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## **DCX300-ET**

### ***SEPARATELY EXCITED DC MOTOR CONTROLLERS FOR THE ELEC-TRAK and WHEELHORSE ELECTRIC GARDEN TRACTORS - ET's***

#### **Controller Use**

The ET version of the DCX controllers have been modified from the original DCX designed for golf car use. The ET version has a lower Field current and a different Field Map installed in the software than the golf car controller, therefore it will not work in golf cars and the golf car version will not work in the Elec-Trak and WheelHorse ET's. Installation of the ET version into a golf car or installation of the golf car version into a ET will void the warranty. The DCX series controller is designed for shunt wound motors only and will not work with permanent magnet motors used in some models of ET's. For these models you need one of our AXE controllers.

#### **Limited Warranty**

Alltrax, Inc. warrants this motor controller to be free from defects in materials and workmanship for a period of 2 years from the date of manufacture. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs or alterations. We shall in no event be liable for death, injuries to persons or property or for incidental, contingent or consequential damages arising through the use of our products. Alltrax, Inc. specifically disclaims the implied warranties of merchantability and fitness for a particular purpose, however some areas do not allow limitations on how long an implied warranty lasts, so the preceding exclusion may not apply to you. This is Alltrax, Inc. sole written warranty, no other warranty is expressed or implied. In the event you need warranty repair, please call Alltrax to obtain a return authorization number. Alltrax reserves the right to repair or replace merchandise at its option, and to make changes to any of its products or specifications without notice.

## **Safety**

Disconnect and remove the front batteries then disconnect the rear battery pack **BEFORE** beginning work on the Electric Tractor (ET). Use insulated wrenches when working on batteries connections and follow the battery manufactures recommendations for safe battery installation/removal.

## **Installation**

Remove all relays, contactors (except the PTO contactor), control boards, ribbon resistors and associated wiring from the Electric Tractor (ET). Leave the high current wiring for the PTO contactor and PTO receptacle. Mount the controller, face up on the back of the metal plate that separates the battery area from the steering gear area, the top of the controller should face toward the driver. Position the controller to the left of the steering shaft with it's face approx. 1 1/2 inches higher than the plate. Drill two holes thru the controller mounting flange and plate near the top of the plate. Match drill two holes thru the plate for the bottom set of holes on the controller. Mount one of the removed contactors on top of the controller using 1/4 -20 bolts 3/4 inches long, screwing them into the plastic nuts in the case. Orient the contactor so it does not interfere with the black plastic plug that covers the serial port connector under the case. Using the wiring diagram provided with your controller wire the high current connections first, connecting the motor and batteries to the controller. Make sure you connect the B- terminal thru the ***Current Shunt*** and not directly to the battery otherwise your Power Meter won't work.

**Connect the motor leads as shown making sure that you connect the B+ power lead from the contactor and the A1 motor lead AT the B+ terminal of the controller.** This is important for proper controller operation.

Connect the S2 terminal of the motor to the M- terminal of the controller. Make all of the high current leads as short as practical. If you want to use the Thermal Breaker mounted on the out side of the motor wire it in the M- to motor S2 lead. Connect the field winding to the F1 and F2 spade lugs on the controller. If the ET runs backwards when the Reverse switch is in the Forward position, reverse the two field leads F1 and F2 at the controller.

We suggest you replace the crimp lugs at the motor ***field*** connections because they see extreme conditions and may not be making good contact. Use 18 AWG stranded wire for connector and run wires per the wiring diagram for the switches, main contactor and backup horn. Bring all these wires (6 total) close to the face plate of the controller leaving enough slack to work comfortably. Also bring the two wires for the throttle to the same area. The connector for the control pins is installed so the wires exit

upwards on the face plate. The connector is keyed so it cannot be plugged in wrong. Push the wires into their corresponding pins on the connector using a small screw driver or needle nose pliers. Slide the white cover over the wire connections when all wires have been tested for continuity. *The connector is designed to cut thru the insulation making contact with the wire. Make sure they are pressed all the way down.*

Pins 9 & 10 go thru the 1 ohm 10 watt resistor and pin 10 has a 3A, 100V diode as shown. The Diode keeps the controller caps from discharging back into the controls and the ET. The resistor limits the in-rush current when power is applied to the controller. If you do not use the manual disconnect switch that came with your ET install the switch shown to allow the battery charger or pins 9 & 10 to be switched to the battery. **The battery charger leads from the battery charger should be 10 AWG wire size, and the switch used to switch the charger out of the circuit should be rated for at least 30 amps. The battery charger should not be connected when the controller is connected.** High charger voltages may exceed the ratings of the internal components of the controller and cause them to be damaged. **Make sure you dress all the wiring to ensure that the wires do not get chewed up in the steering gears. Recheck all your wiring with a meter to make sure they are connected properly, errors could cause a fire.**

Reinstall the batteries observing the battery manufactures safety procedures. The throttle pot installation is dependent upon which model ET you have and how the user wants it to function. Therefore we have made no effort to describe it's installation. It must be installed so the pot provides 0 – 5K ohms resistance to controller pins 1 & 2. The **Throttle Switch** must open when the throttle reaches the off position. Off is 250 ohms or less, full throttle is 4.5K ohms and more. Open Throttle Shutdown occurs at 9K and above. This shuts down the controller if a throttle wire breaks.

### **Control Pins Description**

Pins 1 & 2 - Throttle Inputs.

Pin 3 - Horn driver capable of sinking 50ma max. Install a driver such as a relay or power transistor if you need more output power for backup lights etc.

Pin 4 - Reverse input. Applying B+ to this pin causes the controller to reverse the field current.

Pin 5 - Throttle Switch input. B+ is applied to this input when the throttle is depressed causing the contactor to close.

- Pin 6 - Key Switch input. B+ is applied when the key is on, this makes the controller go Ready. When Key Switch is off and pin 9 is at B+, Roll Detect is enabled.
- Pin 7 - Contactor Driver capable of sinking 2A max. This pin pulls one side of the contactor to ground.
- Pin 8 - Not Used
- Pin 9 - Provides B+ power for Roll Detect logic.
- Pin 10 - Provides B+ power to precharge controller caps

### **Operation**

Turn on the Manual Disconnect switch if retained or move the Chrg/Storage – Run switch to the Run position. In the Chrg/Storage position all power to the controller is disconnected when the ET is not being used or when charging the batteries. In the Run position it provides power to the controller to precharge the caps and for the Roll Detect feature to operate. Turn on the Key Switch and move the throttle. As the throttle moves from the off position, the Throttle Switch closes, turning on the controller. The controller will blink one Green blink and then stay solid green and then energize the main contactor, the controller is now operational. The controller turns off the contactor if no throttle input signal is received within one second.

Apply the throttle further and the ET will go forward if the REV switch is off. Reverse is activated when the Reverse switch is turned on, applying pack plus voltage to pin 5.

The Reverse switch may be turned on at any speed and the ET will reverse direction. The abruptness of the reversal depends on where the Throttle *Ramp Up* and *Ramp Down* rate is set. We normally set the Up and Down ramp rate at 2 for the ET. This keeps the wheels from locking up and spinning on normal dry grass, except in low range gear.

Turning off the Key Switch causes the Roll Detect logic to be activated. If the Key switch is turned off while moving the ET will go into a regen braking mode. The Seat switch is in series with the Key switch so if it opens it also causes the ET to go into regen braking. This is a safety feature and stops the ET if the Operator falls off.

The PTO switch is in series with the Key and Seat switches, this causes the PTO to be turned off if either of these are opened. It also turns off the PTO if the operator falls off.

The Brake switch causes regen braking to be activated, if the switch is adjusted so it opens before the mechanical brakes are applied it causes regen braking to do most of the braking.

### **Troubleshooting:**

At power up, the front panel LED on the controller will blink green a number of times. The number of green blinks identifies the throttle configuration of the controller. If there is an error, the LED will then blink a RED pattern.

Green Blinks = Throttle Type

1 green = 0-5K 2 wire throttle (this is the only code you should see on the ET)

2 green = 5K-0 2 wire throttle

4 green = E-Z-GO ITS compatible throttle

Red Blinks = Error Code

1 red = Throttle position sensor over range. Check for open throttle wires.

2 red = Under temperature. Controller shuts down at temps below -25C.

3 red = HPD. Throttle has not returned to zero during this power up sequence. Caused by throttle being on when unit powered up.

4 red = Over temperature. Controller shuts down at temps greater than 95C.

5 red = Field circuit open. Check field wires and motor field winding.

6 red = Battery undervoltage shutdown. Battery V < undervoltage slider.

7 red = Battery overvoltage shutdown. Battery V > overvoltage slider.

Solid Green = OK and ready.

Solid yellow = Throttle wide open and controller not in current limit.

Solid RED = Controller in boot load mode. Only occurs during software update.

This controller may be reprogrammed to change some of the operating characteristics such as throttle response rate, throttle type, top speed and braking force. Go to our web site and download the free software tool *ControllerPRO*. With a DB-9 serial cable or a USB to serial adapter and a PC running Windows 98, 2000, NT or XP, you can customize the driving style of the ET. Using a laptop, changes can be made on the fly while driving. Data can be stored to a log file using *ControllerPro*, see ControllerPro Manual.

CAUTION, do not change the throttle type while driving ET. This can cause the ET to lunge and take off full speed.

Thank you for buying our product. We are sure you will appreciate the features and performance built into our controllers. If you have any problems or questions please call or e-mail us.

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