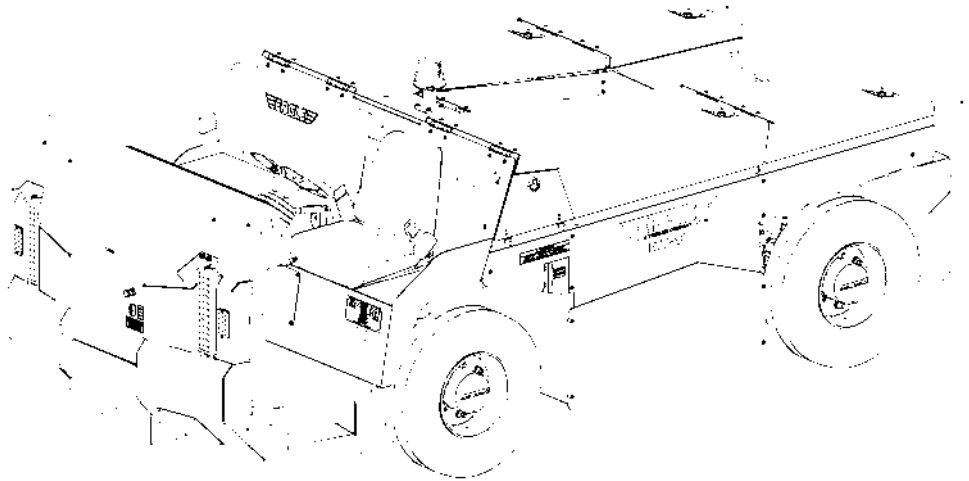




OPERATION & SERVICE MANUAL



Model: eTT-8X/ eTT-12X Electric Tow Tractor

05/2023 – Rev. 01

**For Spare Parts, Operations & Service Manuals or Service Needs
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From everyone at Eagle Tugs, we would like to say thank you for purchasing an Eagle eTT 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 eTT 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 eTT 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

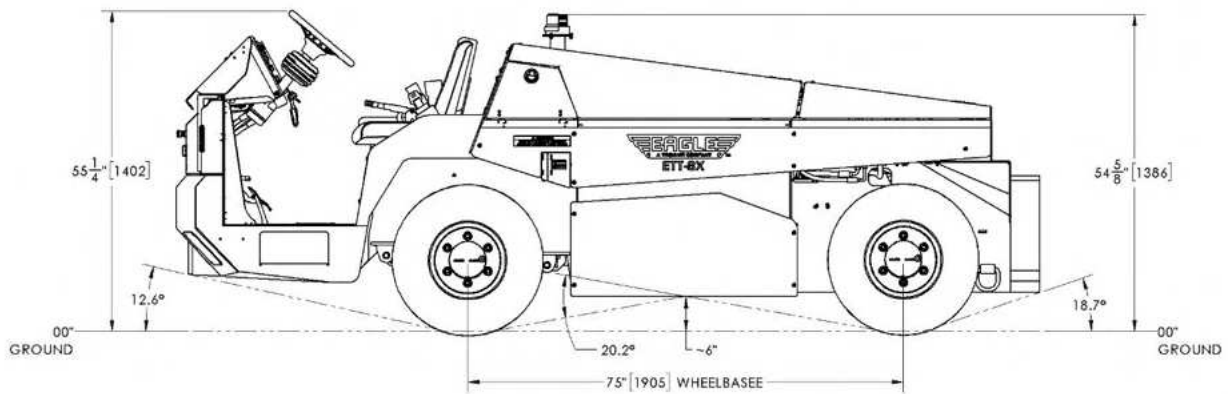
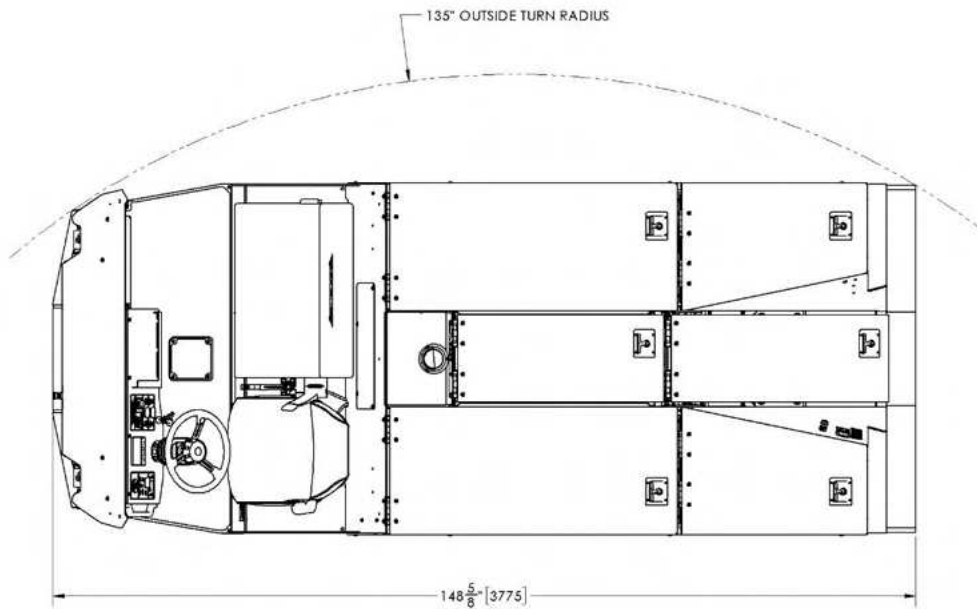
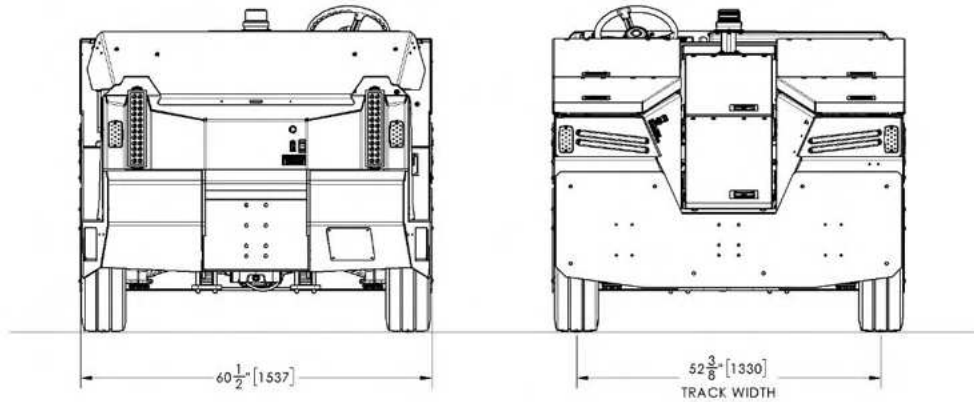
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E-mail: sales@tronair.com

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)
eTT-8X	10,060 (6,441)	8000 (35.6)	500 (2200)	115,000 (52,000)
eTT-12X	14,470 (6,563)	12,000 (53.3)	500 (2200)	170,000 (77,110)

† Towing Capacity applies to 1% grade, wet surface condition.

* GVW listed for the heaviest battery option 1

1.4.2 Chassis System

Length (not including hitches)	148.6 in (3,775 mm)
Width	60.5 in (1,537 mm)
Height at Wheels	55.25 in (1,402 mm)
Step-In Height	18.4 in (467 mm)
Ground Clearance	6 in (152 mm)

1.4.3 Vehicle Weight (without cab)

	eTT-8X	eTT-12X
Lead Acid Battery Option		
Gross Vehicle Weight	10,060 lbs (4,563 kg)	14,470 lbs (6,563 kg)
Weight distribution	51% Front / 49% Rear	41% Front / 59% Rear
Lithium Battery Option		
Gross Vehicle Weight	8,130 lbs (3,688 kg)	TBC
Weight distribution	49% Front / 51% Rear	TBC

1.4.4 Traction Specifications

	eTT-8X	eTT-12X
Motor Model	InMotion TSP 180/6-200	Dana TM4
Motor Type	AC Induction	SRIPM
Motor Power	18.4 kW – S2 60 min	40 kW – S2 60 min
Motor IP Rating	20	66
Inverter Model	InMotion AC80L70-C35T	InMotion AC80L70-C35T
Inverter Power Max	700A – 2 min	700A – 2 min
Inverter Power Nom	350A – S2 60 min	350A – S2 60 min
Inverter IP Rating	65	65
Inverter Cooling	Active Finned Heatsink	Active Finned Heatsink

1.4.5 Pump Specifications

	eTT-8X	eTT-12X
Motor Model	CFR APE125-0002-0019-1	CFR AMP173-150-SAE A
Motor Type	AC Induction	AC Induction
Motor Power	1.2 kW – S2 60 min	4 kW – S2 60 min
Motor IP Rating	44	44
Inverter Model	InMotion ACS80S	InMotion ACS80S
Inverter Power Max	175A – 1 min	175A – 1 min
Inverter Power Nom	80A – S2 60 min	80A – S2 60 min
Inverter IP Rating	65	65
Inverter Cooling	Passive Flat Heatsink	Passive Flat Heatsink

1.4.6 Transfer Case

Gear Ratio Low	4.85
Gear Ratio High	1.5
Output Flange	DIN100
Shift Pressure (max)	507 psi (35 bar)



- 1.4.7 Axles
 - Wheelbase60.5 in (1,537 mm)
 - Track Width52.4 in (1,330 mm)
 - Inside Steering Angle35°
 - Steering Working Pressure180 psi (12.4 bar)
 - Center Differential Ratio2.818
 - Planetary Ratio4.235
 - Overall Ratio11.936
 - Service Brake Working Pressure685 psi (47 bar)
 - Service BrakesDry Disc
 - Parking BrakesDry Disc, front only
 - Input FlangeDIN100

- 1.4.8 Tires
 - Tire Size7.00 R12 | TL

- 1.4.9 Electrical
 - System Voltage80V Floating Ground
 - Lighting/Logic Voltage12V Floating Ground
 - 12V Converter RatingDual 500W

- 1.4.10 Battery Specifications:
 - Nominal Voltage80V
 - Connector TypeDIN/Euro
 - Compartment Length36.5 ± 0.25 in (1,295 mm)
 - Compartment Width20.5 ± 0.25 in (575 mm)
 - Compartment Height29 ± 0.25 in (797 mm)

- 1.4.10.1 Battery Option 1
 - Battery chemistryLead Acid
 - Industrial Designation20-85-13
 - Capacity530 Ahr

- 1.4.10.2 Battery Option 2
 - Battery chemistryLithium
 - Industrial DesignationGCQ-210824
 - Capacity315 Ahr

- 1.4.11 Performance
 - Top Speed - Low5 mph (8 kph)
 - Top Speed - Drive15 mph (24.1 kph)
 - Outside Turning Radius135 in (3,429 mm)
 - Approach Angle Without Hitch13°
 - Departure Angle Without Hitch19°
 - Breakover Angle20°

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 eTT 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 driveshafts. Also keep clear of hot surfaces such as drive and motor components.
- The eTT series tractor is intended to be operated 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 eTT 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 manual and 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 tires are inflated.
- Verify that the battery state of charge is above 30%.
- Check the hydraulic fluid level.
- Familiarize yourself with the tractor operation and control.

5.0 OPERATION

5.1 OPERATOR REQUIREMENTS

The eTT 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.

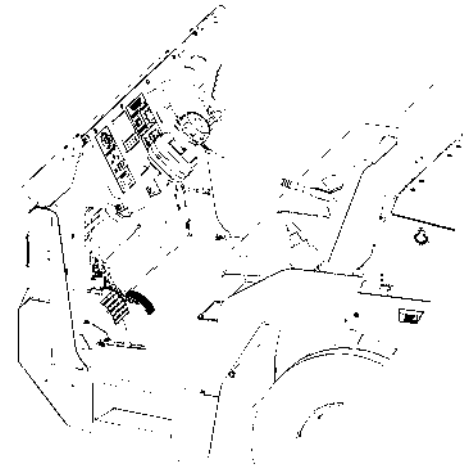
The operator should be familiar with all aspects of the tow tractor before operating it.

5.2 OPERATOR WORKSTATION

Your eTT 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 seated with the seatbelt secured when moving or operating the tractor.

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			
Visually verify tires are fully inflated			
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			
Cab Inspection (if equipped)			
Verify windows clean			
Verify windows free of cracks and chips			
Verify windshield wipers operate properly			
Verify heater and fans operate properly			



5.3.2 Weekly Operation Checklist

Weekly Pre-Operation Checklist	Satisfactory	Service Required	Not Applicable
Walk-Around Inspection			
Verify tire inflation pressure			
Battery/Motor Compartment Inspection			
Check top of battery for debris, electrolyte, or electrolyte residue			
Check hydraulic fluid level (top off if necessary)			
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. With feet firmly on the floor mat, adjust the seat to a comfortable position.
2. Sit in the operator seat and buckle the seat belt.
3. Verify that the FNR selector switch is in the neutral position.
4. Verify the E-stop is in the up position.
5. Turn on the tractor with the ignition switch.
6. Select the desired transmission gear (LOW for towing, HIGH for unloaded travel)
7. Release the parking brake.
8. 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:

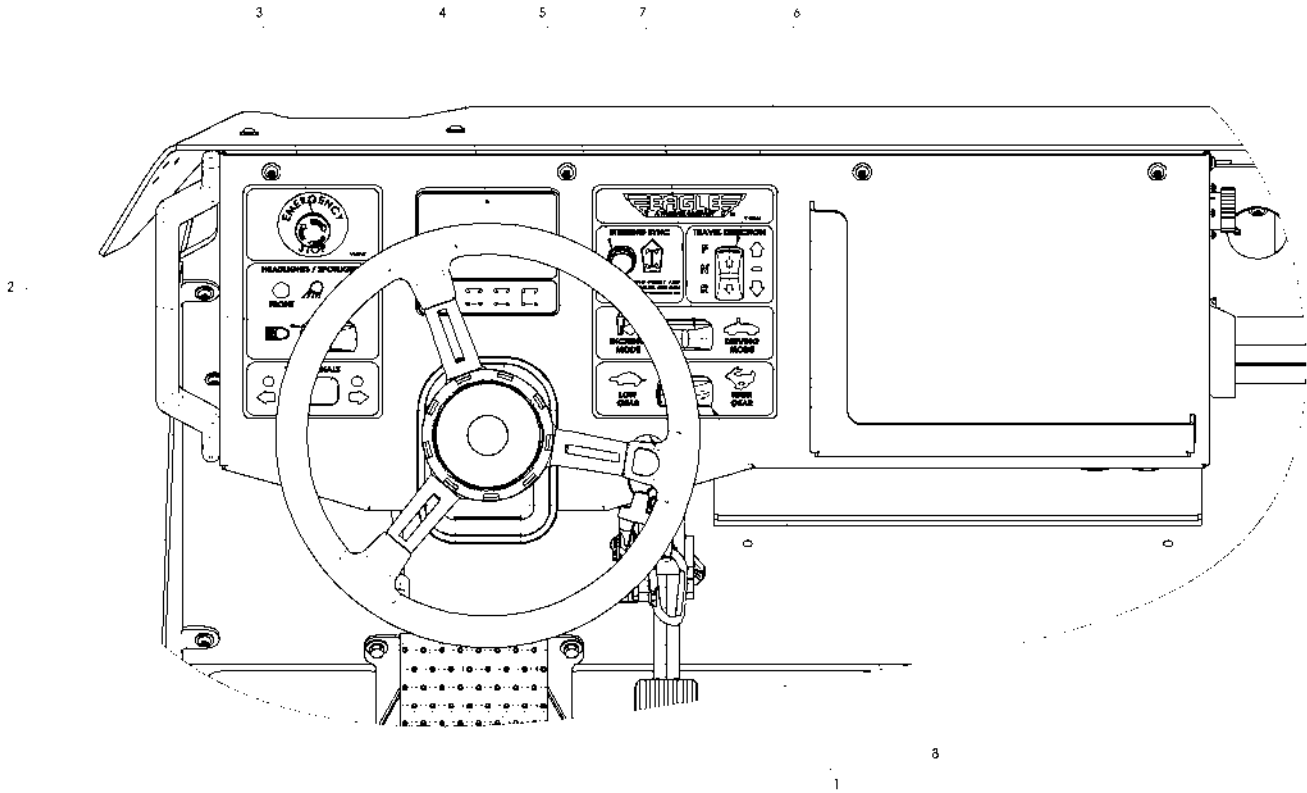
1. Bring the tractor to a complete stop with the service brake.
2. Put the tractor in neutral using the FNR selector switch.
3. Set the parking brake by pulling the parking brake handle.
4. Turn the tractor off by turning the ignition switch.

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 plane or other towed load clears all obstacles when towing.

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. Note, the third momentary position is used to start-up the truck and the second maintained position is used to keep it on. If the E-stop is pressed, the truck will get power in the momentary switch position, but will turn off immediately in the maintained switch position.
2. **Headlight Switch:** The headlight switch is an on/off type. There is no hi/low beam control position.
3. **Emergency Stop:** In the event of an emergency, the emergency stop button will shut down the tractor.
Note that steering functionality requires the tractor be on to function.
4. **Multi-function Digital Display:** The digital display module provides critical information on the tractor operational status. The digital display module includes detailed I/O diagnostics that enable troubleshooting of various tractor systems without needing a laptop or other external device. The digital display can provide specific motor control diagnostic codes that allow easy troubleshooting.
5. **Steering Sync Switch:** Steering Sync switch allows the operator to sync the front and rear axle. The vehicle is equipped with 4-wheel hydraulic steering system. Press-hold the Steering Sync switch and turn the steering wheel all the way to left till it hits the bump stops. Release the switch and resume normal vehicle operation.
6. **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.
7. **Drive/Inch Mode Selector Switch:** The Drive/Inch mode selector switch allows the operator to put the tractor in inching mode which enables the low speed inching controls at the front and rear of the vehicle for single operator hitch connection.
8. **Transfer Case Gear Selector Switch:** The transfer case gear selector allows for switching between LOW gear for towing, and HIGH gear for unloaded operation. Gear changes can only be performed while stationary.
9. **Parking Brake Lever (Not shown above):** The parking brake can be engaged or released with the parking brake lever located between the driver and passenger seats. The parking brake should never be used to stop a moving unit except in an emergency situation.

5.5.1 Multi-Function Display

Operation Screen:

The multi-function display allows for monitoring a wide range of vehicle parameters. The default running operation screen includes all of the following diagnostic information:

- Battery charge indicator
- Speedometer
- Traction Drive Current Meter
- Low/High Gear Indicator
- Parking Brake Indicator
- Traction Motor Temperature
- Traction Drive Temperature
- Battery Voltage
- Hours



Imperial/Metric Units:

Press **C** then **B** at the same time for 3 seconds to toggle from Imperial to Metric Units.

Error Messages:

The multi-function display is capable of showing many error, warning, and informational messages such as Low Battery Level, Motor Inverter Fault, and others.

I/O Diagnostics:

Press **D** to from the Operation Screen to view the I/O diagnostics menu. This menu allows you to review a wide range of data about the vehicle. Flip between diag screens using the arrows, and use **D** to exit the diagnostics.

See below for a brief description of each parameter.

Diagnostic Screen 1 – Low/High Gear Parameters:

- MAX SPD L: Max Low motor RPM parameter setting
- MAX SPD H: Max High motor RPM parameter setting
- CUR MODE: Current Speed Mode on the traction controller

Diagnostic Screen 2 – Throttle Parameters:

- TPS1 Value: Throttle Wiper 1 current voltage
- TPS2 Value: Throttle Wiper 2 current voltage
- THR CMND: The throttle percent currently being sent to the traction drive, from -100% for full reverse to +100% for full forward.

Diagnostic Screen 3 – Traction Drive Parameters:

- TRAC DRV TEMP: Temperature of the traction drive inverter
- TRAC MTR TEMP: Temperature of the traction motor
- TRAC MTR RPM: Traction motor RPM
- TRAC RMS CUR: Current traction motor torque current

Diagnostic Screen 4 – Hydraulic Pump Parameters:

- PUMP DRV TEMP: Pump inverter temperature
- PUMP MTR TEMP: Pump motor temperature
- PUMP MTR RPM: Pump motor speed
- PUMP STATUS: ON for throttle command to pump, OFF for no throttle command
- LOW PRESS SW: Status of the low pressure switch
- HIGH PRESS SW: Status of the high pressure switch
- PRESS STATE: Pressure state based on the two pressure switches, LOW, NORMAL, or HIGH.

Diagnostic Screen 5 – Shifting Parameters:

- LOW GEAR SW: Status of the low gear switch input
- LOW GEAR SENS: Status of the low gear sensor
- SHIFT LOW SOL: Output status of the shift low solenoid
- HIGH GEAR SW: Status of the high gear switch input
- HIGH GEAR SENS: Status of the high gear sensor
- SHIFT HIGH SOL: Output status of the shift high solenoid

5.5.1 Multi-Function Display *(continued)*

Diagnostic Screen 6 – Inching Parameters:

- DRIVE-INCH MODE: Status of the Drive/ Inch switch
- INCH-FWD SWITCH: Status of the Inch forward switch on either of the front or rear Inching switches
- INCH-REV SWITCH Status of the Inch reverse switch on either of the front or rear Inching switches
- INCH HOLD TIME: Maximum inching duration before timeout

Diagnostic Screen 7 – Miscellaneous I/O:

- P BRAKE SW: Parking brake switch status
- S BRAKE SW: Service brake switch status
- HIGH HYD TEMP: Hydraulic overtemp switch status
- FWD SW: Forward switch input status
- REV SW: Reverse switch input status
- BRAKE RLY: Brake relay power output status
- FAN RLY: Cooling fan relay power output status

Diagnostic Screen 8.1 – Battery Parameters for Lead Acid battery:

- STATE OF CHARGE: Current state of charge
- VOLTAGE: Current battery voltage
- TEMPERATURE: Current battery temp
- TOTAL AH DISCH: Total lifetime battery amp-hours discharged
- TOTAL AH CHARG: Total lifetime battery amp-hours charged

Diagnostic Screen 8.2 – Battery Parameters for Lithium battery:

- STATE OF CHARGE: Current state of charge
- VOLTAGE: Current battery voltage
- TEMPERATURE: Current battery temp
- Battery diagnostic parameters

5.5.2 Inching Mode

Inching mode allows the tractor to be controlled from the front or rear of the unit at a very slow and controlled speed.

To enable inching functionality, switch the DRIVE/INCH mode switch in the dash to the INCH position. In order to complete the transition to inching mode, the following requirements must also be met.

- Service brake pedal released
- FNR switch set to neutral
- P-brake released
- Transfer case set to LOW



As each requirement is met, the display module will dynamically reflect the status. Once the display shows that the Inching mode is active, the inching switches (1 at the front and 1 at the rear) will be enabled.

To inch, press and hold the inching switch in the desired direction. The tractor will roll in the requested direction for as long as the switch is pressed, up to a maximum value. If additional inching travel is required, release and then re-press the switch.

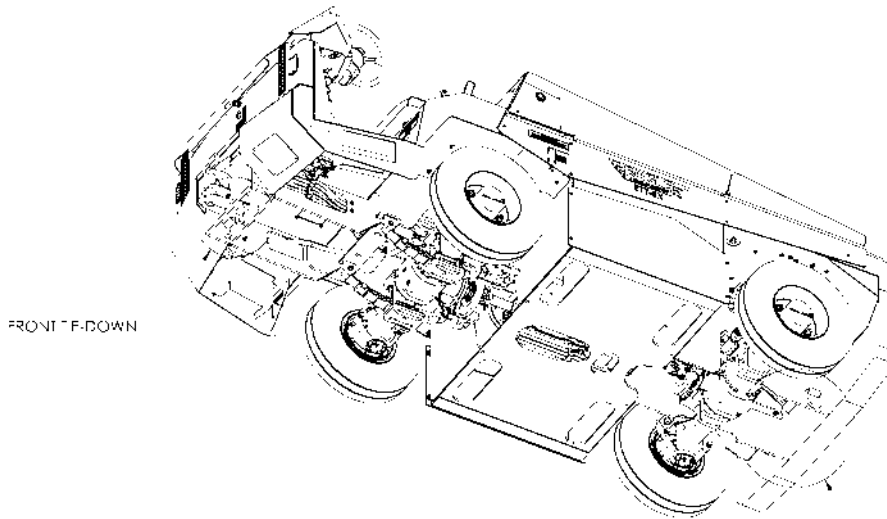
To return to normal operation, return to the operator compartment and return the DRIVE/INCH mode switch in the dash to the DRIVE position.

5.5.3 Steering Sync Operation

The steering calibration mode is used to recalibrate the front and rear axles in the event that a synchronization is lost between the front and rear steering.

To perform steering sync, set the FNR directional switch to neutral. Apply the parking brake and set the DRIVE/INCH switch to DRIVE. Press and hold the STEERING SYNC SWITCH on the dash with one hand and, use the other hand to turn the steering wheel all the way to the left till it dead heads. Release the STEERING SYNC SWITCH. Perform visual inspection of the steering while turning all the way from left to right while being stationary.

- 6.0 PACKAGING AND STORAGE
- 6.1 HANDLING
- 6.1.1 Tie Downs



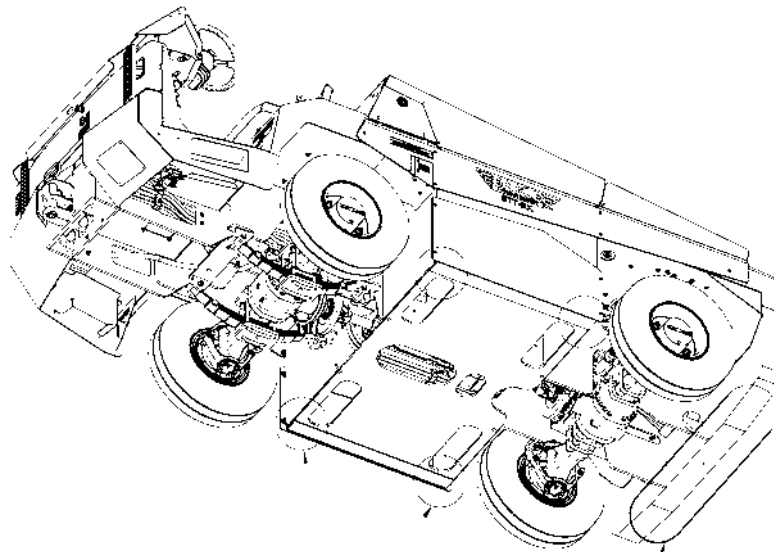
REAR TIE-DOWN

The eTT is equipped with four heavy duty tie-down rings located on the front and rear of the tractor. These tie-downs 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 rings. At no point should the hitches be used for securing the tractor.

- 6.1.2 Jacking and Jack Stand locations

When lifting the eTT with jacks use the locations shown above for maximum safety.

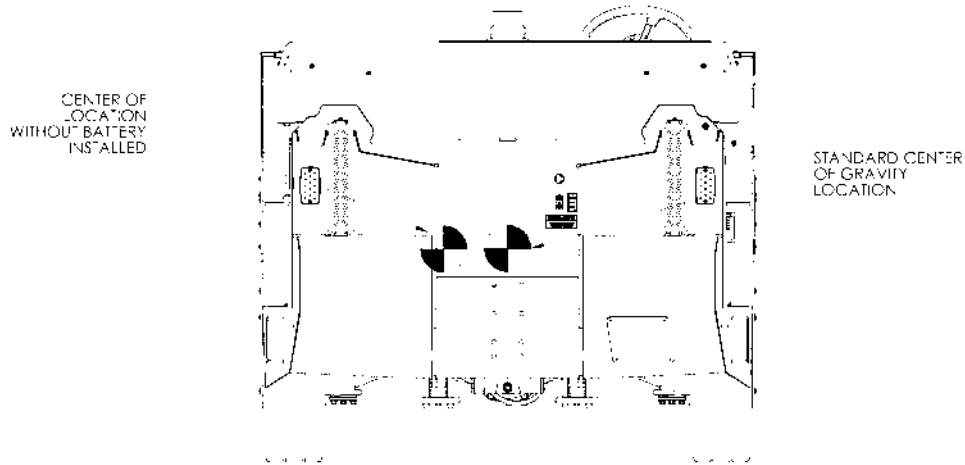


ACCEPTABLE LIFT
AND JACK-STAND LOCATIONS

Jacks and jack stands should be rated for 5 short tons or 5 metric tons minimum when using one located at each corner of the tractor.

6.1.3 Weight Distribution Without Battery

The battery or batteries of the eTT series tractor constitutes a large portion of the total tractor weight. Removal of the battery will result in a large shift in center of gravity location. For a single battery option, the center of gravity will shift from the center. For dual battery option, the center of gravity location will not be affected.



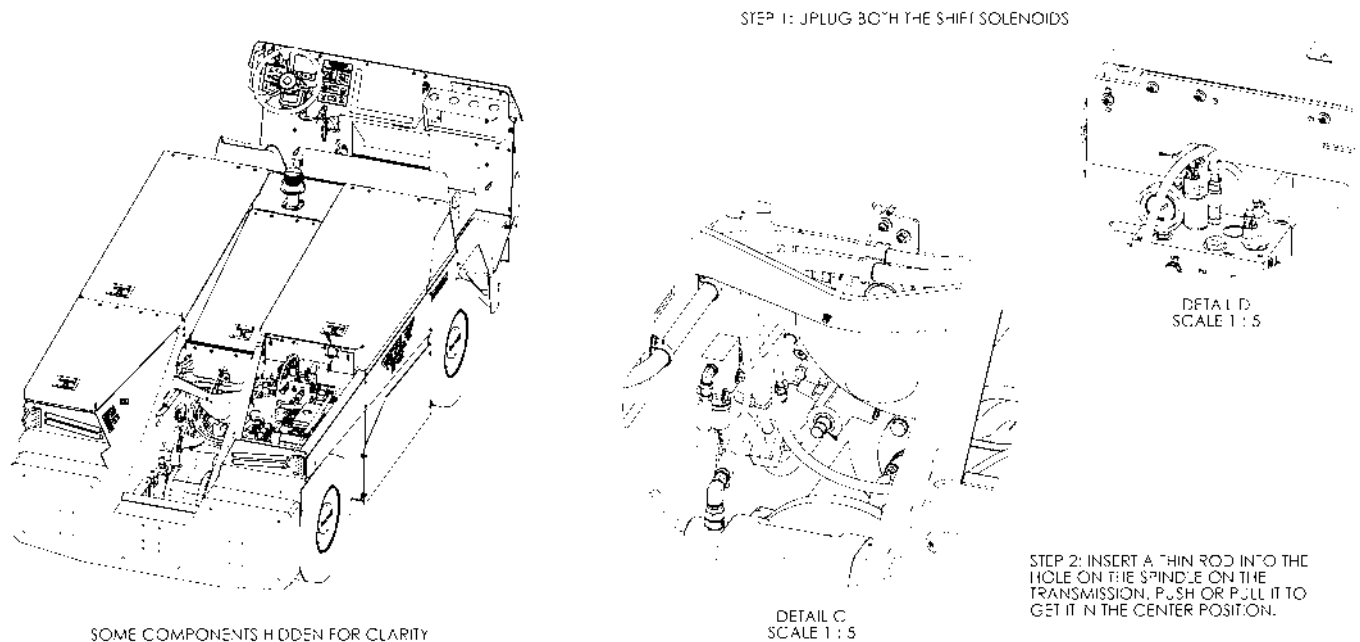
When transporting or handling a tractor without a battery installed, the new center of gravity needs to be taken into account. When lifting with a fork lift, always lift from the heavy side (non-battery side). When lifting with jacks, factor in the new center of gravity location.

6.1.4 Flat Towing

Should the eTT tractor be disabled, it can be flat towed for short distances 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
- The tractor should be put in Neutral using the below mentioned steps.

During towing, the axles may be steered with the steering wheel, but at a greatly increased effort.





7.0 TROUBLESHOOTING

7.1 OPERATIONAL TROUBLESHOOTING

Tractor won't move when the throttle pedal is pressed
Verify that the parking brake is released. Confirm by looking at the display module for the parking brake icon. If the indicator graphic does not turn off the parking brake proximity sensor is not working correctly
Verify that the tractor is in the selected gear by looking at the dash shift selector switch and display module. A brand-new transmission may hesitate when shifting until the gears get some hours on them. Switch between high/tow a couple times to attempt to get the transmission fully into the desired gear
Verify that the tractor is in Drive Mode
Verify that no active codes are present that could be impeding travel
Use the display module diagnostics to verify the throttle pedal input is working correctly
Tractor won't inch when switches are pressed
Verify that the tractor is in inch mode
Use the display module to verify that all inching mode requirements have been met
Verify that the surface you are on is flat and level. The inching functionality is not intended to be used while under load, including up-slope
Use the display module diagnostics to verify that inching switch input commands are being received
Tractor drives very slowly (creeping) and will not speed up
The tractor may be in limp-home mode. Use the display module to verify that there are no active errors or codes that could be causing the issue
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 display module to 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, replace the drive motor encoder bearing
Low battery state of charge will put the vehicle in Limp-mode. Check if the battery state of charge is below 30%. If so, plug in to a charger.
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 high gear. High gear is intended to be used for unloaded travel only. Towing while in high gear will drain the battery very quickly
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
Vehicle is crabbing when the steering wheel is held in straight position
Perform steering sync operation using the instruction mentioned above. (<i>Section 5.5.4</i>)



7.1 OPERATIONAL TROUBLESHOOTING (continued)

Hydraulic pump runs more frequently than usual, or does not shut off
<p>One possible cause is that the system cannot maintain pressure. A relief valve stuck in the open position or any other valve or seal that is bleeding pressure from the accumulator will result in reduced battery life and increased component wear</p> <ul style="list-style-type: none">• Let the pump charge the system and then shut off. With the pump off, listen for any hydraulic bleed-by that is draining the accumulator pressure• Watch the pressure gage located on the manifold block once the system has charged. The pressure should hold at a steady rate. If no pressure bleeds seem to be present and the system can hold pressure for a long period of time, there may be an issue with the gear pump• Test the time to charge the accumulator from a fully depressurized state. If the accumulator takes longer to charge than when new, the hydraulic pump may be worn or damaged. An alternative cause of frequent pump operation is a loss of accumulator pre-charge. The accumulator relies on highly compressed nitrogen to store hydraulic energy. If some of the nitrogen leaks out, the accumulator will store much less energy and the pump will have to work much more often• Test the number of turns possible on the steering wheel after the pump charges the system up, before the pump turns back in in response to low pressure. If the amount of turns differs significantly from when new, the accumulator pre-charge should be checked



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.

202: 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.
- If the motor cables and speed encoder are working correctly and the issue persists, replace the controller.

207-209: Phase Not Connected

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.

Motor Temperature Sensor: Ensure motor temperature sensor is connected properly.

600: Not Connected – Check wiring on the motor temperature sensor. Sensor is defective.

601: Short Circuit – Check wiring on the motor temperature sensor. Sensor is defective.

602: Moderately high – Event is set if motor temperature is above a predefined setpoint. Max allowed AC current is limited.

603: High – Event is set if motor temperature is above a predefined setpoint. Motor is disabled.

604: Moderately low – Event is set if motor temperature is below a predefined setpoint. Max allowed AC current is limited.

Controller Temperature Sensor: Ensure cooling fins are free of debris.

700: Not Connected – Sensor inside the controller is defective.

701: Short Circuit – Sensor inside the controller.

702: Moderately high – Event is set if controller temp is above a predefined setpoint. Max allowed AC current is limited.

703: High – Event is set if controller temp is above a predefined setpoint. Motor is disabled.

704: Moderately low – Event is set if controller temp is below a predefined setpoint. Max allowed AC current is limited.

800: Sensor Supply not connected

801: Sensor Supply High current

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.

802-805: 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.

Open Drain Output faults: Check wiring for respective coils below or the coils are defective.

1001, 1011, 1021, 1031 – Main contactor faults.

1002, 1012, 1022, 1032 – Shift low solenoid faults

1003, 1013, 1023, 1033 – Shift high solenoid faults

1004, 1014, 1024, 1034 – Brake light relay faults

1006, 1016, 1026, 1036 – Cooling fan relay faults



7.2 ERROR CODES (Continued)

1250- 1280: 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 9 and pins 22 on the pump controller
- Missing CAN termination resistor near the display. Verify the 120-ohm 3 pin resistor under the dash is connected.

10110 – 10114 Pedal Handler faults

- Check if the wiring for accelerator pedal is intact.
- Faulty accelerator pedal.

Code	Fault Message	Effect of Fault	Possible Cause	Set/ Clear Conditions
Warning	Return to Neutral Before Driving	Disable throttle output	The unit is keyed on with the vehicle direction rocker set to Forward or Reverse instead of Neutral	Set Gear To Neutral
Warning	Inch Mode Time Up	Disable throttle output	Inching hold time surpassed	Release The Forward/ Reverse Inching Switch And Re-Press
Fault	Throttle Compare Fault, Service Throttle Pedal	Disable all traction and pump activity	If the throttle pedal wiper 1 and 2 compare fail	Force A Key Cycle To Reset
Fault	Inching Switch Fault, Service Inching Switches	Disable all traction and pump activity	If an inching switch is active (forward or reverse) on key-on	Force A Key Cycle To Reset
Fault	Inching Switch Fault, Service Inching Switches	Disable all traction and pump activity	If both inching switch inputs (forward and reverse) are activated simultaneously	Force A Key Cycle To Reset
Fault	Motor Control Fault	Disable all traction and pump activity	If the motor RPM exceeds 1.5x the command speed during inching	Force A Key Cycle To Reset
Fault	Pressure Switch Or Pump Failure, Service Hydraulic System	Disable all traction and pump activity	If the pump motor runs for 30 seconds continuously without triggering the Pressure Good or Pressure High state	Force A Key Cycle To Reset
Fault	Hydraulic Fluid Over Temp	Disable all traction and pump activity	If the hydraulic temp switch shows over-temp	Force A Key Cycle To Reset
Fault	Pressure Switch Fault, Service Pressure Switches	Disable all traction and pump activity	If both high and low pressure switches are OFF at the same time	Force A Key Cycle To Reset
Fault	Low Battery, Charge Required	Reduce vehicle speed to 1 mph	battery SOC falls to 30% or lower	Force A Key Cycle To Reset
Fault	Battery Low Voltage, Please Charge Or Service	Reduce vehicle speed to 1 mph	If the battery voltage reported falls below 60V for 2 or more seconds at a time	Force A Key Cycle To Reset
Fault	Gear Shift Fault	Disable throttle output	If the gear sensor output stays 0 for 5 seconds	Gear Sensor=1
Fault	Operator Presence Switch Error, Traction Disabled	Disable all traction and pump activity	Operator seat switch opened	Set Gear To Neutral. Seat Switch = Closed



8.0 MAINTENANCE

8.1 PREVENTIVE MAINTENANCE SCHEDULE

TBC for the eTT-12X

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	Weekly	First 50 hours	First 150 hours	500 hours	1500 hours or annually †
Perform daily pre-operation checklist	X					
Check hydraulic fluid level and top off as necessary (Section 8.3)		X				
Verify tire pressure and add air as necessary		X				
Perform battery equalization charge then water (For Battery option 1)		X				
Re-torque front and rear axle U-bolts			X			
Drain and replace axle oil; center & planetaries (1 st time only: Section 8.5)				X		
Drain and replace transfer case oil (1 st time only: Section 8.6)				X		
Check axle oil level, center and planetaries					X	
Clean axle oil breathers (Section 8.5)					X	
Grease upper and lower kingpin grease fittings on axles					X	
Check transfer case oil level					X	
Clean transfer case oil breather					X	
Grease driveshaft U-joints and slip shafts					X	
Inspect wheel lug nuts and tighten if necessary					X	
Check all battery cable connections for tightness and corrosion						X
Drain and replace axle oil; center and planetaries (Section 8.5)						X
Clean axle magnetic drain plugs						X
Drain and replace transfer case oil (Section 8.6)						X
Clean transfer case magnetic drain plug						X
Drain hydraulic fluid from tank and replace (Section 8.3)						X
Remove and clean hydraulic magnetic drain plug						X
Replace hydraulic filter, A-ES12-0485 (Section 8.4)						X
Inspect axle U-bolts for loosening and tighten if necessary						X
Re-torque driveshaft U-joint straps and flange hardware						X
Inspect wet brake discs for wear and replace if necessary						X
Check front parking brake disc and pads and replace if necessary						X
Inspect steering tie-rod ball ends for play and replace if necessary						X
Inspect steering tie-rod adjustment nuts and tighten if necessary						X
Inspect steering stops and re-set/tighten if necessary						X
Inspect steering sensor potentiometers						X



8.1 PREVENTIVE MAINTENANCE SCHEDULE *(continued)*

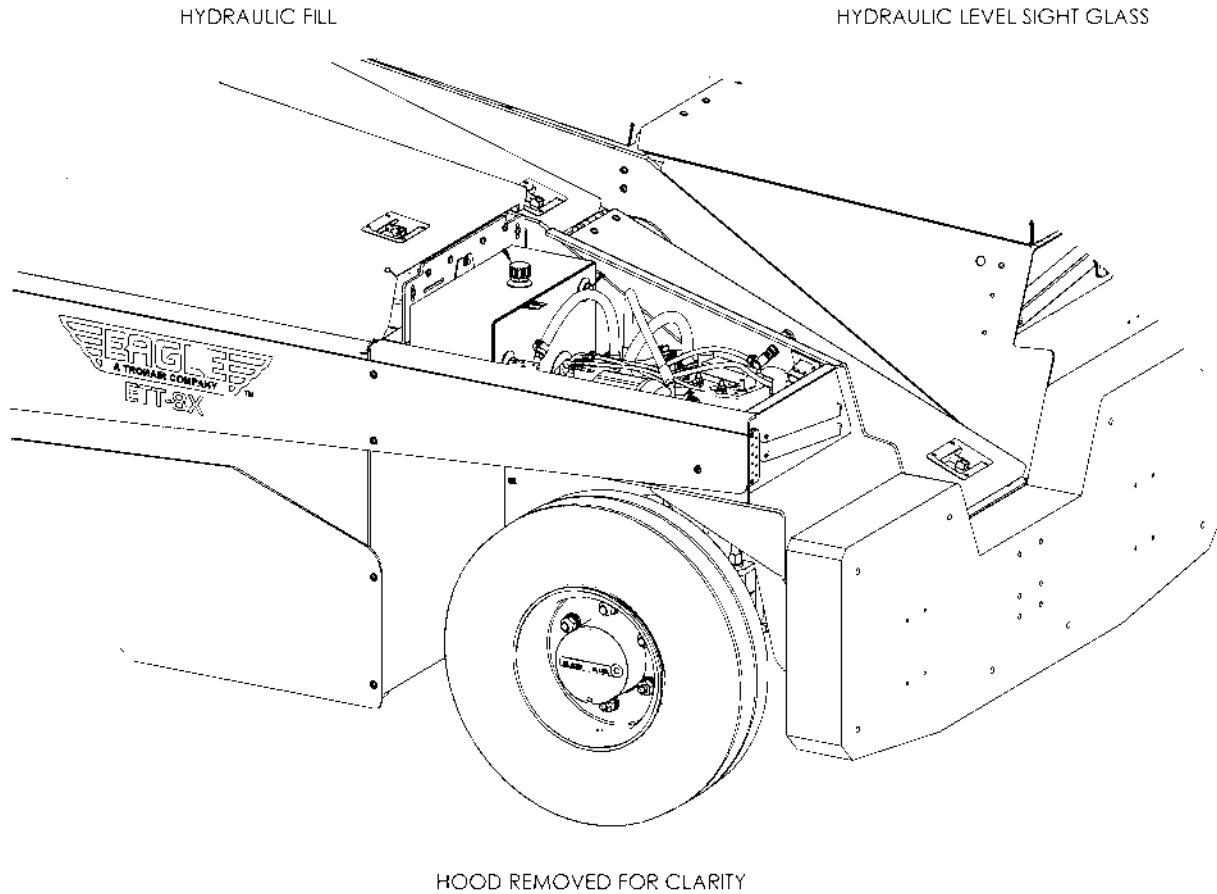
Preventive Maintenance Item	Daily	Weekly	First 50 hours	First 150 hours	500 hours	1500 hours or annually †
Inspect all hydraulic tubes and hoses for wear/damage and leaks						X
Inspect hitch pins for wear and replace if beyond specifications						X
Inspect motor / transfer case mount isolators and replace if necessary						X
Check steering accumulator pre-charge pressure (key-on hours)						X
Check brake accumulator pre-charge pressure (key-on hours)						X

8.2 FLUIDS

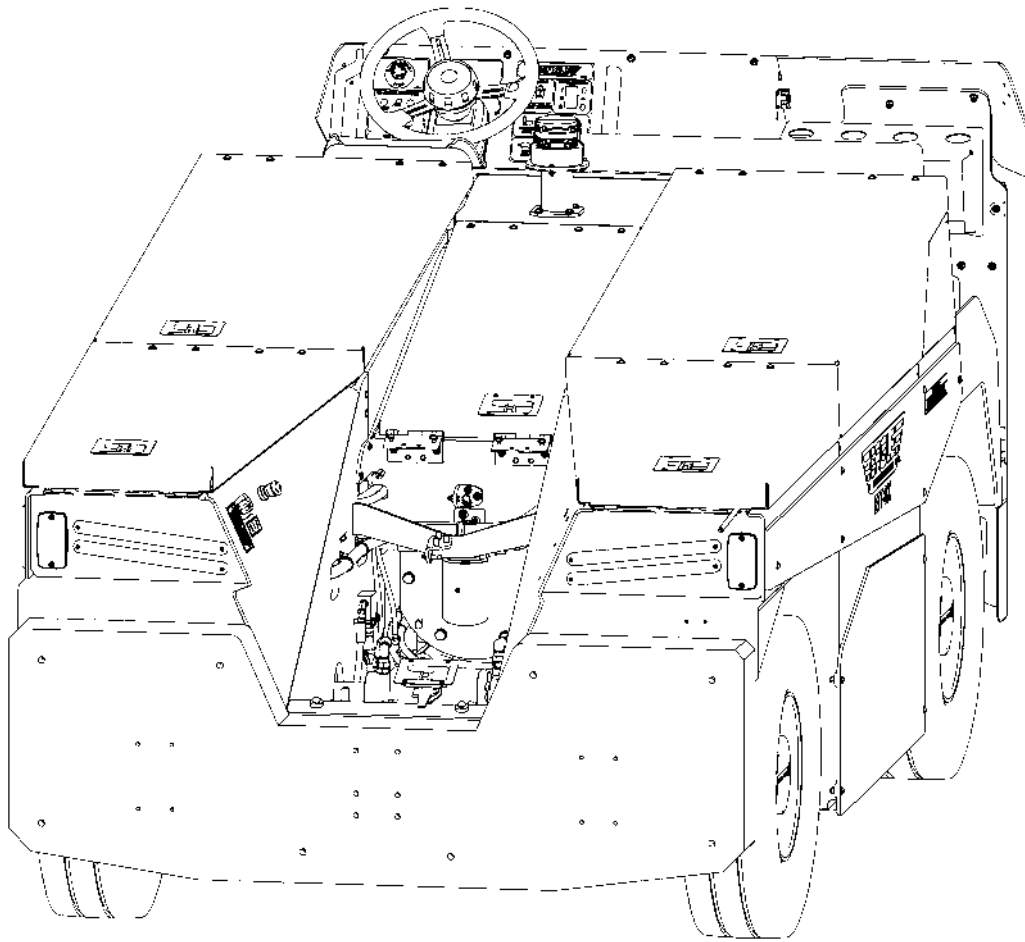
		FLUID SPECIFICATIONS		
Fluid	Recommendation	Requirement	eTT-8X Volume approximate	eTT-12X Volume approximate
Hydraulic Fluid	Castrol Dual Range HV 32	ISO 32 Mineral Oil Based	7.5 gal (28.4 l)	TBC
Axle Gear Oil	FUCHS TITAN EG LS 90 (GL5)	API GL5	1 gal (3.7 l)	TBC
Transfer Case Oil	ELF SF3 (GL4)	API GL4	1 gal (3.7 l)	TBC

8.3 HYDRAULIC SIGHT GLASS AND FILL

Hydraulic Fluid:	eTT-8X	eTT-12X
Recommendation	Castrol Dual Range HV 32.....	Castrol Dual Range HV 32
Total Volume	10.3 gal (39 l) approximate	TBC
Tank Volume	7.5 gal (28.4 l) approximate	TBC



- 8.4 HYDRAULIC FILTER
Hydraulic Filter A-ES12-0485



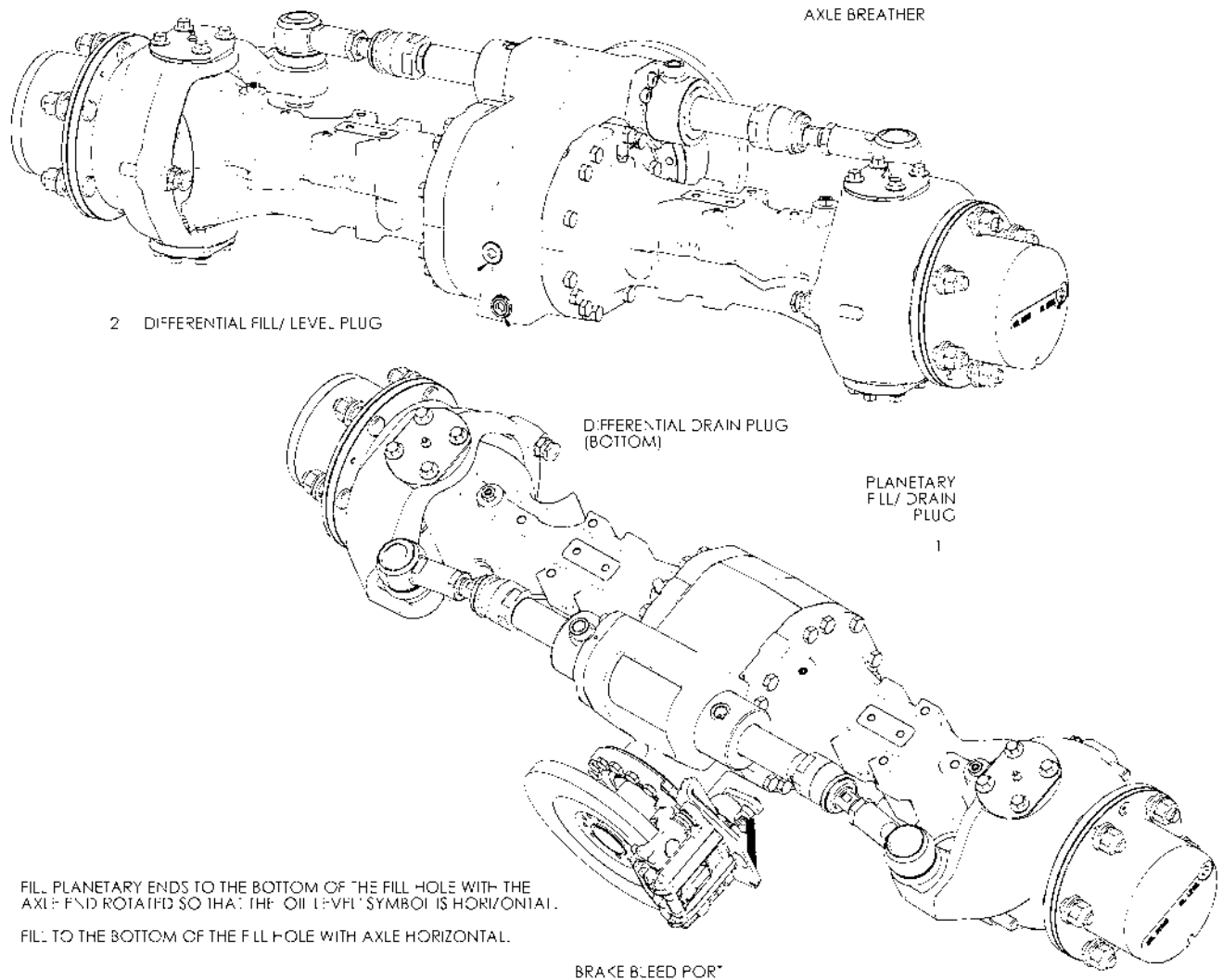
HYDRAULIC FILTER

CENTER HOOD HIDDEN FOR CLARITY

8.5 PLANETARY AXLE SERVICE POINTS

Axle Gear Oil:	eTT-8X	eTT-12X
Recommendation	Castrol Trans-C SAE 50	Castrol Trans-C SAE 50
Center Volume	0.9 gal (3.5 l) approximate	TBC
Planetary Volume (each)	0.1 gal (0.4 l) approximate	TBC
Total Volume (each axle)	1 gal (3.9 l) approximate	TBC

Oil level should be maintained at the bottom of the planetary and differential Oil Fill ports.

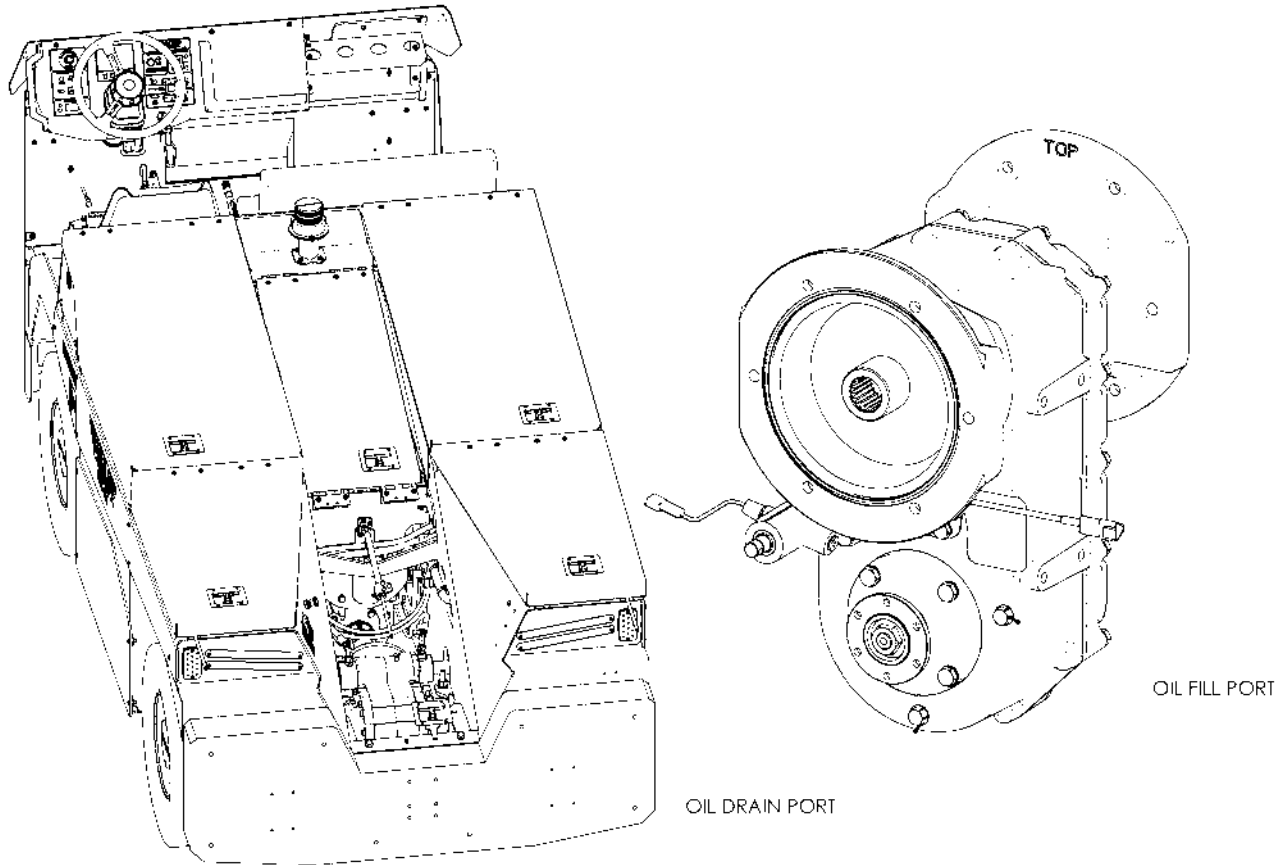


- 1 FILL PLANETARY ENDS TO THE BOTTOM OF THE FILL HOLE WITH THE AXLE END ROTATED SO THAT THE OIL LEVEL SYMBOL IS HORIZONTAL.
- 2 FILL TO THE BOTTOM OF THE FILL HOLE WITH AXLE HORIZONTAL.

8.6 TRANSFER CASE SERVICE

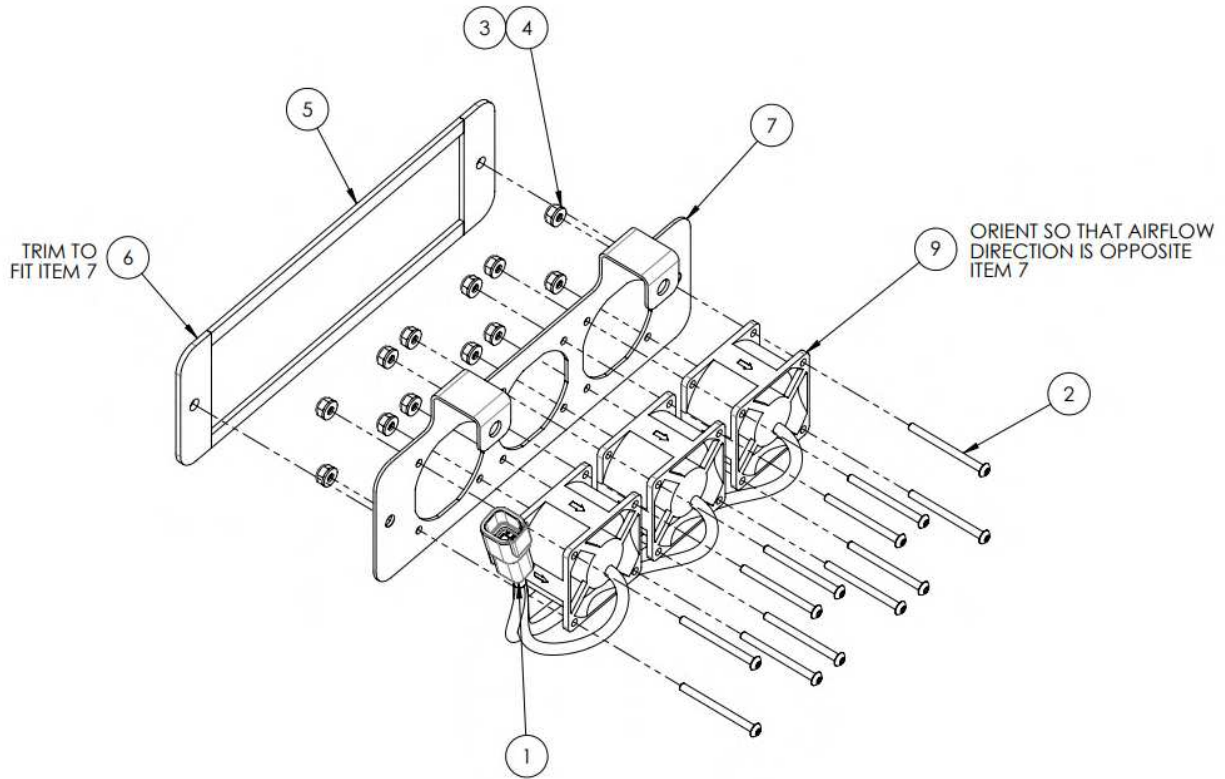
Transfer Case Oil:	eTT-8X	eTT-12X
Recommendation	ELF SF3 (GL4)	ELF SF3 (GL4)
Volume	1 gal (3.7 l) approximate	TBC

Oil level should be maintained at the bottom of the Oil Fill port.



OPEN REAR CENTER HOOD TO ACCESS THE GEARBOX FILL AND DRAIN PORTS.

9.0 **DRIVETRAIN**
9.1 **ASSEMBLY, COOLING FANS**



Parts List

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

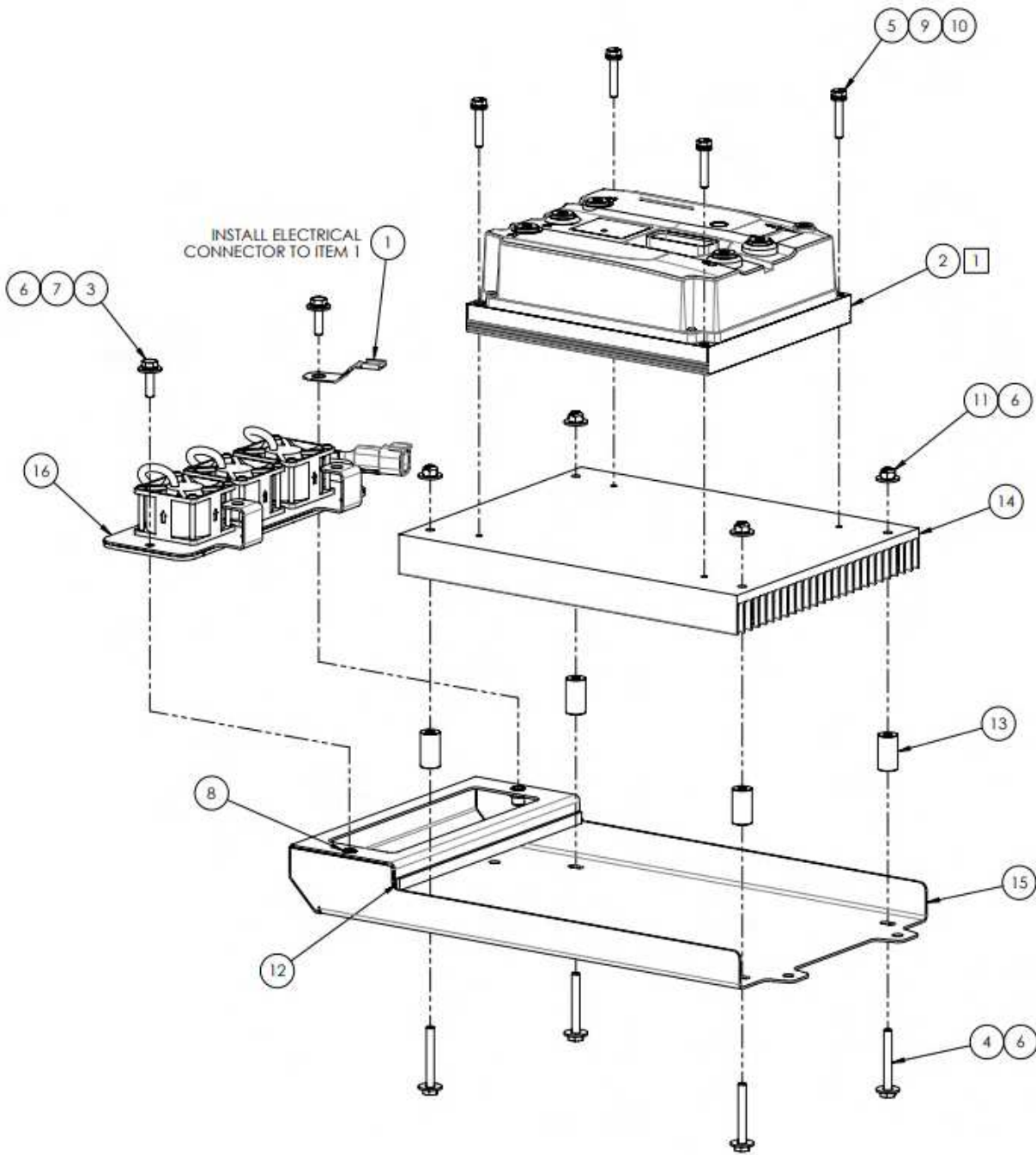
Item	Part Number	Description	Qty
1	DTM04-6P	DEUTSCH CONNECTOR	1
2	G-1154-102220	SCREW, #8-32 X 2.00" LG. SST SOC BUTT. HD CAP	12
3	G-1202-1020	STOPNUT, #8-32 ELASTIC	12
4	G-1250-1020N	FLATWASHER, #8 NARROW	12
5	H-1204-03	TAPE, NEOPRENE FOAM SEALING, 1/8" X 3/8"	As Needed
6	H-1204-10	TAPE, NEOPRENE FOAM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



Model: eTT-8X / eTT-12X
Electric Tow Tractor

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9.2 ASSEMBLY, MOTOR CTRLR WITH HEATSINK



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



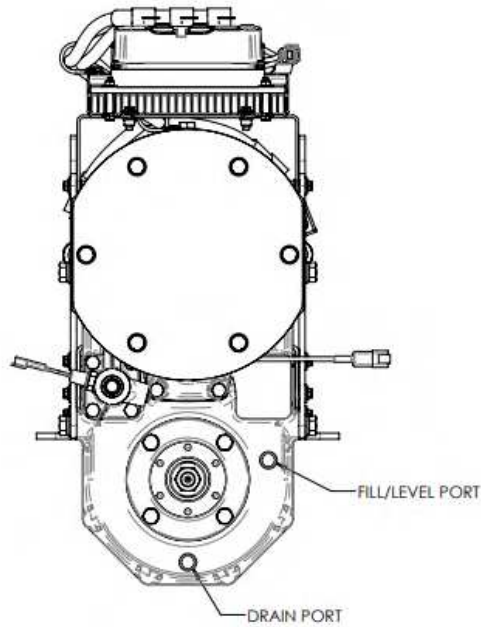
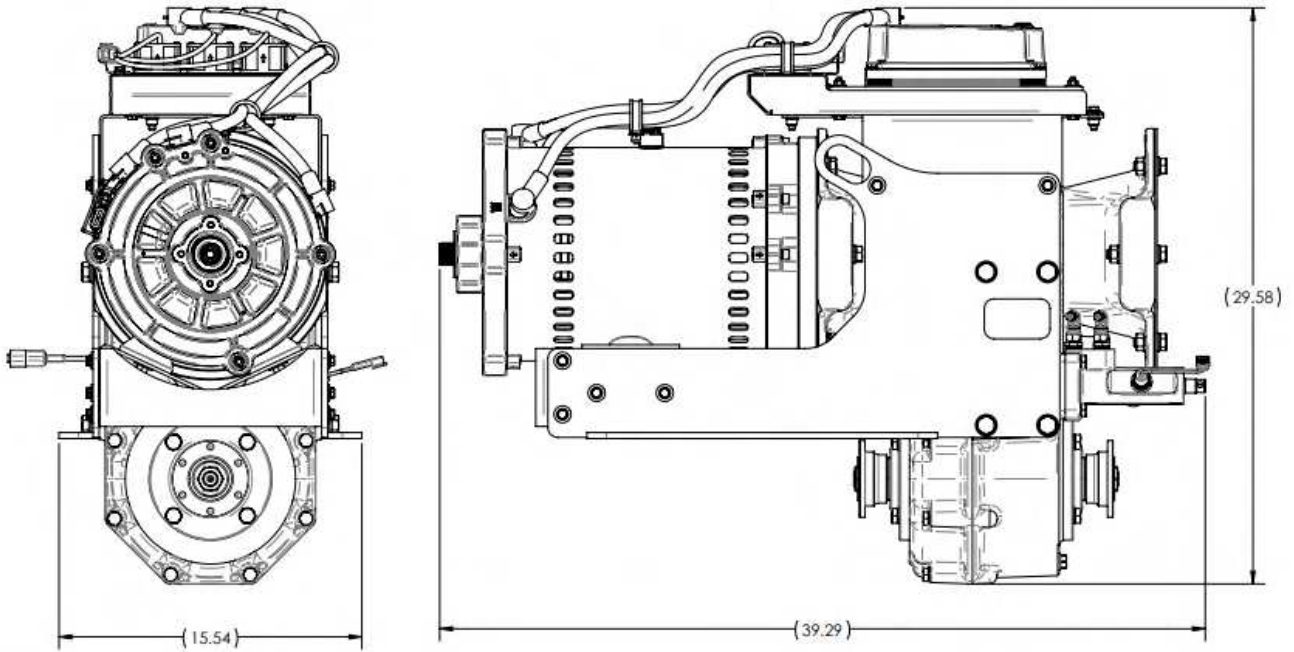
9.2 ASSEMBLY, MOTOR CTLR WITH HEATSINK (continued)

Parts List

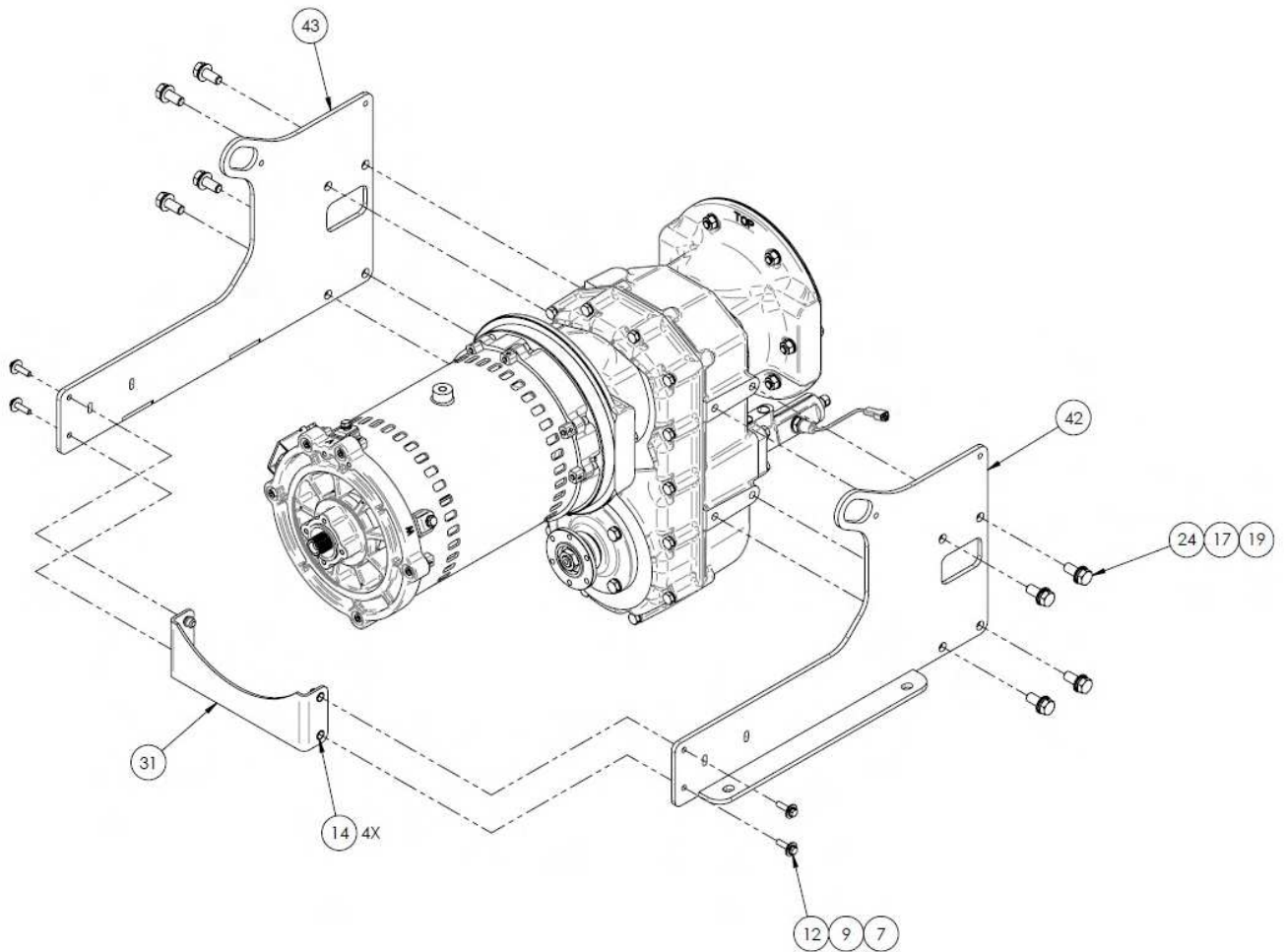
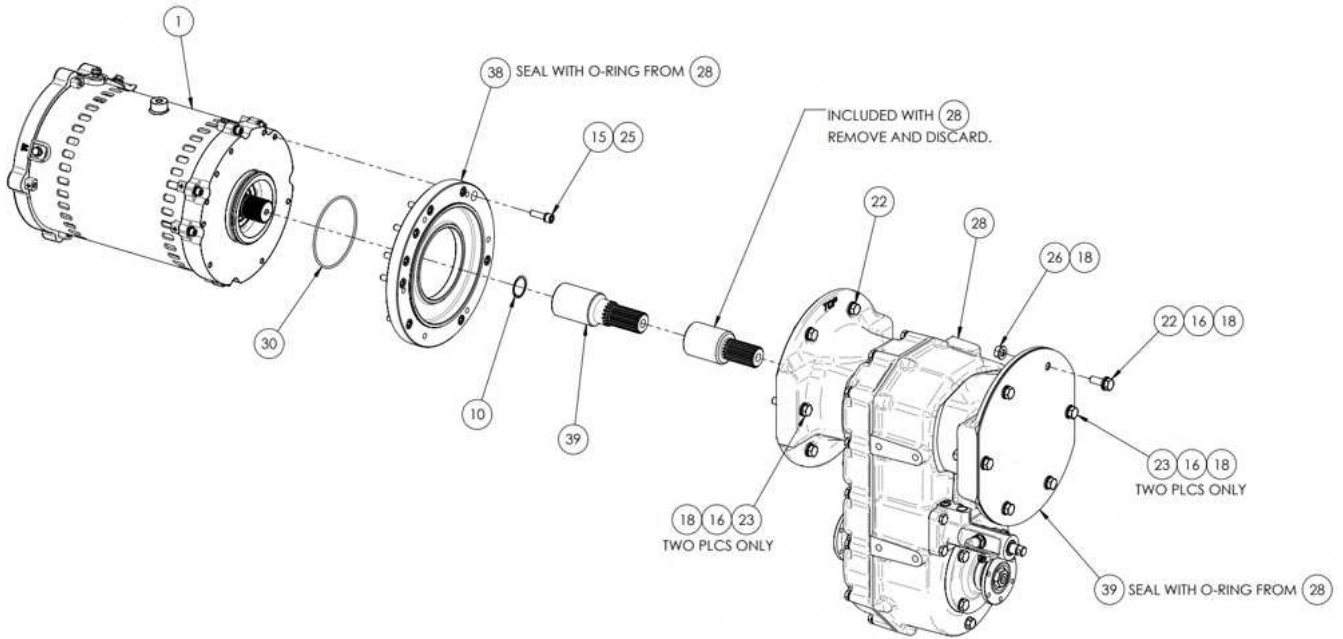
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	1027-003-1200	DEUTSCH RETAINER CLIP	1
2	EC-3475	INVERTER, INMOTION 700A	1
3	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	2
4	G-1100-105020	BOLT, 1/4-20 X 2.0" LG HEX HD GR 5	4
5	G-1114-060035	BOLT, M6X1.0 X 35 CLASS 8.8	4
6	G-1250-1050W	G-1250-1050W	10
7	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	2
8	G-1439-1050-S	NUTSERT, THIN WALL 1/4-20	2
9	G-1514-M60R	LOCKWASHER, M6 REGULAR	4
10	G-1515-M60	FLATWASHER, M6	4
11	G-1727-1050	NUT, 1/4-20 TOP LOCK ZINC	4
12	H-1204-03	TAPE, NEOPRENE FOAM SEALING, 1/8" X 3/8"	As Needed
13	H-4566-11	SPACER, .252 ID X .625 OD X 1.125	4
14	H-5024	HEATSINK, MODIFIED	1
15	Z-11005-00	WLD, DRIVE COOLING PLENUM (P)	1
16	Refer above section	ASY, COOLING FANS	1

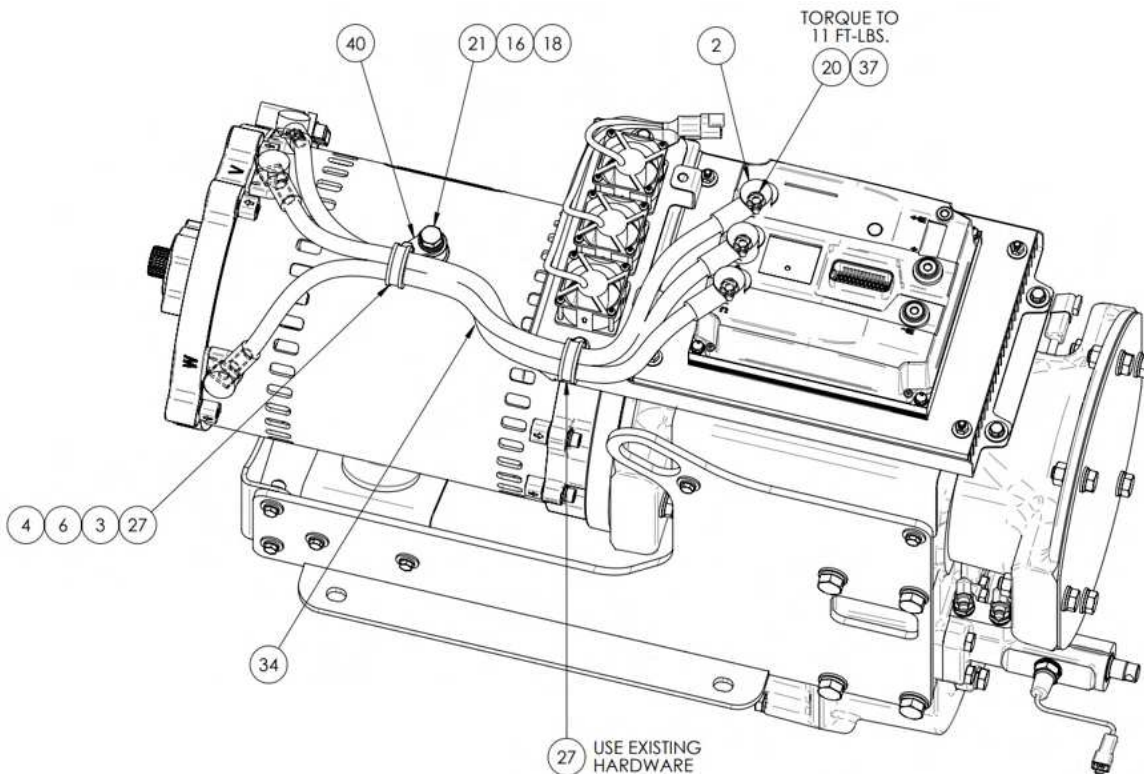
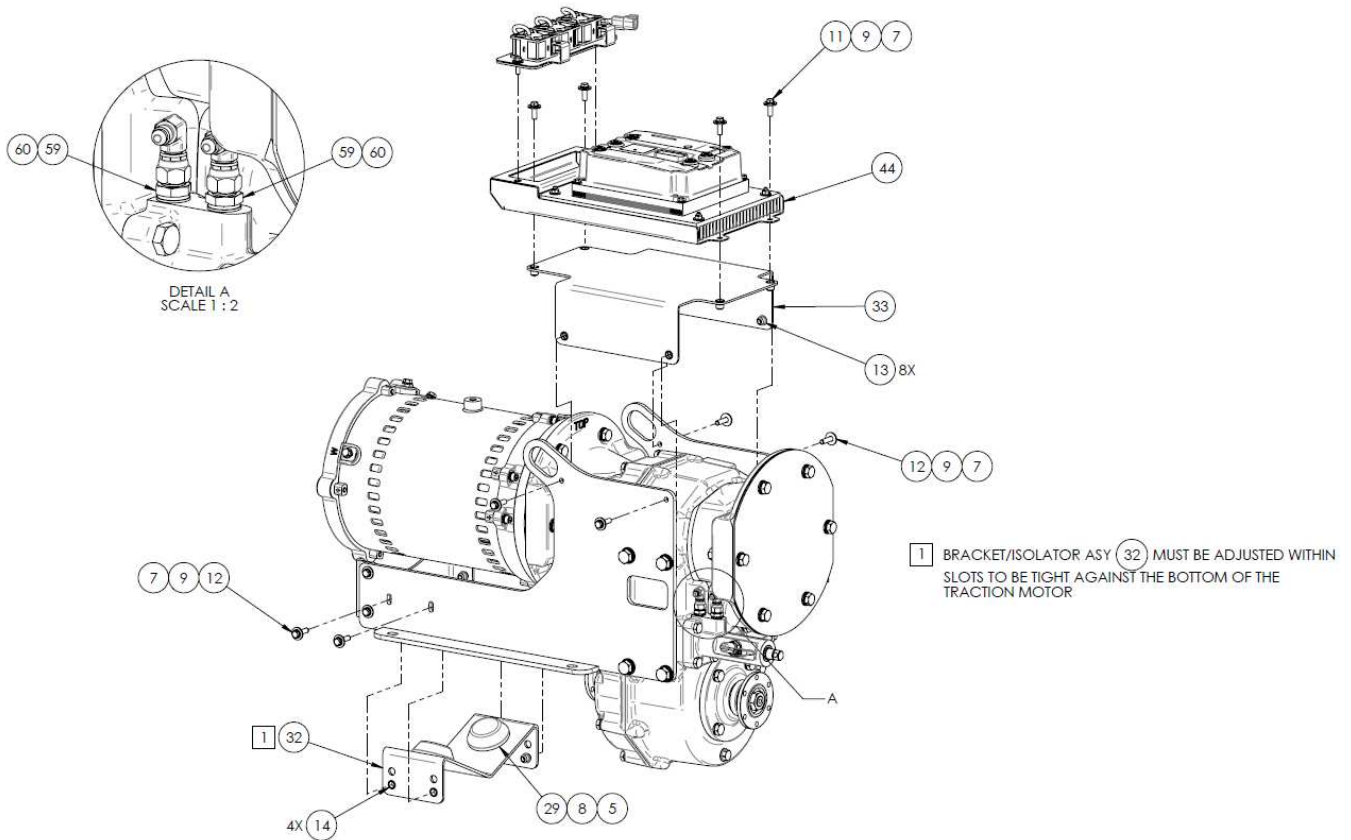
9.3 ASSEMBLY, MOTOR AND XFER CASE



9.3 ASSEMBLY, MOTOR AND XFER CASE (continued)



9.3 ASSEMBLY, MOTOR AND XFER CASE (continued)





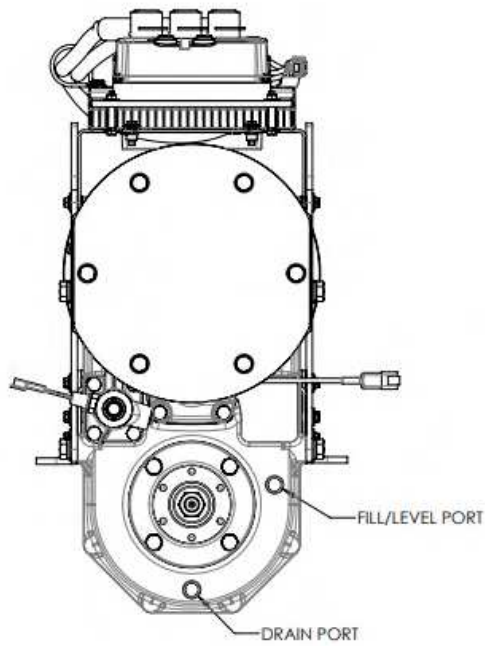
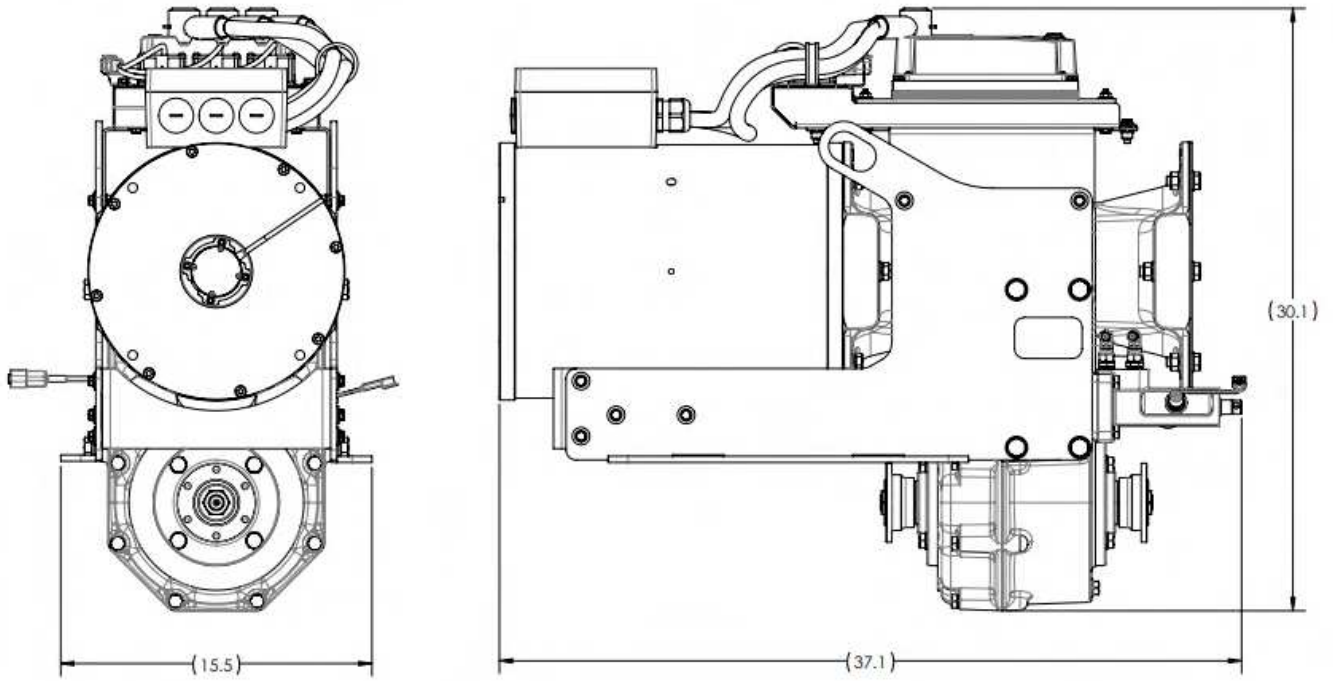
9.3 ASSEMBLY, MOTOR AND XFER CASE (continued)

Parts List

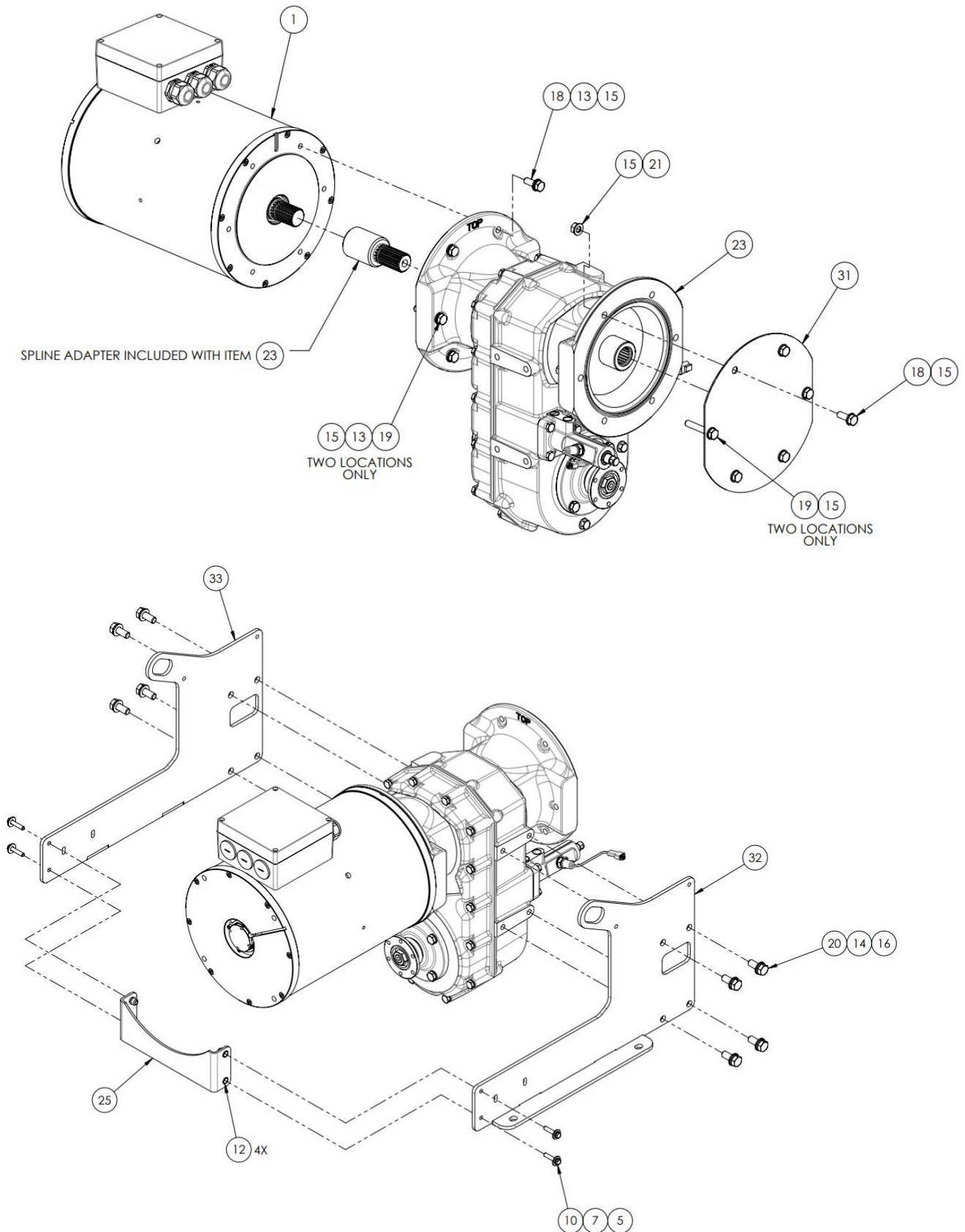
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-ES12-0420	TRACTION MOTOR	1
2	EC-2110	BATTERY, TERMINAL INSULATOR	6
3	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	1
4	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	1
5	G-1202-1070	STOPNUT, 3/8-16 ELASTIC	2
6	G-1250-1050W	FLATWASHER, 1/4 WIDE	1
7	G-1250-1060W	FLATWASHER, 5/16 WIDE	16
8	G-1250-1070W	FLATWASHER, 3/8 WIDE	2
9	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	16
10	G-1391-13	RING, INTERNAL RETAINING	1
11	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	4
12	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	12
13	G-1439-1060-S	NUTSERT, THIN WALL 5/16-18	8
14	G-1440-1060-S	NUTSERT, THICK WALL 5/16-18	8
15	G-1491-108016	SOC HD CAP SCR, M10X1.5 X 35	8
16	G-1514-M120R	LOCKWASHER, M 12 REGULAR	13
17	G-1514-M140R	LOCKWASHER, M 14 REGULAR	8
18	G-1515-M120	FLATWASHER, M12	19
19	G-1515-M140	FLAT WASHER, M14	8
20	G-1533-080020	BOLT M8-1.25 X 20mm LG. CLASS 10.9	3
21	G-1533-120020	BOLT M12-1.75 X 20mm LG. CLASS 10.9	1
22	G-1533-120035	BOLT M12-1.75 X 35mm LG. CLASS 10.9	8
23	G-1533-120070	BOLT M12-1.75 X 70mm LG. CLASS 10.9	4
24	G-1533-140035	HEX BOLT, M14 X 2.0 X 35, CLASS 10.9	8
25	G-1626-M10Z	LOCKWASHER, M10 HIGH COLLAR	8
26	G-1793-16	NUT, HEX CLASS 8 M12X1.75	6
27	H-3521-15	CLAMP, CUSHIONED LOOP 1 1/4"	2
28	H-4863	TRANSFER CASE, 2 SPEED (368)	1
29	H-4868	ISOLATOR, MOTOR	2
30	HC-2000-250	O-RING, SERIES 2	1
31	J-7862-00	PLATE, TIE (P)	1
32	J-7863-00	PLATE, MOTOR SUPPORT (P)	1
33	J-7864-00	PLATE, DRIVE MOUNTING (P)	1
34	K-5535	ASY, UVW MOTOR CABLES	1
35	MC5315X6X14	M14 X 1.5 DIN M 6 JIC M	2
36	N-2002-14-S	ELBOW 90°, -06 F JIC X -04 M JIC	2
37	NVSP-21-016-CB	M8 BELLEVILLE LOCK WASHER	3
38	R-3416	ADAPTER, MOTOR	1
39	R-3417	SPLINE ADAPTER	1
40	S-3957-00	MOUNTING TAB, BATTERY CABLES	1
39	S-4191-00	TRANSFER CASE COVER PLATE (P)	1
42	Z-11514-00	WLD, LH MOTOR MOUNT (P)	1
43	Z-11515-00	WLD, RH MOTOR MOUNT (P)	1
44	Z-11822	ASY, MOTOR CTRLR WITH HEATSINK	1

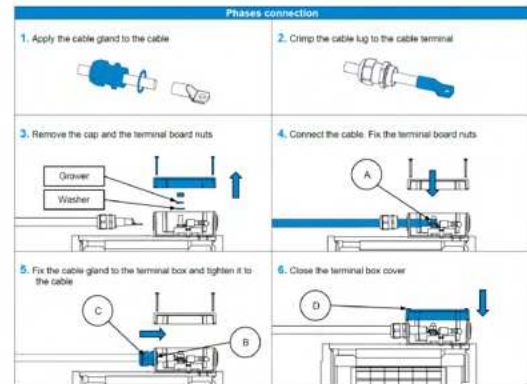
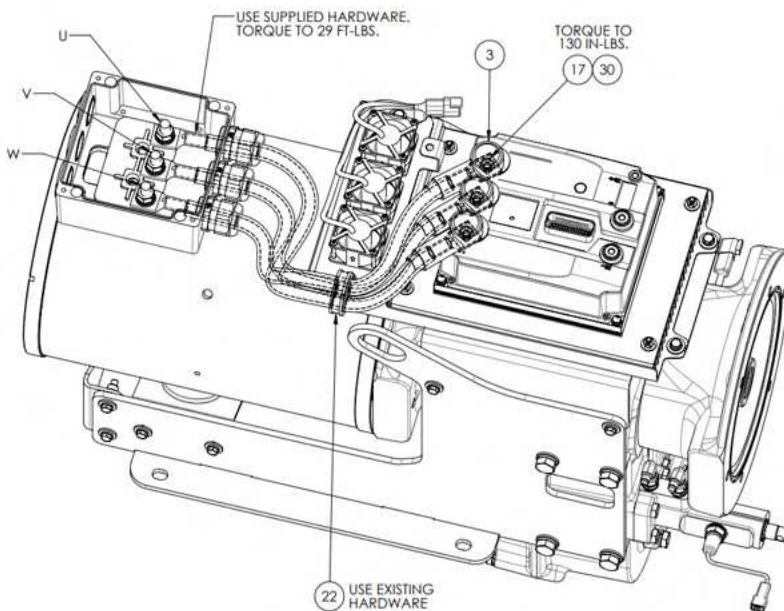
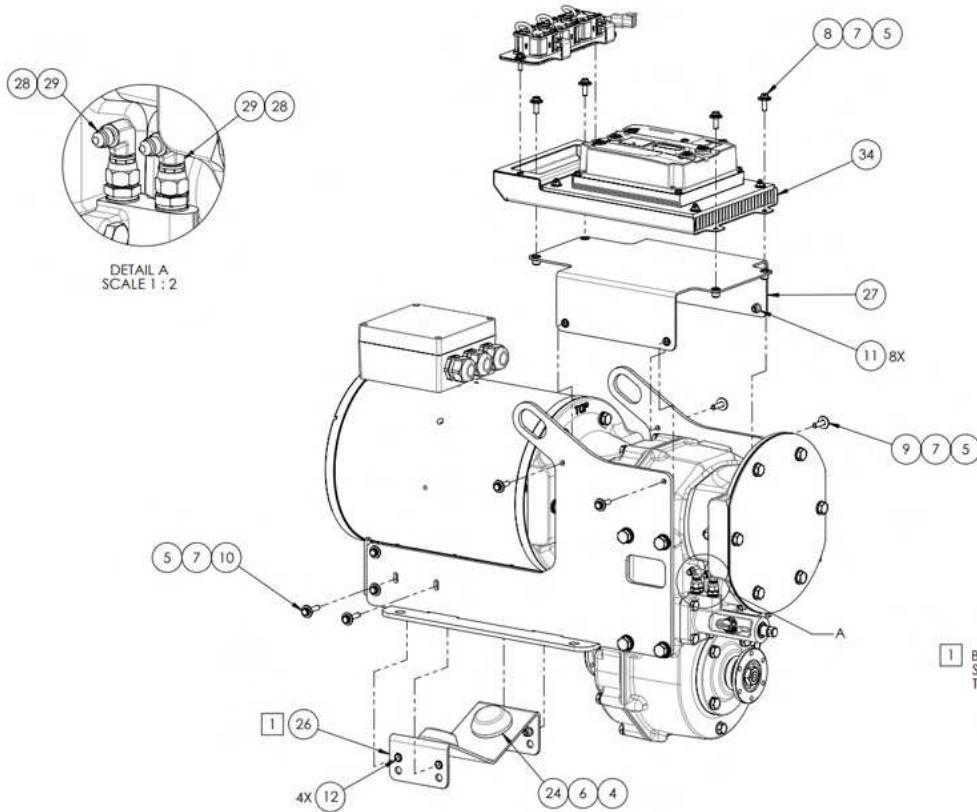
9.3 ASSEMBLY, MOTOR AND XFER CASE (ETT-12X) *(continued)*



9.3 ASSEMBLY, MOTOR AND XFER CASE (continued)



9.3 ASSEMBLY, MOTOR AND XFER CASE (continued)





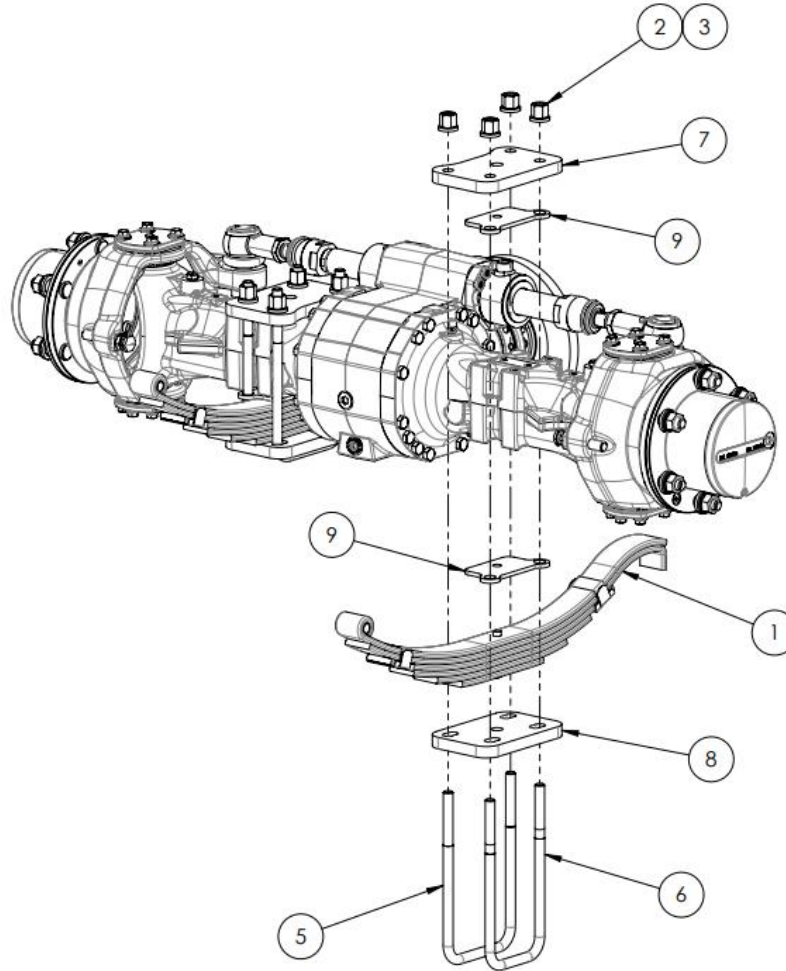
9.3 ASSEMBLY, MOTOR AND XFER CASE (continued)

Parts List

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

Item	Part Number	Description	Qty
1	EC-3367	TRACTION MOTOR, 40KW	1
2	EC-3388	ASY, UVW MOTOR CABLE	3
3	EC-3393	BATTERY TERMINAL INSULATOR	3
4	G-1202-1070	STOPNUT, 3/8-16 ELASTIC	2
5	G-1250-1060W	FLATWASHER, 5/16 WIDE	16
6	G-1250-1070W	FLATWASHER, 3/8 WIDE	2
7	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	16
8	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	4
9	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	4
10	G-1420-106014	BOLT, 5/16-18 HEX HD GR 8	8
11	G-1439-1060-S	NUTSERT, THIN WALL 5/16-18	8
12	G-1440-1060-S	NUTSERT, THICK WALL 5/16-18	8
13	G-1514-M120R	LOCKWASHER, M 12 REGULAR	6
14	G-1514-M140R	LOCKWASHER, M 14 REGULAR	8
15	G-1515-M120	FLATWASHER, M12	18
16	G-1515-M140	FLAT WASHER, M14	8
17	G-1533-080016	BOLT M8-1.25 X 16mm LG. CLASS 10.9	3
18	G-1533-120035	BOLT M12-1.75 X 35mm LG. CLASS 10.9	8
19	G-1533-120070	BOLT M12-1.75 X 70mm LG. CLASS 10.9	4
20	G-1533-140035	HEX BOLT, M14 X 2.0 X 35, CLASS 10.9	8
21	G-1793-16	NUT, HEX CLASS 8 M12X1.75	6
22	H-3521-23	CLAMP, CUSHIONED LOOP 1 3/4"	1
23	H-4863	TRANSFER CASE, 2 SPEED (368)	1
24	H-4868	ISOLATOR, MOTOR	2
25	J-7862-00	PLATE, TIE (P)	1
26	J-7863-00	PLATE, MOTOR SUPPORT (P)	1
27	J-7864-00	PLATE, DRIVE MOUNTING (P)	1
28	MC5315X6X14	M14 X 1.5 DIN M 6 JIC M	2
29	N-2002-14-S	ELBOW 90°, -06 F JIC X -04 M JIC	2
30	NVSP-21-016-CB	M8 BELLEVILLE LOCK WASHER	3
31	S-4191-00	TRANSFER CASE COVER PLATE (P)	1
32	Z-11332-00	WLD, LH MOTOR MOUNT (P)	1
33	Z-11333-00	WLD, RH MOTOR MOUNT (P)	1
34	Refer above section	ASY, MOTOR CTRLR WITH HEATSINK	1

9.4 ASSEMBLY, FRONT AXLE

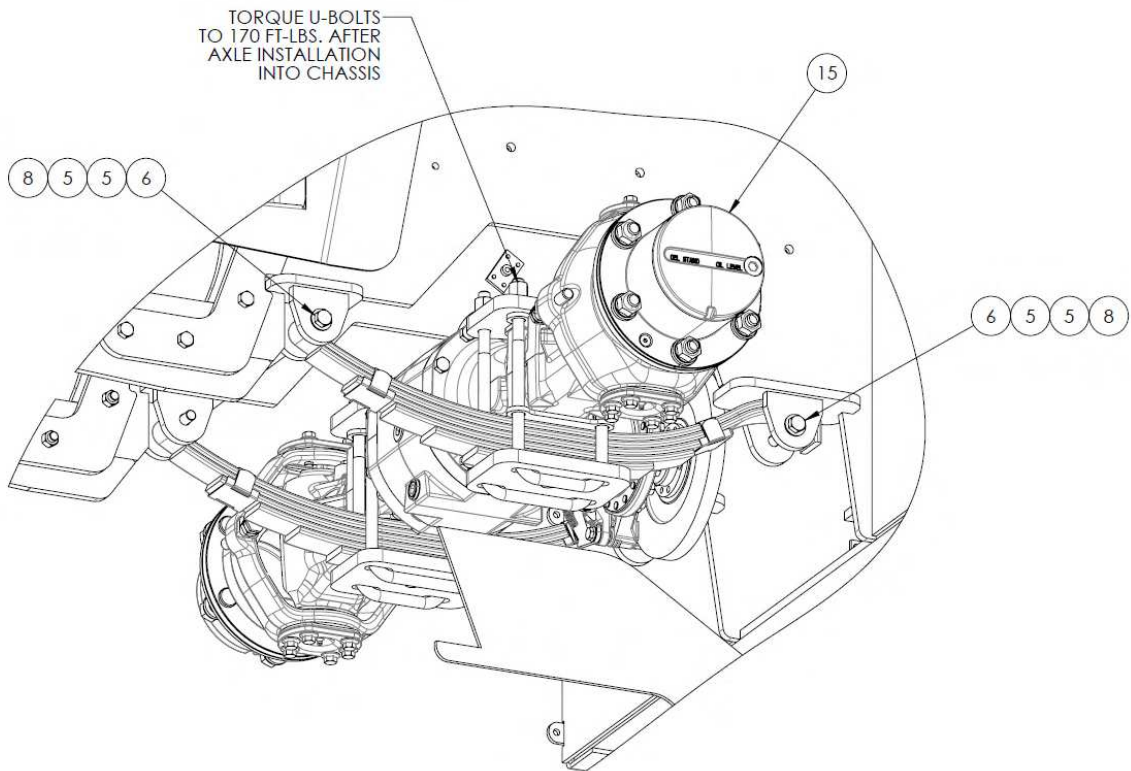
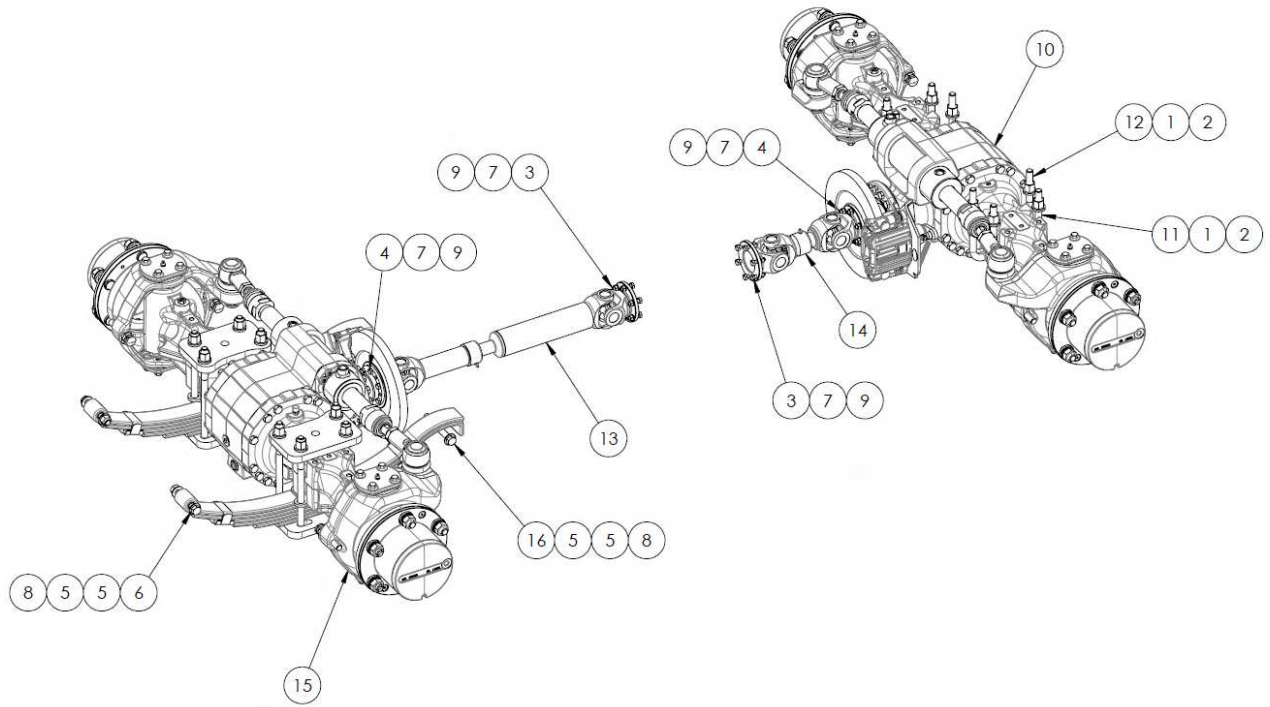


Parts List

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

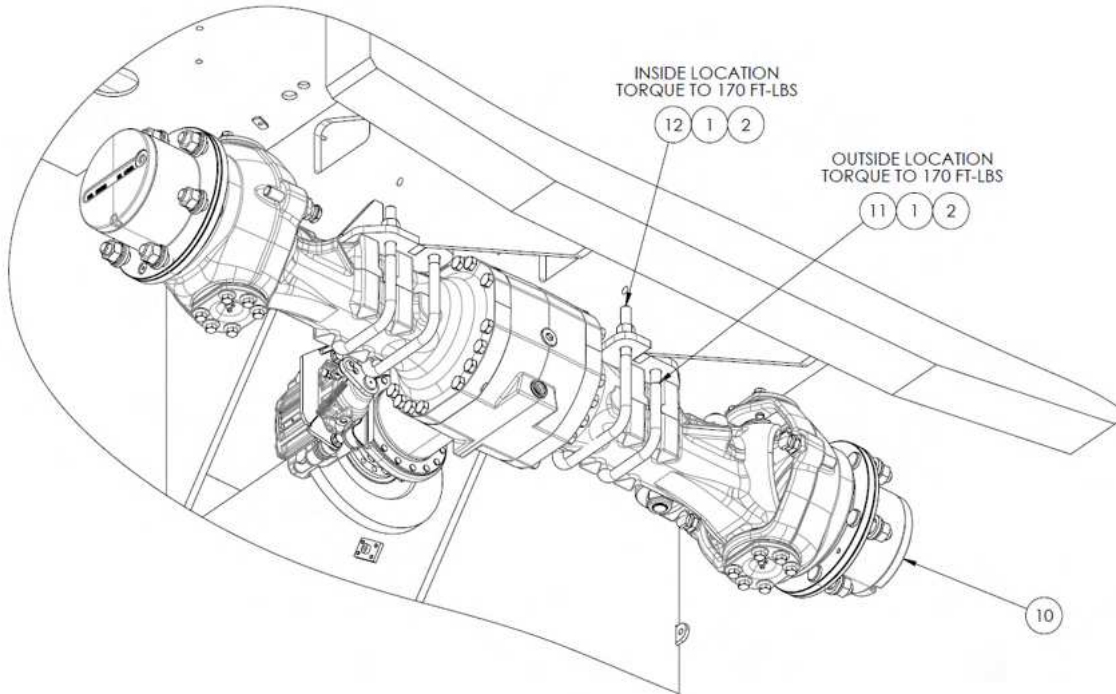
Item	Part Number	Description	Qty
1	A-TT10-00116	LEAF SPRING, TT12	2
2	A-TT4-00365	NUT, AXLE U-BOLT	8
3	A-TT4-00366	WASHER, AXLE U-BOLT	8
4	H-4860	AXLE, FRONT PLANETARY (211)	1
5	H-4879	U-BOLT, FRONT, 10.875" LG	2
6	H-4880	U-BOLT, FRONT, 10.70" LG	2
7	S-4109-00	U-BOLT PLATE	2
8	S-4110-00	U-BOLT PLATE, BOTTOM	2
9	S-4111-00	PLATE, AXLE SPACER	4

9.5 ASSEMBLY, AXLES AND DRIVESHAFTS

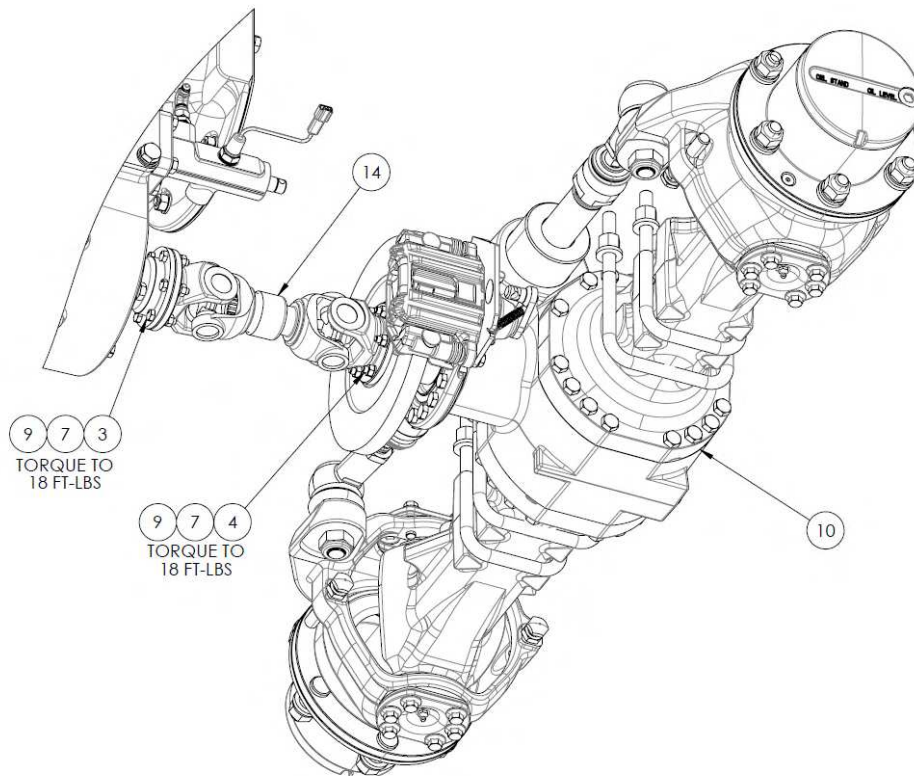


FRONT AXLE INSTALLATION

9.5 ASSEMBLY, AXLES AND DRIVESHAFTS (continued)

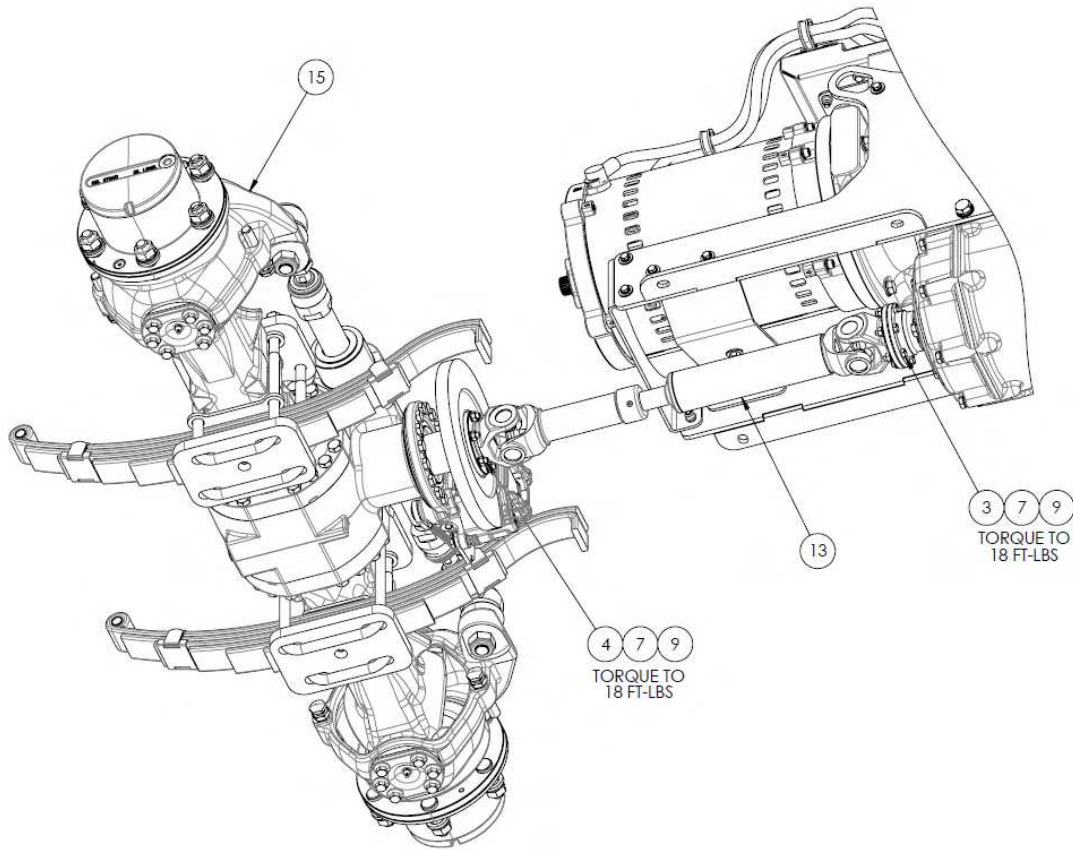


REAR AXLE INSTALLATION



REAR DRIVESHAFT

9.5 ASSEMBLY, AXLES AND DRIVESHAFTS (continued)



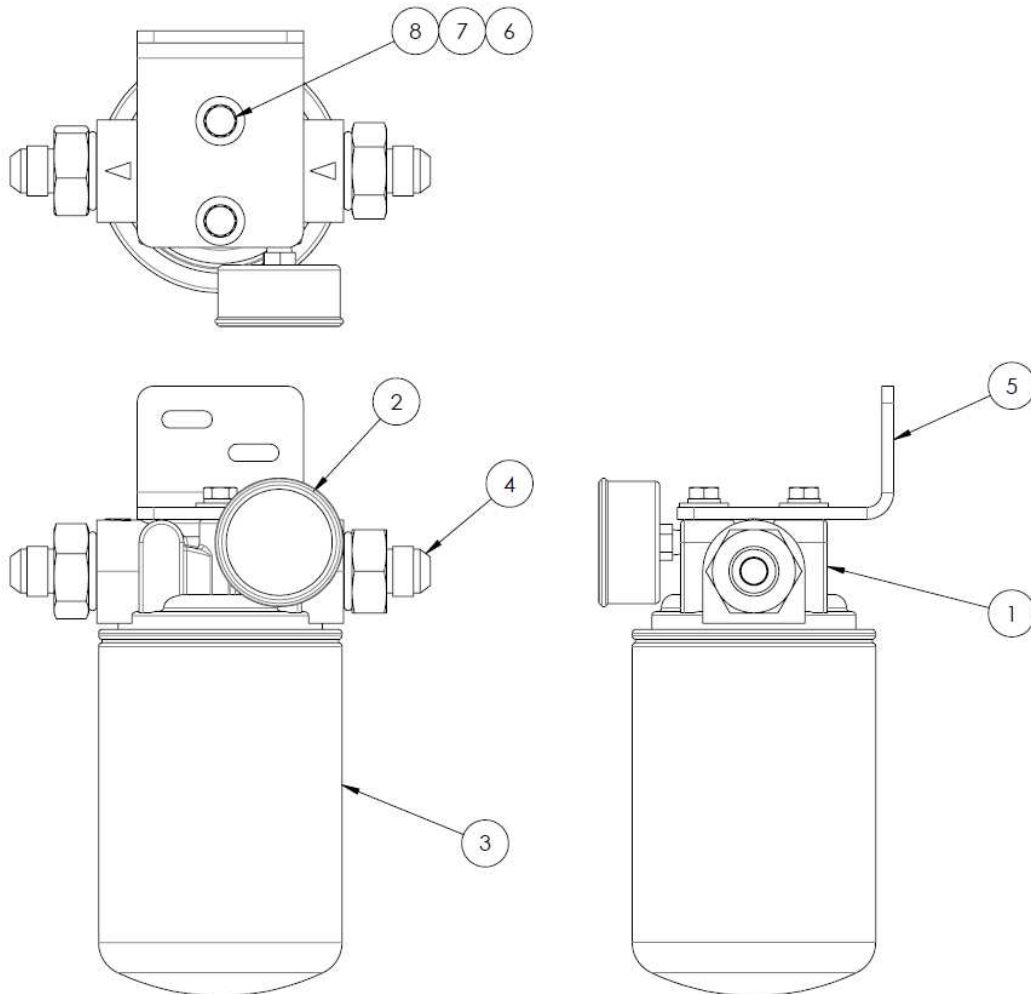
FRONT DRIVESHAFT

Parts List

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

Item	Part Number	Description	Qty
1	A-TT4-00365	NUT, AXLE U-BOLT	8
2	A-TT4-00366	WASHER, AXLE U-BOLT	8
3	G-1114-080030	BOLT M8-1.25 X 30mm LG. CLASS 8.8	12
4	G-1114-080040	BOLT M8-1.25 X 40mm LG. CLASS 8.8	12
5	G-1250-1210N	FLATWASHER, 9/16 NARROW	8
6	G-1420-121540	BOLT, 9/16-18 X 4.0" HEX HD GR 8	4
7	G-1514-M80R	SPLIT LOCK WASHER M8	24
8	G-1727-1210	NUT, 9/16-18 TOP LOCK ZINC	5
9	G-1793-09	NUT, HEX CLASS 8 M8X1.25	24
10	H-4861	AXLE, REAR PLANETARY (211)	1
11	H-4881	U-BOLT, REAR, 7.50" LG	2
12	H-4882	U-BOLT, REAR, 7.875" LG	2
13	H-4909	FRONT DRIVESHAFT	1
14	H-4910	REAR DRIVESHAFT	1
15	Refer above section	ASY, FRONT AXLE	1

10.0 **HYDRAULIC SYSTEM**
10.1 ASSEMBLY, SPIN-ON FILTER

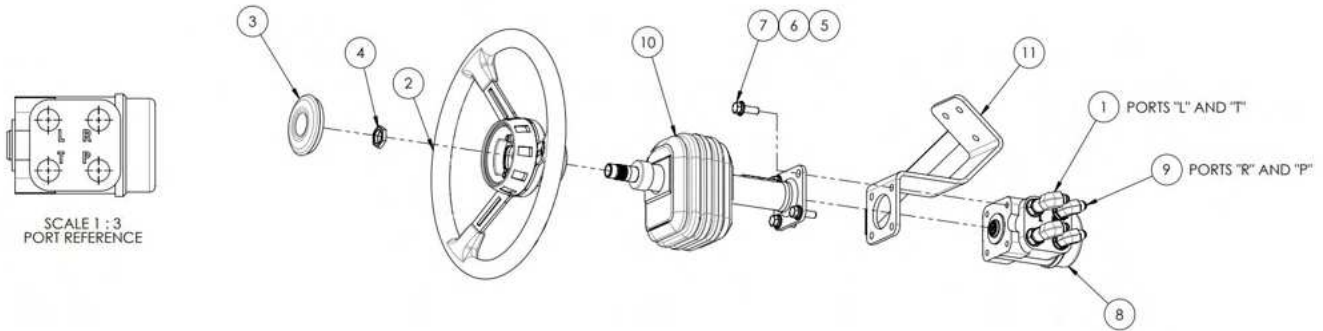


Parts List

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

Item	Part Number	Description	Qty
1	A-ES12-0486	HYD FILTER HEAD	1
2	A-ES12-0487	FILTER PRESSURE INDICATOR	1
3	A-ES12-0485	HYD FILTER, SPIN-ON	1
4	N-2007-14-S-B	CONNECTOR, STR THD	2
5	S-4089-00	BRACKET, FILTER (P)	1
6	G-1250-1050W	FLATWASHER, 1/4 WIDE	2
7	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	2
8	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	2

10.2 ASSEMBLY, STEERING WHEEL

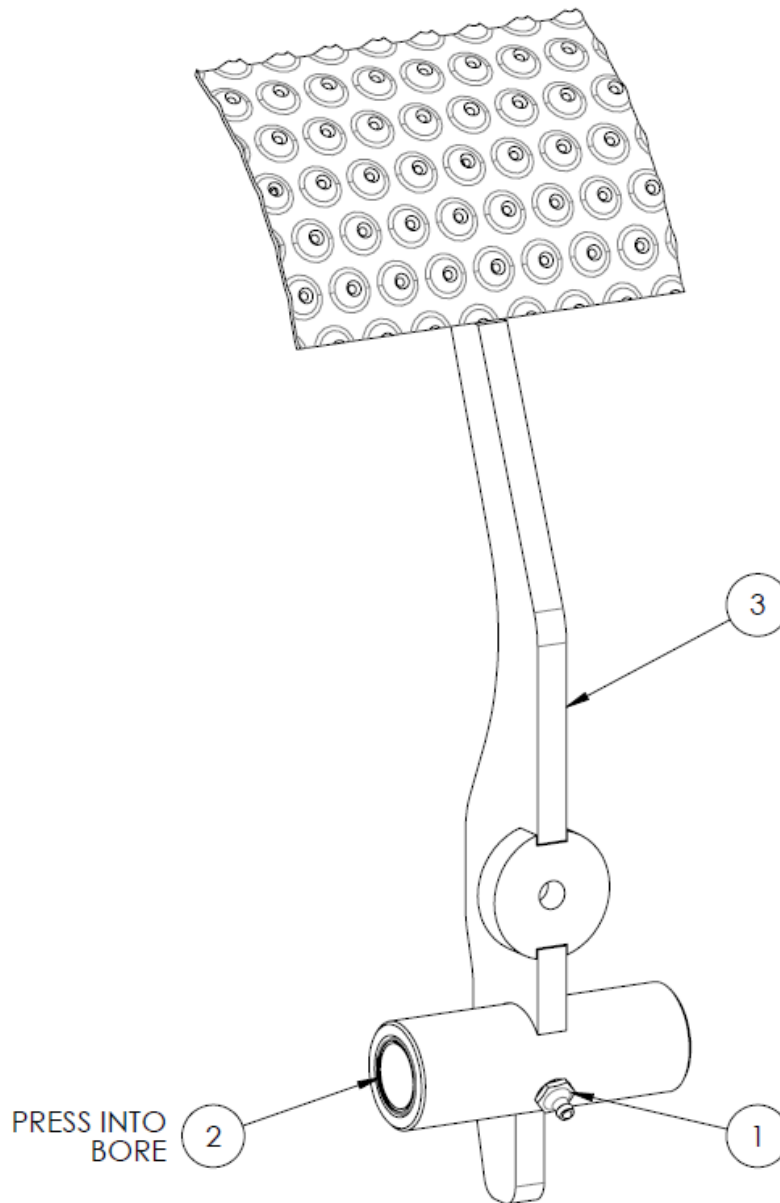


Parts List

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

Item	Part Number	Description	Qty
1	6-8 CC5OX-S	ELBOW LONG, -06 M JIC X -08 M ORB	2
2	A-TN4-00809E	STEERING WHEEL, 14"	1
3	A-TT10-00811	HORN BUTTON	1
4	A-TT10-00813	WHEEL NUT, 13/16-20 UNEF	1
5	G-1250-1070N	FLATWASHER, 3/8 NARROW	4
6	G-1251-1070R	LOCKWASHER, 3/8 REGULAR	4
7	G-1420-107012	BOLT, 3/8-16 X 1.25" HEX HD GR 8	4
8	HC-2789-00	STEERING VALVE (WP)	1
9	N-2001-09-S-B	ELBOW, STRAIGHT THREAD	2
10	XL00-14-019-SA	TILT STEERING COLUMN	1
11	Z-11390-00	WELDMENT, STEERING MOUNT (P)	1

10.3 ASSEMBLY, BRAKE PEDAL

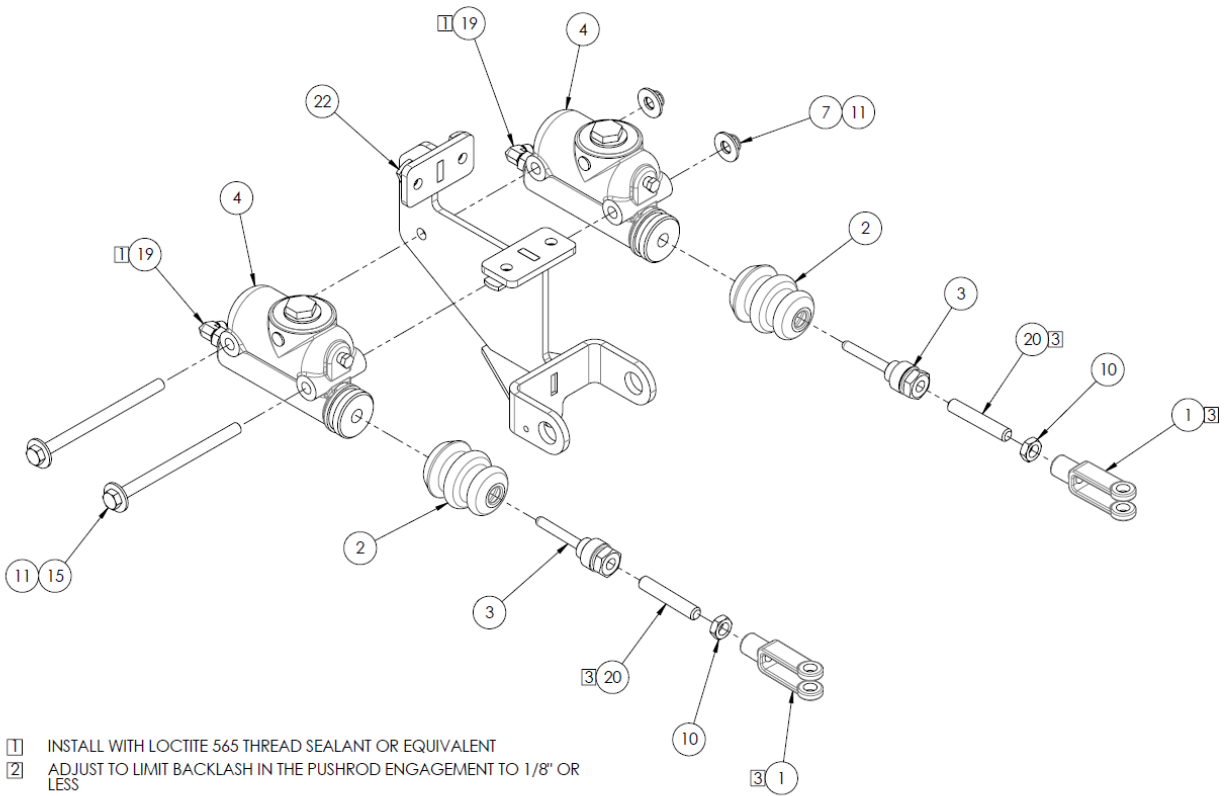


Parts List

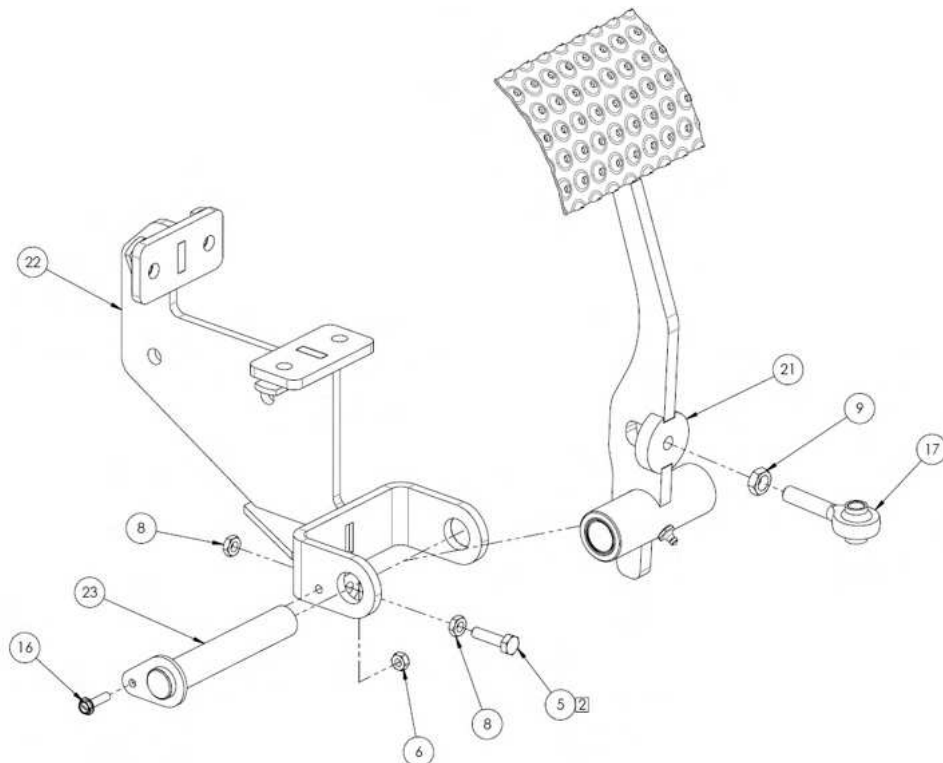
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-RTT50-0328	GREASE ZERK	1
2	C-TT4-10188	NYLINER BEARING	2
3	Z-11785-00	WLD, BRAKE PEDAL (P)	1

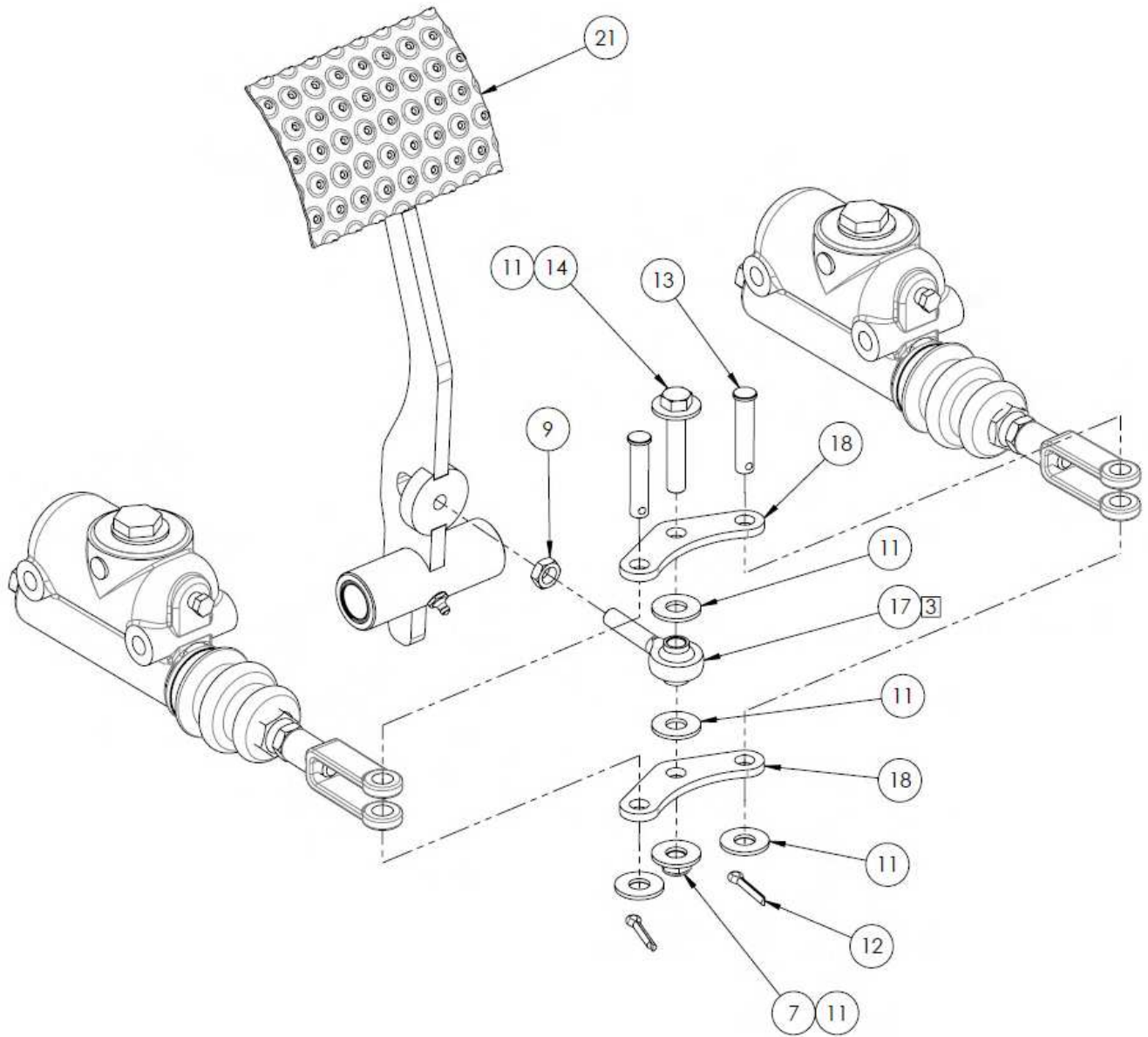
10.4 ASSEMBLY, BRAKE PEDAL SUB-ASSEMBLY



- 1] INSTALL WITH LOCTITE 565 THREAD SEALANT OR EQUIVALENT
- 2] ADJUST TO LIMIT BACKLASH IN THE PUSHROD ENGAGEMENT TO 1/8" OR LESS
- 3] ADJUST PUSHROD AND ROD END THREAD ENGAGEMENT FOR SMOOTH OPERATION AND SUFFICIENT FORWARD TRAVEL ALLOWANCE FOR ALL BRAKING CONDITIONS.



10.4 ASSEMBLY, BRAKE PEDAL SUB-ASSEMBLY (continued)





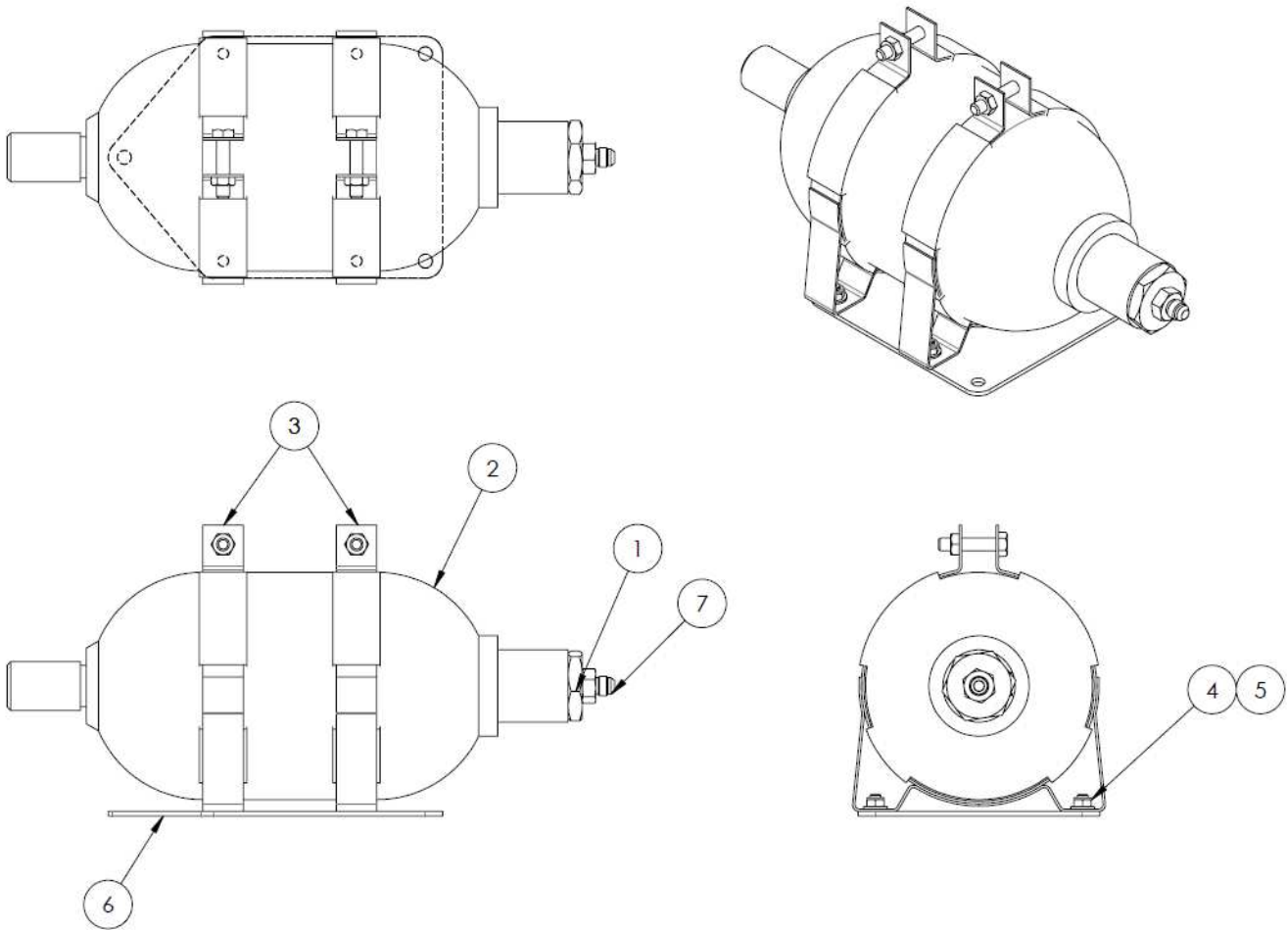
10.4 ASSEMBLY, BRAKE PEDAL SUB-ASSEMBLY (continued)

Parts List

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

Item	Part Number	Description	Qty
1	A-ETT8-0530	BRAKE, PEDAL CLEVIS	2
2	A-TN3E-00159	BRAKE PUSHROD BOOT	2
3	A-TN3E-00160	PUSHROD, MASTER CYLINDER	2
4	A-TN3E-00161	MASTER CYLINDER	2
5	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	1
6	G-1202-1035	STOPNUT, #10-32 ELASTIC	1
7	G-1202-1070	STOPNUT, 3/8-16 ELASTIC	3
8	G-1207-1050	NUT, 1/4-20 JAM	2
9	G-1207-1075	NUT, 3/8-24 JAM	1
10	G-1207-1085	NUT, 7/16-20 JAM	2
11	G-1250-1070W	FLATWASHER, 3/8 WIDE	10
12	G-1301-04	PIN, 5/32 X 1.0" LG. COTTER	2
13	G-1302-30	PIN, 3/8 X 1.50 LG CLEVIS	2
14	G-1420-107020	BOLT, 3/8-16 X 2.0" HEX HD GR 8	1
15	G-1420-107054	BOLT, 3/8-16 X 5.5" HEX HD GR 8	2
16	G-1720-103506	SCR, #10-32X.75 MACH HEX WSH HD	1
17	H-5014-06	ROD END, SUPER SWIVEL 3/8	1
18	J-8191-00	BAR, EQUALIZER (P)	2
19	N-2005-03-S	90° ELBOW, 1/8 M NPT X -04 M JIC	2
20	R-3393	PUSHROD, BRAKE	2
21	Refer above section	ASY, BRAKE PEDAL	1
22	Z-11786-00	WLD, BRAKE MOUNT (P)	1
23	Z-11787-00	WLD, ROTATION PIN (P)	1

10.5 ASSEMBLY, ACCUMULATOR

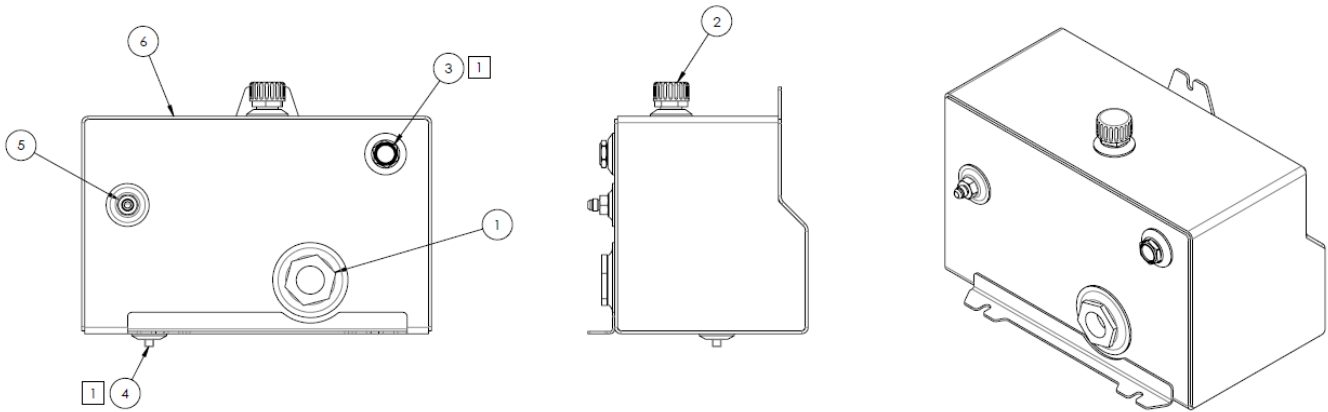


Parts List

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

Item	Part Number	Description	Qty
1	20-8 F5OG5-S	REDUCER, -20 SAE ORB M X -08 SAE ORB F	1
2	A-ETT8-0454-C8	CHARGED ACCUMULATOR, 1 GALLON	1
3	ET08-09-001-CA	BRACKET, ACCUMULATOR	2
4	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	4
5	G-1250-1060N	FLATWASHER, 5/16 NARROW	4
6	J-8217-00	PLATE, ACCUMULATOR MTG (P)	1
7	N-2007-09-S-B	ADAPTER, -06 M JIC X -08 M ORB	1

10.6 ASSEMBLY, HYDRAULIC TANK



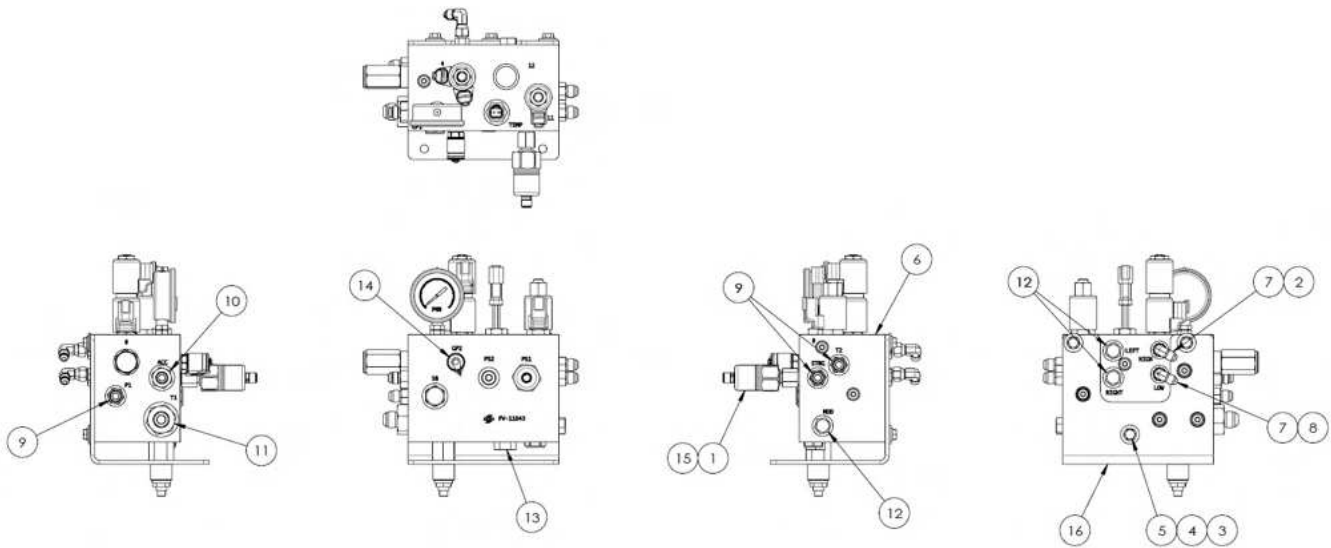
1 INSTALL SPECIFIED FITTINGS WITH LOCTITE 565 PIPE THREAD SEALANT OR EQUIVALENT

Parts List

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

Item	Part Number	Description	Qty
1	A-ES12-0488	HYDRAULIC TANK STRAINER	1
2	A-ES12-0550	HYD FILLER-BREATHER CAP	1
3	A-ES12-0551	HYD SIGHT GAGE	1
4	A-ES12-0552	MAGNETIC DRAIN PLUG, .5 NPT	1
5	N-2007-09-S-B	ADAPTER, -06 M JIC X -08 M ORB	1
6	Z-11878-00	WLD, HYD TANK (P)	1

10.7 ASSEMBLY, MANIFOLD BLOCK

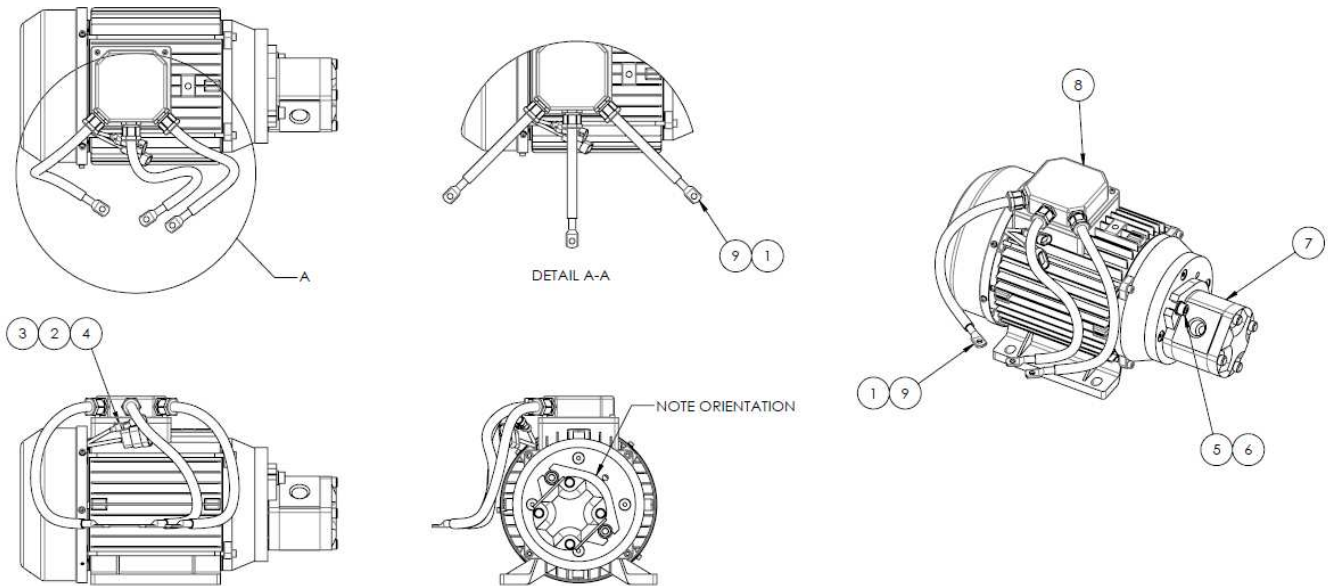


Parts List

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

Item	Part Number	Description	Qty
1	EC-3493-PGM-1	PRESSURE SENSOR, PROGRAMMED (ETT-8X)	1
1	EC-3493-PGM-2	PRESSURE SENSOR, PROGRAMMED (ETT-12X)	1
2	ET00-09-003-CA	ADAPTER, -04 SAE ORB M X -04 JIC M X .031 ORIFICE	1
3	G-1250-1060W	FLATWASHER, 5/16 WIDE	3
4	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	3
5	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	3
6	HC-2983	MANIFOLD BLOCK, 24V	1
7	N-2002-03-S	ELBOW, SWIVEL NUT	2
8	N-2007-03-S-B	CONNECTOR, STR THD	1
9	N-2007-08-S-B	ADAPTER, -06 JIC M X -06 ORB M	3
10	N-2007-09-S-B	ADAPTER, -06 M JIC X -08 M ORB	1
11	N-2007-14-S-B	CONNECTOR, STR THD	1
12	N-2053-05-S-B	PLUG, HEX HD W/ O-RING	3
13	N-2053-06-S-B	PLUG, HEX HD W/O-RING	1
14	N-2544-04	CPLG, QUICK DISCONNECT MB	1
15	N-2846-02	FITTING, ADAPTOR	1
16	S-4084-00	BRACKET, MANIFOLD (P)	1

10.8 ASSEMBLY, PUMP MOTOR (ETT-12X)

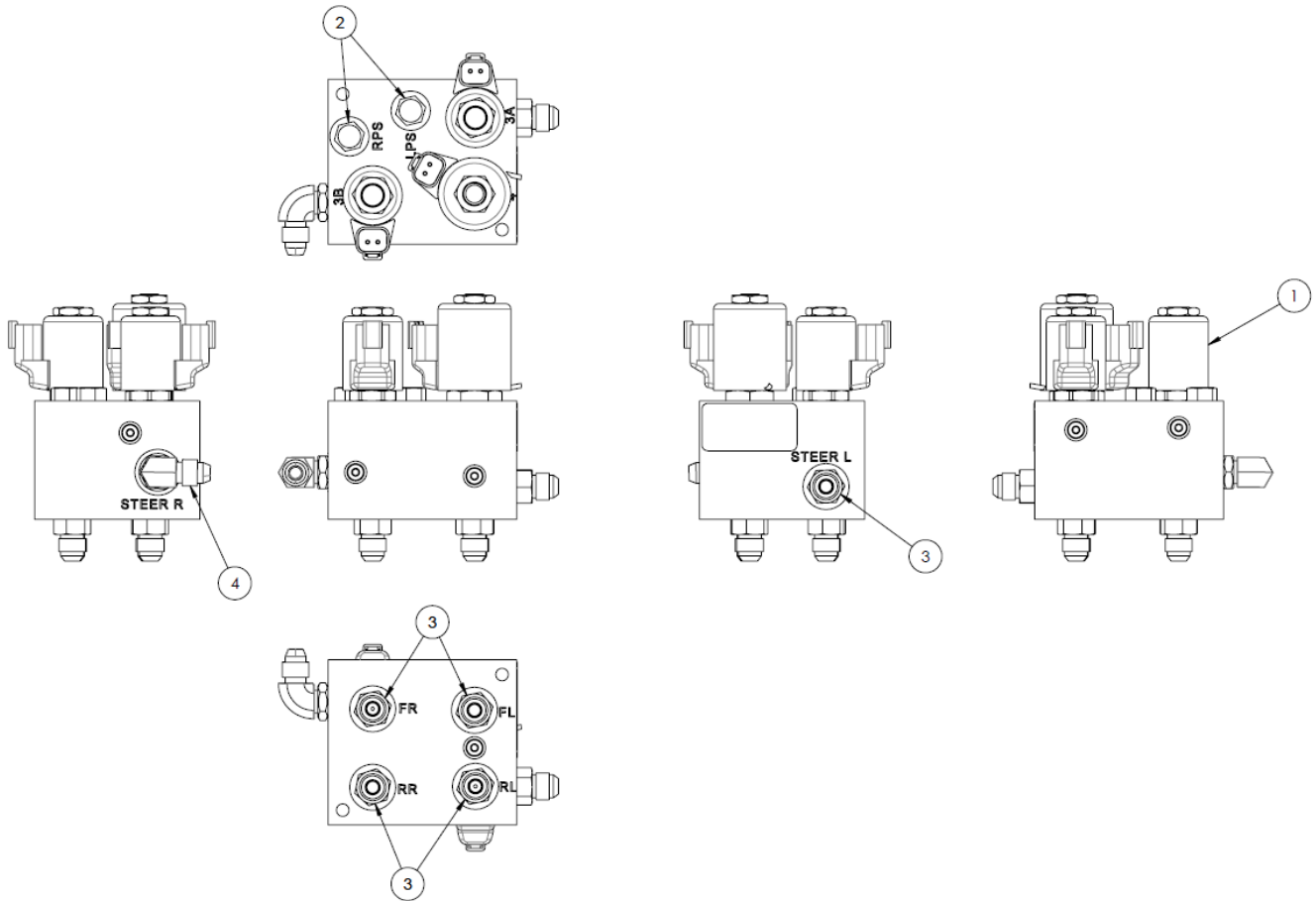


Parts List

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

Item	Part Number	Description	Qty
1	EC-1057-01	TUBING, BLACK 3/4" HEAT SHRINK (NOT SHOWN)	9"
2	EC-3489-01	TERMINAL, AMP SUPERSEAL	2
3	EC-3490-01	WIRE SEAL, AMP SUPERSEAL	2
4	EC-3491	CONNECTOR, AMP SUPERSEAL	1
5	G-1491-108015	SOC HD CAP SCR, M10X1.5 X 30	2
6	G-1515-M100	FLATWASHER, M10	2
7	HC-2973	PUMP, GEAR 9T SAE-A 0.4IN3	1
8	LAVT-09-001-CA	HYDRAULIC PUMP MOTOR	1
9	NVSP-33-001-CB	BATTERY CABLE LUG, 5/16, 1-2 AWG	3

10.9 ASSEMBLY, STEER BLOCK

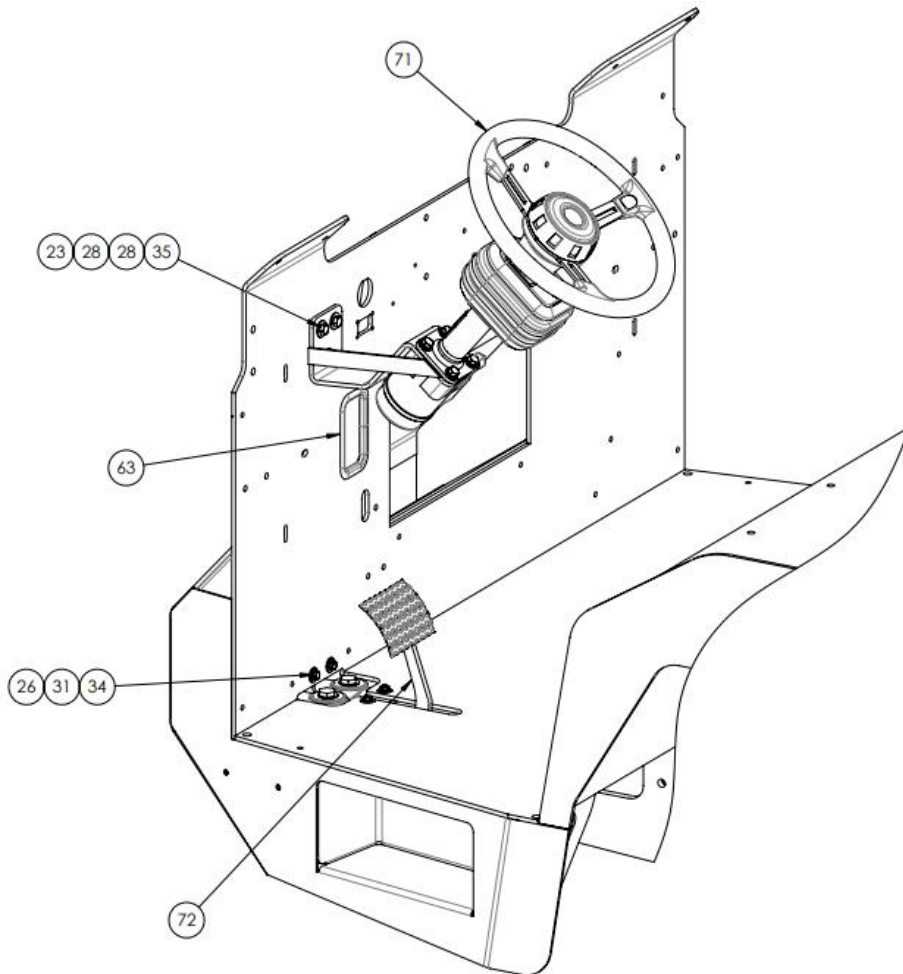
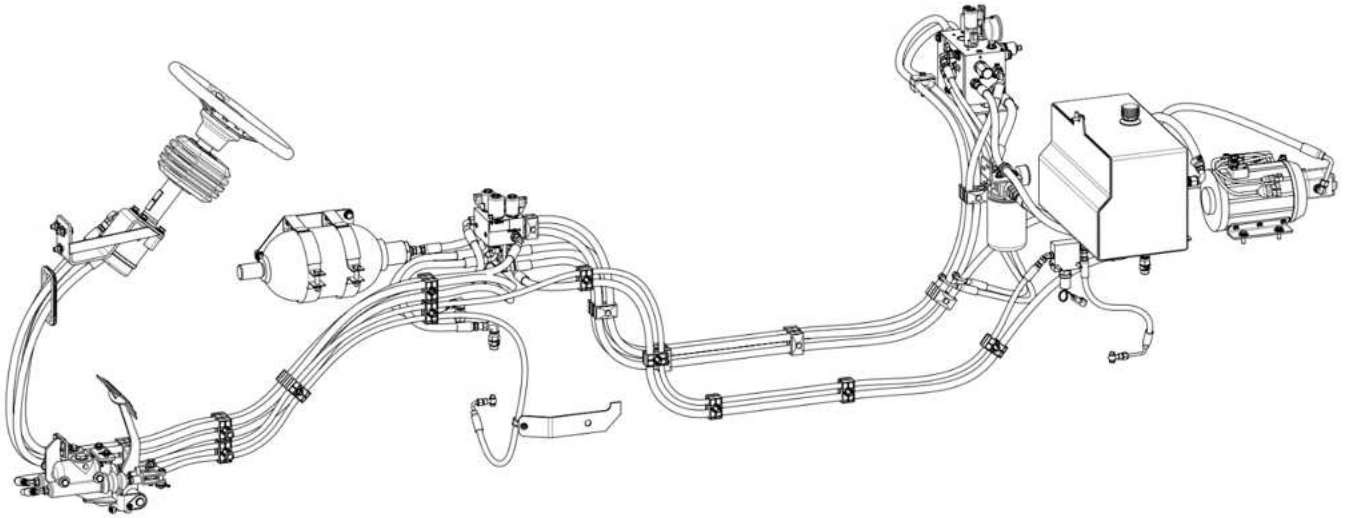


Parts List

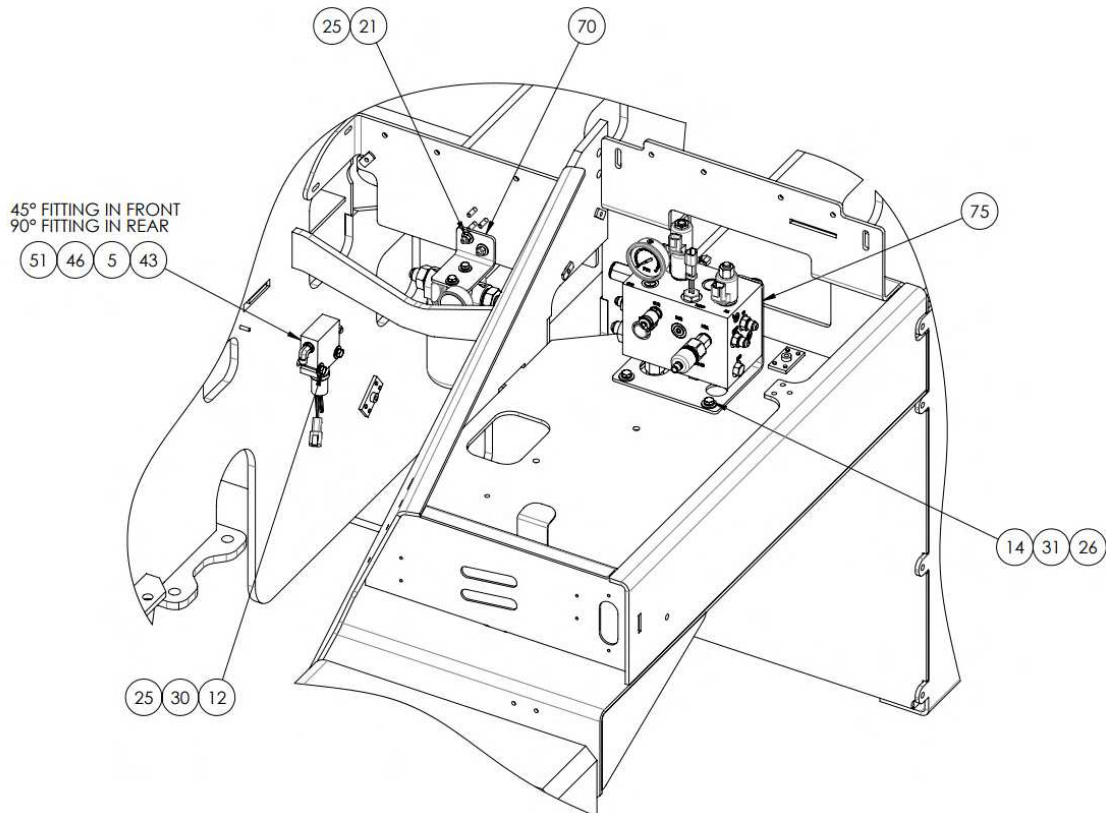
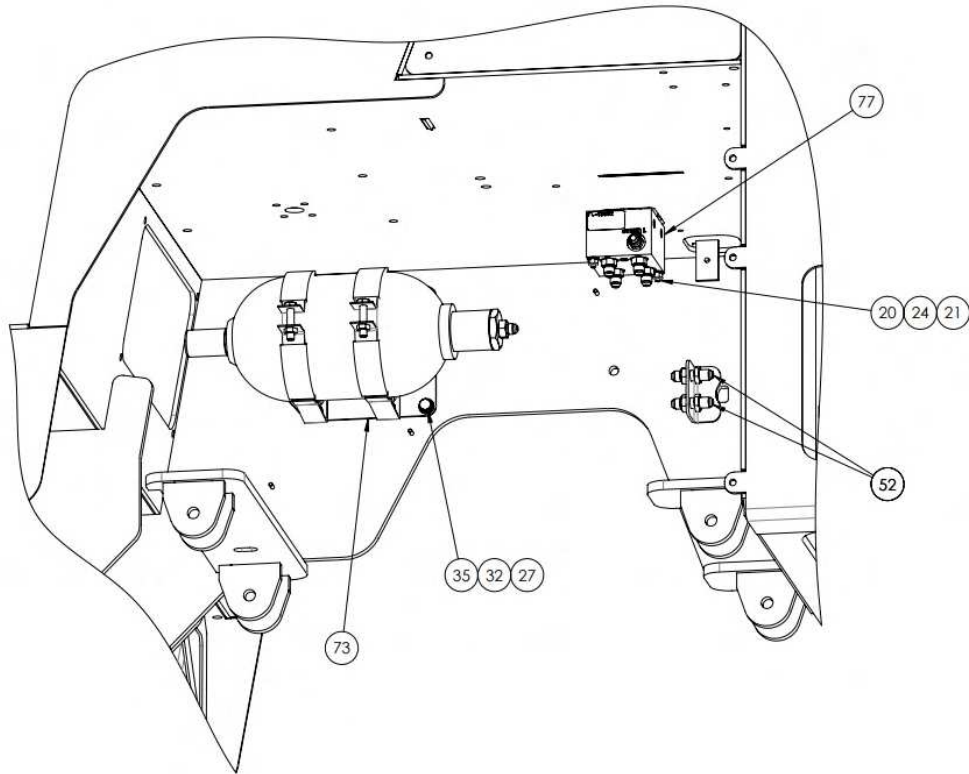
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	HC-2937	STEERING SYNCH VALVE	1
2	N-2053-03-S-B	PLUG, HEX HD W/O-RING	2
3	N-2007-08-S-B	ADAPTER, -06 JIC M X -06 ORB M	5
4	N-2001-08-S-B	ELBOW, STRAIGHT THREAD	1

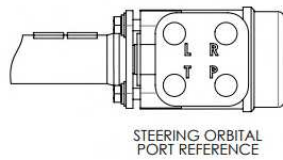
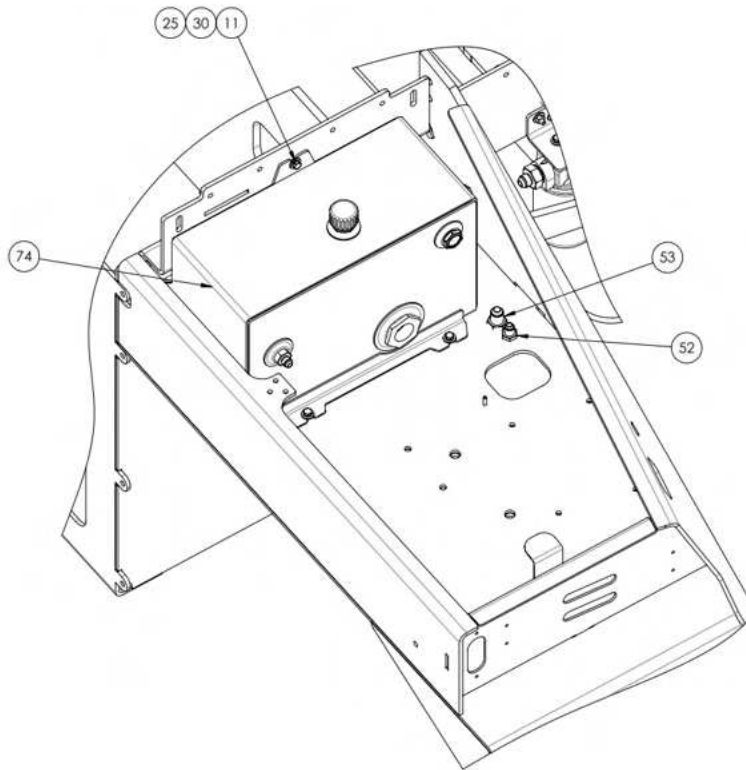
10.10 ASSEMBLY, HYDRAULIC SYSTEM



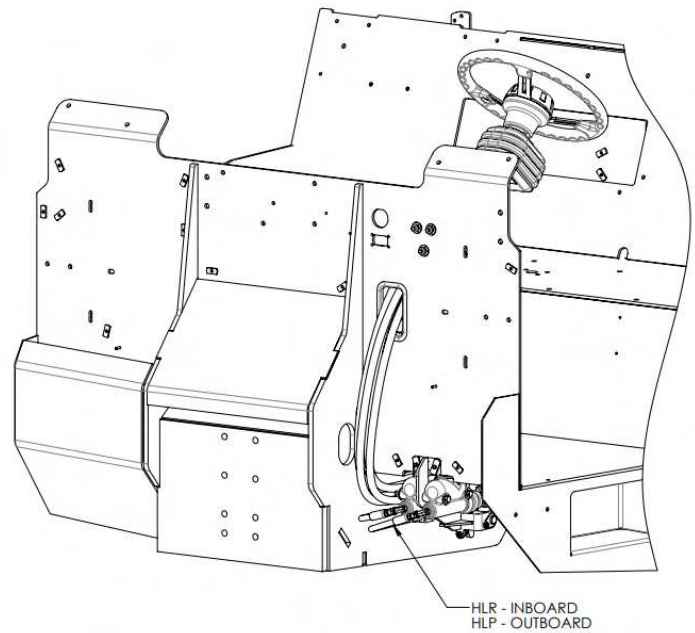
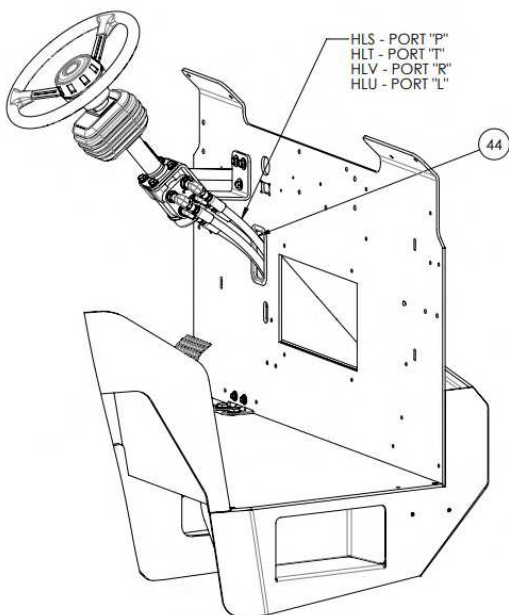
10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)



10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

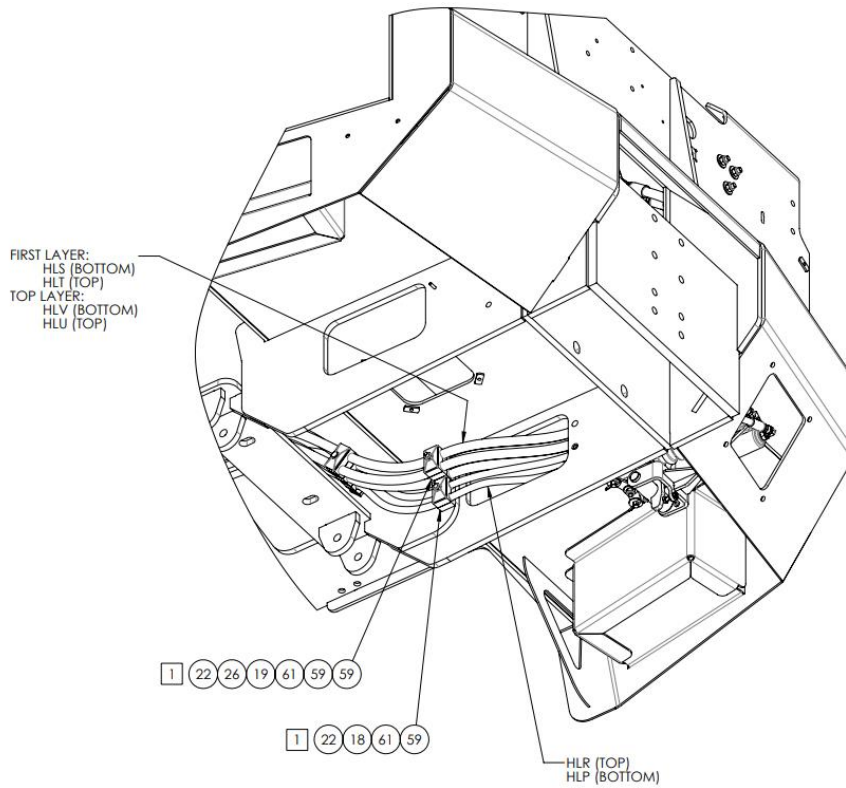
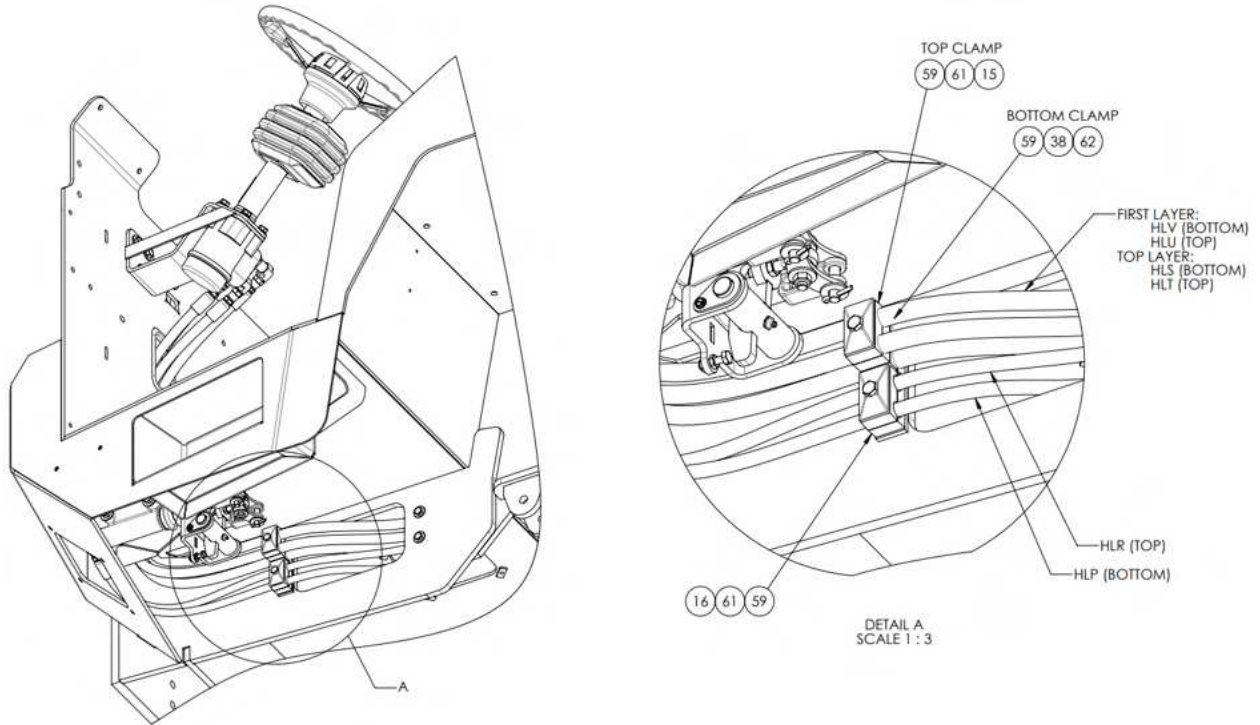


STEERING ORBITAL
PORT REFERENCE



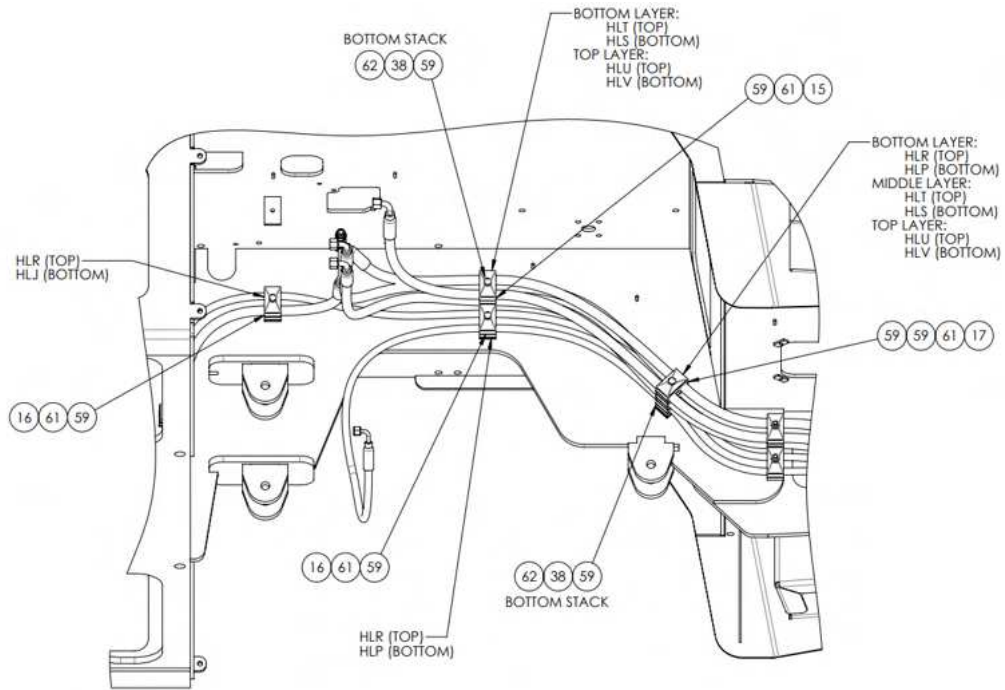
CHASSIS PANEL HIDDEN FOR CLARITY

10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

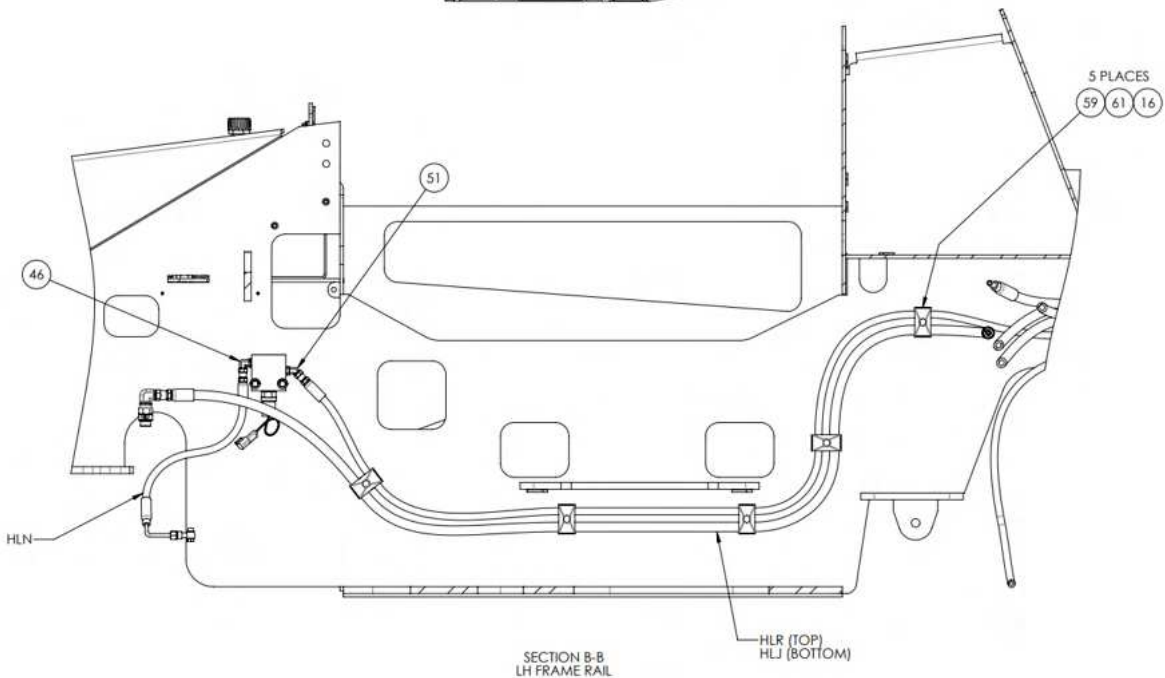
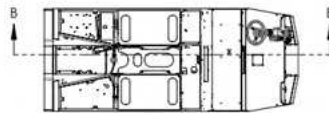


1 NOTE: THESE CLAMPS MUST BE THROUGH BOLTED TO ENABLE HARDWARE ACCESS WITH 12X BALLAST KIT INSTALLED

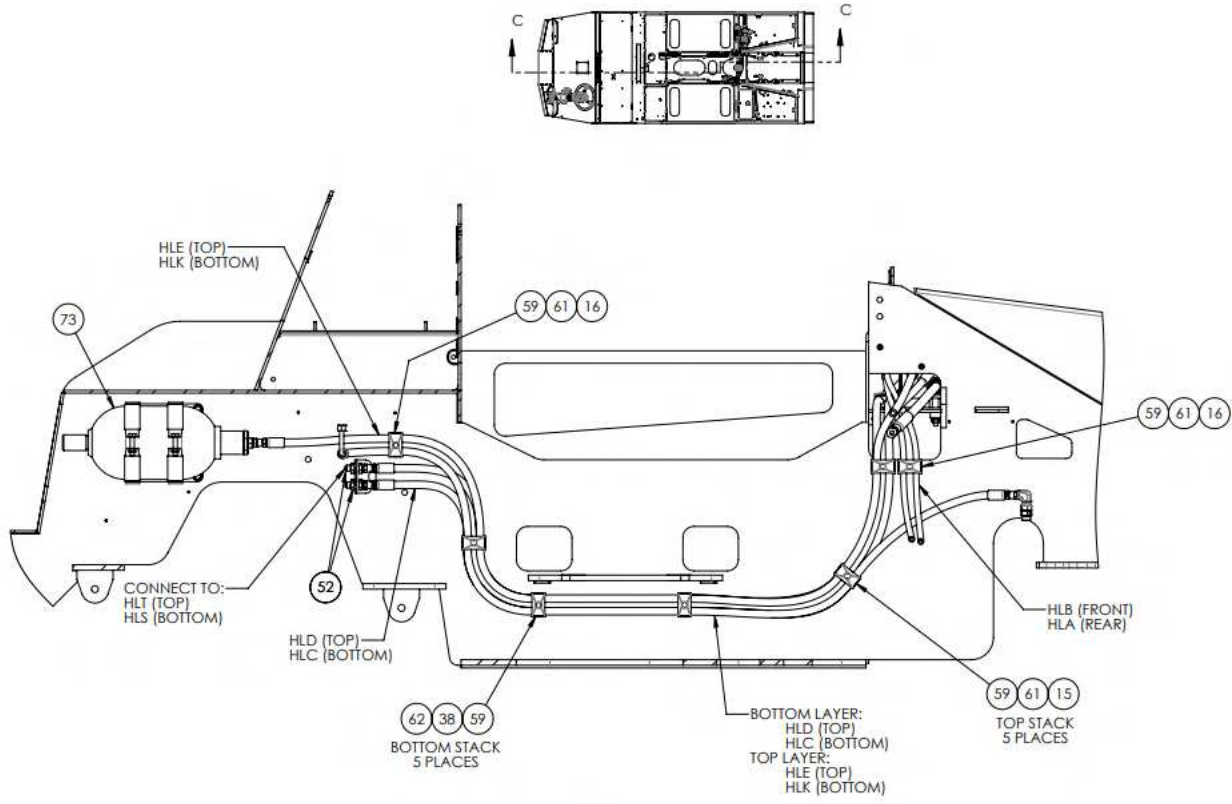
10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)



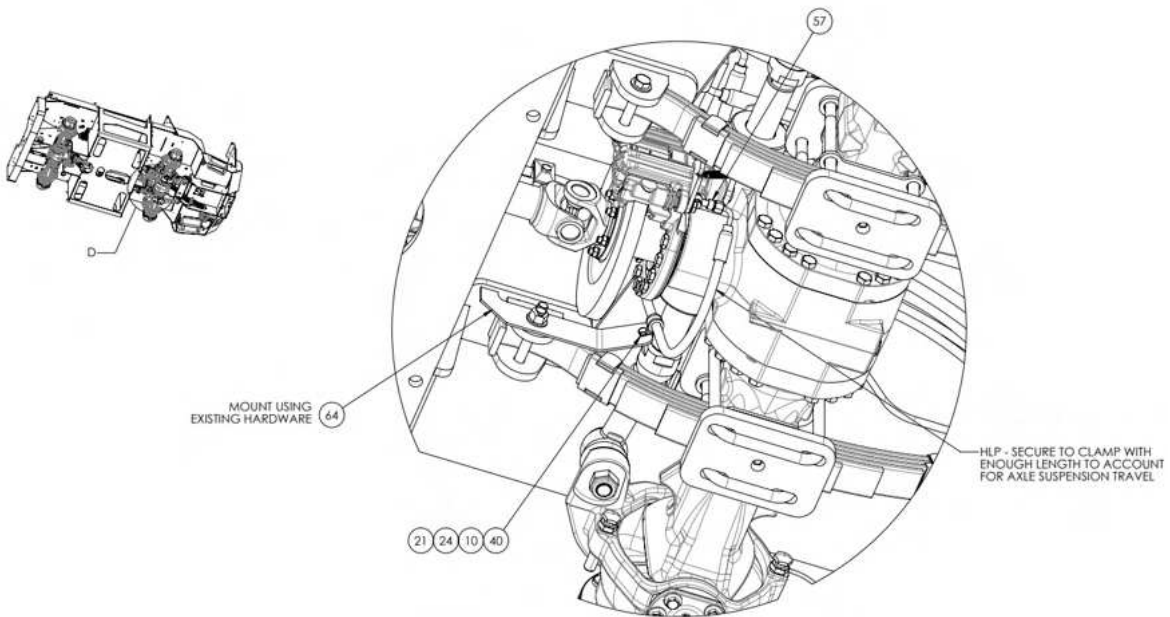
CHASSIS PANELS HIDDEN FOR CLARITY



10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

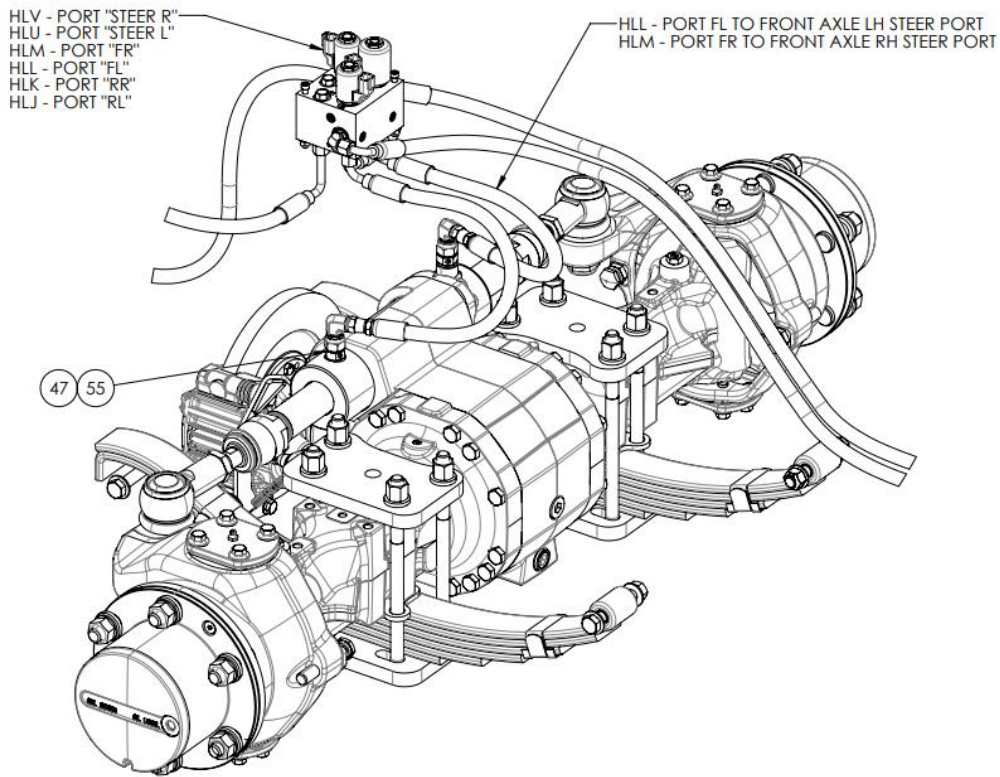


SECTION C-C
RH FRAME RAIL

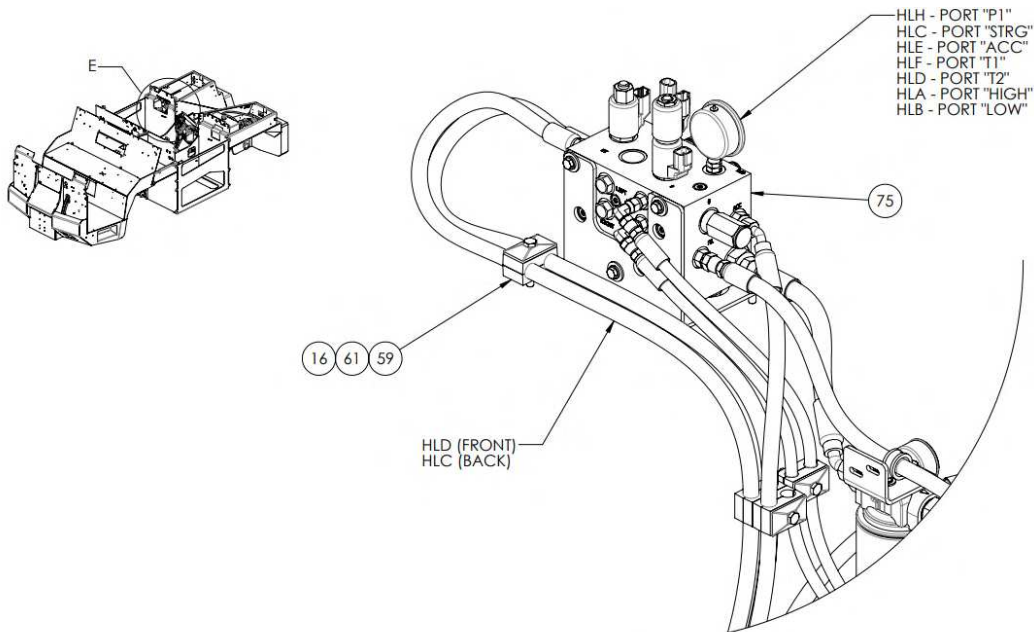


DETAIL D
FRONT AXLE BRAKE CONNECTION

10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

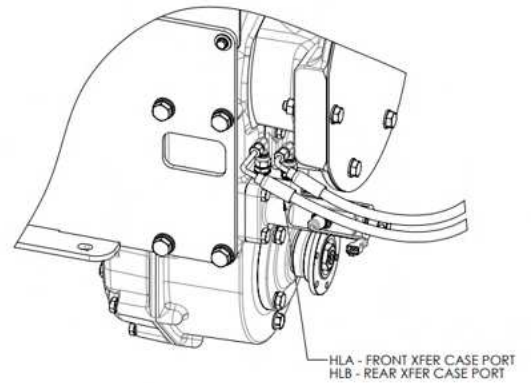
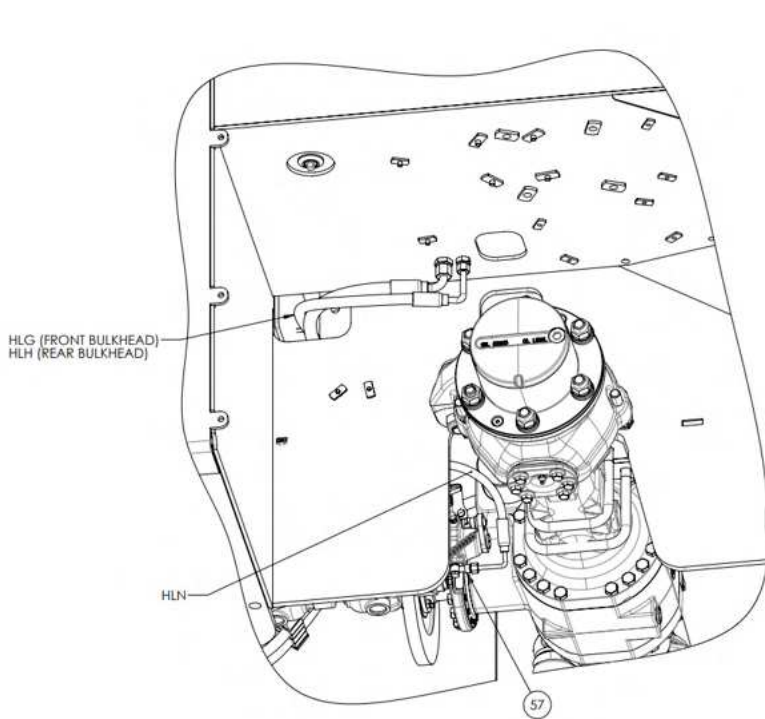
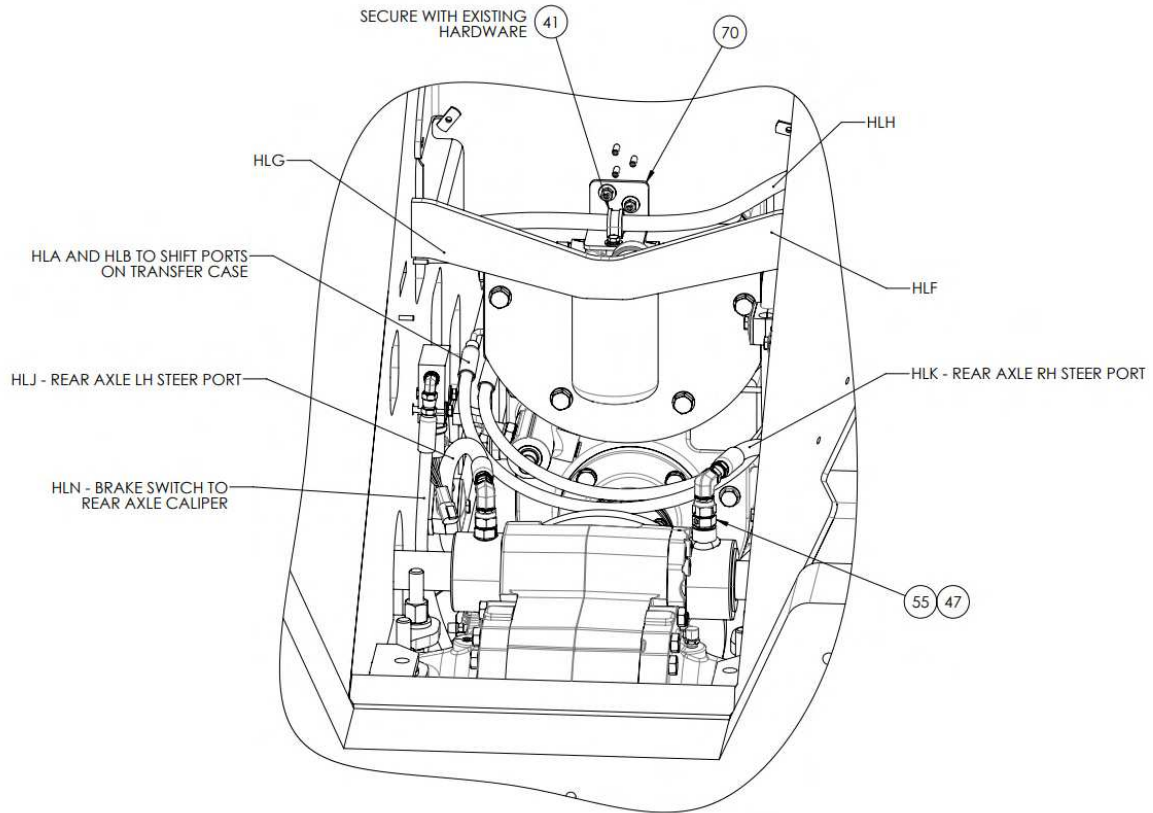


STEER MANIFOLD AND FRONT AXLE STEERING CONNECTIONS



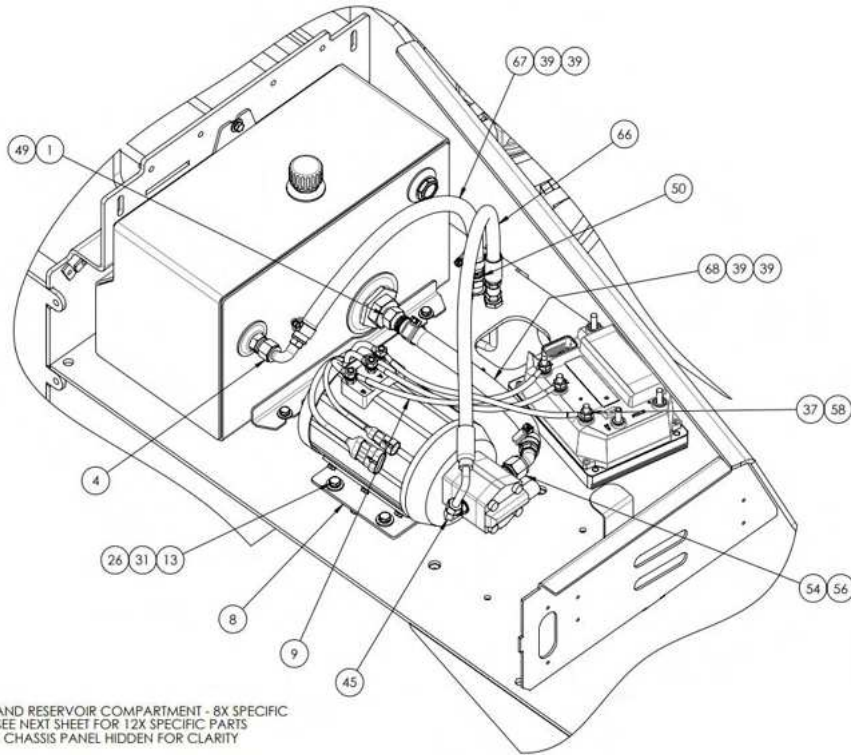
DETAIL E
CHASSIS HIDDEN FOR CLARITY

10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

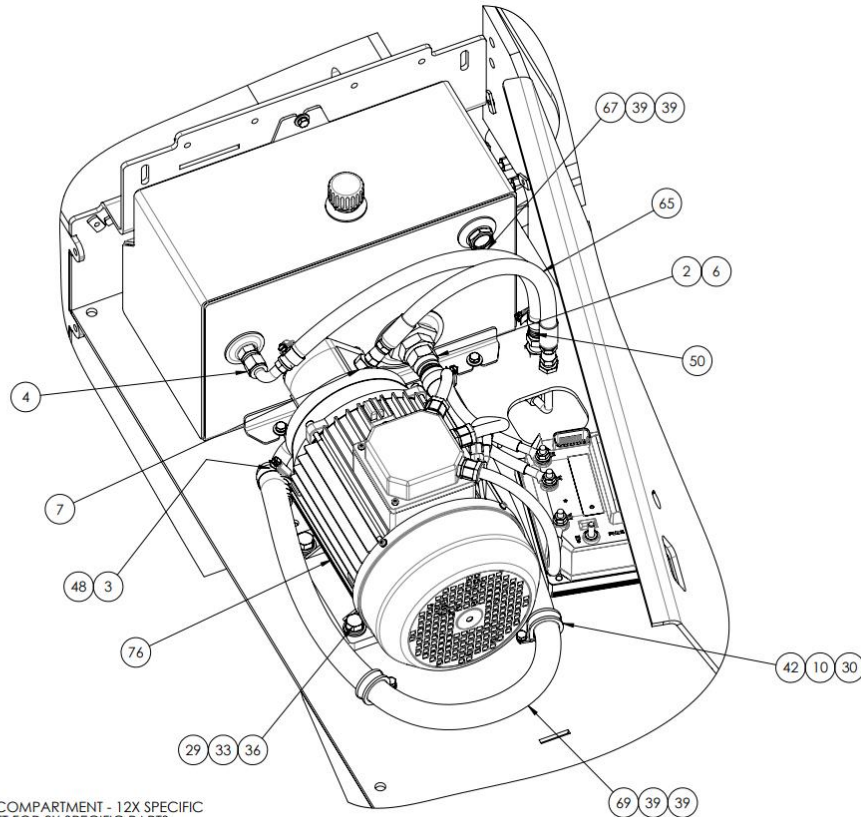


SCALE 1 : 4
TRANSFER CASE CONNECTIONS

10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)



PUMP AND RESERVOIR COMPARTMENT - 8X SPECIFIC
SEE NEXT SHEET FOR 12X SPECIFIC PARTS
CHASSIS PANEL HIDDEN FOR CLARITY



PUMP AND RESERVOIR COMPARTMENT - 12X SPECIFIC
SEE PREVIOUS SHEET FOR 8X SPECIFIC PARTS
CHASSIS PANELS HIDDEN FOR CLARITY



10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

Parts List

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

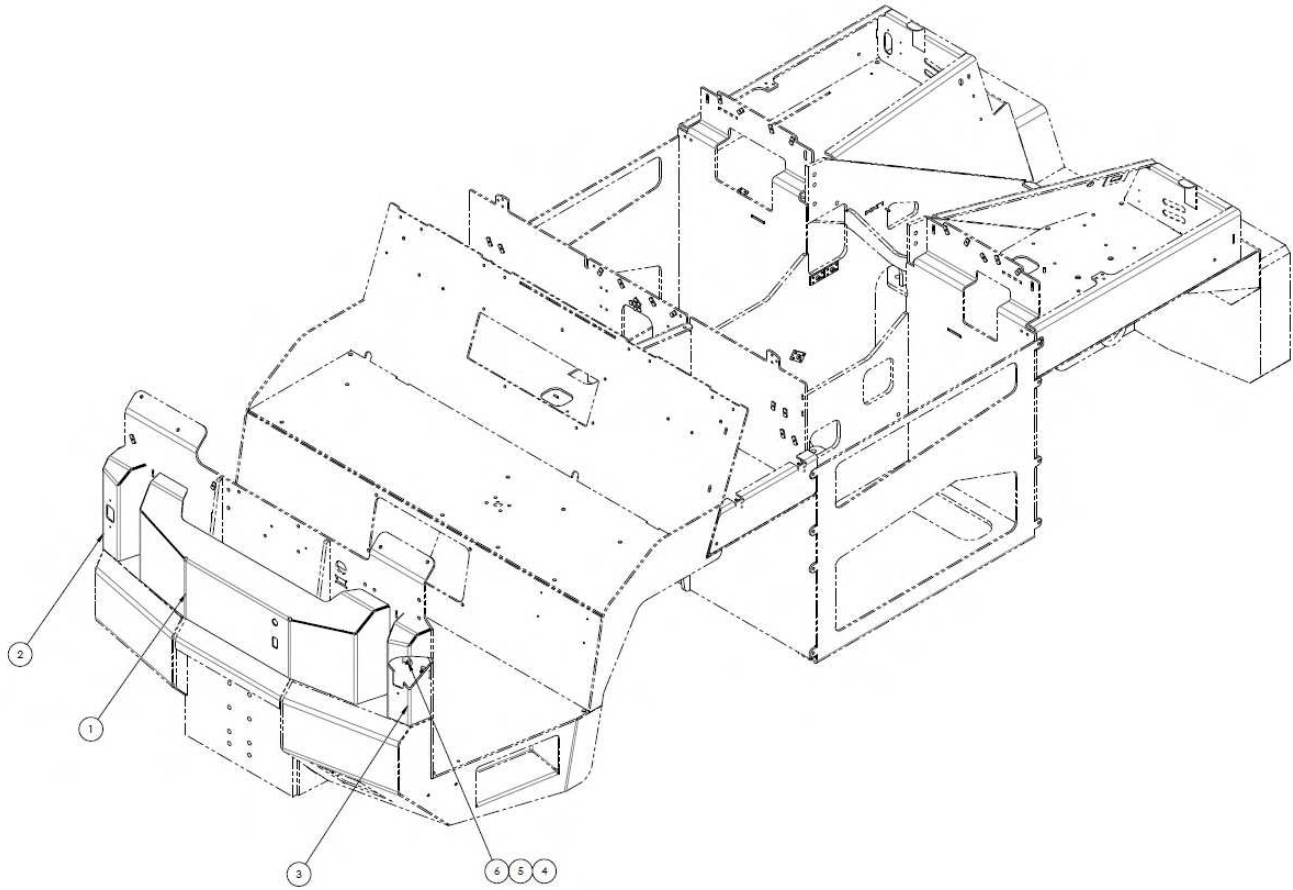
Item	Part Number	Description	Qty
1	30682-10-10	HOSE BARB-10 JIC F-10 BARB	1
2	30682-12-12	HOSE BARB, -12 F JIC X 3/4" BARB	-
3	33982-12-12	90 DEG HOSE BARB 12 JIC	-
4	33982-8-8	HOSE BARB, 90° ELBOW, -08 F JIC X 1/2" BARB	1
5	A-ES12-0468-1	BRAKE PRESSURE SWITCH	1
6	C5315X12X16	ADAPTER, -16 M SAE ORB X -12 M JIC	-
7	C5315X6X10	ADAPTER, -10 M SAE ORB X -06 M JIC	-
8	EC-3108	ASSEMBLY, PUMP/ MOTOR	1
9	EC-3488	BATTERY CABLE KIT, PUMP	1
10	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	1
11	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	3
12	G-1100-105022	BOLT, 1/4-20 X 2-1/4" LG HEX HD GR 5	2
13	G-1100-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 5	4
14	G-1100-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 5	2
15	G-1100-106014	BOLT, 5/16-18 X 1-1/2" LG. HEX HD GR 5	7
16	G-1100-106020	BOLT, 5/16-18 X 2.0" LG. HEX HD GR 5	10
17	G-1100-106024	BOLT, 5/16-18 X 2-1/2" LG. HEX HD GR 5	1
18	G-1100-106030	BOLT, 5/16-18 X 3" HEX HD GR 5	1
19	G-1100-106040	BOLT, 5/16-18 X 4.0" LG. HEX HD GR 5	1
20	G-1151-105036	SCR, 1/4-20 HEX SOC HD CAP	2
21	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	5
22	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	2
23	G-1202-1070	STOPNUT, 3/8-16 ELASTIC	3
24	G-1250-1050N	FLATWASHER, 1/4 NARROW	3
25	G-1250-1050W	FLATWASHER, 1/4 WIDE	7
26	G-1250-1060W	FLATWASHER, 5/16 WIDE	12
27	G-1250-1070N	FLATWASHER, 3/8 NARROW	3
28	G-1250-1070W	FLATWASHER, 3/8 WIDE	6
29	G-1250-1090N	FLATWASHER, 1/2 NARROW	-
30	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	5
31	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	10
32	G-1251-1070R	LOCKWASHER, 3/8 REGULAR	3
33	G-1251-1090R	LOCKWASHER, 1/2 REGULAR	-
34	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	4
35	G-1420-107012	BOLT, 3/8-16 X 1.25" HEX HD GR 8	6
36	G-1420-109014	BOLT, 1/2-13 X 1-1/2" HEX HD GR 8	-
37	G-1793-09	NUT, HEX CLASS 8 M8X1.25	3
38	G-1871-03	STACKING BOLT, HYD CLAMP	8
39	H-1426-04	CLAMP, HOSE, SAE -12	6
40	H-3521-04	CLAMP, CUSHIONED LOOP 9/16"	1



10.10 ASSEMBLY, HYDRAULIC SYSTEM (continued)

Item	Part Number	Description	Qty
41	H-3521-09	CLAMP, CUSHIONED LOOP 7/8"	1
42	H-3521-15	CLAMP, CUSHIONED LOOP 1 1/4"	-
43	HC-2939	3 WAY VALVE BLOCK #4	1
44	K-5577	KIT, HYDR. HOSES ETTX	1
45	MC5515X6X14	ELBOW 90°, M14X1.5 M METRIC ORB X -06 M JIC	1
46	N-2001-03-S-B	ELBOW, STRAIGHT THREAD	1
47	N-2002-15-S	ELBOW 90°, -08 F JIC X -06 M JIC	4
48	N-2007-18-S-B	ADAPTER, -12 SAE ORB M X -12 JIC M	-
49	N-2007-45-S-B	ADAPTER, -16 M SAE ORB X -10 M JIC	1
50	N-2026-05-S	HOSE BARB, -08 JIC M X 1/2" BARB	1
51	N-2042-03-S-B	ELBOW 45°, -04 M SAE ORB X -04 M JIC	1
52	N-2061-03-S	BULKHEAD, -06 M JIC X -06 M JIC W/ NUT	3
53	N-2061-04-S	BULKHEAD, -08 M JIC X -08 M JIC, W/NUT	1
54	N-2747-10-S	HOSE BARB, 45° ELBOW, -10 M JIC X 5/8"	1
55	N-3054-08M18-SB	ADAPTOR, METRIC	4
56	N-3054-10M18-SB	ADAPTER, M18X1.5 M METRIC ORB X -10 M JIC	1
57	N-3181	BANJO ADAPTER, M10X1.0 M METRIC ORB X -06 M JIC	2
58	NVSP-21-016-CB	M8 BELLEVILLE LOCK WASHER	3
59	NVSP-24-015-CF	HYD CLAMP - DUAL 15MM SMOOTH	7
59	NVSP-24-015-CG	HYD CLAMP - DUAL 16MM SMOOTH	23
61	NVSP-24-017-CC	HYD CLAMP - COVER PLATE	20
62	NVSP-24-018-CB	HYD CLAMP - SAFETY PLATE	8
63	NVSP-24-042-CB	METAL CORE EDGE TRIM	14
64	S-4350-00	BRACKET, BRAKE HOSE (P)	1
65	TF-1038-04-17.5	HYDRAULIC HOSE ASSEMBLY	-
66	TF-1038-18-26.5	HYDRAULIC HOSE ASSEMBLY	1
67	TF-1105-08	PUSH-LOK HOSE, 1/2" ID	20
68	TF-1105-10	PUSH-LOK HOSE, 5/8 ID	12
69	TF-1143-12	SUCTION HOSE, 3/4" ID	-
70	Refer above section	ASY, SPIN-ON FILTER	1
71	Refer above section	ASY, STEERING WHEEL	1
72	Refer above section	ASY, BRAKE PEDAL SUBASSEMBLY	1
73	Refer above section	ASY, ACCUMULATOR	1
74	Refer above section	ASY, HYDRAULIC TANK	1
75	Refer above section	ASY, MANIFOLD BLOCK	1
76	Refer above section	ASY, PUMP MOTOR	-
77	Refer above section	ASY, STEER BLOCK	1

11.0 CHASSIS
11.1 ASSEMBLY, FRONT GRILLE

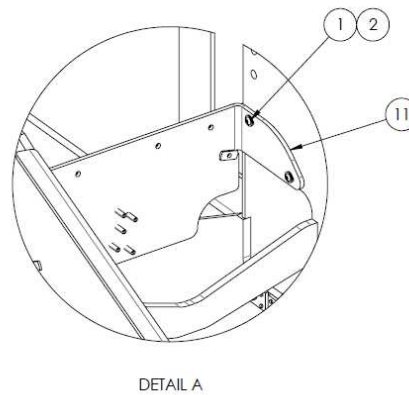
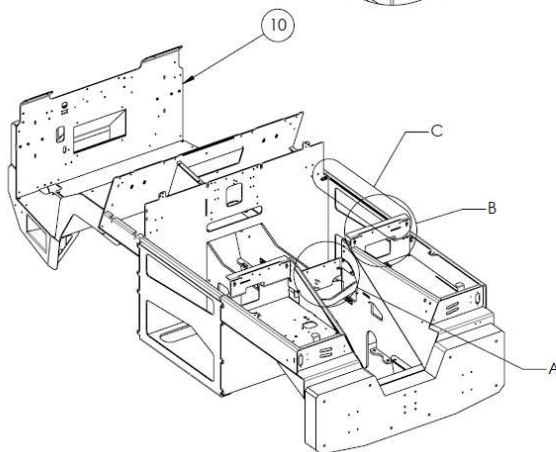
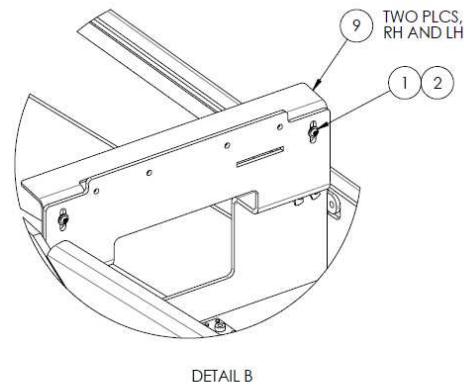
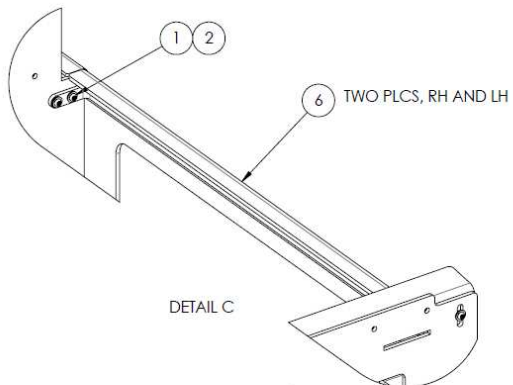
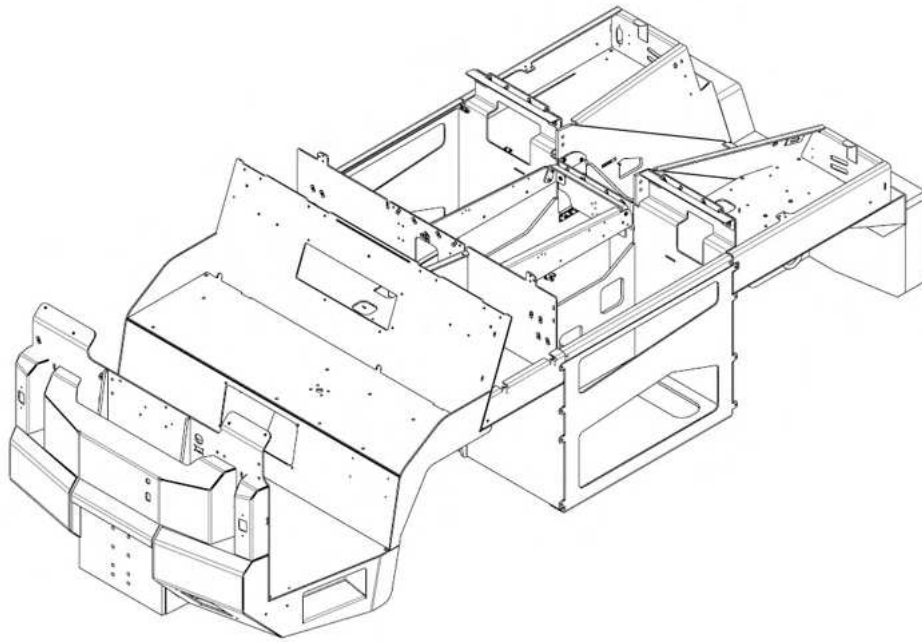


Parts List

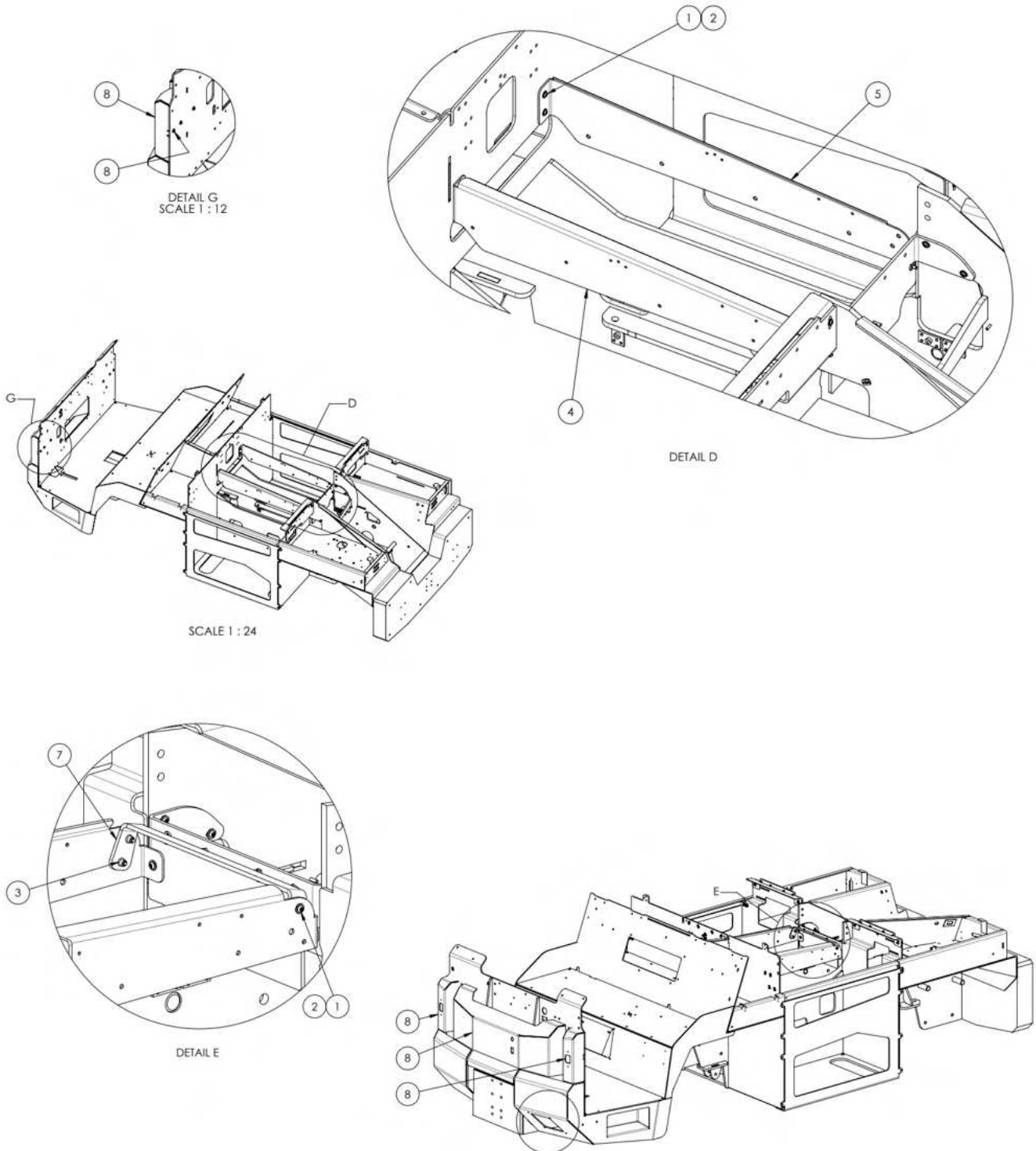
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	S-4154-00	GRILLE, CENTER (WP)	1
2	S-4155-00	GRILLE, RH (WP)	1
3	S-4156-00	GRILLE, LH (WP)	1
4	326-009	BHCS, 1/4-20 x 1" LG	6
5	G-1250-1050N	FLATWASHER, 1/4 NARROW	6
6	G-1439-1050-S	NUTSERT, THIN WALL 1/4-20	6

11.2 ASSEMBLY, CHASSIS SUB



11.2 ASSEMBLY, CHASSIS SUB (continued)





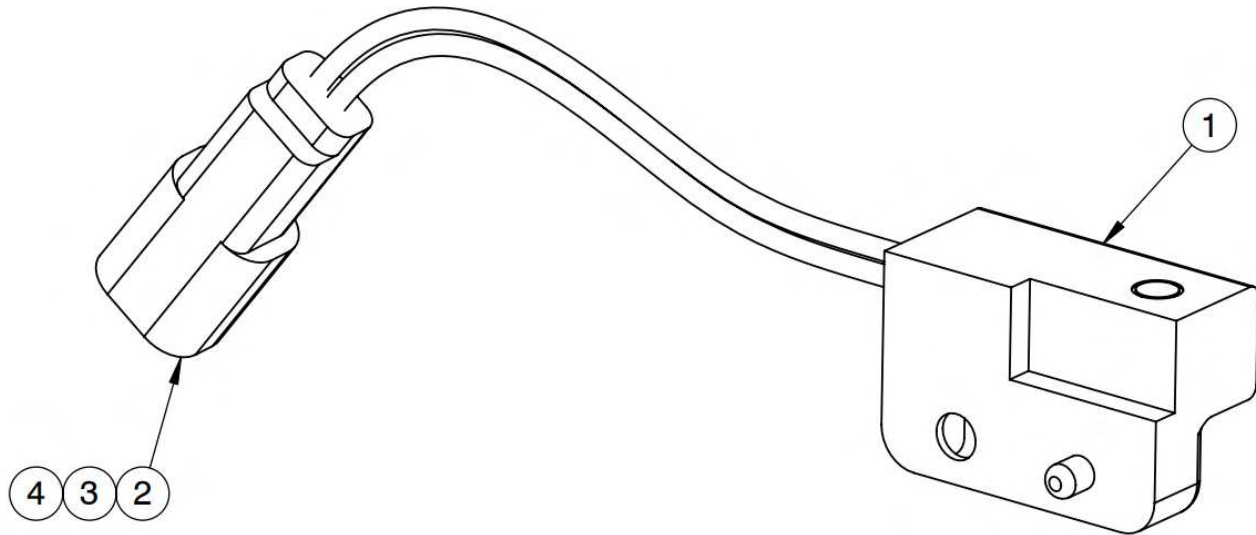
11.2 ASSEMBLY, CHASSIS SUB (continued)

Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	25
2	G-1250-1050N	FLATWASHER, 1/4 NARROW	25
3	G-1440-1050-S	NUTSERT, THICK WALL 1/4-20	3
4	J-7896-00	INSIDE BULKHEAD, LH (WP)	1
5	J-7897-00	BATTERY BULKHEAD, RH (WP)	1
6	J-8037-00	BATTERY TRIM (WP)	2
7	J-8260-00	MIDDLE DOOR STRIKE PLATE (WP)	1
8	Refer above section	ASSY, FRONT GRILLE	1
9	Z-11538-00	WLD, BATTERY DOOR STRIKE PLATE (WP)	2
10	Z-11794-00	WLD, VEHICLE CHASSIS (WP)	1
11	Z-11875-00	WLD, FILTER MOUNT PLATE (P)	1

- 12.0 OPERATOR COMPARTMENT
- 12.1 PRX SENSOR BUZZLITE W CONNECT

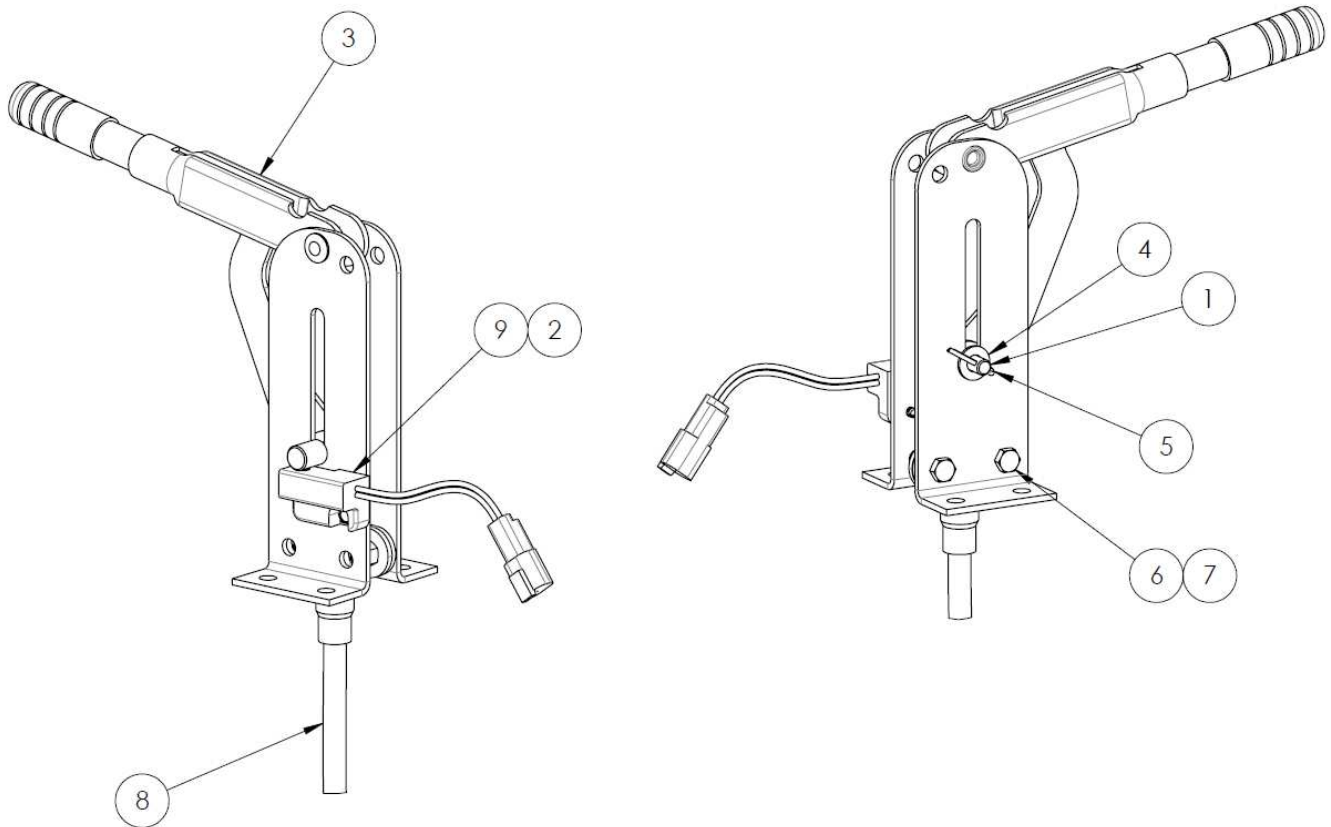


Parts List

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

Item	Part Number	Description	Qty
1	82050000	PROXIMITY SENSOR BUZZLITE	1
2	DT04-2P	DEUTSCH CONNECTOR	1
3	W2P	DEUTSCH LOCK	1
4	0460-215-16141	DEUTSCH TERMINAL	2

12.2 ASSEMBLY, PARKING BRAKE CABLE

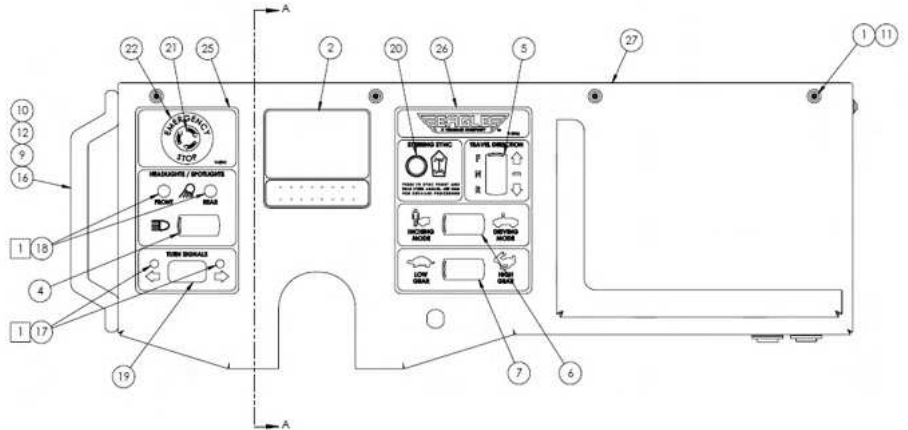
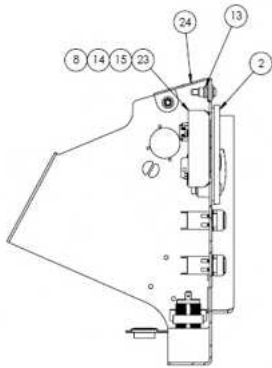


Parts List

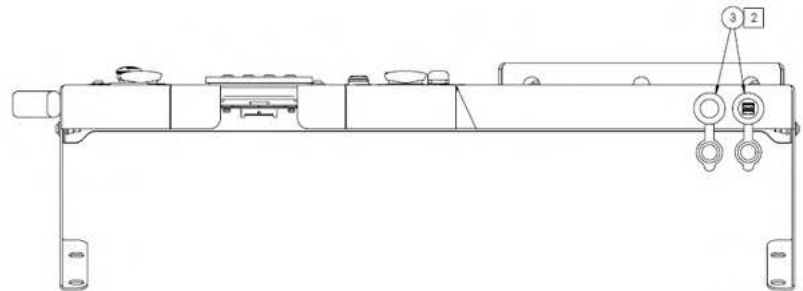
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	81008429	BUZZLITE PRK BRAKE CONTACT PIN	1
2	82066700	MOUNTING SCREW BUZZLITE	1
3	A-TT4-00141	BRAKE LEVER-HAND	1
4	G-1250-1060N	FLATWASHER, 5/16 NARROW	1
5	G-1301-01	PIN, 3/32 X 1 LG COTTER	1
6	G-1420-106006	BOLT, 5/16-18 X 3/4" LG. HEX HD GR 8	2
7	G-1727-1060	NUT, 5/16-18 TOP LOCK ZINC	2
8	H-5051	CABLE, PARKING BRAKE	1
9	Refer above section	PRX SENSOR BUZZLITE W CONNECT	1

12.3 ASSEMBLY, DASH PANEL



SECTION A-A



- NOTES:
- 1 SECURE WITH HOT MELT ADHESIVE
 - 2 REMOVE AND DISCARD MOUNTING PLATE. SECURE WITH BACKING NUTS.

Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	6
2	EC-3309	OPERATOR DISPLAY MODULE	1
3	EC-3404	OUTLET, 12V USB+SOCKET, PANEL	1
4	EC-3450-01	LIGHTS SWITCH	1
5	EC-3450-03	FNR SWITCH	1
6	EC-3450-04	DRIVE/INCH SWITCH	1
7	EC-3450-05	HIGH/LOW SWITCH	1
8	G-1114-040008	BOLT, METRIC, CLASS 8.8, M4X0.7X8	4
9	G-1154-106212	SCR, 5/16-18 SOC BUT HD CAP	2
10	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	2
11	G-1250-1050N	FLATWASHER, 1/4 NARROW	6
12	G-1250-1060N	FLATWASHER, 5/16 NARROW	2
13	G-1439-1050-S	NUTSERT, THIN WALL 1/4-20	6
14	G-1514-M40R	SPLIT LOCK WASHER (M4)	4
15	G-1515-M40	FLAT WASHER, M4	4
16	H-1584	HANDLE	1
17	H-4693-05	PANEL PLUG, Ø5/16	2



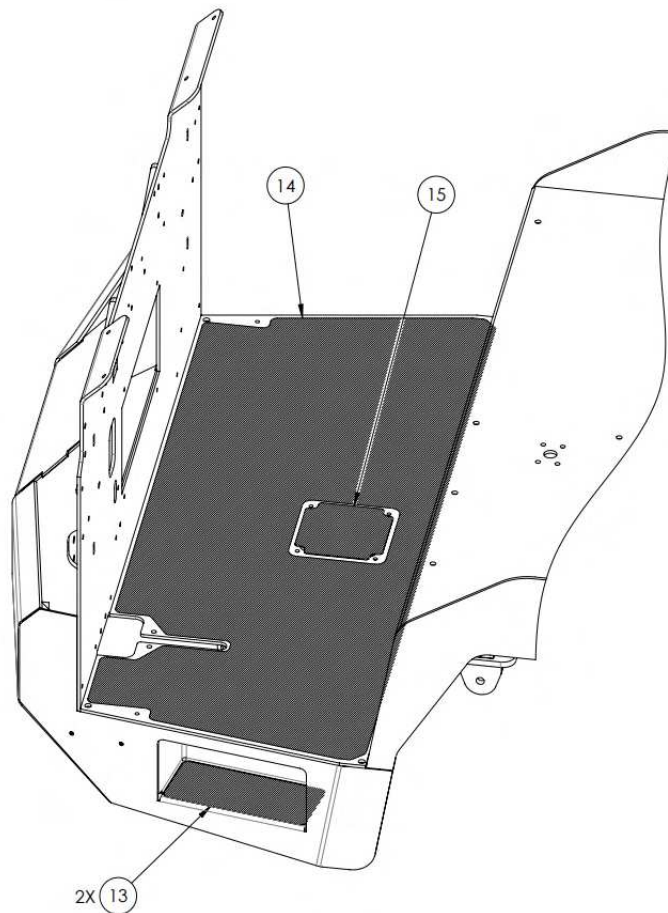
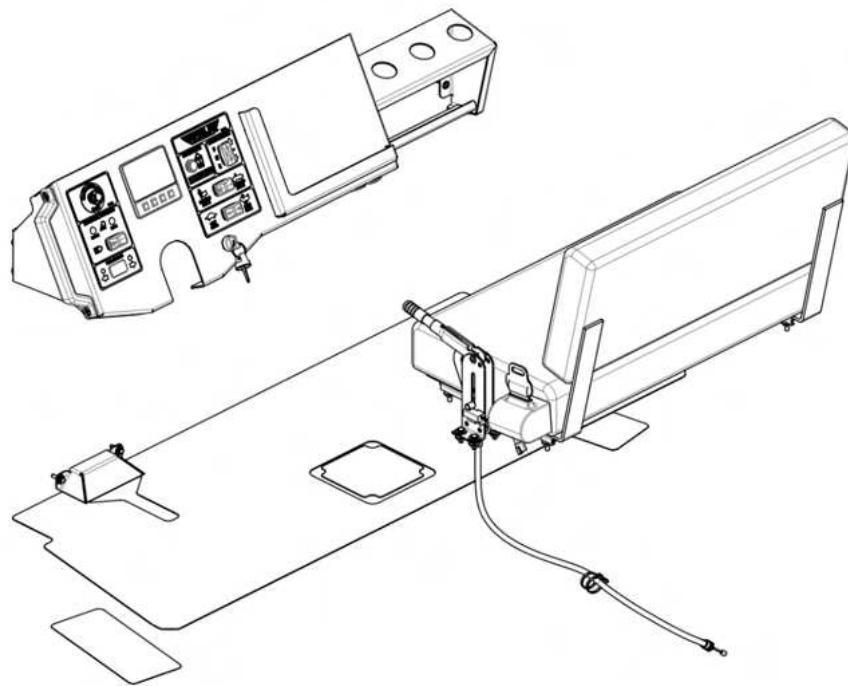
12.3 ASSEMBLY, DASH PANEL (continued)

Parts List

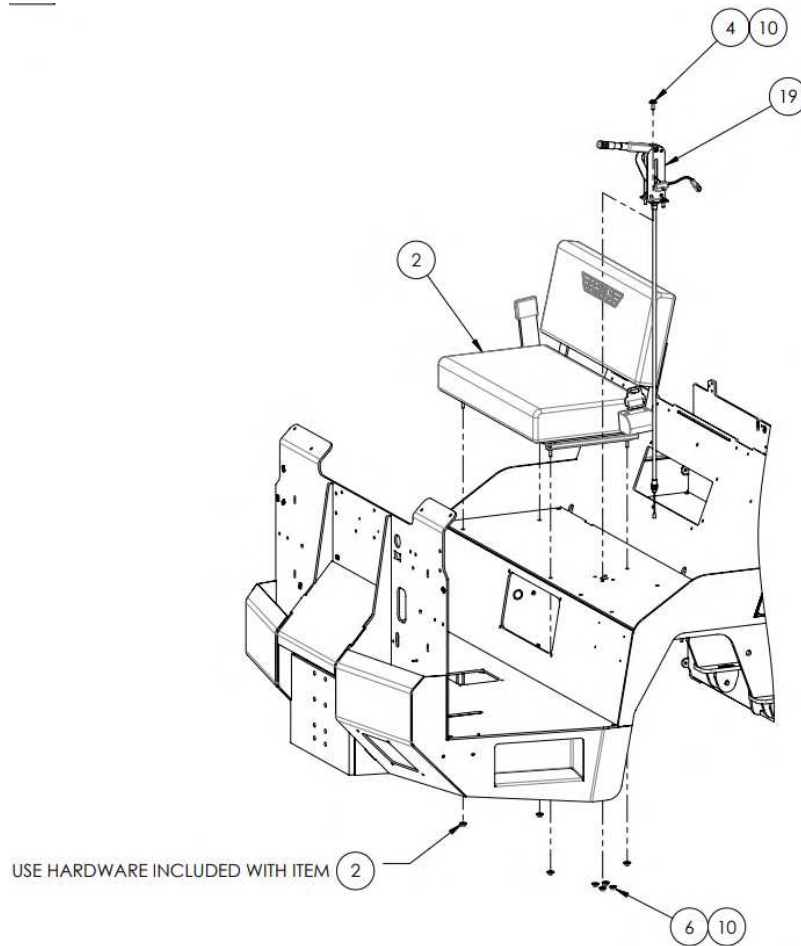
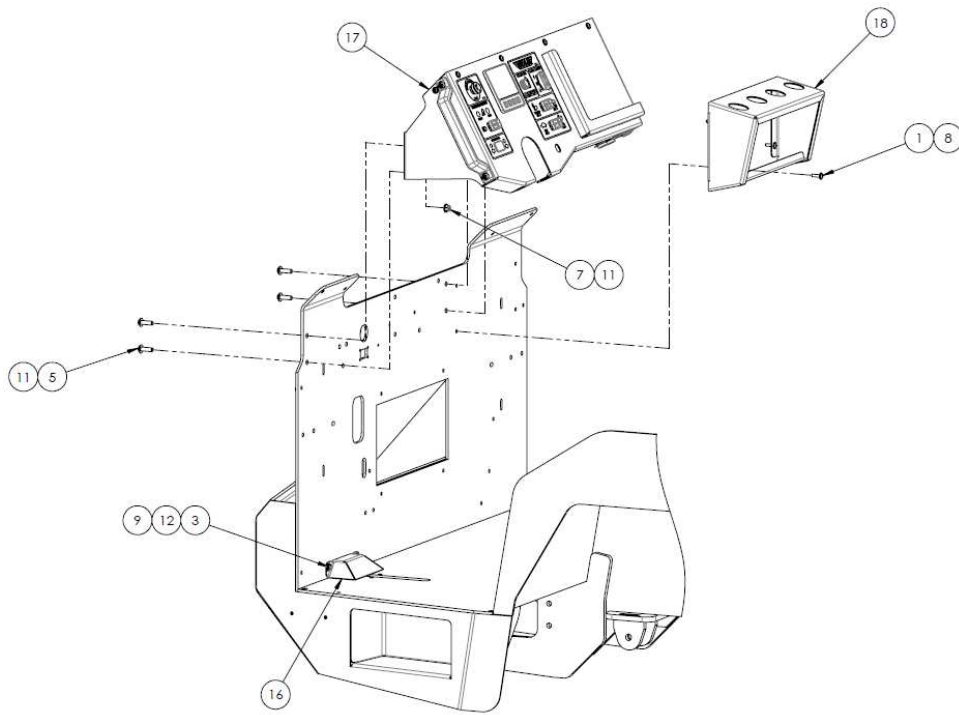
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
18	H-4693-09	PANEL PLUG, 1/2"	2
19	H-4992	SVR EMPTY SWITCH PLUG	1
20	NVSP-05-042-CA	MOMENTARY SWITCH PUMP CONTROL	1
21	NVSP-14-041-CA	E-STOP BUTTON	1
22	NVSP-14-042-CA	E-STOP PLACARD	1
23	S-3926-00	DISPLAY BRACKET	1
24	S-4377-00	BEAUTY COVER, DASH (P)	1
25	V-2941	LABEL, ETTX DASH LH	1
26	V-2946	LABEL, ETT-8 DASH RH	1
27	Z-11807-00	WLD, DASH PANEL (P)	1

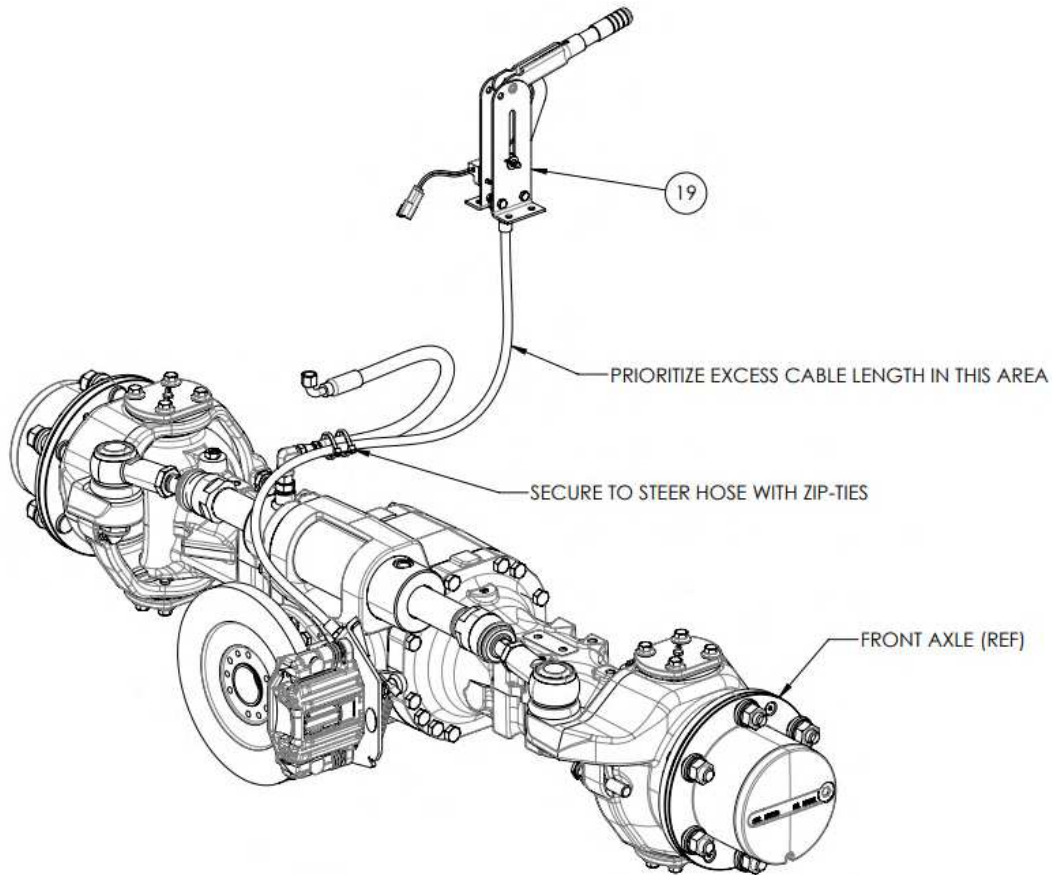
12.4 ASSEMBLY, OPERATOR COMPARTMENT



12.4 ASSEMBLY, OPERATOR COMPARTMENT (continued)



12.4 ASSEMBLY, OPERATOR COMPARTMENT (continued)

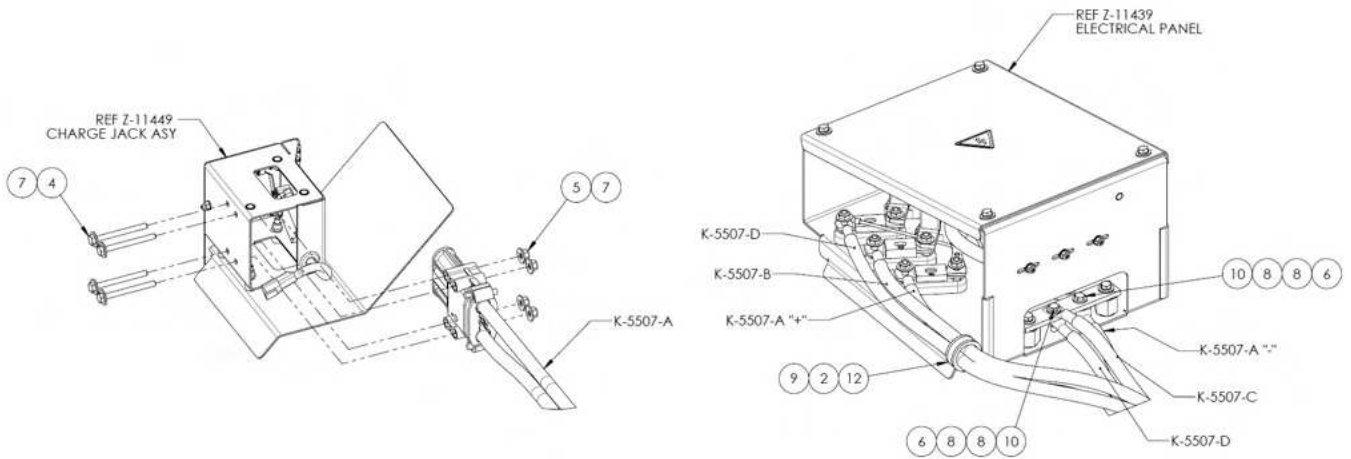
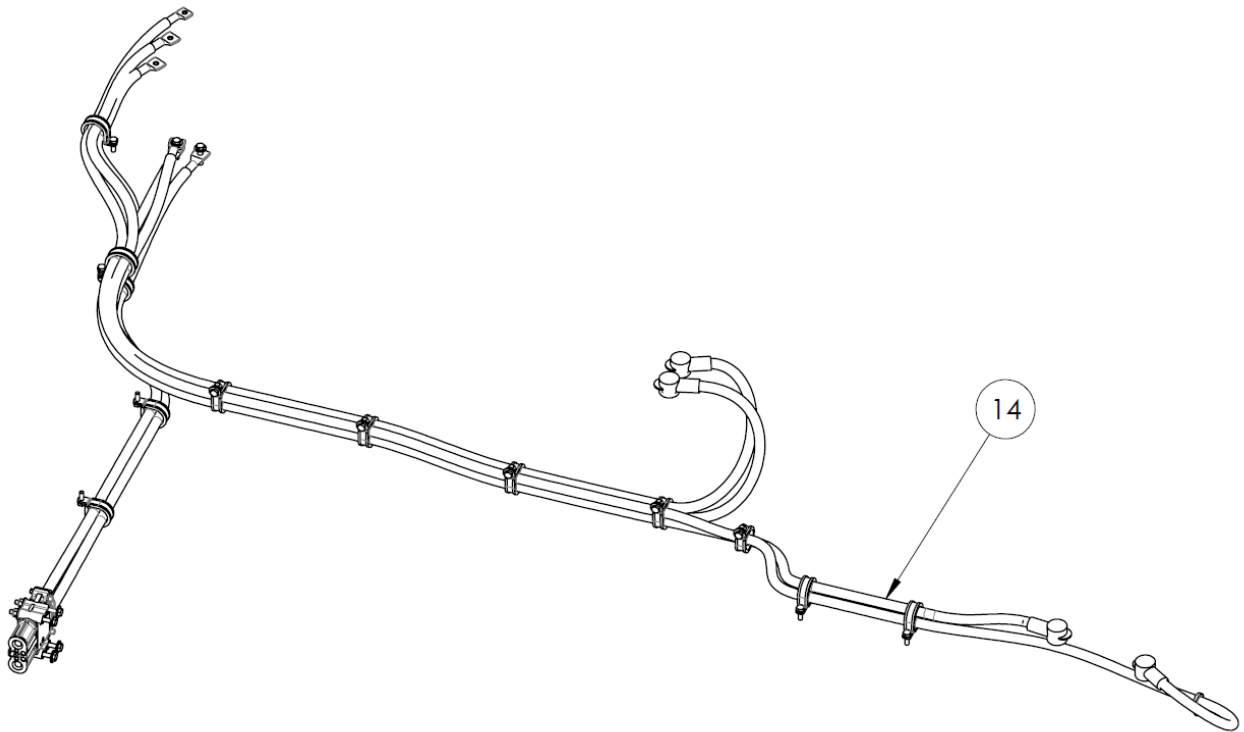


Parts List

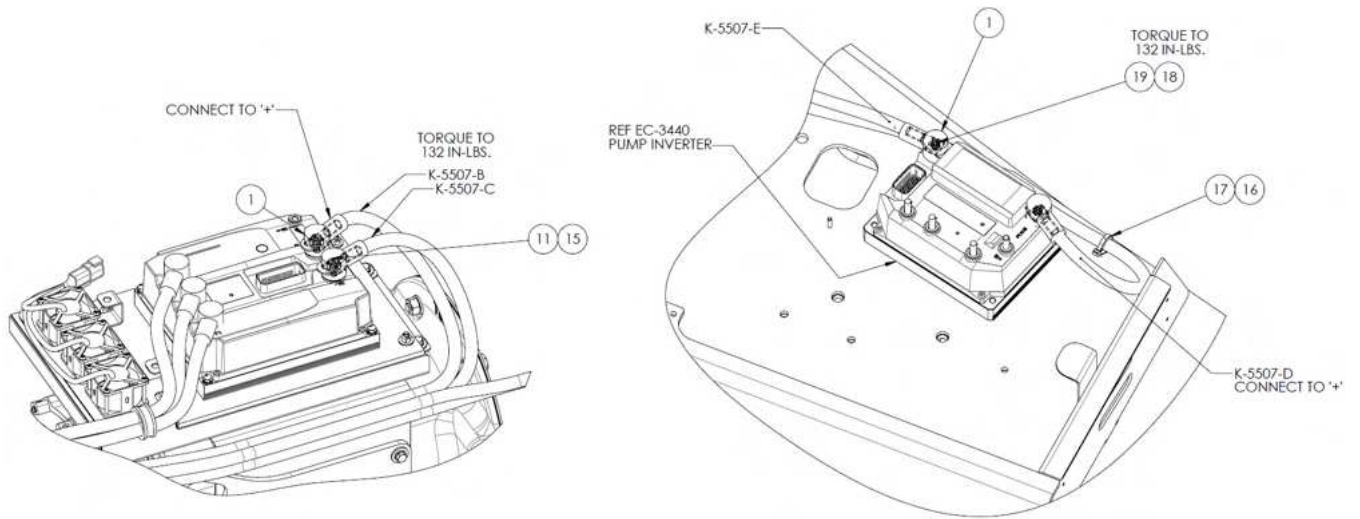
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	4
2	A-TT10-00048	BENCH SEAT W/ SEATBELT	1
3	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	2
4	G-1100-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 5	4
5	G-1154-107212	SCREW, 3/8-16 X 1-1/4" LG. SOCKET BUTT HD CAP	4
6	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	8
7	G-1202-1070	STOPNUT, 3/8-16 ELASTIC	4
8	G-1250-1050N	FLATWASHER, 1/4 NARROW	4
9	G-1250-1050W	FLATWASHER, 1/4 WIDE	2
10	G-1250-1060W	FLATWASHER, 5/16 WIDE	12
11	G-1250-1070N	FLATWASHER, 3/8 NARROW	8
12	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	2
13	H-4915	GRIP TAPE, STEP	2
14	H-5020	GRIP TAPE, FLOOR MAT	1
15	H-5021	GRIP TAPE, ACCESS PANEL	1
16	S-4332-00	SHIELD, MASTER CYLINDER (P)	1
17	Refer above section	ASY, DASH PANEL	1
18	Z-11819-00	WELDMENT, BATON HOLDER (P)	1
19	Refer above section	ASY, PARKING BRAKE CABLE	1

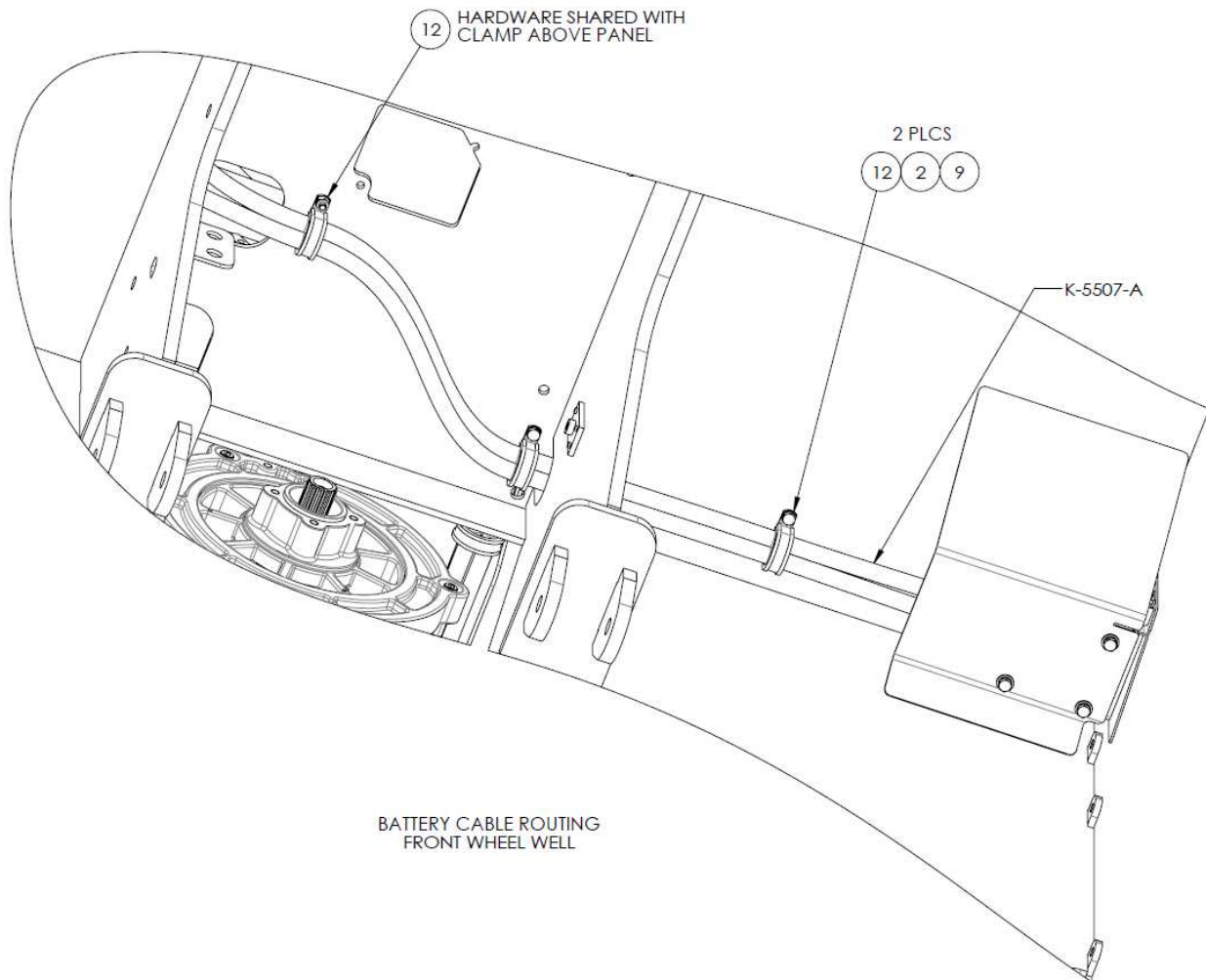
13.0 ELECTRICAL SYSTEM
13.1 ASSEMBLY, BATTERY CABLES



13.1 ASSEMBLY, BATTERY CABLES (continued)

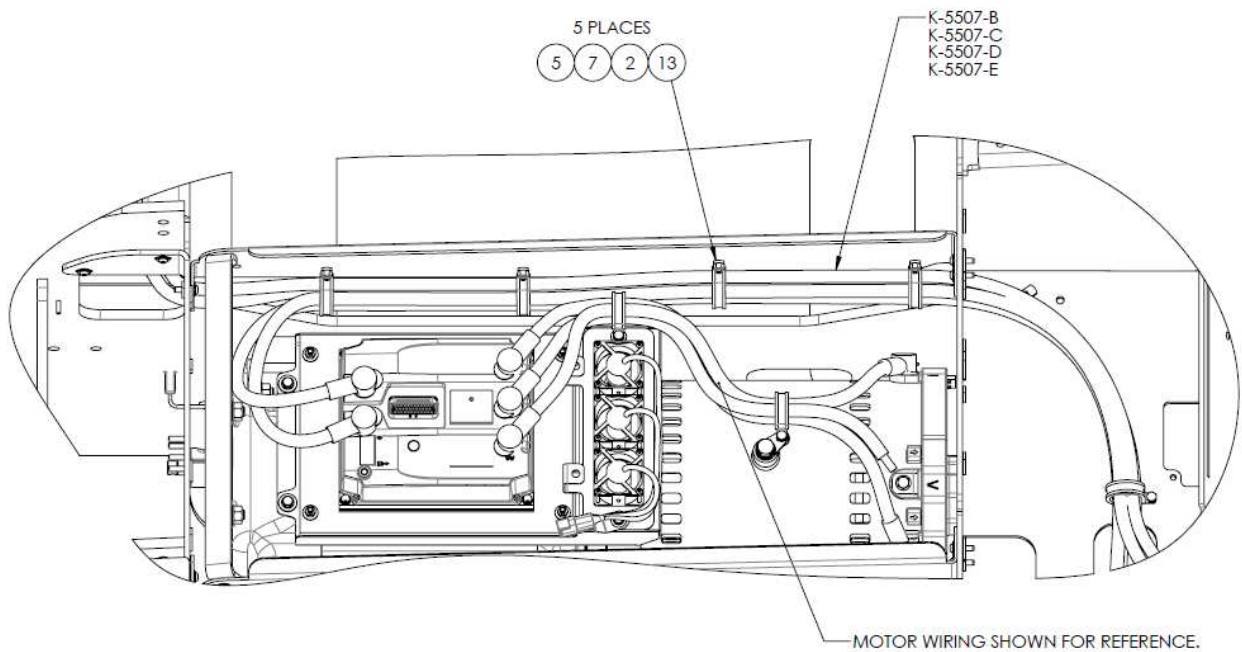
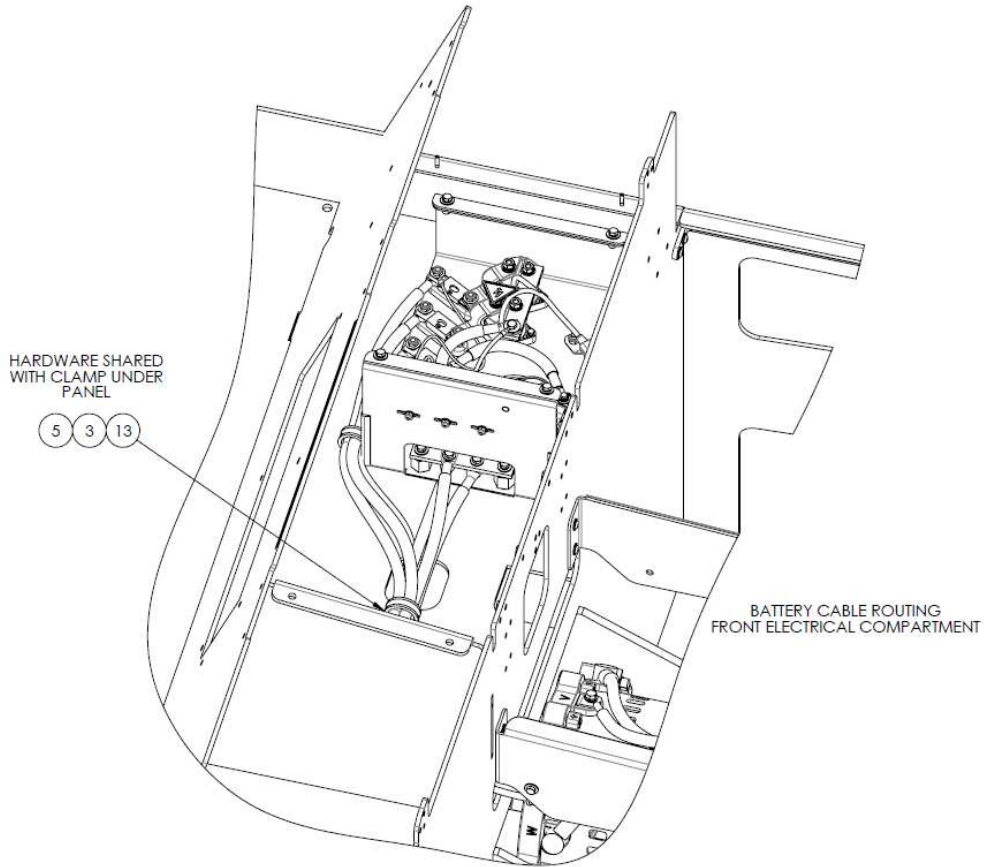


NOTE: SOME COMPONENTS ARE HIDDEN FOR CLARITY

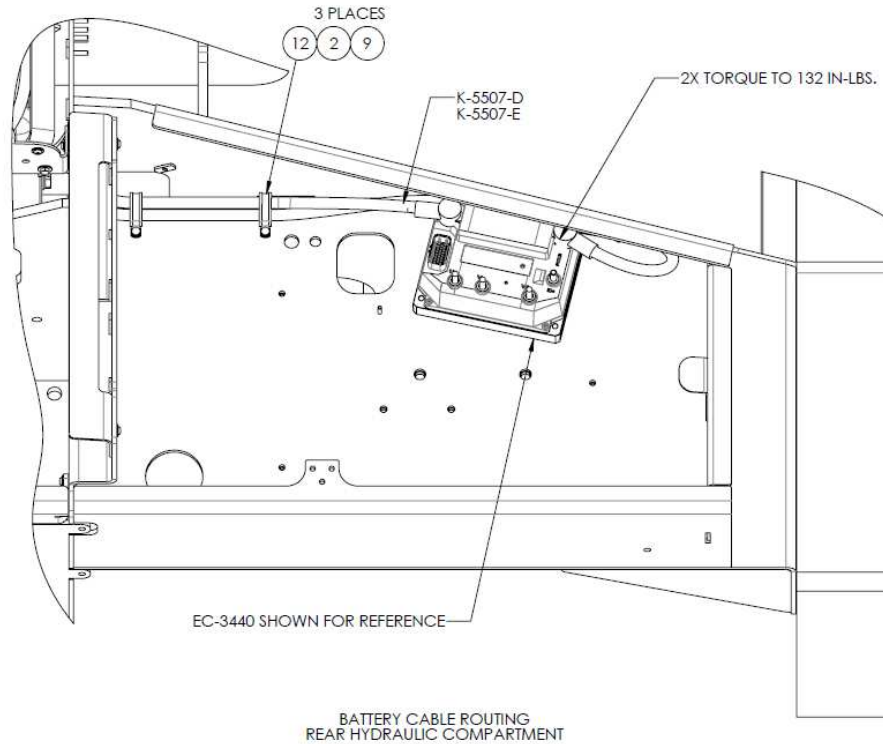


BATTERY CABLE ROUTING
FRONT WHEEL WELL

13.1 ASSEMBLY, BATTERY CABLES (continued)



13.1 ASSEMBLY, BATTERY CABLES (continued)

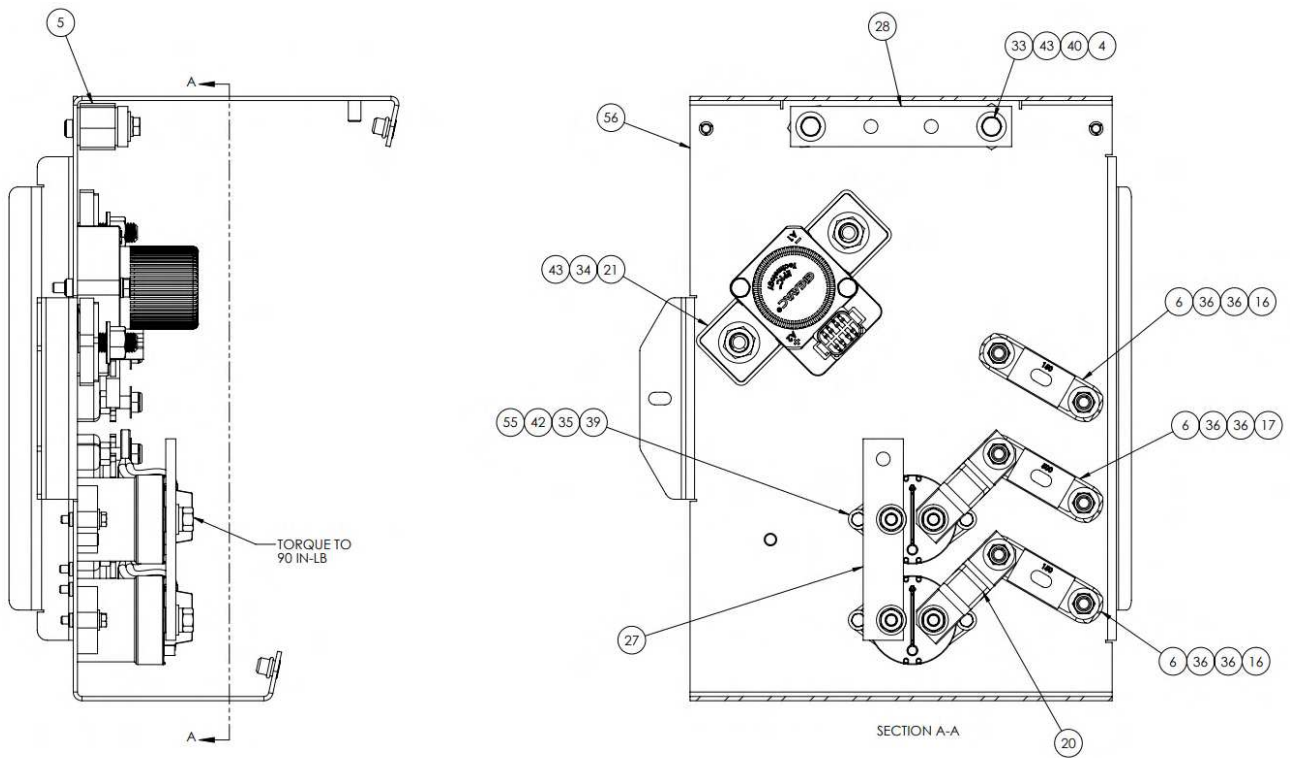
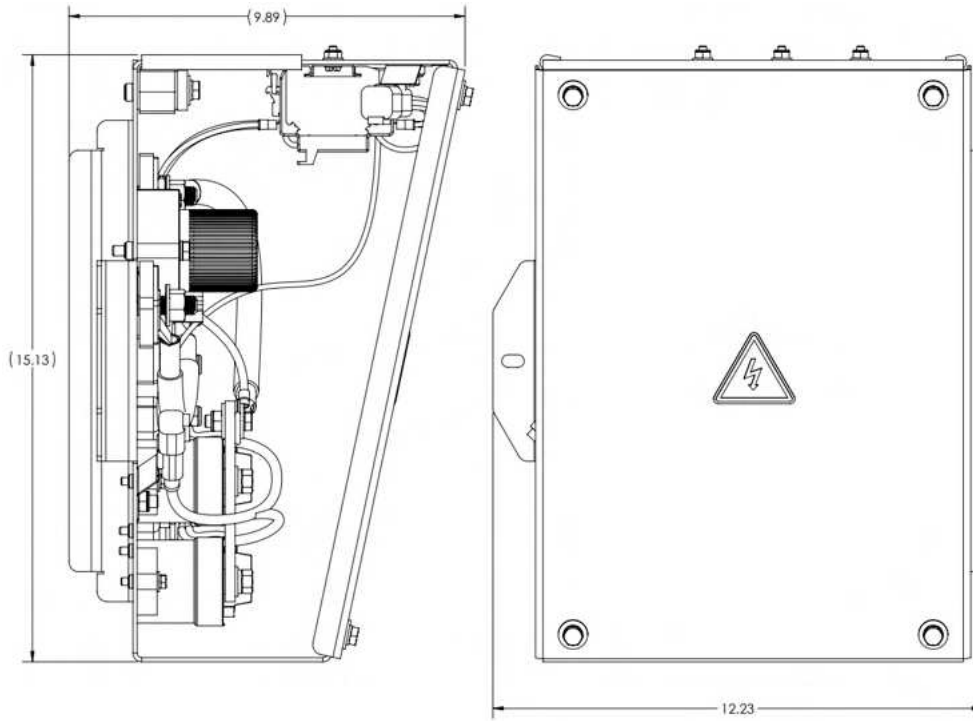


Parts List

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

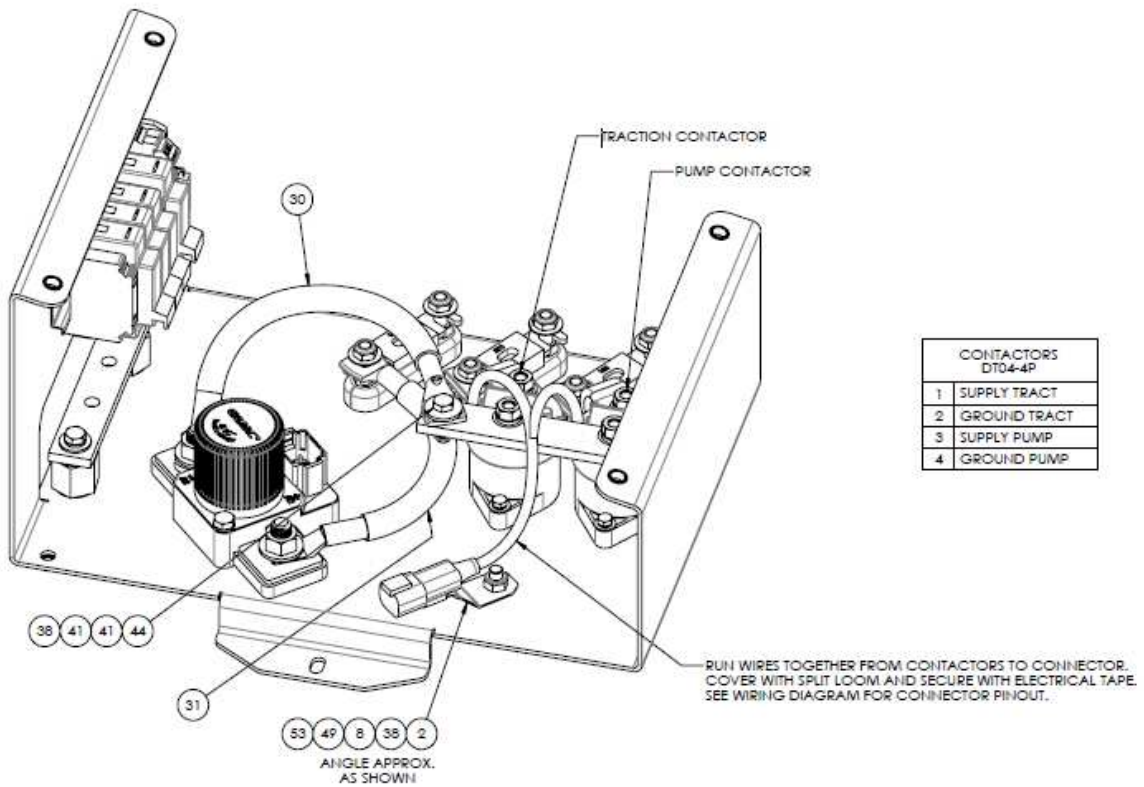
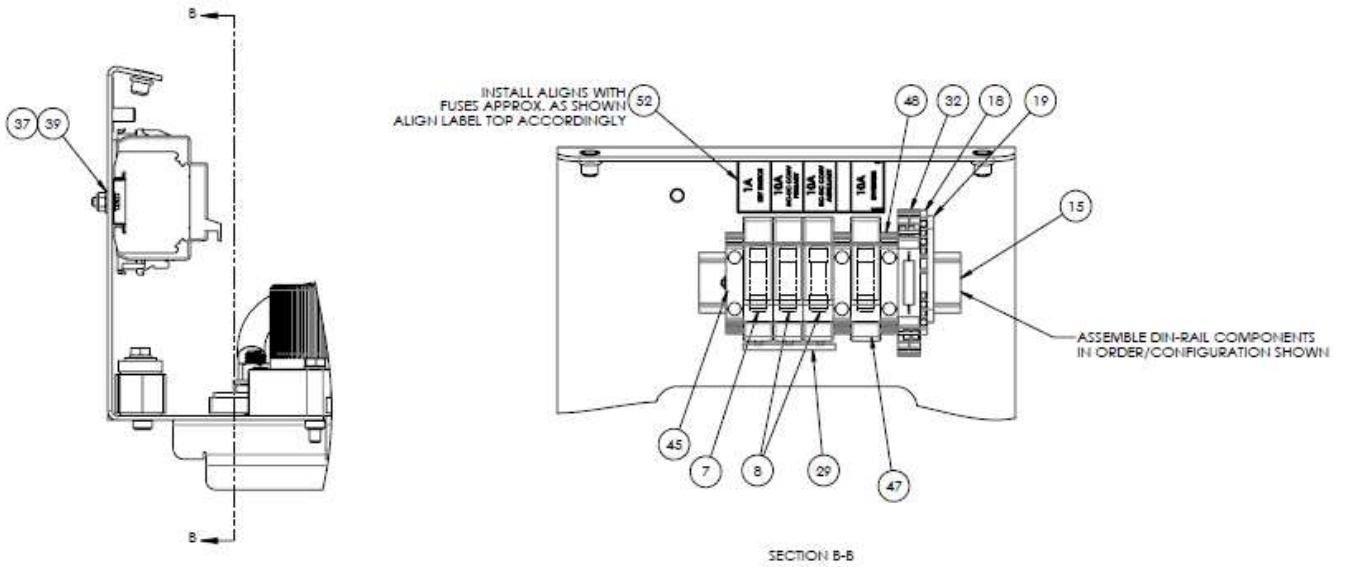
Item	Part Number	Description	Qty
1	EC-2110	BATTERY, TERMINAL INSULATOR	4
2	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	10
3	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	1
4	G-1100-105026	BOLT, 1/4-20 X 2-3/4" LG HEX HD GR 5	4
5	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	10
6	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	2
7	G-1250-1050W	FLATWASHER, 1/4 WIDE	13
8	G-1250-1060N	FLATWASHER, 5/16 NARROW	4
9	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	5
10	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	2
11	G-1533-080016	BOLT M8-1.25 X 16mm LG. CLASS 10.9	2
12	H-3521-15	CLAMP, CUSHIONED LOOP 1 1/4"	7
13	H-3521-19	CLAMP, CUSHIONED LOOP 1 1/2"	5
14	K-5507	BATTERY CABLE KIT	1
15	NVSP-21-016-CB	M8 BELLEVILLE LOCK WASHER	2
16	NVSP-24-022-CA	CABLE TIE ANCHOR STD (Ø.375 X .27 THK)	1
17	N/A	CABLE TIE	1
18	G-1250-1020N	FLATWASHER, #8 NARROW	2
19	G-1202-1020	STOPNUT, #8-32 ELASTIC	2

13.2 ASSEMBLY, ELECTRICAL PANEL



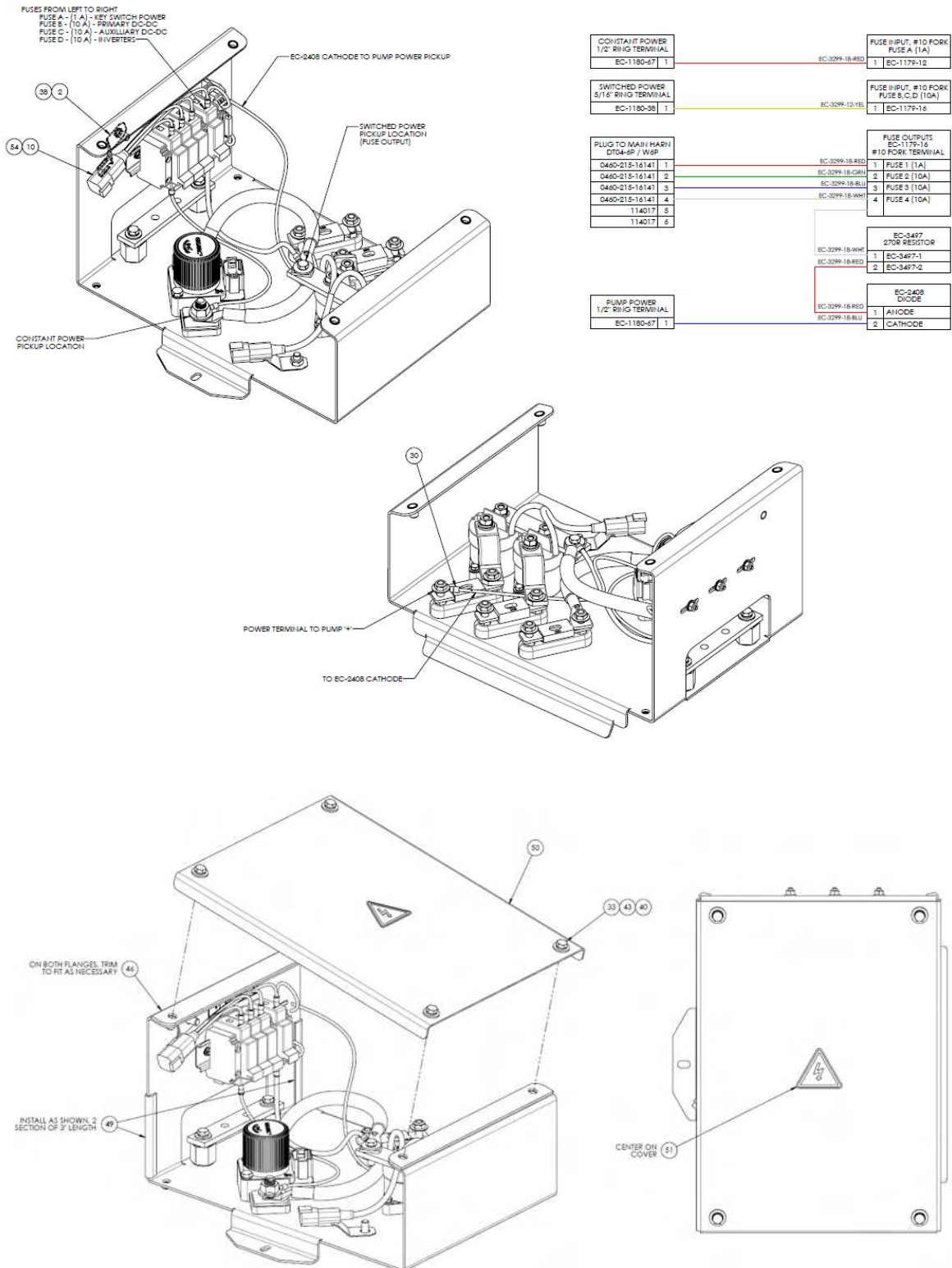
STEP 1

13.2 ASSEMBLY, ELECTRICAL PANEL (continued)



STEP 2

13.2 ASSEMBLY, ELECTRICAL PANEL (continued)





13.2 ASSEMBLY, ELECTRICAL PANEL (continued)

Parts List

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

Item	Part Number	Description	Qty
1	0460-215-16141	DEUTSCH TERMINAL	4
2	1027-003-1200	DEUTSCH RETAINER CLIP	2
3	114017	DEUTSCH EMPTY SOCKET PLUG	2
4	12050	SPLIT LOOM, 3/8"	7"
5	13015	RECTIFIER ISOLATOR	2
6	A-MTT5-0225	ANN FUSE HOLDER	3
7	BLN-1	10X38 FUSE, 250V, 1A	1
8	BLN-10	10X38 FUSE, 250V, 10A	3
9	DT04-4P	DEUTSCH CONNECTOR	1
10	DT04-6P	DEUTSCH CONNECTOR	1
11	EC-1179-12	#10 FORK TERMINAL, 14-18 AWG.	5
12	EC-1179-16	#10 FORK TERMINAL, 10-12 AWG.	1
13	EC-1180-38	TERMINAL, RING YEL 5/16, 10 AWG	2
14	EC-1180-67	TERMINAL, RING BLUE 1/2	1
15	EC-1514*006.00	35MM DIN RAIL	1
16	EC-1619-09	FUSE, ANL 150	2
17	EC-1619-19	FUSE, ANL-500	1
18	EC-2408	TERMINAL BLOCK, DIODE 4COND.	1
19	EC-2411	PLATE, END DIODE BLOCK	1
20	EC-2998	CABLE, FLEXIBLE BRAIDED	2
21	EC-3006	CONTACTOR, 600A, 12V	1
22	EC-3299-12-YEL	TXL WIRE, 18 AWG, YELLOW	10
23	EC-3299-18-BLU	TXL WIRE, 18 AWG, BLUE	21
24	EC-3299-18-GRN	TXL WIRE, 18 AWG, GREEN	6
25	EC-3299-18-RED	TXL WIRE, 18 AWG, RED	17
26	EC-3299-18-WHT	TXL WIRE, 18 AWG, WHITE	6
27	EC-3316	BUSBAR, ETT	1
28	EC-3317	BUSBAR, ETT	1
29	EC-3361-3	FUSE INPUT BUS, 3 POLE	1
30	EC-3389	BATTERY CABLE	1
31	EC-3390	BATTERY CABLE	1
32	EC-3497	RESISTOR, DIN MOUNTED, 270R	1
33	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	6
34	G-1100-105016	BOLT, 1/4-20 X 1-3/4" LG HEX HD GR 5	2
35	G-1150-103510	SCREW, #10-32 X 1.0" LG HEX HD MACHINE	4
36	G-1152-103510	SCREW, #10-32 X 1.0" LG SOCKET FLAT HD CAP	6
37	G-1202-1035	STOPNUT, #10-32 ELASTIC	3
38	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	3
39	G-1250-1030N	FLATWASHER, #10 NARROW	7



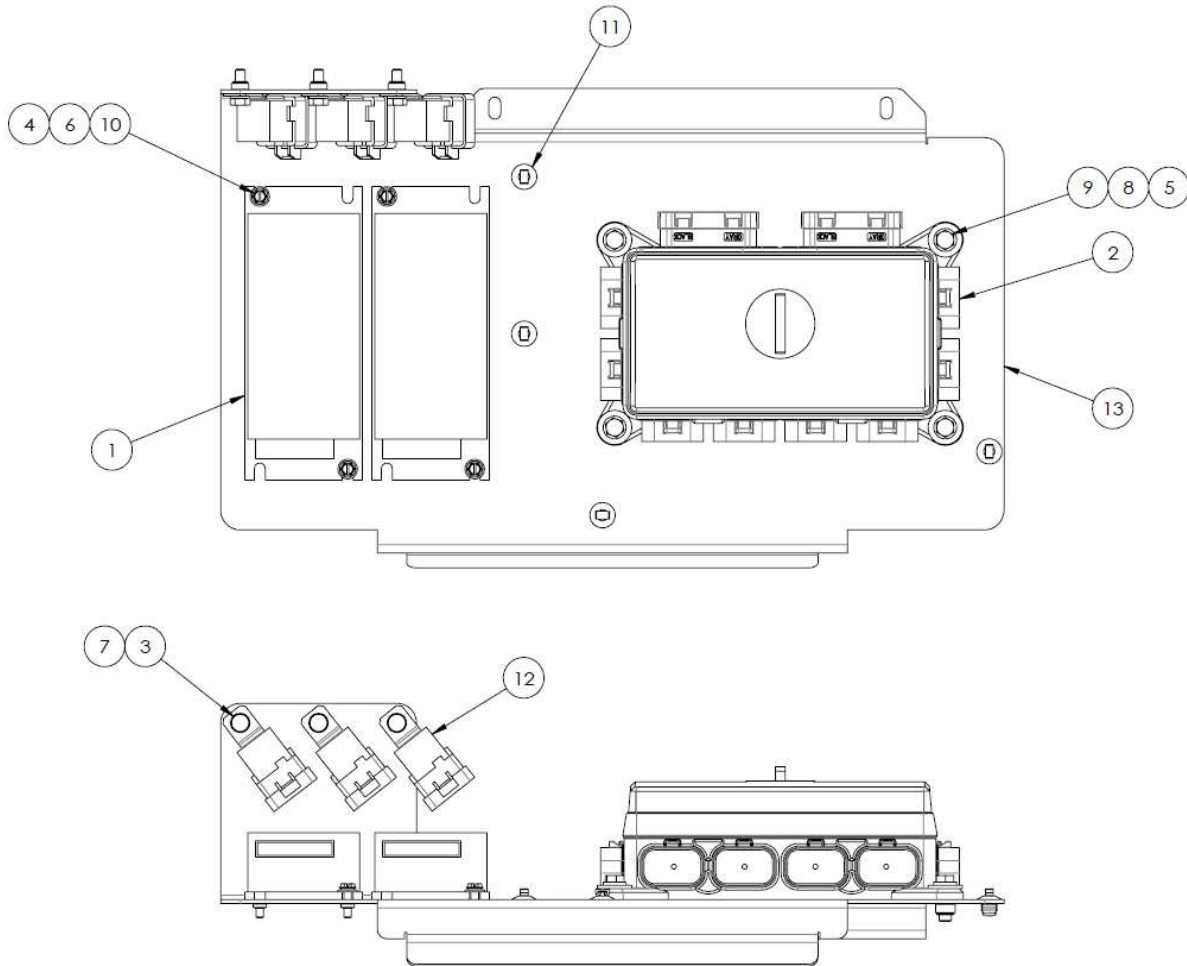
13.2 ASSEMBLY, ELECTRICAL PANEL (continued)

Parts List

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

Item	Part Number	Description	Qty
40	G-1250-1050W	FLATWASHER, 1/4 WIDE	6
41	G-1250-1060W	FLATWASHER, 5/16 WIDE	2
42	G-1251-1030R	LOCKWASHER, #10 REGULAR	4
43	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	8
44	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	1
45	G-1720-103504	SCR,#10-32X0.5 MACH HEX WSH HD	3
46	H-1204-10	TAPE, NEOPRENE FOAM SEALING	2
47	LAVT-05-006-CA	10X 38 DIN DIN RAIL MOUNTED FUSE HOLDER	4
48	LAVT-05-009-CA	35MM DIN RAIL END STOP	3
49	NVSP-24-042-CA	METAL CORE EDGE TRIM, 1/8	6
50	S-4211-00	COVER PANEL (P)	1
51	V-1050	LABEL, ISO ELECTRICAL SHOCK	1
52	V-2944	LABEL, FUSE BLOCK	1
53	W4P	DEUTSCH LOCK	1
54	W6P	DEUTSCH CONNECTOR LOCK	1
55	Z-11102	ASY, CONTACTOR AND TERMINALS	2
56	Refer above section	ASY, ELECTRICAL PANEL	1

13.3 ASSEMBLY, ELECTRICAL PANEL

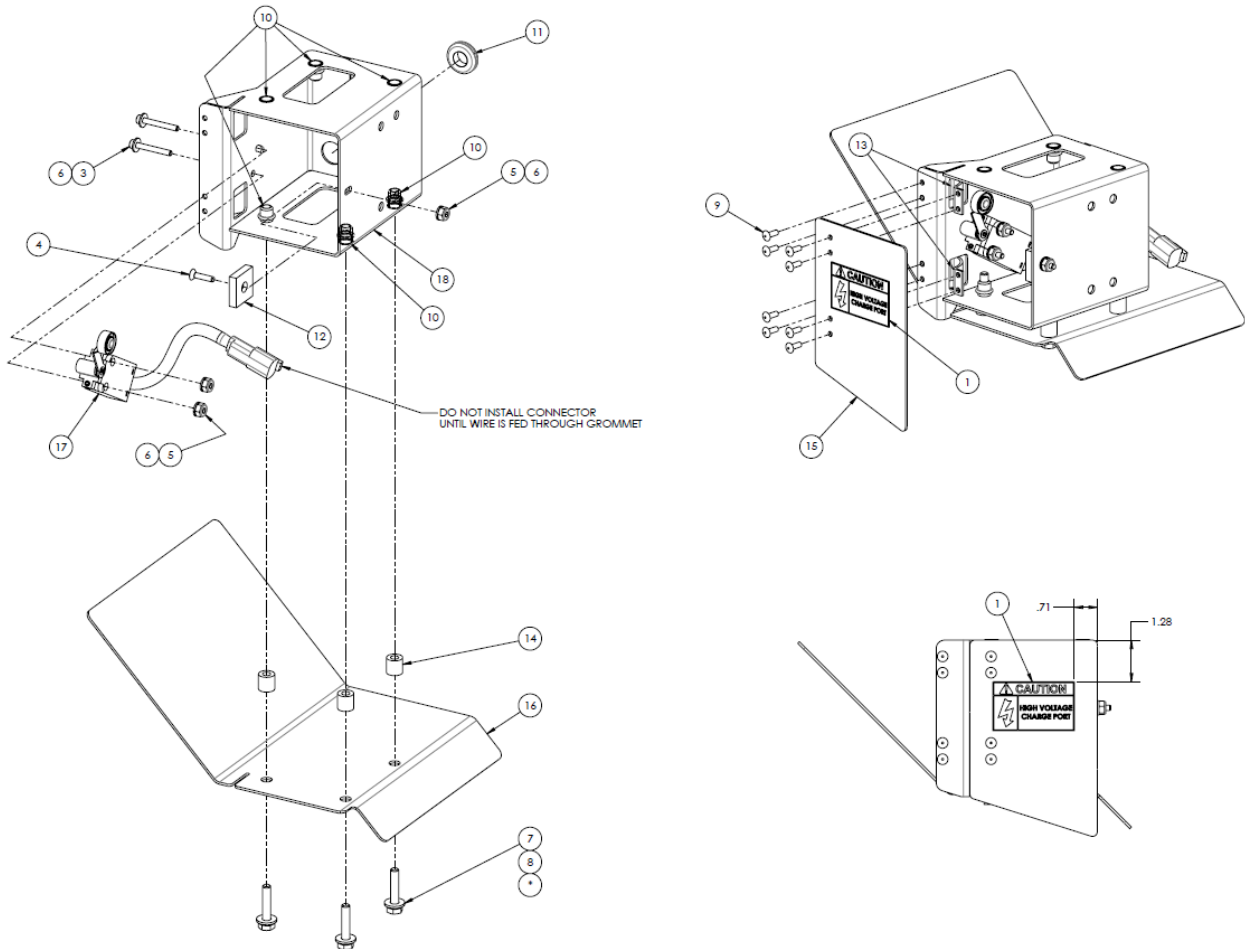


Parts List

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

Item	Part Number	Description	Qty
1	AE-OPT-0320-B	DC-DC CONVERTER, 300W	2
2	EC-3391	FUSE BOX, MOD	1
3	G-1100-105006	BOLT, 1/4-20 X 3/4" LG HEX HD GR 5	3
4	G-1250-1030N	FLATWASHER, #10 NARROW	4
5	G-1250-1060W	FLATWASHER, 5/16 WIDE	4
6	G-1251-1030R	LOCKWASHER, #10 REGULAR	4
7	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	3
8	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	4
9	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	4
10	G-1720-103506	SCR,#10-32X.75 MACH HEX WSH HD	4
11	NVSP-24-022-CA	CABLE TIE ANCHOR STD (Ø.375 X .27 THK)	4
12	NVSP-31-002-CA	SEALED RELAY	3
13	S-4134-00	PANEL, ELECTRICAL (P)	1

13.4 ASSEMBLY, CHARGE JACK SUB

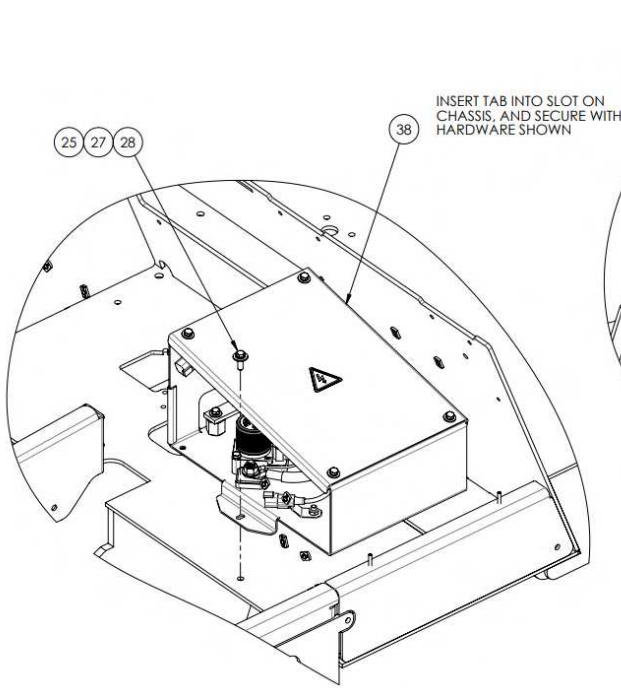
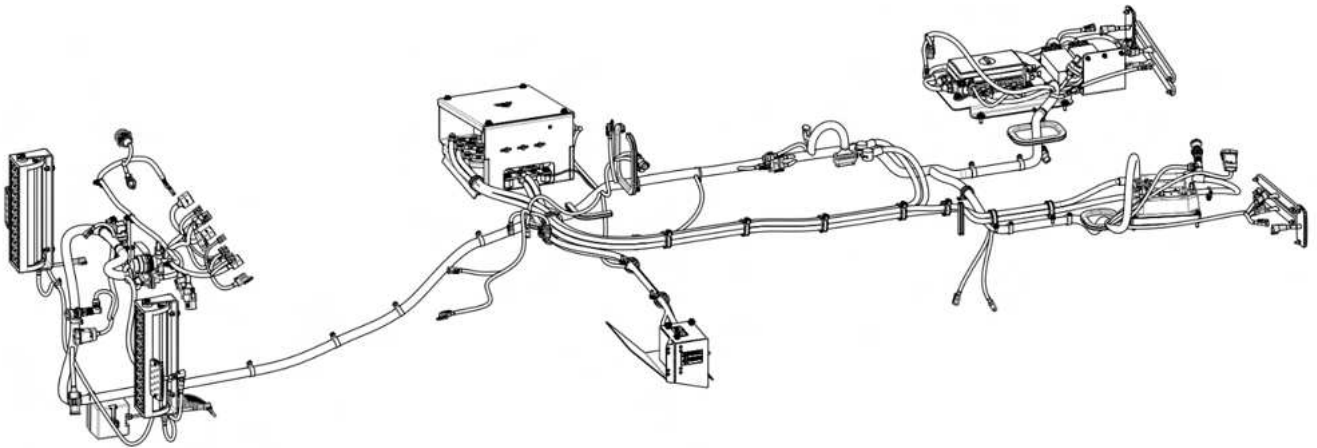


Parts List

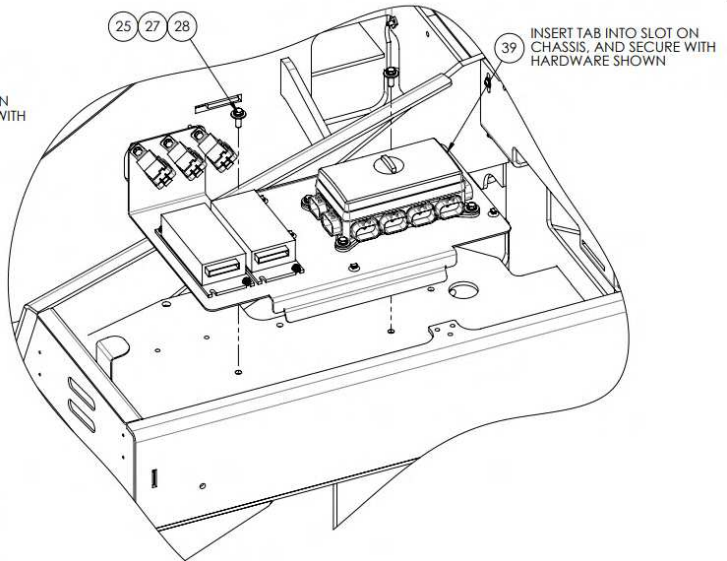
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	A-ETT12-00494	ETT12 BATTERY CHARGE DECAL	1
2	G-1100-105014	BOLT, 1/4-20 X 1-1/2" LG HEX HD GR 5	3
3	G-1151-102012	SCREW, #8-32 X 1-1/4" SOCKET HD CAP	2
4	G-1152-102110	SCR, SOC FLT HD 82 DEG CAP	1
5	G-1202-1020	STOPNUT, #8-32 ELASTIC	3
6	G-1250-1020N	FLATWASHER, #8 NARROW	5
7	G-1250-1050N	FLATWASHER, 1/4 NARROW	3
8	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	3
9	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	8
10	G-1439-1050-S	NUTSERT, THIN WALL 1/4-20	6
11	H-1901-20	GROMMET, 1/2 INCH	1
12	H-4844	MAGNET, CHARGE JACK DOOR	1
13	H-4874	HINGE, BLIND	2
14	H-4900-050804	SPACER, 1/4 SCR X 1/2 OD X 1/2 LG	3
15	S-4092-00	DOOR, CHARGE JACK (P)	1
16	S-4395-00	CRUD DEFLECTOR, CHARGE JACK (P)	1
17	Kit, TBC	ASY, LIMIT SW WITH CONN	1
18	Z-11462-00	WLD, CHARGE JACK HSG (P)	1

13.5 ASSEMBLY, ELECTRICAL SYSTEM

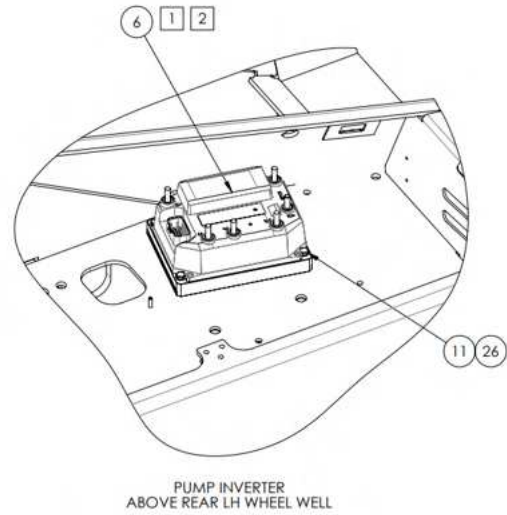
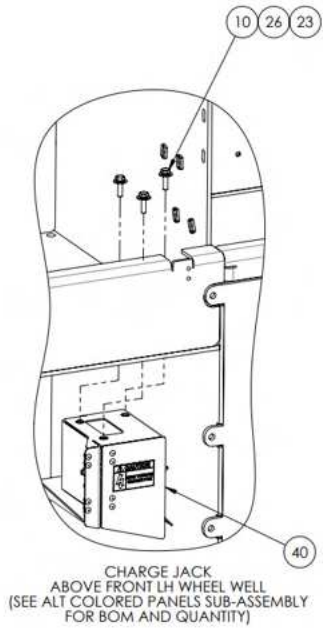


CONTACTOR PANEL
ABOVE FRONT RH WHEEL WELL



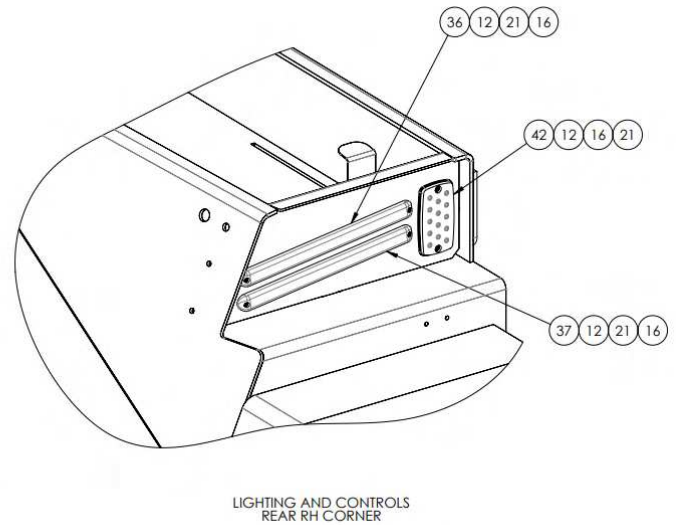
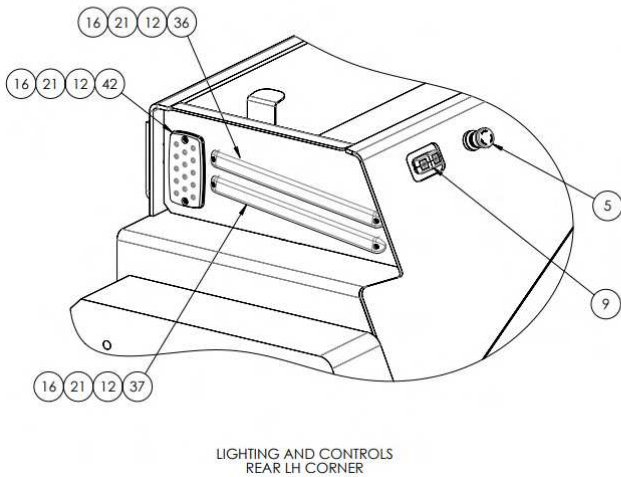
FUSE BOX PANEL
ABOVE REAR RH WHEEL WELL

13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)

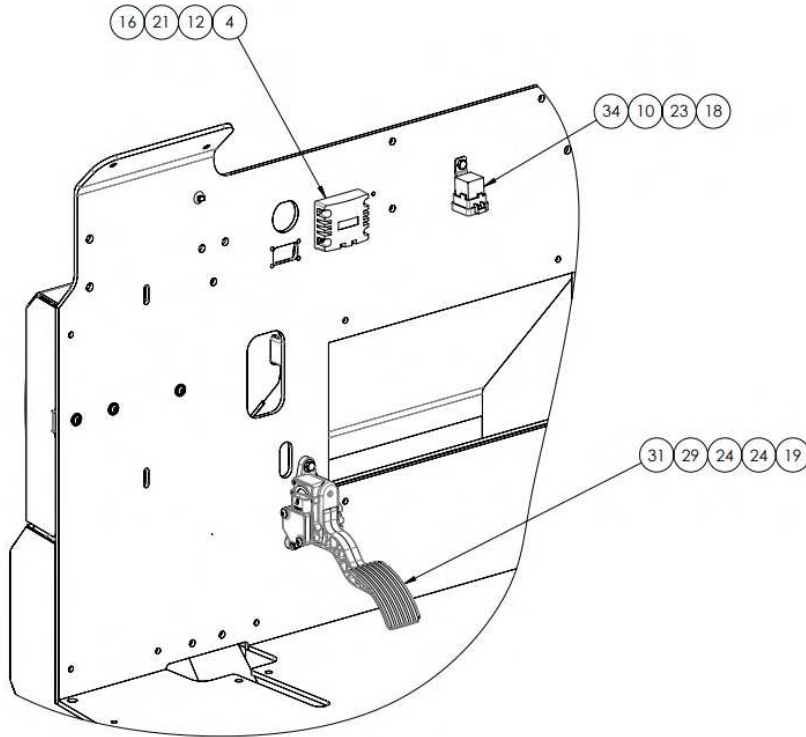


1 INSPECT FRAME SURFACE PRIOR TO ASSEMBLY STEP 2 TO VERIFY SURFACE IS BARE METAL / FREE OF PAINT.

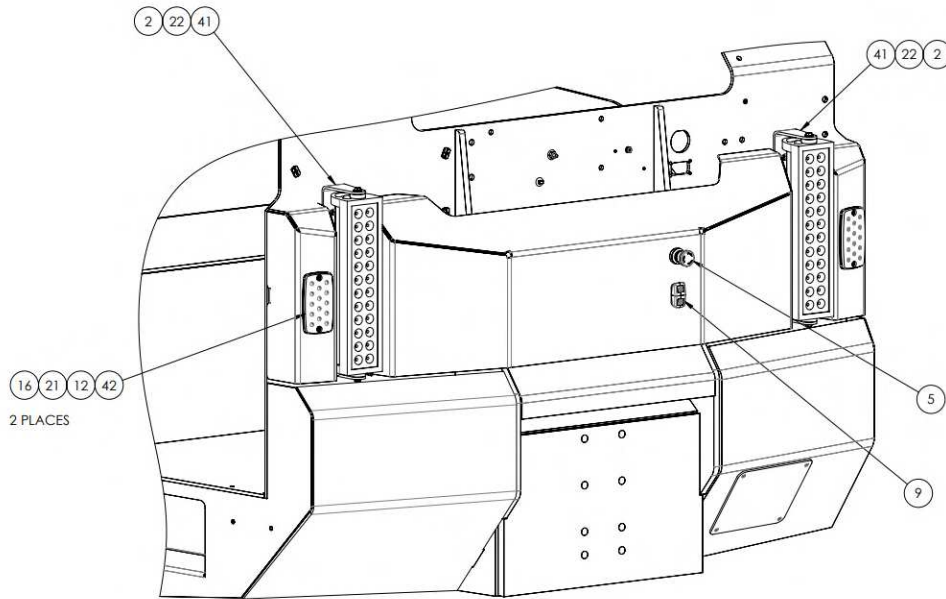
2 APPLY A THIN UNINTERRUPTED LAYER OF THERMAL INTERFACE COMPOUND SUCH AS LOCTITE TC-4 OR EQUIVALENT TO BOTTOM OF DRIVE BEFORE MOUNTING TO CHASSIS.



13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)

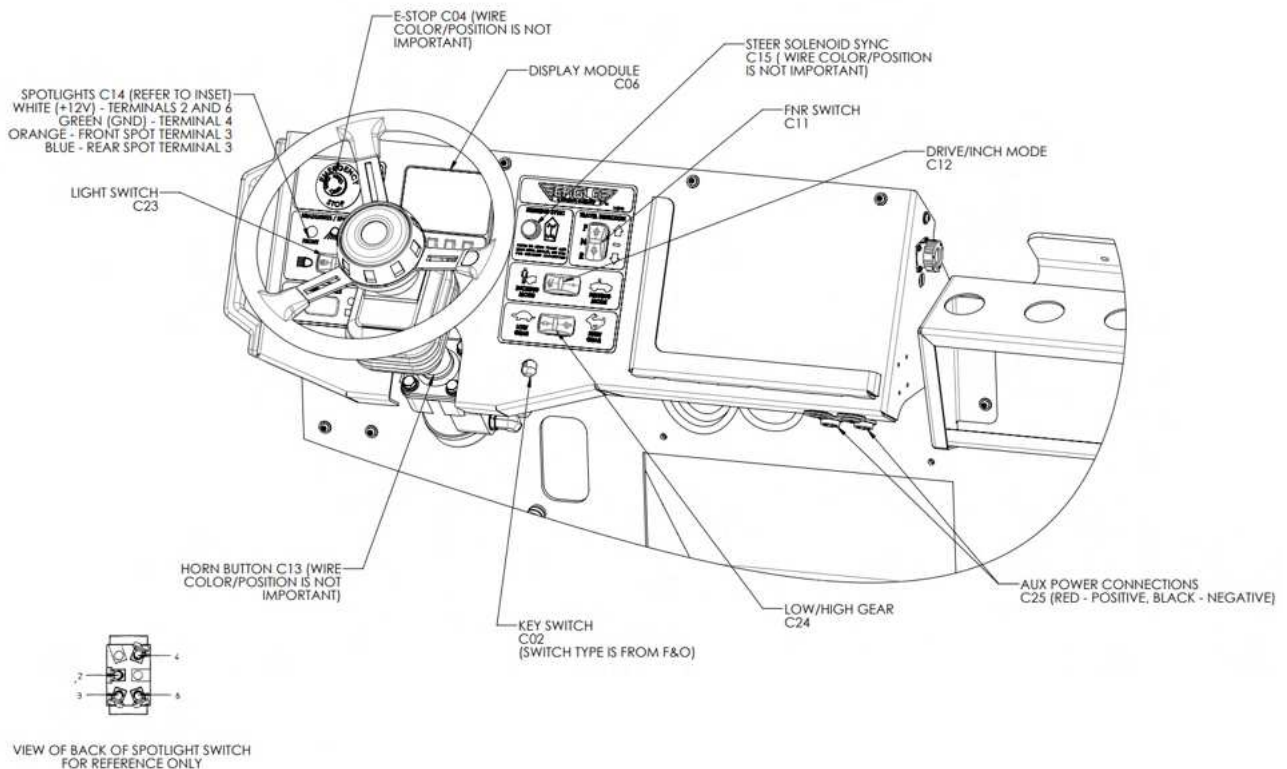
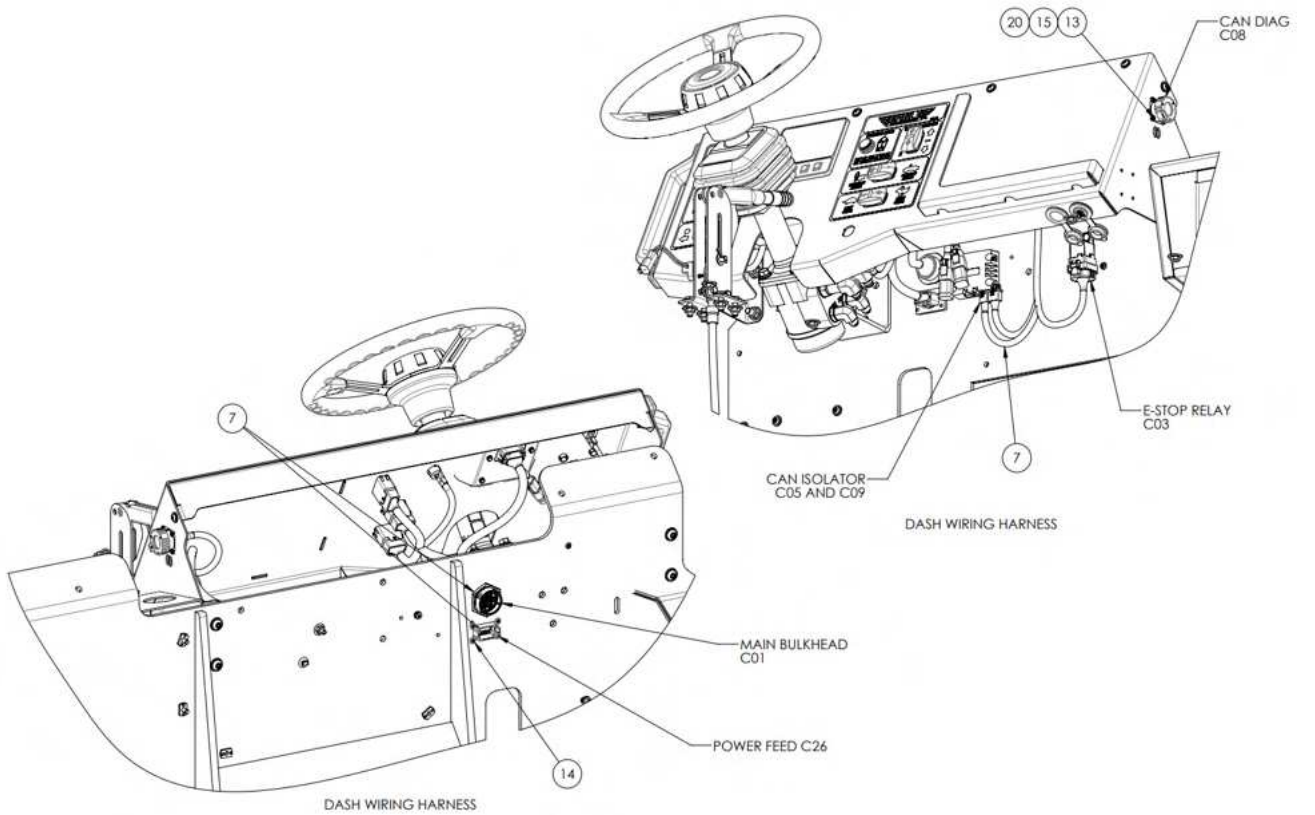


OPERATOR COMPARTMENT ITEMS

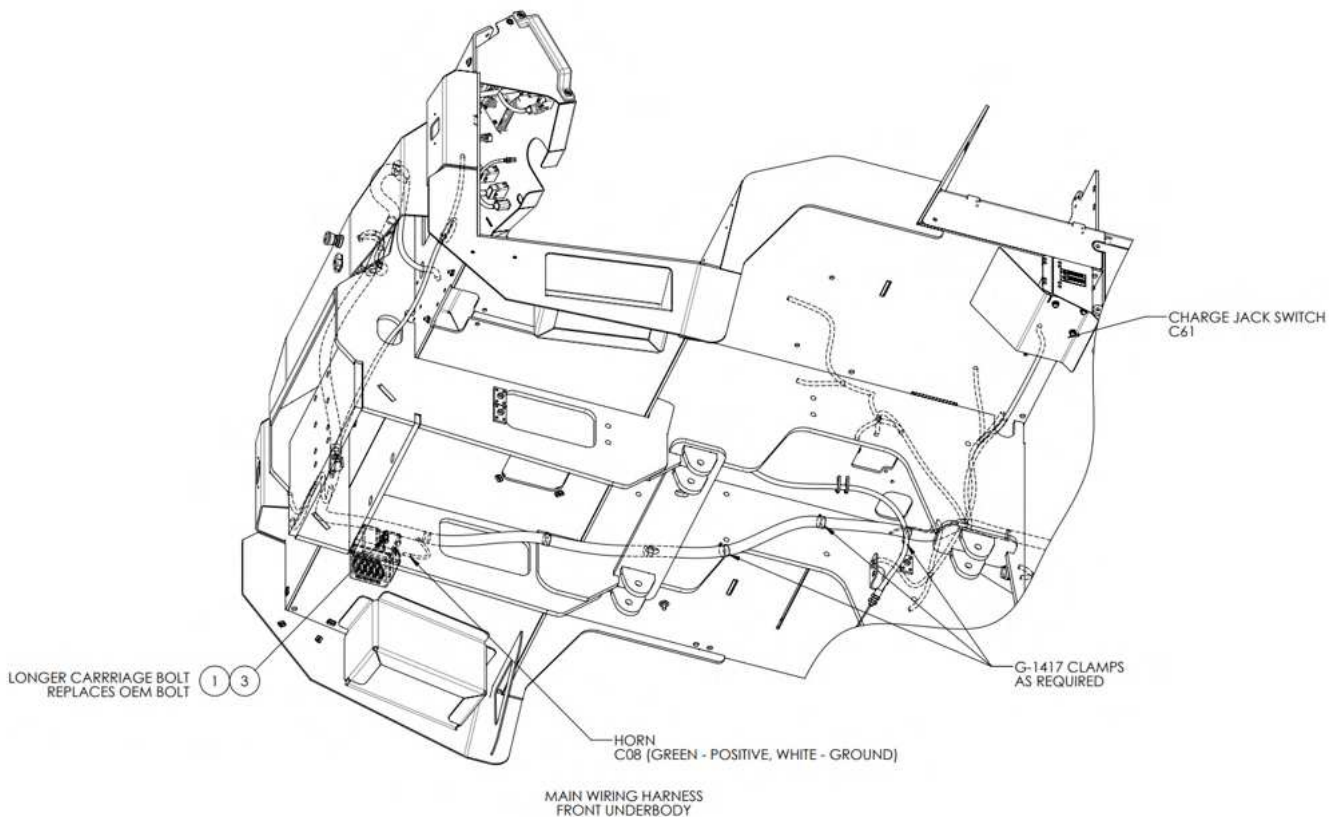
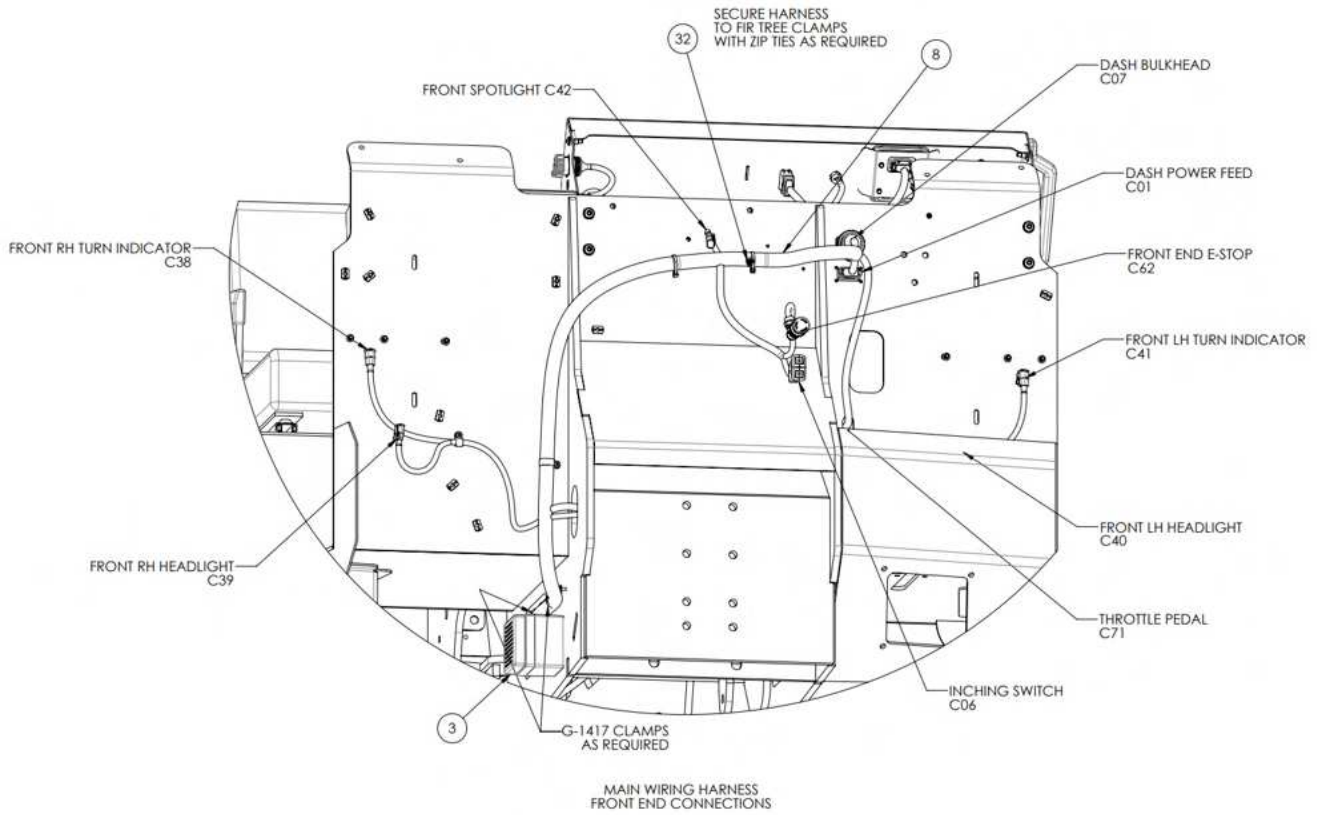


LIGHTING AND CONTROLS
FRONT END

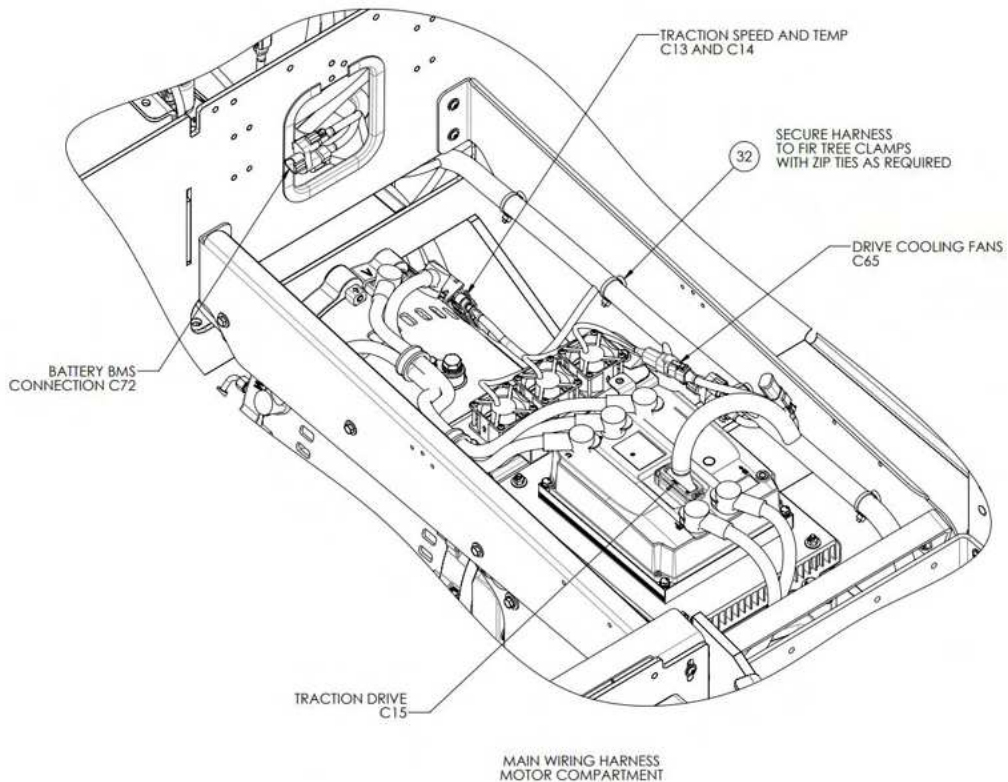
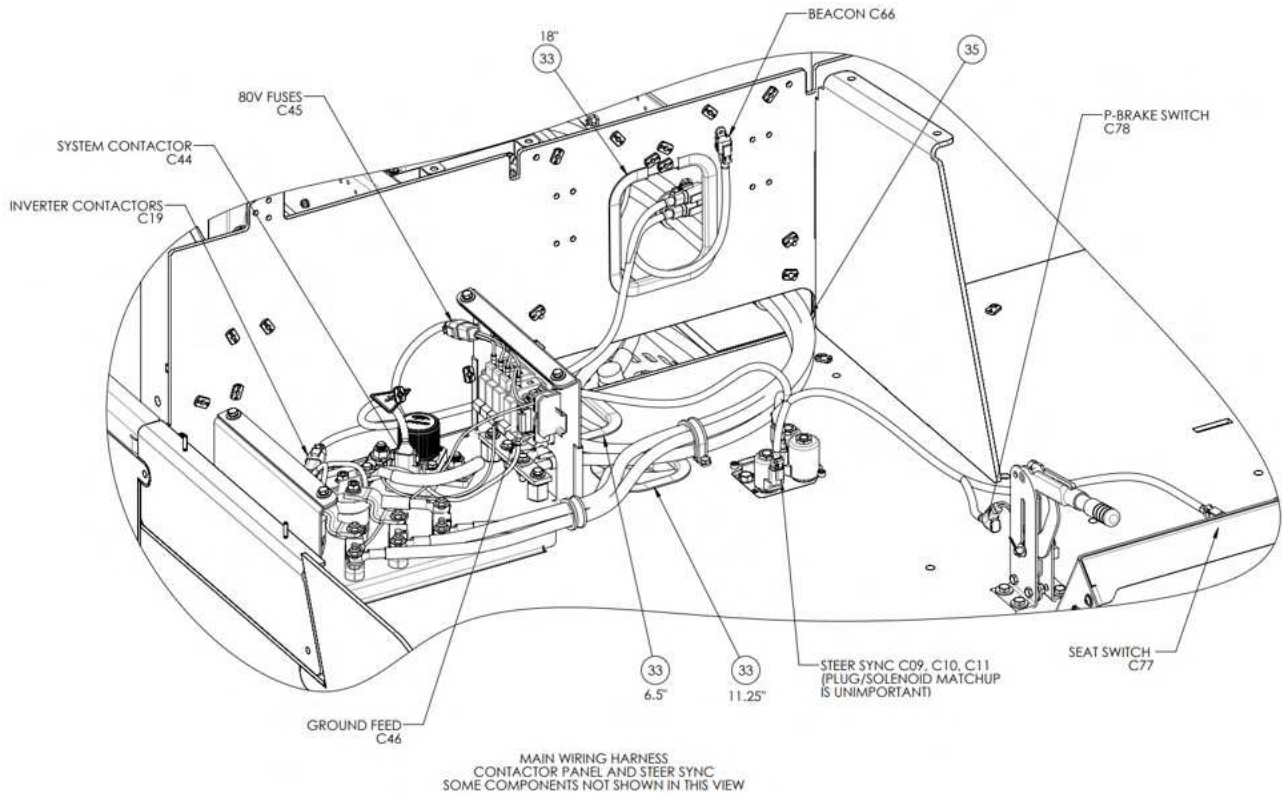
13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)



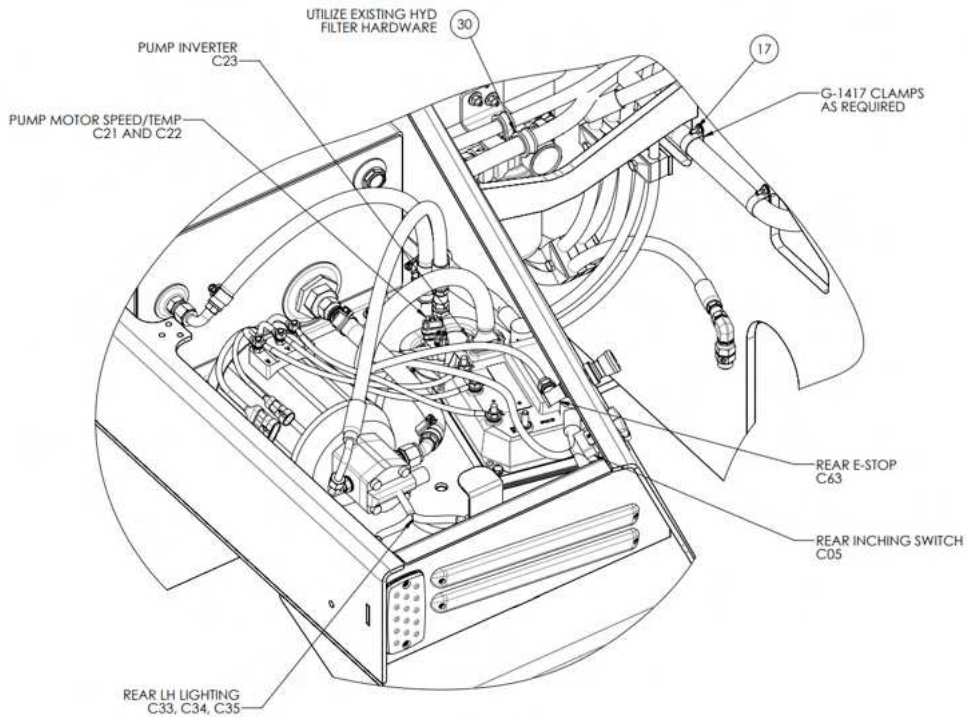
13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)



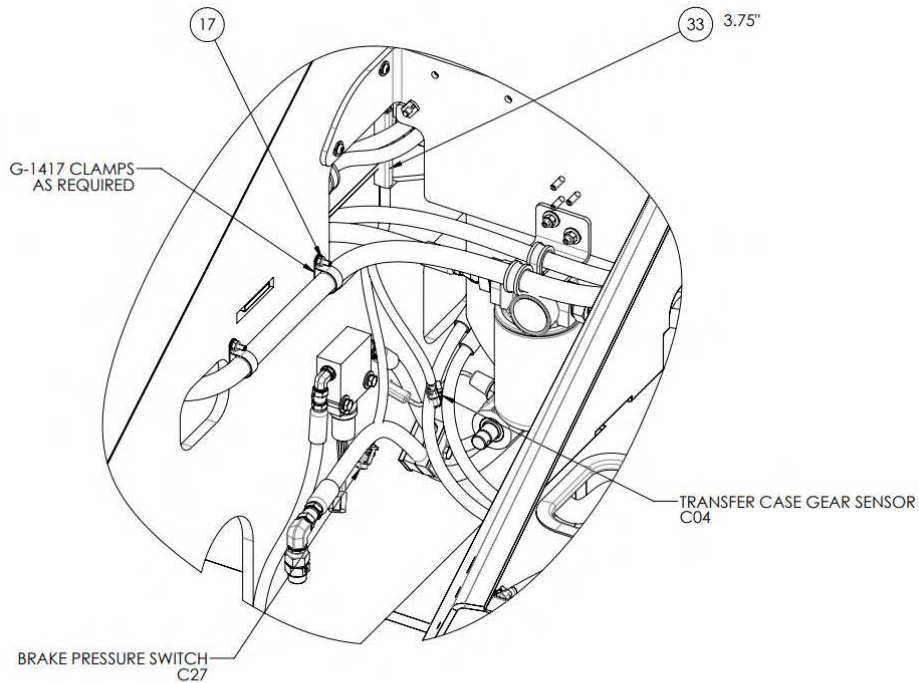
13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)



13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)

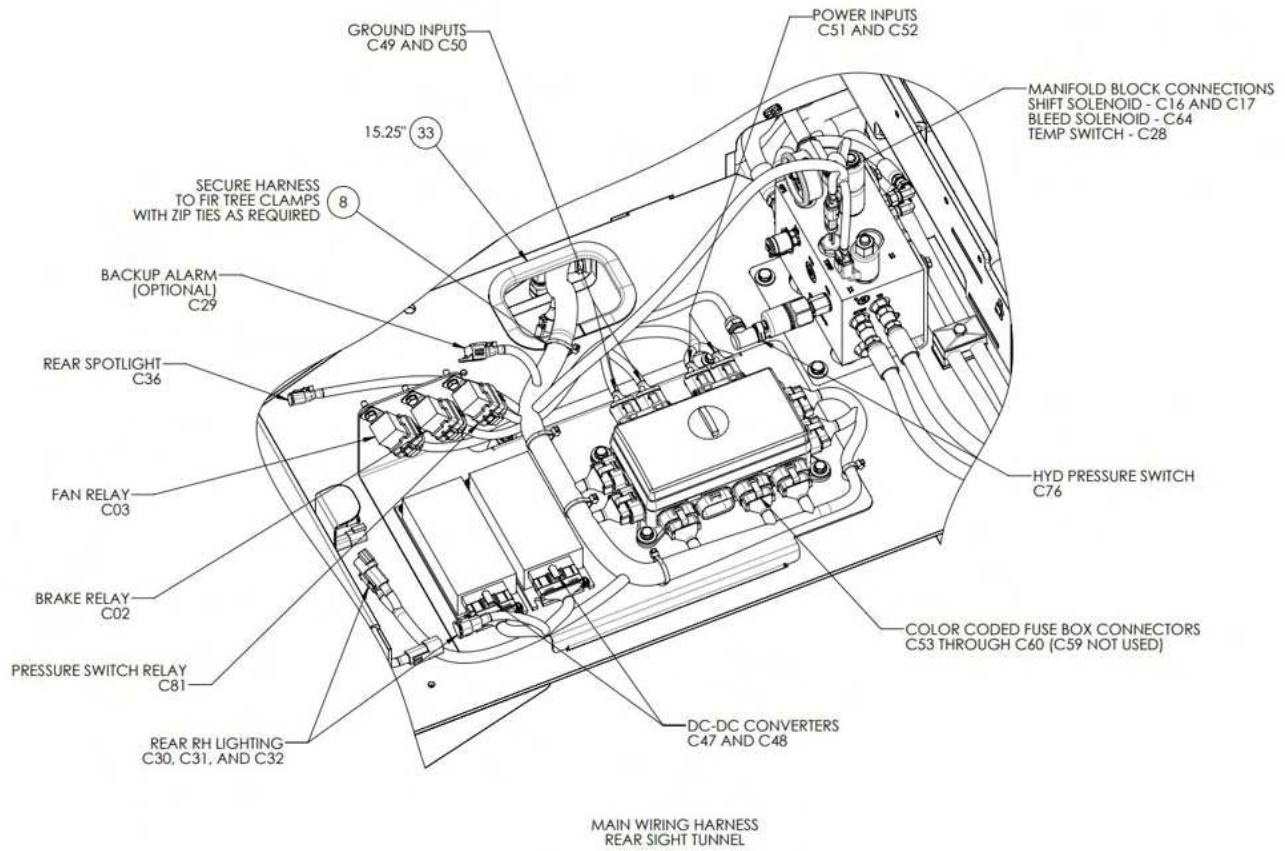


MAIN WIRING HARNESS
REAR LH HYDRAULIC COMPARTMENT



MAIN WIRING HARNESS
REAR SIGHT TUNNEL

13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)





13.5 ASSEMBLY, ELECTRICAL SYSTEM (continued)

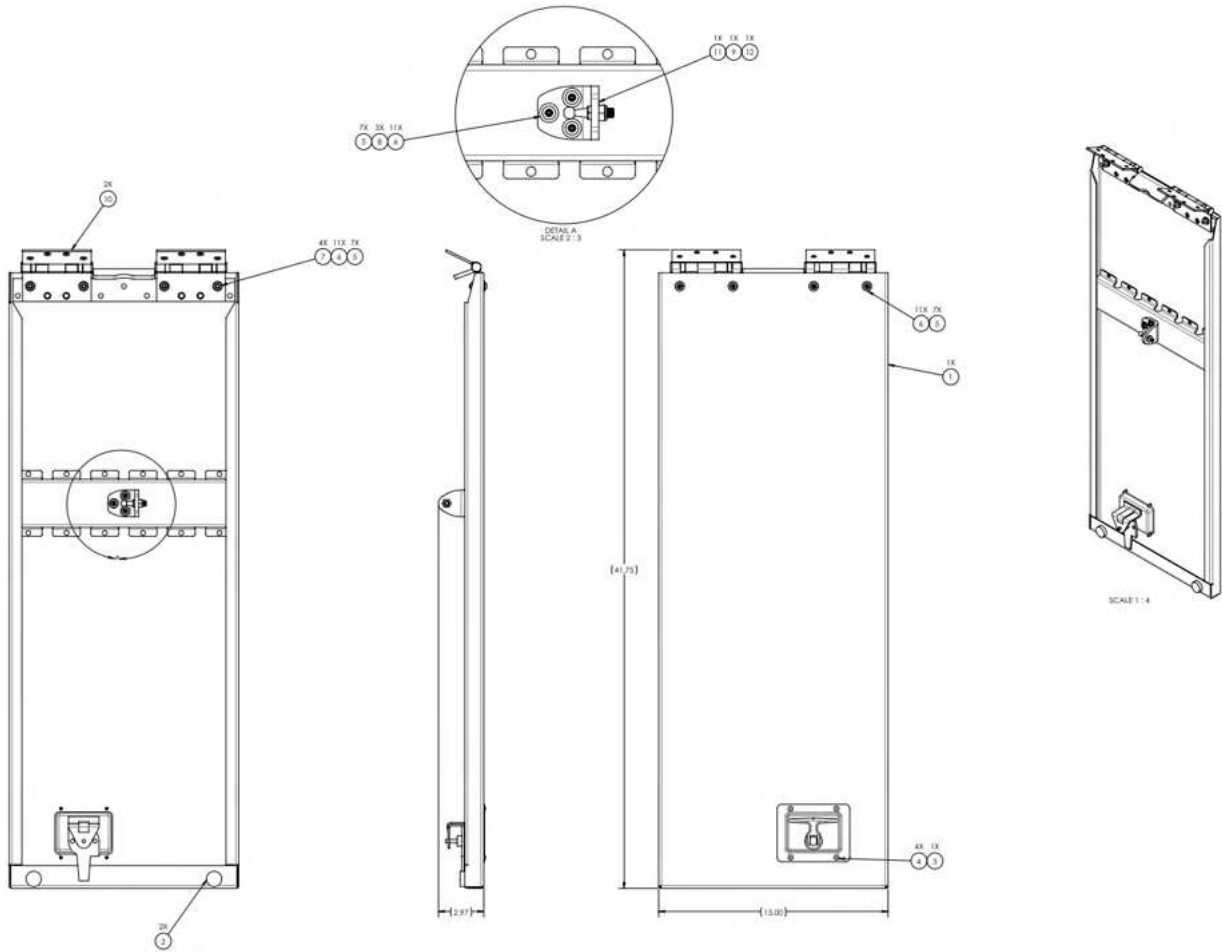
Parts List

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

Item	Part Number	Description	Qty
1	324-042	BOLT, CARRIAGE, 3/8-16 X 1 1/2 SS	1
2	326-009	BHCS, 1/4-20 x 1" LG	4
3	A-RTT12-00052	ELECTRONIC HORN	1
4	EC-3356	CAN ISOLATOR	1
5	EC-3399	E-STOP, IP67	2
6	EC-3440	PUMP DRIVE-INMOTION ACS80S	1
7	EC-3483	DASH HARNESS	1
8	EC-3487	MAIN VEHICLE HARNESS	1
9	ET00-14-001-CA	SVR ROCKER, (ON)-NONE-(ON), SPDT	2
10	G-1100-105010	BOLT, 1/4-20 X 1.0" LG HEX HD GR 5	4
11	G-1100-105016	BOLT, 1/4-20 X 1-3/4" LG HEX HD GR 5	4
12	G-1151-102006	SCREW, #8-32 X 3/4" SOCKET HD CAP	18
13	G-1154-100004	SCREW, #4-40 X 1/2" LG. SOC BUTT. HD CAP	4
14	G-1178-103005	SCREW, #10 X 5/8 PAN HEAD SELF TAPPING	4
15	G-1202-1000	STOPNUT, #4-40 ELASTIC	4
16	G-1202-1020	STOPNUT, #8-32 ELASTIC	18
17	G-1202-1035	STOPNUT, #10-32 ELASTIC	14
18	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	1
19	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	3
20	G-1250-1000N	FLATWASHER, #4 NARROW	4
21	G-1250-1020N	FLATWASHER, #8 NARROW	18
22	G-1250-1050N	FLATWASHER, 1/4 NARROW	4
23	G-1250-1050W	FLATWASHER, 1/4 WIDE	4
24	G-1250-1060N	FLATWASHER, 5/16 NARROW	6
25	G-1250-1060W	FLATWASHER, 5/16 WIDE	3
26	G-1251-1050R	LOCKWASHER, 1/4 REGULAR	7
27	G-1251-1060R	LOCKWASHER, 5/16 REGULAR	3
28	G-1420-106010	BOLT, 5/16-18 X 1.0" LG. HEX HD GR 8	3
29	G-1420-106012	BOLT, 5/16-18 X 1-1/4" LG. HEX HD GR 8	3
30	H-3521-11	CLAMP, CUSHIONED LOOP 1"	1
31	NVSP-14-033-CA	THROTTLE PEDAL DUAL ANALOG	1
32	NVSP-24-022-CA	CABLE TIE ANCHOR STD (Ø.375 X .27 THK)	10
33	NVSP-24-042-CB	METAL CORE PLASTIC EDGE TRIM - 1/4	70"
34	NVSP-31-002-CA	SEALED RELAY	1
35	Refer above section	ASY, BATTERY CABLES	1
36	Kit, TBC	TAIL LIGHT WITH CONNECTOR	2
37	Kit, TBC	REVERSE LIGHT WITH CONNECTOR	2
38	Refer above section	ASY, ELECTRICAL PANEL	1
39	Refer above section	ASSY, ELECTRICAL PANEL	1
40	Refer above section	ASY, CHARGE JACK SUB	1
41	Kit, TBC	ASY, WORKLIGHT WITH CONN	2
42	Kit, TBC	ASY, TURN IND W/CONNECTOR	4

14.0 ASSEMBLY, STD COLOR PANELS

14.1 ASSEMBLY, REAR MIDDLE DOOR

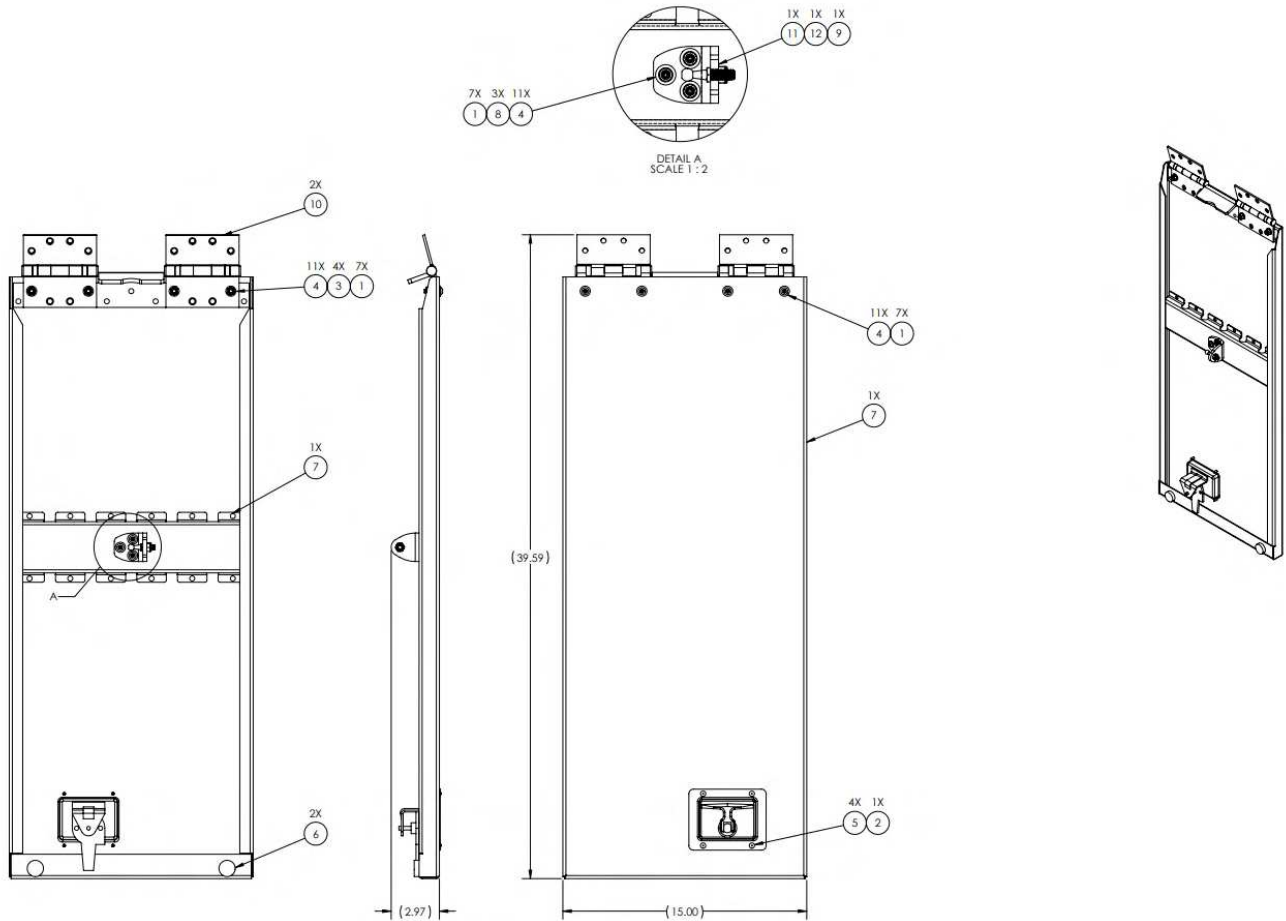


Parts List

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

Item	Part Number	Description	Qty
1	Z-11874-00	WLD, REAR MIDDLE DOOR (WP)	1
2	NVSP-21-004-CA	RUBBER PRESS-IN BUMPER	2
3	C-TT4-0012-2	T HANDLE LATCH	1
4	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	4
5	326-009	BHCS, 1/4-20 x 1" LG	7
6	G-1250-1050N	FLATWASHER, 1/4 NARROW	11
7	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	4
8	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	3
9	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	1
10	H-5034	HINGE	2
11	S-4348-00	MOUNT BRACKET (P)	1
12	394-069	BALL STUD FOR GAS SPRING	1

14.2 ASSEMBLY, MOTOR DOOR

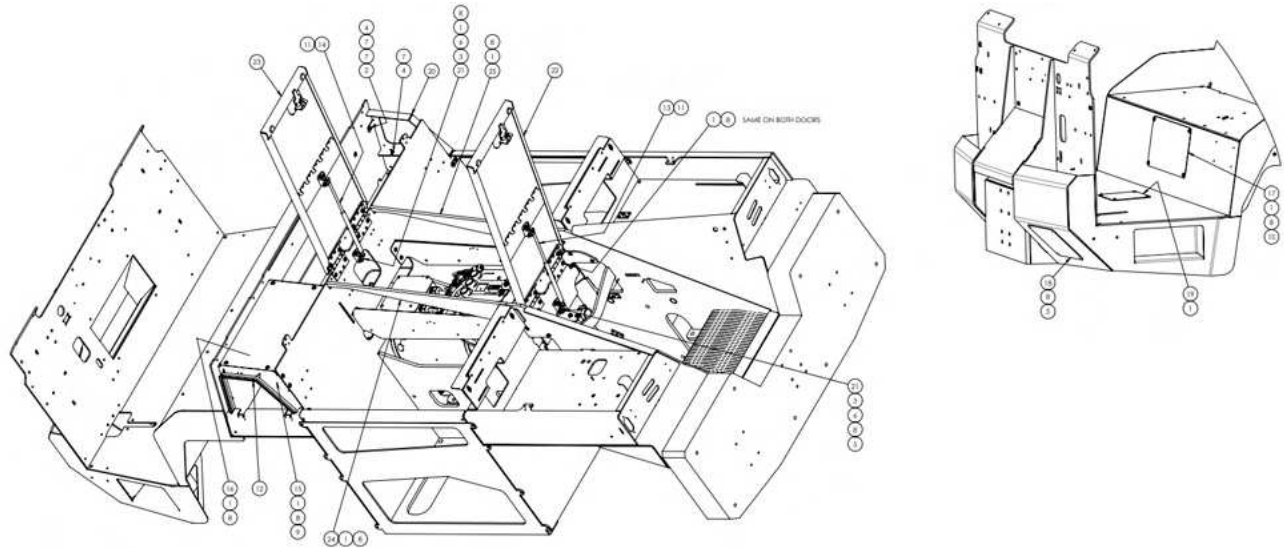


Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	7
2	C-TT4-0012-2	T HANDLE LATCH	1
3	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	4
4	G-1250-1050N	FLATWASHER, 1/4 NARROW	11
5	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	4
6	NVSP-21-004-CA	RUBBER PRESS-IN BUMPER	2
7	Z-11877-00	WLD, MOTOR DOOR (WP)	1
8	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	3
9	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	1
10	H-5034	HINGE	2
11	S-4348-00	MOUNT BRACKET (P)	1
12	394-069	BALL STUD FOR GAS SPRING	1

14.3 ASSEMBLY, STANDARD COLOR PANELS

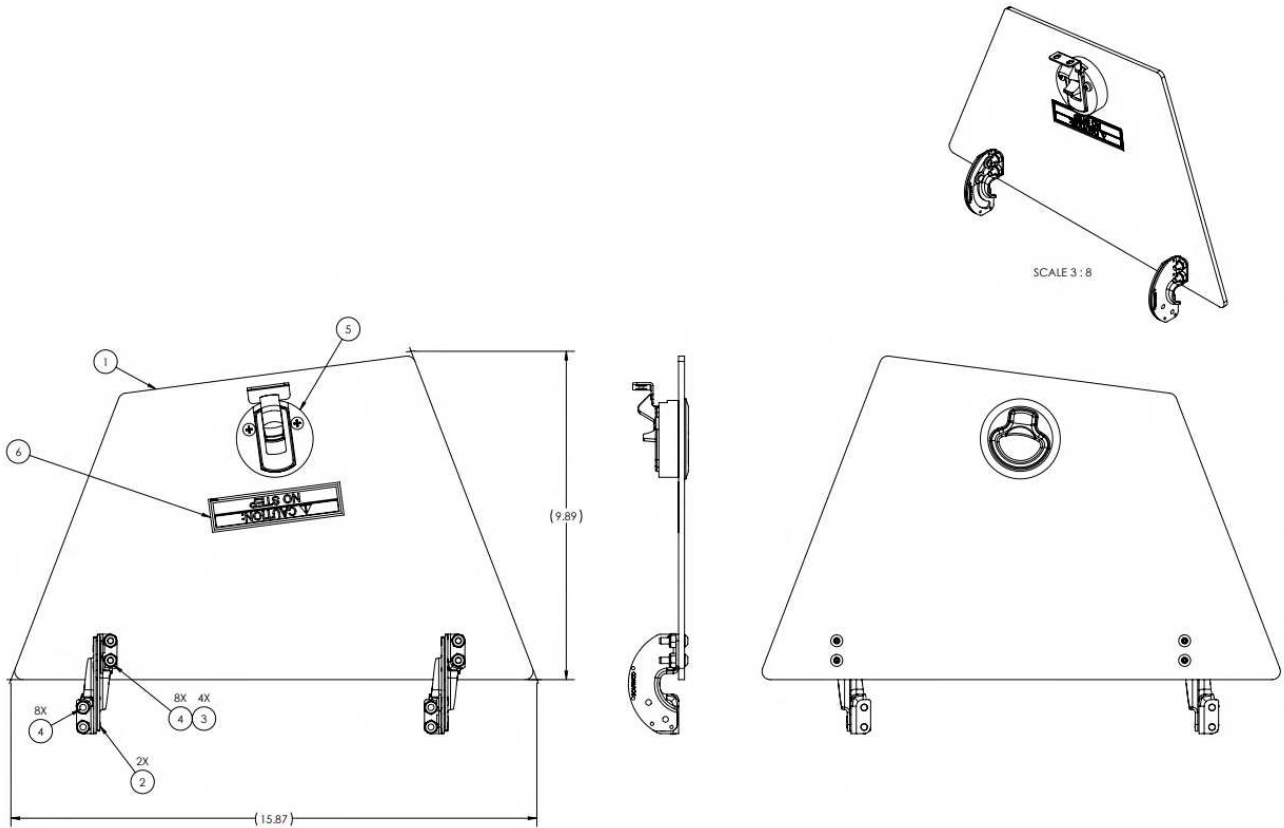


Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	31
2	326-038	BHCS, 10-32 x 3/4 LG	1
3	394-069	BALL STUD FOR GAS SPRING	2
4	G-1202-1035	STOPNUT, #10-32 ELASTIC	3
5	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	7
6	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	2
7	G-1250-1030N	FLATWASHER, #10 NARROW	4
8	G-1250-1050N	FLATWASHER, 1/4 NARROW	34
9	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	6
10	G-1440-1050-S	NUTSERT, THICK WALL 1/4-20	6
11	H-4652	END FITTING FOR GAS SPRING	4
12	H-4931-26.1	BULB SEAL, PUSH ON	1
13	H-5041	GAS SPRING	1
14	H-5043	GAS SPRING	1
15	S-4198-00	LOCKER THRESHOLD (P)	1
16	S-4214-00	LOCKER ROOF (P)	1
17	S-4226-00	ACCESS PANEL (WP)	1
18	S-4301-00	BRAKE ACCESS COVER (WP)	1
19	S-4333-00	COVER, BALLAST ACCESS (P)	1
20	S-4343-00	ELECTRICAL FAUX FRAME (P)	1
21	S-4348-00	MOUNT BRACKET (P)	2
22	Refer above section	ASY, REAR MIDDLE DOOR	1
23	Refer above section	ASY, MOTOR DOOR	1
24	Z-11882-00	WLD, GAP PATCH, LH (WP)	1
25	Z-11883-00	WLD, GAP PATCH, RH (WP)	1

15.0 ASSEMBLY, ALT COLOR PANELS
15.1 STORAGE DOOR SUB

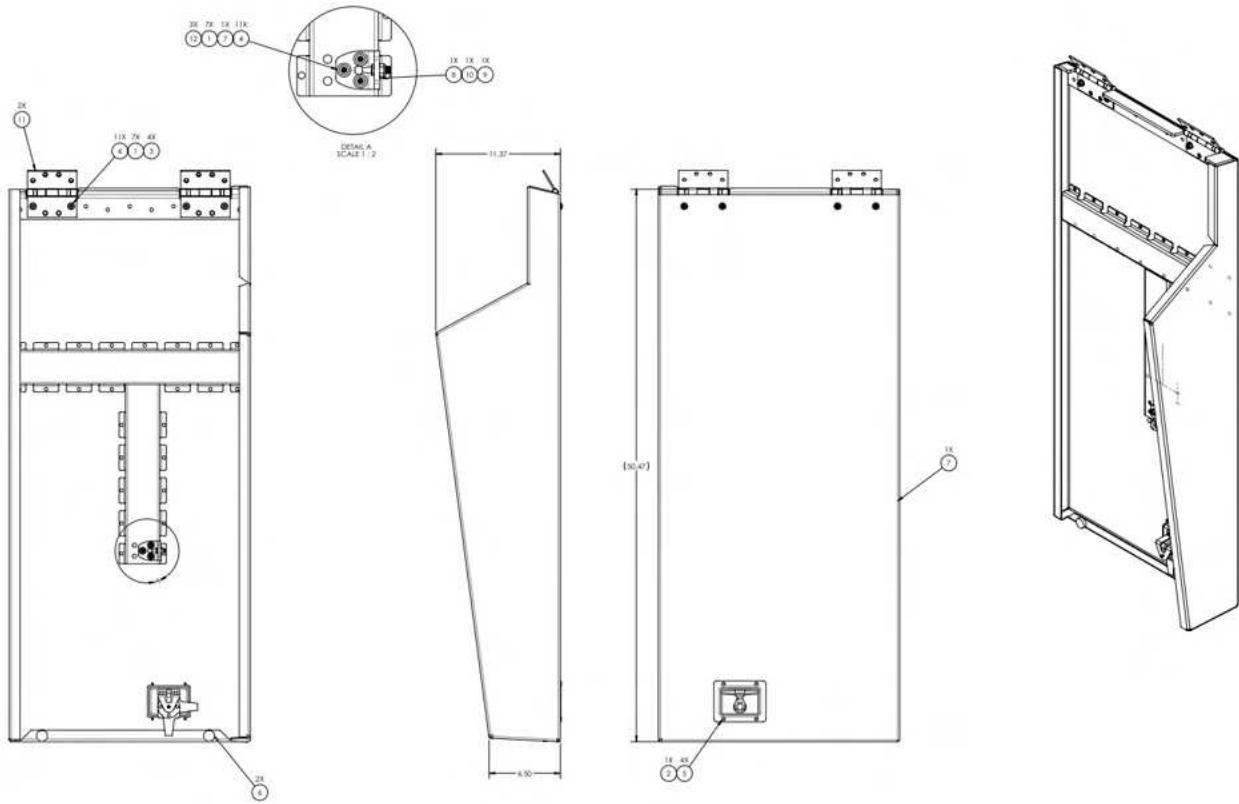


Parts List

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

Item	Part Number	Description	Qty
1	J-8229-00	STORAGE ACCESS DOOR (P)	1
2	H-5028	HINGE, CONCEALED, 90	2
3	326-038	BHCS, 10-32 x 3/4 LG	4
4	G-1202-1035	STOPNUT, #10-32 ELASTIC	8
5	H-4927	LATCH, STAINLESS, 1/8"-1/4" DOOR THICKNESS	1
6	V-2545	LABEL, NO STEP	1

15.2 ASSEMBLY, BATTERY DOOR, LH

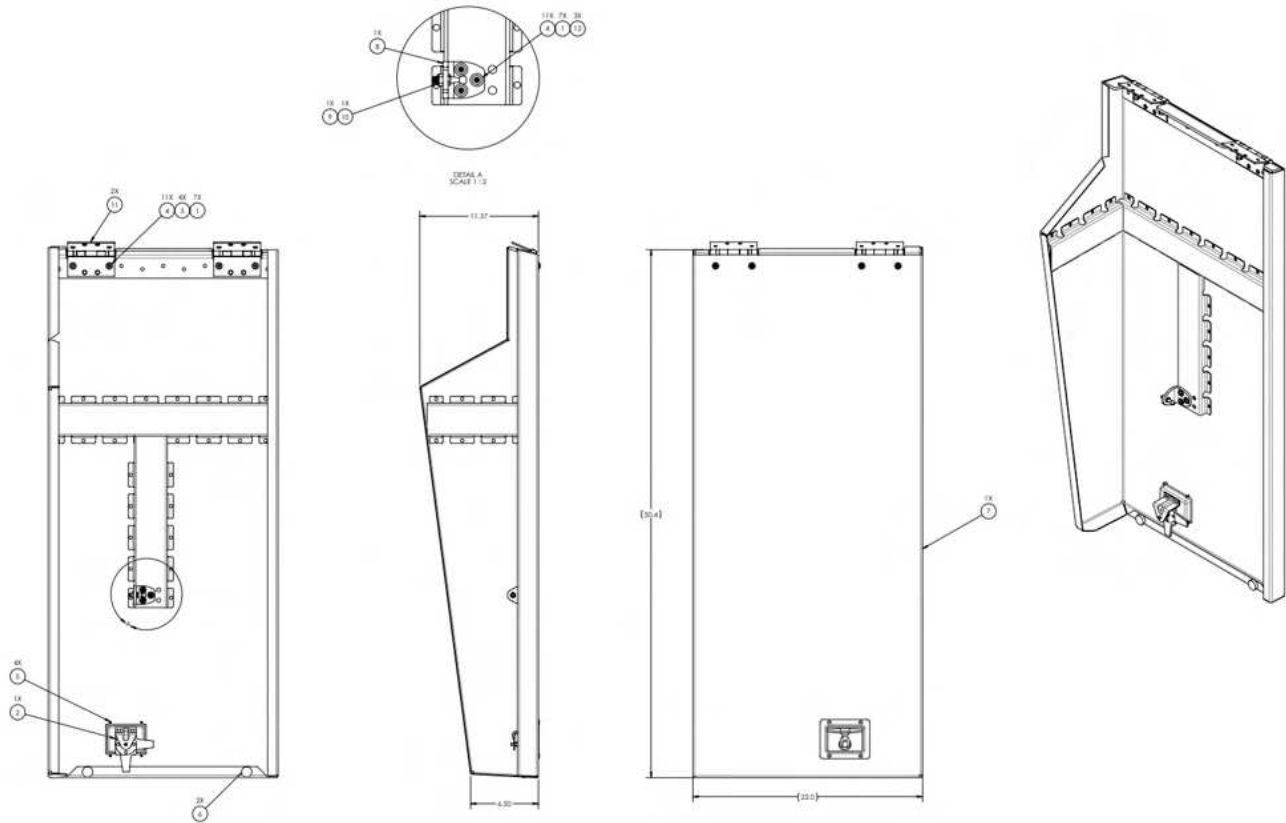


Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	7
2	C-TT4-0012-2	T HANDLE LATCH	1
3	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	4
4	G-1250-1050N	FLATWASHER, 1/4 NARROW	11
5	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	4
6	NVSP-21-004-CA	RUBBER PRESS-IN BUMPER	2
7	Z-11858-00	WLD, BATTERY DOOR, LH (P)	1
8	S-4348-00	MOUNT BRACKET (P)	1
9	394-069	BALL STUD FOR GAS SPRING	1
10	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	1
11	H-5034	HINGE	2
12	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	3

15.3 ASSEMBLY, BATTERY DOOR, RH

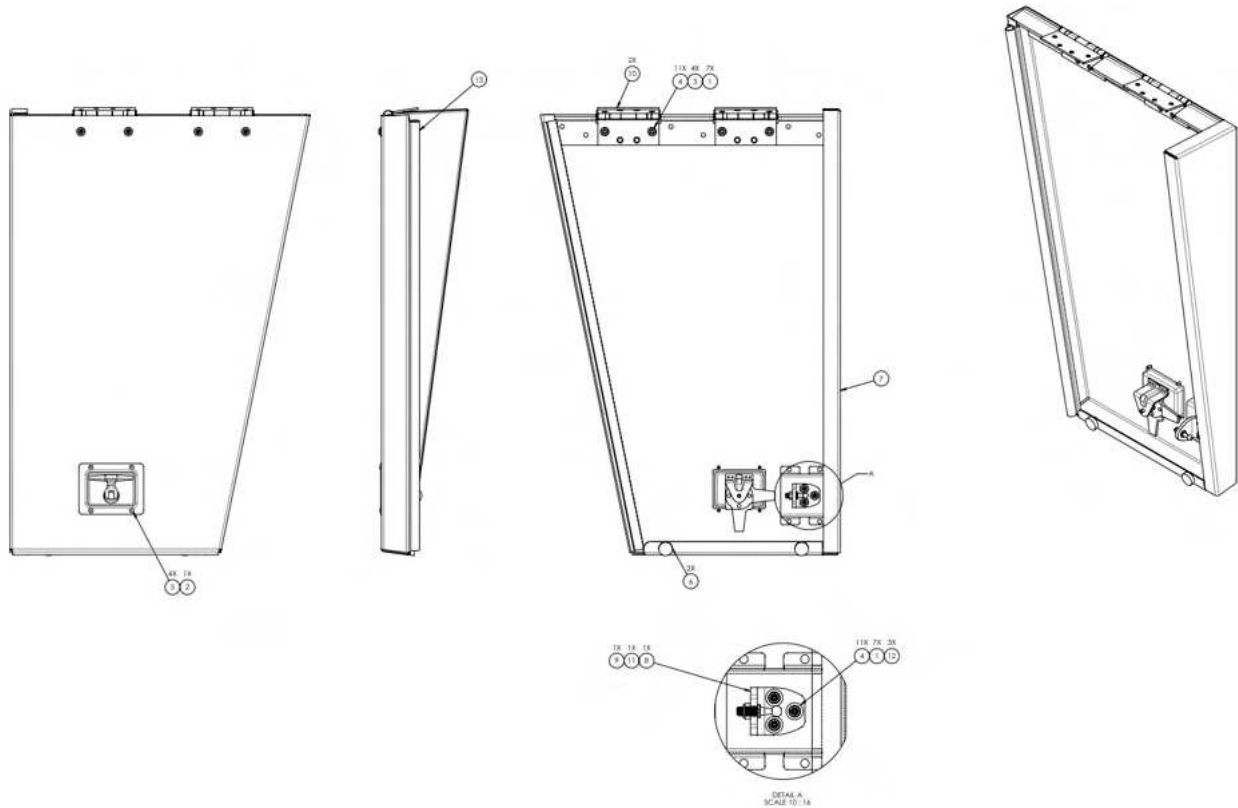


Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	7
2	C-TT4-0012-2	T HANDLE LATCH	1
3	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	4
4	G-1250-1050N	FLATWASHER, 1/4 NARROW	11
5	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	4
6	NVSP-21-004-CA	RUBBER PRESS-IN BUMPER	2
7	Z-11864-00	WLD, BATTERY DOOR, RH (P)	1
8	S-4348-00	MOUNT BRACKET (P)	1
9	394-069	BALL STUD FOR GAS SPRING	1
10	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	1
11	H-5034	HINGE	2
12	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	3

15.3 ASSEMBLY, REAR DOOR, LH (continued)

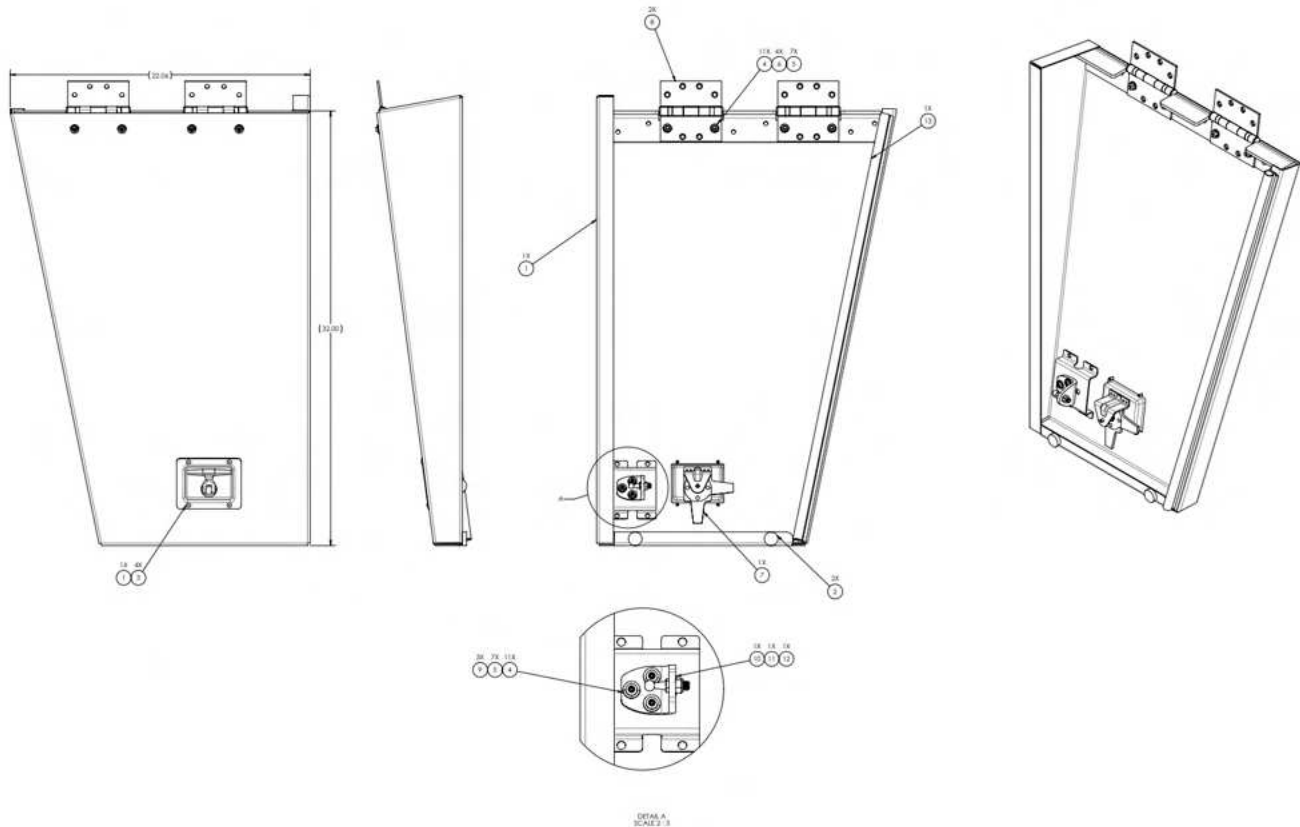


Parts List

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

Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	7
2	C-TT4-0012-2	T HANDLE LATCH	1
3	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	4
4	G-1250-1050N	FLATWASHER, 1/4 NARROW	11
5	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	4
6	NVSP-21-004-CA	RUBBER PRESS-IN BUMPER	2
7	Z-11870-00	WELD, REAR DOOR, LH (P)	1
8	S-4348-00	MOUNT BRACKET (P)	1
9	394-069	BALL STUD FOR GAS SPRING	1
10	H-5034	HINGE	2
11	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	1
12	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	3
13	H-5040	PUSH-ON BULB SEAL	1

15.3 ASSEMBLY, REAR DOOR, LH (continued)



Parts List

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

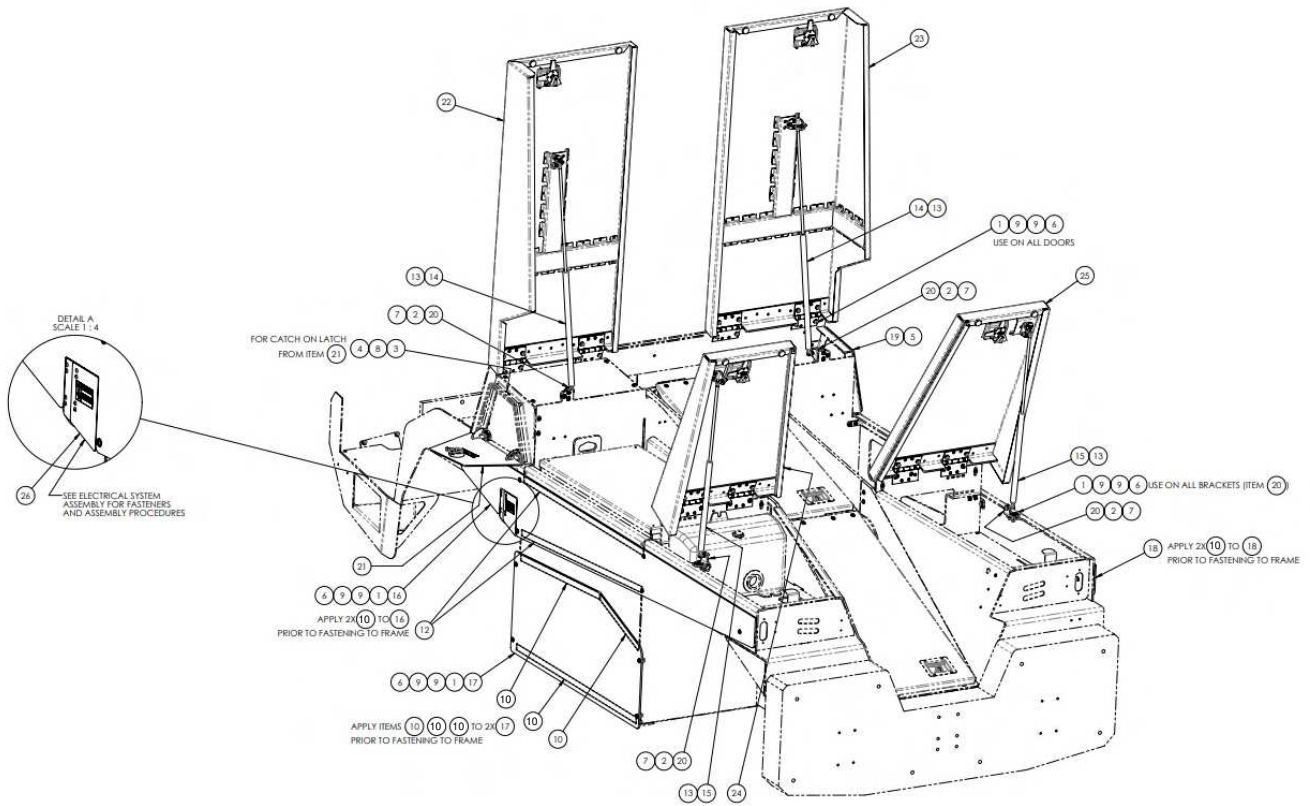
Item	Part Number	Description	Qty
1	Z-11872-00	WELD, REAR DOOR, RH (P)	1
2	NVSP-21-004-CA	RUBBER PRESS-IN BUMPER	2
3	G-1351-13-SS	RIVET, 5/32 OPEN-END SS	4
4	G-1250-1050N	FLATWASHER, 1/4 NARROW	11
5	326-009	BHCS, 1/4-20 x 1" LG	7
6	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	4
7	C-TT4-0012-2	T HANDLE LATCH	1
8	H-5034	HINGE	2
9	G-1439-1050-S	NUTSERT, 1/4-20 OPEN END	3
10	S-4348-00	MOUNT BRACKET (P)	1
11	394-069	BALL STUD FOR GAS SPRING	1
12	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	1
13	H-5040	PUSH-ON BULB SEAL	1



Model: eTT-8X / eTT-12X
Electric Tow Tractor

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15.4 ASSEMBLY, ALT COLOR PANELS



NOTE:

ORDER OF ASSEMBLY OF DOORS FOR EASE OF INSTALLATION:

- 1 Z-11869 ASY, REAR DOOR, LH (ASSEMBLE HYDRAULIC OIL TANK TO FRAME PRIOR TO ASSEMBLY OF THIS DOOR.)
- 2 Z-11871 ASY, REAR DOOR, RH
- 3 Z-11857 ASSY, BATTERY DOOR, LH
- 4 Z-11863 ASY, BATTERY DOOR, RH



15.4 ASSEMBLY, ALT COLOR PANELS (continued)

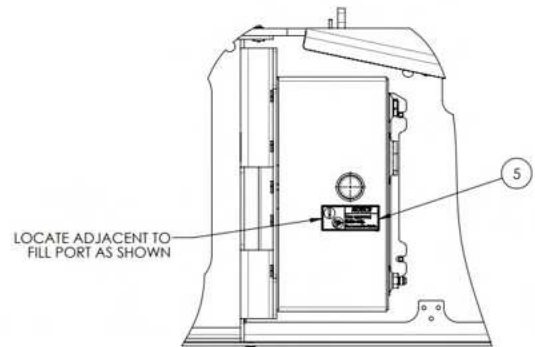
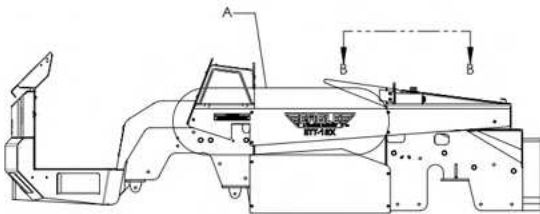
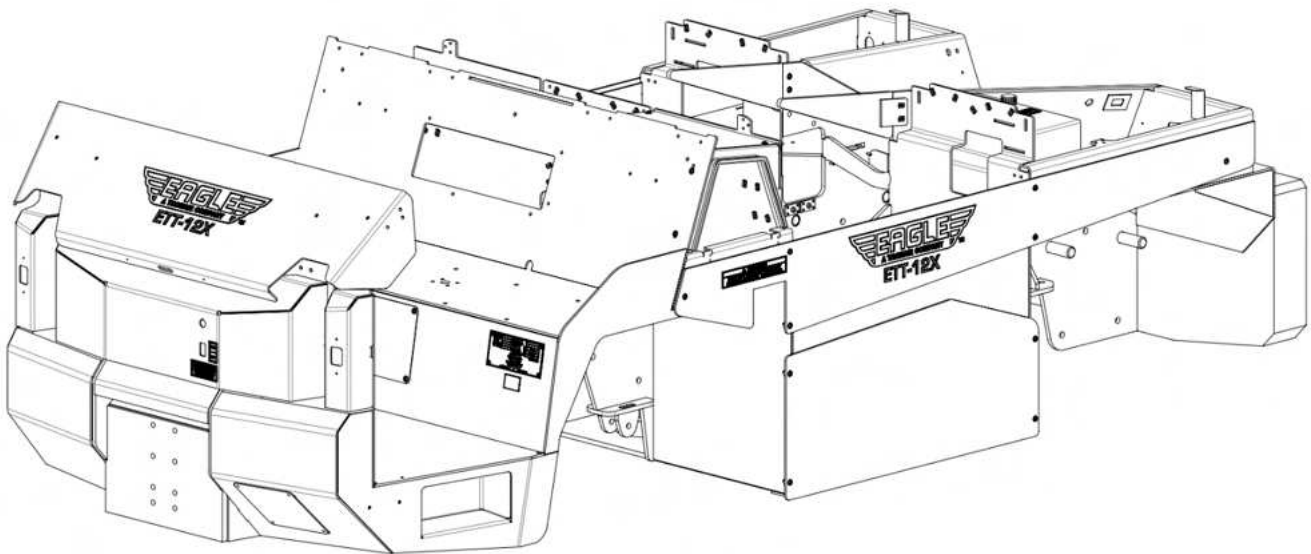
Parts List

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

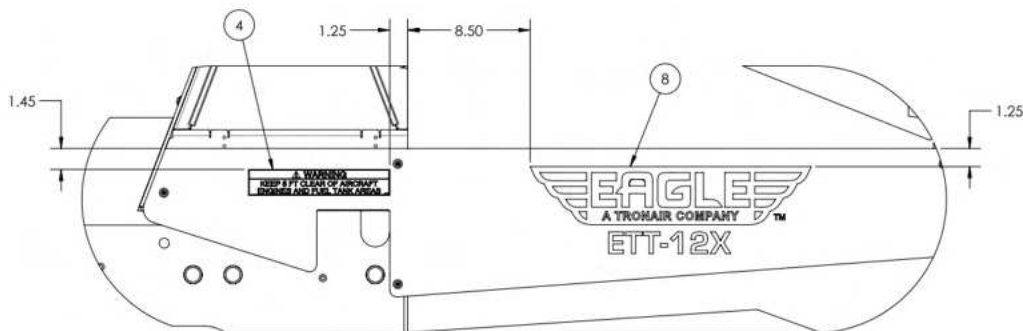
Item	Part Number	Description	Qty
1	326-009	BHCS, 1/4-20 x 1" LG	48
2	394-069	BALL STUD FOR GAS SPRING	4
3	G-1154-102204	SCREW, #8-32 X .50" LG. SOC BUTT. HD CAP	2
4	G-1202-1020	STOPNUT, #8-32 ELASTIC	2
5	G-1202-1035	STOPNUT, #10-32 ELASTIC	4
6	G-1202-1050	STOPNUT, 1/4-20 ELASTIC	40
7	G-1202-1060	STOPNUT, 5/16-18 ELASTIC	4
8	G-1250-1020N	FLATWASHER. #8 NARROW	2
9	G-1250-1050N	FLATWASHER, 1/4 NARROW	88
10	H-1204-10	TAPE, NEOPRENE FOAM SEALING	As Needed
13	H-4652	END FITTING FOR GAS SPRING	8
14	H-4950	GAS SPRING	2
15	H-5031	GAS SPRING	2
16	J-7973-00	UPPER SIDE ARMOR, LH (P)	1
17	J-7974-00	LOWER SIDE ARMOR (P)	2
18	J-7975-00	UPPER SIDE ARMOR, RH (P)	1
19	J-8041-00	ELECTRICAL FAUX DOOR (P)	1
20	S-4348-00	MOUNT BRACKET (P)	4
21	Refer above section	STORAGE DOOR SUB	1
22	Refer above section	ASSY, BATTERY DOOR, LH	1
23	Refer above section	ASY, BATTERY DOOR, RH	1
24	Refer above section	ASY, REAR DOOR, LH	1
25	Refer above section	ASY, REAR DOOR, RH	1
26	Refer above section	ASY, CHARGE JACK SUB	1

16.0 ASSEMBLY, DECALS & LABELS

16.1 ASSEMBLY, DECALS & LABELS

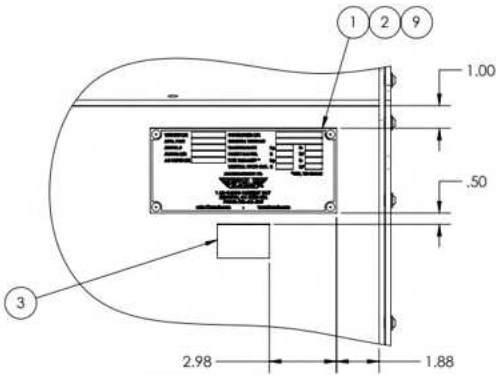
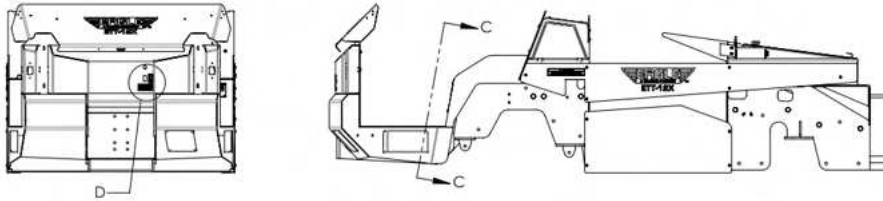


SECTION B-B

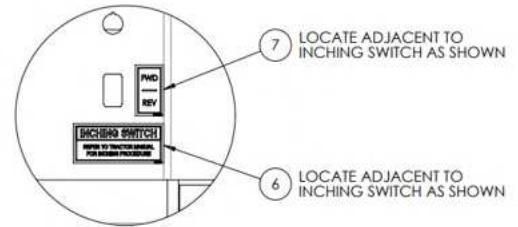


DETAIL A
2 PLCS, BOTH SIDES OF TRACTOR

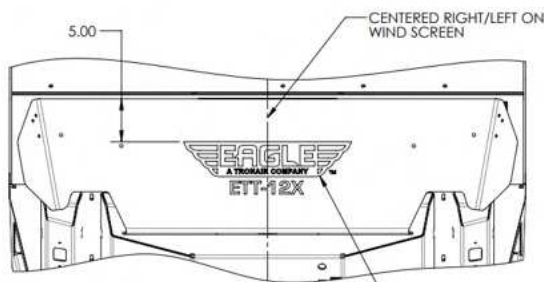
16.1 ASSEMBLY, DECALS & LABELS (continued)



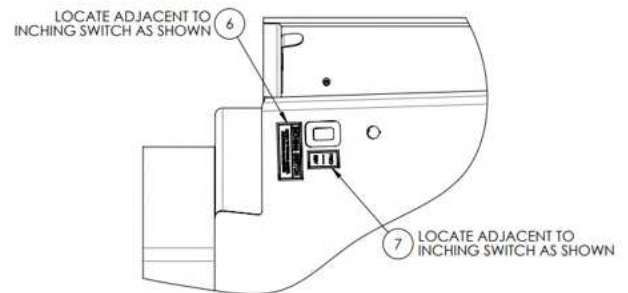
SECTION C-C



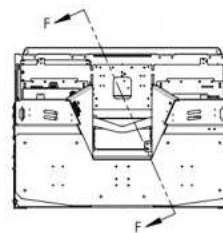
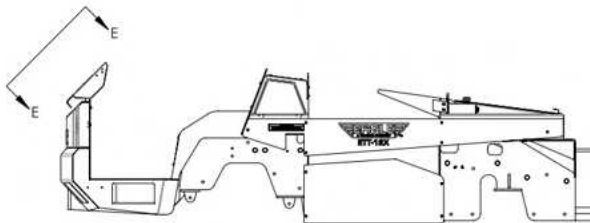
DETAIL D



VIEW E-E
45.0°



SECTION F-F
SCALE 1 : 6





16.1 ASSEMBLY, DECALS & LABELS (continued)

Parts List

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

Item	Part Number	Description	Qty
1	ET00-14-005-SA	DATA PLATE - ETT AND MTT	1
2	G-1351-26-SS	RIVET, 3/16 X .501-.625 OPEN-END SS	4
3	V-1001	LABEL, MADE IN USA	1
4	V-1814	LABEL, WARNING KEEP 5 FT	2
5	V-2745	LABEL, APPROVED FLUIDS NOTICE	1
6	V-2873	LABEL, INCHING SWITCH	2
7	V-2893	FWD/REV DECAL	2
8	V-2943	TRACTOR DECAL, ETT-12X	3
9	INS-2731	INS, ELECTRIC TUGS DATA PLATES	1



17.0 PROVISION OF SPARES

17.1 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

17.2 ORDERING SPARE/SERVICE PARTS

Eagle inventories many of the spare/service parts found in its eTT 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.

17.3 RECOMMENDED SPARE PARTS LIST

Description	Part Number	Suggested Replacement Interval
Hydraulic Filter	A-ES12-0485	Annually
Key Switch Contactor	EC-3006	As Required
Drive Contactor	Z-11102	As Required
ANL Fuse – 500A (Traction)	EC-1619-19	As Required
ANL Fuse – 150A (Pump/Charge)	EC-1619-09	As Required
Key Switch Relay	NVSP-31-002-CA	As Required
Mini Fuse, 2A (Power Dist. Box)	MIN-2	As Required
Mini Fuse, 5A (Power Dist. Box)	MIN-5	As Required
Mini Fuse, 7.5A (Power Dist. Box)	MIN-7.5	As Required
Mini Fuse, 10A (Power Dist. Box)	MIN-10	As Required
Mini Fuse, 15A (Power Dist. Box)	MIN-15	As Required
Cube Relay (Power Dist. Box)	XL00-81-001-CA	As Required
10X38 FUSE, 250V, 1A	BLN-1	As Required
10X38 FUSE, 250V, 1A	BLN-10	As Required
Headlight	EC-3400	As Required
Front Turn Indicator	Z-9826	As Required
Reverse Lamp	Z-11367	As Required
Amber Marker Lamp	Z-9826	As Required
Work light	Z-11367	As Required
Stop/Tail/Turn Lamp	Z-11366	As Required
12V DC-DC Converter	AE-OPT-0320-B	As Required
Hydraulic Block Coil Kit	ET00-59-001-CA	As Required
Drive Cooling Fan	Z-11062	As Required
Parking Brake Proximity Switch	Z-9940	As Required
Hydraulic Pressure Switch	EC-3493-PGM-1	As Required
Tire, 7.00 R12 TL	Z-11335	As Required
Traction Motor Encoder	ET00-54-001-CA	As Required



18.0 IN SERVICE SUPPORT

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

18.1 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.



19.0 GUARANTEES/LIMITATION OF LIABILITY - EAGLE 3-YEAR WARRANTY

The Eagle Tugs (Eagle) 3-Year Warranty covers all NEW TT-series, TTR-series, eTT-series, XL-series, eXL-series and USATS tow tractors, used in aviation applications. Eagle Tugs warrants that these tractors will be free from defects in material and workmanship for a period of 3 years or 3,000 operating hours from date of delivery, with the exception of the electrical system which is covered for a period of 1 year or 1,000 hours (See electrical component warranty for eTT & eXL electric tow tractors below).

Electrical Component Warranty for eTT & eXL electric tow tractors: The following electrical components will be covered under Eagle's 3-year Warranty as they are considered major drive train components: Traction & Hydraulic Pump Motors, Drive Inverter for both the Traction and Hydraulic Pump Motors, Main & Pump Contactors, High and Low Hydraulic Pressure Switches, Steer & Shift Solenoids, DC-DC Converters, and the Programmable Vehicle Controller. 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 apply to any Eagle tow tractor, or component part(s) that have damage caused by: misuse of the vehicle, accidents, collision or object 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. However, all brackets, guards, and mounts made by Eagle for these options are covered under the 3-year Warranty.

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 damages

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.

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 damaged upon return. This warranty does not extend beyond its original term for any Eagle tow tractor or part replaced or repaired under warranty.

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

Please check our website www.eagletugs.com periodically for service bulletins and updates to manuals.

*Note: The Eagle Tugs 3-Year Warranty covers TT-series, TTR-series, eTT-series, XL-series, eXL-series and USATS tow tractors used in aviation applications. All MTT, RTT-series, Transit Pro tow tractors, and all Eagle models which are used in non-aviation/industrial applications are covered under the Eagle Standard Warranty of 1 Year or 2,000 hours. Eagle Bob Tails are covered under Ford Motor Company's Standard Warranty for each respective Ford truck model.



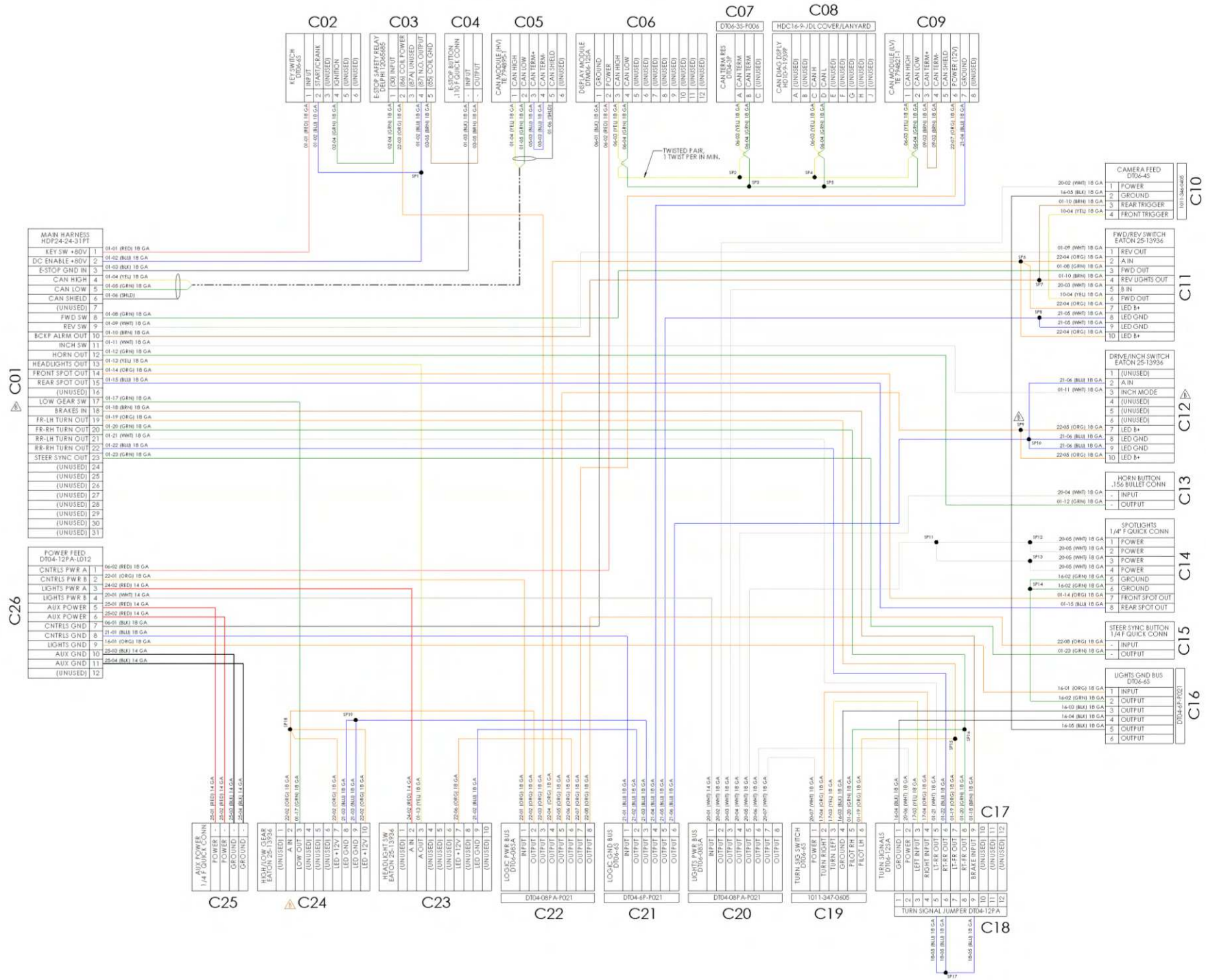
20.0 APPENDICES

- APPENDIX I Dash Panel Harness (INS-2771)
- APPENDIX II Main Vehicle Harness (INS-2774)
- APPENDIX III Hydraulic Schematic (INS-2777)



APPENDIX I

Dash Panel Harness (INS-2771)





APPENDIX II

Main Vehicle Harness (INS-2774)

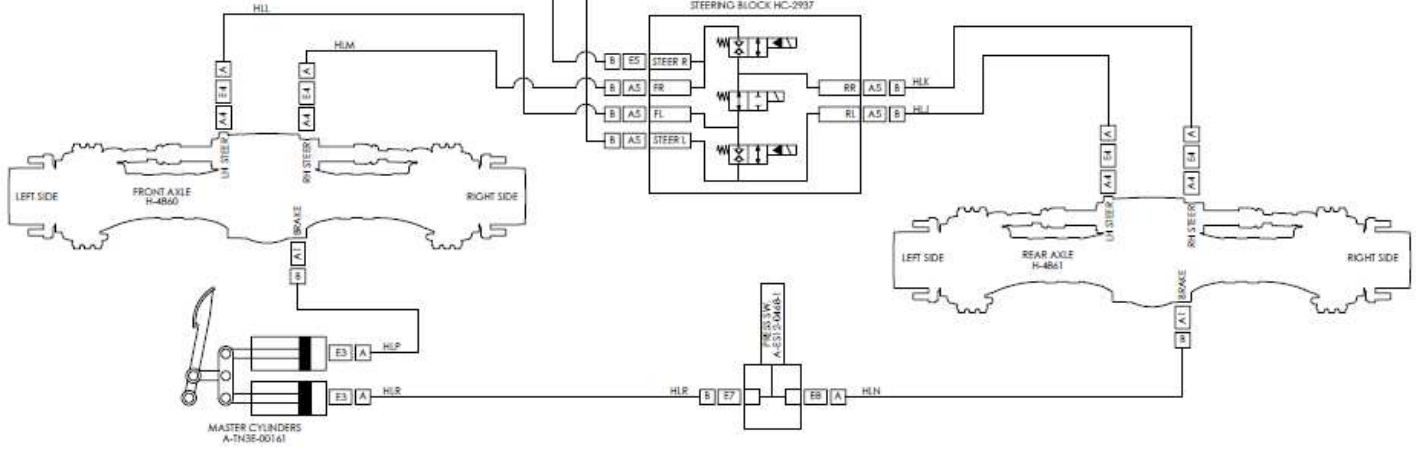
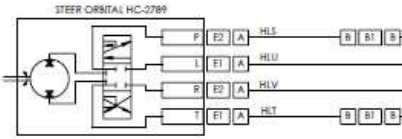
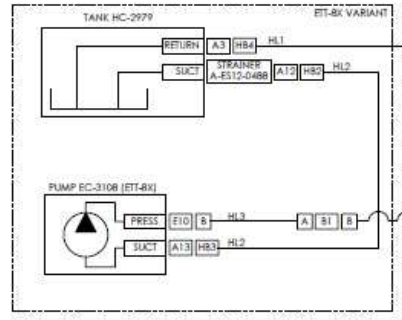
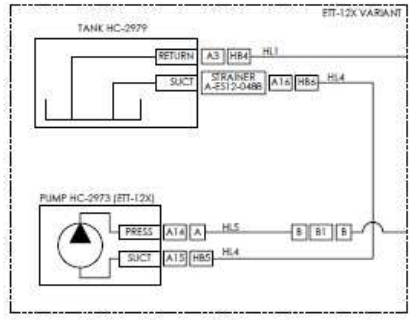


APPENDIX III

Hydraulic Schematic (INS-2777)

ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN INCHES AND DECIMALS THEREOF.
 DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS.
 UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE TO CENTERLINE UNLESS OTHERWISE SPECIFIED.

REVISIONS					
REV	DESCRIPTION	ECN	OWN	CHK	DATE
A	ORIGINAL RELEASE	28332	-	-	11/17/2022



FITTING TABLE					
ITEM	DESCRIPTION	PART NO.	QTY BX	QTY 12X	
A1	BANJO FITTING, M10X1.0 M METRIC ORB X .04 M JIC	N-3181	2	2	
A2	ADAPTER, .20 SAE M ORB X .08 SAE F ORB	20-8 25005-3	1	1	
A3	ADAPTER, .08 SAE M ORB X .06 M JIC	N-2007-09-3-B	3	3	
A4	ADAPTER, M18X1.5 M METRIC ORB X .08 M JIC	N-3054-10M18-5B	4	4	
A5	ADAPTER, .04 M SAE ORB X .06 M JIC	N-2007-08-5-B	8	8	
A6	ADAPTER, M14X1.5 M METRIC ORB X .06 M JIC	MC531556X14	2	2	
A7	ADAPTER, .04 M SAE ORB X .04 M JIC, .001 ORIFICE	E202-09-003-CA	1	1	
A8	ADAPTER, .04 M SAE ORB X .04 M JIC	N-2007-03-5-B	1	1	
A9	ADAPTER, .04 M SAE ORB X .04 F BSPP	N-2844-02	1	1	
A10	TEST PORT ADAPTER, .04 M SAE ORB	N-2544-04	1	1	
A11	ADAPTER, .12 M SAE ORB X .08 M JIC	N-2007-14-5-B	3	3	
A12	ADAPTER, .14 M SAE ORB X .10 M JIC	N-2007-45-5-B	1	1	
A13	ADAPTER, M18X1.5 M METRIC ORB X .10 M JIC	N-3054-10M18-5B	1	1	
A14	ADAPTER, .10 M SAE ORB X .06 M JIC	C53156X10	-	1	
A15	ADAPTER, .12 M SAE ORB X .12 M JIC	N-2007-18-5-B	-	1	
A16	ADAPTER, .14 M SAE ORB X .12 M JIC	C5315012X14	-	1	
E1	ELBOW 90° LONG, .08 M SAE ORB X .06 M JIC	4-8 CC303X-3	2	2	
E2	ELBOW 90°, .08 M SAE ORB X .08 M JIC	N-2001-09-5-B	2	2	
E3	ELBOW 90°, 1/8 M NPT X .04 M JIC	N-2005-03-5	2	2	
E4	ELBOW 90°, .08 F JIC X .04 M JIC	N-2000-15-5	4	4	
E5	ELBOW 90°, .04 M ORB X .04 M JIC	N-2001-08-5-B	1	1	
E6	ELBOW 90°, .06 F JIC X .04 M JIC	N-2002-14-5	2	2	
E7	ELBOW 45°, .04 M SAE ORB X .04 M JIC	N-2042-03-5-B	1	1	
E8	ELBOW 90°, .04 M ORB X .04 M JIC	N-2001-03-5-B	1	1	
E9	ELBOW 90°, .04 F JIC X .04 M JIC	N-2002-03-5	2	2	
E10	ELBOW 90° M14X1.5 M METRIC ORB X .06 M JIC	MC55156X14	1	1	
B1	BULKHEAD .04 M JIC X .04 M JIC WITH NUT	N-2041-03-5	3	3	
B2	BULKHEAD .08 M JIC X .08 M JIC WITH NUT	N-2041-04-5	1	1	
H81	HOSE BARB, .08 F JIC X 1/2" SAE	N-2003-05-5	1	1	
H82	HOSE BARB, .10 F JIC X 5/8" SAE	30685-10-10	1	1	
H83	HOSE BARB, ELBOW 45°, .10 F JIC X 5/8" SAE	N-2747-10-5	1	1	
H84	HOSE BARB, ELBOW 90°, .08 F JIC X 1/2" SAE	33982-8-9	1	1	
H85	HOSE BARB, ELBOW 90°, .12 F JIC X 3/4" SAE	33982-12-12	-	1	
H86	HOSE BARB, .12 F JIC X 3/4" SAE	30682-12-12	-	1	

- NOTES:
- SEE HYDRAULIC SYSTEM PRINT Z-11803 FOR FULL HYDRAULIC SYSTEM DETAILS.
 - SEE HOSE KIT I-5577 FOR HOSE KIT DETAILS. END "A" CORRESPONDS TO "END FITTING 1", AND END "B" CORRESPONDS TO "END FITTING 2" ON THE HOSE KIT PRINT.

DRAWN: N/A CHECKED: N/A DATE: N/A SCALE: 1:2 DO NOT SCALE DRAWING	SERIAL ALL SHOWN FIGURES AND DIMENSIONS EXCEPT FOR AS SHOWN IN THIS DRAWING COMPATIBLE IN THE FIELD AND TO BE USED FOR ALL OTHER RELATED DRAWINGS AND SPECIFICATIONS TRONAIR PER: [Signature] EJT DATE: 11/17/2022 SCHEMATIC, ETX HYDRAULICS INS-2777 SHEET 1 OF 1
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