

# Battery life with a CommandLIFT

There are countless types of batteries that are available for the over the road market. Selecting the right type of battery for the CommandLIFT / Purkeys auxiliary power unit is critical for continued long term trouble free operation.

Our recommendation is an AGM (absorbed glass mat) deep cycle battery.

AGM (Absorbed Glass Mat) batteries require no maintenance.

Deep cycle batteries can withstand deeper states of discharge with minimal effect on the overall life of the battery.

The less a battery is discharged before being recharged increases the life expectancy of the battery. Ideally a deep cycle battery doesn't go below a 30% discharge rate.

Meaning the battery is recharged at or above 70% capacity. Going below 70% doesn't have any adverse effects on the battery or performance; however going into that rate of depletion continually will reduce the overall life expectancy of the battery. For this reason a Group 31 battery is the recommended size. A Group 31 battery is rated at 95 to 125 amp hours. 105 amp hours was used for the calculations in the chart below.

The chart below shows the daily requirements of a CommandLIFT at 12 amps draw, which is higher than typical, but possible in cold conditions.

Using the chart below you can see that a Group 31 battery is suitable up to 300 cycles per day, which would be considered extremely unlikely.

Complete Cycles (open and close)	Accumulated Motor Run Time (minutes)	Amp/hour Consumption	Parasitic draw per day	Total Amp Draw	Battery Type	Remaining Capacity
50	25	4.98	1.2	6.12	Group 31	94%
100	50	9.96	1.2	11.08	Group 31	90%
200	100	19.92	1.2	21.12	Group 31	81%
300	150	29.88	1.2	31.08	Group 31	70%
400	200	39.84	1.2	41.04	Group 31	61%

It is imperative to determine the actual cycles per day to ensure the proper battery is provided. Using a starting battery or a battery that is under capacity can result in poor or intermittent operation of the CommandLIFT.

Keep in mind that cold working environments increase resistance on the door resulting in higher amp draw, cold also decreases the battery's storage capacity and ability to recharge at a fast rate.



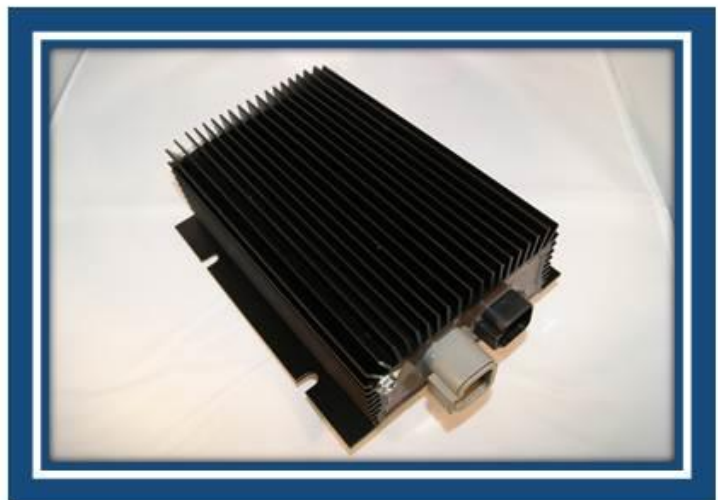
**PURKEYS**  
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## **TRAIL CHARGER WITH LOCKOUT**

### **OWNERS MANUAL**

- OPERATION
- INSTALLATION
- WIRING DIAGRAM
- TROUBLESHOOTING

**G**



**TC6-KIT-W**

**Version 1.01**

**06/10/2011**



## TRAIL CHARGER WITH LOCKOUT

### GENERAL OPERATION

#### PROBLEM

On applications where the CommandLIFT battery is mounted a long distance from the primary vehicle's electrical system, voltage drop will occur. The longer the distance and the smaller the cables that connect the two battery systems, the greater the voltage drop. To charge the CommandLIFT battery, the correct voltage must be applied to the battery. Without the necessary voltage (electrical pressure) to push current through the CommandLIFT battery for recharging, no recharging can occur. To charge a group 31 battery at 0 degrees F, voltages of 15 volts are necessary. The same battery pack at 80 degrees F might only require 14.0 volts. The heavy duty commercial vehicle alternator is normally set at 14.0 volts and flat compensated. The typical vehicle's battery pack is maintained at approximately 13.5 volts. The difference occurs because of the voltage drop between the battery and the alternator. With this fact in mind, the starting voltage for the CommandLIFT battery is 13.5 volts.

The circuit to charge the CommandLIFT battery includes the cables from the vehicle's battery box to the dual pole receptacle at the back of the tractor, the dual pole cable from the tractor to the trailer, the receptacle at the front of the trailer, and the cable that connects to the CommandLIFT battery. The total length of this can be well over 60 feet. All of this length and connections (including fuses) create voltage drop in the system. While the total circuit resistance of this circuit is constant, as the current load increases, the voltage drop also increases. It is impossible to have the correct level of voltage at the CommandLIFT battery. This reduced voltage results in a battery pack that is not maintained at a proper state of charge which results in shortened battery life, less operating time and possible damage to the CommandLIFT system.

#### SOLUTION

**TRAIL CHARGER** – Eliminates the above problem by amplifying (boosting) any input voltage (9 to 14) to the correct voltage necessary to charge and maintain the CommandLIFT battery. This input voltage can be obtained through the 7-way auxiliary pin, which now allows the CommandLIFT battery to be charged when connected to any tractor with no dual pole connection necessary. This increased voltage will allow the battery to be charged and maintained at a higher state of charge so that it provides the energy necessary to do whatever job they are designed for, even in the toughest environments. The Trail Charger also will not let the CommandLIFT battery back feed to the tractor's battery pack.

The Trail Charger with Lockouts has a shutdown mode of operation:

- **Shutdown Mode:** This mode is enabled when the lock out pin is active. In this mode the charger output is shutdown and will not charge an external battery. This mode has the highest priority and over-rides all other modes. *This feature is used when the TC is powered off of the aux circuit. A lead is connected to the stop light circuit to the six pin connector of the TC with LO's. When the brakes are applied the TC with LO's turns off so that the trailer's ABS system gets full available power. When the brakes are released the TC turns back on.*



## TRAIL CHARGER WITH LOCKOUT

### INSTALLATION INSTRUCTIONS

**Step 1:** Mount the Trail Charger on the back of the battery box using the supplied self-drilling sheet metal screws. (See Figure 1) The Trail Charger should be mounted about 1 ½" down from the top and just to the right of the grommet. The unit must also be mounted with the plug pointed down (6 o'clock). Note: Be sure that the screws will not interfere with the batteries in the box.

**Step 2:** Route the main harness into the battery box through the hole in the side of the battery box. **All wires routed through the battery box should be protected with a rubber grommet or dome nut.**

Route the following wires (the Deutsch pins go to the outside) out of the battery box through the hole in the back next to the Trail Charger. (See Figure 2)

- Yellow wire "D", labeled "Ignition Pin #4"
- Red wire "E", labeled "12V Output Pin #2"
- Blue wire "B", labeled "Lockout Input"

- Red wire "A", labeled "12V Input Pin #1"
- Black wire "F", labeled "GRND Pin #3"

**Step 3:** Once the wires are routed properly the Trail Charger input and ignition wires can be inserted into the Deutsch connector body. The input (red) wire will slide into the #1 position. The ignition (yellow) wire will slide into the #4 position. (See Figure 3)

**Step 4:** The positive (red) output wire will slide into the #2 position. The negative (black) output wire will slide into the #3 position. (See Figure 4)



Figure 1



Figure 2



Figure 3

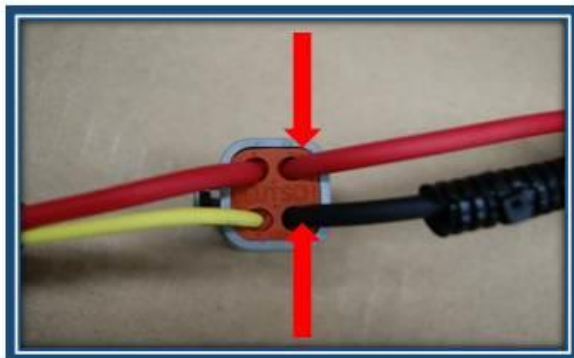


Figure 4

## TRAIL CHARGER WITH LOCKOUT

### INSTALLATION INSTRUCTIONS

**Step 5:** Verify all the wires are in their correct positions and locked in place. (See Figure 5)

- Figure 5-1: Red 10 AWG 12 Volt input power of the main harness.
- Figure 5-2: Red 10 AWG Trail Charger output power to liftgate battery's positive (+).
- Figure 5-3: Black 10 AWG Trail Charger output ground to liftgate battery's negative (-).
- Figure 5-4: Yellow 14 AWG ignition input of the main harness.

**Step 6:** Once both wires are inserted into the connector the orange lock can be inserted . (See Figure 6)

**Step 7:** Insert the brake circuit wire into the 6 way Deutsch connector in the #2 position. The other positions should already have plugs inserted into the empty holes to help prevent corrosion and contamination. (See Figure 7)

**Step 8:** Once the wire is inserted into the connector the orange lock can be inserted. Make sure that the lock is properly seated. (See Figure 8)

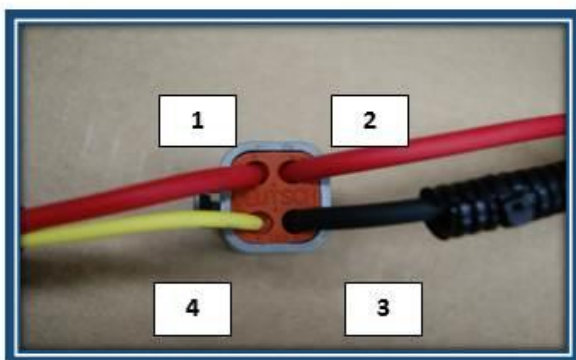


Figure 5

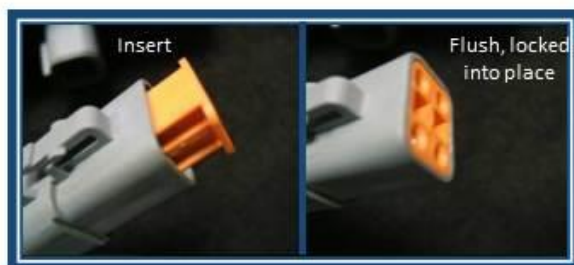


Figure 6



Figure 7

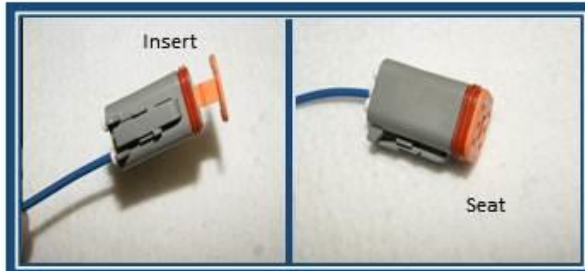


Figure 8



## TRAIL CHARGER WITH LOCKOUT

### INSTALLATION INSTRUCTIONS

**Step 9:** Slide the included clear tubing over the connectors on the Trail Charger. This will help prevent water and contaminants from entering the electrical connections. (See Figure 9)

**Step 10:** The harness plugs may now be inserted into the Trail Charger. Push the 4 wire connector into the tubing and into the appropriate socket on the Trail Charger. Push the 6 wire connector into the tubing and into the appropriate socket on the Trail Charger. It may be necessary to use a screwdriver to make sure the plugs are properly seated. (See Figure 10)

**Step 11:** The last connections can now be made at the CommandLIFT battery. First install the fuse cube assembly on one of the liftgate positive battery terminals. (See Figure 11)

**Step 12:** The red 10 AWG Trail Charger output positive wire labeled "liftgate positive" can now be connected to the fuse cube assembly. Remove the insulated nut, install the wire and reinstall the nut. (See Figure 12)

The black Trail Charger output ground wire should be connected to the negative post of the battery as shown. (See Figure 12)



Figure 9



Figure 10



Figure 11

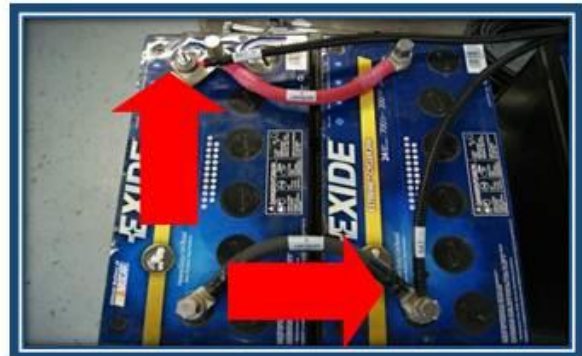


Figure 12

## TRAIL CHARGER WITH LOCKOUT

### INSTALLATION INSTRUCTIONS

**Step 13:** Once the Trail Charger is mounted the main harness can be routed to the front of the trailer utilizing the factory channels up to the fifth wheel plate and then through the electrical/air line tubes the rest of the way to the front of the trailer. (See Figure 13)

**Step 14:** Route the main harness out the front of the trailer. Make sure the cable is protected from chaffing. (See Figure 14)

**Step 15:** Now route the three wires (red 10 AWG, black 10 AWG and blue 16 AWG) into the 7 way nose box. Cover with conduit and secure with a wire tie. (See Figure 15)

**Step 16:** Route the black 10 AWG wire to the ground screw in the 7 way box. Cut to length and slide a piece of the black heat shrink over the wire. Now crimp and solder a #10 eyelet on the wire and apply heat to the heat shrink. Once properly terminated remove the nut and add this wire to the ground stud. (See Figure 16)

NOTE: It is strongly suggest that these wires be labeled due to the color difference from the standard.



Figure 13



Figure 14



Figure 15



Figure 16



## TRAIL CHARGER WITH LOCKOUT

### INSTALLATION INSTRUCTIONS

**Step 17:** Now the red 10 AWG wire can be cut to length and connected using the fuse holder with the orange leads (30 amp fuse). Slide a piece of the red heat shrink over the wire and crimp and solder the two wires together and cover with the heat shrink, then apply heat. Once connected remove the nut for the AUX/ABS stud and add this wire, then retighten the nut to spec. (See Figure 17)

**NOTE:** We strongly suggest that these wires be labeled due to the color difference from the standard.

**Step 18:** Cut the blue 16 AWG wire and connect to the black fuse holder with black leads (2 amp fuse). Slide a piece of red heat shrink over the blue wire, crimp and solder the two wires together, cover with the heat shrink and apply heat. Once connected remove the nut for the brake/stop stud and add this wire, retighten to spec. (See Figure 18)

**NOTE:** We strongly suggest that these wires be labeled due to the color difference from the standard.

**Step 19:** The front of the trailer is now finished. Reinstall the 7 way nose box cover, cover any exposed wires with conduit and secure with wire ties. (See Figure 19)

**Step 20:** Installation is now complete, connect a tractor to the trailer via the 7-way receptacle, turn the key on and check operation of Trail Charger. The Trail Charger's green LED light should be illuminated. Measure the CommandLIFT battery voltage, should be near 14.0 volts. Check the brake lockout function by verifying that the green LED on the Trail Charger flashes slowly when the brakes are applied. When the brakes are released, the LED should go back to solid.



Figure 17



Figure 18



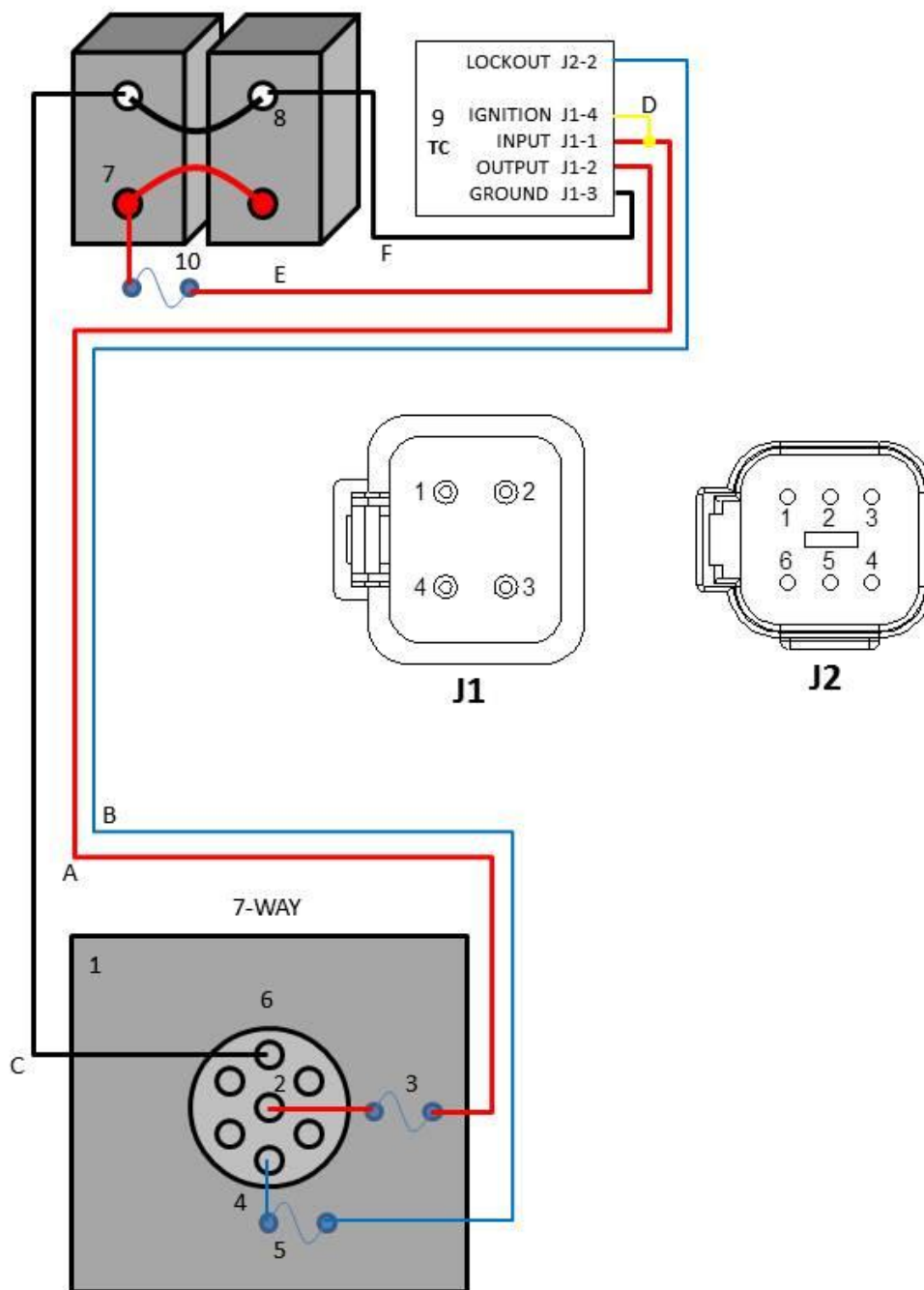
Figure 19



VERSION 1.03

## TRAIL CHARGER WITH LOCKOUT

## WIRING DIAGRAM



## TRAIL CHARGER WITH LOCKOUT

### WIRING DIAGRAM LEGEND

#### Components

1. 7-Way Connector
2. 7-Way Aux Pin
3. 30 Amp Fuse
4. 7-Way Brake Circuit
5. 5 Amp Fuse
6. 7-Way Ground Circuit
7. CommandLIFT Battery Positive
8. CommandLIFT Battery Negative
9. Trail Charger
  - J1-1 Input from 7-way aux pin
  - J1-2 Output to CommandLIFT battery positive
  - J1-3 Ground to CommandLIFT battery negative
  - J1-4 Ignition spliced from input wire from 7-way aux pin
  - J2-1 Not used in this application
  - J2-2 Brake circuit sense from 7-way brake circuit
  - J2-3 Not used in this application
  - J2-4 Not used in this application
  - J2-5 Not used in this application
  - J2-6 Not used in this application
10. 30 Amp Fuse

	<u>Connection 1</u>	<u>Connection 2</u>	<u>Color</u>
A.	7-Way Aux Pin	Trail Charger Input J1-1	Red
B.	7-Way Brake Circuit	Trail Charger Lockout J2-2	Blue
C.	7-Way Ground	CommandLIFT Battery Negative	Black
D.	Input Wire (Splice)	Trail Charger Ignition	Yellow
E.	Trail Charger Output	CommandLIFT Battery Positive	Red
F.	Trail Charger Ground	CommandLIFT Battery Negative	Black



