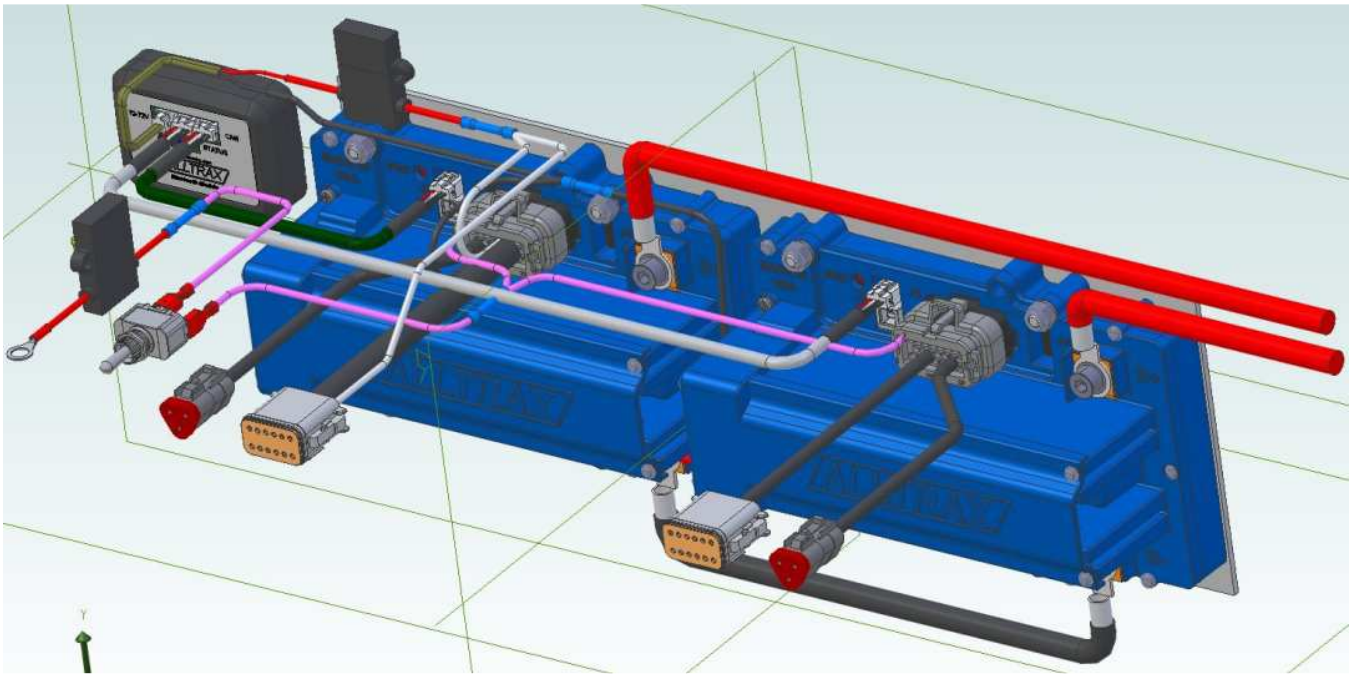
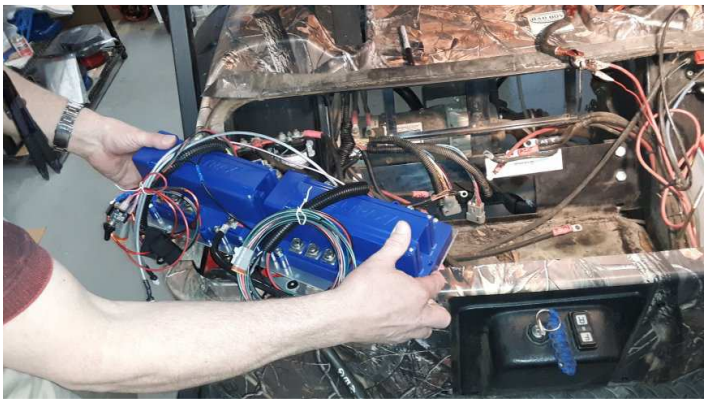
ALLTRAX INC ASY105-001-20
Power Panel Installation Procedures
BAD BOY BUGGIES
XT CLASSIC, XT, and XTO
BEHIND the battery



The Power panel is pre-wired from ALLTRAX for behind the batteries installation only.
(Behind the seat see BB2 instructions)



Doc113-027-A, Released EC-03212020
Author: Tony Thorne, Engineering
Updated 10/10/2020 to add XTC (Classic) and redlines

WARNING

These procedures assume you are of technical background "known in the craft" to properly and safely work on Electric Vehicles.

Use of safety glasses and other safety gear is crucial along with using proper tools and equipment.

Welcome to the Alltrax Conversion system for Bad Boy Buggies.

This conversion assumes your Bad Boy is a XT, XT Classic, or XTO for behind the batteries installation.
>The BB2 and AMS4 require a different installation kit and installation instructions.

CAUTION

This conversion also requires the car had the Bad Boy Buggies "THROTTLE RECALL" procedure and replacement equipment performed.

From the www.CPSC.gov recall notice, Dec 22, 2010:

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Recall Details

Description:
This expanded recall involves all Bad Boy Classic model off-road utility vehicles manufactured from early 2003 through May 2010. Bad Boy Buggy Classic models come in camouflage patterns, hunter green, red and black colors. The XT model is not included in this recall.

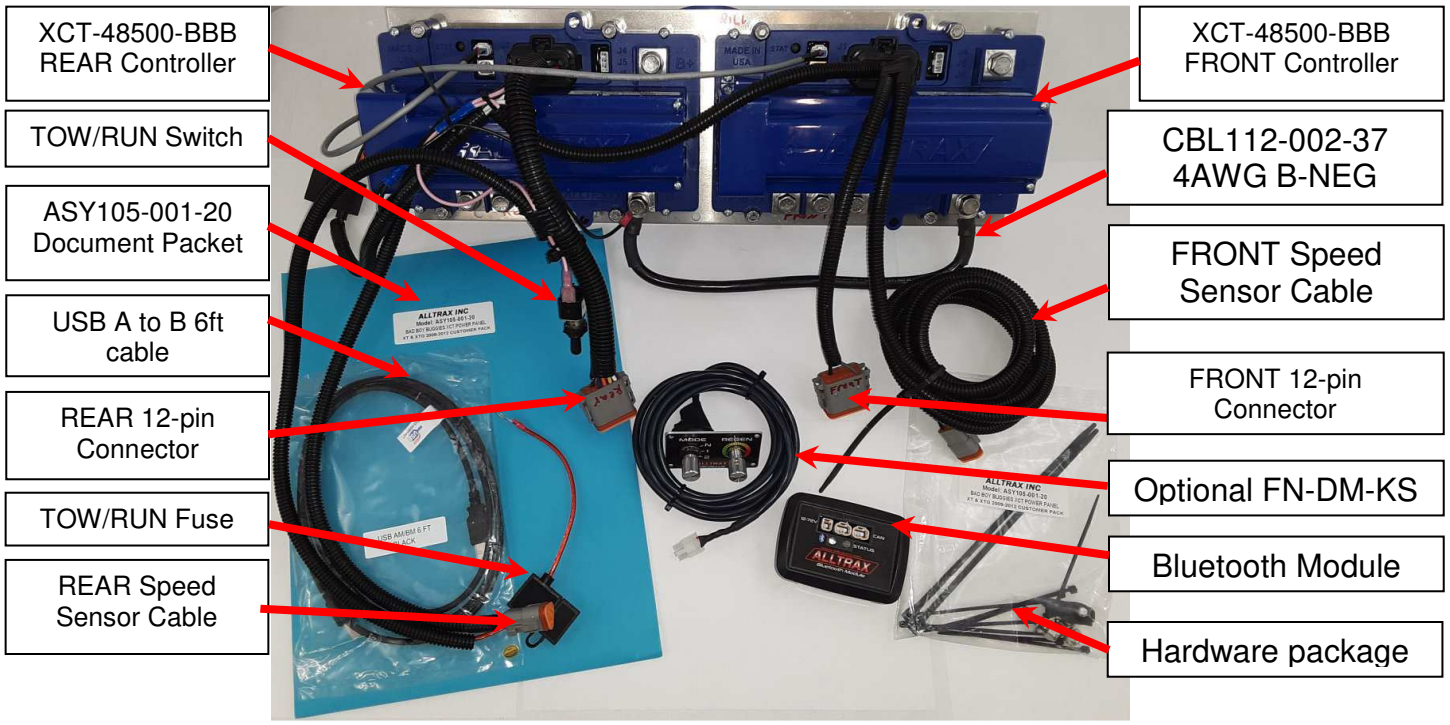
Remedy:
Consumers should immediately stop using the buggies and contact their BB Buggies dealer to schedule a free repair.
Incidents/Injuries:
Since the October 2009 recall announcement, BB Buggies has received 27 additional reports of unexpected acceleration, including reports of arm and leg fractures.
Sold At:
Authorized dealers nationwide from Spring 2003 through June 2010 for about $10,000.
Manufacturer(s):
Bad Boy Enterprises LLC, of Natchez, Miss. This recall is being performed by BB Buggies Inc., which recently acquired certain assets of Bad Boy Enterprises, LLC.
Manufactured In:
United States
Recall number:
11-079
****

The original electronic throttle under recall had ONE 3 pin connector from the throttle pedal group.
The recall kit included a new throttle with wire harness that now has 2-connecotrs & black box:
> 3 Pin connector with throttle signal.
> 6 Pin connector that provided a footswitch signal enabling the controller.
Software upgrade to the Sevcon's was required.

The ALLTRAX installation kit ASY105-001-20 requires this recall procedure and equipment MUST BE INSTALLED prior to utilizing the Alltrax Conversion System.

Your kit includes the following items and instructions:

- ASY105-001-20: Power Panel, Dual XCT48500-BBB controllers and wire harness assembly, prewired and programmed from Alltrax with 12pin Bad Boy wire connector interface.
- CBL112-002-37: Battery minus intertie, 4awg x 12" between B- of each XCT controller
- HNS105-001-20 Main wire harness:
  - REAR controller on Passenger side (Master control unit)
  - FRONT controller on Drivers side
  - Includes TOW/RUN switch, only TOW the vehicle in the TOW position)
  - Includes FUSE Bluetooth, 5amp ATC
  - Includes FUSE TOW/RUN, 20amp ATC
- Alltrax BLUETOOTH module: Provides CAN BUS communications between controllers & User
- KIT-EZGO-DIODE-T: Regen diode (2pc): Installs on solenoids for regen protection
- Installation HDWR pack: Hardware bolts for mounting power panel to BBB frame rack
- **Installation Document Package:**
  - ASY105-001-20-01: Drawing, BBB Power Panel conversion system
  - HNS105-001-20-01: Drawing 11x17 wire harness diagram & assembly
  - ASY200-017-20-01: Drawing TOW/RUN
  - ASY200-018-20-01: Drawing Bluetooth power cable
  - Doc113-002: Toolkit software manual
  - Doc113-006: XCT Operators manual
  - Doc113-018: Bluetooth Operators manual
  - Doc113-027: Bad Boy Installation procedure XT-C, XT, and XTO
  - Doc113-026: Optional FN-DM-KS-BBB_XCT-Operators-Manual
  - Doc140-034: Optional EXRAY for BADBOY-XT-XTO (See www.edt-exray.com)



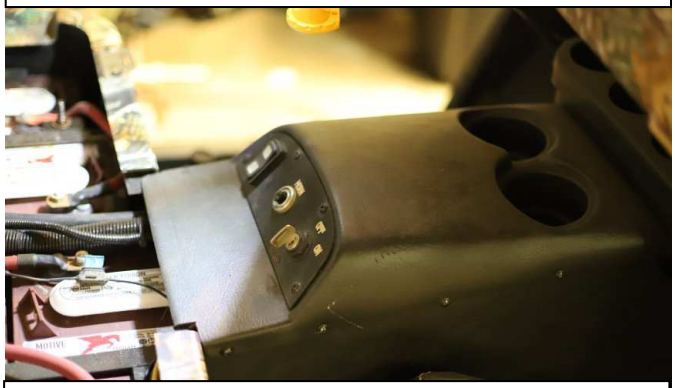
The following procedure applies to XT-Classic (XTC), the XT and the XTO. The difference is the solenoids are mounted on opposite sides, the battery configuration is different and Key Switch and Forward/Reverse are located in different locations but the power panel is relatively the same.

1. XT Classic (XTC) and XT:

- All 8 batteries are in the battery compartment but extend into the center portion of the floor board between passenger and driver
- The Older XT has the Forward and Reverse mounted in a panel above the center console
- The newer XT has the Forward and Reverse switch mounted on the dash board
- The XT Classic and XT both have the solenoids mounted under the DRIVERS seat

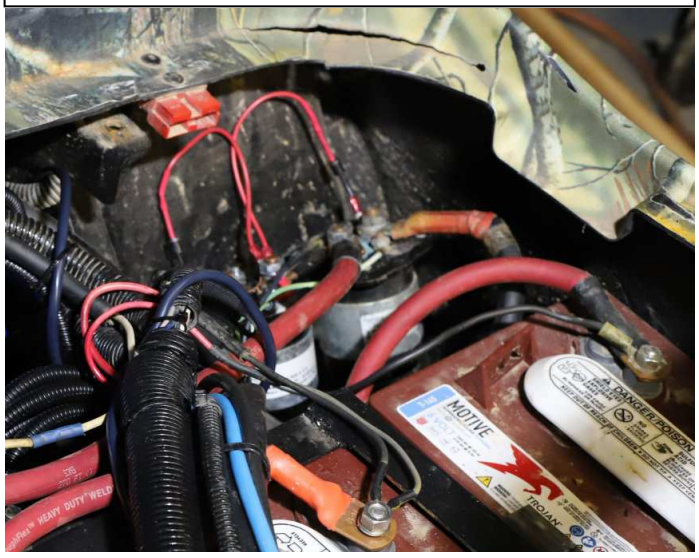
XTC and XT has 6 batteries under seat and 2 batteries mounted on floor board into and under dash

XTC Center console with Key Switch, Forward and Reverse Switch



Some pictures courtesy of Chris Oliver TX

XTC and XT Solenoid mounting, DRIVERS side:



XT with 2 batteries mounted on floor board and under dash. The newer XT replaced the console with cup holders

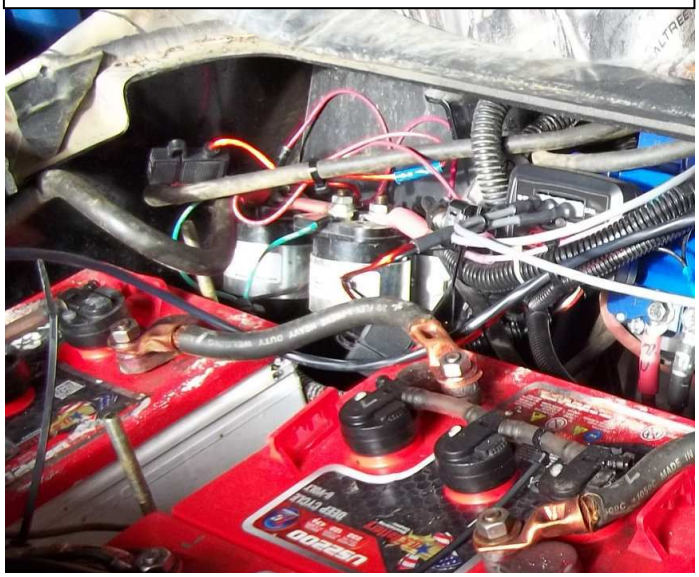
2. XTO:

- 6 batteries in the battery compartment and 2 batteries under the front cowl above the axle. There is no battery compartment protrusion occupying the floor board between the passenger and driver.
- The XTO has the Forward and Reverse switch and the Key Switch mounted on the battery compartment cowl between passenger and drivers legs
- The XTO solenoids are mounted under the PASSENGER seat

XTO has 6 batteries under seat and 2 batteries mounted under the front cowl above the axle

XTO Forward and Reverse switch along with Key Switch mounted on front battery compartment cowl

XTC and XT Solenoid mounting, DRIVERS side:



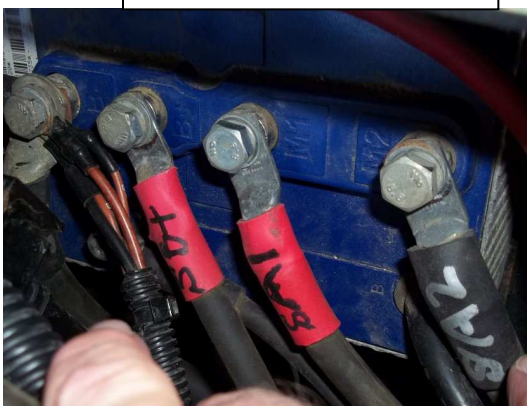
3. Pictures and Marking the wires BEFORE Disassembly:

The first step is TAKE PICTURES of everything. When you are trying to reconnect all the cables and wires and say ***"Where did this wire come from"*** is not going to make a fun day.

a. Read the instructions, watch the videos, and check out the INSTALL directory on the included Flash Drive.
b. Become familiar with the drawings, read them ALL!
c. **Mark all wires as shown below**. We found some cars had the motor wires reversed. This would result in unexpected operation as the front might go forward and the rear might go backwards. We know this because it happened to us! A1-A2, F1 and F2 must be marked correctly or bad things happen.
d. After the wires are marked, the old Sevcon controllers are removed, installation time about 1 hour if you read the instructions and about 8 hours if you don't read the instructions…. (Trust me….)

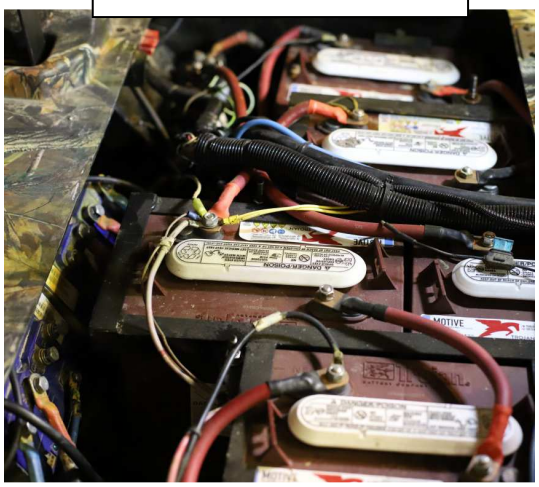
PASSENGER SIDE REAR MASTER

DRIVERS SIDE FRONT



*** Motor wires are polarity sensitive affecting the direction of the motor travel. Make sure the motor A1 is actually the A1 wire you marked and F1, F2 and A2 all go to the correct motor terminals.

PICTURES OF BATTERY AND SECONDARY WIRES



REAR Controller MASTER Under PASSENGER side

FRONT Controller Under DRIVERS side

FAILURE to mark these correctly will cause major problems. Each controller has specific control wires to the solenoid. The REAR is the MASTER CONTROL and receives all signals. The ALLTRAX REAR-XCT controller will communicate these inputs over the CAN BUS to the FRONT controller. The REAR controller turns the REAR solenoid on and off, the FRONT controller turns the FRONT solenoid on and off.

4. Remove Batteries:

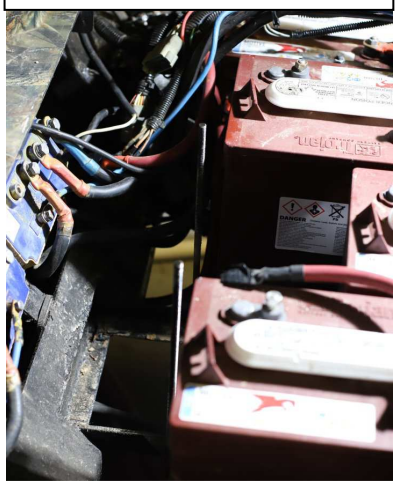
Now that ALL your cables and wires are marked, we will carefully remove the battery cables and supplemental wires necessary to gain access to the controller mounting area. If you leave ANY cable remaining connected to a battery and it shorts out will be a dangerous situation. Tape the terminal ends. We found it helpful that with a bunch of wires going to one post we ran a Zip Tie through the rings to keep them together.

a. Use a strap on the seat body panel to pull upwards to gain access, not too far but enough to get your hands in there. (Shown on next page)
b. Remove battery cables, some are slightly different to XT Classic (XTC), the XT, and the XTO. The pictures below are reference only – compare to your pictures of your car.
c. Remove the Battery Hold Down rack, clean/remediate corrosion and paint as required.

Before XTC / XT Shown

After XTC – Wires and Battery Hold down removed

Center rear battery removed



Before XTO Shown

After - XTO Battery Hold Down and Center 4-batteries removed

5. Remove the Sevcon Controllers.

Remove the Sevcon OEM controllers, we suggest marking them as REAR and FRONT in case you sell them or reinstall them into the car.

a. Use a strap to pull up on the body seat panel to gain access to the controller bolts.
b. Remove the Sevcon bolts (Metric) and suggested to reinstall them into the lugs for safe keeping. You may need two people to get access to the rear nuts. Use Liquid Wrench® if needed.
c. Remove the 4 mounting bolts for each controller and remove them out of the vehicle.
d. Clean the mounting surfaces and repaint if needed. Allow paint to dry.

From HERE FORWARD we will show the XTO pictures as they apply to the XTC, XT, and XTO in regards to the ALLTRAX Conversion Power Panel.

Strap to roof rack to pull up seat panel

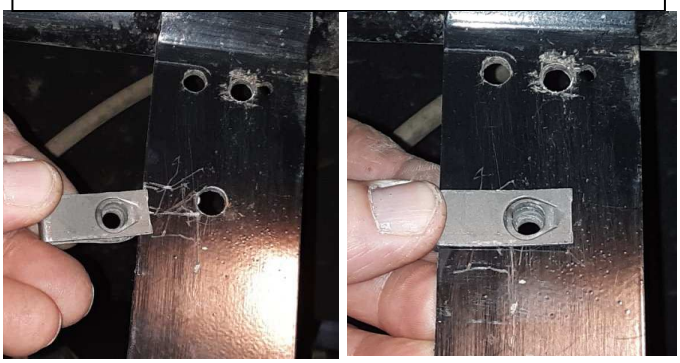
Controllers removed, brush any rust and coat of paint

6. Drill Mounting Rack

a. Temporarily set new panel in place of the mounting rack and place a HDW100-057 (1/4-20x3/4") Socket Head Cap Screws into one of the BOTTOM holes to align it in place.
b. Mark the "center hole" between the XCT controllers. A silver PM marker works the best. Remove the power panel and set aside
c. Drill a hole 5/16" hole, remove any fillings
d. Install the ¼-20 U-Spring Clip included in your Hardware Pack.

Mark hole & Drill Center Hole

Install lHDW200-034 Spring Clip



Install ASY105-001-20 Power Panel

At this point we are ready to install the System Power Panel. Be careful of the cables and wires, secure with the three HDW100-057 (1/4-20x3/4") Socket Head Cap Screws using an SAE Allen wrench. We suggest using small amount on grease on the threads. Outside bottom and the center hole. The CENTER ONE first – then push the panel to align the bottom holes.

NOTE We discovered Bad Boy Buggies did not use a JIG to properly locate all 8 controller mounting holes in every car. If they don't align place one bolt in the center – then one in a corner, and CAREFULLY drill the odd ball hole to move it. Install the last bolt then clean up any metal shavings.

REAR CONTROLLER

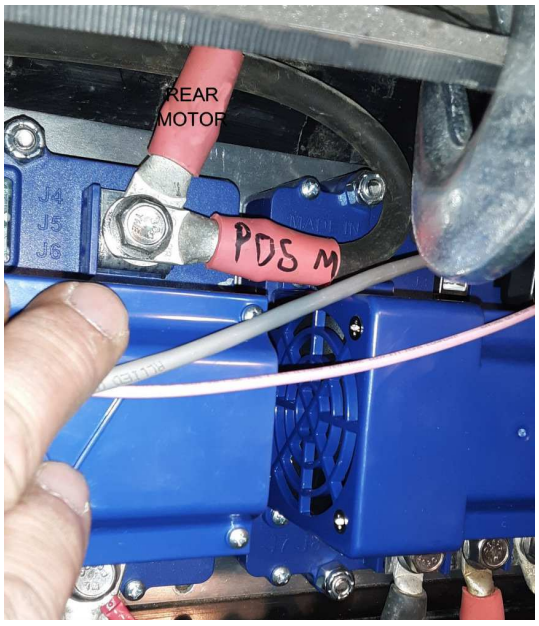
FRONT CONTROLLER

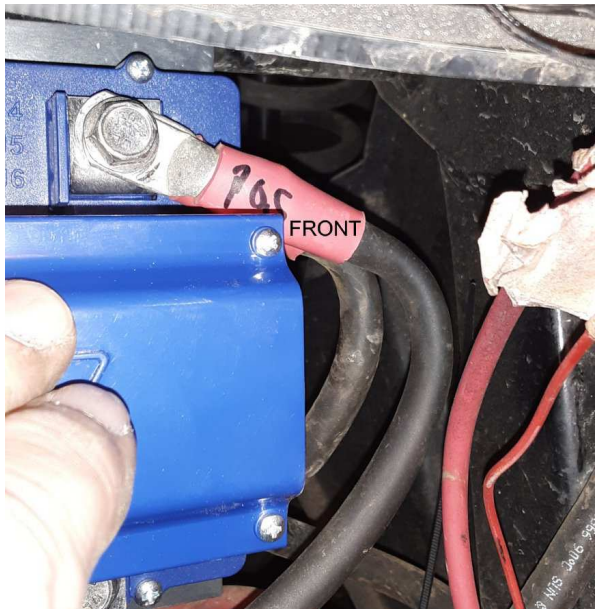
7. Connect Motor Wires

The motor wires are VERY polarity sensitive and affects the direction of the motor travel. Verify the motor A1 is actually the A1 wire as marked, F1, F2 and A2 all go to the correct motor terminals.

See Diagram ASY1105-001-20-01, DWG Assembly Bad Boy Buggies

a. A2-Connect the wires as shown in the Diagram. We found some cars were A2-RED and some were A2-BLACK. So Funny! Do NOT TRUST THE HEATSHRINK COLOR.
b. BOTH the REAR motor A2 with the REAR SOLENOID BATT-POS cable in the upper right corner of the PASSENGER SIDE XCT controller.
c. BOTH the FRONT motor A2 with the FRONT SOLENOID BATT-POS cable in the upper right corner of the DRIVERS SIDE XCT controller.





Connect wires continued:

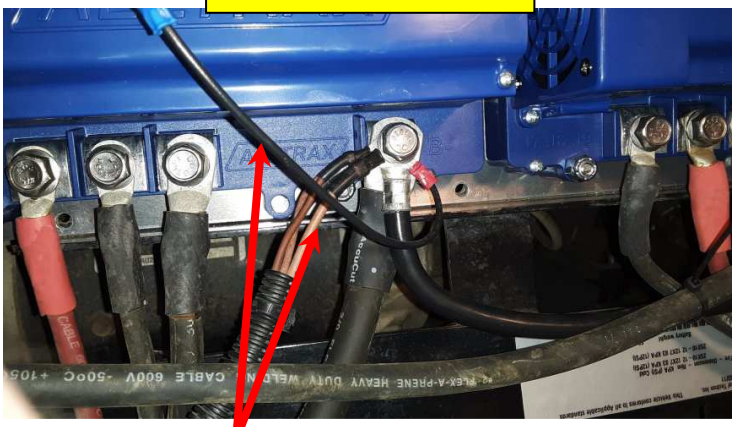
BNEG – The XCT REAR and the FRONT controller have the B-NEG CBL112-002 jumped with a 4AWG cable. Some BBB Car "control negative wires" will need to connect to this B-NEG bus. The 3 TAN wires in the XT and XTO may be located on different sides of the cars wire harness.

d. XTO (Shown below) the control TAN wires are connected to the REAR Controller B-NEG terminal with the black 18AWG Bluetooth negative power wire.

e. XTC and XT the TAN wires may be located in the Driver's side wire harness. Connect the TAN wires to the FRONT controller B-NEG terminal.

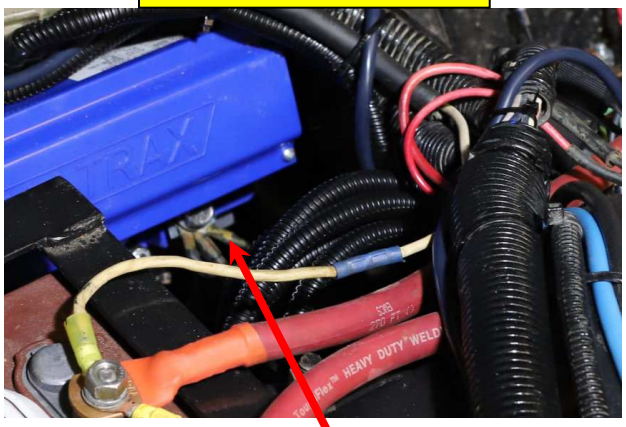
>Leave the BLK 18AWG wire for the Bluetooth NEG on the REAR controller B-NEG terminal.

REAR CONTROLLER



XTO Car TAN Wires to XCT B-NEG with Bluetooth 18AWG negative wire. Connect he BATTERY NEG cable to this terminal

FRONT CONTROLLER



XTC or XT Car TAN Wires to FRONT B-NEG. The BATTERY NEG cable to this terminal OR the REAR controller depends on its length.
(Bluetooth 18AWG NEG on REAR controller)

8. The F2-F1-A1 Motor Wires

The XTC, XT, and the XTO had different color heatshrink! Both controllers must be the same connections. **CAUTION: DO NOT TRUST THE HEATSHRINK COLOR! See below they mixed up the F1 and F2 heat shrink colors!**

J7=F2
J8=F1
J9-A1

9. Speed Sensors:

Your ALLTRAX Power panel includes Speed sensor cables pre-wired from Alltrax for Aftermarket motors. The STOCK OEM motors DID NOT have speed sensors which is a major issue for 4WD cars. Without the speed input, strange things can happen. The Alltrax controllers are programmed to accommodate no speed sensors, but aftermarket motors will improve performance.

If you do not have aftermarket motors, simply zip tie these safely away. **If you do install aftermarket motors you will need to load NEW FIELD MAPS.**

Upgrading to aftermarket motors with Speed sensors will provide the controller "precise control" of BOOST and REGEN that you cannot get with stock motors as we estimate the RPM.

a. The REAR Speed Sensor cable is about 18" long. If using a motor with sensor, route to the REAR motor AWAY from any high power wires. If not used simply tie away safely.
b. The FRONT Speed Sensor is 84" Long. If using a motor with sensor, route under frame AWAY from any high power wires. If not used simply tie away safely.

REAR MASTER CONTROLLER

FRONT CONTROLLER

10. CONTROL Connectors

The XCT installed on these panels have particular field maps and programming for THAT POSITION.

a. REAR is programmed for a DA8-4013 stock motor
b. FRONT is programmed for a DA7-4009 stock motor

The 12-pin car connectors are wired to the XCT 23 pin connectors and wired in a way to provide the REAR MASTER control of the car input signals such as THROTTLE, FOOTSWITCH, FORWARD and REVERSE Signals. The REAR controller then sends data to the FRONT controller over the CAN BUS through the Bluetooth CAN BUS connectors (Installed later in this document).

This provides a means to have one controller in control of the car; the throttle, direction, and footswitch for safety concerns.

*****CAUTION*****

Each controller has its own SOLENOID control line, thus is critical the REAR controller has control of the REAR solenoid, and the FRONT controller has control of the FRONT solenoid. VERIFY the SMALL gauge control wires on the solenoid should be marked REAR and FRONT. If a failure is detected by the XCT, THAT controller will disconnect its own solenoid.

Control Connectors Continued:

12-PIN Control Harness:

c. Connect both the 12PIN connectors to the proper controller wire harness. REAR connector to the REAR controller and FRONT connector to the FRONT controller.
d. See HNS105-001-20-01 and ASY105-001-20-01 drawings.
e. Tuck the cables safely above the controllers

BLUETOOTH Module and the CAN bus Wires:

f. There are three small grey communication cables. One 2-pin power connector and two 4-pin CAN BUS connectors. (One for each controller)
g. Install the BLUETOOTH Module “hook and loop” on the REAR controller FAN cover.
h. Connect the 2-pin POWER connector
i. Connect the short 4-pin connector from the REAR controller next to it (Middle slot)
j. Connect the long 4-pin connector from the FRONT controller next to it (Right slot)

11. TOW/RUN Power Cable and REGEN PROTECTION DIODES

The TOW RUN circuit provides power to the XCT motor controllers for Roll Away protection. Without a speed sensor and KEY OFF the movement may not build enough voltage that would awaken the XCT and stop the movement. With a speed sensor, the XCT will immediately stop the movement.

*****CAUTION*****

If the car has to be towed, the TOW/RUN switch must be switched to the TOW position or the controller will wake up detecting movement try to “stop the car” and can overheat the motor or damage the controller.

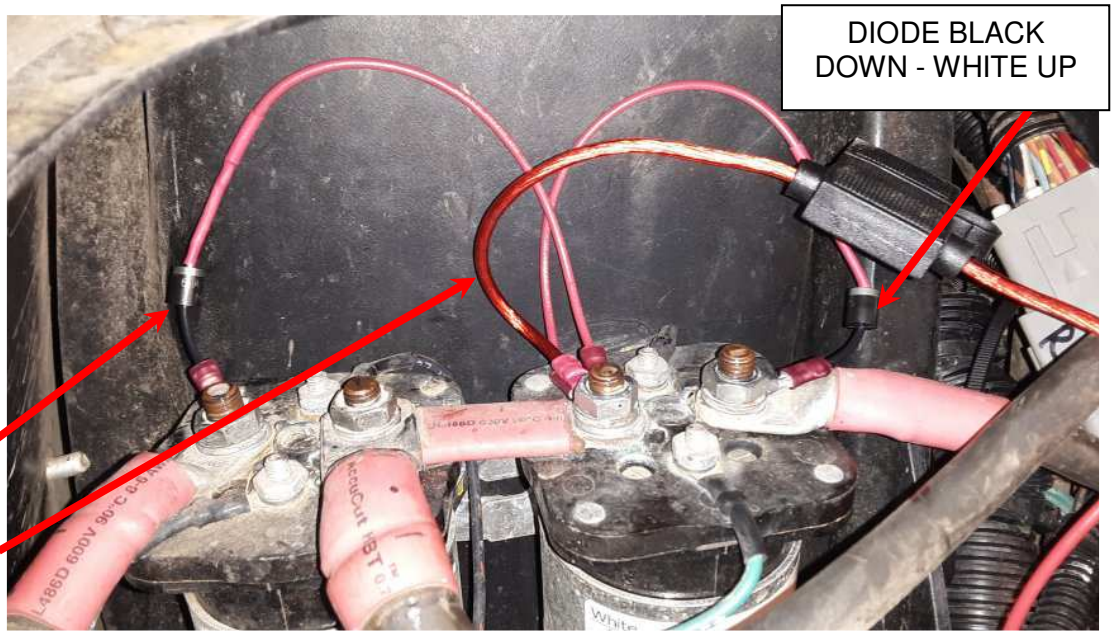
Mount the TOW/RUN switch where convenient. In this example was zip tied to the harness. A switch plate is included but some work on your part to find and mount the switch.

Shown here in the TOW position. Located near the REAR controller side

Route the TOW/RUN FUSE RED wire to the solenoids, for XTO solenoids on Passenger side, for XTC and XT solenoids on the Driver’s side.
The TOW/RUN Fuse ring terminal (RED WIRE) connects to the CENTER BUS BAR going BETWEEN the two solenoids with the TWO KIT-EZGO-DIODE-T regen protection diodes.

a. Remove both KIT-EZGO-DIODE-T from the packages.
b. The Battery cable connects to one nut of the CENTER BUS BAR, loosen the other nut for these small wires. You may need a little grease on the nut to prevent seizing.
c. The WHITE BAND of the diode has RED HEATSHRINK and is positive to the CENTER BUS BAR.
d. The BLACK BODY of the Diode connected to the solenoid cable nut for each controller

DIODE BLACK DOWN - WHITE UP



DIODE BLACK DOWN - WHITE UP

TOW/RUN Fuse Wire to CENTER BUS

Control Connectors Continued:

12. Install Batteries and Cables

Make sure the TOW/RUN switch is in TOW, the KEY Switch is OFF, and the FORWARD and REVERSE switch is in NEUTRAL position.

CHECK ALL Hardware on the controller main terminal's are tight. Once the batteries are installed there is not allot of room to safely get a metal wrench in there to retighten bolts.

Install the batteries, battery hold down brackets, and cables one by one using extreme caution to connect them properly. Polarity reversal is not covered by warranty. When in doubt, measure with a voltage meter.

Add any zip ties to keep the wires or cables from being pinched, but not too tight that would stress or break connections. (Shown below nice job on a XTC curtesy of Chris Oliver TX)

The next section is where we apply power. Before we do that – TAKE A BREAK. Then recheck everything. Trust me – this is a conversion process and allot of cables were taken out and reinstalled.

- Recheck your battery cables and nuts are tight
- Verify all connectors are tight
- Measure the voltage at the solenoid. +48V good – 30V bad. If you do not get 48volt (or higher) check to ensure one battery was accidentally reversed. (It happened to us and we are supposed to be the experts!)

13. Power on Sequence:

The power on sequence is TOW/RUN first, the XCT controllers are feed voltage to "pre-charge" the large internal capacitors. **NOTE: The Forward and Reverse switch must be in Neutral when turning on the Key Switch or the car will not move. A safety feature**.

a. Please place the BBB car on jacks - front and rear tires off the ground.
b. Set TOW/RUN to the RUN position
c. Measure the voltage at the motor controllers B+ terminal – other side of the meter to any B-Minus connection. Should read 42 volts or greater. If not check the 20amp ATC fuse. If that fuse blew – STOP. Check ALL your wires. Check the REGEN didoes we mounted to the solenoids. Are the WHITE BANDS headed to the CENTER BUS BAR?
d. If all is normal and voltages were within spec, turn KEY Switch to ON
   - The BLUETOOTH module GREEN LED will turn on indicating it is communicating with the controllers.
     - If no green light – check the 5amp ATC fuse. If blown STOP and check all connections.
   - Both the REAR and FRONT controllers green LED will flash 3 times green then SOLID GREEN. This indicates good throttle. If you get red flashes, STOP and check the XCT operators manual for the red flash codes and call or email ALLTRAX Helpdesk for trouble shooting advise.
   - If both solid green LED on both controllers, set the Forward/Reverse switch to the FORWARD position, with wheels OFF THE GROUND slowly and slightly press the pedal.
     - Front and Rear Solenoid should engage
     - Front and Rear tires should slowly spin in the same direction!
     - If the front turns opposite direction from the rear, the FIELD wires from ONE motor will have to be reversed. If you properly marked the wires then check the motor to see if Bad Boy manufacturing incorrectly installed them. This happened to us on an XT car. (Suggest swap the front motor F1 and F2)
     - If the front and rear are turning the same direction as forward (rotating forward) then stop and release the pedal. Next step
   - Switch the Forward and Reverse switch to the Reverse Direction.
     - If the front and rear are turning the same direction as reverse direction (rotating backwards) then stop and release the pedal. Next step
   - You're done – Place the F&R switch in NEUTRAL position, turn KEY Switch to OFF, get the car off the jacks. You're ready to drive it.

Side notes:
The next section is for information. If you have any issues, we can connect a laptop to the controller USB connector and monitor any alarms, why it won't move, or check status of signals. The next section will discuss how to download and install Toolkit on your laptop.

We have found through experience the electronic throttle assembly is the weak link in this system and if a previous Sevcon OEM controller failed in such a way (shorted) that can damage the throttle assembly. They are very hard to find and expensive. We know….happened to us.

14. TOOLKIT SOFTWARE

The Alltrax Toolkit program allows us to communicate (using a Windows® platform) to our controller. The REAR is the MASTER Control unit.

- From the Alltrax Web Site, download the Alltrax Toolkit from the XCT web page.
- Save this file to your desktop.
- Click on the file and it will install Toolkit into Windows®.
  - Some Windows® based tablets may not work and may have security so tight nothing can be installed unless you have administrator privileges.
- If a warning pops up "Run this program?" select YES
- Once installed run the Toolkit program. DO NOT connect anything yet until you fully read the warning below.

*****WARNING*****

The USB cable is connected to your laptop DO NOT LET THE USB END OR LAPTOP TOUCH the frame of the car, a short circuit will follow through the USB cable and the USB connector of the XCT controller and cause damage.

DO NOT let the END OF THE USB cable itself touch any metal part of the car frame, bad things happen and destroy either the laptop or the controller.

Do not charge the car when using the USB Cables, the charger internal ground system map cause problems.

We suggest lay the "computer end" of the USB cable on the ground, then connect the XCT USB side first, then connect into your laptop.

When you're done, unplug the computer first and lay on the ground so it cannot touch the frame, then remove the cable from the XCT.

With Toolkit you can change some settings but there is a catch. BOTH CONTROLLERS must have the same setting! If you change settings in one controller and press set (which is saved to the controller), then you disconnect and connect to the other controller and do the same setting change.

It's like the two guys in the movie "Pacific Rim" where the huge Yeager robots require two pilots to link the two minds together so they can run the machines neural load – if they are in sync - all is good. If they are not in sync, weird things can happen. BOTH XCT controllers must be set the same.

Special Thanks to a customer Chris Oliver of Texas who worked very hard with Alltrax Engineering since Jan 7th 2020, all during the great 2020 pandemic, the Riots, the Fires, the Hurricanes, and the epic election, all to get a bad Boy Buggies conversion system fully operational.