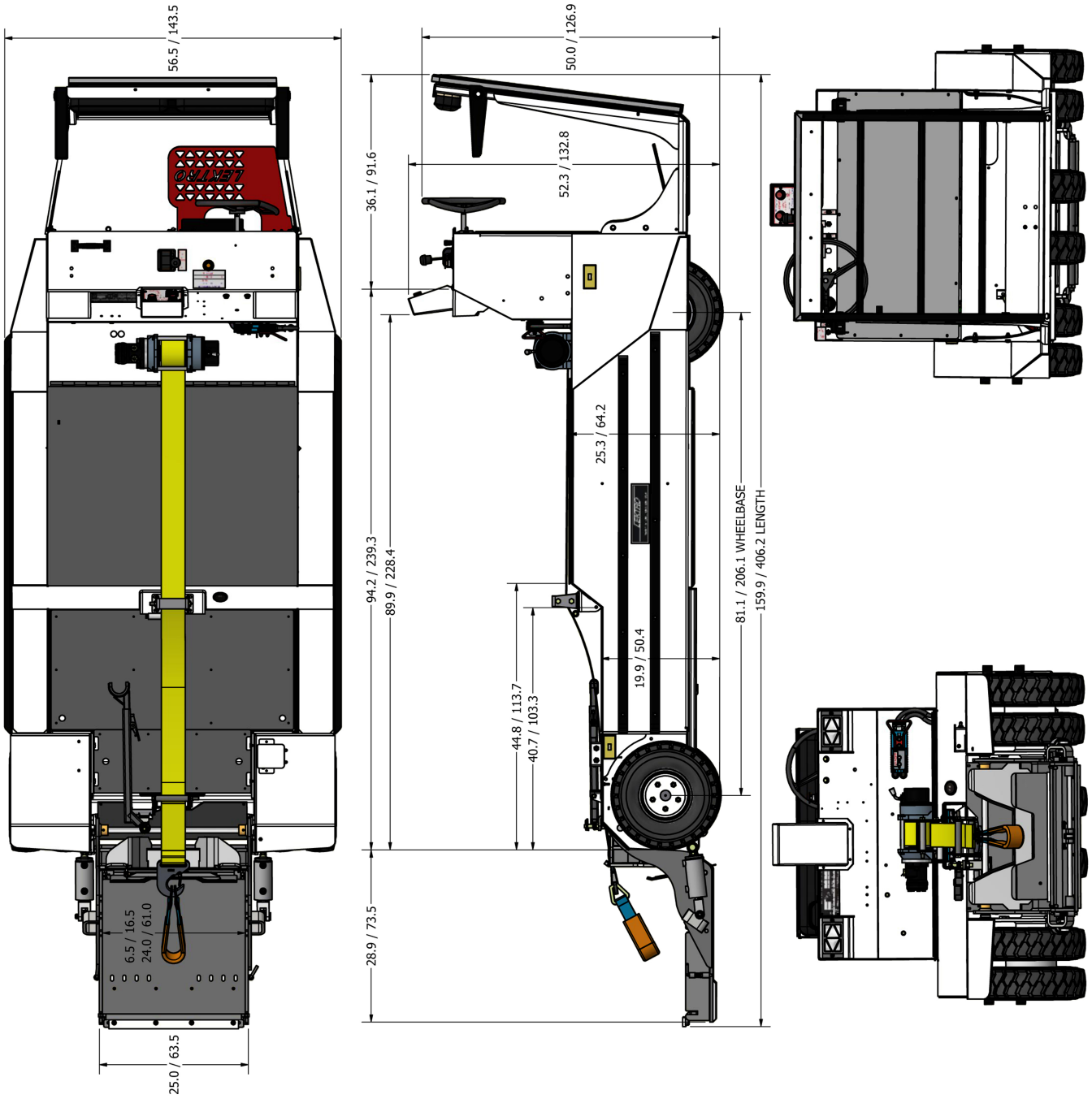
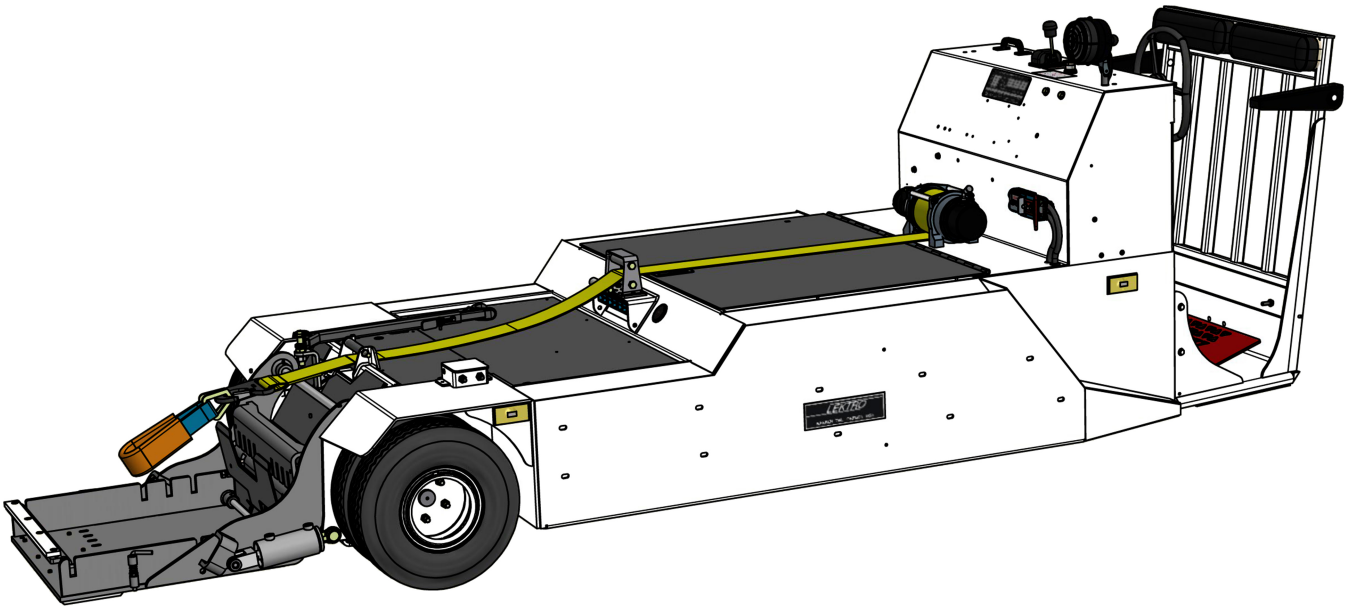
3.4.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8700C-ALM tractor.



3.5 8750C-EZ

The LEKTRO 8750C-EZ is designed to tow aircraft up to 70,000 lbs/31,752 kg.



3.5.1 FEATURES

- **Vehicle Drive:** 33.1 HP/24.8 kW, 72 VDC traction motor mated with an Auburn/Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Twelve 6 VDC / 328 AMP-HR battery (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in 12/24/28 VDC / 1374 CCA motive/GPU batteries are optional. Independent 12/24/28 VDC / 1175 CCA GPU battery and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, patented torque-sensing turntable, and aircraft selection system are optional.
- **Winch:** Hydraulic winch with automatic safety cutoff. Winch and strut straps included.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake at each drive wheel.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 5.00 x 8 8-pneumatic highway tread. Traction tread, poly foam, tire socks and chains are optional.

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- **Steer Tires:** Dual 5.00 x 8 10-ply poly foam-filled pneumatic traction tread. Poly foam and steer axle suspension are optional.
- **Lighting:** Single 360-degree rotating spotlight mounted on the cowl and five amber reflectors. Second LED spotlight, rear LED spotlight, four flashing amber LED running lights, and brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest is optional.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

3.5.2 SPECIFICATIONS

- **Length:** .....158.2 in / 401.9 cm
- **Width:** .....54.5 in / 138.4 cm
- **Height (at lowest steering tilt setting):** .....49.9 in / 126.6 cm
- **Turning Radius:** .....139.0 in / 353.0 cm
- **Wheelbase:** .....81.1 in / 205.9 cm
- **Vehicle Speed (empty):** .....8.0 MPH / 12.6 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** .....3.5 MPH / 5.6 KPH
- **Lift Cradle Capacity:** .....7,000 LBS / 3175 KG**
- **Nose Gear Cradle Lifting Height:** .....9.0 in / 23.0 cm
- **Ground Clearance:** .....5.0 in / 12.7 cm
- **Shipping Weight (w/o batteries & charger):** ..... 3,240 LBS / 1470 KG
- **Shipping Weight (w/ motive batteries & charger):** ..... 4,705 LBS / 2134 KG
- **Shipping Weight (w/o motive & GPU batteries & charger):** ..... 5,505 LBS / 2293 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using an 18 in / 46 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 20.5 in / 52 cm from the drive tire center line.

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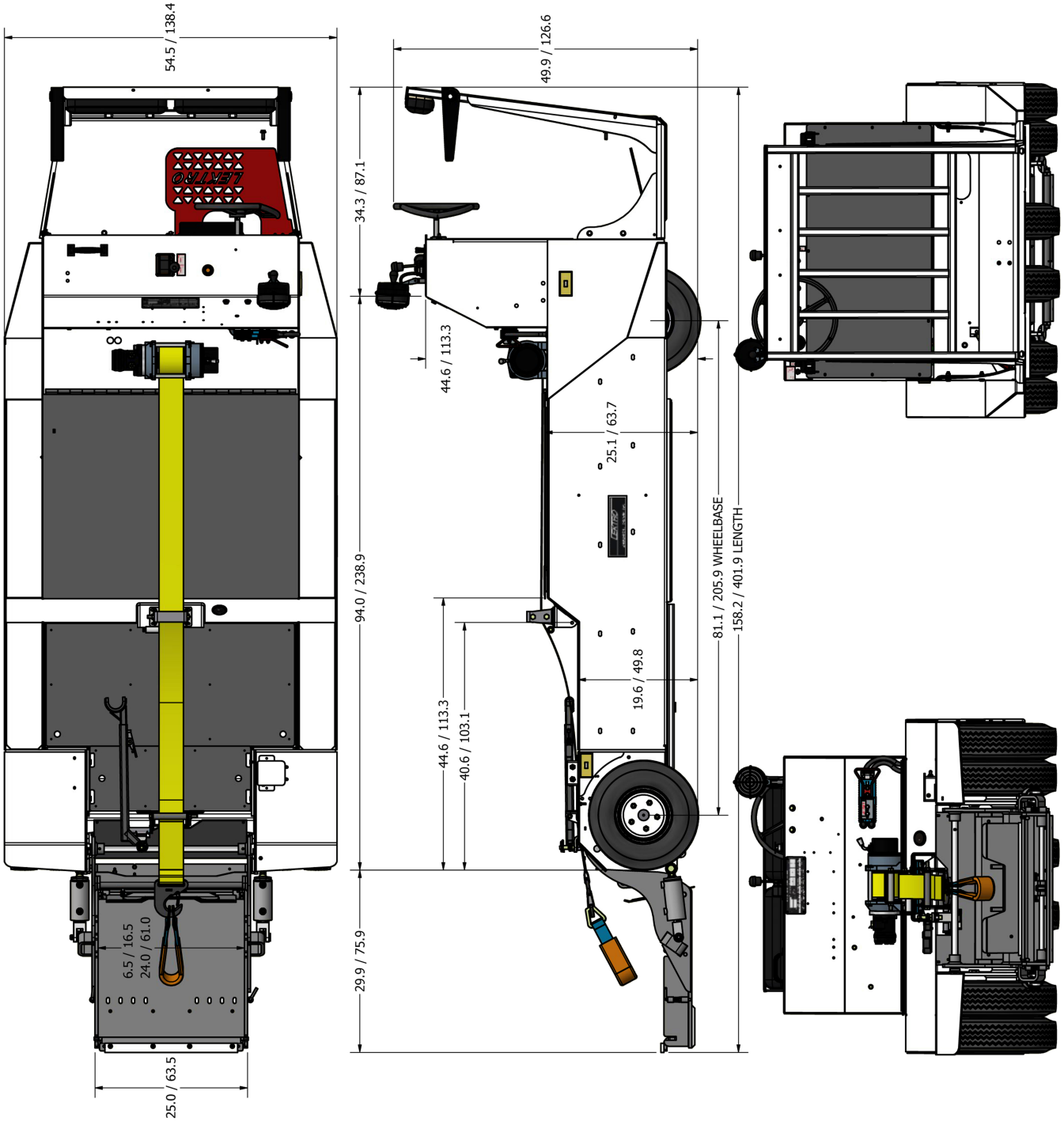
3.5.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8750C-EZ tractor.



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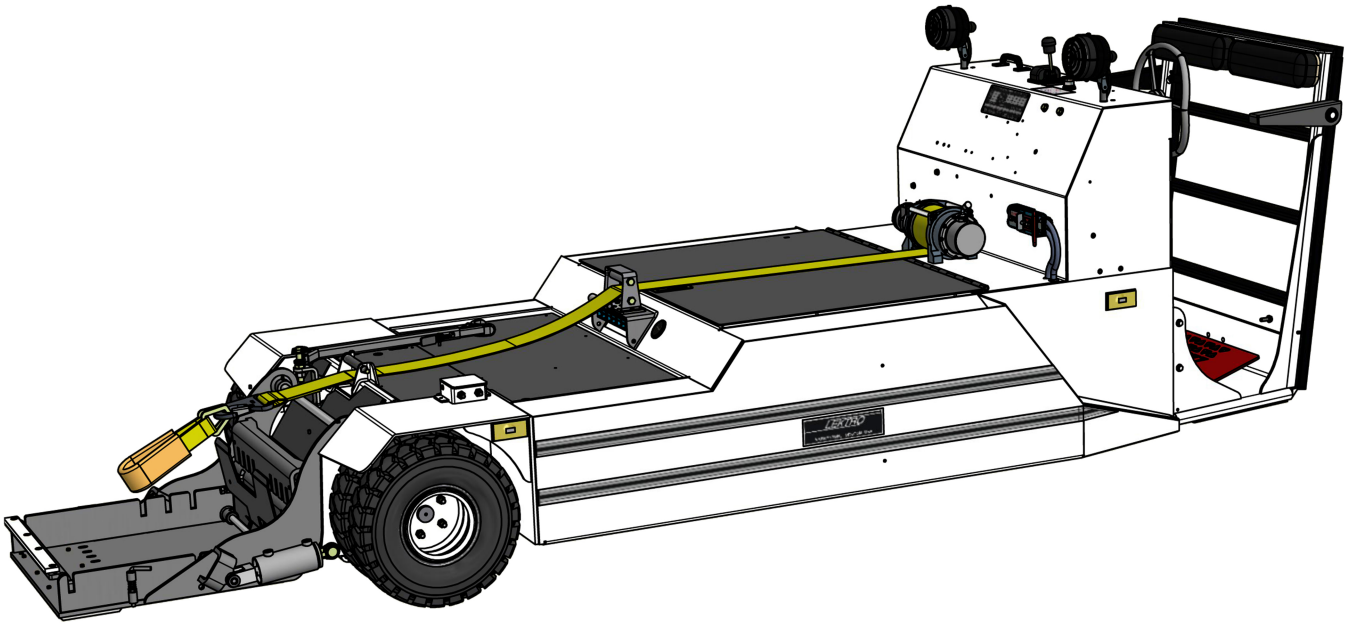
3.6 8750C

The LEKTRO 8750C is designed to tow aircraft up to 70,000 lbs/31,752 kg.



3.6.1 FEATURES

- **Vehicle Drive:** 33.1 HP/24.8 kW, 72 VDC traction motor mated with an Auburn/Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** Twelve 6 VDC / 328 AMP-HR battery (6-hour rate), wired in series. Single-point watering system is optional.
- **GPU:** Built-in 12/24/28 VDC / 1374 CCA motive/GPU batteries. Independent 12/24/28 VDC / 1175 CCA GPU batteries and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 40 AMP DC / 230 VAC / 50-60 Hz / 1-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, patented torque-sensing turntable, and aircraft selection system are optional.
- **Winch:** Hydraulic winch with automatic safety cutoff. Winch and strut straps included.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake at each drive wheel.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 5.00 x 8 10-ply pneumatic traction tread. Poly foam, tire socks, and chains are optional.
- **Steer Tires:** Dual 5.00 x 8 10-ply pneumatic traction tread. Poly foam and steer axle suspension are optional.

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- **Lighting:** Dual 360-degree rotating spotlights mounted on the cowl, one rear LED spotlight, four flashing amber LED running lights. Brake/turn signal lights are optional.
- **Extension Ladder:** Step ladder attached to the operator back rest.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

3.6.2 SPECIFICATIONS

- **Length:** ..... 159.7 in / 405.8 cm
- **Width:** ..... 54.5 in / 138.4 cm
- **Height (at lowest steering tilt setting):** ..... 49.9 in / 126.6 cm
- **Turning Radius:** ..... 139.0 in / 353.0 cm
- **Wheelbase:** ..... 81.1 in / 205.9 cm
- **Vehicle Speed (empty):** ..... 6.0 MPH / 9.6 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 3.3 MPH / 5.4 KPH
- **Lift Cradle Capacity:** ..... 7,000 LBS / 3175 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.0 in / 23.0 cm
- **Ground Clearance:** ..... 5.0 in / 12.7 cm
- **Shipping Weight (w/o batteries & charger):** ..... 3,240 LBS / 1470 KG
- **Shipping Weight (w/ motive batteries & charger):** ..... 4,750 LBS / 2155 KG
- **Shipping Weight (w/o motive & GPU batteries & charger):** ..... 5,100 LBS / 2313 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

**Lift capacity is calculated using an 18 in / 46 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 20.5 in / 52 cm from the drive tire center line.

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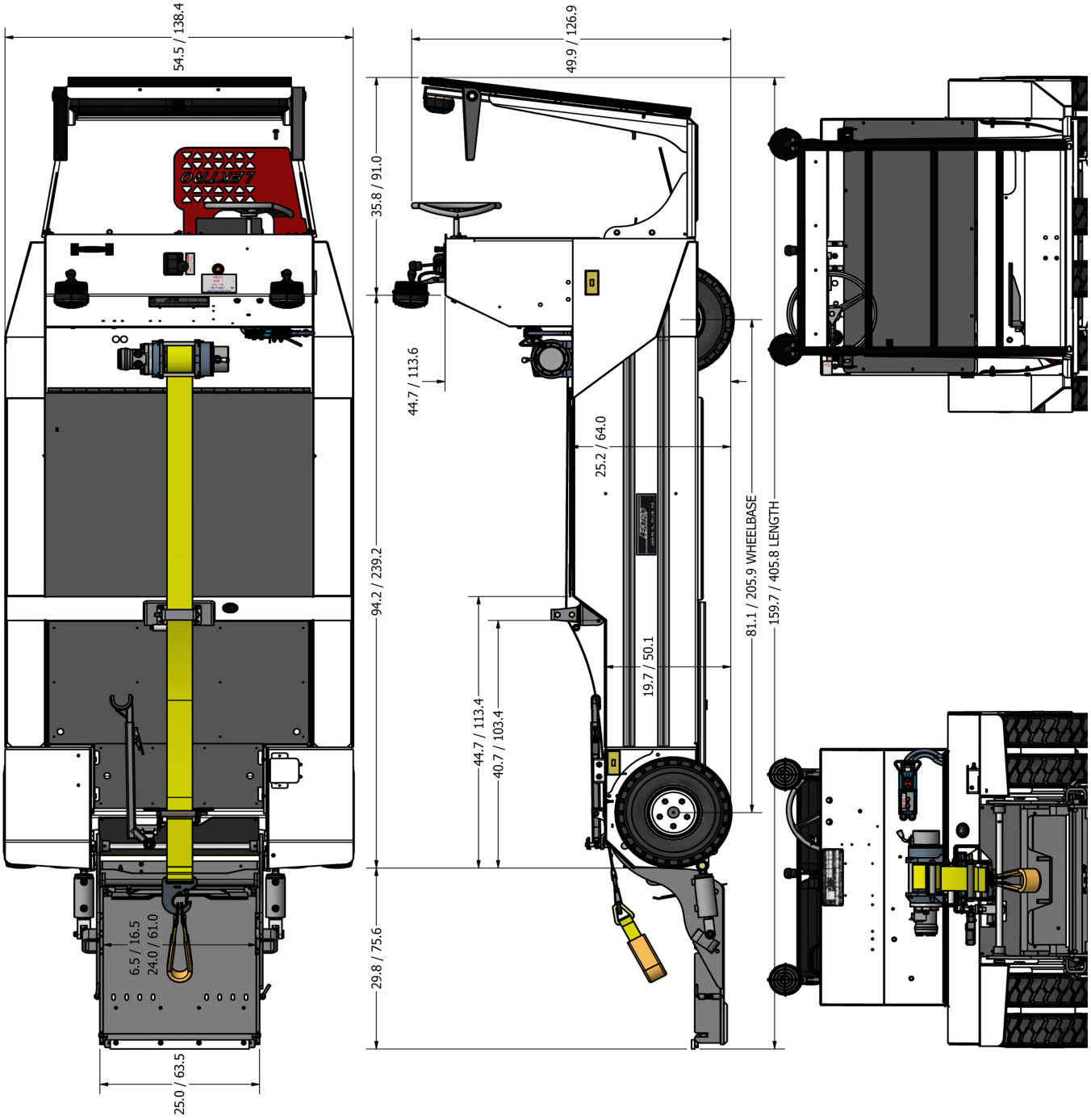
3.6.3 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8750C tractor.



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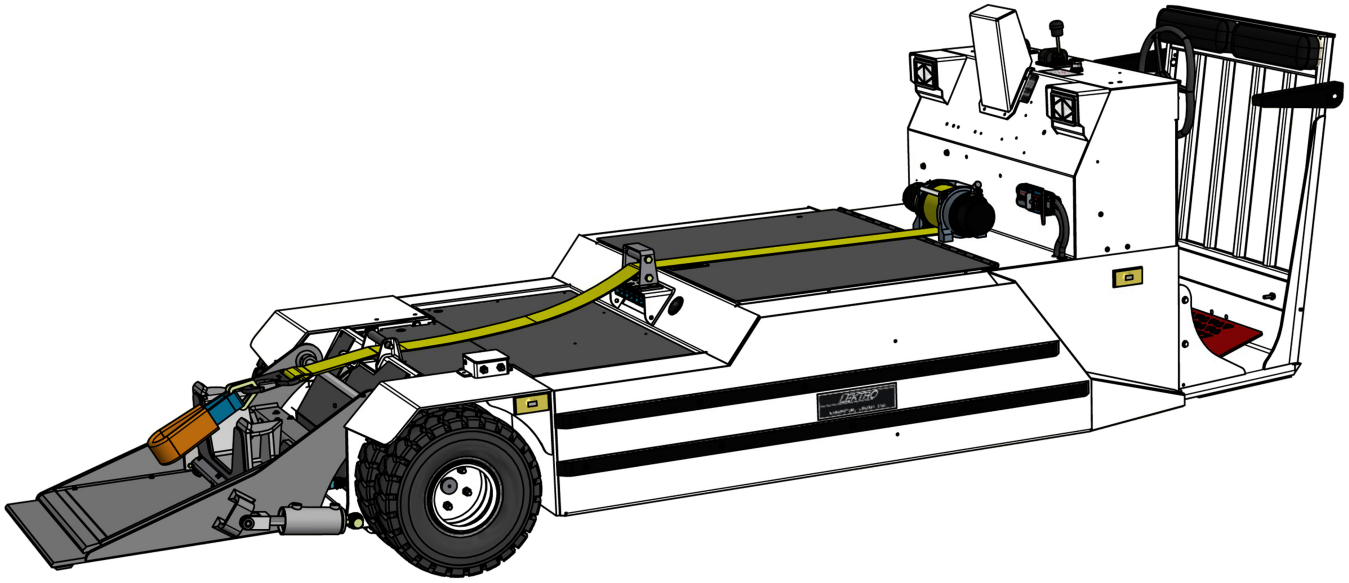
3.7 8750C-AL-700

The LEKTRO 8750C-AL-700 is designed to tow aircraft up to 80,000 lbs/36,287 kg.



3.7.1 FEATURES

- **Vehicle Drive:** 33.1 HP/24.8 kW, 72 VDC traction motor mated with an Auburn/Dana 44 differential. Limited-slip differential is optional.
- **Motor Speed Control:** EV100 with on-board diagnostics. Speed controlled by combination hand throttle/foot lever.
- **Batteries:** 72 VDC industrial, 275 AMP-HR battery (6-hour rate) with single-point watering system. 375 AH is optional.
- **GPU:** Built-in independent 12/24/28 VDC / 1175 CCA GPU batteries and charging system are optional.
- **Motive Battery Charger:** External fully-automatic 60 AMP DC / 208-480 VAC / 50-60 Hz / 3-PH charger.
- **Nose Gear Lift Cradle:** Patented lift cradle activated by an electric/hydraulic pump assembly capable of handling dual- and single-wheel aircraft. Hold-down adapter for light-nose aircraft, wheel fairing package, patented torque-sensing turntable, and aircraft selection system are optional.
- **Winch:** Hydraulic winch with automatic safety cutoff and fender-mounted controls. Winch and strut straps included.
- **Steering:** Automotive-type steering wheel coupled to a gearbox for very responsive steering action.
- **Service Brakes:** Foot-operated hydraulic disc brake at each drive wheel.
- **Parking Brake:** Hand/foot-activated electric dead man parking brake.
- **Drive Tires:** Dual 5.00 x 8 10-ply poly foam-filled pneumatic traction tread. Tire socks and chains are optional.
- **Steer Tires:** Dual 5.00 x 8 10-ply poly foam-filled pneumatic traction tread. Steer axle suspension is optional.

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- **Lighting:** Dual forward and aft LED headlights and five flashing amber LED running lights. Brake/turn signal lights are optional.
- **Operator Compartment:** Two-person configuration, stand-up operation with restraint.
- **Construction:** Welded steel plate and polymers preserved with primer and automotive high-gloss red or white enamel paint with protective polyurethane coating to prevent rust, scratches, and corrosion. Custom colors are optional.

3.7.2 SPECIFICATIONS

- **Length:** ..... 161.5 in / 410.1 cm
- **Width:** ..... 56.5 in / 143.5 cm
- **Height (at lowest steering tilt setting):** ..... 49.6 in / 126.1 cm
- **Turning Radius:** ..... 139.0 in / 353.0 cm
- **Wheelbase:** ..... 81.1 in / 205.9 cm
- **Vehicle Speed (empty):** ..... 8/0 MPH / 12.8 KPH
- **Vehicle Speed (loaded to max. vehicle capacity):** ..... 3.5 MPH / 5.6 KPH
- **Lift Cradle Capacity:** ..... 8,000 LBS / 3629 KG**
- **Nose Gear Cradle Lifting Height:** ..... 9.75 in / 24.8 cm
- **Ground Clearance:** ..... 5.0 in / 12.7 cm
- **Shipping Weight (w/o batteries & charger):** ..... 3,340 LBS / 1515 KG
- **Shipping Weight (w/ motive batteries & charger):** ..... 5,400 LBS / 2449 KG
- **Additional Options:** Draw bar pin, specialized aircraft towing adapters, and custom high-lift adapters (consult JBT LEKTRO, Inc.).

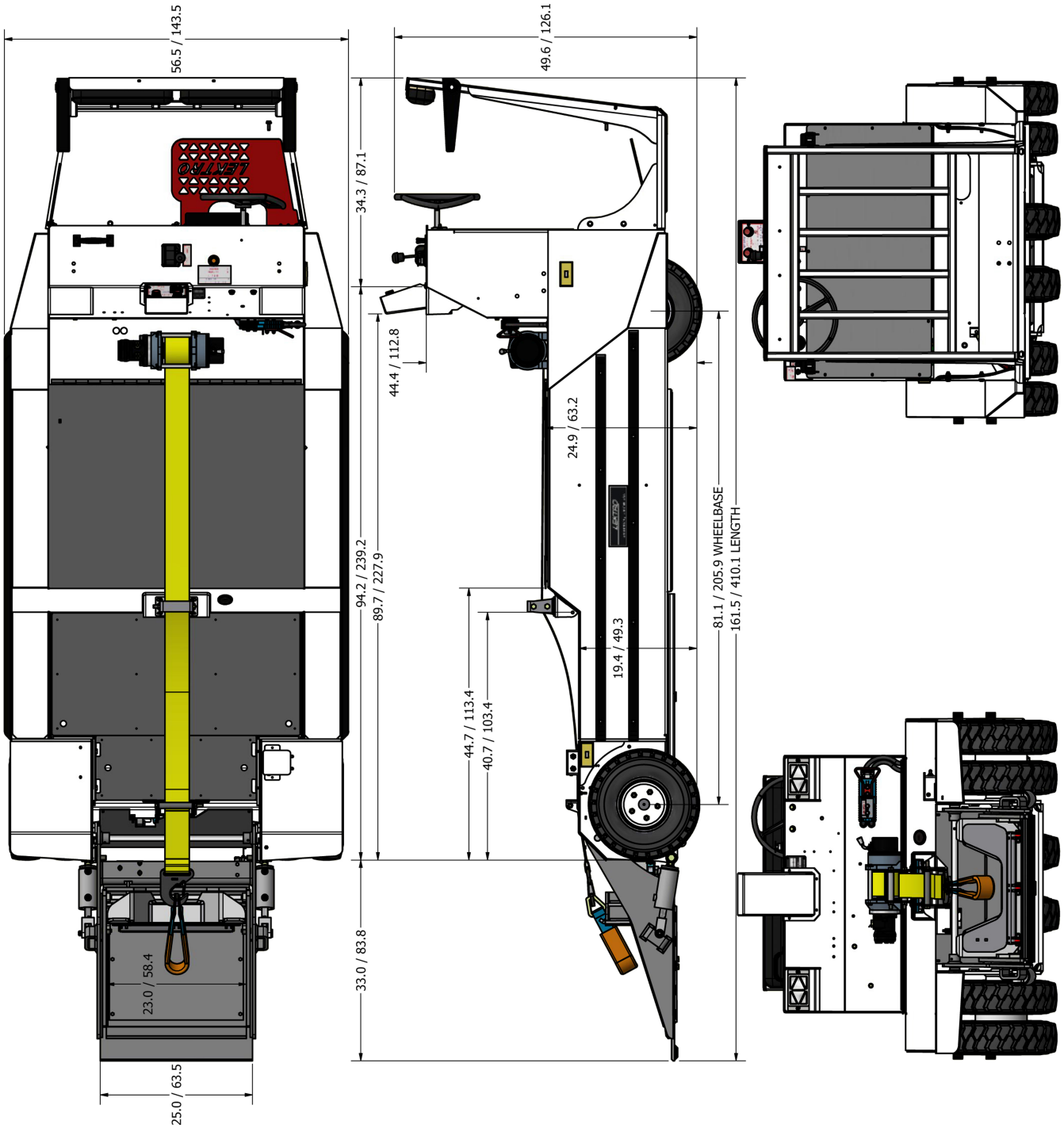
**Lift capacity is calculated using an 18 in / 46 cm diameter aircraft tire in the lift cradle, with the aircraft tire center line at 20.5 in / 52 cm from the drive tire center line.

3.7.3 BRAKE LIMITER

The 8750C-AL-700 includes a factory-preset brake Limiter System in order to meet the LEKTRO towbar-less aircraft OEM certification requirements of specific regional aircraft types, including the Bombardier CRJ-700 Regional Jet. These requirements are within but near the top end of the tractor's capacity range. Unlike the tow bar method, the LEKTRO 8750C-AL-700 uses aircraft nose weight as tractor mass, thereby applying more tractive and braking effort as aircraft weight increases. This also increases the maximum possible traction force on the aircraft nose landing gear. Specific aircraft in this heavier range require brake limiting to meet tested extreme-condition maximum deceleration certification criteria, and the 8750C-AL-700 tractor is thus certified for tow bar-less towing and pushback.

3.7.4 LAYOUT

This image displays the top, right side, front, and back of the LEKTRO 8750C-AL-700 tractor.



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CHAPTER 4

COMPONENTS & CONTROLS

This chapter describes the layout of the tractor, including the following components and controls:

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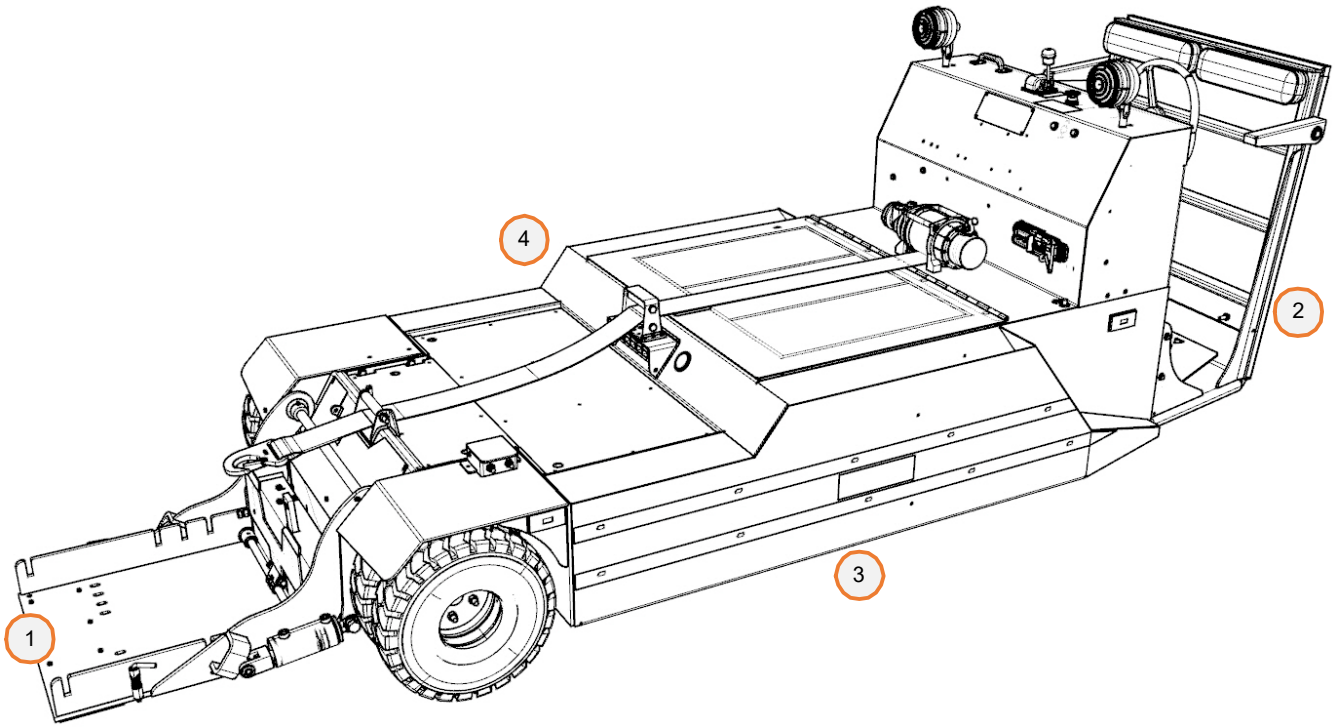
4.1 ORIENTATION

LEKTRO 86/87 Series aircraft tractors are oriented as shown here:



In this diagram:

- The Cradle and Winch are at the FRONT of the tractor (1).
- The Operator Compartment is at the REAR of the tractor (2).
- The LEFT (or “A”) side of the tractor is on the left as seen from the rear of the tractor (3).
- The RIGHT (or “B”) side of the tractor is on the right as seen from the rear of the tractor (4).
- Driving the tractor toward the Cradle and Winch is FORWARD.
- Driving the tractor away from the Cradle and Winch is REVERSE.

All instructions in this manual reflect this orientation.

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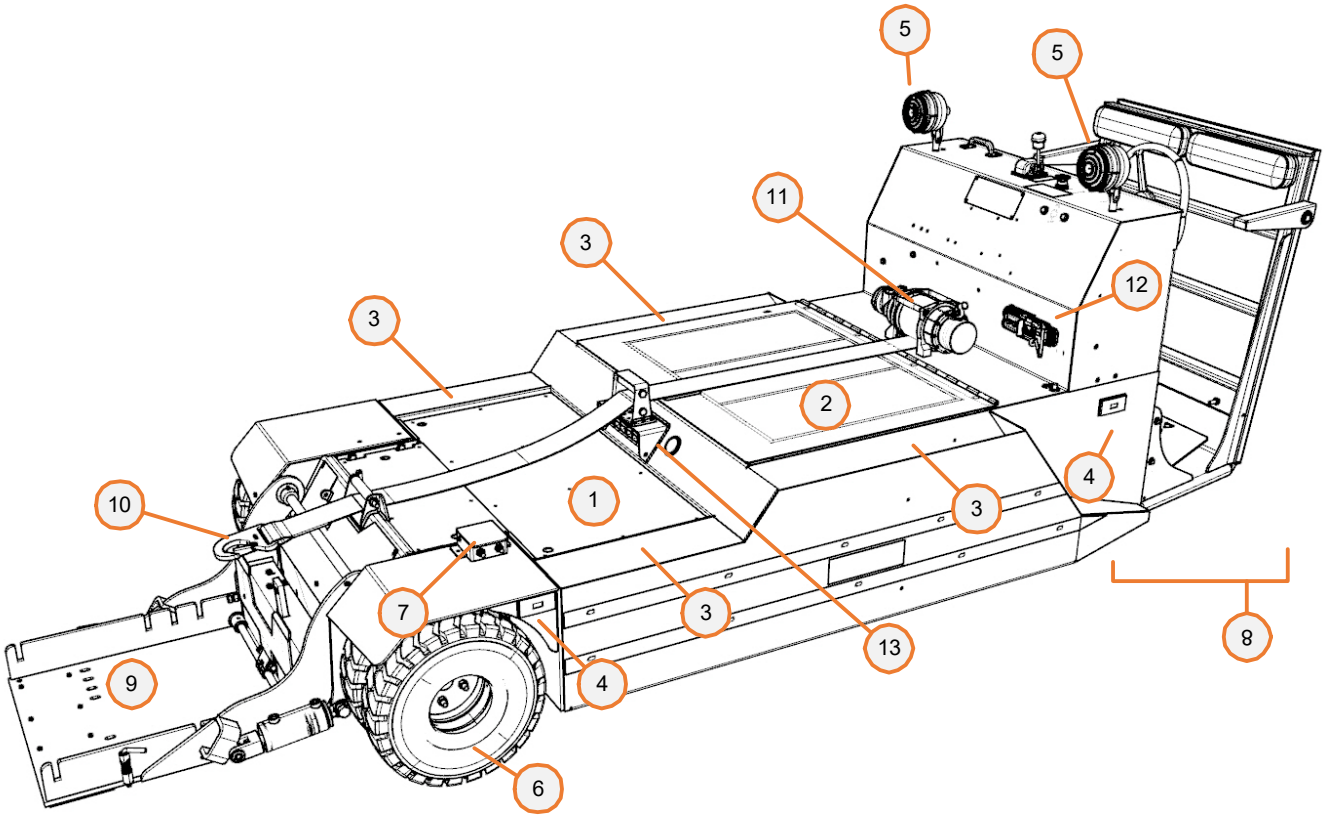
4.2 GENERAL LAYOUT

This section describes the general layout of your LEKTRO 86/87 Series aircraft tractor.

Note

The following illustrations may show optional equipment (87 shown).



The major components of the LEKTRO 86/87 Series tractor are:

- **Forward Deck Cover (1):** Covers the Forward Compartment, which contains the Drive Motor, Differential, Brakes, and other vehicle components. See *"FORWARD COMPARTMENT" on page 4-22*.
- **Battery Deck Cover (2):** Covers the Rear Compartment, which contains the Motive Batteries that power the Drive Motor, optional GPU Batteries, and other vehicle components. See *"REAR COMPARTMENT" on page 4-25*.

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- **Side Compartments (3):** These four (4) compartments store components, such as a removable Extended Rear Gate (see *"EXTENDED REAR GATE" on page 4-14*) or Front Gate (see *"FRONT GATE (STANDARD CRADLE)" on page 4-16*), chocks, and/or aircraft adapters.
- **Running & Parking Lights (4):** Used at night, during periods of low visibility, or in accordance with airport policy.
- **Spotlights (*5*; *if equipped*):** Used at night, during periods of low visibility, or in accordance with airport policy. Spotlights are typically mounted on non-airline tractors that do not have "AL" in the model name, such as the 8600A or 8700C-EZ, but can be equipped on any 86/87 Series tractor.
- **Headlights (*not shown*; *if equipped*):** Used at night, during periods of low visibility, or in accordance with airport policy. Headlights are typically mounted on airline tractors with "AL" in the model name, such as the 8750C-AL-700, but can be equipped on any 86/87 Series tractor.
- **Drive Wheels (6):** Transmit power from the Drive Motor and Differential to the tarmac to move the vehicle.
- **GPU VDC Outlets (7; *if equipped*):** Provide 12, 24, or 48 VDC ground power to aircraft.
- **Steer Wheels (*not shown*):** Turn the vehicle. The dual Steer Wheels are located under the Control Console, which is part of the Operator Compartment.
- **Operator Compartment (8):** Contains one operator and one passenger station. See *"OPERATOR COMPARTMENT" on page 4-5*.
- **Cradle (9):** Holds the aircraft wheel.
- **Strut Strap (*not shown*):** Secures the aircraft wheel or strut to the tractor. Includes a protective sleeve.
- **Winch Strap and Hook (10):** Winches the aircraft onto the Cradle and hooks onto the Strut Strap.
- **Winch (11):** Manual or hydraulic winch motor used to pull the aircraft nose landing gear on to the Cradle. See *"WINCH ASSEMBLY" on page 4-17*.
- **Main Power Disconnect (12):** Manual disconnect system for emergency or repair-related safety purposes. Also allows Motive Battery charging. See *"MAIN POWER DISCONNECT" on page 4-10*.
- **GPU Connections and GPU Battery Gauge (13; *if equipped*):** The GPU connections provide 12, 24, or 28 volt power to start aircraft engines, and the GPU Battery Gauge displays the level of charge of the GPU Batteries. See *"OPTIONAL GPU SYSTEM" on page 4-31*.

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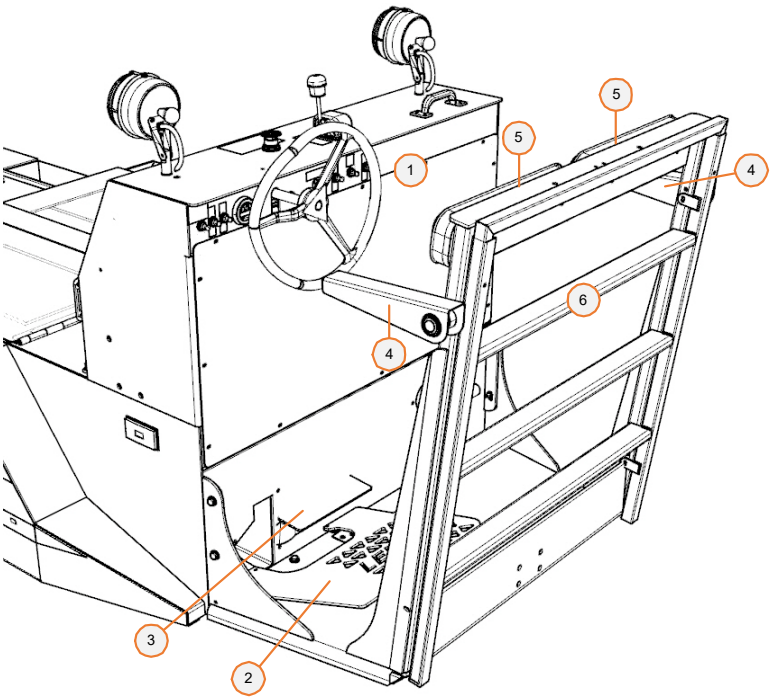
4.3 OPERATOR COMPARTMENT

The Operator Compartment is laid out as shown here. This area contains the following components and controls:



- **Control Console (1):** Holds the Instrument Panel, Steering Wheel, Main Power Disconnect Switch, Motor Control Lever, and Passenger Safety Handle. See *"CONTROL CONSOLE" on page 4-6*.
- **Dead Man Brake Pedal (2):** Applies or releases the Parking Brake and shuts off or activates power to the Drive Motor. See *"PARKING BRAKE" on page 4-26*.
- **Service Brake Pedal (3):** Applies the brake. Depressing the pedal further applies the brake more strongly.
- **Arm Rests (4):** Help restrain the operator and passenger in the Operator Compartment while enhancing comfort. See *"ARM RESTS" on page 4-8*.
- **Back Rests (5):** Help restrain the operator and passenger in the Operator Compartment while enhancing comfort.
- **Extension Ladder (6; *if equipped*):** Allows personnel to climb for easier aircraft access. See *"OPTIONAL EXTENSION LADDER" on page 5-8*.
- **Rear Light Module (*not shown*; *if equipped*):** Holds rear-facing lights and/or reflectors.
- **Electronic Drive Controller (*not shown*):** Transfers inputs from the Motor Control Lever to the Drive Motor.
- **Hydraulic Pump (*not shown*):** Provides hydraulic pressure for the brakes and Cradle. If equipped, also powers the hydraulic Winch Motor.

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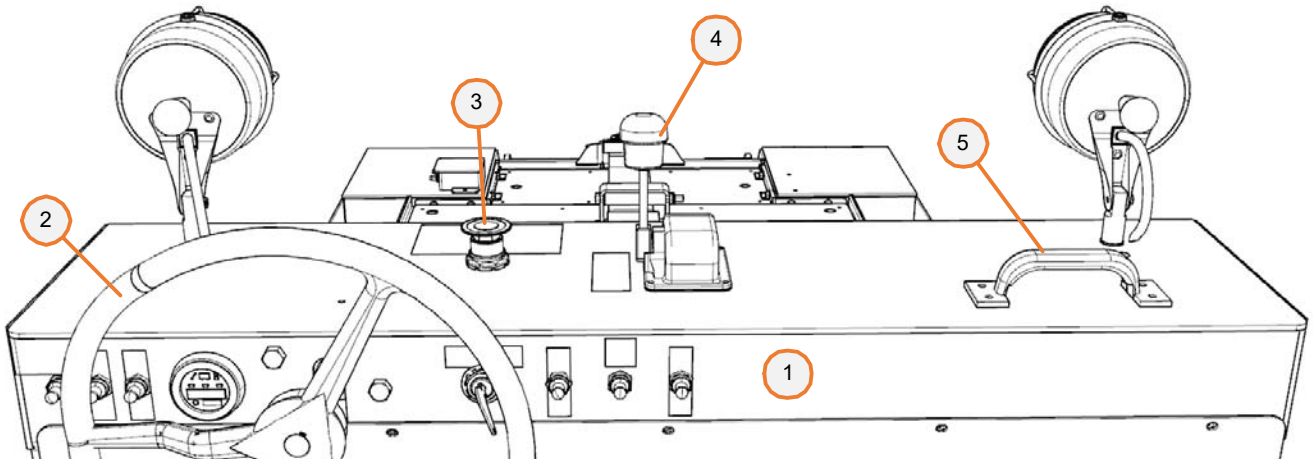
4.3.1 CONTROL CONSOLE

The Control Console is laid out as follows on a LEKTRO 86/87 tractor:



This area includes the following controls:

- **Instrument Panel (1):** Includes a number of instruments and controls. See *"INSTRUMENT PANEL" on page 4-7*.
- **Steering Wheel (2):** Turns the Steer Wheels located just forward of the operator's position. The vehicle responds similarly to a forklift when turning. A Steering Knob helps facilitate steering, especially when the tractor is standing still.
- **Turn Signal Lever (*optional; not shown*):** Activates the left- or right-hand turn signal lights, as follows:
  - > Pull the lever down to indicate a left turn.
  - > Push the lever up to indicate a right turn.
- **Main Power Disconnect Switch (3):** Switches main power on or off and engages/ disengages the Parking Brake.
  - > Pushing this switch down turns main power OFF and engages the Parking Brake.
  - > Pulling this switch up turns main power ON and releases the Parking Brake.

  See *"TRACTOR STARTUP" on page 6-2* and *"TRACTOR SHUTDOWN" on page 6-10*.
- **Motor Control Lever (4):** Controls the Motor direction and speed. See *"USING THE MOTOR CONTROL LEVER" on page 5-5*.
- **APS Control Box (5; *if equipped*):** Holds the Aircraft Protection System controls. See *"OPTIONAL AIRCRAFT PROTECTION SYSTEM" on page 4-27*.
- **Passenger Handle (5):** Enhances passenger safety by providing a convenient grab point.

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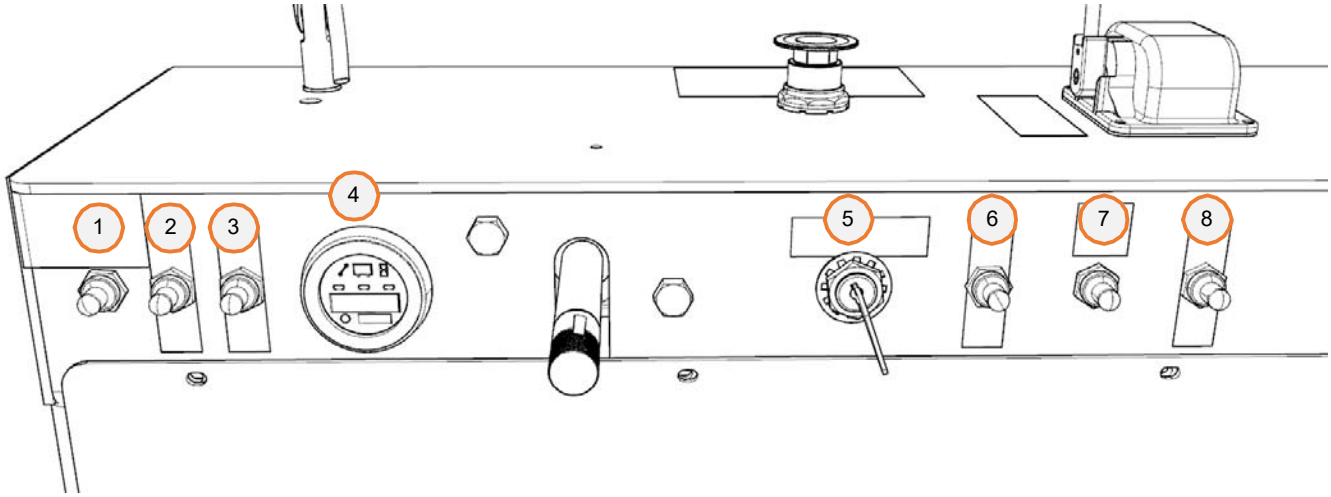
The inside of the Control Console contains the EV100 Drive Controller, Contactor Panel, Hydraulic Pump/Motor Assembly, Service Brake Master Cylinder, Parking Brake Master Cylinder, and the Steering Linkage.

4.3.2 INSTRUMENT PANEL

The AP96/87 Instrument Panel faces the operator.



This panel includes the following controls:

- **Running/Parking Light Switch (1; *if equipped*):** Turns the flashing amber running or parking lights on or off.
- **Rear Headlight Toggle Switch (2; *if equipped*):** Turns the two rear-mounted headlights on or off. The Motive Power Switch must be in the ON position.
- **Front Headlight Toggle Switch (3; *if equipped*):** Turns the two front-mounted headlights on or off. The Motive Power Switch must be in the ON position.
- **EVT100 Drive Controller Dash Display (4):** Indicates the total hours of motor operation using a four-segment LED display that displays status codes, hours, and battery discharge from the EVT100 Drive Controller.
  - > When the Motive Power Switch is turned OFF, the hour glass LED and hours of operation will display for two seconds.
  - > When the Motive Power Switch is turned ON, the gauge will display the percentage of remaining battery power.
  - > If a fault occurs, the wrench LED will illuminate and the gauge will display a fault code.

- **Motive Power Switch (5):** Two-position on/off power switch. This will either be a lever or a key switch. To use this switch:

  a. If equipped with a key switch, insert the key with the teeth facing downward.

  b. Turn the lever or key clockwise to turn power ON.

  c. Turn the lever or key counterclockwise to turn power OFF.

- **Cradle Raise/Lower Switch (6; *if equipped*):** This spring-loaded, three-position toggle switch raises or lowers the Cradle, as follows:

  > Pushing and holding the switch down lowers the Cradle.

  > Pushing and holding the switch up raises the Cradle.

  > Release the switch when the Cradle reaches the desired height.

- **Winch Strap Motor Control Switch (7; *if equipped*):** This spring-loaded, three-position toggle switch extends or retracts the Winch Strap, as follows:

  > Pushing and holding the switch up extends the strap.

  > Pushing and holding the switch down retracts the Cradle.

  > Release the switch when the strap reaches the desired length.

CAUTION

THIS SWITCH OVERRIDES BOTH THE FENDER-MOUNTED CONTROL SWITCH AND THE WINCH LIMIT SWITCH. DO NOT OVER-RETRACT THE WINCH.

- **Horn Button (8):** Sounds the tractor horn. This button can be pressed with a thumb while operating the Motor Control Lever.

4.3.3 ARM RESTS

The left and right sides of the Operator Compartment include retractable Arm Rests that also serve as restraint devices during turns. The Arm Rests are mounted on the Back Rests. To use the Arm Rests:

- Raise the Arm Rests vertically when entering and exiting the tractor.
- Lower the Arm Rests to the horizontal position before moving the tractor. The Arm Rests must always be in this position when the tractor is moving.

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DANGER

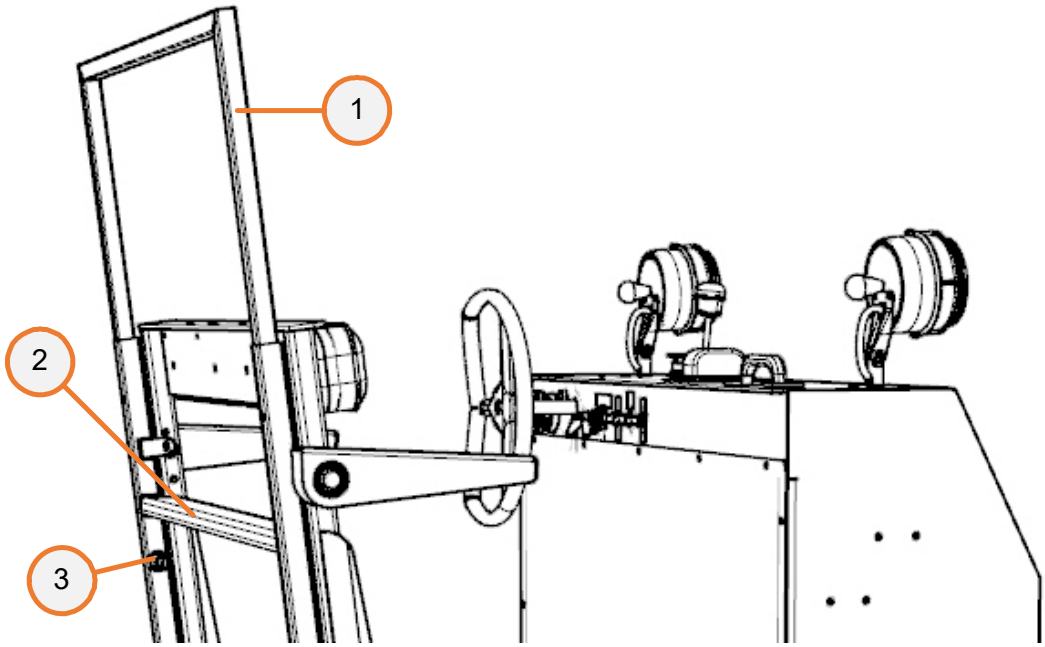
FAILURE TO LOWER THE ARM RESTS BEFORE MOVING THE TRACTOR COULD CAUSE THE OPERATOR OR PASSENGER TO FALL OUT OF THE TRACTOR DURING A TOWING OR DRIVING OPERATION.

CAUTION

THE DEAD MAN BRAKE WILL ENGAGE AND STOP THE TRACTOR IF THE OPERATOR FALLS OUT OF THE TRACTOR. THE RESULTING BRAKING FORCE COULD DAMAGE THE AIRCRAFT NOSE LANDING GEAR.

4.3.3.1 OPTIONAL EXTENSION LADDER

If equipped, the optional Extension Ladder allows the operator to reach and service high areas of the aircraft, such as when cleaning windshields. It appears as follows:



The Extension Ladder has the following components:

- **Handrail (1):** Steadies the operator and helps prevent falls.
- **Ladder Third Step (2):** Tallest step to which the operator can climb.
- **Handrail Release Knob (3):** Allows the operator to lock the Handrail in the extended (up) or retracted (down) position.

See *"OPTIONAL EXTENSION LADDER" on page 5-8* for instructions on using the Extension Ladder.

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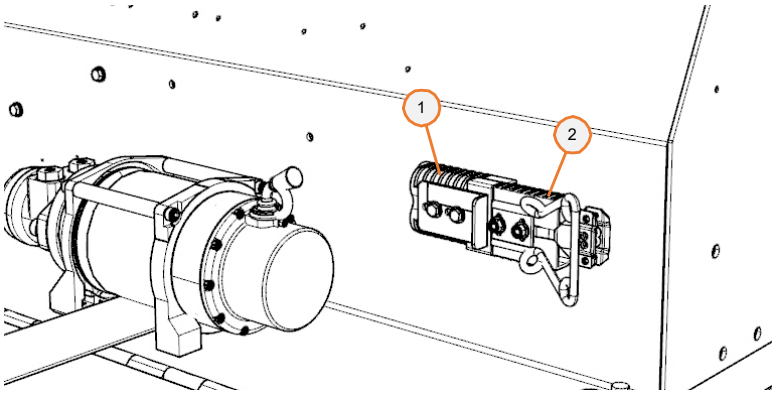
4.4 MAIN POWER DISCONNECT

The Main Power Disconnect is located on the left side of the tractor just in front of the Operator Compartment. This system includes the following components:



- **Main Power Disconnect Handle (1):** Manual disconnect for emergency or repair-related safety purposes, as described in *"MAIN POWER DISCONNECT" on page 5-4*. Also used to charge the Motive Batteries, as described in *"CHARGING THE BATTERIES" on page 5-20*.
- **Main Power Connector (2):** Receives the Main Power Disconnect Handle.

CAUTION

NEVER ATTEMPT TO PLUG THE MOTIVE BATTERY CHARGING CABLE INTO THE MAIN POWER CONNECTOR. THE MAIN POWER CONNECTOR IS FITTED WITH A PREVENTER PLATE. FORCING THIS PLATE WILL FEED CHARGING POWER TO THE DRIVE CONTROLLER INSTEAD OF THE BATTERIES, WHICH COULD DAMAGE THE TRACTOR.

See *"MAIN POWER DISCONNECT" on page 5-4* for information on using the Main Power Disconnect.

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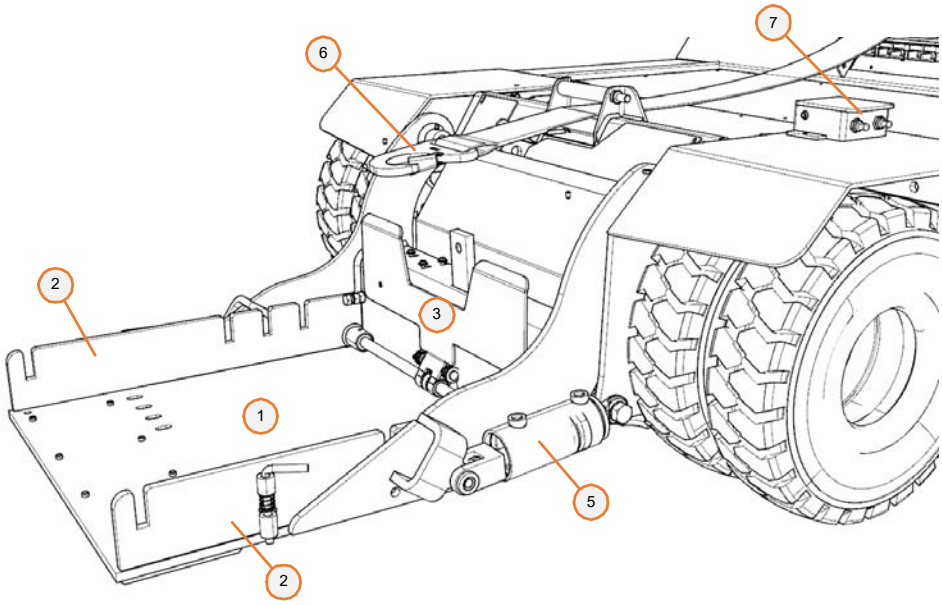
4.5 CRADLE

The hydraulic Cradle and Winch Assembly carries the aircraft wheel during towing operations. This area will be configured in one of two ways:

- **Standard:** See *"STANDARD WINCH/CRADLE CONFIGURATION" on page 4-11*.
- **Turntable:** See *"TURNTABLE WINCH/CRADLE CONFIGURATION" on page 4-12*.

4.5.1 STANDARD WINCH/CRADLE CONFIGURATION

The standard Cradle and Winch Assembly does not include a turntable with torque-sensing load cell. This area includes the following components:



- **Cradle (1):** Carries the aircraft wheel during towing operations. The Cradle lowers to capture the aircraft, and raises to provide ground clearance during towing operations. The Cradle includes a Wear Plate on the underside that protects the Cradle and aircraft from excessive wear. This will be either:
  - > UHMW high-density plastic Wear Plate that protects hangar floors.
  - > AR steel Wear Plate is standard for operations that do not require protecting hangar floors and that have high wear exposure, such as airline ramp operations.
- **Side Gates (2):** These gates can be adjusted either outward to allow the aircraft wheel to pivot or inward to prevent wheel movement. See *"SIDE GATES (STANDARD CRADLE)" on page 4-13*.
- **Back Wall (3):** Limits how far the aircraft wheel can advance on the Cradle. This option is equipped on tractors that have a manually-operated Winch. If your tractor is equipped with a hydraulic Winch Motor, then it will also be equipped with a Winch Limit Switch. See *"WINCH ASSEMBLY" on page 4-17*.

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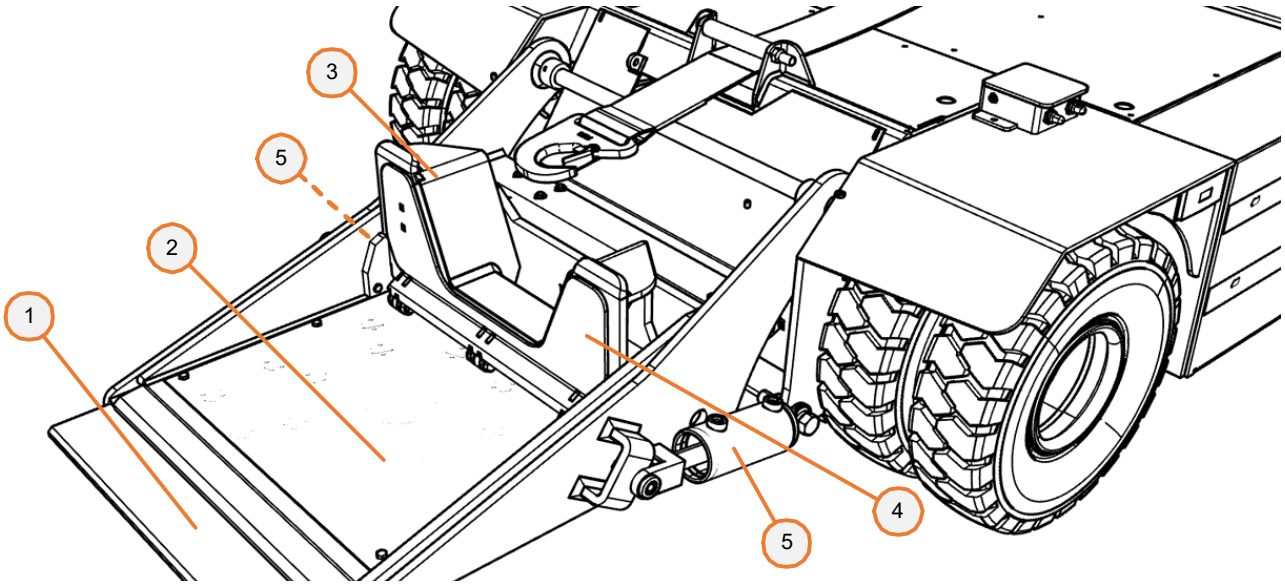
- **Extended Rear Gate (*not shown*):** Used when towing aircraft with torque links or other protrusions that extend beyond the front of the wheel. See *"EXTENDED REAR GATE" on page 4-14*.
- **Front Gate (*not shown*):** Prevents the aircraft wheel from rolling off the Cradle. See *"FRONT GATE (STANDARD CRADLE)" on page 4-16*.
- **Cradle Adapter Post (4):** Allows attaching a variety of adapters. See *"CRADLE ADAPTER POST" on page 4-16*.
- **Cradle Lift Cylinders (5):** Lift and lower the Cradle.

> *Note*
>
> *The 86 is equipped with a single Lift Cylinder located on the vehicle centerline.*

- **Winch Strap and Hook (6):** Winches the aircraft onto the Cradle and hooks onto the Strut Strap.
- **Fender-Mounted Winch/Cradle Controls (7):** If equipped, allow the operator to control the Cradle and Winch functions. See *"FENDER-MOUNTED CONTROLS" on page 4-19*.
- **Strut Strap (*not shown*):** Secures the aircraft wheel or strut to the tractor. Includes a protective sleeve.

4.5.2 TURNTABLE WINCH/CRADLE CONFIGURATION

The turntable Cradle and Winch Assembly includes a turntable with torque-sensing load cell, which is part of a single- or multi-level Aircraft Protection System. See *"OPTIONAL AIRCRAFT PROTECTION SYSTEM" on page 4-27*.



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This area includes the following components:

- **Cradle (1):** Carries the aircraft nose or tail wheel during towing operations. The Cradle lowers to capture the aircraft, and raises to provide ground clearance during towing operations. The Cradle includes an AR steel Wear Plate on the underside that protects the Cradle and aircraft from excessive wear.
- **Turntable (2):** Includes a torque-sensing load cell that measures torque forces being applied to the aircraft nose landing gear.
- **Rear Gate (3):** Limits how far the aircraft wheel can advance on the Cradle.
- **Winch Limit Switch (4):** Stops the Winch Motor when contacted by the aircraft wheel.
- **Cradle Lift Cylinders (5):** Lift and lower the Cradle.

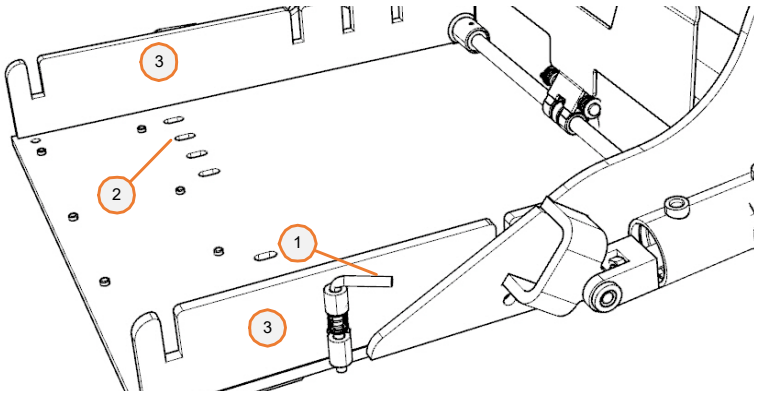
Note

The 86 is equipped with a single Lift Cylinder located on the vehicle centerline.

- **Fender-Mounted Winch/Cradle Controls (6; *if equipped*):** Allow the operator to control the Cradle and Winch functions. See *"FENDER-MOUNTED CONTROLS" on page 4-19*.
- **Winch Strap and Hook (7):** Winches the aircraft onto the Cradle and hooks onto the Strut Strap.
- **Strut Strap (*not shown*):** Secures the aircraft wheel or strut to the tractor. Includes a protective sleeve.

4.5.3 SIDE GATES (STANDARD CRADLE)

The Side Gates are attached to a slide bar on the rear of the Cradle. Each gate includes locks that secure the gates to the Cradle in the required positions and secure the aircraft tire to the Cradle. The Side Gates have the following components:



- **Side Gate Anchors (1):** Secure the Side Gates in position when inserted into the Side Gate Anchor Hole (2).
- **Side Gate Anchor Holes (2):** Secure the Side Gate Anchors to lock the Side Gates.
- **Side Gates (3):** Restrict sideways movement of the aircraft tire during towing operations.
- **Chine Protectors (*not shown*):** If needed, place these on the Side Gates to prevent damaging the aircraft tire chine.

The Side Gates are normally left in their outermost positions to allow the aircraft wheel to pivot on the Cradle, but can be moved inward when needed to prevent movement of the aircraft wheel. See the *Aircraft Towing Procedures Manual*.

4.5.4 EXTENDED REAR GATE

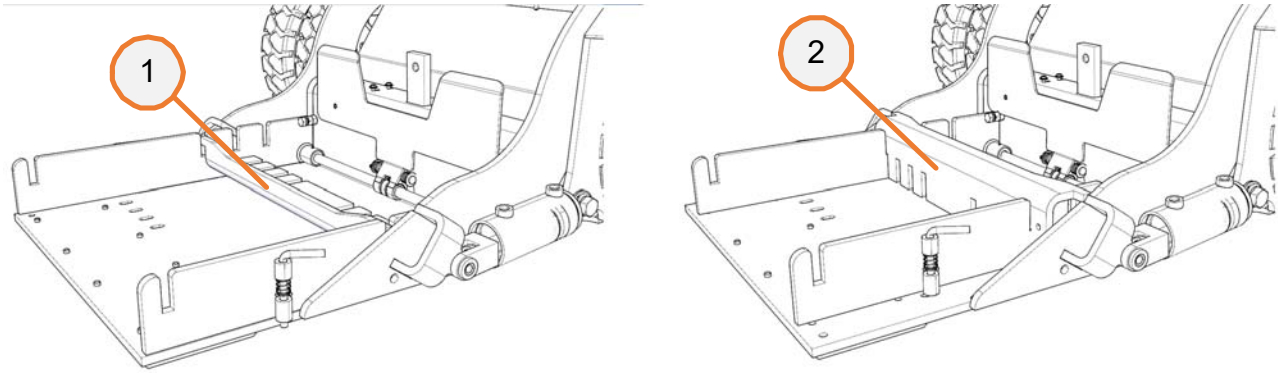
The Extended Rear Gate is used when towing an aircraft with a nose wheel of approximately 12” (30cm) diameter that is also equipped with torque links or other protrusions that extend beyond the front of the wheel. The protrusions must be at least 4” (10cm) above the ground in order to use the Extended Rear Gate.

There are three types of Extended Rear Gate:

- **Small Removable:** See *"SMALL REMOVABLE REAR GATE (STANDARD CRADLE)” on page 4-14*.
- **Large Removable:** See *"LARGE REMOVABLE REAR GATE” on page 4-15*.
- **Fixed:** See *"FIXED EXTENDED REAR GATE” on page 4-15*.

4.5.4.1 SMALL REMOVABLE REAR GATE (STANDARD CRADLE)

The small removable Rear Gate can be installed and removed as needed.



The small removable Rear Gate may be mounted as follows:

- **Horizontal (1):** For aircraft with low nose gear clearances, by moving the Side Gates to their outermost positions and then fitting the tabs in the short side of the gate into the slots in the Side Gates.
- **Vertical (2):** For normal operations, by fitting the slots in the tall side of the gate over the Side Gates.

See the *Aircraft Towing Procedures Manual* for instructions on using the small removable Rear Gate.

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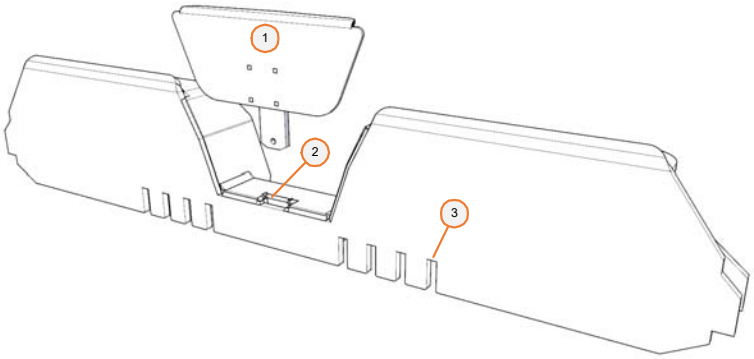
4.5.4.2 LARGE REMOVABLE REAR GATE

The large removable Rear Gate can be installed and removed as needed. The large removable Rear Gate has the following components:

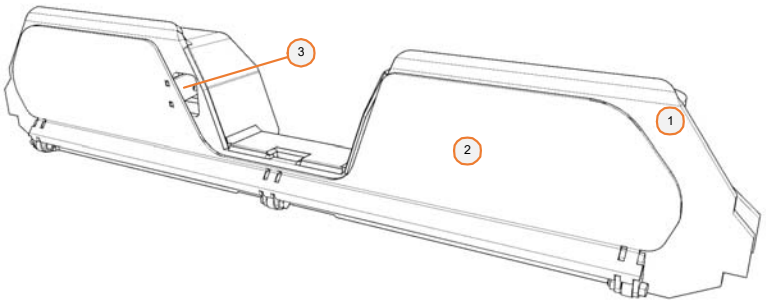


- **Fill Plate (1):** Insert this plate when towing an aircraft with a single wheel. Remove this plate when towing an aircraft with dual wheels. See the *Aircraft Towing Procedures Manual*.
- **Pocket (2):** Secures the Fill Plate into position.
- **Slots (3):** Fit over the Side Gates, if equipped.

See the *Aircraft Towing Procedures Manual* for instructions on using the large removable Extended Rear Gate.

4.5.4.3 FIXED EXTENDED REAR GATE

The fixed Extended Rear Gate is permanently mounted to the Cradle. If the tractor is equipped with a hydraulic Winch, then the fixed Extended Rear Gate (1) includes a Winch Limit Switch (2), which stops the Winch Motor when the aircraft nose wheel contacts the switch. A linkage (3) connects this switch to the Winch Limit Switch on the back wall of the Cradle.



LEKTRO offers Fixed Extended Rear Gates for a variety of aircraft models. For example, the Dash 8/Falcon 20 Fixed Extended Rear Gate may be used for both these aircraft types and any other aircraft type nose landing gear with protruding torque links, trailing arm knuckles, or other between-tire fittings that are less than 11" (28cm) wide. This gate keeps the protrusion clear of the back wall of the Cradle while providing automatic Winch cutoff.

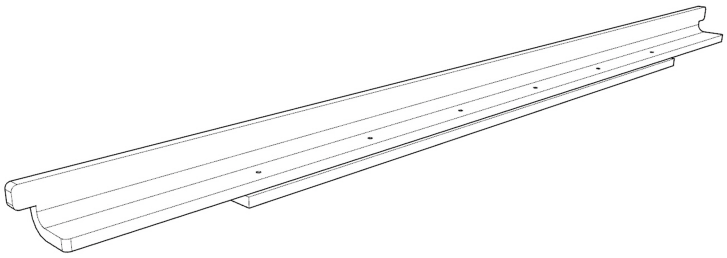
Note

The Dash 8/Falcon 20 fixed Extended Rear Gate with Fill Plate installed must be used on single-wheel or narrow dual-wheel aircraft.

4.5.5 FRONT GATE (STANDARD CRADLE)

The removable Front Gate can be installed on the Side Gates to:

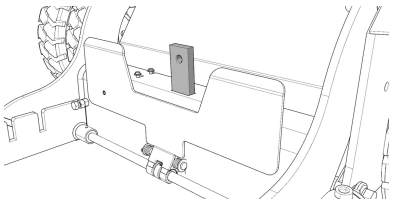
- Help prevent the aircraft wheel from rolling off the Cradle in the event of Winch Strap or associated component failure.
- Prevent the Tow Bar from contacting the Side Gates when turning while towing with a Pintle Hook.



The Front Gate is normally stored in a Side Compartment when not installed. It is not use on a Cradle that is not equipped with Side Gates. sSee the *Aircraft Towing Procedures Manual*.

4.5.6 CRADLE ADAPTER POST

The back wall of the Cradle includes a fixed Cradle Adapter Post that can secure a variety of adapters.



CAUTION

EITHER THE SMALL OR LARGE EXTENDED REAR GATE MUST BE MOUNTED ON THE CRADLE ADAPTER POST AT ALL TIMES WHEN NOT USING A DIFFERENT ADAPTER AND WHEN NO REAR GATE IS MOUNTED ON THE SIDE GATES. THIS PREVENTS THE AIRCRAFT TIRE FROM CONTACTING AND BEING DAMAGED BY THE CRADLE ADAPTER POST.

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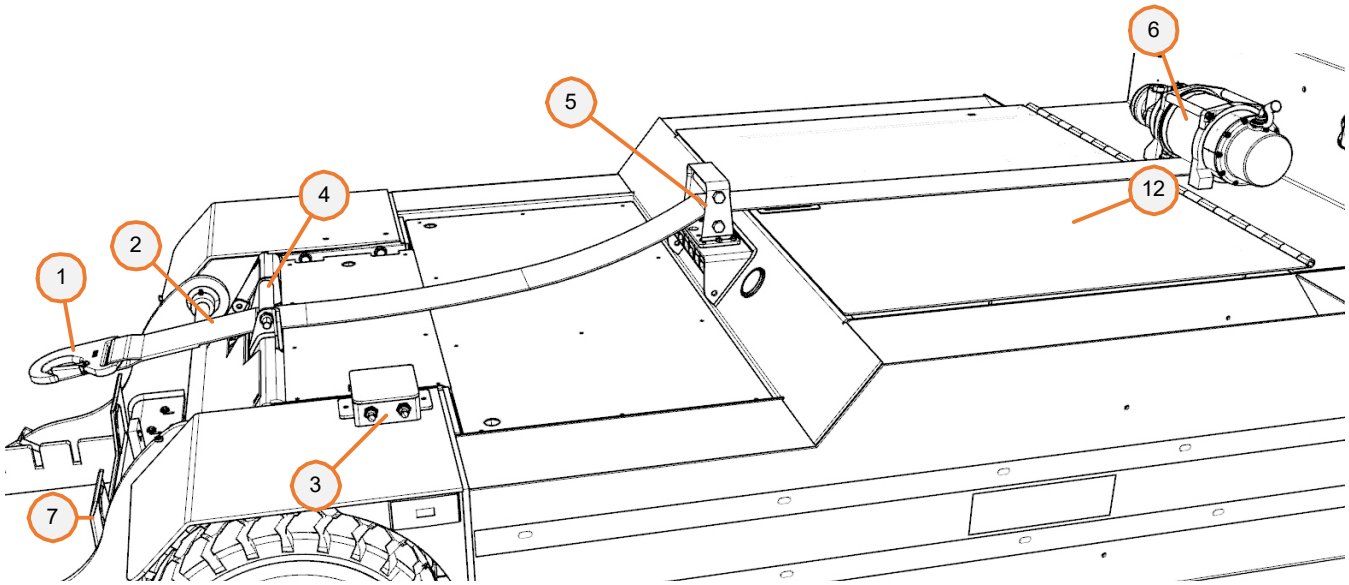
4.5.7 WINCH ASSEMBLY

The Winch Assembly secures the aircraft to the tractor.

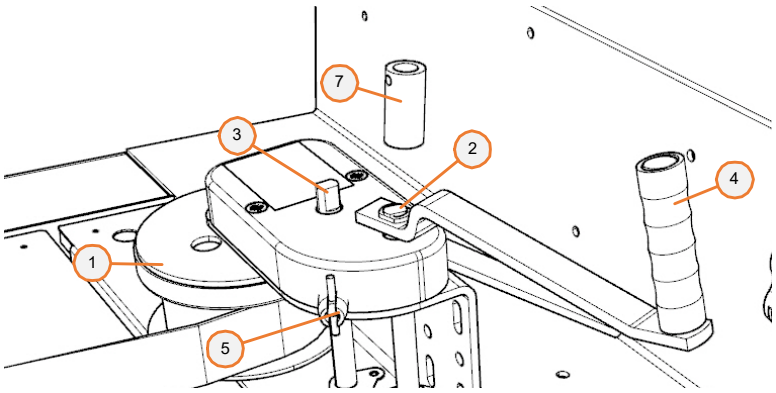


This assembly includes the following components:

- **Strut Strap (*not shown*):** Wraps around the aircraft landing gear strut and attaches to the Winch Strap Hook with two “D” rings. This strap includes a Protective Sleeve that helps prevent damage to the aircraft oleo strut. See *"STRUT STRAP” on page 4-19* and the *Aircraft Towing Procedures Manual* for both general capture instructions and specific capture procedures by aircraft type.
- **Winch Strap Hook (1):** Secures the “D” Rings on the Strut Strap to the Winch Strap.
- **Winch Strap (2):** Connects the Strut Strap to the Winch.
- **Fender-Mounted Winch and Cradle Controls (3; *if equipped*):** If the tractor is equipped with a hydraulic Winch Motor, these controls allow the operator to control the Winch Motor and Cradle without having to return to the Operator Compartment. See *"FENDER-MOUNTED CONTROLS” on page 4-19*.
- **Front Fairlead (4):** Routes the Winch Strap over the Forward Compartment.
- **Rear Fairlead (5):** Routes the Winch Strap over the Rear Compartment.
- **Winch Motor (6):** Powers the Winch Assembly. This manual or hydraulic motor and attached Winch Spool holds the Winch Strap that pulls the aircraft wheel onto the Cradle and secures it during towing. See *"MANUAL WINCH” on page 4-18* or *"HYDRAULIC WINCH” on page 4-18*, as appropriate for your tractor.
- **Winch Limit Switch (7):** If the tractor is equipped with a hydraulic Winch, stops the Winch motor when contacted by the aircraft wheel. This safety feature overrides the operator.

4.5.7.1 MANUAL WINCH

If your tractor is equipped with a manual Winch, then it will appear as shown here. The manual Winch has the following components:

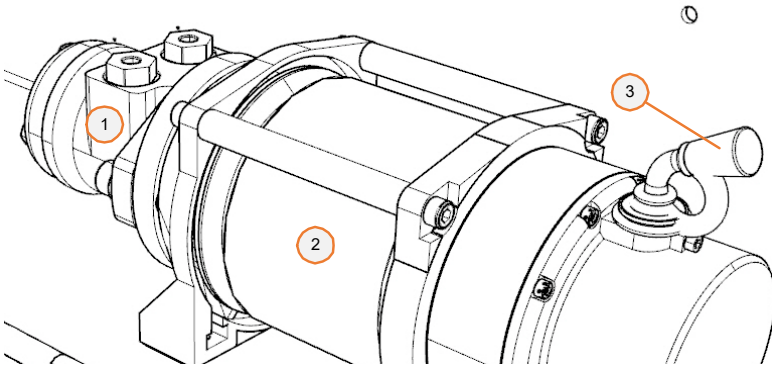


- **Winch Spool (1):** Holds the Winch Strap and turns to either pay out or retract the Winch Strap.
- **Low Speed Shaft (2):** Turns the Winch Spool at a low speed, which offers increased torque.
- **High Speed Shaft (3)**: Turns the Winch Spool at a high speed, which decreases torque.
- **Winch Handle (4):** Turn this crank to winch the aircraft on to the Cradle. This handle is removable, to prevent accidental release while towing.
- **Ratchet Plunger Pin (5):** Controls the winching direction to either reel in or pay out the Winch Strap.
- **Brake Handle (6):** Pressing this handle allows the Winch Spool to turn freely.
- **Winch Handle Stop Tube (7):** Place this tube over the Low-Speed Winch Shaft to prevent accidental release while towing.

See the *Aircraft Towing Procedures Manual* for instructions on using the manual Winch.

4.5.7.2 HYDRAULIC WINCH

If your tractor is equipped with a hydraulic Winch, then it will appear as shown here. The hydraulic Winch has the following components:



- **Winch Motor (1):** Powers the Winch Spool.
- **Winch Spool (2):** Holds the Winch Strap and turns to either pay out or retract the Winch Strap.
- **Winch Release Lever (3; *if equipped*):** Allows the operator to release the Winch Strap in an emergency. This is not normally installed on 86/87 Series tractors but can be included if requested.

See the *Aircraft Towing Procedures Manual* for instructions on using the hydraulic Winch.

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4.5.7.3 STRUT STRAP

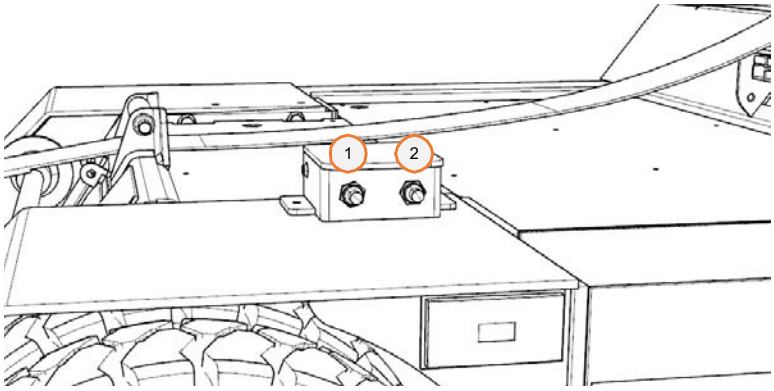
A variety of Strut Straps are available to suit a wide array of towing needs. Some of the available options include:

- Length
- Width
- Single or dual ply construction
- Metal “D” rings to attach the Strut Strap to the Winch Strap

For most aircraft types, use a Strut Strap length that ensures that the “D” rings (if equipped), Winch Strap Hook, and aircraft oleo strut will not be damaged. The Strut Strap is equipped with a replaceable Protective Sleeve that protects sensitive areas on the aircraft wheel strut. See the *Aircraft Towing Procedures Manual*.

4.5.8 FENDER-MOUNTED CONTROLS

If the tractor is equipped with a hydraulic Winch, then the left front fender will hold a mount with two spring-loaded, three-position switches. These switches are:



- **Winch Control Switch (1):** Extends and retracts the Winch Strap. This switch is interconnected to the Winch Stop Switch that overrides the operator and stops winch retraction when contacted by the aircraft wheel.
- **Cradle Control Switch (2):** Lifts and lowers the Cradle.

> *Note*
>
> *The Cradle Switch, Winch Control Switch(es), and any Aircraft Protection System switches located on the Instrument Panel and Control Console override the fender-mounted Winch and Cradle controls to allow adjustments while towing.*

4.5.9 OPTIONAL TOWING ADAPTERS

Your LEKTRO 86/87 Series aircraft tractor may be fitted with one or more of a variety of optional fixed and/or removable towing adapters to suit a wide variety of aircraft. Some of these optional adapters include:

- **Fairing:** See *"FAIRING ADAPTER” on page 20*.

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- **Long Reach:** See *"LONG-REACH ADAPTER" on page 4-20*.
- **High Lift:** See *"HIGH-LIFT ADAPTER" on page 4-21*.
- Others??? Please list specific adapter(s) to include, and provide 3D models for each. Recommend NOT including any type-specific adapters

4.5.9.1 FAIRING ADAPTER

Used for aircraft with nose wheel pants or fairings.

NEED 3D model of this!!!

4.5.9.2 LONG-REACH ADAPTER

The aluminum Long-Reach Adapter mounts to the Cradle. It is intended for use in the following towing scenarios:

- Aircraft with long reaches and low clearances to the nose or tail wheel. See the *Aircraft Towing Procedures Manual*
- Aircraft that require a high lift to lower the tail height to clear hangar doors and/or roof beams. See the *Aircraft Towing Procedures Manual*.

This adapter is available for aircraft with both single and dual nose wheels.

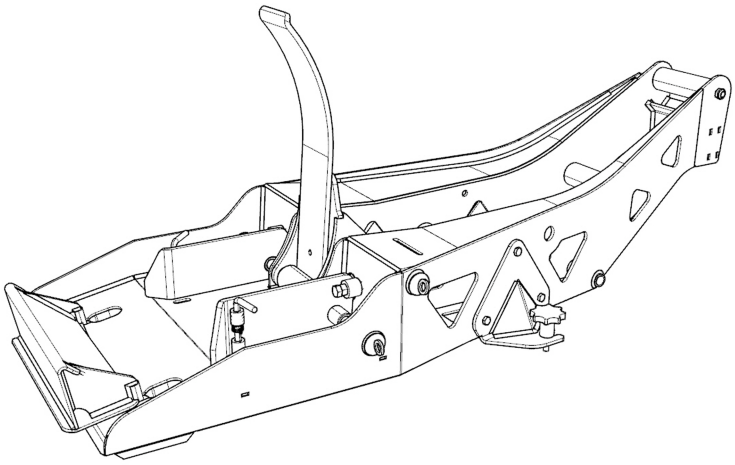

Table 1:

TRACTOR MODEL	MAX. NOSE WHEEL LIFT[a]	CAPACITY[b]	NOTE
8600/EZ	14 3/8 in (14.375") / 36.5 cm	1,700 lbs / 771 kg	Hold-Down Spring height and radius depends on tire size.
8700C/EZ	16 3/8 in (16.375") / 41.6 cm	2,360 lbs / 1070 kg	
8750C/EZ	16 3/8 in (16.375") / 41.6 cm	2,550 lbs / 1156 kg	
8750C-AL	16 3/8 in (16.375") / 41.6 cm	3,200 lbs / 1451 kg	

a. Typical for average nose wheel size.
b. NLG weight.

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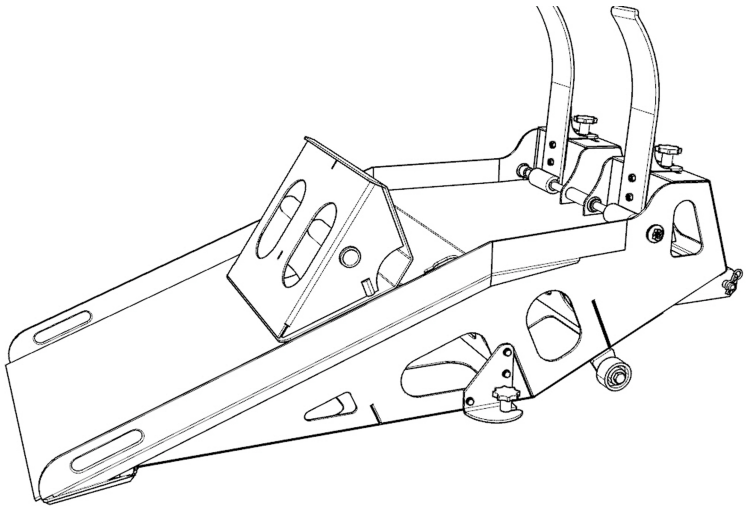
4.5.9.3 HIGH-LIFT ADAPTER

The High-Lift Adapter (also called a “Highlift Adapter”) mounts to the Cradle. It is intended for use when hangar door and/or roof beam overhead clearances are too low for the aircraft tail height. See the *Aircraft Towing Procedures Manual*.



This adapter is designed to accommodate the aircraft's dual nose wheel tire tracks and the required NLG Door clearance on capture and release. It is available in either 24” / 61 cm or 27” / 68.6 cm widths, and may be configured to tow specific aircraft nose landing gear before or after being installed on the tractor.

Table 2:

TRACTOR MODEL	MAX. NOSE WHEEL LIFT[a]	CAPACITY[b]	NOTE
8700	19 3/8 in (19.375”) / 49.2 cm	5,500 lbs / 2494 kg	Hold-Down Spring height and radius depends on tire size.
8750/AL	19 3/8 in (19.375”) / 49.2 cm	7,000 lbs. / 3175 kg	

a. Typical for average nose wheel size.
b. NLG weight.

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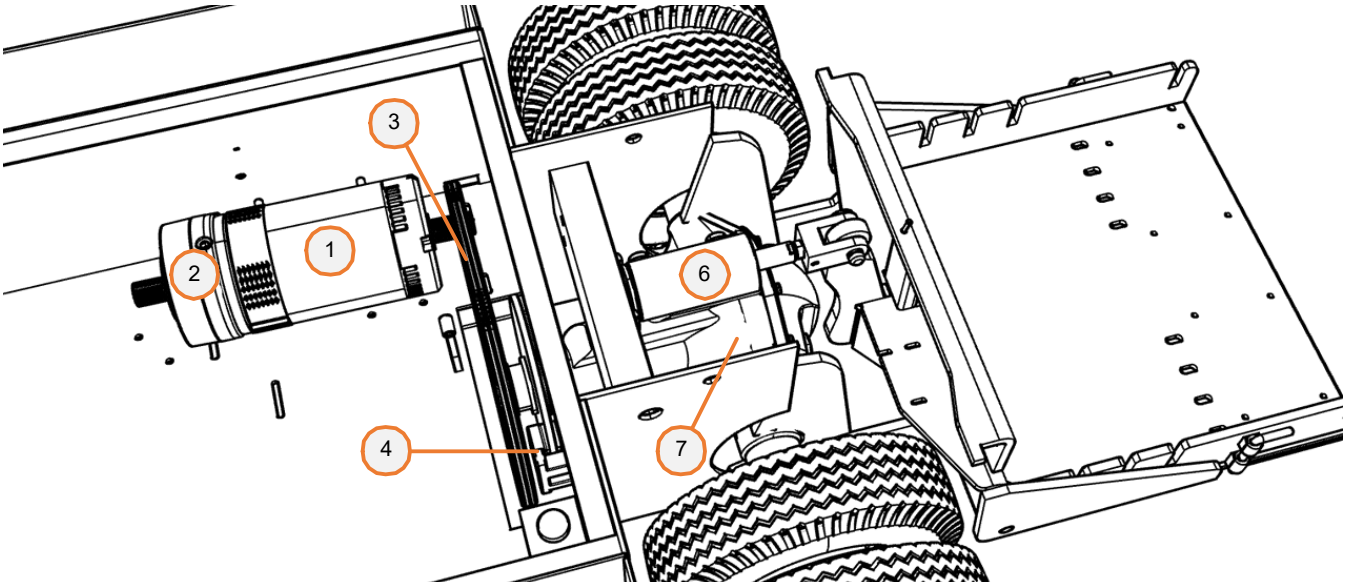
4.6 FORWARD COMPARTMENT

The Forward Compartment is located at the front of the tractor, just behind the Drive Wheels. This compartment varies by tractor type:

- **86:** See *"86 FORWARD COMPARTMENT" on page 4-22*.
- **87:** See *"87 FORWARD COMPARTMENT" on page 4-23*.

4.6.1 86 FORWARD COMPARTMENT

The Forward Compartment is arranged as follows on an 86 tractor:



This compartment contains the following components:

- **Drive Motor (1):** A heavy-duty 36 VDC electric traction motor provides the motive power for the tractor**.**
- **Parking Brake Assembly (2):** The Parking Brake prevents rolling when the tractor is parked. This brake can be activated using either of the following:

  > Main Power Disconnect button on the Control Console.

  > Dead Man Brake Pedal, when the operator is not standing on it.

  See *"PARKING BRAKE" on page 4-26* for more information about the Parking Brake.

- **Drive Chain and Sprockets (3):** Transfer Motor power to the Differential while reducing Motor RPM for added torque.

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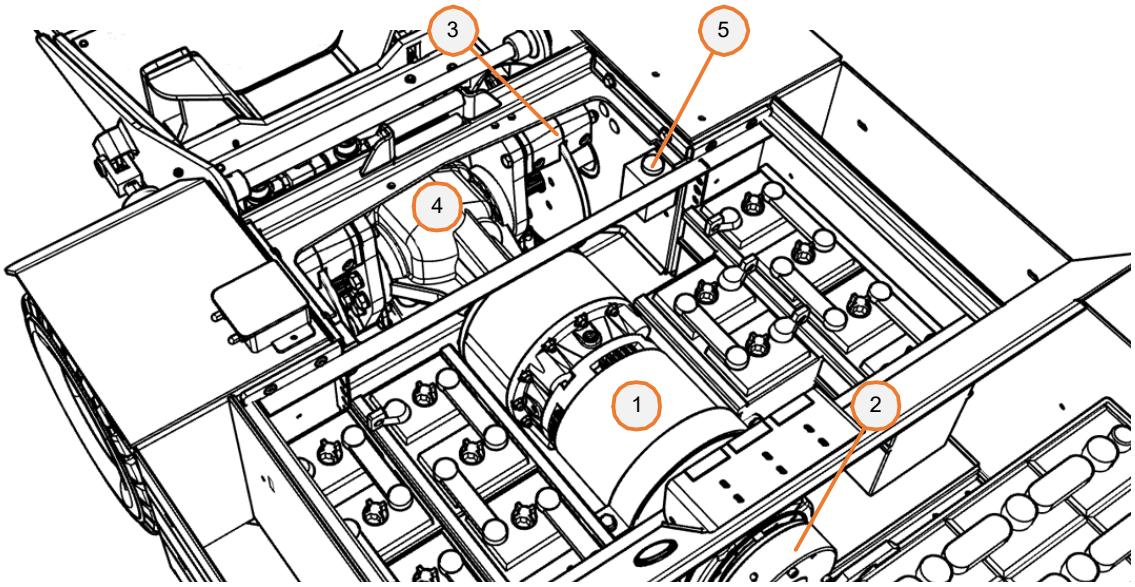
- **Single-Speed Gearbox (*not shown*; *if equipped*):** This option may be equipped instead of the Drive Chain and Sprockets, depending on motor configuration and installed options.
- **Service /Parking Brake Caliper Assembly (4):** Both the Service Brake and Parking Brake use hydraulic calipers and a brake disc mounted on the Differential input (pinion) shaft to slow or stop the vehicle while moving and/or to prevent roll-away. The Service Brake is actuated by the foot-operated Brake Pedal in the Operator Compartment (see *"BRAKING" on page 6-8*). The Parking Brake is actuated by the Dead Man Brake Pedal and when electrical power is shut down (see *"PARKING BRAKE" on page 4-26*).
- **Brake Pressure Release Pump (5):** Releases the Parking Brake, if needed.
- **Cradle Lift Cylinder (6):** Lifts and lowers the Cradle.
- **Differential (7):** Heavy-duty, helical-geared automotive differential.

4.6.2 87 FORWARD COMPARTMENT

The Forward Compartment is arranged as follows on an 87 tractor:



This compartment contains the following components:

- **Drive Motor (1):** A heavy-duty 48 or 72 VDC electric traction motor provides the motive power for the tractor**.**
- **Parking Brake Assembly (2):** The Parking Brake prevents rolling when the tractor is parked. This brake can be activated using either of the following:

  > Main Power Disconnect button on the Control Console.

  > Dead Man Brake Pedal, when the operator is not standing on it.

  See *"PARKING BRAKE" on page 4-26* for more information about the Parking Brake.

- **Service Brake Caliper Assembly (3):** The Service Brakes use hydraulic calipers and brake discs mounted at each Drive Wheel to slow or stop the vehicle while moving and/or to prevent roll-away. The Service Brake is actuated by the foot-operated Brake Pedal in the Operator Compartment (see *"BRAKING" on page 6-8*).
- **Differential (4):** Heavy-duty, helical-geared automotive differential.
- **Brake Pressure Release Pump (5):** Releases the Parking Brake, if needed.

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4.7 REAR COMPARTMENT

The Rear Compartment is located just behind the Forward Compartment, as shown in *"GENERAL LAYOUT" on page 4-3*. This compartment contains the Motive Batteries, which power the Drive Motor and other vehicle components. If equipped, this compartment will also contain the GPU Batteries. The battery configuration will depend on your specific model of LEKTRO 86/87 Series aircraft tractor. Please see the following:

- **86 Series:**
  - > *"8600A" on page 2-3*
  - > *"8600A-EZ" on page 2-6*
  - > *"8650AX-EZ" on page 2-9*
  - > *"8650AX" on page 2-12*
  - > *"8600A-M" on page 2-15*
- **87 Series:**
  - > *"8700C" on page 3-3*
  - > *"8700C-EZ" on page 3-6*
  - > *"8700C-ALM" on page 3-9*
  - > *"8750C-EZ" on page 3-12*
  - > *"8750C" on page 3-15*
  - > *"8750C-AL-700" on page 3-18*

IF YOUR SPECIFIC TRACTOR MODEL IS NOT LISTED HERE, THEN PLEASE REFER TO THE SPECIFICATION SHEET FOR YOUR TRACTOR MODEL AND/OR THE DOCUMENTATION PROVIDED WITH YOUR TRACTOR FOR INFORMATION ABOUT YOUR SPECIFIC BATTERY CONFIGURATION.

4.8 PARKING BRAKE

The Parking Brake on the LEKTRO 86/87 Series aircraft tractor is unique in that it requires power to be released. A loss of power or system leak does either of the following, depending on how your tractor is equipped:

- Engages a magnetic brake attached to the Drive Motor.
- Removes hydraulic pressure and applies the brake.

This system is intended as a “failsafe” to help ensure that the vehicle will not move accidentally.

- **Manual operation:** During normal operations, the Parking Brake is intentionally engaged by either:
  - > Pulling the Main Power Disconnect Knob on the Control Console (see *"CONTROL CONSOLE” on page 4-6*) up to the APPLIED position.
  - > Stepping off the Dead Man Brake Pedal.
  - > Removing the Main Power Disconnect Handle from the Main Power Connector (see *"MAIN POWER DISCONNECT” on page 4-10*).
- **Automatic operation:** The Parking Brake will engage automatically if one of the following conditions exists:
  - > Electrical power is not available from the Motive Battery.
  - > Electrical failures occur which affect the drive circuits.
  - > Leakage or loss of pressure occurs in the hydraulic system.
  - > The red Main Power Disconnect Switch is in the OFF position.
  - > The Dead Man Brake Pedal is released.
  - > The Main Power Disconnect Handle is removed from the Main Power Connector.

See *"DEAD MAN EMERGENCY / PARKING BRAKE PEDAL” on page 5-6* for instructions on using the Parking Brake.

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4.9 OPTIONAL AIRCRAFT PROTECTION SYSTEM

The optional Aircraft Protection System limits tractor Winch power, Cradle height, Motor power, and braking force to prevent torque damage to the aircraft nose gear. This system measures the amount of torque during a tow and alerts the operator if safe levels have been exceeded. The Aircraft Protection System consists of the following components:

- **Load Pins:** Each Lift Cylinder includes a Load Pin that measures aircraft node gear weight.
- **Turntable Cradle:** The Cradle includes a Turntable with Torque Cell to measure the amount of torque being applied to the aircraft nose landing gear.
- **Cradle Height Limiter:** Restricts the maximum Cradle height, to prevent false alarms and reduce torque on the aircraft nose landing gear.
- **Pressure Reducing Valve:** Controls hydraulic pressure to the Winch motor, to limit Winch force.
- **Programmable Logic Controller:** Interprets the Load Pin and Load Cell readings, specified recognition level, and other parameters to limit tractor acceleration, deceleration, and Winch force as needed to prevent damage to the aircraft nose landing gear. The PLC includes a Key Switch that is used to reset the system if a torque warning is triggered. See *"RESETTING THE AIRCRAFT PROTECTION SYSTEM" on page 5-17*.
- **APS Control Box:** Contains the Aircraft Protection System controls. This box is mounted on the Control Console. See *"CONTROL CONSOLE" on page 4-6*.

> **Note**
>
> *If the tractor is not equipped with an Aircraft Protection System, then the Control Console will not include an APS Control Box.*

If equipped, the Aircraft Protection System may be configured as either:

- **Single-level:** A single-level Aircraft Protection System is calibrated for a single aircraft type. See *"SINGLE-LEVEL AIRCRAFT PROTECTION SYSTEM" on page 4-28*.
- **Multiple-level:** A multi-level Aircraft Protection System is calibrated for multiple aircraft types. The tractor operator presses the appropriate button for the type of aircraft being towed, and the tractor adjusts to the specified level. See *"MULTI-LEVEL AIRCRAFT PROTECTION SYSTEM" on page 4-28*.
- **Non-PLC:** A non-PLC Aircraft Protection System limits braking system force only, using a mechanical pressure-limiting valve. See *"NON-PLC AIRCRAFT PROTECTION SYSTEM" on page 4-29*. This is not a common option.

4.9.1 SINGLE-LEVEL AIRCRAFT PROTECTION SYSTEM

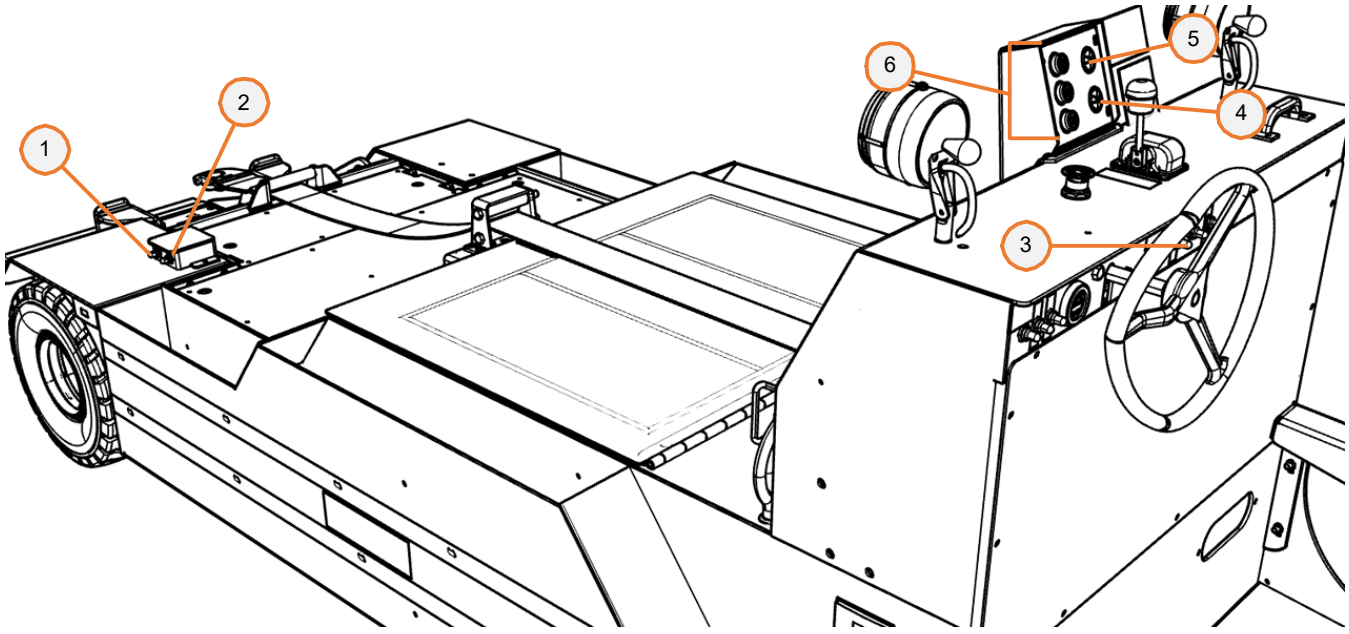
Tractors equipped with a single-level Aircraft Protection System may be configured in a variety of ways to suit individual customer requirements and may or may not include some or all of the following controls:

- **Turntable Cradle:** See *"TURNTABLE WINCH/CRADLE CONFIGURATION" on page 4-12*.
- **Fender-mounted Winch Control:** See *"FENDER-MOUNTED CONTROLS" on page 4-19*.
- **Fender-mounted Cradle Control:** See *"FENDER-MOUNTED CONTROLS" on page 4-19*.
- **Instrument Panel Winch and/or Cradle Switches (*if equipped*):** See *"INSTRUMENT PANEL" on page 4-7*.
- **Yellow Torque Caution Light:** This light illuminates and an alarm sounds when the towing operation exceeds the configured maximum safe torque for the aircraft being towed. The alarm stops sounding and the light turns off when the torque falls below the safe maximum. You may continue the towing operation.
- **Red Torque Warning Light:** This light illuminates and an alarm sounds when the towing operation exceeds a level that could damage the aircraft nose landing gear. If this happens, see *"RESETTING THE AIRCRAFT PROTECTION SYSTEM" on page 5-17*.

See the *Aircraft Towing Procedures Manual* for instructions on using the Aircraft Protection System.

4.9.2 MULTI-LEVEL AIRCRAFT PROTECTION SYSTEM

Tractors equipped with a multiple-level Aircraft Protection System will include the following controls:



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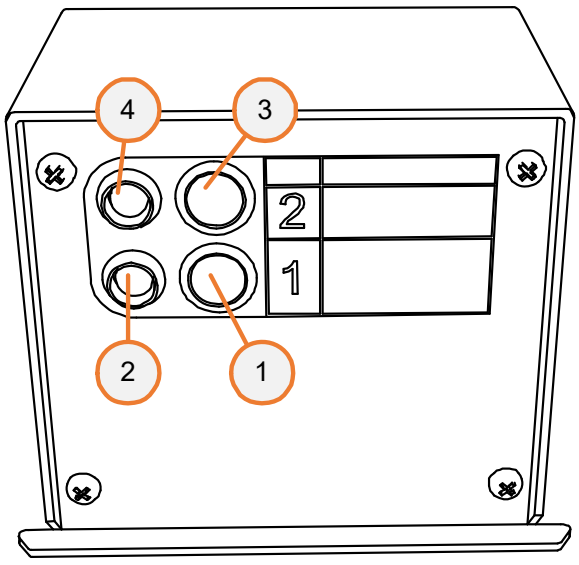
These controls are:

- **Fender-mounted Winch control (1):** See *"FENDER-MOUNTED CONTROLS" on page 4-19*.
- **Fender-mounted Cradle control (2):** See *"FENDER-MOUNTED CONTROLS" on page 4-19*. As the Cradle is raised, the Programmable Logic Controller senses the weight of the aircraft nose gear and selects the appropriate protection level.
- **Instrument Panel Winch and/or Cradle switches (3; *if equipped*):** See *"INSTRUMENT PANEL" on page 4-7*.
- **Yellow Torque Caution Light (4):** This light illuminates and an alarm sounds when the towing operation exceeds the configured maximum safe torque for the aircraft being towed. The alarm stops sounding and the light turns off when the torque falls below the safe maximum. You may continue the towing operation.
- **Red Torque Warning Light (5):** This light illuminates and an alarm sounds when the towing operation exceeds a level that could damage the aircraft nose landing gear. If this happens, see *"RESETTING THE AIRCRAFT PROTECTION SYSTEM" on page 5-17*.
- **Instrument Panel APS Level Buttons (6):** Series of buttons, typically two or three. Each button corresponds to a configured aircraft nose landing gear weight, which will range from 1 (lightest) to either 2 or 3 (heaviest).

See the *Aircraft Towing Procedures Manual* for instructions on using the Aircraft Protection System.

4.9.3 NON-PLC AIRCRAFT PROTECTION SYSTEM

Tractors equipped with a non-PLC Aircraft Protection System include two levels of aircraft nose gear torque protection that works by limiting the maximum braking that can be applied to the tractor when towing an aircraft. By default, the system selects Level 1 for lighter aircraft. To tow a heavier aircraft, press the Level 2 button. A blue lamp illuminates to indicate the current protection level.



The placard on the control boxes lists the aircraft ramp weights that correspond to each protection level.

WARNING

SELECTING LEVEL 1 FOR AN AIRCRAFT WITH A HIGHER TAMP WEIGHT THAN INDICATED WILL NOT ALLOW SUFFICIENT BRAKING FORCE TO BE APPLIED, WHICH COULD CAUSE A COLLISION DUE TO FAILURE TO STOP THE TRACTOR IN TIME.

WARNING

SELECTING LEVEL 2 FOR AN AIRCRAFT WITH A LOWER RAMP WEIGHT THAN INDICATED WILL ALLOW HARDER BRAKING FORCES TO BE APPLIED, WHICH COULD OVER-TORQUE THE AIRCRAFT LANDING GEAR.

The non-PLC Aircraft Protection System controls are:

- **Level One Button (1):** Pressing this button illuminates the Level One Indicator Lamp (2) and sets the tractor braking force to a level appropriate for towing aircraft of the listed Level 1 ramp weights.
- **Level One Indicator Lamp (2):** Illuminates when Level 1 protection is active.
- **Level Two Button (3):** Pressing this button illuminates the Level Two Indicator Lamp (4) and sets the tractor braking force to a level appropriate for towing aircraft of the listed Level 2 ramp weights.
- **Level Two Indicator Lamp (4):** Illuminates when Level 2 protection is active.

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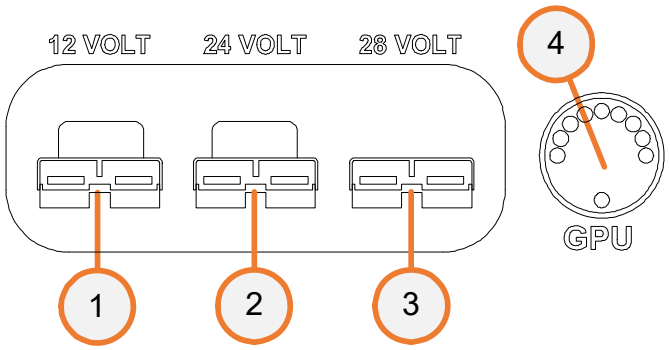
4.10 OPTIONAL GPU SYSTEM

If your tractor is equipped with optional GPU Batteries, this system will appear as follows:



The GPU system includes the following components:

- **12 VDC Outlet (1):** Provides 12 volts of power.
- **24 VDC Outlet (2):** Provides 24 volts of power.
- **28 or 30 VDC Outlet (3):** Provides either 28 or 30 volts of power.
- **GPU Battery Power Gauge (4):** Displays the current charge level of the GPU Batteries.
- **GPU Extension Cable (*not shown*):** Connects the appropriate VDC outlet to the appropriate Aircraft Adapter. Each end of this cable is fitted with a DC Connector. This cable is 15’ (4.5 m) long.
- **Aircraft GPU Adapter (*not shown*):** Used to connect the GPU Extension Cable to the aircraft. A variety of adapters are available for different aircraft makes/models.

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CHAPTER 5

BASIC OPERATIONS

This chapter describes how to perform the following basic operations on the tractor:

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5.1 PRE-USE SAFETY CHECKS

The tractor operator is fully responsible for operating the vehicle in a safe manner, in accordance with all applicable LEKTRO procedures and airport policies/regulations. It is critical to involve operators in creating and maintaining safe operating conditions by having them perform a pre-use visual and/or functional check of all vehicle components that could directly or indirectly affect the safety of all persons, equipment, and property exposed to operation of that vehicle.

CAUTION

MANY JURISDICTIONS MANDATE PRE-USE INSPECTIONS AND/OR CHECKS BY LAW.

This safety check occurs before the first working use for each day, shift, or period of exposure for a specific operator. This check neither supersedes nor is superseded by scheduled technical servicing and inspection; rather, it is an independent activity whereby operator exercises her/his responsibility to ensure that the tractor is safe from a user viewpoint, and that all safety-related defects are attended to on an appropriately prioritized and controlled basis.

The *Operator Pre-Use Safety Checklist* form provides the pre-use safety check procedure and allows the operator to record the results of each inspection. See *"OPERATOR PRE-USE SAFETY CHECKLIST" on page A-1*. This checklist lists critical components, provides evaluation methods for each component, and helps prioritize repairs. It can serve as either the basis for an employee/operator maintained program or as a serviceability guide for the owner/operator.

Note

An experienced person can accomplish the pre-use safety check in a few minutes of coordinated walk-around and driving activity as she/he readies the tractor for the first job.

LEKTRO suggests making a two-sided master copy of the *Operator Pre-Use Safety Checklist* form (see *"OPERATOR PRE-USE SAFETY CHECKLIST" on page A-1*). This master copy can then be used to:

- Generate forms as needed. These forms are checked off and signed on a daily basis.
- Serve as a master guide for the safety check. In this scenario, defects are documented using safety tags on the affected component(s).

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5.2 ACCESSING COMPARTMENTS

This section describes how to open and close the Front and Rear Compartments.

5.2.1 OPENING/CLOSING THE FORWARD COMPARTMENT

The Forward Compartment is covered by two floating deck cover plates. To open the two Forward Compartment covers:

1. Grasp the hole near the one forward corner of a deck cover, and lift the cover up a little.
2. Reach under the deck cover and lift it up and clear of the tractor.
3. Repeat this process for the other deck cover.

To open the two Forward Compartment covers:

1. Place the aft edge of the deck cover evenly on both side tracks on the chassis.
2. Slide the deck cover rearward while lowering the front edge until the cover clears below the GPU panel protrusion (if equipped).
3. Push the deck cover aft, and lower it into place.

5.2.2 OPENING/CLOSING THE REAR COMPARTMENT

The Rear Compartment is covered by a single hinged deck cover. To open the Rear Compartment:

1. Move the Winch Strap (1) out of the way.
2. Lift the Deck Cover Unlock Handle (2).
3. Lift the deck cover (3) to its full open position.

To close and lock the Rear Compartment when you have finished accessing the compartment:

1. Lower the deck cover (3) to its fully down position.
2. Keep pushing the deck cover down as you release the Deck Cover Unlock Handle (2).
3. Replace the Winch Strap (1).

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5.3 MAIN POWER DISCONNECT

The Main Power Disconnect is located on the front left side of the Control Console. Pulling on the “D” handle until all power line connectors are disconnected cuts off the main power supply to all tractor functions, including the Motor and Hydraulic Pump. If the tractor is equipped with a hydraulic Winch, this will also stop the Hydraulic Winch Motor.

To connect the Main Power Disconnect:

1. Grasp the “D” handle.
2. Align the male and female connectors.
3. Push the “D” handle firmly in until the connectors are fully engaged.

To remove the Main Power Disconnect:

1. Grasp the “D” handle.
2. Pull the removable connector completely out of the fixed connector.

The removable portion of the Main Power Disconnect with the “D” handle connector is used to charge the Motive Power Batteries, as described in *"CHARGING THE BATTERIES” on page 5-20*.

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5.4 USING THE MOTOR CONTROL LEVER

The Motor Control Lever mounted on the Control Console allows you to:

- Select the direction of movement (FORWARD or REVERSE).
- Accelerate or decelerate the tractor in either direction.

To use the Motor Control Lever, select the desired direction of movement.

- To move the tractor forward, push the lever toward the front of the tractor.
- To move the tractor in reverse, pull the lever toward the rear of the tractor.

You can control tractor speed as follows:

- **Acceleration:** Continue pushing (FORWARD) or pulling (REVERSE) the Motor Control Lever away from the center (NEUTRAL) position. The farther you move the lever away from the center position, the more power will be applied to the Drive Motor. This increases speed.
- **Deceleration:** Move the Motor Control Lever toward the center (NEUTRAL) position. The closer you move the lever toward the center position, the less power will be applied to the Drive Motor. This decreases speed.
- **Zero:** Moving the Motor Control Lever to the center position cuts off all power to the Drive Motor. The tractor will coast to a stop, unless you are on a hill.

Note

You must keep your hand on the Motor Control Level to maintain speed. The lever has a spring that returns it to NEUTRAL when released.

When using the Motor Control Lever:

- For greater stability and finer speed control, rest the palm of your hand on the horizontal surface of the Control Console and grasp the Motor Control Lever between your thumb and forefinger.
- Do not grab the Motor Control Lever at the top. The additional leverage may wear the internal potentiometer switch prematurely and cause overly coarse throttle movement.
- Use gradual movements to help ensure smooth, controlled acceleration and deceleration.
- If the tractor does not move on initial Motor Control Lever application, return the Motor Control Lever to the center (NEUTRAL) position, wait a few moments, and then apply power again. This will reset the Drive Controller, and the tractor should begin moving.

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5.5 USING THE PARKING BRAKE

This section describes how to release and engage the Parking Brake. It also describes how to restore hydraulic pressure to release the brakes, if the normal procedure does not work.

5.5.1 SERVICE BRAKE

The Service Brake is used while driving to slow or stop the tractor. Pressing the Service Brake Pedal applies the Service Brake. The further the pedal is depressed, the harder the brakes are applied.

5.5.2 DEAD MAN EMERGENCY / PARKING BRAKE PEDAL

Fully depressing the Dead Man Brake Pedal by standing on it with the left foot fully disengages the mechanically-activated Parking Brake and allows electric power to the Drive Motor. Removing weight from the Dead Man Brake Pedal spring-returns it to the raised position and applies the Parking Brake while also cutting off power to the Drive Motor.

CAUTION

DO NOT USE THE DEAD MAN BRAKE PEDAL IN LIEU OF THE SERVICE BRAKE PEDAL, AS THIS WILL PREMATURELY WEAR THE PARKING BRAKE AND POSSIBLY CAUSE A ROLL-AWAY.

Removing the left foot from the pedal applies the Parking Brake immediately and fully. This is only to be used in the event of emergency or once the tractor comes to a complete stop for parking hold. This action also automatically cuts off all power to the drive motor, as an added safety feature.

5.5.3 APPLYING THE PARKING BRAKE

To apply the brakes, you may either:

- Push the red Main Power Disconnect Switch on the Control Console down to the OFF position.
- Step off the Dead Man Brake Pedal.

You will typically apply the brakes as follows:

- **During operation:** You will step off the Dead Man Brake Pedal but leave the Main Power Disconnect Switch ON.
- **When securing from operation**: You will step off the Dead Man Brake Pedal and push the Main Power Disconnect Switch down to the OFF position.

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5.5.4 RELEASING THE BRAKES

To release the brakes:

1. If needed, move the Direction Selector to the NEUTRAL position.
2. Pull the Main Power Disconnect Switch on the Control Console to the ON position.
3. Turn the Motive Power Switch on the Instrument Panel to the ON position.
4. Step on the Dead Man Brake Pedal.

If this procedure does not release the brakes, this indicates a loss of hydraulic brake pressure. See *"RESTORING BRAKE HYDRAULIC PRESSURE" on page 5-7*.

5. You may now:
   > Move the Motor Control Lever to FORWARD or REVERSE and begin driving. See *"DRIVING" on page 6-1*.
   > Operate the Cradle or Winch Motor.

5.5.5 RESTORING BRAKE HYDRAULIC PRESSURE

As described in *"PARKING BRAKE" on page 4-26*, the brakes require hydraulic pressure to release. A loss of power or hydraulic leak will remove hydraulic pressure and apply the brakes. This "failsafe" system helps prevent the tractor from running away in the event of an electrical or hydraulic failure.

If the procedure described in *"RELEASING THE BRAKES" on page 5-7* does not release the brakes, you may use the brake Pressure Release Pump to restore hydraulic pressure, as described in *"PARKING BRAKE RELEASE" on page 5-10*.

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5.6 OPTIONAL EXTENSION LADDER

Some 86/87 Series tractors include a three-step Extension Ladder that is attached to the rear side of the Operator Compartment. The Extension Ladder may be used to access higher areas on the aircraft, such as when cleaning windshields.

5.6.1 EXTENSION LADDER WARNINGS

DANGER

FAILURE TO FOLLOW EACH OF THE WARNINGS LISTED IN THIS SECTION MAY CAUSE A FALL OR OTHER INJURY.

Before using the Extension Ladder:

- **Always inspect thoroughly for missing or damaged components:** Never use a damaged ladder, and never make temporary repairs.
- **Always remove any foreign material (mud, snow, grease, oil, etc.):** This helps prevent slipping and falling.
- **Always extend the Handrail before using the Extension Ladder:** This helps you maintain balance and helps prevent falls.
- **Always climb the front side of the Extension Ladder:** This helps you maintain balance and helps prevent falls.
- **Always face the Extension Ladder when climbing:** This helps you maintain balance and helps prevent falls.
- **Always use both hands when climbing, and maintain a firm grip:** This helps prevent slipping and falling.
- **Always keep your body centered between the side rails:** This helps you maintain balance and helps prevent falls.
- **Never over-reach:** Move the tractor, if you need to access a different location: This helps you maintain balance and helps prevent falls.
- **Never climb, stand, or sit about the third step:** This helps you maintain balance and helps prevent falls.

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5.6.2 USING THE EXTENSION LADDER

To extend the Handrail:

1. Pull the Handrail Release Knob.
2. Lift the Handrail to the fully-extended position.
3. Push the Handrail Release Knob, and then verify that it is seated on the Extension Ladder to prevent the Handrail from collapsing.

To retract the Handrail:

1. Pull the Handrail Release Knob.
2. Lower the Handrail to the fully-lowered position.

CAUTION

ALWAYS LOWER THE HANDRAIL BEFORE MOVING THE TRACTOR.

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5.7 EMERGENCY PROCEDURES

This section describes the following emergency procedures:

- *"PARKING BRAKE RELEASE" on page 5-10*.
- *"EMERGENCY AIRCRAFT RELEASE" on page 5-12*.
- *"TOWING THE TRACTOR" on page 5-14*.

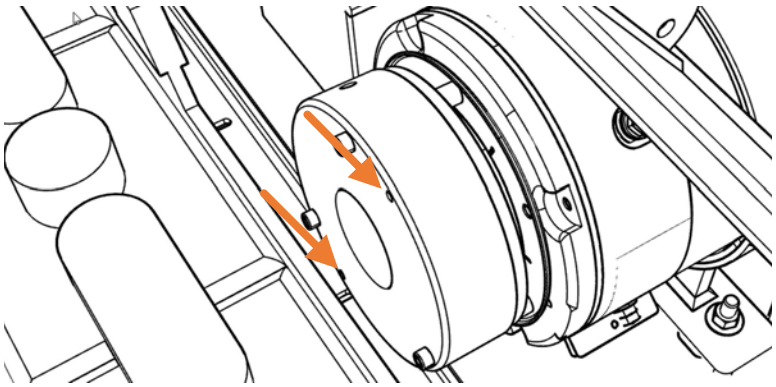
5.7.1 PARKING BRAKE RELEASE

The following conditions may lock the brakes in the engaged position and require mechanical release in order to tow the tractor for safety or operational reasons:

- Electric motive power is not available.
- Hydraulic pressure fails.
- Mechanical seizure due to mechanical damage or mis-adjustment.

To mechanically release the Parking Brake on a LEKTRO 86 or 87 Series tractor:

1. Chock the Drive Wheels.
2. Push the Main Power Disconnect Switch on the Center Console to the OFF position.
3. Open the Forward Compartment, as described in *"OPENING/CLOSING THE FORWARD COMPARTMENT" on page 5-3*.
4. Locate the two Allen screws and Wrench that are zip-tied to the Drive Motor.
5. Install the Allen Screws into the holes at the end of the Parking brake assembly, as shown here.
6. If needed, release the aircraft, as described in *"EMERGENCY AIRCRAFT RELEASE" on page 5-12*.
7. If needed, lower the Cradle, as described in *"EMERGENCY CRADLE LOWER" on page 5-11*.



8. Close the Forward Compartment, as described in *"OPENING/CLOSING THE FORWARD COMPARTMENT" on page 5-3*.

You may now tow the tractor, as described in *"TOWING THE TRACTOR" on page 5-14*.

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DANGER

NEVER OPERATE OR DRIVE THE TRACTOR WHEN THE BRAKES HAVE BEEN MECHANICALLY RELEASED, AS THIS WILL RENDER THE TRACTOR PRONE TO RUNAWAY WHEN STANDING AND IMPOSSIBLE TO STOP WHEN MOVING, AND MAY CAUSE A COLLISION.

DANGER

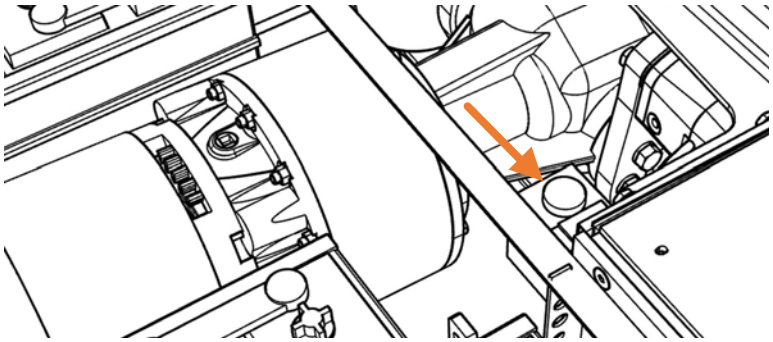
DO NOT OPERATE THE TRACTOR UNTIL THE BRAKES HAVE BEEN REPAIRED, ADJUSTED, AND TESTED ACCORDING TO THE PROCEDURES DESCRIBED IN THE BRAKES SECTION OF THE SERVICE MANUAL.

5.7.2 EMERGENCY CRADLE LOWER

The Cradle may be lowered manually if electric motive power is not available or if hydraulic pressure fails. If no aircraft is on the Cradle, or if you are on Step 6 of the Emergency Aircraft Release procedure (see *"EMERGENCY AIRCRAFT RELEASE" on page 5-12*), then you may lower the Cradle as follows:

1. Open the Forward Compartment, as described in *"OPENING/CLOSING THE FORWARD COMPARTMENT" on page 5-3*.
2. Locate the Cradle Valve at the front right of the Forward Compartment (appearance may vary).
3. Pull the Cradle Valve Knob to release hydraulic pressure to the Lift Cylinders.

   The Cradle will begin lowering.



DANGER

KEEP YOUR FEET CLEAR OF THE CRADLE TO AVOID POSSIBLE CRUSHING INJURY.

4. When the Cradle is lowered sufficiently, release the Emergency Cradle Lower Knob.

CAUTION

DO NOT ALLOW THE CRADLE TO CONTACT THE GROUND. THE WEIGHT OF THE AIRCRAFT LANDING GEAR ON THE CRADLE COULD SANDWICH IT IN PLACE AND MAKE IT IMPOSSIBLE TO MOVE THE TRACTOR.

5.7.3 EMERGENCY AIRCRAFT RELEASE

If the tractor cannot be operated safely and an aircraft is on the Cradle, the aircraft must be released prior to moving the tractor. This procedure depends on the type of Winch installed on the tractor:

- **Manual Winch:** See *"MANUAL WINCH RELEASE" on page 5-12*.
- **Hydraulic Winch:** See *"HYDRAULIC WINCH RELEASE" on page 5-13*.

5.7.3.1 MANUAL WINCH RELEASE

To release a manual Winch:

1. Secure the aircraft by placing chocks on the main gear and/or setting the aircraft Parking Brake, as appropriate.
2. Pay out the Winch Strap as described in the *Aircraft Towing Procedures Manual*.
   > Use the Low Speed Shaft first.
   > If the Low Speed Shaft does not work, then use the High Speed Shaft.

   Note

   Consider placing a soft, clean, lint-free cloth between the Winch Hook and the "D" rings, and the aircraft strut, to prevent damage. Alternatively, consider having a helper manage the Winch Strap or release the brake.

   Note

   If Step 2 fails to release or pay out the Winch Strap, then use a sharp knife to cut the Winch Strap, being careful to not allow the Winch Hook or "D" rings on the Strut Strap, if used, to contact the aircraft.
3. Release the brakes, as described in *"PARKING BRAKE RELEASE" on page 5-10*.
4. Lower the Cradle, as described in *"EMERGENCY CRADLE LOWER" on page 5-11*.
5. If used, remove the Pawl Adapter from the aircraft.
6. Manually push the tractor away from the aircraft to a safe location, and then chock the Drive Wheels. The tractor operator must be standing in the Operator Compartment, with at least two helpers pushing the tractor.

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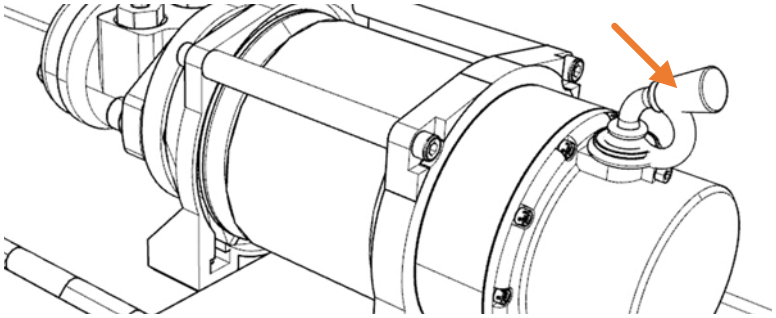
5.7.3.2 HYDRAULIC WINCH RELEASE

To release a hydraulic Winch:

1. Secure the aircraft by placing chocks on the main gear and/or setting the aircraft Parking Brake, as appropriate.
2. If equipped, locate the Winch Release Lever on the Winch Spool, and then release the Winch Spool by rotating the lever counterclockwise.
3. Grasp and manually pay out the Winch Strap, being sure to prevent the Winch Strap Hook or the “D” rings on the Strut Strap, if used, from contacting the aircraft.



Note

Consider placing a soft, clean, lint-free cloth between the Winch Hook and the “D” rings, and the aircraft strut, to prevent damage. Alternatively, consider having a helper manage the Winch Strap or release the brake.

Note

If Steps 2 and/or 3 fail to release or pay out the Winch Strap, then use a sharp knife to cut the Winch Strap, being careful to not allow the Winch Hook or “D” rings on the Strut Strap, if used, to contact the aircraft.

4. Release the brakes, as described in *"PARKING BRAKE RELEASE” on page 5-10*.
5. Lower the Cradle, as described in *"EMERGENCY CRADLE LOWER” on page 5-11*.
6. If used, remove the Pawl Adapter from the aircraft.
7. Manually push the tractor away from the aircraft to a safe location, and then chock the Drive Wheels. The tractor operator must be standing in the Operator Compartment, with at least two helpers pushing the tractor.

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5.7.4 TOWING THE TRACTOR

You may need to tow the tractor if it has lost power or is otherwise unable or unsafe to move under its own power. To do this:

1. Chock the tractor Drive Wheels and, if towing an aircraft, the aircraft main landing gear (or set the aircraft Parking Brake).
2. Release the brakes, as described in *"PARKING BRAKE RELEASE" on page 5-10*.
3. If an aircraft is captured and/or on the Cradle, then lower the Cradle, as described in *"EMERGENCY CRADLE LOWER" on page 5-11* and release the aircraft, as described in *"EMERGENCY AIRCRAFT RELEASE" on page 5-12*.
4. Tow the tractor, using either a tow bar or tow truck.

DANGER

DO NOT OPERATE THE TRACTOR UNTIL THE BRAKES HAVE BEEN REPAIRED, ADJUSTED, AND TESTED ACCORDING TO THE PROCEDURES DESCRIBED IN THE BRAKES SECTION OF THE SERVICE MANUAL.

CAUTION

TOWING THE TRACTOR AT SPEEDS EXCEEDING THE MAXIMUM SAFE TOWING SPEED FOR THAT SPECIFIC MODEL OF TRACTOR WILL DAMAGE THE DRIVE MOTOR.

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5.8 USING THE OPTIONAL AIRCRAFT PROTECTION SYSTEM

This system describes how to use the optional multi-level Aircraft Protection System. See the following:

- *"NORMAL APS STARTUP" on page 5-15*.
- *"APS FAULTS AND TROUBLESHOOTING" on page 5-15*.
- *"RESETTING THE AIRCRAFT PROTECTION SYSTEM" on page 5-17*.

Please also see the *Aircraft Towing Procedures Manual* for information on using the Aircraft Protection System while towing an aircraft.

Note

LEKTRO 86 and 87 Series tractors equipped with a single-level Aircraft Protection System may be configured in a variety of ways to suit individual customer requirements. Please refer to the portion(s) of these instructions that apply to the control(s) mounted on the tractor being operated.

5.8.1 NORMAL APS STARTUP

When starting the tractor, the yellow Torque Caution Light and red Torque Warning light should flash and an alarm should sound momentarily. See *"TRACTOR STARTUP" on page 6-2*.

5.8.2 APS FAULTS AND TROUBLESHOOTING

The Aircraft Protection System lights will flash and an alarm may sound if a fault is detected, as follows:

- **Startup failure:** If the lights and/or alarm fail to activate when starting the tractor, then the system has experienced a failure. You may continue using the tractor, however all limits on acceleration, braking, Winch force, and Cradle heights are disabled.

CAUTION

AVOID PLACING EXCESSIVE TORQUE LOADS ON THE AIRCRAFT NOSE LANDING GEAR WHEN LIMITS ARE DISABLED BY LIMITING ACCELERATION, BRAKING, AND TURNING.

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- **Red Torque Warning Light illuminates and alarm sounds:** The towing operation has exceeded a level that could damage the aircraft nose landing gear. The light and alarm will remain on and all tractor movement will be disabled until the Aircraft Protection System has been reset, as described in *"RESETTING THE AIRCRAFT PROTECTION SYSTEM" on page 5-17*.

WARNING

IF THE TORQUE WARNING ALARM IS TRIGGERED, THEN THE AIRCRAFT NOSE LANDING GEAR MUST BE INSPECTED FOR DAMAGE BEFORE MOVING THE AIRCRAFT.

- **Yellow Torque Caution Light illuminates and alarm sounds:** The towing operation exceeds the configured maximum safe torque for the aircraft being towed. The alarm stops sounding and the light turns off when the torque falls below the safe maximum. You may continue the towing operation, being cautious to avoid high-torque maneuvers.
- **Yellow Torque Caution Light is flashing:** The system has lost communications with both of the Load Pins mounted near the Lift Cylinders. You may continue using the tractor, however all limits on acceleration, braking, Winch force, and Cradle heights are disabled.

CAUTION

AVOID PLACING EXCESSIVE TORQUE LOADS ON THE AIRCRAFT NOSE LANDING GEAR WHEN LIMITS ARE DISABLED BY LIMITING ACCELERATION, BRAKING, AND TURNING.

- **Alarm sounds three times every 10 seconds:** The system has lost communications with the Torque Cell in the Turntable. You may continue using the tractor, however all limits on acceleration, braking, Winch force, and Cradle heights are disabled.

CAUTION

AVOID PLACING EXCESSIVE TORQUE LOADS ON THE AIRCRAFT NOSE LANDING GEAR WHEN LIMITS ARE DISABLED BY LIMITING ACCELERATION, BRAKING, AND TURNING.

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- **Flashing APS Level Buttons and Yellow Torque Caution Light:** The system has detected a weight outside the parameters of any programmed levels. This typically indicates a Load Pin problem. You may continue using the tractor, however all limits on acceleration, braking, Winch force, and Cradle heights are disabled.

CAUTION

AVOID PLACING EXCESSIVE TORQUE LOADS ON THE AIRCRAFT NOSE LANDING GEAR WHEN LIMITS ARE DISABLED BY LIMITING ACCELERATION, BRAKING, AND TURNING.

5.8.3 RESETTING THE AIRCRAFT PROTECTION SYSTEM

The Aircraft Protection System must be reset when a torque warning is triggered. This warning:

- Continually illuminates the red Torque Warning Light.
- Continually sounds the alarm.
- Disables all tractor movement.

To reset the Aircraft Warning System:

1. Open the Forward Compartment, as described in *"OPENING/CLOSING THE REAR COMPARTMENT" on page 5-3*.
2. Insert the PLC Key into the Key Switch on the PLC, if not already present.
3. Turn the Key clockwise until it stops.
4. Return the Key to its original position by turning it counterclockwise.
5. If mandated by company policy, remove the Key from the PLC and return the Key to its designated storage location.
6. Inspect the aircraft nose landing gear for damage, and then determine how to proceed based on the inspection results.

WARNING

IF THE TORQUE WARNING ALARM IS TRIGGERED, THEN THE AIRCRAFT NOSE LANDING GEAR MUST BE INSPECTED FOR DAMAGE BEFORE MOVING THE AIRCRAFT.

5.9 USING THE OPTIONAL GPU

Your LEKTRO 86/87 Series aircraft tractor may be equipped with an optional GPU capability that offers an 1175 cold-cranking ampere power supply at 12, 24, and either 28 or 30 volts. See *"OPTIONAL GPU SYSTEM" on page 4-31*.

The GPU Batteries must have at least 25% charge available before starting an aircraft, to avoid deep-discharge damage. The GPU Battery Power Gauge displays the current charge level. Be aware that cold temperatures may increase the aircraft demand.

5.9.1 POSITIONING EQUIPMENT & PERSONNEL

Position the tractor such that neither it nor attending personnel will be exposed to the engine intake or potential propeller arc and roll-ahead path during any part of the aircraft starting procedure or immediately thereafter.

DANGER

NEVER POSITION THE TRACTOR DIRECTLY IN THE TAXI PATH FORWARD OF A JET ENGINE INTAKE OR SPINNING PROPELLER.

When positioning equipment and personnel:

1. Chock the aircraft to prevent movement, as follows:
   - > **Aircraft with nose-mounted propeller/intake:** Forward and aft of the main gear.
   - > **Aircraft with wing-mounted engines:** Forward and aft of the nose wheel (tricycle gear) or tail wheel (conventional/tail-dragger).
2. Position the tractor and personnel, as follows:
   - > **Aircraft with nose-mounted propeller/intake:** Position the tractor behind the propeller/intake danger zone. Servicing personnel must always be behind the tractor.
   - > **Other aircraft:** Position the tractor directly in front of the aircraft nose at 90 degrees to the aircraft centerline. This adds safety by making the tractor the first point of contact in case the aircraft brake fails or is released prematurely, instead of a spinning propeller or jet intake.

WARNING

ALWAYS REMAIN CLEAR OF THE AIRCRAFT ENGINE OPERATING AND POTENTIAL MOVEMENT AREA DURING AND AFTER THE START SEQUENCE.

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DANGER

NEVER APPROACH THE AIRCRAFT AFTER ENGINE START UNTIL THE PILOT SIGNALS THAT IT IS SAFE TO DISCONNECT THE GPU EXTENSION CABLE.

3. After engine start and disconnecting the GPU Extension Cable, move the tractor clear of the aircraft taxi path, and then remove the chocks and marshal the aircraft clear of the area.

5.9.2 CONNECTING THE GPU EXTENSION CABLE

To connect the GPU Extension Cable:

1. Determine the aircraft voltage requirements.
2. Select the correct Aircraft GPU Adapter. See *"OPTIONAL GPU SYSTEM" on page 4-31* for the available adapter types.
3. Connect the Aircraft GPU Adapter to the GPU Extension Cable.
4. Open the GPU Panel Cover.
5. Select the correct VDC Outlet (12, 24, 28, or 30 VDC).
6. Connect the GPU Extension Cable to the selected VDC Outlet.
7. Verify that you have selected the correct voltage for the specific aircraft you are starting.

DANGER

SELECTING THE WRONG VOLTAGE MAY CAUSE A FIRE OR BATTERY EXPLOSION. IT MAY ALSO RESULT IN SERIOUS DAMAGE TO THE AIRCRAFT ELECTRICAL AND ELECTRONICS SYSTEMS AND/OR THE GPU SYSTEM ON THE TRACTOR.

8. When directed, connect the Aircraft GPU Adapter to the aircraft, being sure not to reverse the polarity.

5.9.3 DISCONNECTING THE GPU EXTENSION CABLE

To disconnect the GPU Extension Cable:

1. Wait until the pilot signals that ground power can be disconnected.
2. Disconnect the GPU Extension Cable from the VDC Outlet on the tractor.
3. Close the GPU Panel Cover.
4. Disconnect the Aircraft GPU Adapter from the aircraft.

Stow the GPU Extension Cable and Aircraft GPU Adapter in one of the Side Compartments.

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5.10 CHARGING THE BATTERIES

LEKTRO aircraft tractors are equipped with lead-acid deep discharge batteries. These batteries are designed to be substantially discharged during long periods of use and then fully charged with one continuous charge. Ideally, the tractor should not be operated when the battery charge falls below 20%. Always charge the batteries before they are depleted to this level.

> *Note*
>
> *By contrast, regular automotive batteries are designed to be only partially discharged (e.g. when starting the engine) and then continuously charged while the engine is running.*

A battery will sustain a finite number of charging cycles. A cycle is a single period of continuous or intermittent discharging followed by recharging. This is true whether the battery is drained to 75% or 30% before recharging; however, the depth of each cycle affects the remaining cycle life. For example, discharging a battery below 20% and then recharging that battery counts as far more than one cycle. In general, a deeper discharge requires more equivalent cycles to recharge the battery to 100%. A single discharge can equal three (3) equivalent cycles, which can significantly reduce battery life.

Maximizing the battery life span therefore requires striking a balance between the longest discharges to get more cycles per period of operational use and avoiding excessively deep discharges. Actual tractor operational needs will sometimes involve trading off a shorter cycle to allow opportunity charging if extended tractor or GPU use beyond the normal operating frequency or demand is forecast.

> *Note*
>
> *Opportunity charging is acceptable, provided that the batteries are on charge for no less than 60 minutes (one hour).*

Always connect the charger to an AC power outlet that will supply uninterrupted power overnight. A charger that shuts off when the facility closes for the night may not fully charge the battery and may also waste cycles.

5.10.1 MEASURING THE BATTERY CHARGE

If the tractor is equipped with a Battery Indicator Gauge, this can give a good indication of the amount of charge remaining in the battery. This gauge should never be used when the tractor is connected to a charger, because it will read a full charge.

Measuring the specific gravity of the battery electrolyte is accurate under all conditions.

- A fully-discharged battery has a specific gravity of 1.110 or less.

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- The minimum GPU Battery charge required to safely start an aircraft has a specific gravity of 1.155.
- A fully-charged battery has a specific gravity of approximately 1.265.

Note

These values assume an electrolyte temperature of 80° F (26.7° C), which is the standard hydrometer reference temperature.

5.10.2 BATTERY CHARGING WARNINGS

DANGER

FAILURE TO FOLLOW EACH OF THE WARNINGS LISTED IN THIS SECTION MAY RESULT IN ELECTROCUTION, THERMAL OR CHEMICAL BURNS, AND/OR OTHER INURY AND PROPERTY DAMAGE.

- **Water conducts electricity:** Always charge batteries in a designated indoor or protected outdoor area away from rain, snow, and condensing moisture. Never handle electrical cables while standing in water.
- **Chargers that are not matched to the battery can cause a fire or explosion, and may damage the battery:** Always use battery chargers supplied by or approved by LEKTRO or the battery manufacturer.
- **Batteries release hydrogen and oxygen gases while charging:** Always keep the battery compartment cover open during charging, and ensure that these gases are free to vent directly to the atmosphere.
- **Battery acid can cause severe chemical burns:** Always wear appropriate Personal Protective Equipment (PPE) when servicing batteries. See the Battery section of the *Service Manual* for detailed information.
- **Hydrogen is extremely flammable:** Never smoke or use any open flame or electrical tool, motor, or other spark-producing equipment in the vicinity of a charging battery. Post appropriate standard warning signs in the battery charging area.
- **Vibration can damage battery chargers:** Never store battery chargers in the tractor motor compartment.
- **Excessive charging can damage the batteries:** Never leave batteries unattended on the charger for more than 48 hours, in case the charger auto shutoff fails.
- **Battery fluid level may rise during charging:** Never fill the battery cells prior to charging. See the Battery section of the *Service Manual* for detailed information.

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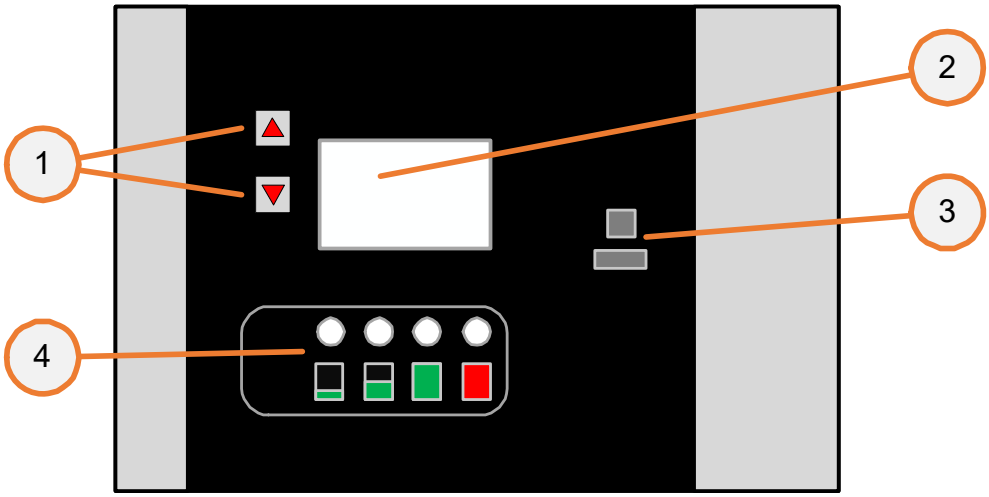
5.10.3 MOTIVE BATTERIES

This section describes the Motive Battery Charger and how to charge the Motive Batteries.

5.10.3.1 MOTIVE BATTERY CHARGER

LEKTRO supplies a Motive Battery Charger that is compatible with the Motive Batteries in LEKTRO 86/87 Series aircraft tractors.



The Motive Battery Charger includes the following indicators and controls:

- **Settings buttons (1):** Allow the user to navigate the display and alter some charger settings. Refer to the manual included with the charger.
- **Volt/Ampere Display (2):** Indicates the amount of battery voltage or current being drawn by the charger. Higher amperage readings indicate a more discharged battery.
- **USB/Network ports (3):** Do not plug anything in to these ports. They are intended for troubleshooting and repair purposes only.
- **Status LED (4):** These LED illuminate from left to right to indicate the battery charge level. When lit, the red LED indicates a problem. All lights turn off when the battery is fully charged.

5.10.3.2 CHARGING THE MOTIVE POWER BATTERIES

To charge the Motive Batteries:

1. Position the tractor and charger in a well-ventilated area on a stable surface, away from precipitation, standing water, and condensation.
2. Open the Battery Deck Cover to allow the explosive gases generated by the charging process to ventilate. See *"OPENING/CLOSING THE REAR COMPARTMENT" on page 5-3*.
3. Check the electrolyte level in the Motive Batteries to verify that the plates in the battery cells are covered with electrolyte and that the cells are below the maximum fill level.

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4. Disconnect the Main Power Disconnect from the tractor by pulling the “D” shaped handle. See *"CONTROL CONSOLE” on page 4-6* for the Main Power Disconnect location.
5. Connect the tractor Charger Output Cable from the Motive Battery Charger to the Main Power Disconnect that you removed in Step 4.

CAUTION

DO NOT ATTEMPT TO CONNECT THE MOTIVE BATTERY CHARGER TO THE MAIN POWER DISCONNECT SOCKET ON THE TRACTOR. ALWAYS CONNECT THE MOTIVE POWER CHARGER TO THE MAIN POWER DISCONNECT SOCKET WITH THE “D” SHAPED HANDLE.

6. Connect the AC Power Cable from the Motive Battery Charger to the incoming AC power supply.
7. Check the Volt/Ampere Display to verify that the charger is supplying power to the tractor.
   > A battery discharged to 20% remaining power should show a maximum ampere draw.
   > A battery nearly fully charged should show a draw of approximately 10 amperes.
   > The Ampere Gauge reading should gradually taper off until the finished rate of approximately 5 to 10 amps is reached.
8. When the batteries are fully charged (Status LEDs are off), disconnect the Motive Battery Charger from the incoming AC power supply first.
9. Disconnect the Motive Battery Charger from the tractor Power DC Connector.
10. Close the Rear Compartment. See *"OPENING/CLOSING THE REAR COMPARTMENT” on page 5-3*.

Charging the Motive Batteries will take approximately eight to ten hours when the batteries have been discharged to the 20% level.

Note

The fully automatic Motive Battery Charger supplied with this tractor will automatically shut off when a full charge is reached. You may leave this charger unattended overnight, because overcharging is not normally a concern.

5.10.3.3 EQUALIZING THE MOTIVE BATTERIES

An “equalizing charge” is a controlled overcharge that brings up low cells and/or removes sulfur from the plates in the Motive Batteries. This process is essential for obtaining full battery performance. LEKTRO recommends performing an equalizing charge every month or after every 16 charging cycles, whichever comes first. To do this:

1. Wait until the Motive Batteries are fully charged and the Motive Battery Charger has sequenced through the finishing automatic ON/OFF cycles and is finally shut off.
2. Press the yellow Equalize Button on the Motive Battery Charger.
3. Wait approximately one hour for the automatic equalizing charge to occur.

Note

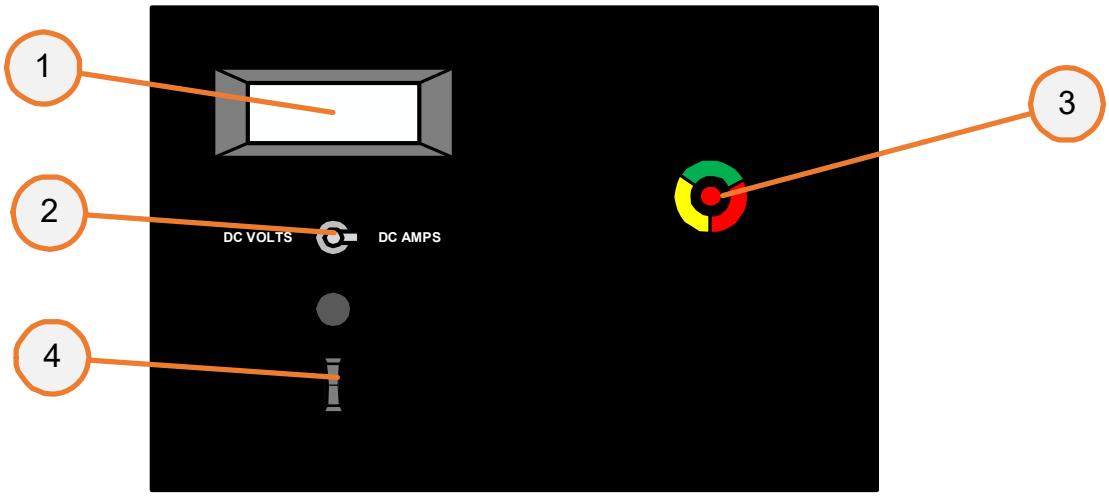
Some replacement chargers may have a different "equalizing" feature. Refer to the manufacturer's instructions in this case.

5.10.4 GPU BATTERIES

This section describes the GPU Battery Charger and how to charge the GPU Batteries.

5.10.4.1 GPU BATTERY CHARGER

If the tractor is equipped with optional GPU Batteries, then LEKTRO will supply a GPU Battery Charger that is compatible with the GPU Batteries.



The GPU Battery Charger includes the following indicators and controls:

- **Volt/Ampere Display (1):** Indicates the amount of battery voltage or current being drawn by the charger. Higher amperage readings indicate a more discharged battery.
- **Volts/Amps Switch (2):** Switches the Volt/Ampere Display between battery voltage and charger current.
- **Status LED (3):** This LED illuminates as follows:
  - > **Red:** Battery charge is less than 80%.
  - > **Yellow:** Battery charge is above 80%.
  - > **Green:** Charger is either off (steady light) or in maintenance mode (flickering light).

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- **Power Switch (4):** Turns the charger on or off.

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5.10.4.2 CHARGING THE GPU BATTERIES

To charge the GPU Batteries:

1. Position the tractor and charger in a well-ventilated area on a stable surface, away from precipitation, standing water, and condensation.
2. Open the Battery Deck Cover to allow the explosive gases generated by the charging process to ventilate. See *"OPENING/CLOSING THE REAR COMPARTMENT" on page 5-3*.
3. Check the electrolyte level in the GPU Batteries to verify that the plates in the battery cells are covered with electrolyte and that the cells are below the maximum fill level.
4. Connect the tractor Charger Output Cable from the GPU Battery Charger to the tractor GPU Power Connector on the GPU Batteries.
5. Connect the AC Power Cable from the GPU Battery Charger to the incoming AC power supply.
6. Check the Volt/Ampere Display to verify that the charger is supplying power to the tractor.
   - > A battery discharged to 20% remaining power should show a maximum ampere draw.
   - > A battery nearly fully charged should show a draw of approximately 10 amperes.
   - > The Ampere Gauge reading should gradually taper off until the finished rate of approximately 5 to 10 amps is reached.
7. When the batteries are fully charged, disconnect the GPU Battery Charger from the incoming AC power supply first.
8. Disconnect the GPU Battery Charger from the tractor GPU Power Connector.
9. Close the Rear Compartment. See *"OPENING/CLOSING THE REAR COMPARTMENT" on page 5-3*.

Charging the GPU Batteries will take approximately eight to ten hours when the batteries have been discharged to the 20% level.

Note

The fully automatic GPU Battery Charger supplied with this tractor will automatically shut off when a full charge is reached. You may leave this charger unattended overnight, because overcharging is not normally a concern.

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5.10.4.3 EQUALIZING THE GPU BATTERIES

An “equalizing charge” is a controlled overcharge that brings up low cells and/or removes sulfur from the plates in the GPU Batteries. This process is essential for obtaining full battery performance. LEKTRO recommends performing an equalizing charge every month or after every 16 charging cycles, whichever comes first. To do this:

1. Wait until the GPU Batteries are fully charged and the GPU Battery Charger has completed the finishing cycles.
2. Disconnect the GPU Battery Charger from the incoming AC power supply.
3. Reconnect the GPU Battery Charger to the incoming AC power supply. This force-restarts the charger, which will run for at least its 45-minute auto-timed base period up to approximately two hours, depending on electrolyte and ambient temperatures.

Note

LEKTRO recommends repeating this sequence no more than two (2) times. The supplied GPU Battery Charger has a higher designed finishing rate than manual chargers, and too many restarts may damage the GPU Batteries because of excessive heat.

Note

Some replacement chargers may have a different “equalizing” feature. Refer to the manufacturer's instructions in this case.

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CHAPTER 6

DRIVING

This chapter describes driving the tractor, which encompasses the following topics:

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6.1 BEFORE DRIVING

Driving the LEKTRO 86/87 Series aircraft tractor is similar to driving a forklift, in that the steering wheel controls the rear wheels rather than the front wheels. This allows the operator to more accurately control the positioning of aircraft; however, additional caution must be exercised when driving the vehicle forward, especially at high speeds.

Note

All of the instructions in this manual use the orientation described in "ORIENTATION" on page 4-2.

6.1.1 DRIVING DIRECTION

The tractor is usually driven in the following directions when moving over longer distances:

- **While towing an aircraft:** Reverse.
- **While not towing an aircraft:** Forward.

6.1.2 TRACTOR STARTUP

To start the tractor at the beginning of each shift or operational period:

1. Perform a Pre-Use Safety Inspection and complete an *Operator Pre-Use Safety Checklist* form, as described in *"OPERATOR PRE-USE SAFETY CHECKLIST" on page A-1*.
2. Perform a walk-around inspection to ensure that the vehicle is free to move without causing damage, and that all objects on the vehicle are secured.
3. Climb in to the Operator Compartment and verify that you can easily reach and operate all driving controls.
4. Dismount the tractor, and then remove the wheel chock(s).
5. Stand in the Operator Compartment, and then lower the armrests.

WARNING

ALWAYS LOWER THE ARMRESTS ALL THE WAY BEFORE MOVING THE TRACTOR.

6. Pull the Main Power Disconnect Switch up to turn it ON. See *"CONTROL CONSOLE" on page 4-6*.

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7. Turn the Motive Power Switch (either key or lever) clockwise to turn it ON. See *"INSTRUMENT PANEL" on page 4-7*.

   > If the tractor is equipped with a single-level Aircraft Protection System, then the yellow Torque Caution Light and red Torque Warning Light should flash and an alarm should sound momentarily.

   > If the tractor is equipped with a multi-level Aircraft Protection System, then the yellow Torque Caution Light and red Torque Warning Light should flash and an alarm should sound momentarily.

   See *"APS FAULTS AND TROUBLESHOOTING" on page 5-15* if the Aircraft Protection System does not respond in this manner.

8. Verify that sufficient charge remains to accomplish the required task. If equipped, you can do this using the Battery Indicator Gauge. See *"INSTRUMENT PANEL" on page 4-7*.

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6.2 DRIVING THE TRACTOR

To drive the tractor:

1. Perform the startup procedure described in *"TRACTOR STARTUP" on page 6-2*.
2. Turn on lights as required for safety based on the time of day, weather conditions, and airport policy. In general, running and parking lights draw little power and may be left on when driving or when parked in a congested area. Headlights and strobes draw more power and should only be turned on when needed.
3. Stand in the Operator Compartment with your left foot on the Dead Man Brake Pedal.
4. Push the Parking Brake Knob in to release the brakes.
5. Move the Motor Control Lever in in the direction that you want to drive.
   > Pushing the lever toward the front of the vehicle selects FORWARD.
   > Centering the lever selects NEUTRAL.
   > Pulling the lever toward the rear of the vehicle selects REVERSE.

WARNING

ALWAYS VERIFY THAT YOU HAVE SELECTED THE CORRECT DIRECTION. SELECTING THE WRONG DIRECTION COULD CAUSE A COLLISION RESULTING IN DEATH, INJURY, AND/OR DAMAGE TO EQUIPMENT OR OTHER PROPERTY.

Note

The FORWARD and REVERSE directions are relative to the front of the vehicle, and not to the direction the operator is facing. In general, move the Motor Control Lever toward where you want to go.

6. Gradually move the Motor Control Lever as required to move the vehicle.
   > If the vehicle does not move on initial accelerator application, then move the Motor Control Lever back to NEUTRAL, and then attempt to drive in your desired direction. This will reset the Controller and the vehicle should begin moving.
   > The more you push or pull the lever, the more power will be applied.
7. Control the vehicle speed using the Motor Control Lever and Service Brake Pedal as required.

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8. Turn as required using the Steering Wheel. See *"USING THE STEERING WHEEL" on page 6-6*.
9. If needed, sound the horn by using your thumb to press the Horn Button on the Instrument Panel. This button is located within easy reach of the Motor Control Lever.
10. Stop the vehicle by pressing the Brake Pedal.

While driving:

- The following chart lists the Maximum Safe Design Speed for selected models in the LEKTRO 86/87 Series of aircraft tractors.

TRACTOR MODEL	MAX. SPEED (EMPTY)	MAX. SPEED (FULLY LOADED)
8600A-EZ	6.6 MPH / 10.6 KPH	4.5 MPH / 7.2 KPH
8600A	6.6 MPH / 10.6 KPH	4.5 MPH / 7.2 KPH
8650AX-EZ	6.8 MPH / 10.9 KPH	4.1 MPH / 6.6 KPH
8650AX	6.8 MPH / 10.9 KPH	4.1 MPH / 6.6 KPH
8600A-M	5.9 MPH / 9.4 KPH	3.5 MPH / 5.7 KPH
8700C-EZ	7.0 MPH / 11.2 KPH	3.0 MPH / 4.8 KPH
8700C	7.0 MPH / 11.2 KPH	3.0 MPH / 4.8 KPH
8700C-ALM	8.0 MPH / 12.6 KPH	3.5 MPH / 5.6 KPH
8750C-EZ	8.0 MPH / 12.6 KPH	3.5 MPH / 5.6 KPH
8750C	6.0 MPH / 9.6 KPH	3.3 MPH / 5.4 KPH
8750C-AL-700	8.0 MPH / 12.6 KPH	3.5 MPH / 5.6 KPH

- Driving or towing the tractor too fast down an incline will overspeed the drive motor. The drive motor may be damaged or destroyed by overspeed.

CAUTION

NEVER DRIVE OR TOW THE TRACTOR FASTER THAN ITS MAXIMUM SAFE DESIGN SPEED, AS THIS MAY DAMAGE OR DESTROY THE DRIVE MOTOR.

6.2.1 USING THE STEERING WHEEL

The Steering Wheel turns the dual Steer Wheels located at the rear of the tractor just ahead of the Operator Platform. When turning, the tractor behaves similarly to a forklift with rear wheel steering. LEKTRO recommends using the Steering Knob on the Steering Wheel to always allow one-handed steering control, even when turning the steering wheel rapidly through multiple revolutions.

- When driving FORWARD:
  - > To turn the tractor to the right relative to the direction of travel, rotate the Steering Wheel counterclockwise. This swings the rear of the tractor to the left to allow the front of the tractor to change direction to the right.
  - > To turn the tractor to its left relative to the direction of travel, rotate the Steering Wheel clockwise. This swings the rear of the tractor to the right to allow the front of the tractor to change direction to the left.
- When driving in REVERSE:
  - > To turn the tractor to its right relative to the direction of travel, rotate the Steering Wheel clockwise. This swings the rear of the tractor to the right and allows the front of the tractor to follow.
  - > To turn the tractor to its left relative to the direction of travel, rotate the Steering Wheel counterclockwise. This swings the rear of the tractor to the left and allows the front of the tractor to follow.

DANGER

NEVER INITIATE A SHARP TURN WHEN DRIVING FORWARD AT HIGH SPEED, AS THIS MAY DESTABILIZE AND/OR CAPSIZE THE TRACTOR.

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6.3 EXITING THE TRACTOR

If you need to temporarily exit the vehicle, such as when capturing or releasing an aircraft:

1. Press the Brake Pedal to apply the brakes, until the vehicle comes to a complete stop.
2. Move the Motor Direction Lever to the NEUTRAL position.
3. Turn the Motive Power Switch counterclockwise to turn it OFF.
4. Raise the arm rests all the way.
5. Step off the Dead Man Brake Pedal.
6. Exit the tractor.

Note

This procedure is intended to temporarily secure the tractor. See "TRACTOR SHUTDOWN" on page 6-10 for instructions on how to shut down the tractor at the end of the shift or operating period.

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6.4 BRAKING

The vehicle can be stopped in several ways:

- Pressing the Brake Pedal to bring the tractor to a gradual and controlled stop. See *"DRIVING THE TRACTOR" on page 6-4*.
- Moving the Motor Control Lever to the position opposite to the current direction of travel, and then applying controlled pressure to the Motor Control Lever. This is called "plug braking," and is described in *"PLUG BRAKING" on page 6-8*.
- Parking Braking by stepping off the Dead Man Brake Pedal. See *"PARKING BRAKING" on page 6-9*.

CAUTION

NEVER USE THE DEAD MAN BRAKE PEDAL FOR ROUTINE STOPPING. THIS WILL CAUSE EXCESSIVE PAD WEAR, WHICH MAY CAUSE THE TRACTOR TO ROLL AWAY WHEN STOPPED. ALWAYS REPORT A WEAKENING PARKING BRAKE TO MAINTENANCE FOR PROMPT REPAIR.

6.4.1 PLUG BRAKING

Plug braking is unique to electric vehicles. It uses the Drive Motor as a brake to slow the vehicle and then reverse direction in a single motion. This method is safe and will not damage the vehicle. To use plug braking:

- With the vehicle moving in one direction, move the Motor Control Lever to the NEUTRAL position.
- Move the Motor Control Lever to the direction opposite the current direction of travel.
- Apply pressure to the Motor Control Lever to stop the vehicle. If you keep pressing the Motor Control Lever after the vehicle stops, it will begin moving in the opposite direction. The amount of pressure on the Motor Control Lever determines the resulting braking and acceleration force.

CAUTION

DO NOT USE PLUG BRAKING WHILE TOWING AN AIRCRAFT, EXCEPT IN CASE OF EMERGENCY.

Using plug braking while towing an aircraft can damage or destroy the Drive Motor for the following reasons:

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- The heavier load applies the braking force more suddenly and with coarser control compared to pressing the Service Brake Pedal. This places excessive loads on the tractor and aircraft and could cause the aircraft wheel to escape the Cradle gates.
- LEKTRO presets plug braking to safely and smoothly stop the tractor when empty. The weight of the captured aircraft weight proportionally increases the overall force required to stop the tractor, and this may exceed Drive Motor limits.

6.4.2 PARKING BRAKING

Parking Braking should only be performed when applying the Service Brake Pedal fails to stop the vehicle. This procedure should only be done in an emergency, because it will bring the vehicle to an abrupt stop.

6.4.2.1 COLLISION IMMINENT

To stop the tractor if the Brake Pedal fails and a collision is imminent:

1. Step off the Dead Man Brake Pedal to engage the brake and stop the tractor.
2. If Step 1 fails, use plug braking to stop the tractor, as described in *"PLUG BRAKING" on page 6-8*.

6.4.2.2 COLLISION NOT IMMINENT

To stop the tractor if the Brake Pedal fails and a collision is not imminent:

1. Use plug braking to stop the tractor, as described in *"PLUG BRAKING" on page 6-8*.
2. Step off the Dead Man Brake Pedal to engage the brake once the tractor is stopped.

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6.5 TRACTOR SHUTDOWN

Perform this procedure to shut down the tractor when it will be left unattended for an extended period of time, such as between shifts or operational periods:

1. Center the Steer Wheels.
2. Press the Service Brake Pedal to apply the brakes.
3. Move the Motor Control Lever to the NEUTRAL position.
4. Ensure the Cradle is lowered.
5. Turn the Motive Power Switch counterclockwise to turn it OFF.
6. Step off the Dead Man Brake Pedal.

If you are parking the tractor where there is a risk of unauthorized persons tampering with the tractor, then push the Main Power Disconnect Switch in to turn main power OFF. If equipped, remove the key from the Motive Power Switch.

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APPENDIX A

OPERATOR PRE-USE SAFETY CHECKLIST

This chapter contains a pre-formatted *Operator Pre-Use Safety Checklist* form that can be copied and used when performing the tractor safety inspection described in *"BASIC OPERATIONS" on page 5-1*.

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LEKTRO

86/87 SERIES
OPERATOR PRE-USE SAFETY CHECKLIST

VEHICLE SERIAL # OR IDENT CODE	DATE	TIME

GUIDE: Before first use of the day or shift, the operator of the tractor must check each of the applicable items listed below during a quick visual walk-around followed by a brief functional test drive, following the instructions on reverse side of this sheet. Place a check mark in the appropriate SERVICEABLE (SVBLE) or WITHDRAWAL priority box.

PRIORITY 1 (P1)	Tag the vehicle and route for immediate repair.
PRIORITY 2 (P2)	Tag the vehicle & route for repair within 24 hrs or as soon as practicable.
— = Priority not applicable for this item.	

#	ITEM	SVBLE	WITHDRAWAL		REMARKS
			P1	P2	
1	MAIN POWER DISCONNECT HANDLE				
2	DEAD MAN BRAKE PEDAL				
3	SERVICE BRAKE PEDAL				
4	STEERING				
5	MOTOR CONTROL LEVER				
6	LIGHTS				
7	ANTI-SKID SURFACES				
8	TIRES				
9	HOOK SAFETY CATCH				
10	WINCH ASSEMBLY/MOTOR				
11	WINCH STRAP				
12	STRUT STRAP				
13	STRUT STRAP PROTECTIVE SLEEVE				
14	ACFT. RECOGNITION SYSTEM (IF EQUIPPED)				
15	GPU CONNECTORS/CABLES (IF EQUIPPED)				
16	BATTERY CHARGER CONNECTORS/CABLES				
17	AIRCRAFT WHEEL CHOCKS				
18	FIRE EXTINGUISHER (IF EQUIPPED)				
19	MISC: _____				

OPERATOR SIGNATURE: _____ **DATE:** _____

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INSTRUCTIONS - 86/87 SAFETY CHECK

MAIN POWER DISCONNECT HANDLE - Verify that motive and hydraulic Winch power (if equipped) is cut off when the handle is pulled to the disconnected OFF position by performing accelerator/Winch functions. **PRIORITY 1 ONLY**.

DEADMAN EMERGENCY/PARK BRAKE - Stand on the Dead Man Brake Pedal, and then gradually accelerate forward until reaching a moderate speed. Move the Motor Control Lever to NEUTRAL, and then remove your foot from the Dead Man Brake Pedal before the tractor decelerates. Tractor should stop abruptly and hold. **PRIORITY 1 ONLY**.

SERVICE FOOT BRAKE - With the tractor in motion, check Service Brake Pedal operation. Pedal should not depress more than 3 inches (7 cm.) from its rest position before braking action is felt. Depressed pedal should feel firm and not spongy. Braking action should be positive and proportional to applied pedal effort. **PRIORITY 1 ONLY.**

STEERING - While driving forward at slow speed, perform a lock-to-lock steering maneuver to verify that steering force is smooth and steady. **PRIORITY 1:** If irregular and/or jams or severe racheting felt. **PRIORITY 2:** If stiff but constant.

MOTOR CONTROL HANDLE - With tractor in motion, ensure speed control functions respond smoothly and proportional to accelerator handle input. **PRIORITY 1:** If undemanded sudden speed-surges or hesitations occur while tractor is moving. **PRIORITY 2:** If minor undemanded speed fluctuation occurs, report and monitor closely until repaired.

LIGHTS (IF EQUIPPED) - Ensure all lights are operational. **PRIORITY 1:** If regulatory requirement or tractor to be used on high density airport traffic corridor at night, then repair prior to dusk. **PRIORITY 2:** In other cases.

ANTI-SKID SURFACES - Anti-skid strips on the Operator Platform are intact and not excessively worn. **PRIORITY 2 ONLY**.

TIRES - Visually check the Drive Tires to ensure adequate inflation, if pneumatic. Tires should not bulge on bottom ground contact area with tractor empty. Rear Steer Tires are solid and not inflation-critical. **PRIORITY 1 ONLY**.

WINCH HOOK - Inspect Winch Hook for damage. Push Winch Strap hook safety catch to the OPEN position. Ensure that the return spring on the catch supplies enough force to fully close catch and that catch is free-moving. **PRIORITY 1:** If hook is damaged and/or spring inoperable or catch jammed. **PRIORITY 2:** If catch operation is sticky.

WINCH ASSEMBLY - Check that the Winch mounting bolts are tight and that the manual or hydraulic controls operate correctly. **PRIORITY 1 ONLY**.

WINCH AND STRUT STRAPS - Visually confirm Winch Strut Strap condition. Strut Strap “D” ring and hook attachment stitching in good condition. **PRIORITY 1:** If failure imminent under tow loads. **PRIORITY 2:** If in state of advanced wear.

STRUT STRAP PROTECTIVE SLEEVE - Touch to ensure free of grease build-up and grit that could scratch shiny aircraft nose wheel oleo strut. Wipe off any grit before use, then wash with detergent at first opportunity. Order replacement if missing. **PRIORITY 2 ONLY**.

AIRCRAFT PROTECTION SYSTEM - Confirm that all Aircraft Protection System lights flash and an alarm sounds briefly when the tractor is powered ON.

GPU ELECTRICAL CONNECTORS AND CABLES (IF EQUIPPED) - Inspect GPU extension, aircraft adapters, and tractor GPU outlet connectors. Ensure cable and connector components are not damaged or worn. **PRIORITY 1:** If wear or damage severe enough to risk electrical insulation integrity do not use GPU until repaired. **PRIORITY 2: I**f lesser wear or damage, monitor during GPU use. Route affected components for repair when practical.

BATTERY CHARGER CABLES AND CONNECTORS - Inspect charger input and output wires, and the connector plugs. Ensure not damaged or worn. **PRIORITY 1:** If risk of electrical insulation integrity loss, do not use charger until repaired. **PRIORITY 2:** If lesser damage or wear, continue to use but tag for repair as soon as practical.

AIRCRAFT WHEEL CHOCKS - Ensure adequate supply of serviceable chocks, sized for aircraft type(s) to be moved, are secured on the tractor or available on site for both sides of both main gear, regardless of whether aircraft brakes are set or not when aircraft released. **PRIORITY 1 ONLY**.

FIRE EXTINGUISHER (IF EQUIPPED) - On tractors so equipped by owner, check for damaged handle, pins, levers, mounting bracket and broken seal. If gauge type, verify gauge registers in “CHARGED” zone. Remove unserviceable extinguisher from tractor and operational area immediately. **PRIORITY 1:** Replace immediately if extinguisher mandatory by regulation or no other “first response” extinguisher of same agent type near operating site. **PRIORITY 2:** If not regulatory requirement and other extinguisher of same agent type is available near operating site, replace at first opportunity.

MISCELLANEOUS - Any additional defect(s) that the operator feels is a direct and immediate safety risk, e.g. sharp protrusion due to a component break that constitutes an injury hazard.

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APPENDIX B

RECEIVING

This chapter contains the LEKTRO Gold Seal Limited Warranty and describes the procedure for receiving, setting up, and running in a new LEKTRO 86/87 Series aircraft tractor.

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B.1 GOLD SEAL LIMITED WARRANTY

This ONE YEAR GOLD SEAL LIMITED WARRANTY covers equipment manufactured by LEKTRO, Inc. (the “Equipment”). LEKTRO warrants that the Equipment is free from defects in material and workmanship, and is fit for the purpose for which we recommend it.

Provided that the Equipment is used in accordance with LEKTRO guidelines, is not abused, and is serviced in accordance with LEKTRO's recommended servicing guidelines, LEKTRO agrees that, for a period of one (1) year after the date of delivery to the party who purchases the Equipment from us, LEKTRO will replace or repair, at our option, any defective material, parts or workmanship which, in our judgment, does not conform to this limited warranty. The Equipment requiring service or repair under this limited warranty shall be returned to LEKTRO’s factory in Warrenton, Oregon at the owner's expense, and will be returned to the owner transportation collect. In the event that any technician from LEKTRO is required to travel to the owner's place of business or elsewhere to perform service or repair under this limited warranty, the owner will be responsible for all costs of travel, meals, lodging and other incidental expenses of LEKTRO.

Notwithstanding the foregoing, no warranty is made with respect to tires, batteries, other wear items, and any parts or accessories used with or incorporated into the Equipment which were not manufactured by LEKTRO. LEKTRO agrees to assign to each purchaser of Equipment all of its rights under any warranties given by the manufacturers of such parts and accessories.

This limited warranty sets forth all obligations of LEKTRO in the event defects appear in the Equipment. In the event repair or replacement of Equipment is in LEKTRO's judgment impossible, LEKTRO’s liability is limited to the amount it actually received for such Equipment. LEKTRO shall in no event be liable to any party for lost profits, diminution of good will or any other incidental or consequential damages, or loss of use, or any other commercial losses, however occasioned.

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B.2 RECEIVING, SETUP, AND RUN-IN

This section describes how to set up your new LEKTRO 86/87 Series aircraft tractor and how to properly run it in to help prolong its useful life while ensuring maximum battery usability and minimizing future maintenance needs.

WARNING

ALL PERSONNEL RESPONSIBLE FOR OPERATING, MAINTAINING, AND/OR REPAIRING THE LEKTRO 86/87 SERIES AIRCRAFT TRACTOR MUST READ, UNDERSTAND, AND COMPLY WITH ALL APPLICABLE COMPONENT SUPPLIER INSTRUCTIONS, WARNINGS, AND MATERIAL SAFETY DATA SHEETS (MSDS) CONTAINED IN THE SERVICE MANUAL BEFORE PERFORMING ANY OF THE TASKS DESCRIBED IN THIS SECTION.

B.2.1 RECEIVING CHECK

When you receive a new LEKTRO 86/87 Series aircraft tractor:

1. Inspect the tractor thoroughly before accepting it from the shipper.
2. Remove all wrappings and look for structural and component damage, battery electrolyte spill corrosion in the battery compartment and any misaligned components caused by tie-down stress, vibration, and/or impact during shipping.
3. Verify that all attachments, adapter, and charger items detailed in the *LEKTRO Component - Chassis Location For Shipping* list are on hand and checked off before signing.
4. Check the packing list for any additional pre-operation instructions that are not included in the *Operation Manual*.
5. Pull the Main Power Disconnect knob to the ON position, turn the Motive Power Switch ON, and then verify that all primary and motive controls described in *"COMPONENTS & CONTROLS" on page 4-1* are functioning properly and to verify that there is no hidden transportation damage.
6. In the event of transportation damage or loss, it is your responsibility to file a claim with the shipping company. Failure to do so could result in the shipping company denying your claim.

B.2.2 POST-DELIVERY INSTALLATION

86/87 Series tractors may ship with some or all external components removed, depending on the mode of transport, packaging needs, customer instructions, and shipping exposure protection. If your 86/87 shipment includes any removed external components, then refer to the appropriate section(s) in the 86/87 Series *Service Manual* for step-by-step instructions.

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B.2.3 BATTERIES

Inspect the battery compartment(s) and batteries, as follows:

1. Check the battery compartment for signs of electrolyte overflow.
2. If any electrolyte has overflowed, then flush the tops and surrounding battery compartment surfaces with a solution of 1 lb. baking soda dissolved in 1 gallon of water (0.5 kg. to 4 liters).
3. Refer to the *Batteries* section of the 86/87 Series *Service Manual* for step-by-step instructions on how to check and fill the electrolyte levels in all battery cells.
4. Charge the batteries to their 100% charge level.

CAUTION

DISCHARGING THE BATTERIES BELOW 50% DURING THE FIRST FIVE CHARGING CYCLES MAY REDUCE BATTERY CAPACITY AND/OR BATTERY LIFE.

B.2.4 CHARGER INSTALLATION

Refer to one or both of the following resources for detailed charger installation instructions:

- *Batteries* section in the 86/87 Series *Service Manual*.
- Charger manual attached to the charger.

You will need to:

- Verify that the adjustable Input Voltage tap setting matches your power source.
- Set the Hour switch. For heavy-use applications, LEKTRO recommends setting this to 12 hours.

B.2.5 TRACTOR RUN-IN

Perform all of the following checks after the first 30 hours of tractor use:

- Open all access panels and decks.
- Check for loose bolts, chafe points, and loose wire connections.
- Check all hydraulic line connection fittings for leaks.
- Check the hydraulic reservoir level and add fluid, if required. Refer to the Hydraulics section in the 86/87 Series *Service Manual* for step-by-step instructions.

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B.2.6 INITIAL SAFETY & TRACTOR CARE PREPARATIONS

- Review *"COMPONENTS & CONTROLS" on page 4-1*, *"BASIC OPERATIONS" on page 5-1*, and any Alert Bulletins included with your tractor.
- Copy the Material Safety Data Sheet (MSDS) for tractor Motive Batteries and (if equipped) GPU Batteries, and then place/post in a designated employee-accessible place per applicable industrial safety regulations.
- Implement an Operator Pre-Use Safety Check program using the procedure described in *"PRE-USE SAFETY CHECKS" on page 5-2* and the form provided in *"OPERATOR PRE-USE SAFETY CHECKLIST" on page A-1*.
- Implement an Inspection and Service Schedule per the Service Manual.
- Set up a Spare Parts Stock per the recommendations in the Service Manual that is tailored to your operations, with a focus on having spare *Strut Straps* and a *Winch Strap/Winch Hook* assembly on hand for either unscheduled or the mandatory three-month replacement schedule.
- For optimum battery performance and life span, never deep-discharge the Motive Batteries and (if equipped) GPU Batteries to deep discharges below a 20% charge level. New batteries require at least 30 discharge / recharge cycles to build up full rated endurance and performance. New batteries will also deplete more quickly under load, especially as the charging level drops below 50%.
- The battery manufacturer recommends not allowing the batteries to discharge below 50% for the first 15 charge cycles.
- Review *"USING THE MOTOR CONTROL LEVER" on page 5-5* for information on how to maintain the batteries while maximizing battery life, including appropriate charging protocols.

86/87 SERIES AIRCRAFT TOWING VEHICLE OPERATION MANUAL

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Version 1.00 (11/2020)
PREVIOUS VERSIONS OBSOLETE

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