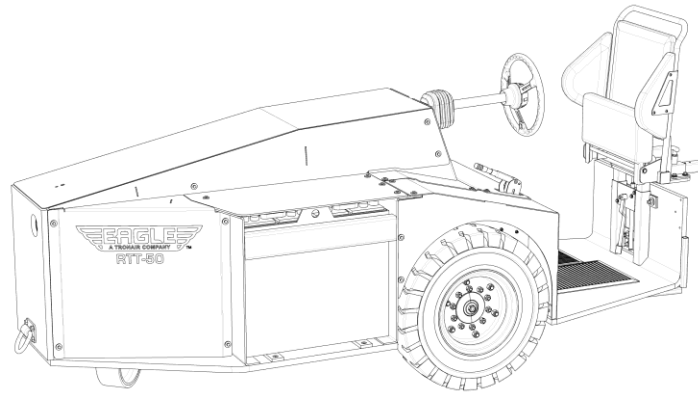




OPERATION & SERVICE MANUAL



Model: RTT-50 Electric Tow Tractor

07/2022 – Rev. 17
Applies to S/N 50076E and later
Applies to build date 03/2021 and later

**For Spare Parts, Operations & Service Manuals or Service Needs
Scan the QR code or visit Tronair.com/aftermarket**



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REVISION	DATE	TEXT AFFECTED
15	02/2022	Major Revision
16	02/2022	Major Revision
17	07/2022	Modified 5.4.1 Starting the Unit, 5.4.4 Operating Notes – Sequence Errors, 7.1 Operational Troubleshooting, 19.0 Assembly, added 7.1 operator presence pedal and 7.2 seat assembly without for-aft adjust



TABLE OF CONTENTS

PAGE

1.0	PRODUCT INFORMATION	1
1.1	DESCRIPTION.....	1
1.2	MODEL & SERIAL NUMBER.....	1
1.3	MANUFACTURER	1
1.4	SPECIFICATIONS	2
1.4.1	Vehicle Specifications	3
1.4.2	Chassis System	3
1.4.3	Vehicle Weights	3
1.4.4	Traction Specifications	3
1.4.5	Drive Axle Specifications.....	3
1.4.6	Front Steerable Wheel Specifications	3
1.4.7	Electrical	3
1.4.8	Battery Specification	3
1.4.9	Performance.....	4
2.0	SAFETY INFORMATION.....	4
2.1	USAGE AND SAFETY INFORMATION	4
2.2	IMPORTANT SAFETY NOTICE.....	4
2.3	GENERAL	4
3.0	TRAINING	5
3.1	TRAINING REQUIREMENTS	5
3.2	TRAINING PROGRAM	5
3.3	OPERATOR TRAINING.....	5
4.0	PUTTING INTO SERVICE	5
4.1	UNPACKING AND SETTING UP.....	5
5.0	OPERATION.....	6
5.1	OPERATOR REQUIREMENTS	6
5.2	OPERATOR WORKSTATION	6
5.3	PRE-OPERATION CHECKLIST	6
5.3.1	Daily Pre-Operation Checklist	6
5.3.2	Weekly Operation Checklist	6
5.4	STARTUP/SHUTDOWN AND SAFE TOWING.....	7
5.4.1	Starting the Unit:	7
5.4.2	Shutting Down the Unit:	7
5.4.3	Load Towing and Pushing Safety.....	7
5.5	CONTROLS AND INSTRUMENTATION	8
6.0	PACKAGING AND STORAGE	9
6.1	HANDLING	9
6.1.1	Tie Downs	9
6.1.2	Jacking and Jack Stand locations	9
6.1.3	Flat Towing	9
7.0	TROUBLE SHOOTING	10
7.1	OPERATIONAL TROUBLESHOOTING.....	10
7.2	ERROR CODES	11
8.0	MAINTENANCE.....	14
8.1	PREVENTIVE MAINTENANCE SCHEDULE	14
8.2	FLUIDS AND VOLUMES	14
8.3	HYDRAULIC STEERING FLUID ACCESS LOCATION	15
8.4	HYDRAULIC BRAKE FLUID ACCESS LOCATION	15
8.5	DRIVE AXLE ACCESS LOCATION	15
9.0	PROVISION OF SPARES.....	16
9.1	SOURCE OF SPARE PARTS.....	16
9.2	ORDERING SPARE/SERVICE PARTS	16
9.3	RECOMMENDED SPARE PARTS LIST.....	16
10.0	IN SERVICE SUPPORT.....	16
10.1	TECHNICAL ASSISTANCE	16
11.0	GUARANTEES/LIMITATION OF LIABILITY - EAGLE 1-YEAR WARRANTY	17
12.0	APPENDICES	17
13.0	DRIVETRAIN	18
14.0	CHASSIS	21
15.0	BRAKING.....	26
16.0	ELECTRICAL.....	31



17.0	SEAT.....	50
17.1	PERATOR PRESENCE PEDAL	56
17.2	SEAT ASSEMBLY WITHOUT FOR-AFT ADJUST	57
18.0	STEERING.....	60
19.0	ASSEMBLY	69



From everyone at Eagle Tugs, we would like to say thank you for purchasing an Eagle RTT series tow tractor. We take a lot of pride in the quality of the products that we build, as well as, our continued customer service. Our goal is to build a long-term relationship with our customers. We want you, the customer, to be 100% satisfied with your Eagle experience. To us, this means that your Eagle RTT series tractor is functionally superior to any other products you have used. This also means that your Eagle product is continually supported in a professional, timely manner.

WARNING!



Read this manual in its entirety before putting your Eagle tow tractor into service. This manual contains important safety instructions. Improper usage or a failure to follow the safety requirements listed in this manual could result in severe injury or death.

1.0 PRODUCT INFORMATION

1.1 DESCRIPTION

This manual is designed as a reference guide to make the reader more familiar with the Eagle-specific components of the Eagle RTT series tow tractor models. This manual includes part numbers and descriptions to assist the reader in ordering component spare/service parts. The manual also outlines the Scheduled Maintenance Intervals recommended by Eagle in order to keep your vehicle running properly.

1.2 MODEL & SERIAL NUMBER

Reference nameplate on unit

1.3 MANUFACTURER

Eagle Tugs

1 Air Cargo Pkwy East
Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301

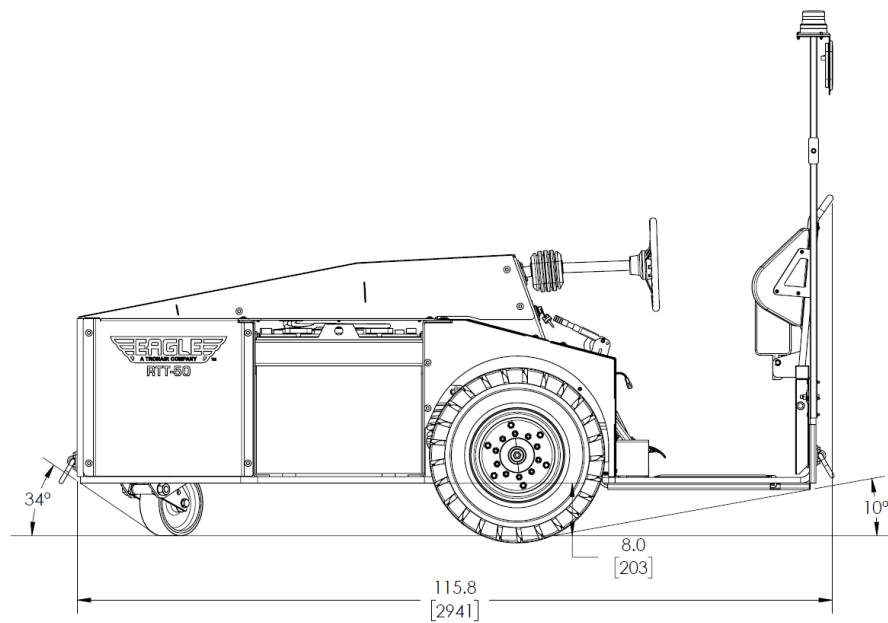
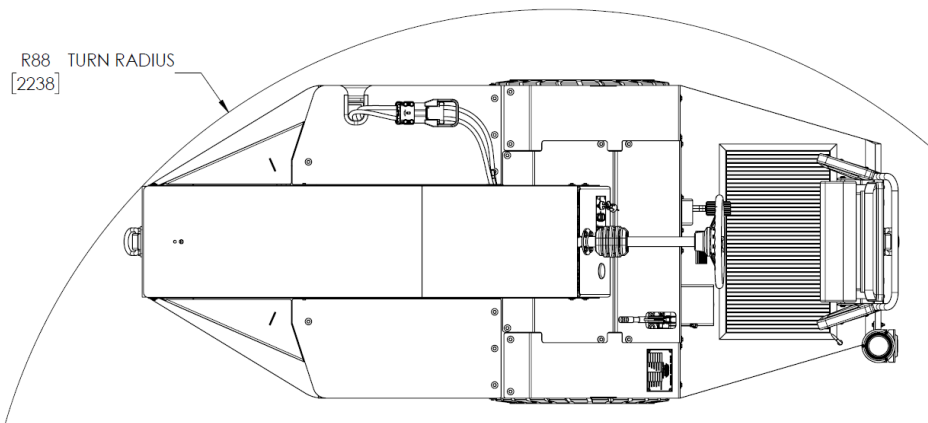
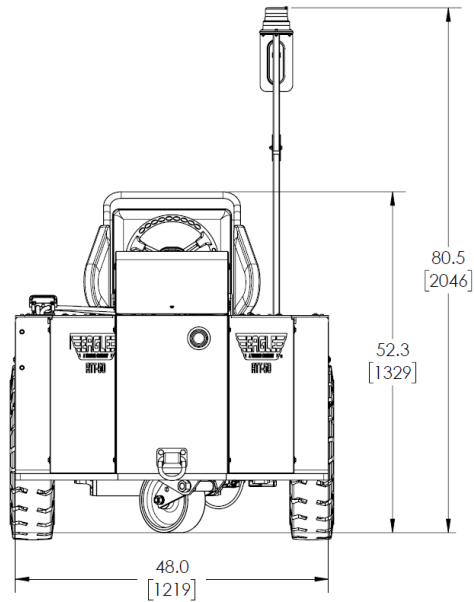
Fax: (419) 867-0634

E-mail: sales@tronair.com

Website: www.eagletugs.com

Please check www.eagletugs.com periodically for updates to this manual, operations manual, and service bulletins that affect your tractor

1.4 SPECIFICATIONS





1.4.1 Vehicle Specifications

Model	GVW lbs (kg)	Rated DBP lbf (kN)	Vertical Hitch Capacity lbf (N)	Towing Capacity † lbs (kg)
RTT-50	7,350 (3,334)	4,500 (20)	50 (220)	50,000 (22,680)

† Towing Capacity applies to 1% grade.

1.4.2 Chassis System

Chassis Length (Not Including Hitches)	113.3 in (2,880 mm)
Width	48 in (1,220 mm)
Chassis Height	44 in (1,120 mm)
Step-in Height	9.9 in (250 mm)
Ground Clearance	6 in (150 mm)

1.4.3 Vehicle Weights

Gross Vehicle Weight (Including Standard Battery)	7,350 lbs (3,334 kg)
Curb Weight (Without Battery)	4,450 lbs (2,019 kg)

1.4.4 Traction Specifications

Motor Model	Carraro Integrated Motor/Axle
Motor Type	AC Induction
Motor Power	20 kW – S2 60 min
Motor IP Rating	43
Inverter Model	Curtis 1238E-6621
Inverter Power Max	650A – 1 min
Inverter Power Nom	195A – S2 60 min
Inverter IP Rating	65
Inverter Cooling	Active Finned Heatsink

1.4.5 Drive Axle Specifications

Axle Model	8.30
Axle Reduction	20.16:1
Flange to Flange Width	42.4 in (1,077 mm)
Suspension	Coil Spring
Brakes (Service and Parking)	Immersed Wet Disc
Differential	Open
Wheels	12x5 Split Rim
Tires	700x12 Resilient/Solid

1.4.6 Front Steerable Wheel Specifications

Model	Custom
Suspension	Coil Spring
Wheel	Cast Steel
Tire	Ø10" x 4" wide Polyurethane

1.4.7 Electrical

System Voltage	80V Floating Ground
Lighting Voltage	12V Floating Ground
12V Converter Rating	500W

1.4.8 Battery Specification

Industrial Designation	40-85-11
Nominal Voltage	80V
Capacity	425 Ahr
Connector Type	DIN/Euro
Compartment Length	44 in (1,118 mm)
Compartment Width	25.8 in (654 mm)
Compartment Height	23.4 in (594 mm)

1.4.9 Performance

Drawbar Pull Rating (.9 COF)	4,500 lbf (20 kN)
Top Speed.....	5 mph (8 kph)
Outside Turning Radius.....	88 in (2,238 mm)
Approach Angle Without Hitch	34°
Departure Angle Without Hitch	10°

2.0 SAFETY INFORMATION

2.1 USAGE AND SAFETY INFORMATION

To insure safe operations please read the following statements and understand their meaning. Also refer to your equipment manufacturer's manual for other important safety information. This manual contains safety precautions which are explained below. Please read carefully.



WARNING!

Warning is used to indicate the presence of a hazard that can cause **severe personal injury, death, and/or substantial property damage** if the Warning Notice is ignored.



CAUTION!

Caution is used to indicate the presence of a hazard, which will or can cause **minor personal injury or property damage** if the Caution Notice is ignored.

2.2 IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe and reliable operation of all industrial equipment as well as the personal safety of the individual performing the work. This service manual provides general directions for accomplishing service and repair work with tested and effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing equipment, as well as in the skill of the individual doing the work. This manual cannot anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that he compromises his/her personal safety and/or the equipment integrity by his/her choice of methods, tools or parts.

2.3 GENERAL

The following list contains some general warnings that you should follow when you work on equipment:

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires you to be under the equipment.
- Be sure that the ignition switch and battery is disconnected unless otherwise required by the procedure.
- Set the parking brake when working on the equipment. Place wheel chocks on the tires to provide further restraint from inadvertent equipment movement.
- Keep yourself and your clothing away from moving parts when the tractor is moving.
- Do not smoke while working on the equipment.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on the equipment. Tie long hair securely behind the head.

For more information regarding safety please refer to the operations manual provided with your tug. This manual can also be found on the Eagle Tugs website at www.eagletugs.com.

2.4 GENERAL SAFETY

The following safety recommendations are not intended to cover all possible safety aspects of the RTT series tow tractor. Please use common sense in addition to the safety recommendations that follow.



WARNING!

Failure to comply with the following safety precautions can result in serious injury or death as well as equipment damage.

- Always do the Pre-Operation Inspection before using the tractor.
- If you have not operated this equipment previously, practice driving and operating it in a safe and clear (not congested) area until you are familiar with all aspects of its operation.
- Always operate the tractor at a speed appropriate for the environmental conditions and the towed load. Slow down in congested areas, when moving a large load, or when conditions reduce traction or visibility.
- Always take care when driving on a slope or uneven ground. Reduce speed and take turns slowly in a controlled manner.
- When working on or around the tractor, take care to keep well clear of any moving components including tires, fans, and linkages. Also keep clear of hot surfaces such as electrical power components.
- The RTT series tractor is intended to be operated indoors on hard improved surfaces. Never drive on soft surfaces, and avoid potholes and damaged pavement.
- The traction battery, contactor, and busbar connections are capable of dangerous electrical discharge and electric shock. Stay away from electrical components and connections unless trained in service and repair on this type of equipment.
- Disconnect the battery and turn the tractor on to fully discharge the electrical system before attempting to work on any electrical components.

3.0 TRAINING

3.1 TRAINING REQUIREMENTS

The employer of the operator is responsible for providing a training program sufficient for the safe operation of the unit.

3.2 TRAINING PROGRAM

The employer provided operator training program should cover safety procedures concerning use of the unit in and around the intended aircraft at the intended aircraft servicing location.

3.3 OPERATOR TRAINING

The operator training should provide the required training for safe operation of the unit.

NOTE: Maintenance and Trouble Shooting are to be performed by a skilled and trained technician.

4.0 PUTTING INTO SERVICE

4.1 UNPACKING AND SETTING UP

The following directions specify the correct steps that should be taken once you receive delivery of your RTT series tow tractor. These steps will ensure that the tow tractor will operate safely. Reference the Parts and Preventive Maintenance Manual for details as appropriate.

- During the unloading of your tractor, note any shipping damage and report it to Eagle Tugs and the shipping company. Verify that all components appear to be in order and undamaged.
- Remove any shipped-loose components from the operator compartment.
- Install shipped-loose components per the Parts and Preventive Maintenance Manual.
- Read this manual in its entirety, paying close attention to all safety requirements.
- Verify that the battery state of charge is above 30%.
- Check the steering fluid level.
- Familiarize yourself with the tractor operation and control.

5.0 OPERATION

5.1 OPERATOR REQUIREMENTS

The RTT series tow tractor is a piece of industrial equipment and has inherent safety risks. As such, the operator of the tow tractor is expected to have a fork truck or similar license, or be otherwise trained in the usage of material handling equipment.

The operator should read this manual in its entirety before operating the tow tractor.

The operator should be familiar with all aspects of the tow tractor before operating it.

5.2 OPERATOR WORKSTATION

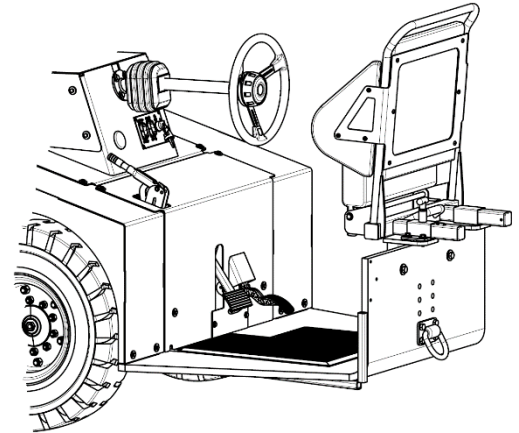
Your RTT series tow tractor features an ergonomically designed operator's workstation. This is the only operator workstation on the tractor. Do not sit on or stand on the tractor outside of this area during tractor movement.

The operator should be standing using the operator seat for support, or sitting in the operator seat during tractor operation.

Keep arms and legs within the perimeter of the tractor's frame to avoid injury. Always place the tractor in Neutral and apply the parking brake before exiting the tractor.

5.3 PRE-OPERATION CHECKLIST

The following inspections should be conducted as stated below. Additional inspections may be required due to unusual operating conditions.



WARNING!



Any problems noted during inspection should be corrected as soon as possible. Failure to promptly attend to problems could compromise safety and/or the tractor's performance. Do not attempt to make repairs. Contact a qualified mechanic.

5.3.1 Daily Pre-Operation Checklist

Daily Pre-Operation Checklist	Satisfactory	Service Required	Not Applicable
Walk-Around Inspection			
Verify no evidence of leaks under and around the tractor			
Verify rims and tires free from damage including tire tread			
Verify tire tread is free from debris			
Verify lights, mirrors, and reflectors are clean			
Operational Checks			
Verify that the dash display is free of errors and warnings			
Verify that battery state of charge is above 30%			
Verify that horn is operational			
Verify that lights, flashers, and beacon work properly			

5.3.2 Weekly Operation Checklist

Weekly Pre-Operation Checklist	Satisfactory	Service Required	Not Applicable
Battery/Motor Compartment Inspection			
Check top of battery for debris, electrolyte, or electrolyte residue			
Verify visible wiring free of damage			
Verify battery cable connection tight			



5.4 STARTUP/SHUTDOWN AND SAFE TOWING

5.4.1 Starting the Unit:

1. Adjust the seat height and depth to a comfortable position, either seated or standing is acceptable.
2. Adjust the steering column tilt to a comfortable position.
3. Sit in the operator seat, or stand resting up against the seat.
4. Stand on operator presence mat or press operator presence pedal down.
5. Verify that the FNR selector switch is in the neutral position.
6. Turn on the tractor with the ignition switch.
7. Select the desired travel speed (SLOW for towing, FAST for unloaded travel)
8. Release the parking brake.
9. Verify that the intended path of the tractor is clear of obstructions and personnel and then proceed with driving.

5.4.2 Shutting Down the Unit:

1. Bring the tractor to a complete stop with the service brake.
2. Put the tractor in neutral using the FNR selector switch.
3. Set the parking brake by pulling the parking brake handle.
4. Turn the tractor off by turning the ignition switch.

5.4.3 Load Towing and Pushing Safety

If towing or pushing a load, check to see that:

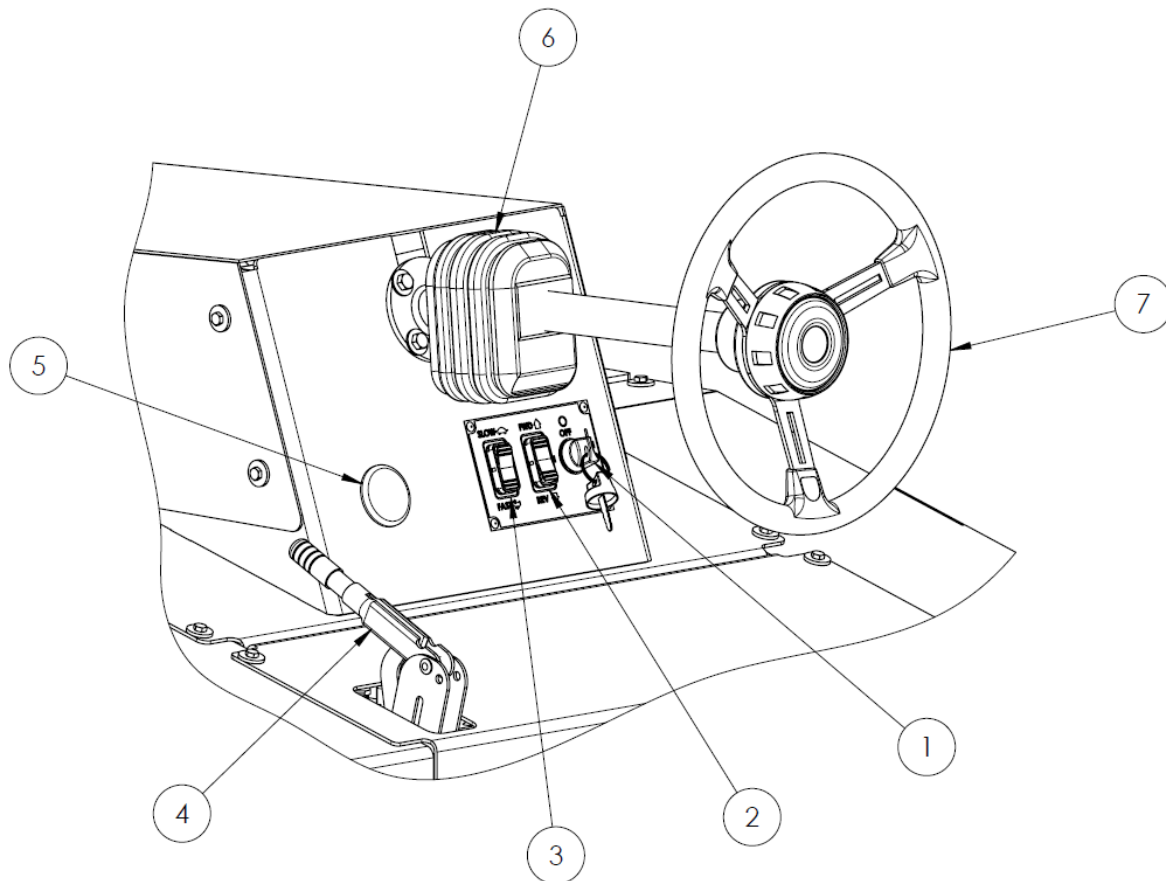
- The towed load is securely connected to the hitch of the tractor. Be sure hitch is locked/fastened into the closed position.
- For maximum tractor and load control and stability, as well as towing power, be sure the towbar is parallel to the ground when connected to the tractor's hitch.
- Ensure the towed load clears all obstacles when towing.

5.4.4 Operating Notes – Sequence Errors

For safety reasons, the tractor controls must be manipulated in a certain order. Attempting to operate outside of the safe procedure will result in a Sequence Error being displayed on the digital display. Below are several examples;

- If the operator steps off the switchmat or operator presence pedal for more than a couple seconds, the tractor will disable the drive motor until the unit is returned to Neutral. A sequence error "SeqEr" will display on screen until the unit is returned to Neutral.
- If the operator is pressing the throttle when moving from Neutral to Forward or Reverse, the tractor will disable the drive motor until the unit is returned to Neutral. A sequence error "SeqEr" will display on screen until the unit is returned to Neutral.
- If the operator starts the tractor up while in Forward or Reverse, the tractor will disable the drive motor until the unit is returned to Neutral. A sequence error "SeqEr" will display on screen until the unit is returned to Neutral.

5.5 CONTROLS AND INSTRUMENTATION



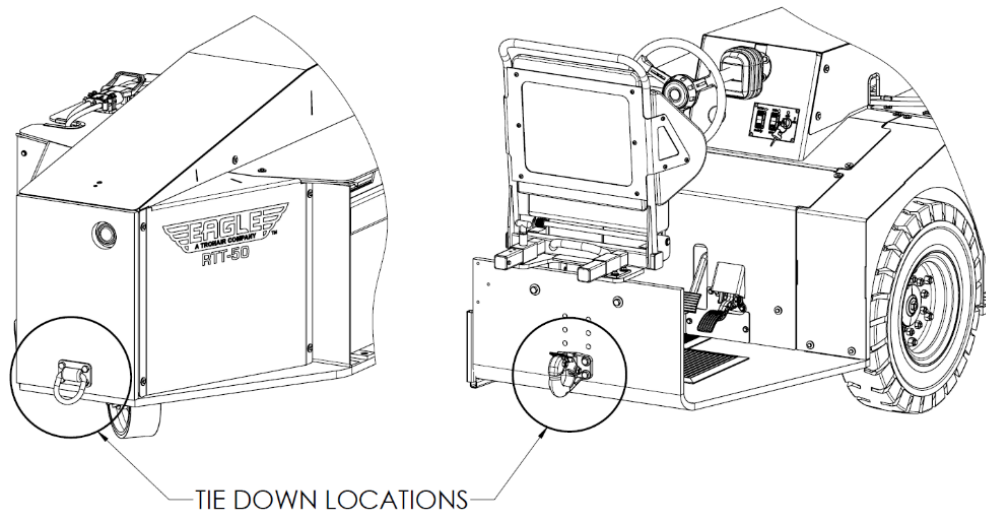
1. **Ignition Switch:** Your tractor is equipped with a keyed or keyless ignition switch. The switch provides power to the tractor to turn the controls system on.
2. **Forward / Neutral / Reverse Selector Switch:** The FNR switch allows the operator to select a travel direction. Neutral should be used during inching operation and before turning off the tractor.
3. **Fast / Slow Selector Switch:** The fast/slow switch allows the operator to select between two pre-set speed settings. Speed is changeable on the fly during tractor movement. The two pre-set values are factory configurable.
4. **Parking Brake Lever:** The parking brake can be engaged or released with the parking brake lever. The parking brake should never be used to stop a moving unit except in an emergency situation.
5. **Multi-function Digital Display:** The digital display module provides critical information on the tractor operational status. The digital display module includes information on battery charge state, cumulative run hours, and any active error codes.
6. **Adjustable Tilt Steering Column:** The steering column is tilt adjustable to accommodate operators in a seated or standing operator position.
7. **Steering Wheel:** Steering is not power assisted and effort is increased when not moving.

6.0 PACKAGING AND STORAGE

6.1 HANDLING

6.1.1 Tie Downs

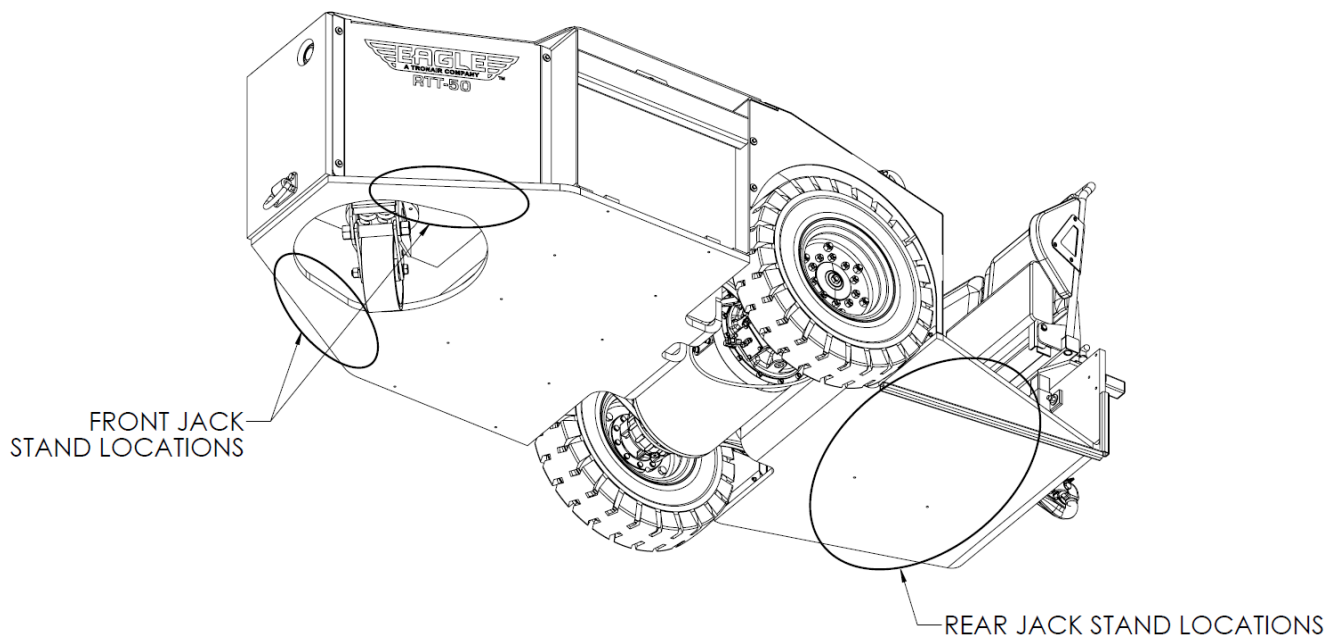
The RTT-50 is equipped with either hitches for tie-down rings at the front and rear of the tractor depending on customer option load. These securing points provide for safe ground transportation.



When securing the tractor, chains/straps should not make contact with the tractor in any area other than the tie down points.

6.1.2 Jacking and Jack Stand locations

When lifting the RTT-50 with jacks they should be located on the main chassis frame plate. The proper front location is forward of the front battery bulkhead. The proper rear location is on the rear frame plate.



6.1.3 Flat Towing

Should the RTT-50 tractor be disabled, it can be flat towed for short distances without any modification as long as the following is observed:

- The maximum speed should never exceed 5 mph / 4.5 kph
- The maximum distance should not exceed .5 mile / .8 kilometer
- The tractor is turned off and the battery is disconnected



7.0 TROUBLE SHOOTING

7.1 OPERATIONAL TROUBLESHOOTING

Tractor won't move when the throttle pedal is pressed
Verify that the parking brake and service brake are released
Verify that the tractor is in Forward or Reverse
Verify that the operator presence switch-mat and/or operator presence pedal are closed (refer to display backlight)
Verify that no active codes are present that could be impeding travel
Use the Curtis handheld diagnostic tool to verify the full I/O list including throttle pedal, switches, motor speed sensor feedback, and other issues that can prevent a no-move scenario.
Tractor drives very slowly (creeping) and will not speed up
The tractor may be in limp-home mode. Verify that BDI shows more than 30% charge remaining
Incorrectly installed UVW cables can cause this issue. Inspect the UVW cables to verify that they are properly installed on the motor and the traction drive
A faulty motor speed sensor can cause this issue. Use the Curtis handheld diagnostic tool watch the motor speed while driving at a slow speed. The input should be smooth during travel. If the motor speed oscillates between positive and negative while traveling, inspect/replace the speed sensor pickup.
Tractor battery does not last long before needing to be charged
Battery life is directly dependent on usage of the tractor. Some causes of short battery life are shown below
Do not tow loads in the Fast speed setting. The Fast speed setting is intended to be used for unloaded travel only. Towing at higher speed will drain the battery faster
After a full equalization charge on the battery, inspect the specific gravity of each cell. If the specific gravity is lower than a full charge, have the charger serviced. If any individual cell differs by more than .020 from the nominal 1.290 (positive or negative), have the battery serviced
Verify that the drivetrain is freely moving and that no bearings, brakes, or other components are creating resistance in the drivetrain
Charger is giving an error message or not working properly
Eagle Tugs does not service the battery charger for the truck. For the most expedient assistance with a charger issue, please contact the manufacturer of the charger directly. Eagle Tugs can assist with working with the charger manufacturer if you do not get a prompt response
Battery is not performing properly or cells are out of specification
Eagle Tugs does not service the battery for the truck. For the most expedient assistance with a battery issue, please contact the manufacturer of the battery directly. Eagle Tugs can assist with working with the battery manufacturer if you do not get a prompt response

7.2 ERROR CODES

Below are error codes for the traction and pump motor controllers. Should one of these devices detect an issue, the device and error code will be displayed on the vehicle display module.

Seq Er: Sequence Error

Effect: Traction disabled (no movement) until cleared

This error means that the operator is operating the unit in an incorrect sequence, such as being in Forward or Reverse when the tractor requires a return to Neutral. This error can be corrected by returning the tractor to the "start" condition of Neutral, Brakes released, Operator Presence Mat closed, and in a stopped condition.

Er12: Controller Overcurrent

Effect: System shutdown of all drive components (motor, pump, contactors)

This error means that the electrical current to the motor has exceeded pre-set limits. Possible causes are:

- The U/V/W cables to the motor are shorted to the tractor frame or each other. Verify that the U/V/W cables are in good condition and not shorted. Replace the cables if necessary.
- There is noise on the speed encoder signal. Verify that the speed encoder is working properly (that the tractor drives smoothly). If not, replace the speed encoder.
- The controller is defective. If the motor cables and speed encoder are working correctly and the issue persists, replace the controller.

Er13: Current Sensor Fault

Effect: System shutdown of all drive components (motor, pump, contactors)

This error means that the controller current sensor is unable to sense proper current. Possible causes are:

- The U/V/W cables are leaking current to the tractor frame. Verify that the U/V/W cables are in good condition and not contacting any of the tractor frame. Replace the cables if necessary.
- The controller is defective. If the motor cables are working correctly and the issue persists, replace the controller.

Er14: Pre-charge Failed

Effect: System shutdown of all drive components (motor, pump, contactors)

This error means that the drive was unable to charge its capacitor banks through the key switch input. Verify that there are no external loads on the B+ power terminal on the controller.

Er15: Controller Severe Undertemp

Effect: System shutdown of all drive components (motor, pump, contactors)

This error means that the controller heatsink is measuring a temperature below -40°C/F. Increase the heatsink temperature above -40°C/F and then power up.

Er16: Controller Severe Overtemp

Effect: System shutdown of all drive components (motor, pump, contactors)

This error means that the controller heatsink is measuring a temperature above 95°C / 203°F. Possible causes are:

- The tractor load is excessive and above the standard duty cycle. Let the tractor rest and cool down and then power up.
- The tractor heatsink fins are obstructed by debris. Use compressed air to clean out the fins of any dust and dirt. Let the tractor cool down and then power up.

Er17: Severe Undervoltage

Effect: Reduced drive torque

This error means that the battery voltage has dropped below pre-set limits. Possible causes are:

- The battery is failing to provide the necessary power to the drive. Re-charge and/or repair the battery and return to service.
- The B+ fuse is blown. Remove the fuse and check for damage. Replace if necessary.
- The main contactor did not close. Verify that the main contactor is "clicking" when starting the tractor and driving.
- A break in the battery connection while driving. Verify that all battery cables and connections are secure.

Er18: Severe Overvoltage

Effect: System shutdown of all drive components (motor, contactor)

This error means that the battery voltage has risen above pre-set limits. Possible causes are:

- The regenerative braking current is too high for the battery. Reduce braking behavior and/or battery charge state.
- A loss of electrical continuity in the battery connection while braking. Verify that all battery cables and connections are secure.
- secure.

7.2 ERROR CODES *(continued)*

Er22: Controller Overtemp Cutback

Effect: Reduced drive and regenerative braking torque

This error means that the controller heatsink is measuring a temperature above 85°C / 203°F. Possible causes are:

- The tractor load is excessive and above the standard duty cycle. Let the tractor rest and cool down and then power up.
- The tractor heatsink fins are obstructed by debris. Use compressed air to clean out the fins of any dust and dirt. Let the tractor cool down and then power up.

Er23: Undervoltage Cutback

Effect: Reduced drive torque

This error means that the battery voltage has dropped below pre-set limits. Possible causes are:

- The battery is failing to provide the necessary power to the drive. Re-charge and/or repair the battery and return to service.
- The B+ fuse is blown. Remove the fuse and check for damage. Replace if necessary.
- The main contactor did not close. Verify that the main contactor is "clicking" when starting the tractor and driving.
- A break in the battery connection while driving. Verify that all battery cables and connections are secure.

Er24: Overvoltage Cutback

Effect: Reduced regenerative braking torque

This error means that the battery voltage has risen above pre-set limits. Possible causes are:

- The regen current is too high for the battery. Reduce braking behavior and/or battery charge state.
- A break in the battery connection while braking. Verify that all battery cables and connections are secure.

Er28: Motor Temp Hot Cutback

Effect: Reduced drive torque

This error means that the motor temperature has exceeded pre-set limits.

- The tractor load is excessive and above the standard duty cycle. Let the tractor rest and cool down and then power up.
- The motor temperature sensor is not connected properly. Verify motor temperature sensor wiring.

Er29: Motor Temp Hot Cutback

Effect: Reduced motor speed

This error means that the motor temperature cannot be read from the controller. Possible causes are:

- The motor temperature sensor is not connected properly. Verify motor temperature sensor wiring.

Er31: Main Open/Short

Effect: System shutdown of all drive components (motor, contactor)

This error means that the main contactor coil is either not connected or the wiring is shorted. Possible causes are:

- The main contactor has a wiring connection issue. Verify main contactor wiring.

Er36: Encoder Fault

Effect: Shutdown throttle

This error means that the motor speed encoder data cannot be read reliably by the controller. Possible causes are:

- The motor speed encoder has a wiring connection issue. Verify speed encoder connection and wiring.
- The motor encoder is faulty. Replace the encoder.

Er37: Motor Open

Effect: System shutdown of all drive components (motor, contactor)

This error means that one of the U, V, or W wires are not connected properly. Possible causes are:

- One of the U, V, or W wires is loose. Verify motor U, V, and W connections are tight and secure.
- One of the U, V, or W wires is faulty or improperly crimped. Verify that the U, V, and W wires are in good condition with good crimps. Replace as necessary.

Er38: Main Contactor Welded

Effect: System shutdown of all drive components (motor, contactor)

This means that the controller thinks that the main contactor is stuck in the closed position.

- The U, V, or W cables are loose. Verify motor U, V, and W connections are tight and secure.
- The main contactor is faulty. Replace the main contactor.

7.2 ERROR CODES *(continued)*

Er39: Main Contactor Did Not Close

Effect: System shutdown of all drive components (motor, contactor)

This error means that the controller thinks that the main contactor is stuck in the open position. Possible causes are:

- The B+ fuse is blown. Remove the fuse and check for damage. Replace if necessary.
- The main contactor did not close. Verify that the main contactor is "clicking" when starting the tractor and driving.
- The main contactor has high resistance across the terminals. Replace the main contactor.

Er46: EEPROM Failure

Effect: System shutdown of all drive components (motor, contactor)

This error means the controller has suffered an internal memory error. Cycle key power to reset. If the issue persists, the controller is faulty. Replace the controller.

Er49: Parameter Change Fault

Effect: System shutdown of all drive components (motor, contactor)

This error means the system detected a parameter change and needs a key cycle to re-set. This should only happen during programming of a controller. Cycle key power to reset. If the problem persists, replace the controller.

Er68: VCL Run Time Error

Effect: System shutdown of all drive components (motor, contactor)

This error means the Eagle-specific software ran into a run time error. Possible causes are:

- The software has an issue. Re-flash Eagle-specific software.
- The controller is faulty. Replace the controller.

Er69: External Supply Out of Range

Effect: None

This error means that the 5V and 12V controller output currents are out of range. Possible causes are:

- The motor speed encoder connection is faulty. Verify encoder wiring connection and repair any issues.
- The motor speed encoder is faulty. Replace the motor speed encoder.

Er71: OS General

Effect: System shutdown of all drive components (motor, contactor)

This error means that the controller experienced an internal fault. Cycle key power to reset. If the error continues, replace the controller.

Er72: PDO Timeout

Effect: Shutdown throttle

This error means that the CAN communication failed to transmit data properly. Possible causes are:

- Faulty CAN wiring. Verify the CAN communication wires between the controller and the display module and repair as necessary.
- Missing CAN termination jumper. Verify the jumper wire connection between pins 21 and pins 34 on the controller
- Missing CAN termination resistor near the display. Verify the 120 ohm resistor between pins 3 and 4 on the display module.

Er73: Stall Detected

Effect: Shutdown throttle

This error means that the motor encoder showed no movement while the motor was being commanded to a speed above zero. Possible causes are:

- A mechanical issue is causing the motor to fail to rotate. Verify free movement of the motor and axle.
- The motor speed encoder has a wiring connection issue. Verify speed encoder connection and wiring.

Er93: Encoder LOS (Limited Operating Strategy)

Effect: Enter LOS control mode

This error means that the motor speed encoder data cannot be read reliably by the controller and the controller has entered a limited operating mode to continue to work. Possible causes are:

- The motor speed encoder has a wiring connection issue. Verify speed encoder connection and wiring.
- The motor encoder is faulty. Replace the encoder.



8.0 MAINTENANCE

8.1 PREVENTIVE MAINTENANCE SCHEDULE

Any items found to be deficient during the preventive maintenance review should be repaired or replaced. All fluids found low should be topped off. Refer to this section for fluid and filter specifications and part numbers.

* See relevant diagrams/instruction in this section for these items.

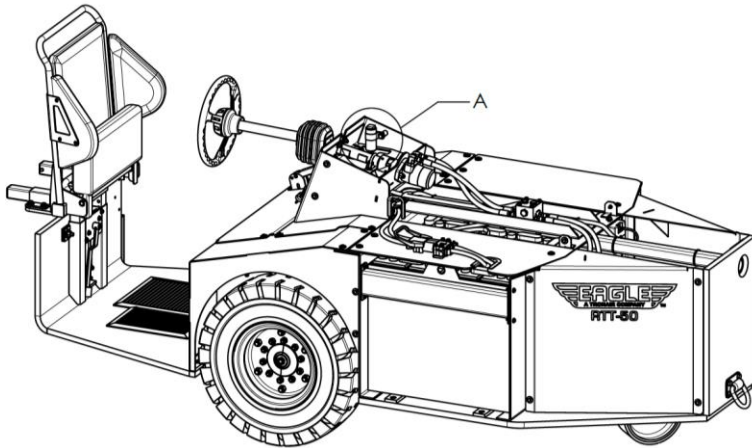
† Whichever time period is shorter.

Preventive Maintenance Item	Daily	Monthly	First 150 hours	500 hours	2000 hours or annually †
Perform daily pre-operation checklist	X				
Check hydraulic steering fluid level and top off as necessary		X			
Perform a battery equalization charge then water		X			
Drain and replace axle oil; both sides (first time only)			X		
Grease front steering assembly			X		
Check axle oil level, both sides				X	
Clean axle oil breathers				X	
Grease front steering assembly				X	
Grease front caster wheel bearings				X	
Check hydraulic brake fluid level				X	
Inspect wheel lug nuts and tighten if necessary				X	
Inspect and grease adjustable seat mechanism				X	
Check all battery cable connections for tightness and corrosion					X
Drain and replace axle oil; both sides					X
Clean axle magnetic drain plugs					X
Drain and replace hydraulic steering fluid and bleed lines					X
Drain and replace hydraulic brake fluid and bleed brakes					X
Inspect parking brake cable connections					X
Inspect steering column coupling					X
Inspect rear axle pins, springs, and chain retainers and tighten if necessary					X
Inspect and clean dust and debris off of electrical panel and inverter					X
Inspect service brake linkage and boot					X
Inspect and clean inverter heatsink fins and cooling fans					X
Inspect all hydraulic tubes and hoses for wear/damage and leaks					X
Inspect hitch pins for wear and replace if beyond specifications					X

8.2 FLUIDS AND VOLUMES

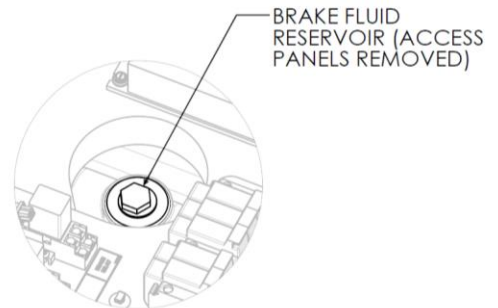
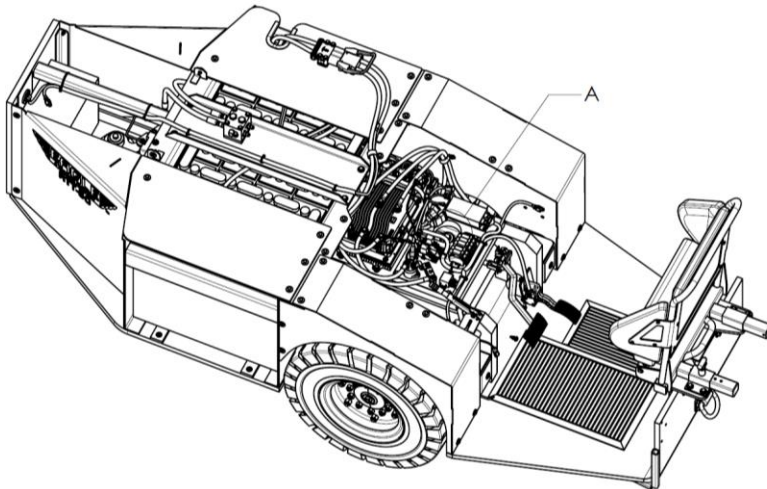
FLUID SPECIFICATIONS		
Fluid	Recommendation	Volume approximate
Hydraulic Steering Fluid	ISO 32 Mineral Oil Based	0.5 quarts (0.47 l)
Hydraulic Brake Fluid	ISO 32 Mineral Oil Based	.2 quarts (.18 l)
Axle Gear Oil	SAE 89W-90 EP API GL4	quarts (1.6 l)

8.3 HYDRAULIC STEERING FLUID ACCESS LOCATION



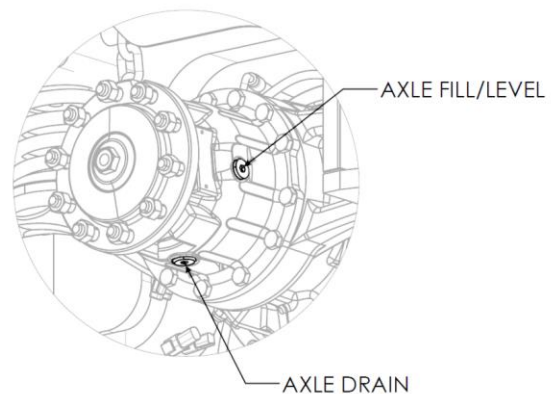
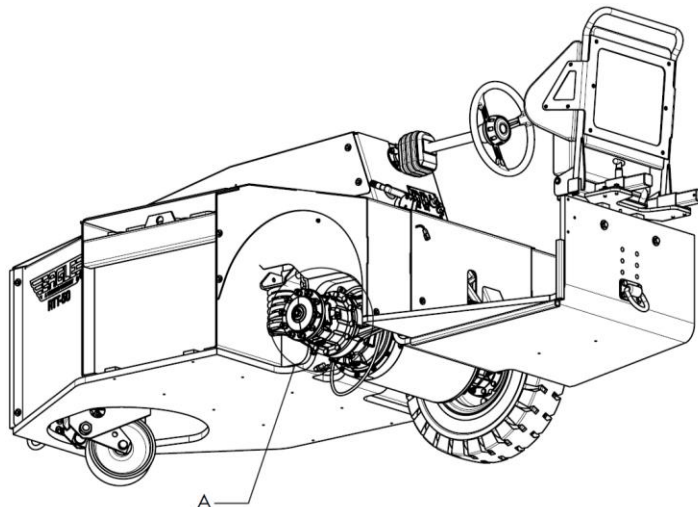
DETAIL A

8.4 HYDRAULIC BRAKE FLUID ACCESS LOCATION



DETAIL A

8.5 DRIVE AXLE ACCESS LOCATION



DETAIL A



9.0 PROVISION OF SPARES

9.1 SOURCE OF SPARE PARTS

Spare parts may be obtained from the manufacturer:

Eagle Tugs

1 Air Cargo Pkwy East
Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301

Fax: (419) 867-0634

E-mail: sales@tronair.com

Website: www.eagletugs.com



For Spare Parts, Operations & Service Manuals or Service Needs:
Scan the QR code or visit Tronair.com/aftermarket

9.2 ORDERING SPARE/SERVICE PARTS

Eagle inventories many of the spare/service parts found in its rTT series tow tractors, and most of these parts can be shipped the day after the order is received. Non-stock parts orders will be shipped as soon as the parts are available.

9.3 RECOMMENDED SPARE PARTS LIST

Description	Part Number	Suggested Replacement Interval
Headlight	NVSP-34-008-CA	As Required
Key Switch	NVSP-05-005-CA	As Required
FNR Switch	A-ES12-0803	As Required
Fast/Slow Switch	A-RTT12-00428	As Required
Traction Contactor	Z-11102	As Required
48V Relay (Brakes / Cooling Fan)	RT00-31-001-CA	As Required
Key Switch Relay	7A5012	As Required
80V Fuse, 1A	BLN-1	As Required
80V Fuse, 10A	BLN-10	As Required
80V Fuse, 500A	EC-1619-19	As Required
DC-DC Converter	AE-OPT-0320-B	As Required
Brake Pushrod Boot	A-TN3E-00159	As Required
Operator Presence Switch mat	A-RTT-00450	As Required
Throttle Pedal	NVSP-14-033-CA	As Required
Cooling Fan	Z-11063	As Required
Back Seat Cushion	A-RTT12-0047-A	As Required
Bottom Seat Cushion	A-RTT-0047-B	As Required
RH Wing – Seat Cushion	A-RTT-0047-C	As Required
LH Wing – Seat Cushion	A-RTT-0047-D	As Required
Seat Air Spring	A-RTT12-00480	As Required
Horn Button	A-TT10-00811	As Required

10.0 IN SERVICE SUPPORT

Contact Eagle Tugs for technical services and information. See Section 1.3 – Manufacturer.

10.1 TECHNICAL ASSISTANCE

When addressing a repair procedure or operational problem, please remember that Eagle technical support is only a phone call away. Eagle technicians are available to assist you in vehicle diagnostics and recommended repair procedures. We encourage you to use this service to reduce machine down-time and to gain a better understanding of proper repair procedures.



11.0 GUARANTEES/LIMITATION OF LIABILITY - EAGLE 1-YEAR WARRANTY

Items added or modified by Eagle Tugs as shown in this manual are covered under Eagle's one-year standard warranty.

The Eagle Tugs (Eagle) Standard Warranty covers all NEW MTT, STT-series, RTT-series, and Transit Pro tow tractors, as well as all Eagle tow tractor models used in non-aviation/industrial applications. Eagle Tugs warrants that these tractors will be free from defects in material and workmanship for a period of 1 year or 2,000 operating hours, from date of delivery.

This warranty does not apply to any Eagle tow tractor, or component part(s) that have damage caused by: misuse of the vehicle, accidents, collision or objects striking the vehicle, vandalism, fire, explosion or water damage, using contaminated or improper fuel/fluids, customer-applied chemicals to painted surfaces, improper handling or application, maintenance neglect including lack of lubricants or fluids; nor does it extend to the Eagle tow tractor and/or parts which have been repaired or altered outside of Eagle's plant or the facility of an Authorized Service Representative without the permission of Eagle. Furthermore, any modification of the tow tractor's electrical system MUST be preapproved and documented in writing by Eagle. Failure to do so voids the unit's electrical component warranty.

This warranty does not apply to routine maintenance or wearable parts of the Eagle tow tractor such as: tires, brake pads or shoes, ball joints, kingpins, u-joints, wheel bearings, filters, seals, spark plugs, hoses, belts, light bulbs, batteries (Diesel & Gas tractors), fuses or similar items. Also snow plows and transit pro options are warranted directly to the user by their respective manufacturer and not by Eagle or an Authorized Service Representative. This warranty does not extend to the batteries and battery chargers as these are warranted directly to the user by their respective manufacturer and not by Eagle or an Authorized Service Representative.

This warranty does not cover or provide credit for the following: tractor rental or other substitute equipment; lodging; loss of time, income, sales or profits; loss of the use of tractor; telephone calls or communication expense; lift truck; storage fees; injury or death to persons or damage or destruction of property; or consequential, incidental or punitive damage.

Warranty Claim Procedure: When a warranty situation arises, it is essential that the customer contact Eagle's Warranty Department at +1 734-442-1000. The customer will need to provide Eagle with the tow tractor serial number and operating hours. A customer service representative will analyze the problem and determine the next steps. In many cases Eagle's technical support personnel will be able to analyze the problem and recommend a solution that will solve the problem and reduce down time. If further service is required, an Eagle customer service representative will work with customer personnel to arrange a service provider and/or will send parts to your facility for the repair as quickly as possible. The determination of a warrantable claim will be at the sole discretion of Eagle.

Notice of any claimed defect must be given to Eagle within the warranty period and within ten (10) days after such defect is discovered. Liability under this warranty is limited to either replacing or repairing, at Eagle's election, any part or parts deemed defective after examination by Eagle or an Authorized Service Representative. Eagle reserves the right to use remanufactured parts as replacements in warranty claims.

At Eagle's election, any part replaced under warranty as defective can be sent out for third party inspection. If the part is not found to be defective, or abuse was the cause for the failure, all associated costs related to the warranty claim may be charged to the customer. All parts returned to Eagle by a customer must be received without further damage. If returned items are not properly packaged for return shipping to Eagle or an Authorized Service Representative via prepaid transportation, the customer will be charged for the full value of the item that was Rev B, 11-Nov-2017 Standard Warranty 2 damaged upon return. This warranty does not extend beyond its original term for any Eagle tow tractor or part replaced or repaired under warranty. Any and all disputes or disagreements will be negotiated in good faith by both parties.

Labor Allowance: A labor allowance may be issued upon request at Eagle's discretion. Allowable labor hours and a per hour labor rate will be determined by Eagle according to reasonable automotive standards.

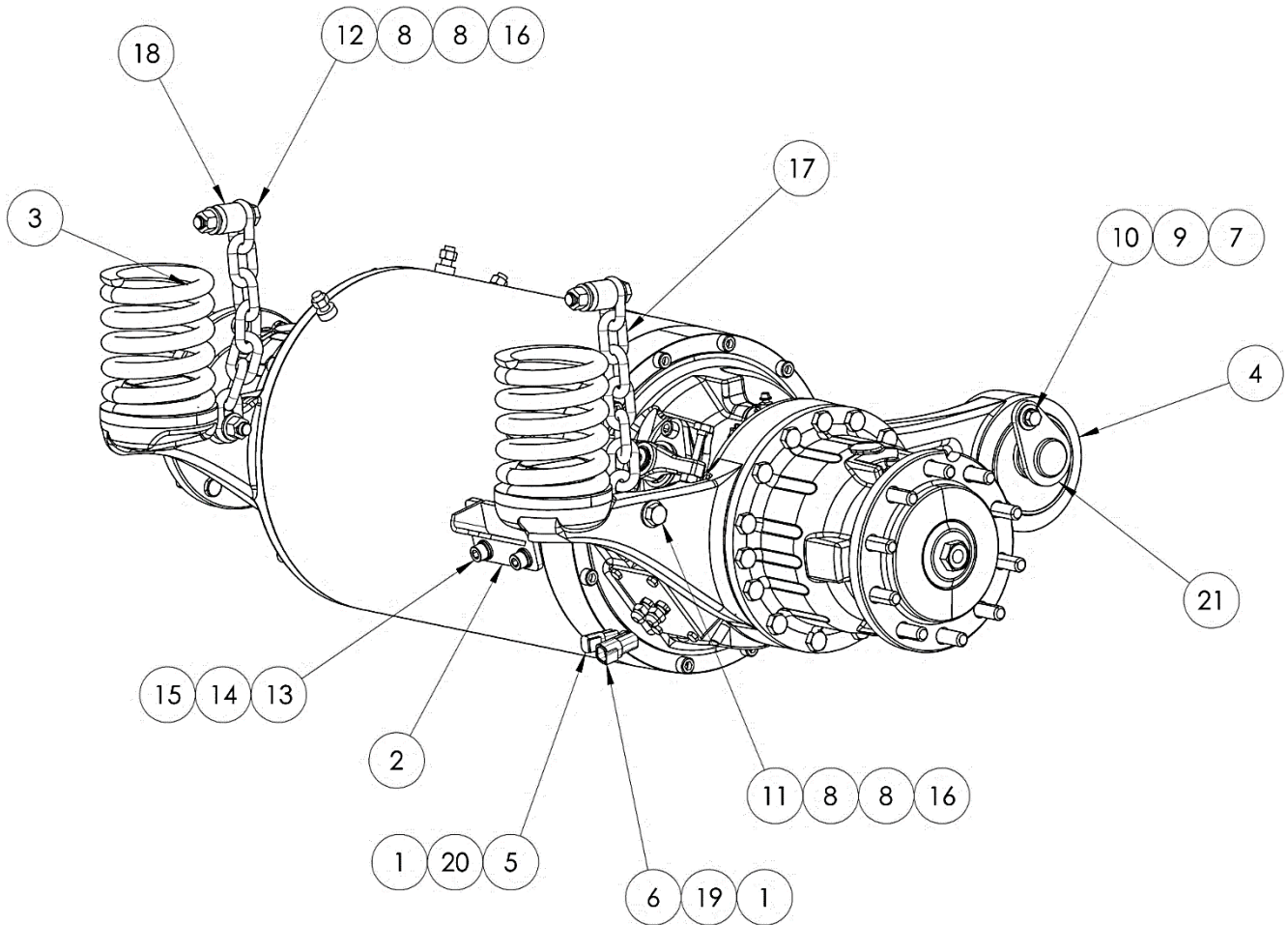
EXCEPT AS SET FORTH ABOVE, ALL WARRANTIES, CONDITIONS, REPRESENTATIONS, INDEMNITIES AND GUARANTEES, EXPRESS OR IMPLIED, WHETHER ARISING BY STATUTE, CUSTOM OF TRADE OR UNDER ORAL OR WRITTEN STATEMENTS MADE BY OR ON BEHALF OF EAGLE NEGOTIATIONS WITH CUSTOMER, DISTRIBUTOR, DEALER, OR ANY REPRESENTATIVE, ARE HEREBY OVERWRITTEN AND EXCLUDED, AND NO LIABILITY SHALL ATTACH TO EAGLE, EITHER IN CONTRACT OR IN TORT, OR STRICT LIABILITY IN TORT, FOR ANY DAMAGE TO PROPERTY, LOSS OF PROFITS, DAMAGES, COSTS, CHARGES, LIABILITY OR EXPENSES, WHETHER DIRECT OR INDIRECT, CONSEQUENTIAL OR OTHERWISE, WHICH ARISE OUT OF OR IN CONNECTION WITH THE SALE OR USE OF ANY EAGLE MACHINE OR THE SUPPLY OF SERVICES.

SUBJECT TO CHANGE WITHOUT NOTICE.

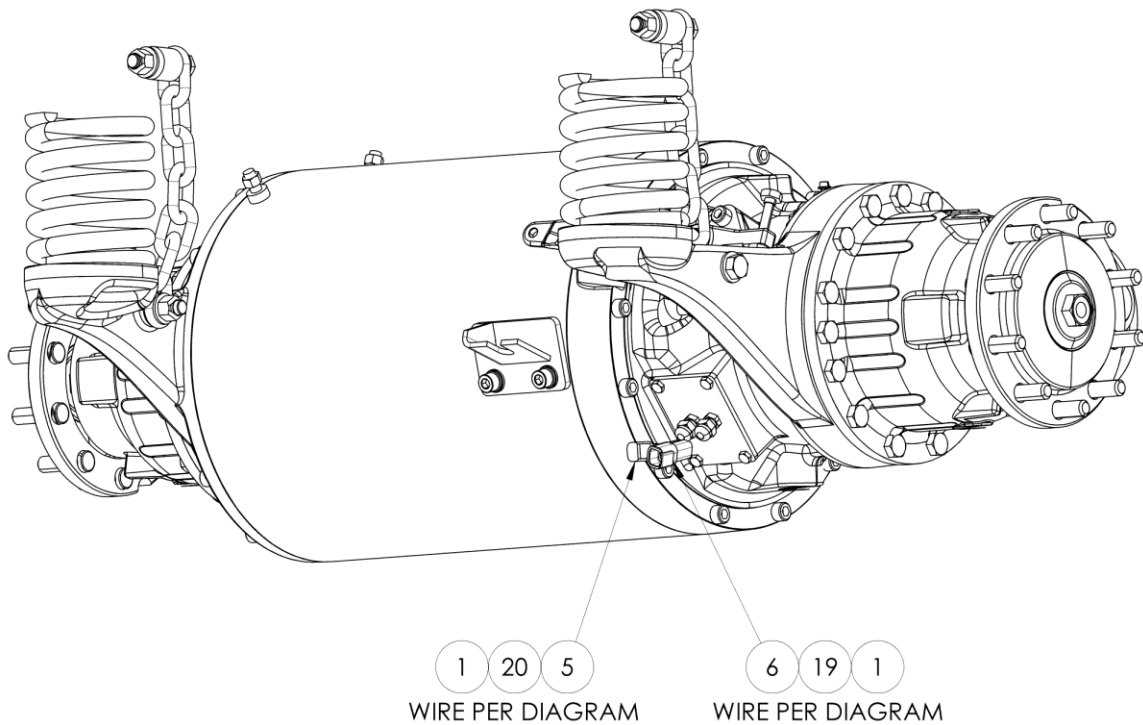
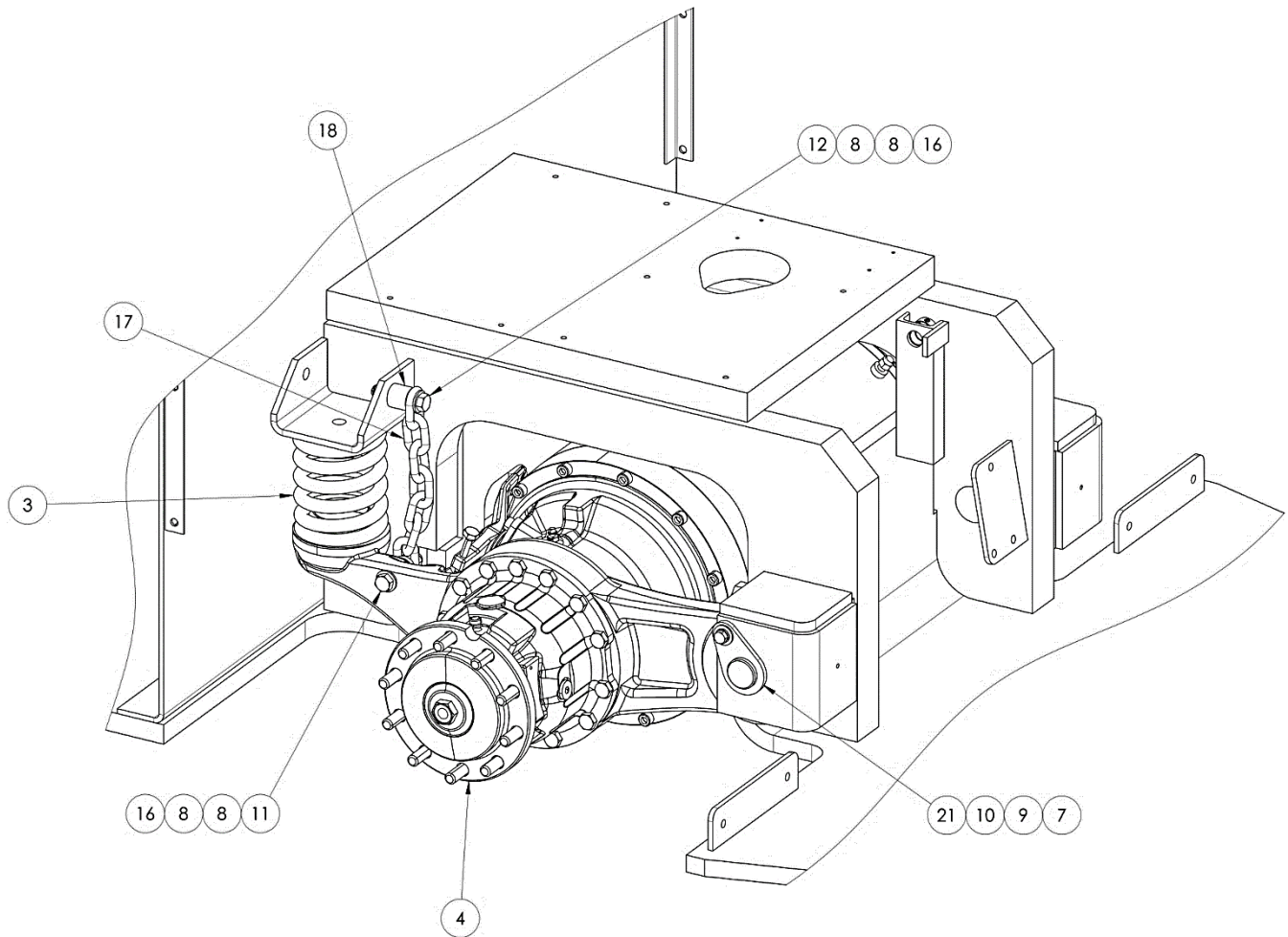
12.0 APPENDICES

APPENDIX I Main Vehicle Harness (INS-2652)

13.0 DRIVETRAIN



13.0 DRIVETRAIN (continued)



WIRE PER DIAGRAM

WIRE PER DIAGRAM



13.0 DRIVETRAIN (continued)

MOTOR SPEED DEUTSCH DTM06-4S		
1	SUPPLY	RED
2	CHANNEL 2	ORANGE
3	CHANNEL 1	BROWN
4	GROUND	BLACK

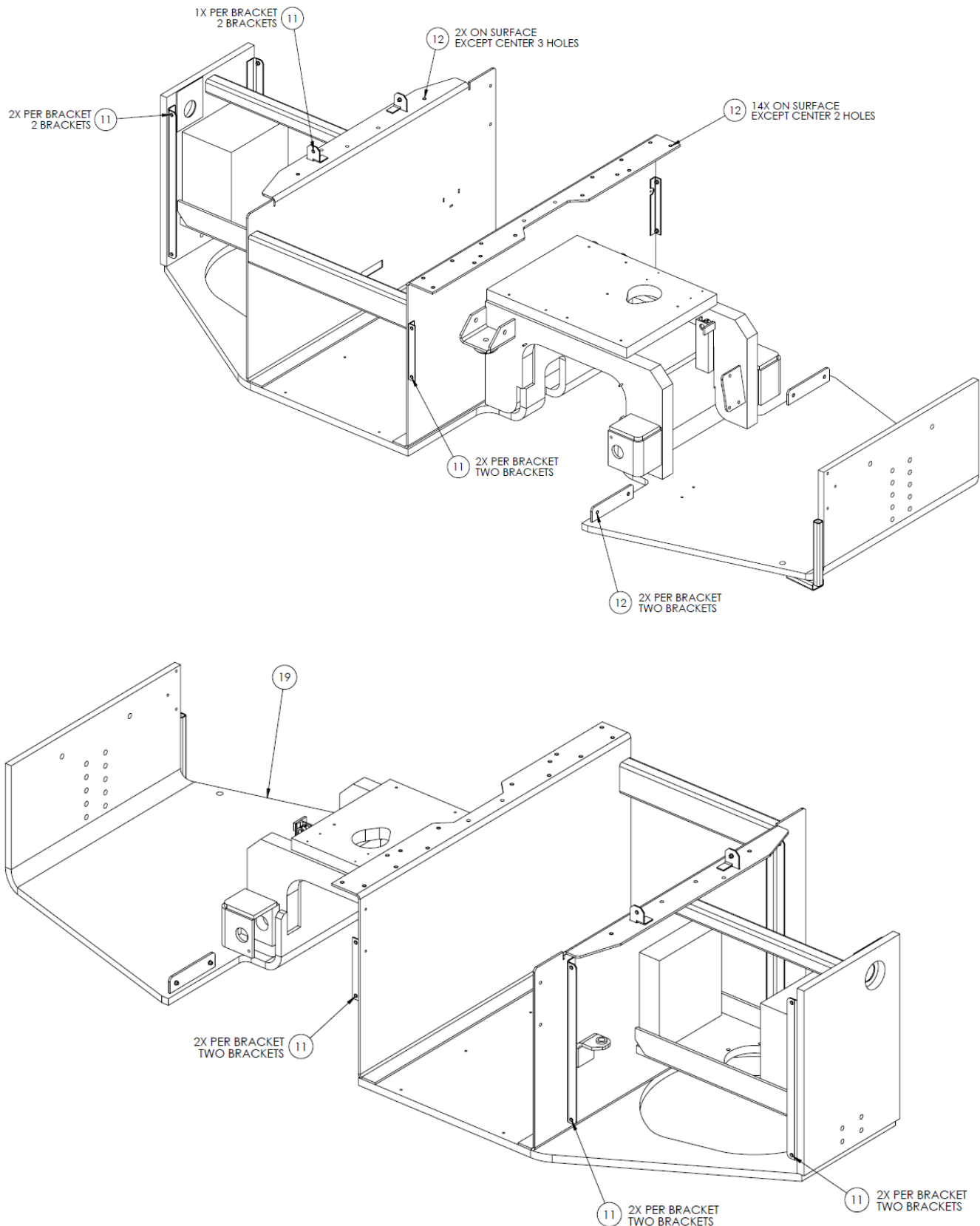
MOTOR TEMP DEUTSCH DTM06-2S		
1	SUPPLY	RED
2	GROUND	WHITE

Parts List

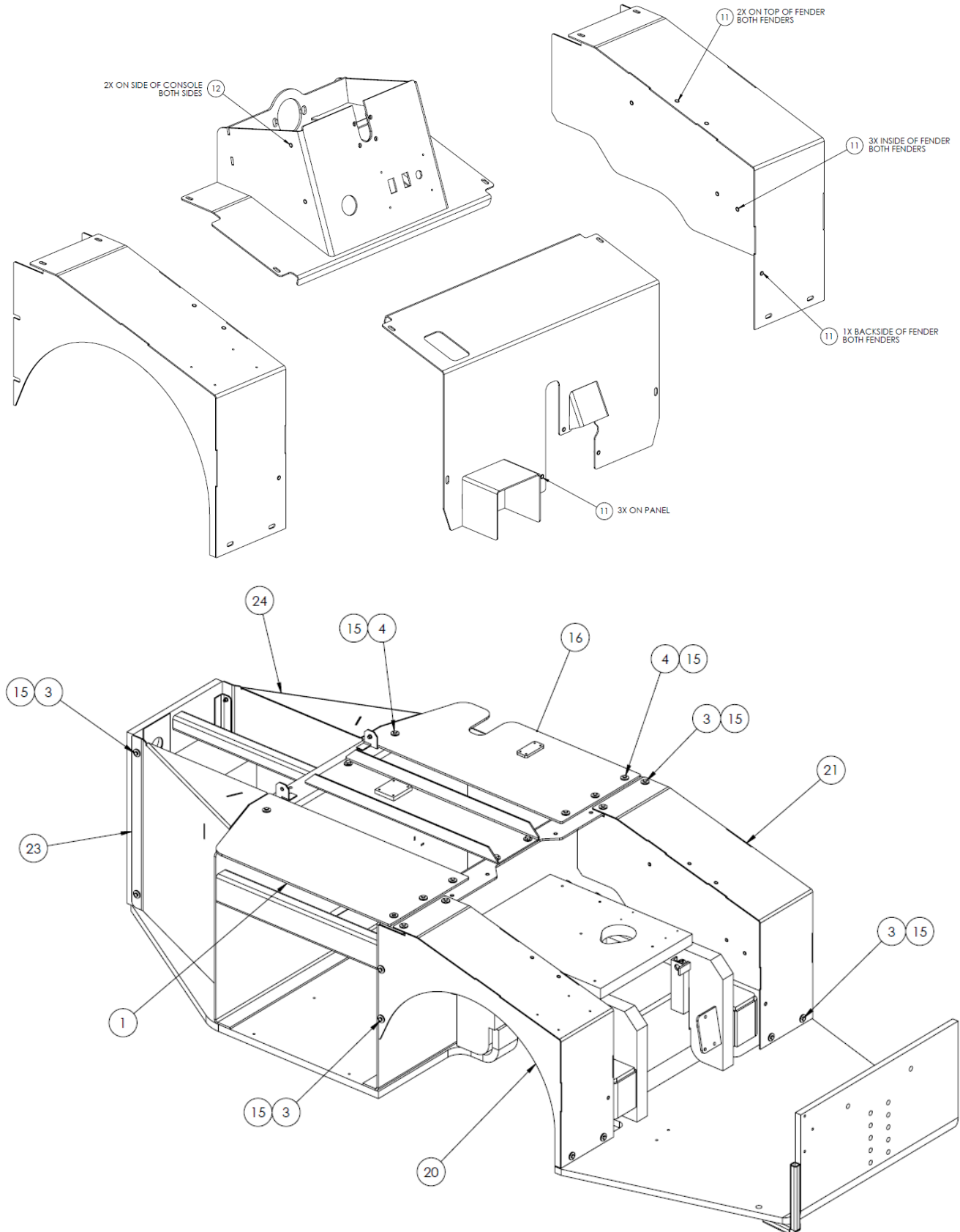
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	0460-202-20141	DEUTSCH TERMINAL	6
2	A-MTT5-0232	PARKING BRAKE BRACKET	1
3	A-RTT50-0312	SPRING, SUSPENSION	2
4	A-RTT50-00361	80V AXLE/MOTOR ASSY-CARRARO	1
5	DTM04-2P	DEUTSCH MINI CONNECTOR	1
6	DTM04-4P	DEUTSCH CONNECTOR	1
7	G-1250-1070W	FLATWASHER, 3/8 WIDE	2
8	G-1250-1090N	FLATWASHER, 1/2 NARROW	8
9	G-1251-1070R	LOCKWASHER, 3/8 REGULAR	2
10	G-1420-107006	BOLT, 3/8-16 X .75" HEX HD GR 8	2
11	G-1420-109030	BOLT, 1/2-13 X 3 H.H. GR 8	2
12	G-1420-109024	BOLT, 1/2-13 X 2-1/2" HEX HD GR 8	2
13	G-1491-108014	SOC HD CAP SCR, M10X1.5 X 25	2
14	G-1514-M100R	LOCKWASHER, M 10 REGULAR	2
15	G-1515-M100	FLATWASHER, M10	2
16	G-1727-1090	NUT, 1/2-13 TOP LOCK ZINC	4
17	H-1504-03-09.5	CHAIN, BINDING	2
18	TR-2679-00	SPACER, AXLE CHAIN (P)	2
19	WM-4P	DEUTSCH LOCK	1
20	WM2P	DEUTSCH CONNECTOR LOCK	1
21	Z-11209-00	WLD, AXLE PIN (P)	2

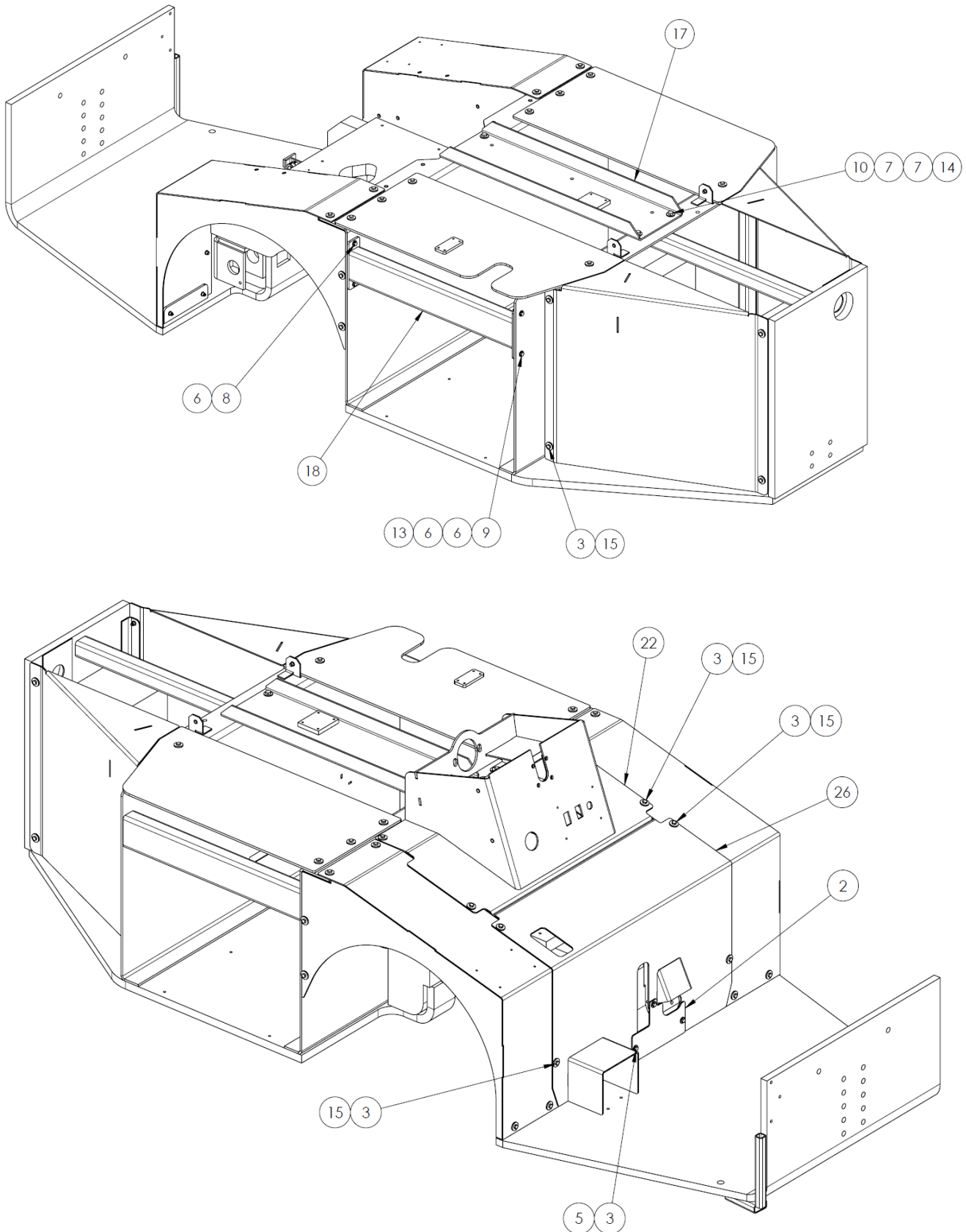
14.0 CHASSIS



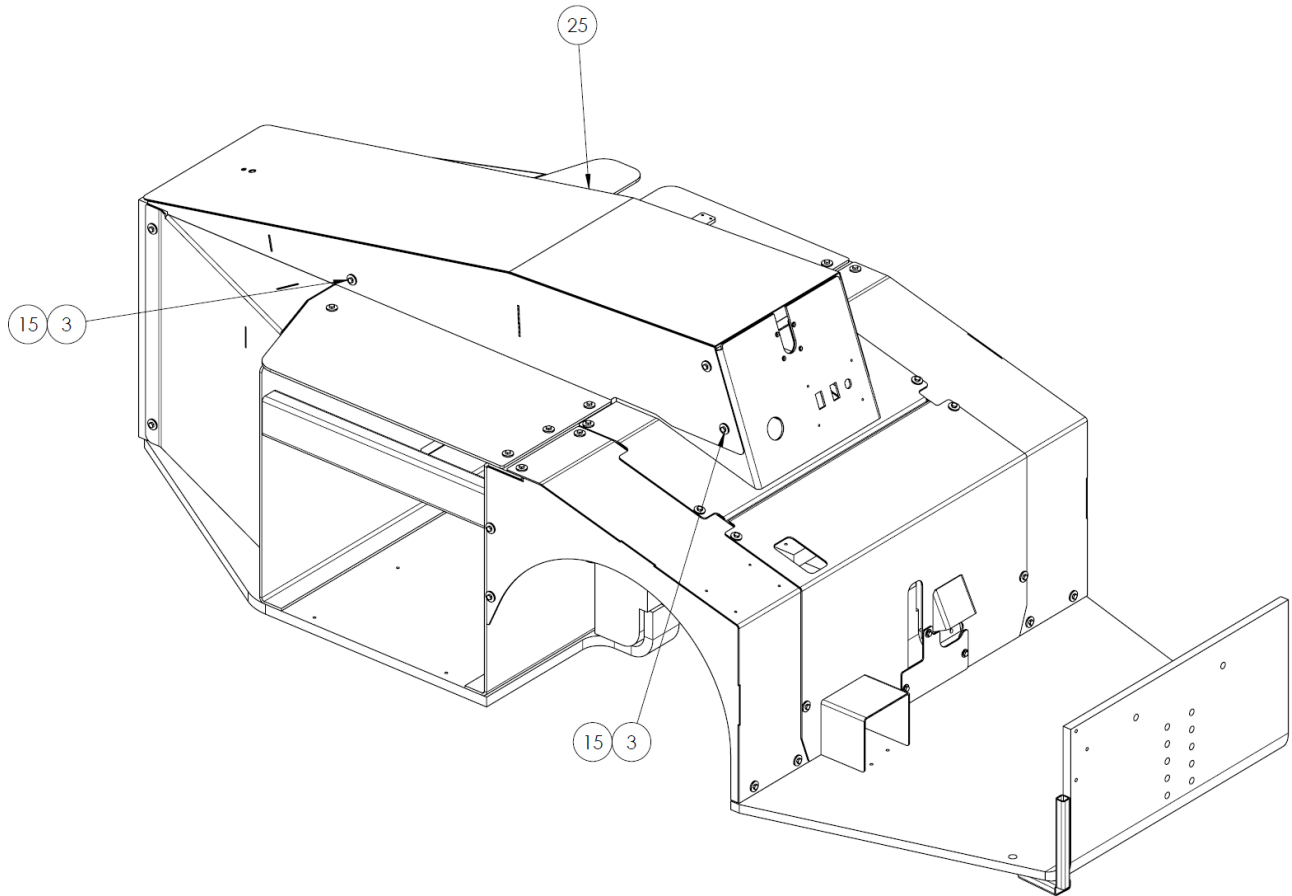
14.0 CHASSIS (continued)



14.0 CHASSIS (continued)



14.0 CHASSIS *(continued)*





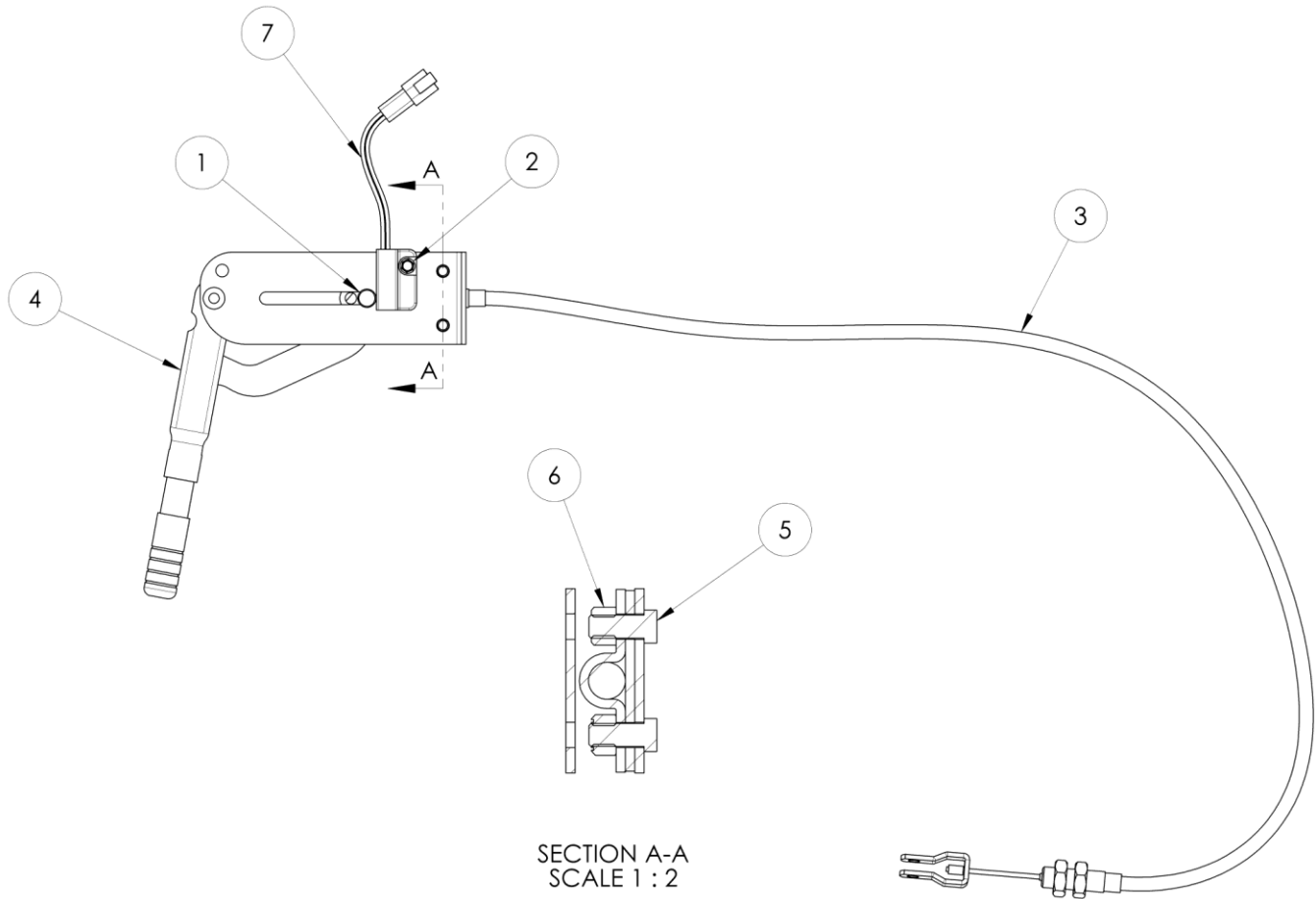
14.0 CHASSIS (continued)

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-RTT50-0203	BATTERY SIDE COVER	1
2	A-RTT50-0211	REAR LOWER COVER	1
3	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	39
4	G-1100-105012	BOLT, 1/4-20 X 1-1/4" LG HEX HD GR 5	8
5	G-1250-1050W	FLATWASHER, 1/4 WIDE	3
6	G-1250-1060N	FLATWASHER, 5/16 NARROW	6
7	G-1250-1070W	FLATWASHER, 3/8 WIDE	8
8	G-1420-106006	BOLT, 5/16-18 X 3/4" LG. HEX HD GR 8	2
9	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	2
10	G-1420-107012	BOLT, 3/8-16 X 1.25" HEX HD GR 8	4
11	G-1439-1050-S	NUTSERT, THIN WALL 1/4-20	29
12	G-1440-1050-S	NUTSERT, THICK WALL 1/4-20	24
13	G-1727-1060	NUT, 5/16-18 TOP LOCK ZINC	2
14	G-1727-1070	NUT, 3/8-16 TOP LOCK ZINC	4
15	G-1848-105	WASHER, 1/4" THICK FENDER	44
16	Z-10716-00	WLD, BATTERY COVER PANEL, RH	1
17	Z-10717-00	WLD, BATTERY BULKHEAD TIE	1
18	Z-10718-00	WLD, BATTERY SIDE RAIL	1
19	Z-11136-00	WLD, CHASSIS (WP)	1
20	Z-11168-00	WLD, LH FENDER (WP)	1
21	Z-11169-00	WLD, RH FENDER (WP)	1
22	Z-11183-00	WLD, DASH CONSOLE (WP)	1
23	Z-11186-00	WLD, FRONT LH COVER (WP)	1
24	Z-11187-00	WLD, FRONT RH COVER (WP)	1
25	Z-11188-00	WLD, STEERING COVER (WP)	1
26	Z-11189-00	WLD, OPERATOR KICK COVER (WP)	1

15.0 BRAKING

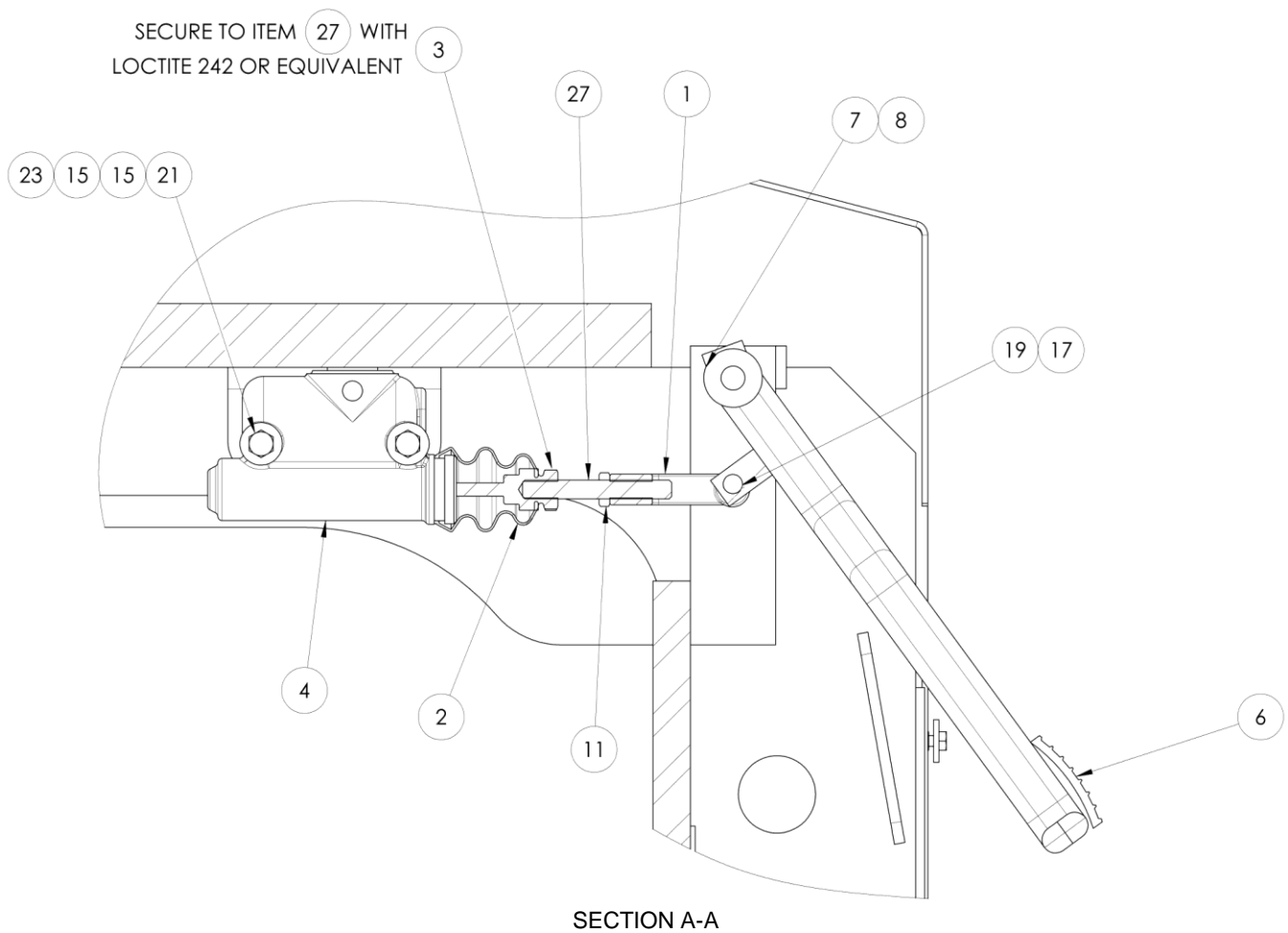
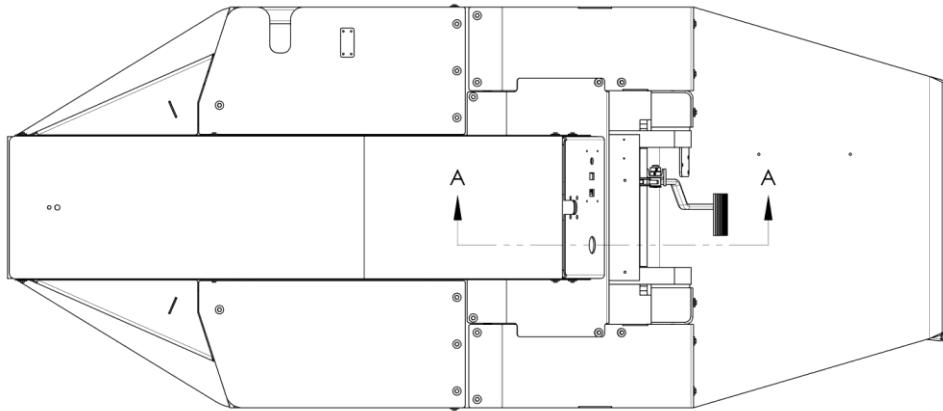


Parts List

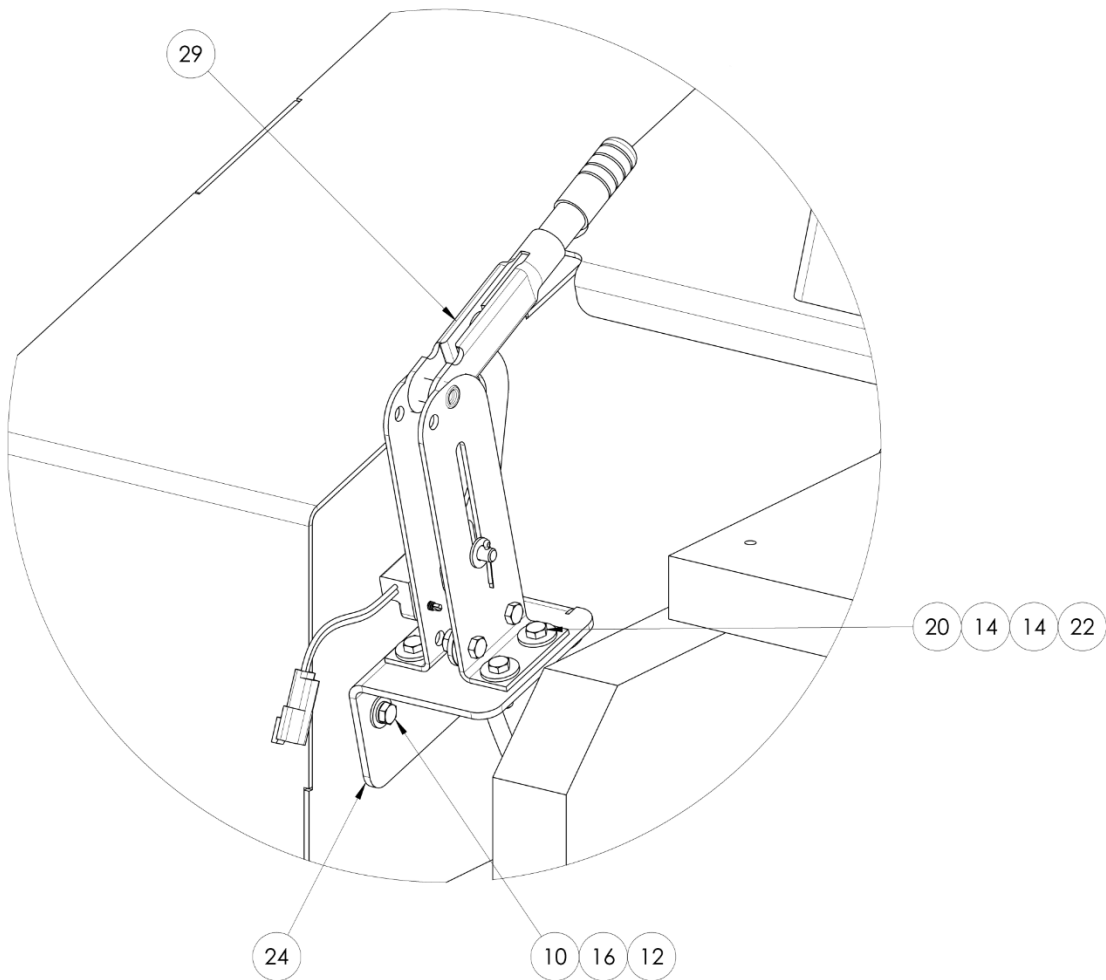
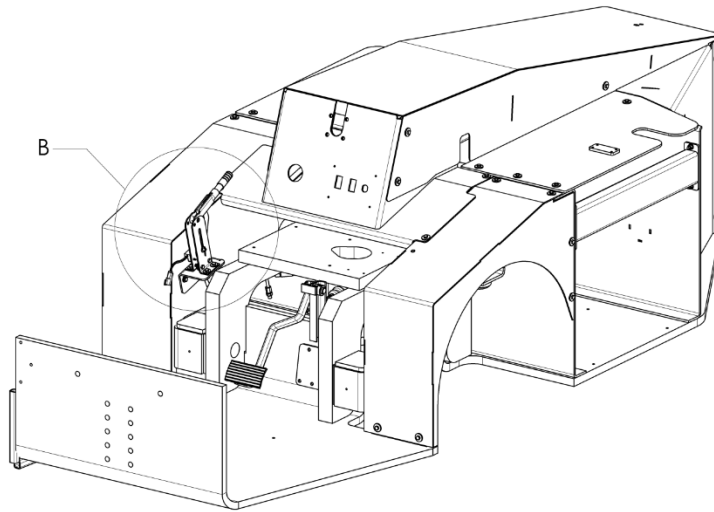
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	81008429	BUZZLITE PRK BRAKE CONTACT PIN	1
2	82066700	MOUNTING SCREW BUZZLITE	1
3	A-RTT50-0550	PARKING BRAKE CABLE	1
4	A-TT4-00141	BRAKE LEVER-HAND	1
5	G-1420-106006	BOLT, 5/16-18 X 3/4" LG. HEX HD GR 8	2
6	G-1727-1060	NUT, 5/16-18 TOP LOCK ZINC	2
7	Z-9940	PRX SENSOR BUZZLITE W CONNECT	1

15.0 BRAKING *(continued)*

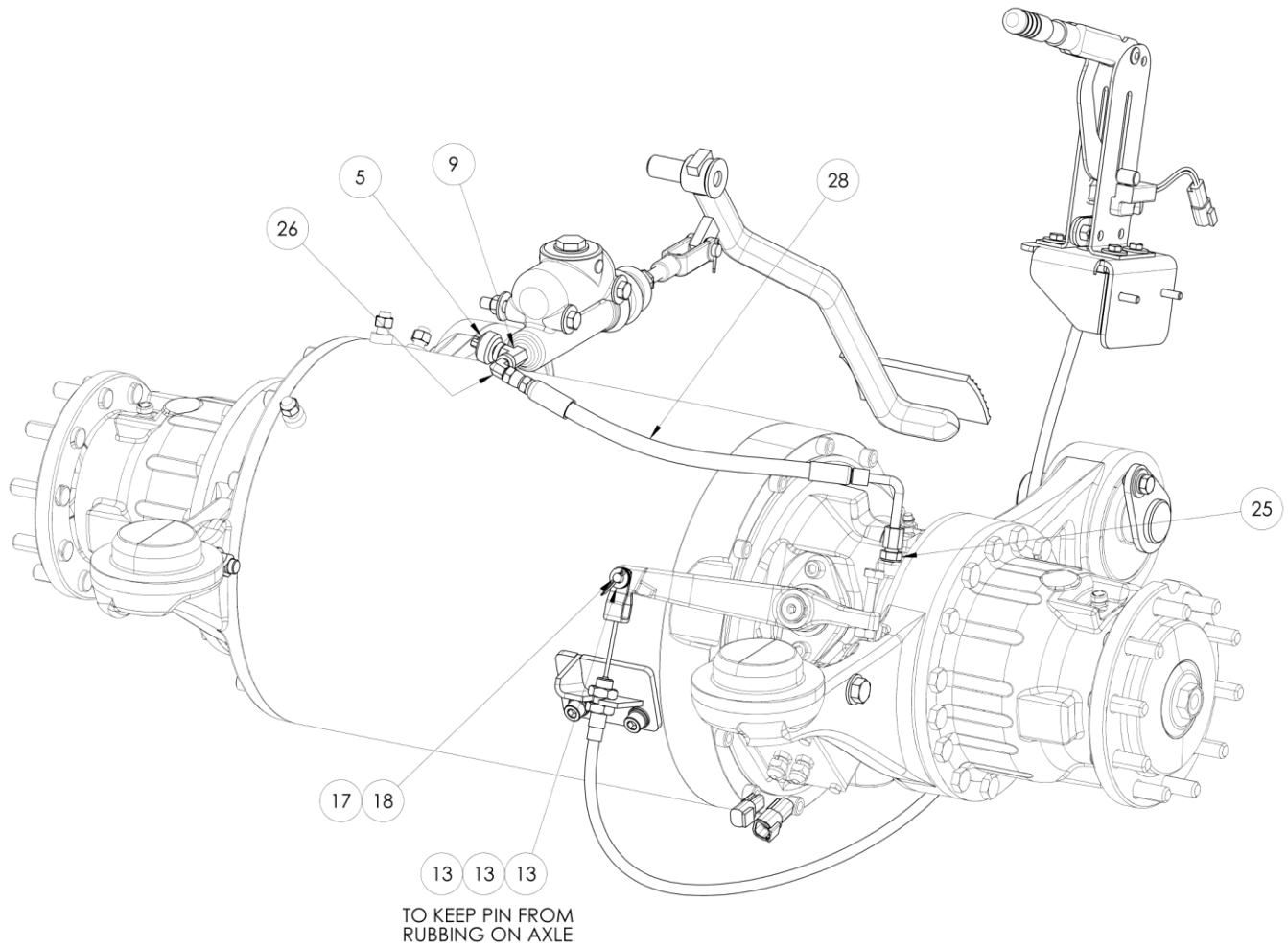


15.0 BRAKING *(continued)*



DETAIL B

15.0 BRAKING *(continued)*





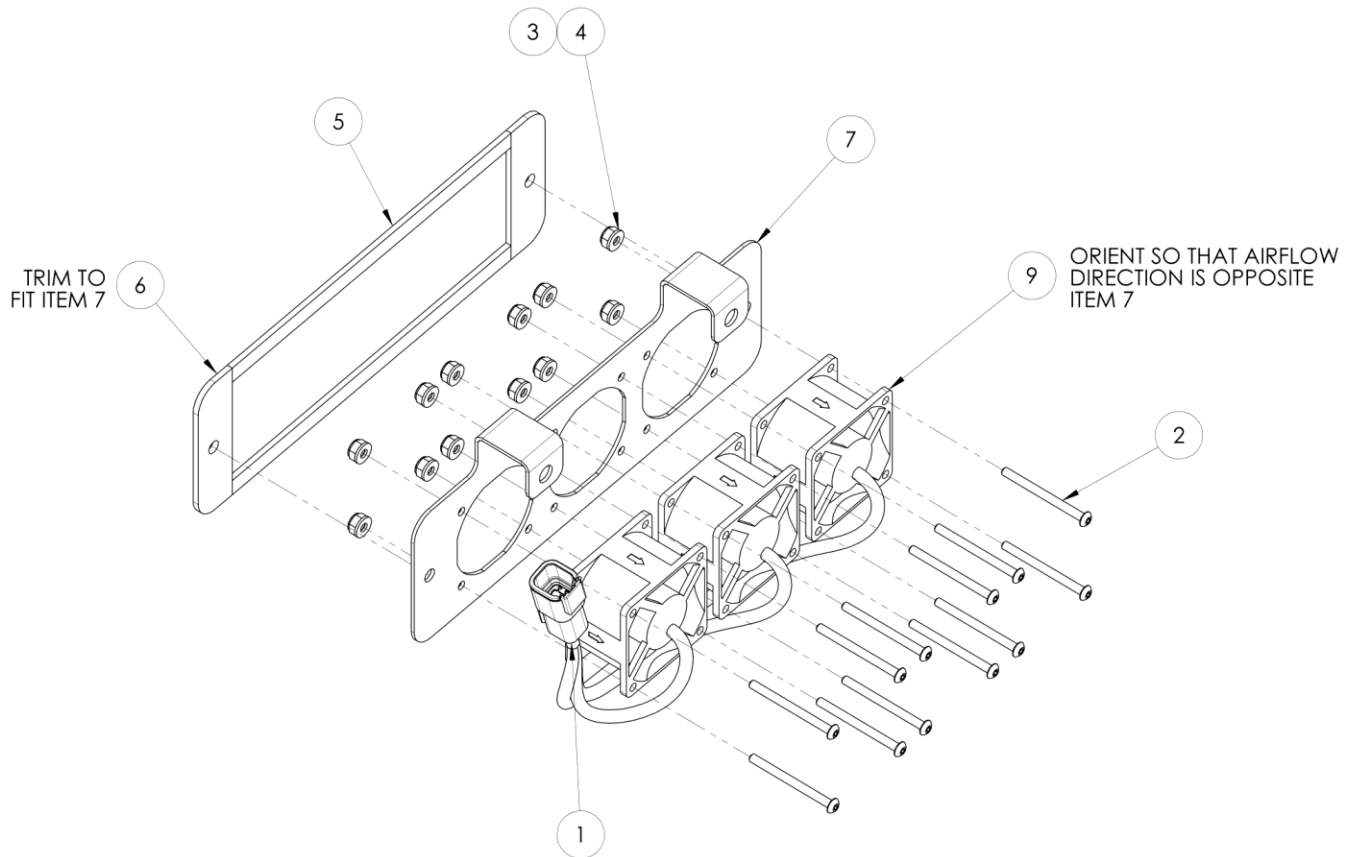
15.0 BRAKING (continued)

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-ETT8-0530	BRAKE, PEDAL CLEVIS	1
2	A-TN3E-00159	BRAKE PUSHROD BOOT	1
3	A-TN3E-00160	PUSHROD, MASTER CYLINDER	1
4	A-TN3E-00161	MASTER CYLINDER	1
5	A-TT4-00173	BRAKE PRESSURE SWITCH	1
6	B-TT10-10181	BRAKE PEDAL	1
7	C-TT4-10182	BRAKE PEDAL PIVOT PIN	1
8	C-TT4-10188	NYLINER BEARING	1
9	C3759X2	RUN TEE, 1/8 NPT	1
10	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	2
11	G-1207-1085	NUT, 7/16-20 JAM	1
12	G-1250-1050W	FLATWASHER, 1/4 WIDE	2
13	G-1250-1060N	FLATWASHER, 5/16 NARROW	3
14	G-1250-1060W	FLATWASHER, 5/16 WIDE	8
15	G-1250-1070W	FLATWASHER, 3/8 WIDE	4
16	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	2
17	G-1301-01	PIN, 3/32 X 1 LG COTTER	2
18	G-1302-03	PIN, CLEVIS, 5/16 X 0.94" LG.	1
19	G-1302-05	PIN, CLEVIS, 7/16 X 1.19" LG.	1
20	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	4
21	G-1420-107034	BOLT, 3/8-16 X 3.5" HEX HD GR 8	2
22	G-1727-1060	NUT, 5/16-18 TOP LOCK ZINC	4
23	G-1727-1070	NUT, 3/8-16 TOP LOCK ZINC	2
24	J-7797-00	BRACKET, P-BRAKE HANDLE	1
25	MC5315X4X10	ADAPTOR, M10 M X 04 JIC M	1
26	N-2005-03-S	ELBOW, MALE	1
27	R-3377	PUSHROD, BRAKE	1
28	TF-1038-15-15.3	HYDRAULIC HOSE	1
29	NOT AVAILABLE	ASY, P-BRAKE HANDLE	1

16.0 ELECTRICAL



PIN ASSIGNMENT INSTRUCTIONS

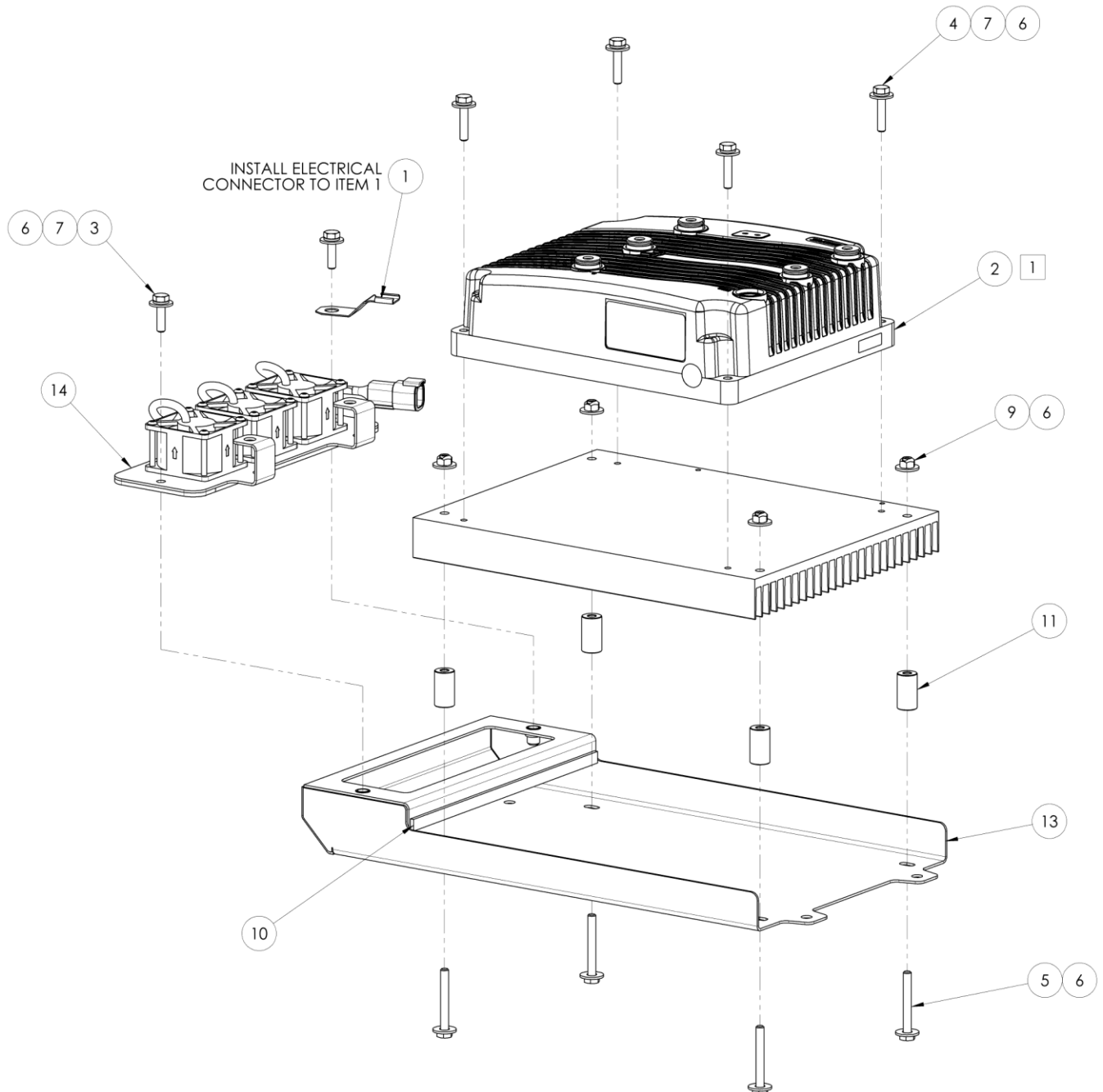
PIN 1	FAN RED (+12V)
PIN 2	FAN RED (+12V)
PIN 3	FAN RED (+12V)
PIN 4	FAN BLACK (GND)
PIN 5	FAN BLACK (GND)
PIN 6	FAN BLACK (GND)

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	DTM04-6P	DEUTSCH CONNECTOR	1
2	G-1154-102220	SCREW, #8-32 X 2.00" LG. SST SOC BUTT. HD CAP	12
3	G-1202-1020	STOPNUT, #8-32 ELASTIC	12
4	G-1250-1020N	FLATWASHER, #8 NARROW	12
5	H-1204-03-008.2	TAPE, NEOPRENE FOAM SEALING, 1/8" X 3/8"	2
6	H-1204-10-03.38	TAPE, NEOPRENE FOAM SEALING, 1/8" X 1"	2
7	S-3930-00	FAN MOUNTING PLATE (P)	1
8	WM-6P	DEUTSCH CONNECTOR LOCK	1
9	Z-11063	ASY, FAN WITH TERMINALS	3

16.0 ELECTRICAL (continued)



- 1 APPLY A THIN UNINTERRUPTED LAYER OF THERMAL INTERFACE COMPOUND SUCH AS TOCTITE TC 4 OR EQUIVALENT TO BOTTOM OF DRIVE BEFORE MOUNTING TO HEATSINK



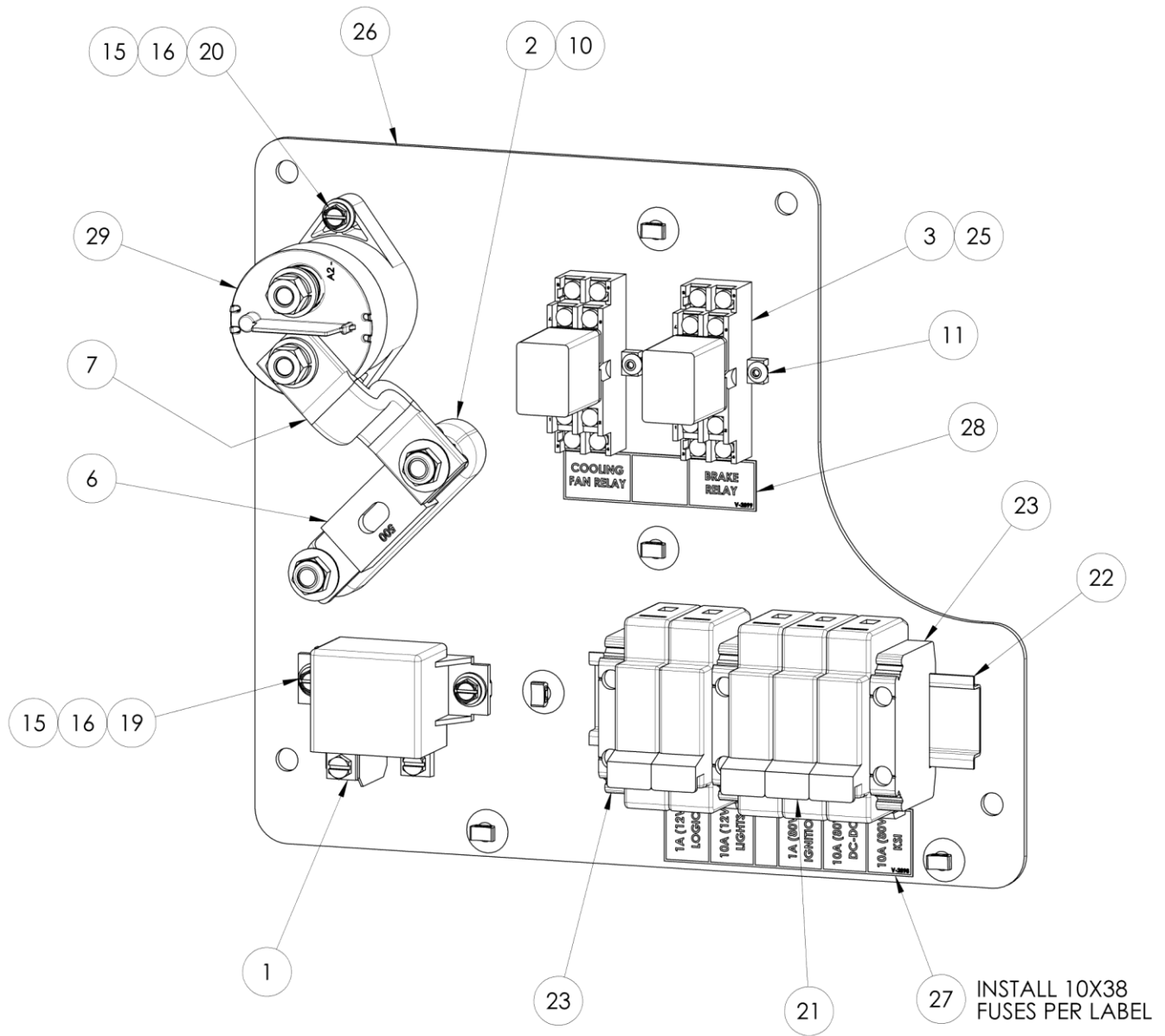
16.0 ELECTRICAL (continued)

Parts List

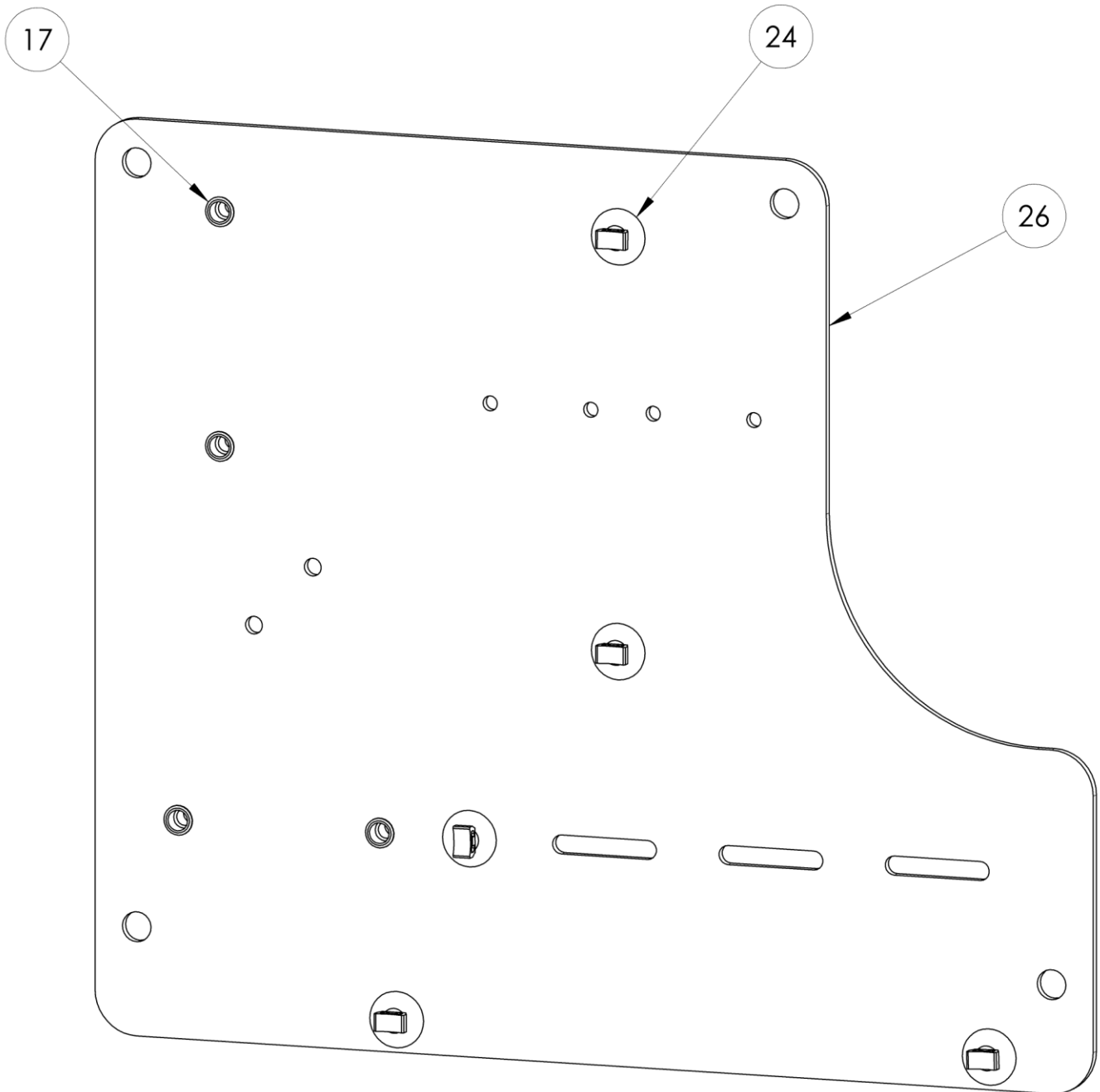
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	1027-003-1200	DEUTSCH RETAINER CLIP	1
2	EC-2877	CONTROLLER, AC MOTOR	1
3	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	2
4	G-1100-105012	BOLT, 1/4-20 X 1-1/4" LG HEX HD GR 5	4
5	G-1100-105020	BOLT, 1/4-20 X 2.0" LG HEX HD GR 5	4
6	G-1250-1050W	FLATWASHER, 1/4 WIDE	14
7	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	6
8	G-1439-1050-S	NUTSERT, THIN WALL 1/4-20	2
9	G-1727-1050	NUT, 1/4-20 TOP LOCK ZINC	4
10	H-1204-03-010.0	TAPE, NEOPRENE FOAM SEALING, 1/8" X 3/8"	1
11	H-4566-11	SPACER, .252 ID X .625 OD X 1.125	4
12	H-4769	HEATSINK, MODIFIED	1
13	Z-11005-00	WLD, DRIVE COOLING PLENUM (P)	1
14	NOT AVAILABLE	ASY, COOLING FANS	1

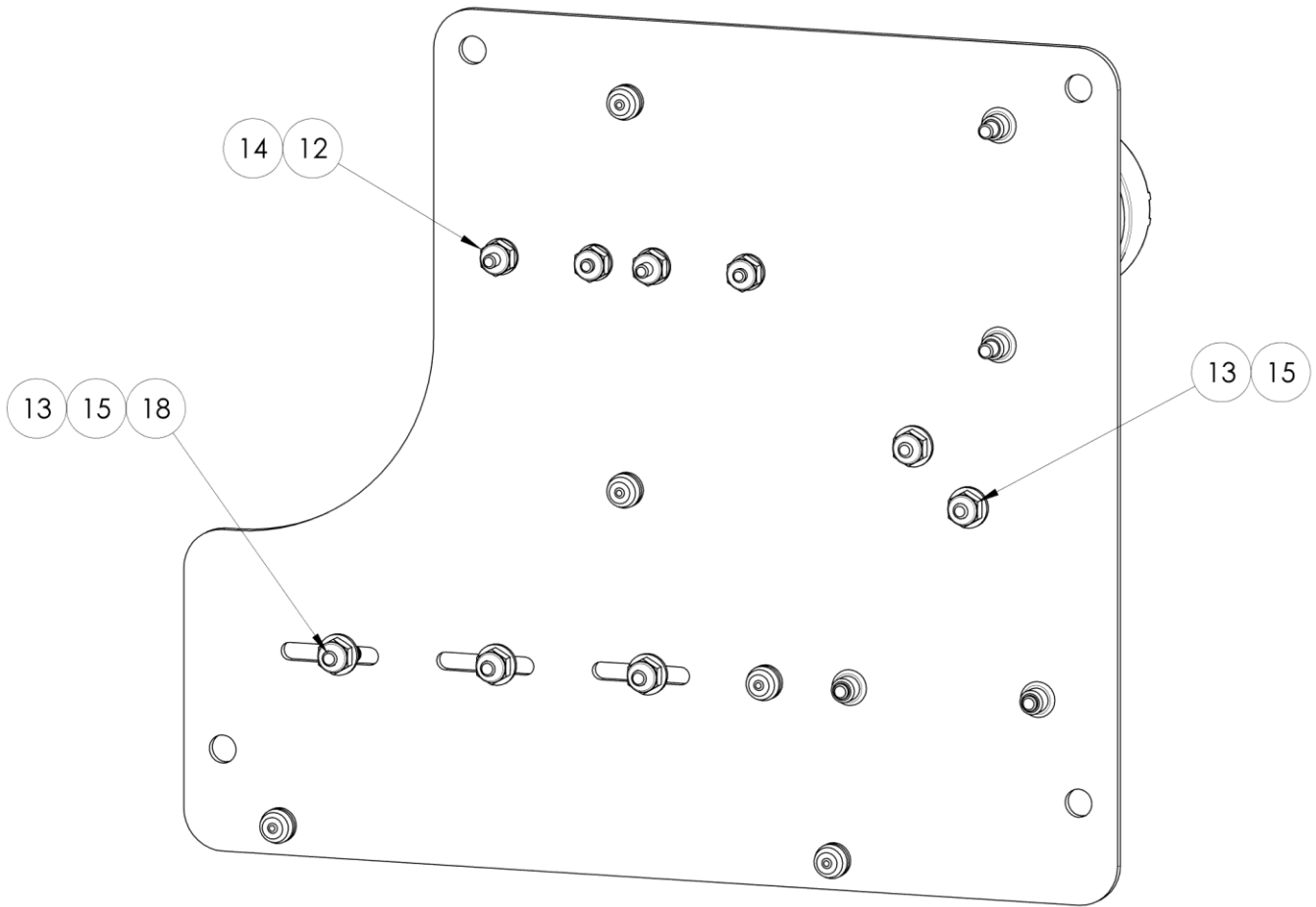
16.0 ELECTRICAL (continued)



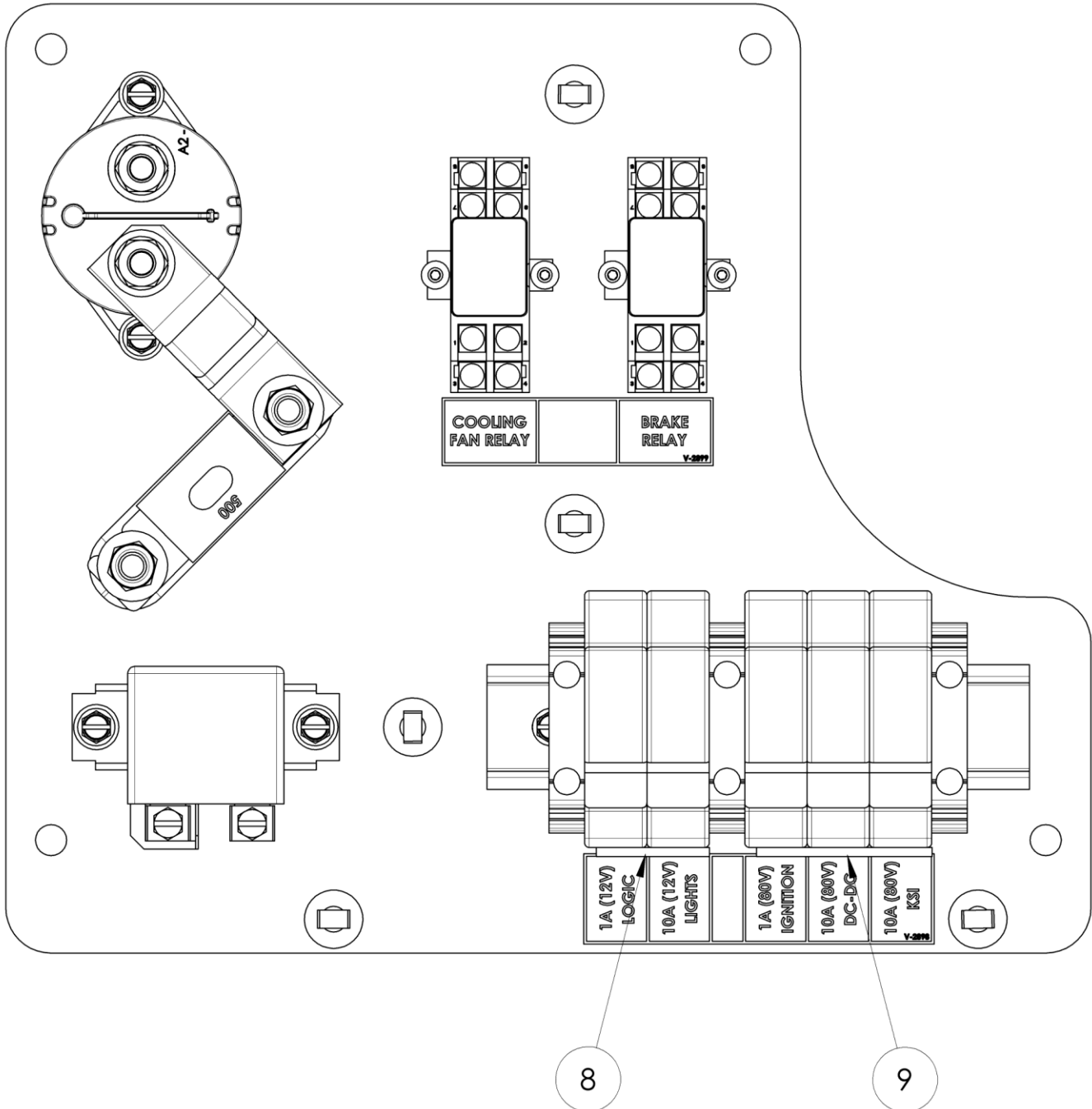
16.0 ELECTRICAL (continued)



16.0 ELECTRICAL (continued)



16.0 ELECTRICAL (continued)





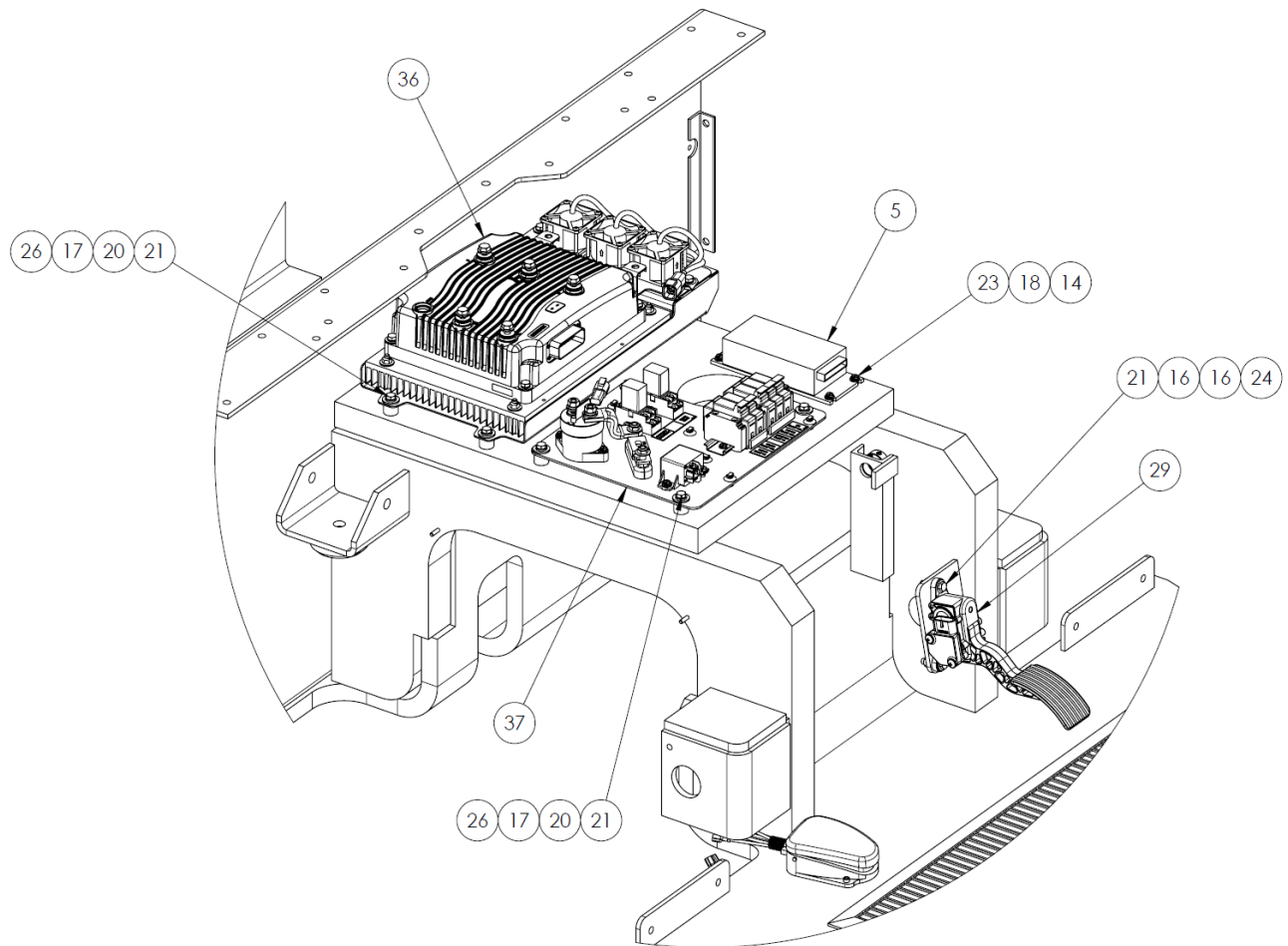
16.0 ELECTRICAL (continued)

Parts List

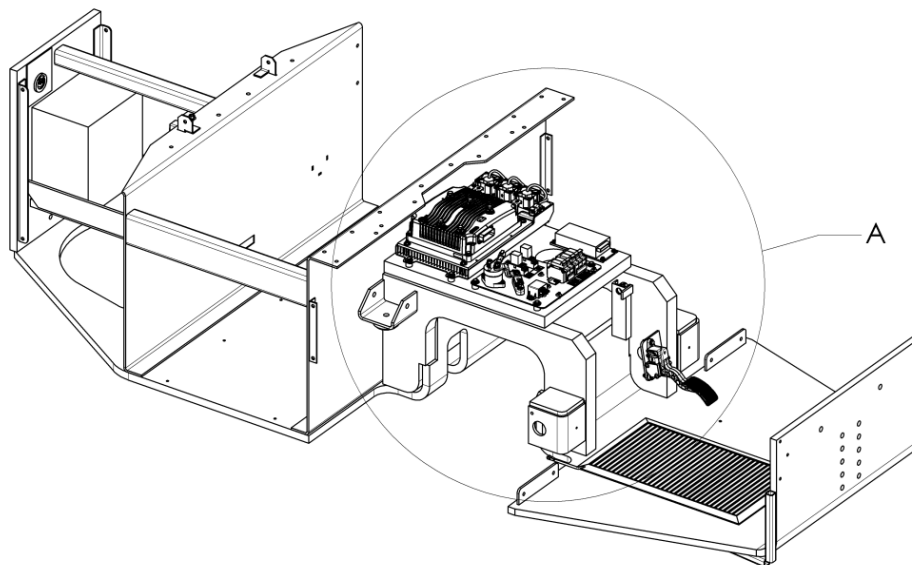
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	7A5012	ACS RELAY	1
2	A-MTT5-0225	ANN FUSE HOLDER	1
3	A-RTT12-00408	8 BLADE RELAY SOCKET	2
4	BLN-1	10X38 FUSE, 250V, 1A	2
5	BLN-10	10X38 FUSE, 250V, 10A	3
6	EC-1619-19	FUSE, ANL-500	1
7	EC-2998	CABLE, FLEXIBLE BRAIDED	1
8	EC-3361-2	FUSE INPUT BUS, 2 POLE	1
9	EC-3361-3	FUSE INPUT BUS, 3 POLE	1
10	G-1152-103710	SCREW, #10-32 X 1.0" LG SOCKET FLAT HD CAP	2
11	G-1154-102206	SCREW, #8-32 X .75" LG. SST SOC BUTT. HD CAP	4
12	G-1202-1020	STOPNUT, #8-32 ELASTIC	4
13	G-1202-1035	STOPNUT, #10-32 ELASTIC	5
14	G-1250-1020N	FLATWASHER, #8 NARROW	4
15	G-1250-1030N	FLATWASHER, #10 NARROW	9
16	G-1251-1030R	LOCKWASHER, #10 REGULAR	4
17	G-1439-1035-S	NUTSERT, THIN WALL #10-32	4
18	G-1720-103504	SCR,#10-32X0.5 MACH HEX WSH HD	3
19	G-1720-103506	SCR,#10-32X.75 MACH HEX WSH HD	2
20	G-1720-103512	SCR,#10-32X1.3 MACH HEX WSH HD	2
21	LAVT-05-006-CA	10X 38 DIN DIN RAIL MOUNTED FUSE HOLDER	5
22	EC-1514*006.00	35MM DIN RAIL	6
23	LAVT-05-009-CA	35MM DIN RAIL END STOP	3
24	NVSP-24-022-CA	CABLE TIE ANCHOR STD (Ø.375 X .27 THK)	5
25	RT00-31-001-CA	SOCKET MOUNT RELAY, 48V DPDT	2
26	S-4051-00	PANEL, ELECTRICAL (P)	1
27	V-2898	LABEL, FUSE BLOCK	1
28	V-2899	LABEL, FUSE BLOCK	1
29	Z-11102	ASY, CONTACTOR AND TERMINALS	1

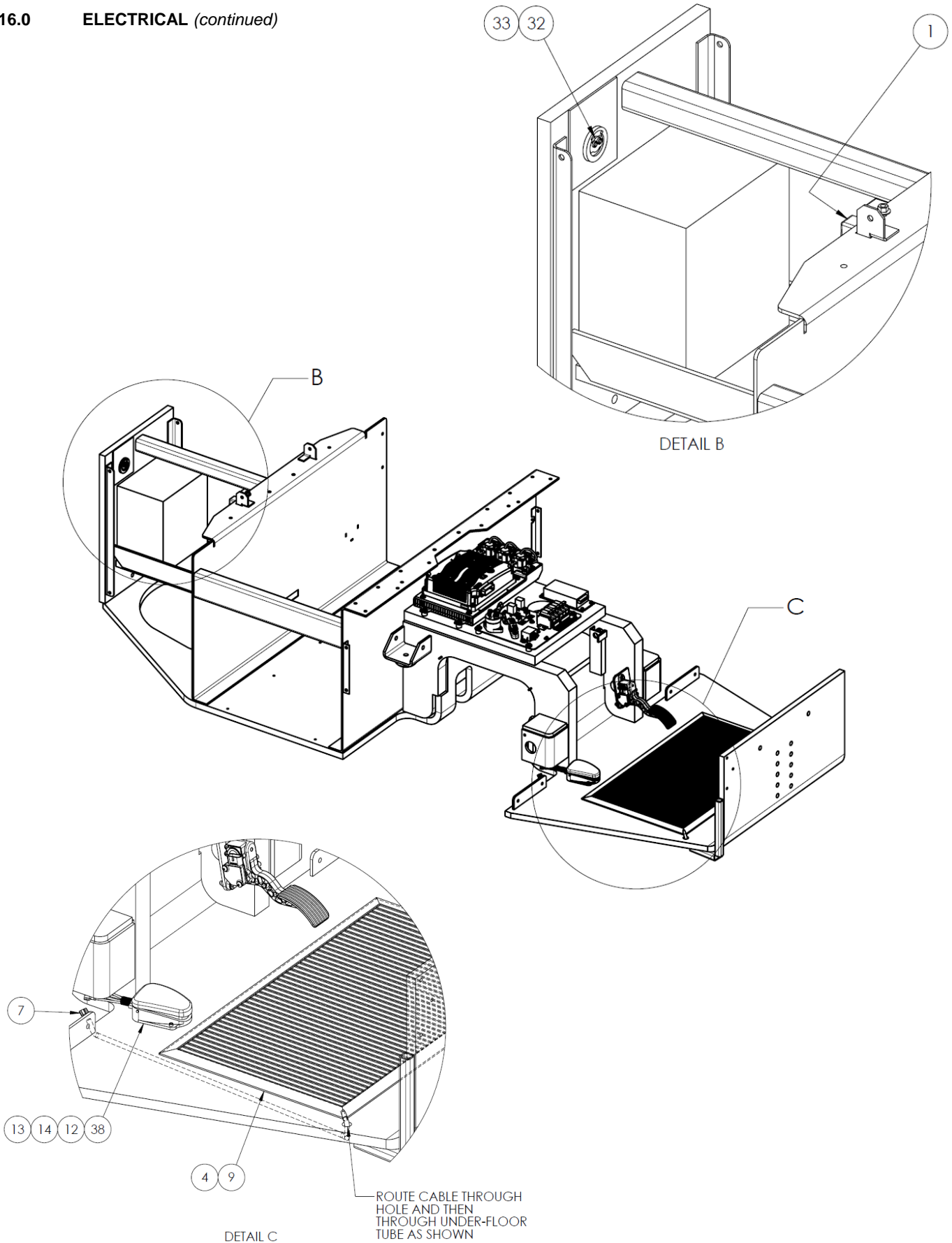
16.0 ELECTRICAL (continued)



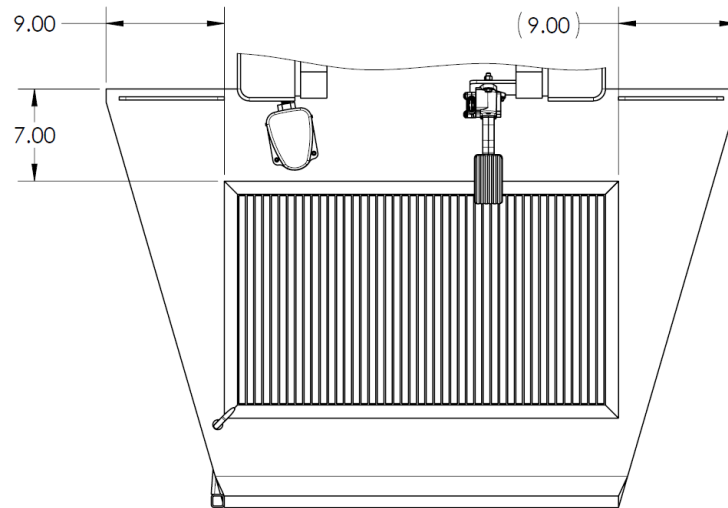
DETAIL A



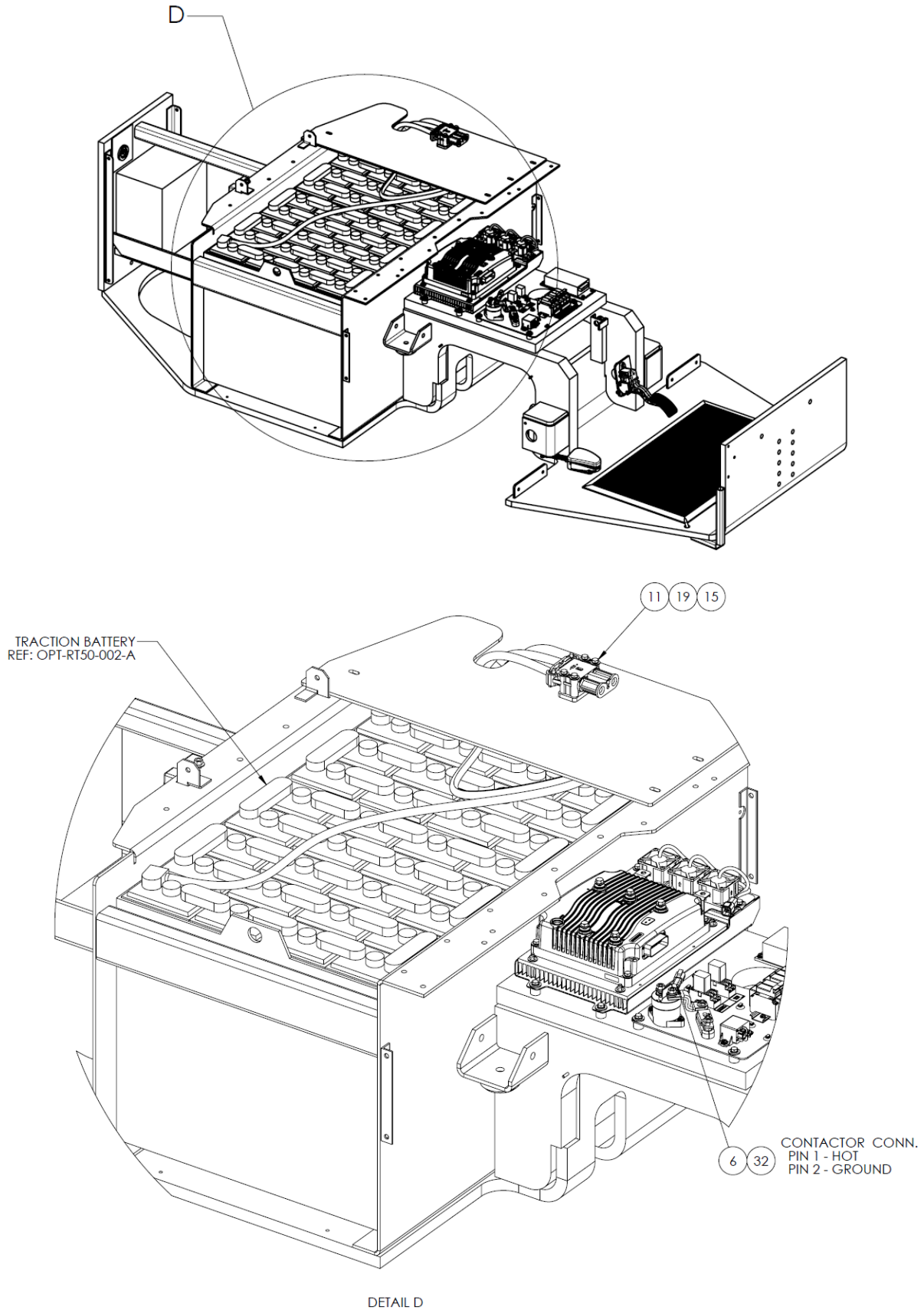
16.0 ELECTRICAL (continued)



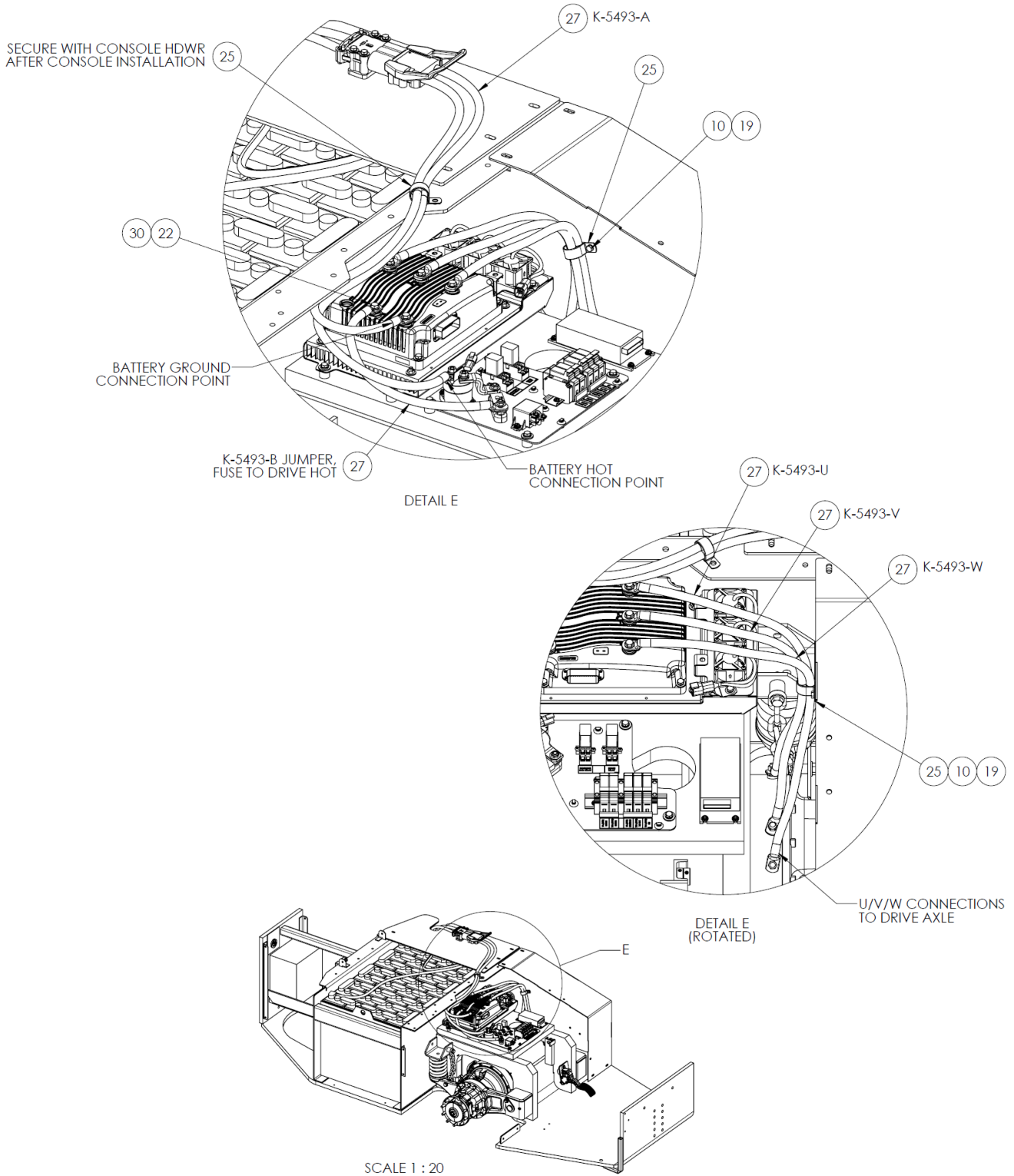
16.0 ELECTRICAL *(continued)*



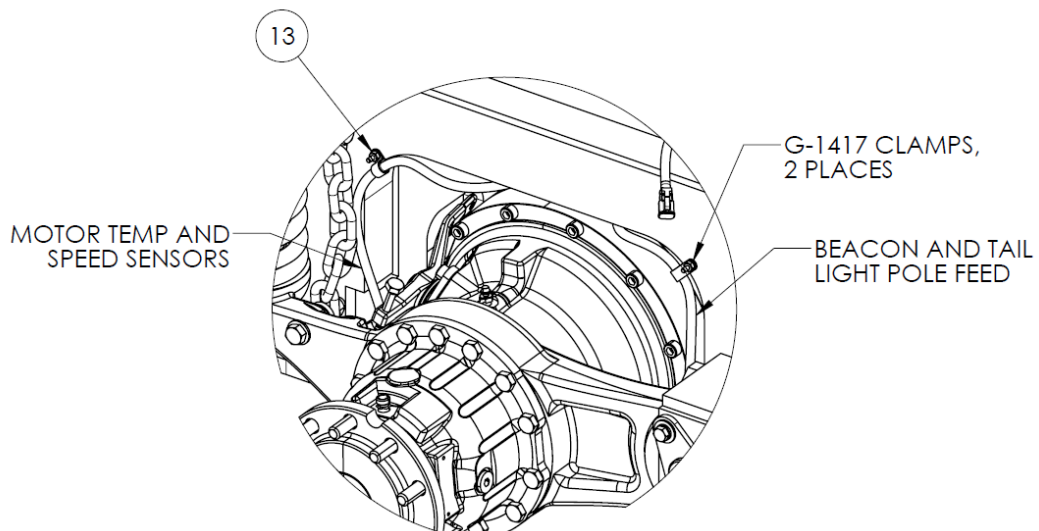
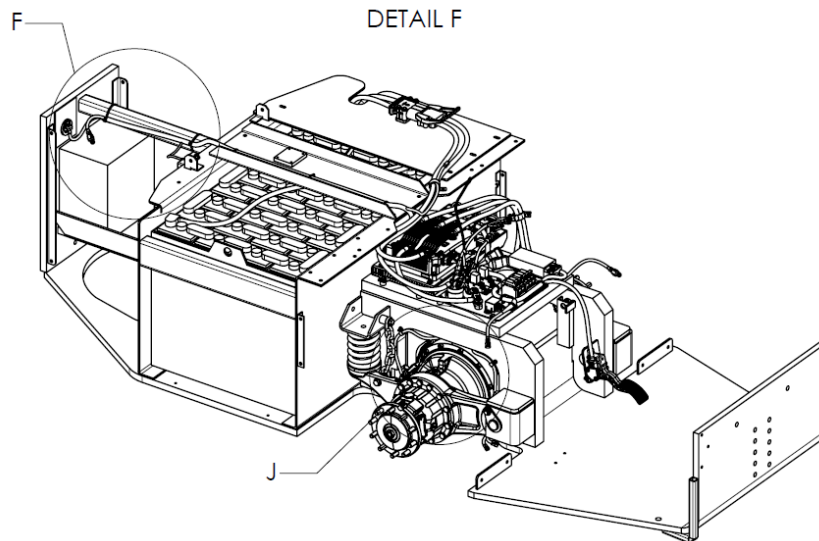
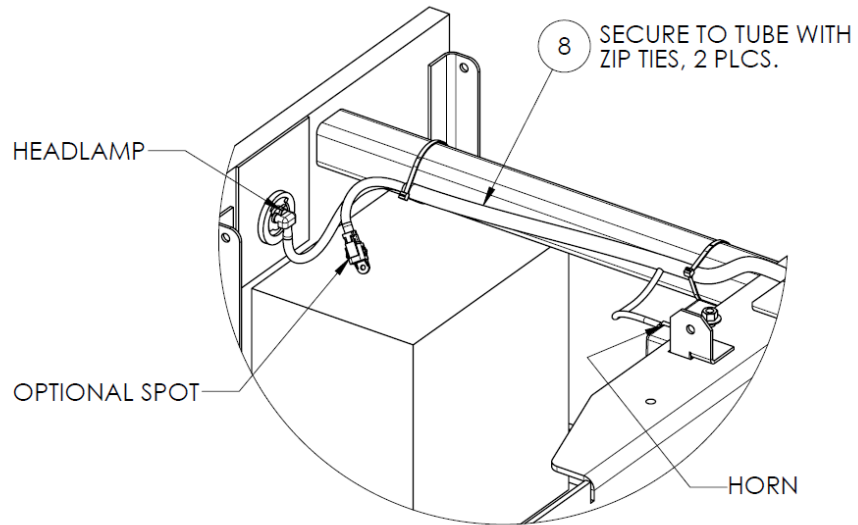
16.0 ELECTRICAL (continued)



16.0 ELECTRICAL (continued)

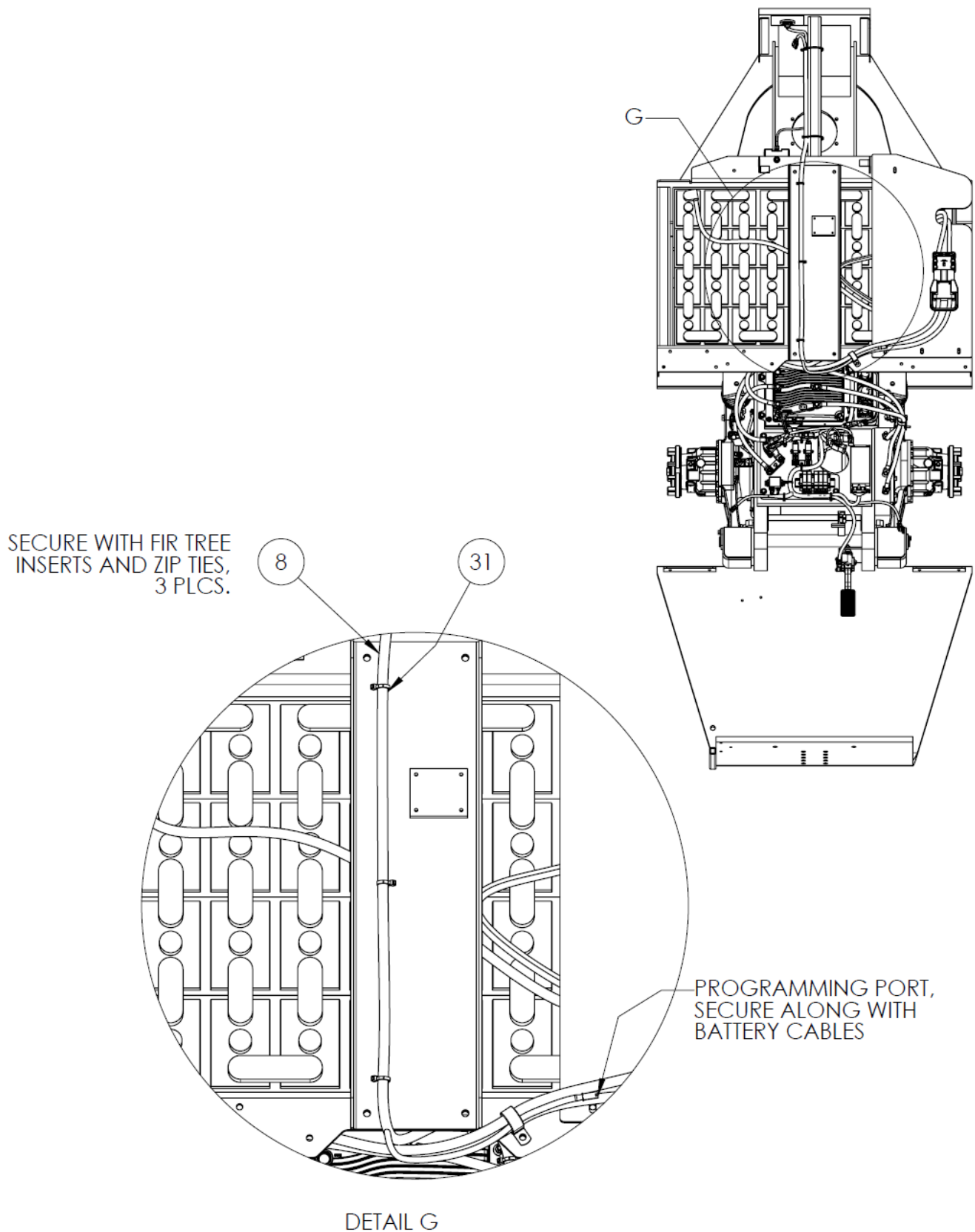


16.0 ELECTRICAL (continued)

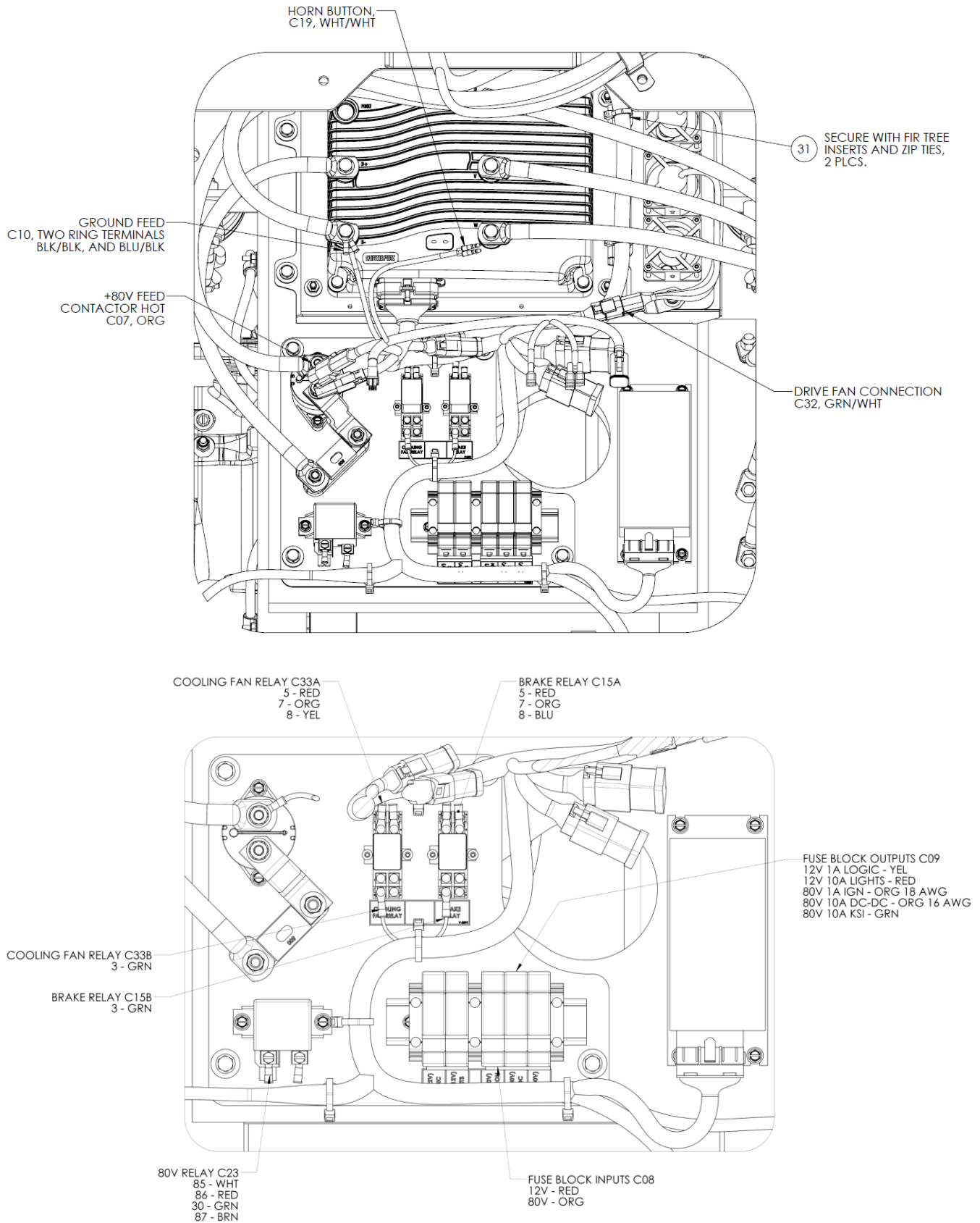


DETAIL J

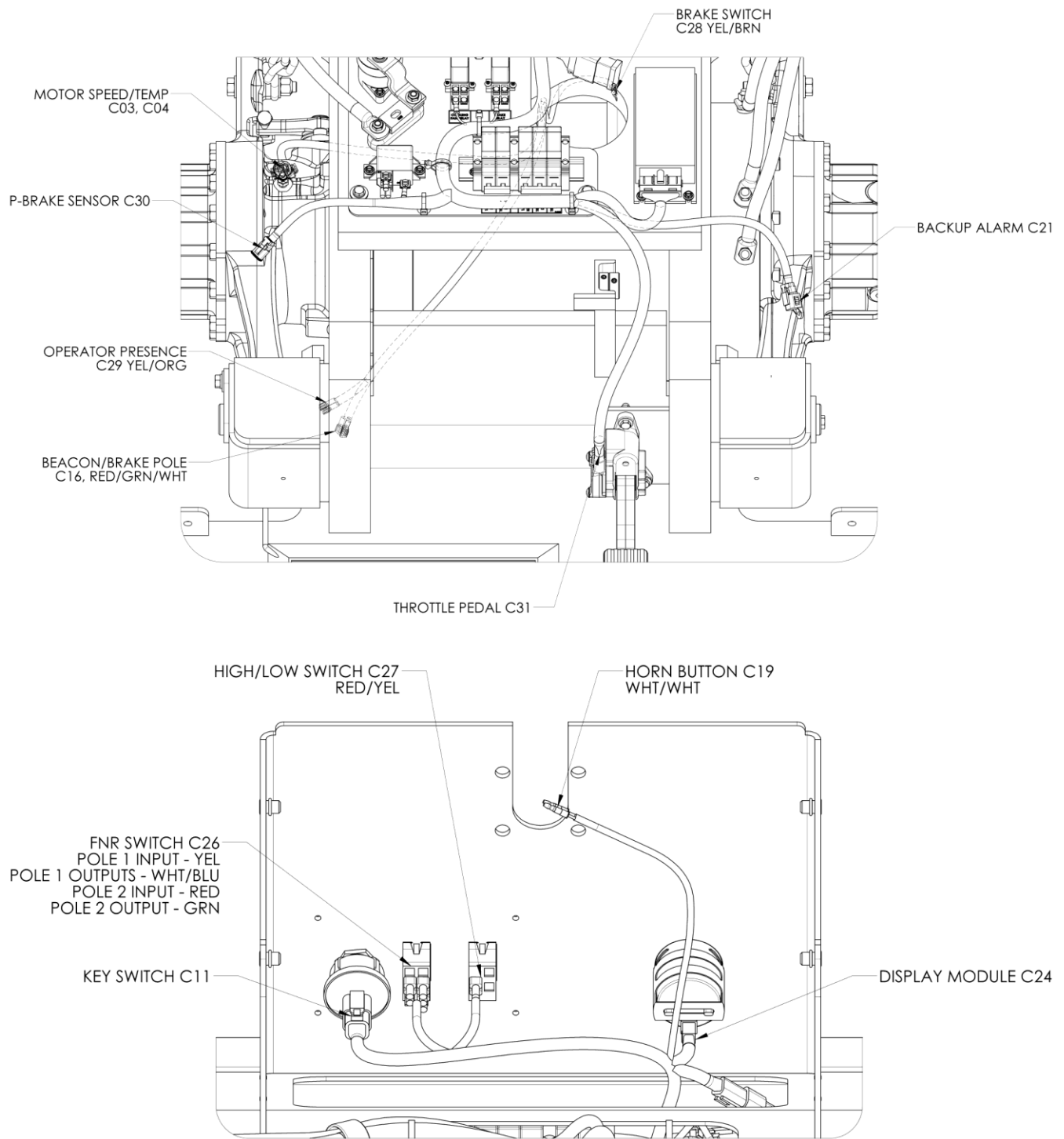
16.0 ELECTRICAL (continued)



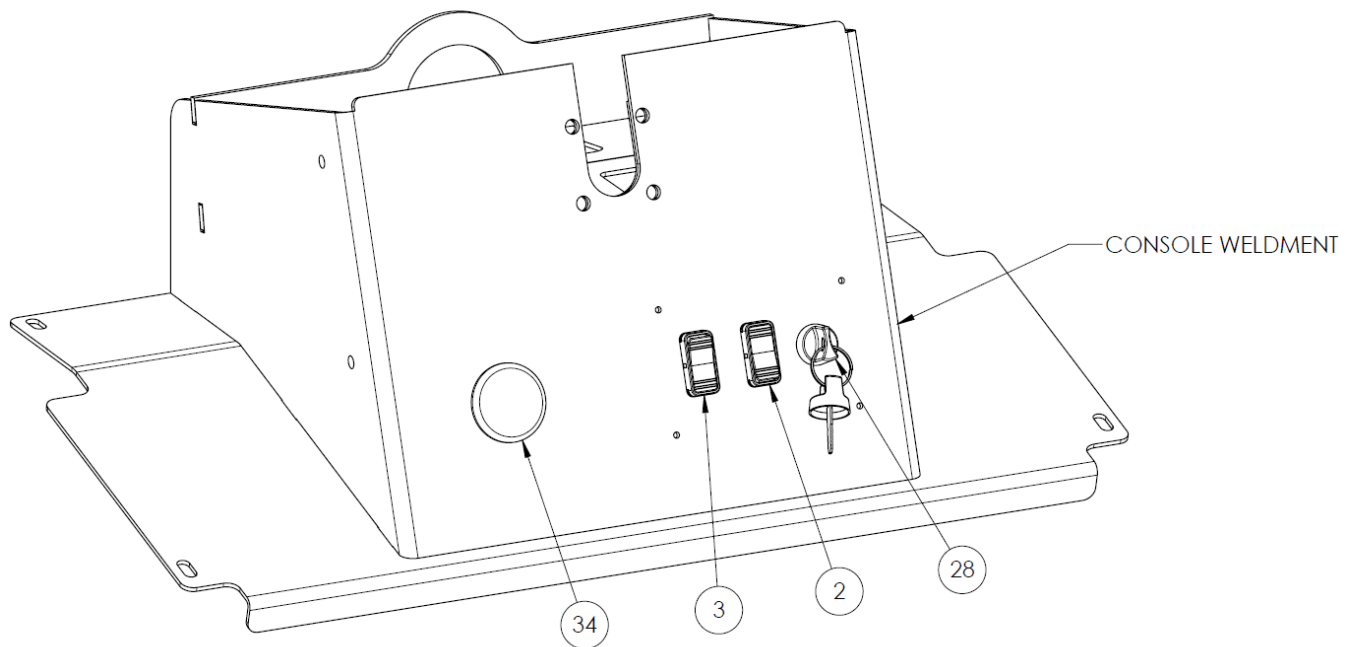
16.0 ELECTRICAL (continued)



16.0 ELECTRICAL (continued)



16.0 ELECTRICAL *(continued)*





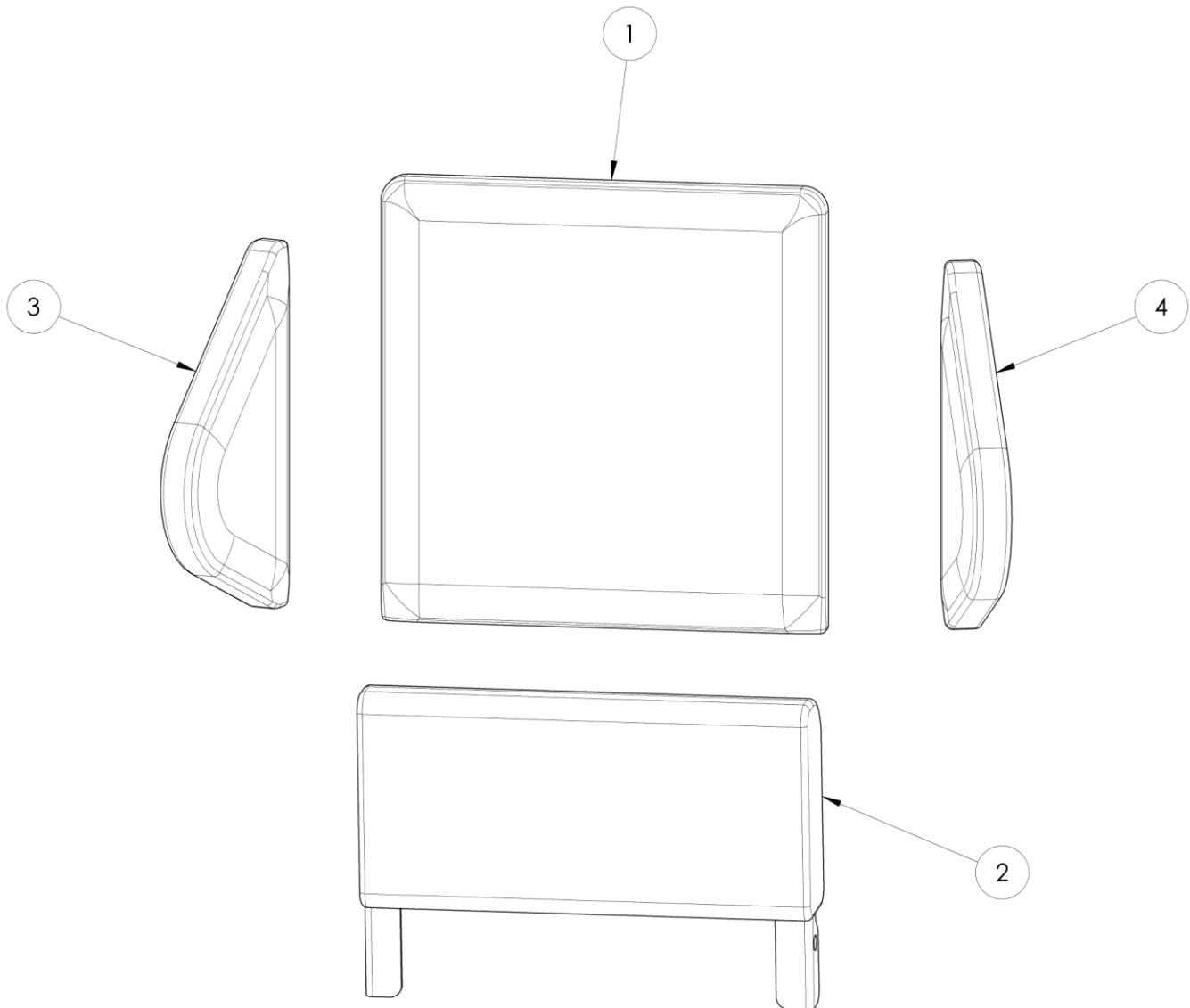
16.0 ELECTRICAL (continued)

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-RTT12-00418-1	DPDT ROCKER SWITCH	1
2	A-RTT-00450	BLACK SWITCHMAT	1
3	A-RTT12-00052	ELECTRONIC HORN	1
4	A-RTT12-00428	SPST ROCKER SWITCH	1
5	AE-OPT-0320-B	DC-DC CONVERTER, 300W	1
6	DT04-2P	DEUTSCH CONNECTOR	1
7	EC-1326-01	DISCONNECT, FEMALE 1/4" RED	2
8	EC-3360	VEHICLE HARNESS, RTT50	1
9	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	1
10	G-1100-105020	BOLT, 1/4-20 X 2.0" LG HEX HD GR 5	4
11	G-1250-1030N	FLATWASHER, #10 NARROW	4
12	G-1250-1050W	FLATWASHER, 1/4 WIDE	4
13	G-1250-1060N	FLATWASHER, 5/16 NARROW	6
14	G-1250-1060W	FLATWASHER, 5/16 WIDE	8
15	G-1251-1030R	LOCKWASHER, #10 REGULAR	4
16	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	5
17	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	8
18	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	11
19	G-1533-080016	BOLT M8-1.25 X 16mm LG. CLASS 10.9	5
20	G-1720-103504	SCR,#10-32X0.5 MACH HEX WSH HD	4
21	G-1727-1060	NUT, 5/16-18 TOP LOCK ZINC	3
22	G-1847-20	CUSHION LOOP CLAMP, 1 1/4", Ø.406 MTG HOLE	2
23	H-4809-05	SPACER, 3/8 ID X 3/4 OD X 5/8 LG	8
24	K-5493	KIT, BATTERY CABLES	1
25	NVSP-05-005-CA	IGNITION SWITCH, 3-POS, KEYED	1
26	NVSP-14-033-CA	THROTTLE PEDAL DUAL ANALOG	1
27	NVSP-21-016-CB	M8 BELLEVILLE LOCK WASHER	5
28	NVSP-24-022-CA	CABLE TIE ANCHOR STD (Ø.375 X .27 THK)	5
29	NVSP-34-008-CA	UTILITY LIGHT, WHITE LED	1
30	NVSP-34-009-CA	2 IN MARKER LIGHT GROMMET	1
31	RT12-10-002-CA	BATTERY CHARGE AND SYSTEM MESSAGE GAGE	1
32	W2P	DEUTSCH LOCK	1
33	NOT AVAILABLE	ASY, MOTOR CTRLR WITH HEATSINK	1
34	NOT AVAILABLE	ASY, ELECTRICAL PANEL	1
N/A	A-RTT12-00452	3M ATTACHMENT TAPE	72

17.0 SEAT

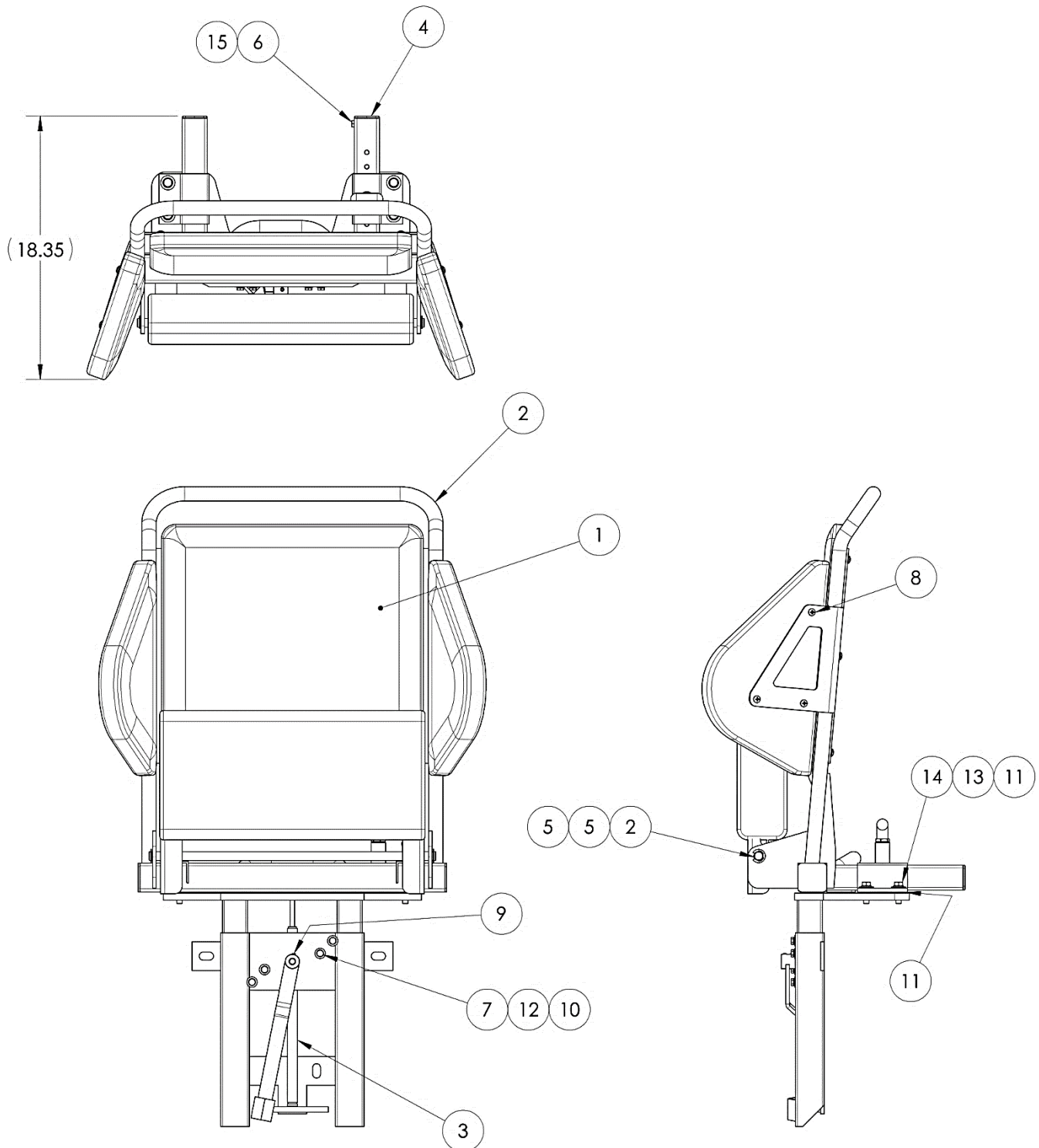


Parts List

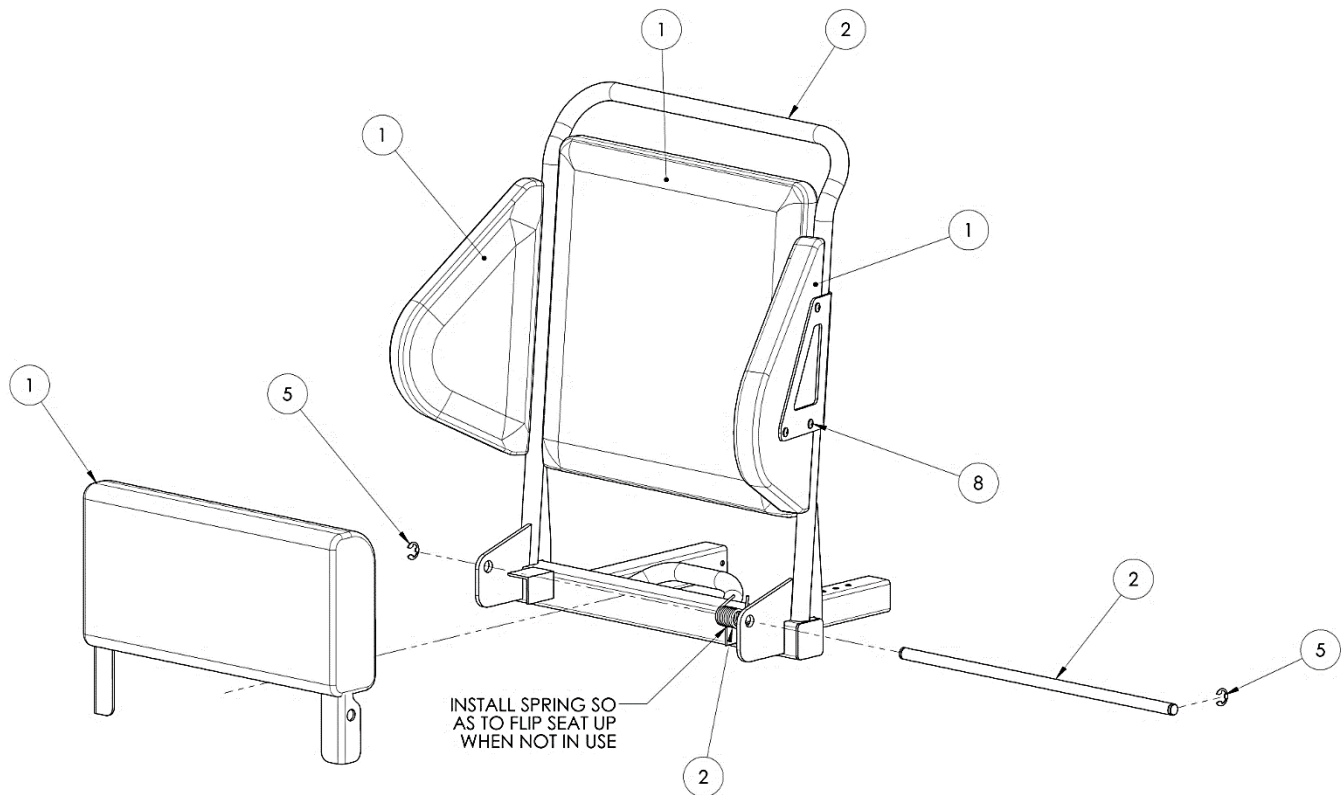
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-RTT12-0047-A	BACK SEAT CUSHION	1
2	A-RTT12-0047-B	BOTTOM SEAT CUSHION	1
3	A-RTT12-0047-C	SEAT CUSHION, RH WING	1
4	A-RTT12-0047-D	SEAT CUSHION, LH WING	1

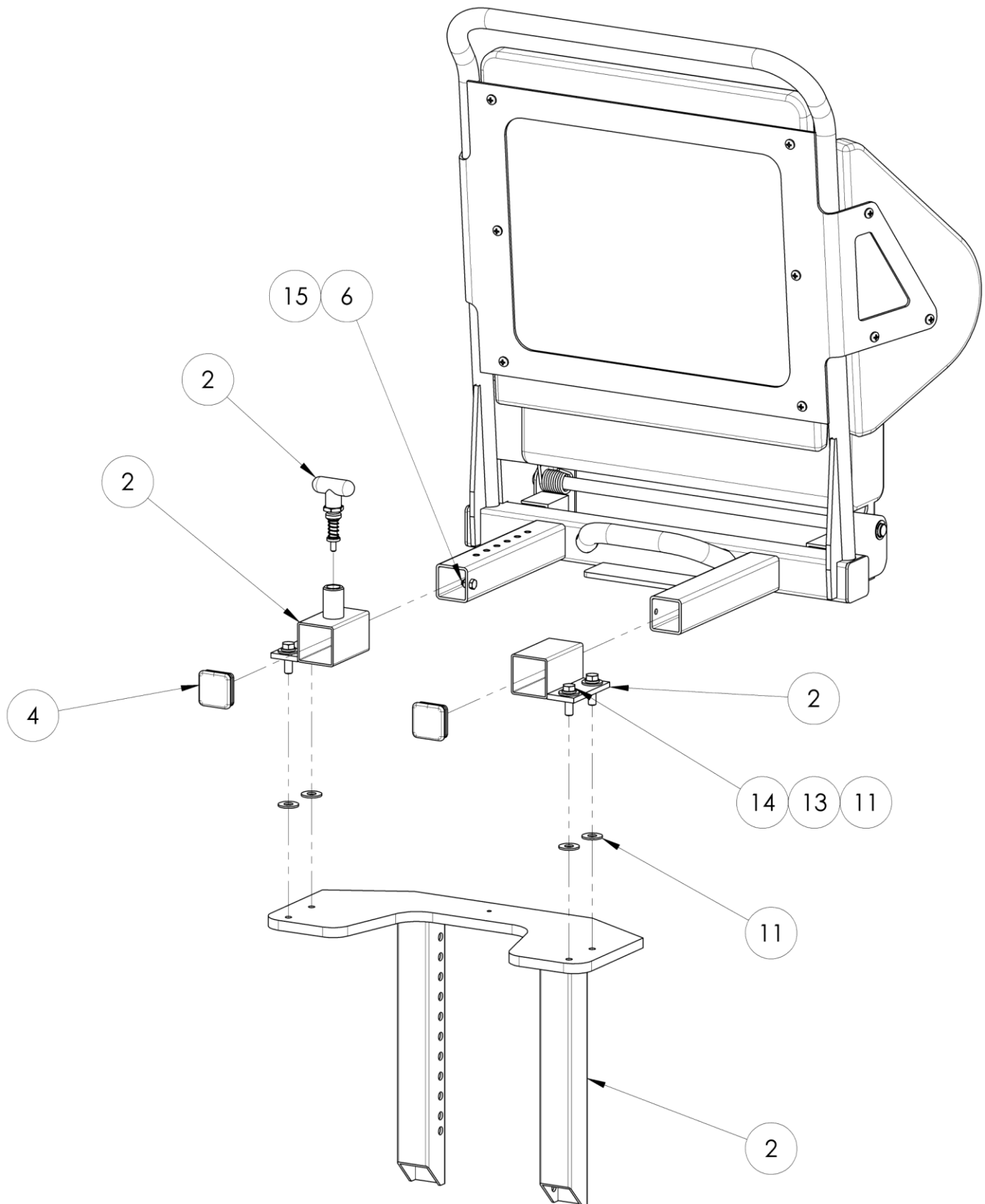
17.0 SEAT (continued)



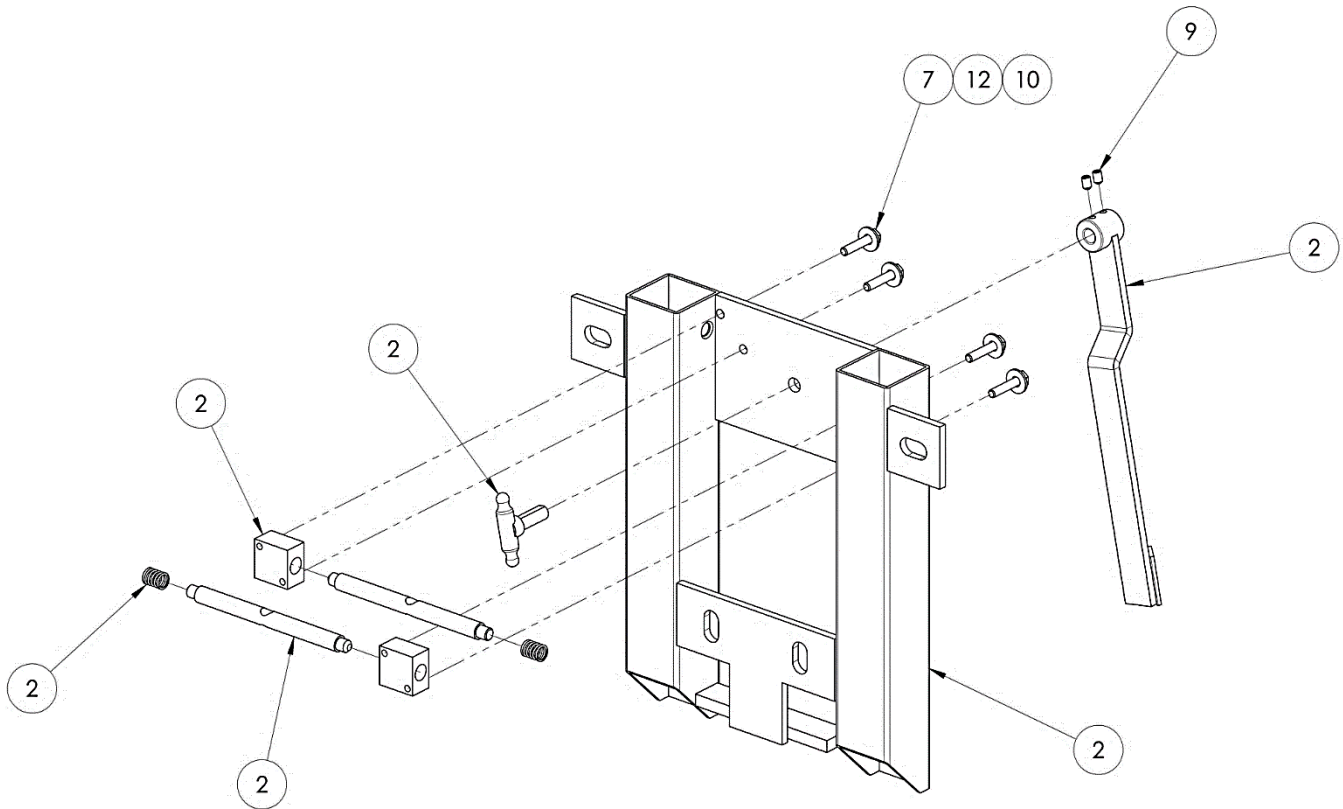
17.0 SEAT (continued)



17.0 SEAT (continued)



17.0 SEAT (continued)





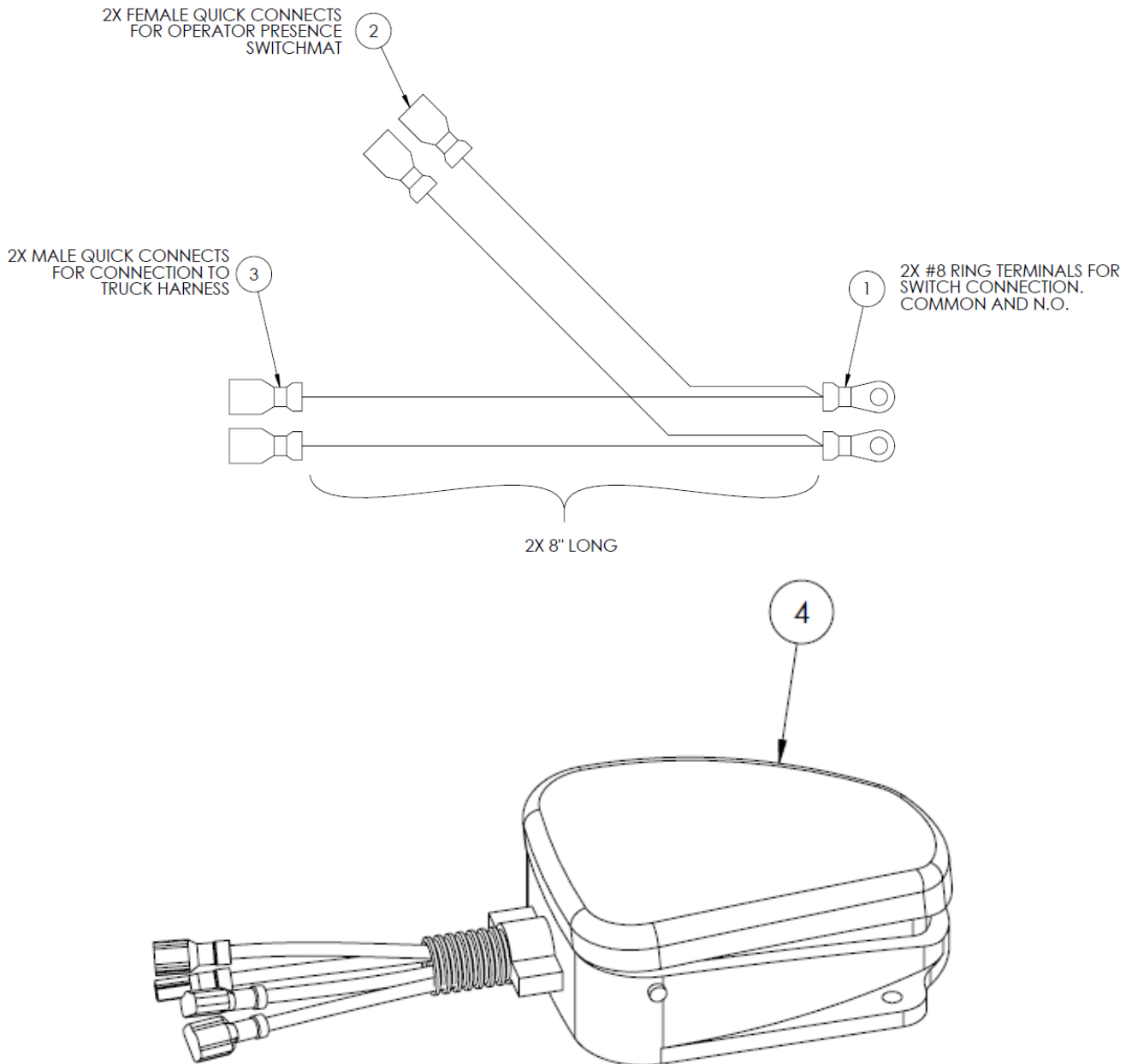
17.0 SEAT (continued)

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	NOT AVAILABLE	RTT SEAT CUSHION SET	1
2	Z-11495-00	RTT SEAT FRAME	1
3	A-RTT12-00480	SEAT ADJUSTMENT SPRING	1
4	A-RTT12-00482	SQUARE TUBE CAP	2
5	A-RTT12-00483	E-STYLE RETAINING RING	2
6	G-1100-105004	BOLT, 1/4-20 X 1/2" LG. HEX HD GR 5	1
7	G-1100-105012	BOLT, 1/4-20 X 1-1/4" LG HEX HD GR 5	4
8	G-1157-105010	SCREW, 1/4-20 PAN HD CRS REC	12
9	G-1163-18	SCREW, 1/4-20 X .375 LG. HEX CUP PT SET	2
10	G-1250-1050W	FLATWASHER, 1/4 WIDE	4
11	G-1250-1070W	FLATWASHER, 3/8 WIDE	8
12	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	4
13	G-1251-1070R	LOCKWASHER, 3/8 REGULAR	4
14	G-1420-107012	BOLT, 3/8-16 X 1.25" HEX HD GR 8	4
15	G-1727-1050	NUT, 1/4-20 TOP LOCK ZINC	1

17.1 OPERATOR PRESENCE PEDAL

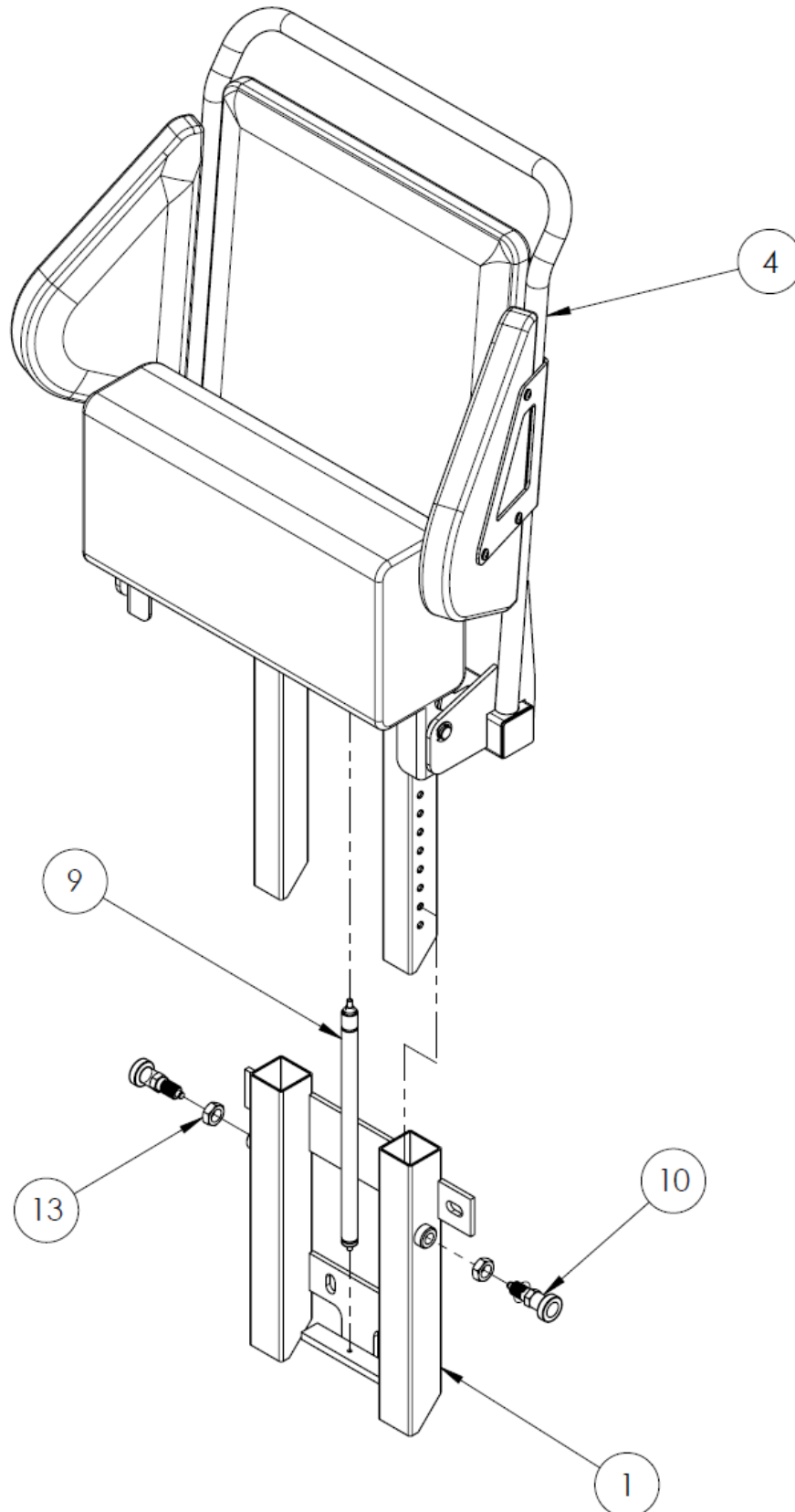


Parts List

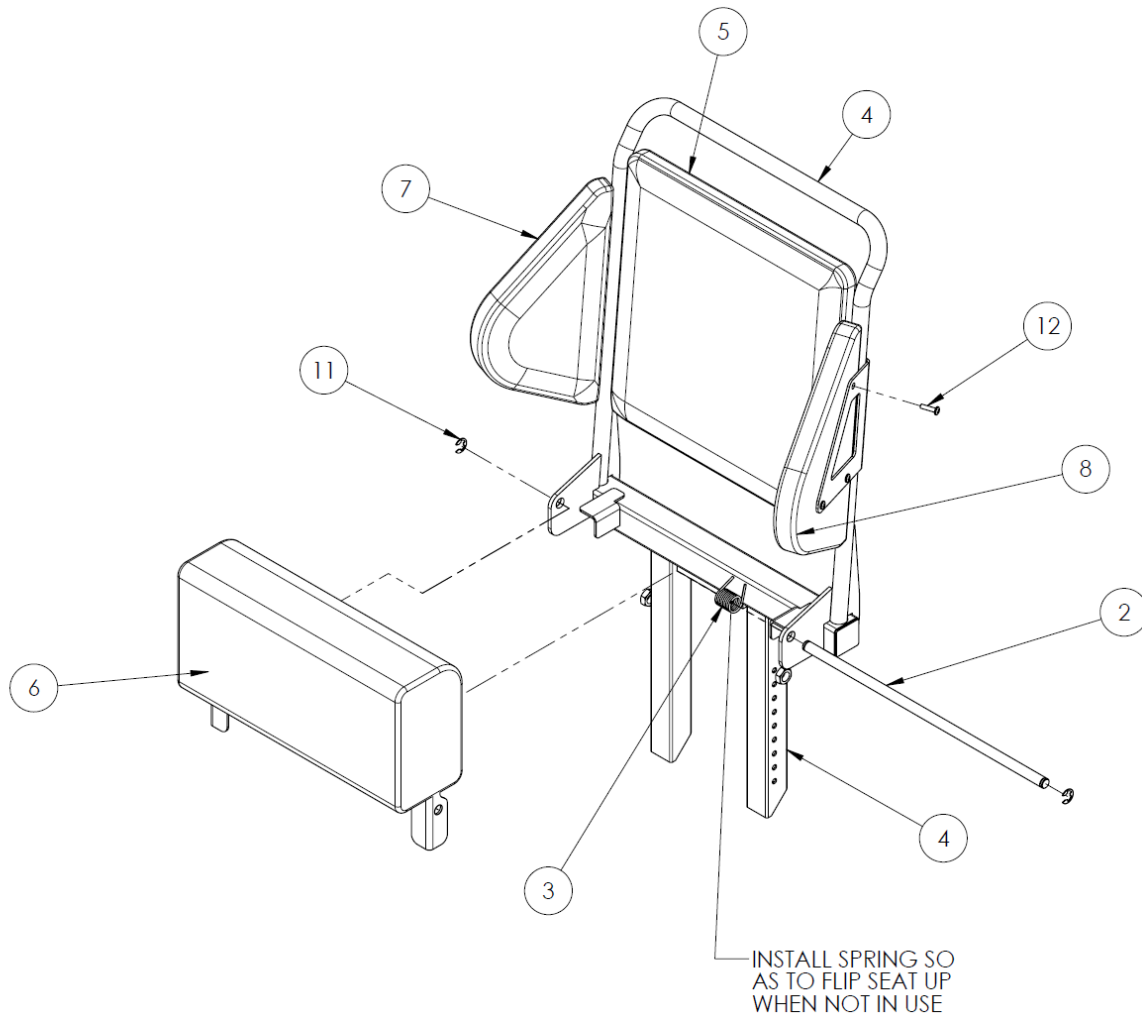
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	EC-1180-20	RING TERMINAL, #8, 14-18 AWG	2
2	EC-1326-01	DISCONNECT, FEMALE RED 1/4 F/I	2
3	EC-1327-01	DISCONNECT, .250 X .032 MALE, 18-22 AWG	2
4	EC-3454	OP. PRESENCE FOOT SWITCH	1
5	EC-3299-18-BLK	TXL WIRE, 18 AWG BLACK	32"
6	12048	SPLIT LOOM, 1/2"	6"

17.2 SEAT ASSEMBLY WITHOUT FOR-AFT ADJUST



17.2 SEAT ASSEMBLY WITHOUT FOR-AFT ADJUST (*continued*)



Parts List

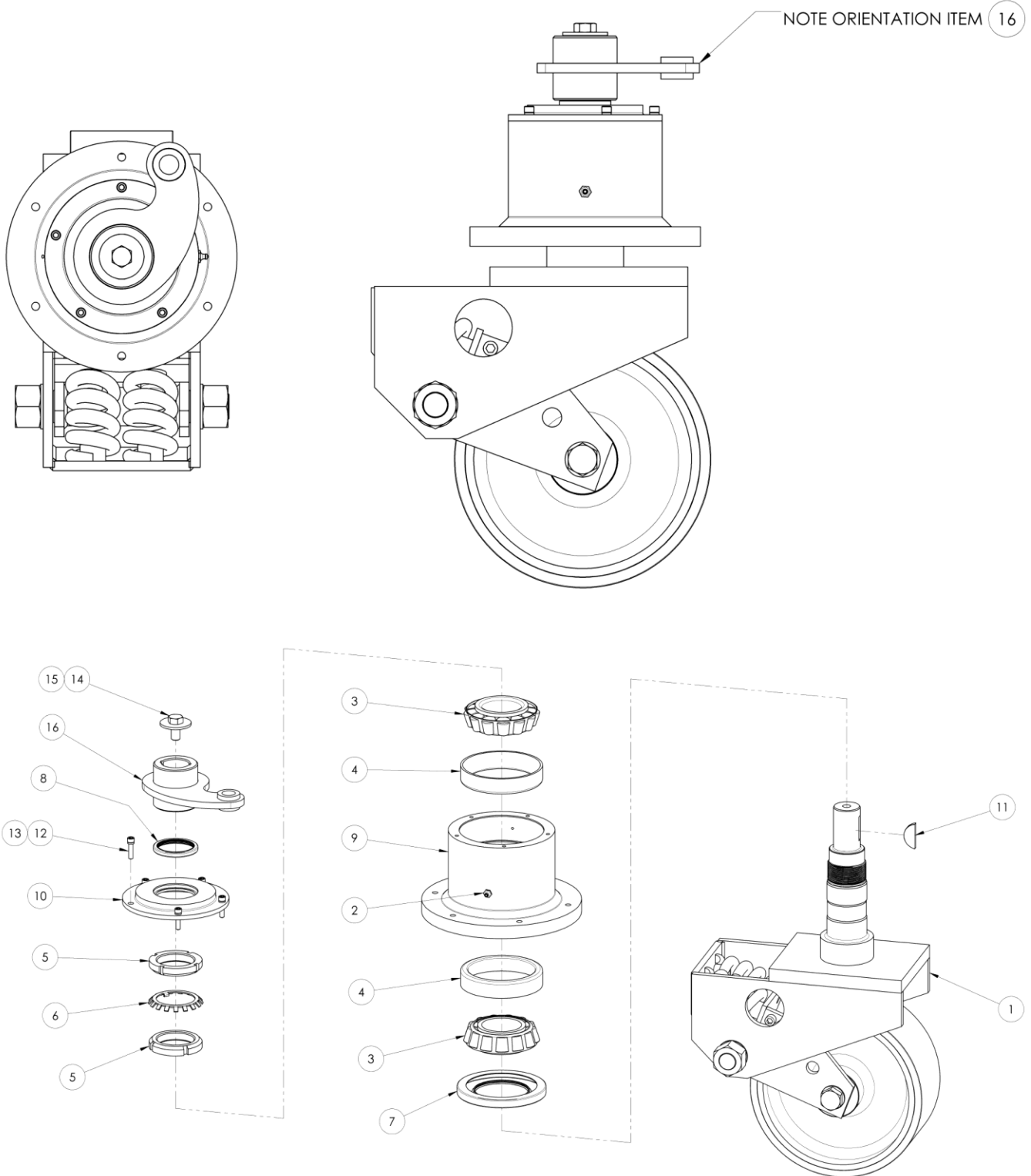
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	Z-11653-00	SEAT MOUNTING FRAME, RTT MOD(P)	1
2	R-3427	SEAT PIVOT SHAFT	1
3	A-RTT12-0048-B	TORSION SPRING	1
4	Z-11652-00	UPPER SEAT FRAME, RTT MOD(P)	1
5	A-RTT12-0047-A	BACK SEAT CUSHION	1
6	A-RTT12-0047-B	BOTTOM SEAT CUSHION	1
7	A-RTT12-0047-C	SEAT CUSHION, RH WING	1
8	A-RTT12-0047-D	SEAT CUSHION, LH WING	1
9	A-RTT12-00480	SEAT ADJUSTMENT SPRING	1
10	H-4964	HAND-RETRACTABLE PLUNGER	2
11	A-RTT12-00483	E-STYLE RETAINING RING	2
12	G-1157-105010	SCREW, 1/4-20 PAN HD CRS REC	12
13	G-1207-1100	NUT, 5/8-11 JAM	2



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18.0 STEERING





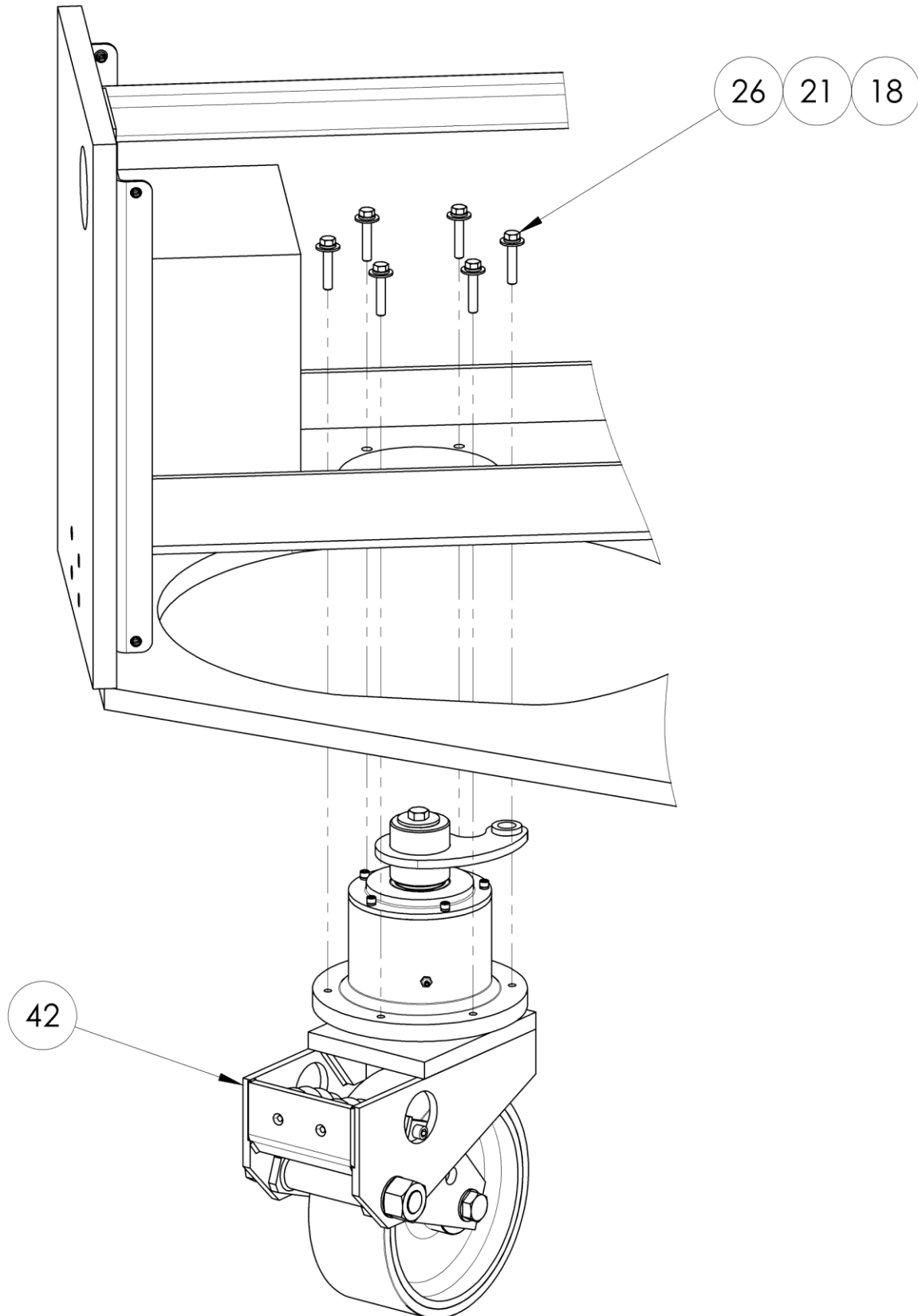
18.0 STEERING (continued)

Parts List

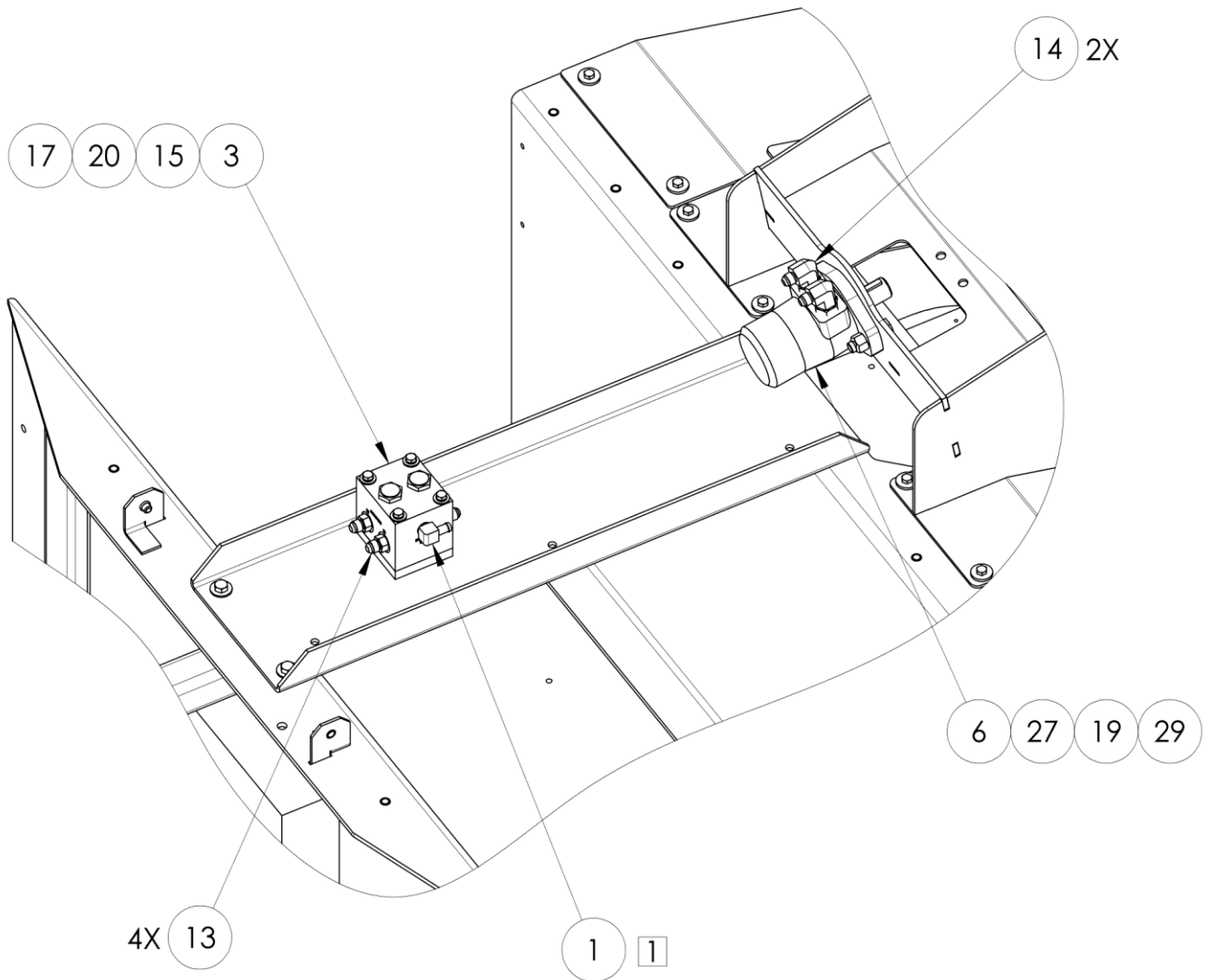
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-RTT50-00050-1	FRONT STEERABLE WHEEL	1
2	A-RTT50-0328	GREASE ZERK	1
3	A-RTT50-0390	TAPERED ROLLER BEARING INNER	2
4	A-RTT50-0391	TAPERED ROLLER BEARING OUTER	2
5	A-RTT50-0392	ABMA LOCKNUT #11	2
6	A-RTT50-0393	ABMA LOCK WASHER NO. 11	1
7	A-RTT50-0394	LOWER GREASE SEAL	1
8	A-RTT50-0395	UPPER GREASE SEAL	1
9	A-RTT50-0396	HOUSING	1
10	A-RTT50-0397	HOUSING COVER	1
11	A-RTT50-0399	WOODRUFF KEY #24	1
12	G-1151-105010	SCREW, 1/4-20 X 1.0" LG SOCKET HD CAP	5
13	G-1251-1050HC	LOCKWASHER, 1/4 HIGH COLLAR	5
14	G-1420-109510	BOLT, 1/2-20 X 1.0" HEX HD GR 8	1
15	G-1848-109	1/2 WASHER, THICK FENDER	1
16	Z-10714-00	STEERING ARM WELDMENT (WP)	1
17	INS-2666	INS, RTT50 FRONT WHEEL ASSEMBLY	1

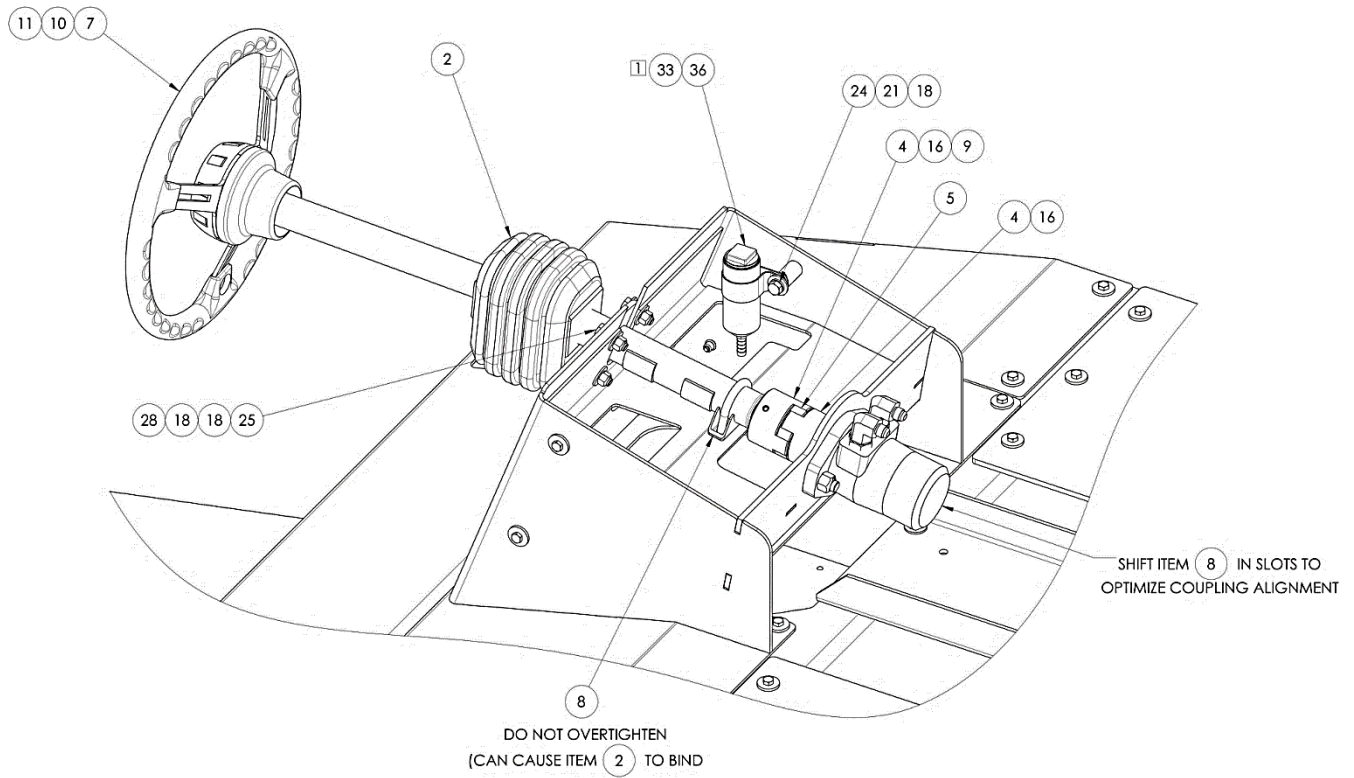
18.0 STEERING (continued)



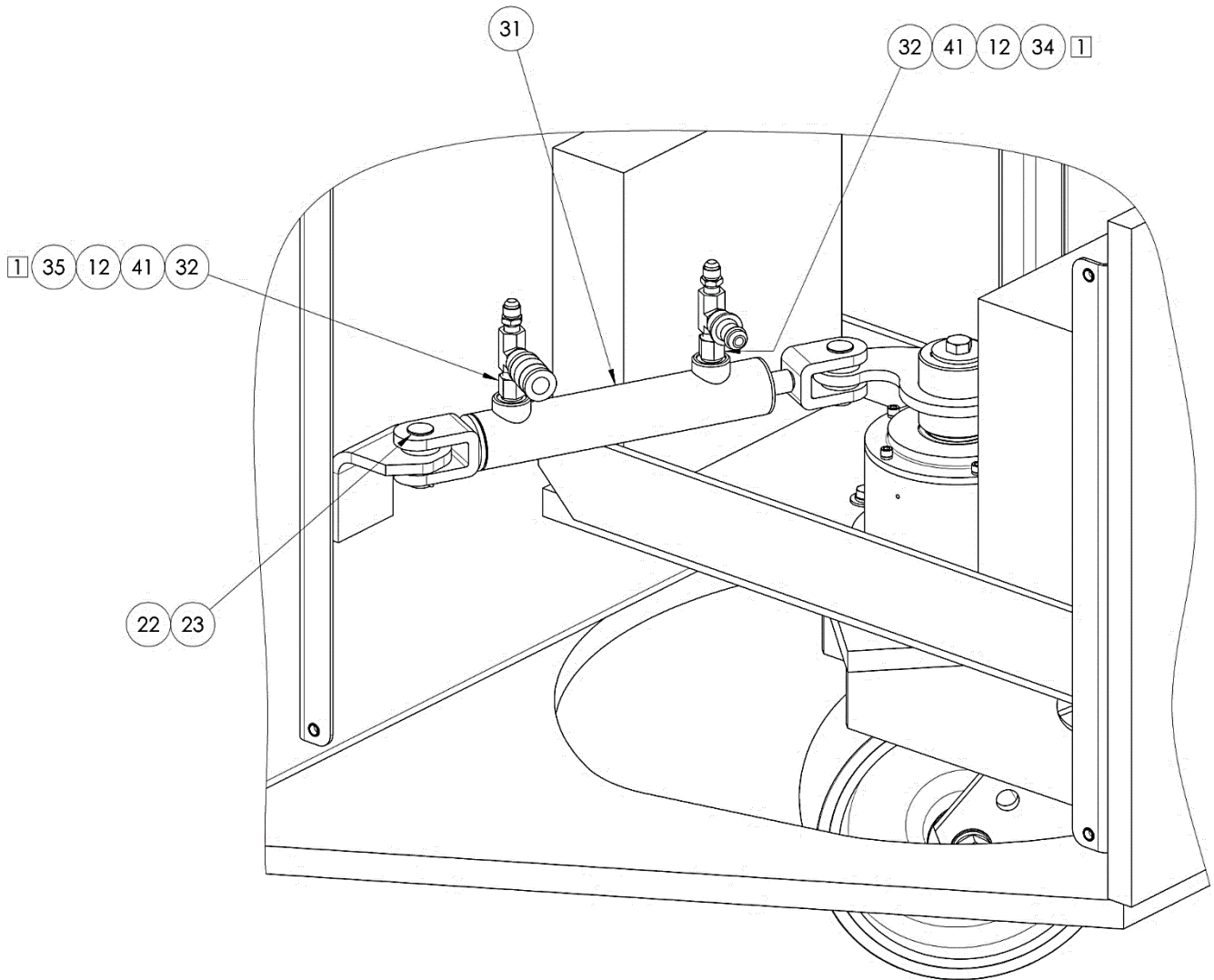
18.0 STEERING (continued)



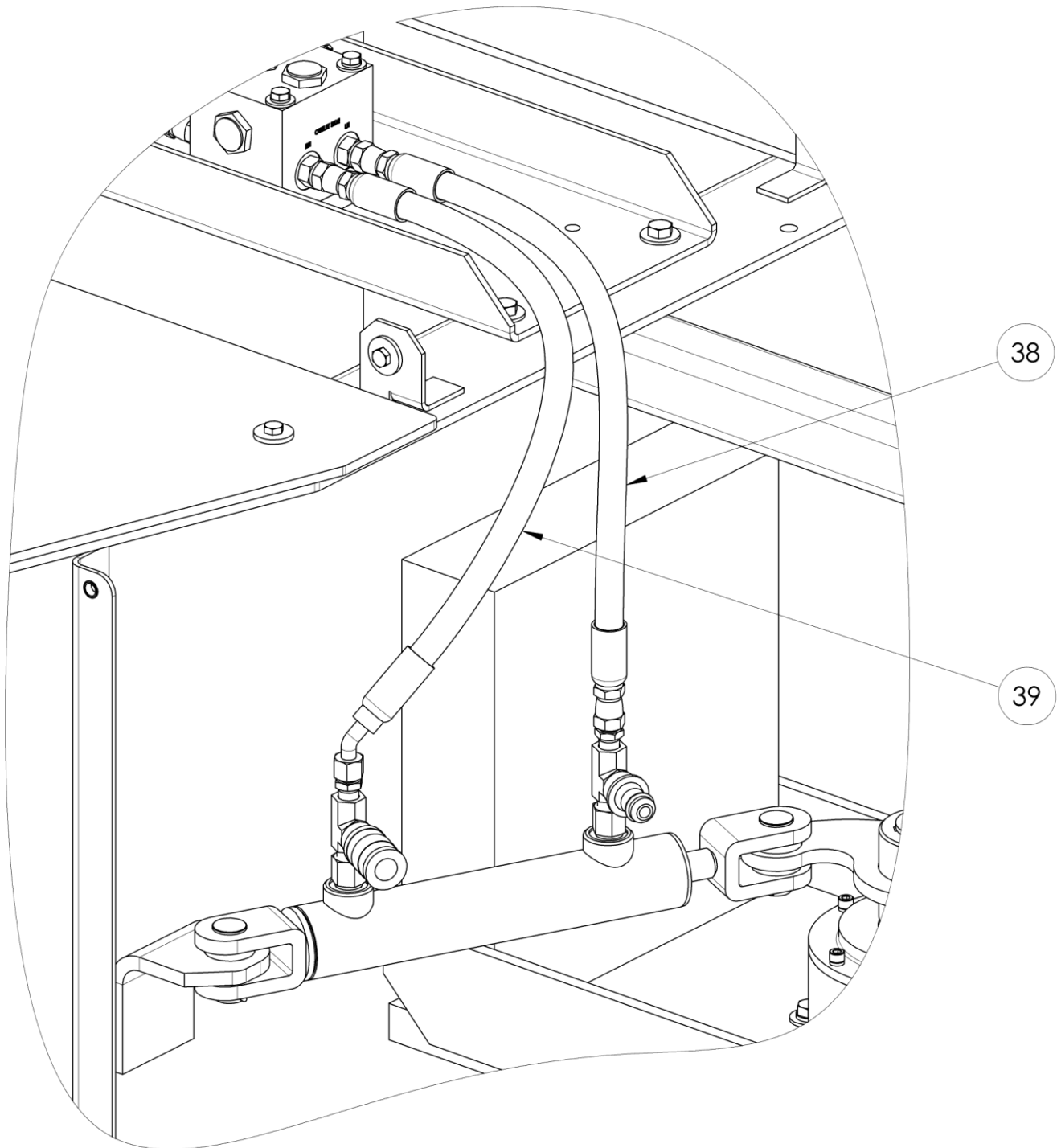
18.0 STEERING (continued)



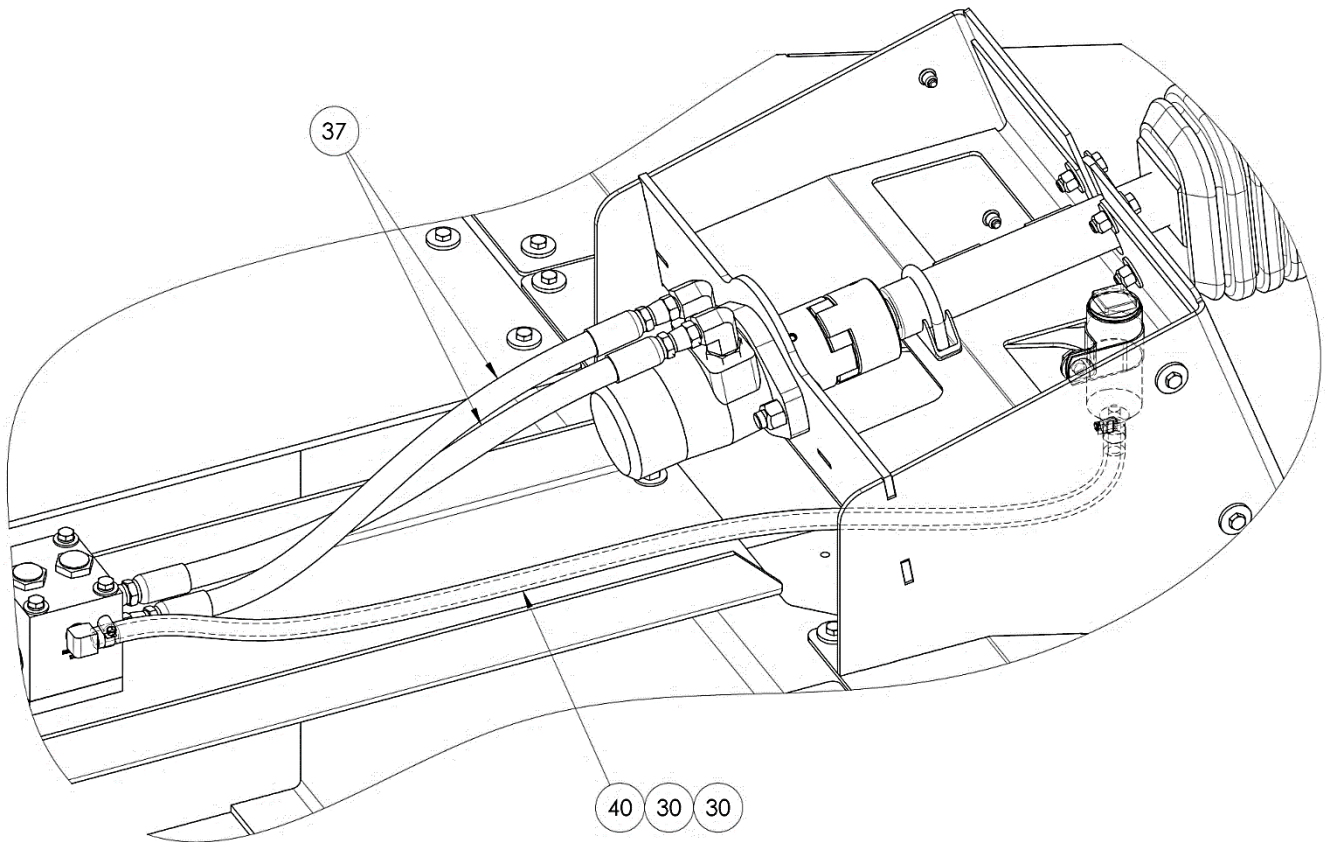
18.0 STEERING (continued)



18.0 STEERING (continued)



18.0 STEERING (continued)





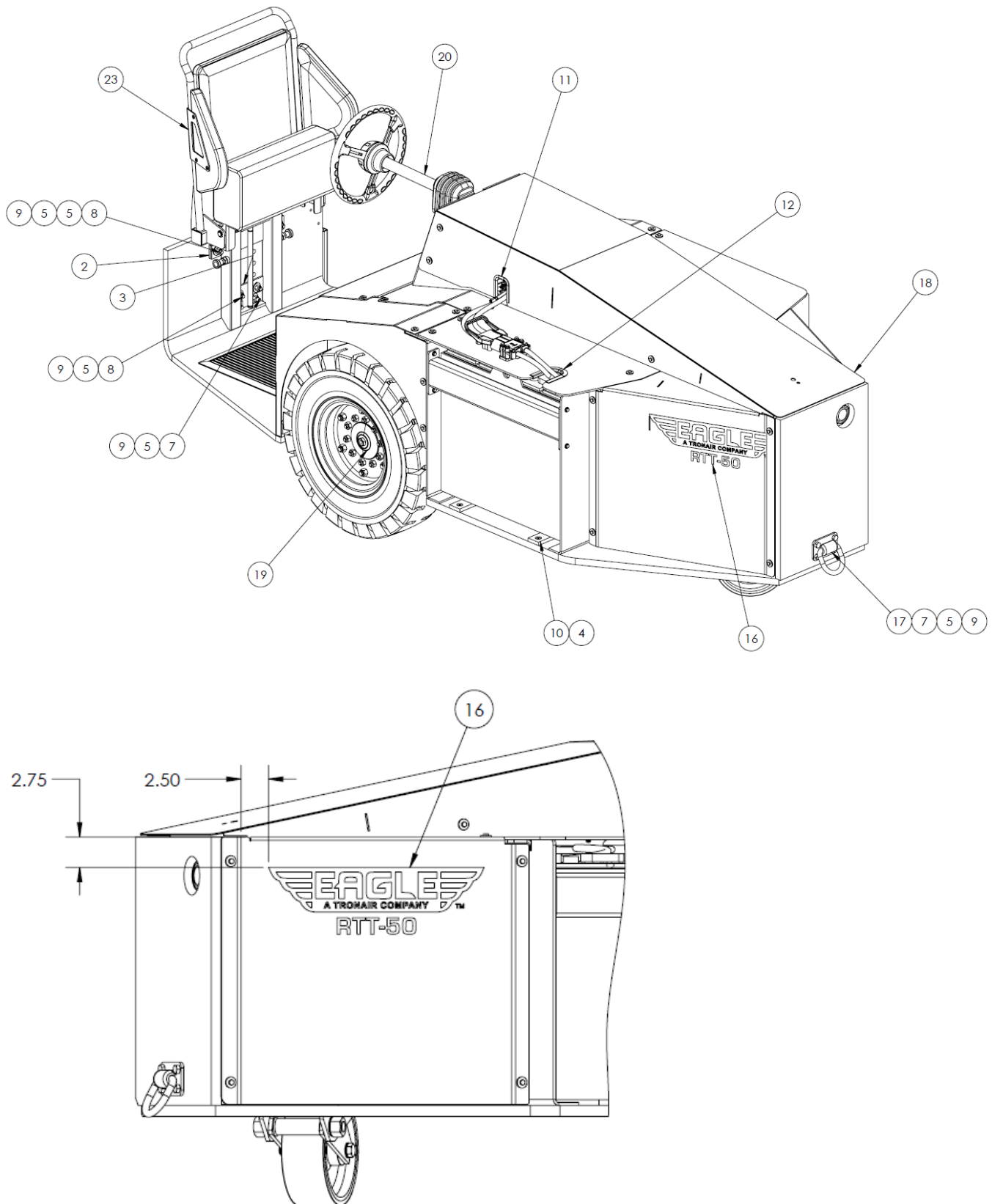
18.0 STEERING (continued)

Parts List

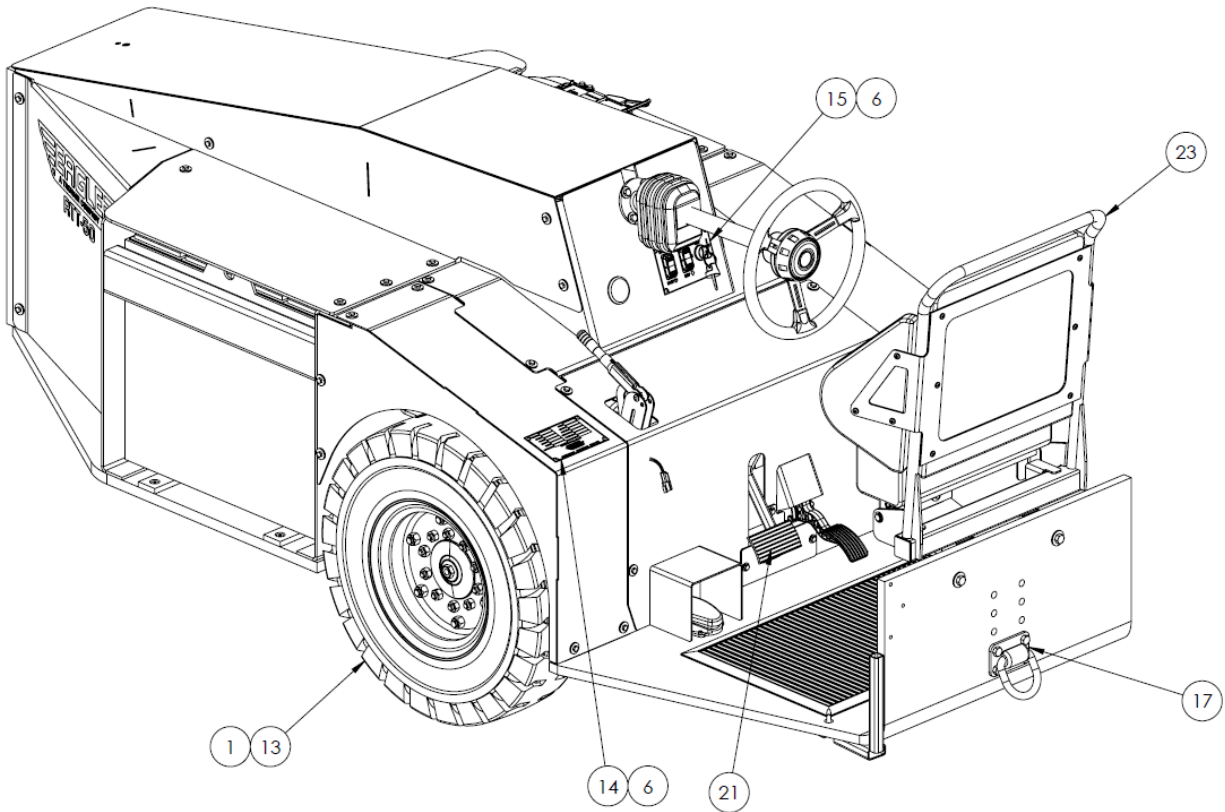
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
2	A-RTT18B-00399	STEERING COLUMN	1
3	A-RTT50-0379	STRG MANIFOLD ASSY	1
4	A-RTT50-0380	STEERING COUPLING, LOVE-JOY	2
5	A-RTT50-0381	SPIDER COUPLING, LOVE-JOY	1
6	A-RTT50-0382	GEROTOR MOTOR	1
7	A-TN4-00809E	14" BLACK STEERING WHEEL ELEC	1
8	A-TT4-00328	HD CLAMP, 1.5 IN DIA	1
9	A-TT4-00393	1/4" GIB KEY	1
10	A-TT10-00811	HORN BUTTON	1
11	A-TT10-00813	WHEEL NUT, 13/16-20 UNEF	1
12	C5205X6	ADAPTOR, 6 JIC M X 1/4 NPT M	2
13	C5315X6	ADAPTER, -06 M SAE ORB X -06 M JIC	4
14	C5515X6X10	ELBOW 90, -06 M JIC X -10 M ORB	2
15	G-1100-105034	BOLT, 1/4-20 X 3-1/2" LG HEX HD GR 5	4
16	G-1163-12	SCREW, 5/16-18 X 1/4" LG. HEX CUP PT SET	2
17	G-1250-1050W	FLATWASHER, 1/4 WIDE	4
18	G-1250-1070W	FLATWASHER, 3/8 WIDE	15
19	G-1250-1090W	FLATWASHER, 1/2 WIDE	2
20	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	4
21	G-1251-1070R	LOCKWASHER, 3/8 REGULAR	7
22	G-1301-03	PIN, 1/8 X 1-1/2 LG COTTER	2
23	G-1302-08	PIN, CLEVIS, 3/4 X 1.91" LG.	2
24	G-1420-107010	BOLT, 3/8-16 X 1.0" HEX HD GR 8	1
25	G-1420-107012	BOLT, 3/8-16 X 1.25" HEX HD GR 8	4
26	G-1420-107020	BOLT, 3/8-16 X 2.0" HEX HD GR 8	6
27	G-1420-109016	BOLT, 1/2-13 X 1-3/4" HEX HD GR 8	2
28	G-1727-1070	NUT, 3/8-16 TOP LOCK ZINC	4
29	G-1727-1090	NUT, 1/2-13 TOP LOCK ZINC	2
30	H-1426-23	CLAMP, HOSE, #6	2
31	HC-2838	CYLINDER, STEERING	1
32	N-2202-01-S-B	ADAPTER, #6 SAE X 1/4 FPT	2
33	N-2412-09	CONNECTOR, STRAIGHT MALE	1
34	NVSP-22-001-CA	HYDRAULIC QUICK DISCONNECT - MALE	1
35	NVSP-22-001-CB	HYD QUICK DISCONNECT - FEMALE	1
36	RT00-13-002-CA	BRAKE RESERVOIR	1
37	TF-1038-04-20.5	HYDRAULIC HOSE	2
38	TF-1038-04-22.0	HYDRAULIC HOSE	1
39	TF-1038-49-23.0	HYDRAULIC HOSE	1
40	TF-1080-06	PUSH ON HOSE	35
41	TF3805X4	RUN TEE, 1/4 NPT F X 2X 1/4 NPT M	2
42	NOT AVAILABLE	ASY, FRONT STEERABLE WHEEL	1

19.0 ASSEMBLY



19.0 ASSEMBLY *(continued)*





19.0 ASSEMBLY (continued)

Parts List

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-RTT12-00123	LUG NUT, REAR	20
2	A-RTT50-0151	SEAT FRAME SPACER A	1
3	A-RTT50-0152	SEAT FRAME SPACER B	1
4	G-1152-106210	82 DEG FHC, 5/16-18 X 1.0	10
5	G-1250-1090W	FLATWASHER, 1/2 WIDE	12
6	G-1351-18-SS	RIVET, 3/16 OPEN-END SS	8
7	G-1420-109022	BOLT, 1/2-13 X 2-1/4 H.H. GR 8	6
8	G-1420-109024	BOLT, 1/2-13 X 2-1/2" HEX HD GR 8	4
9	G-1727-1090	NUT, 1/2-13 TOP LOCK ZINC	10
10	J-7360	BATTERY SLIDE	2
11	NVSP-24-042-CA	METAL CORE EDGE TRIM, 1/8	10
12	NVSP-24-042-CB	METAL CORE EDGE TRIM, 1/4	12
13	RT50-54-001-KA	REAR WHEEL AND TIRE ASSEMBLY	2
14	RT00-14-001-SA	RTT DATA PLATE	1
15	ST00-14-007-SA	SWITCH DATA PLATE	1
16	V-2901	TRACTOR DECAL, RTT-50	2
17	Z-10739-00	WLD, TIE DOWN (P)	2
23	Z-11651	SEAT ASSEMBLY, RTT	1



APPENDIX I

Main Vehicle Harness (INS-2652)

