

Talon SRX Breakout Board
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Team 3044 (0xBE4) developed a breakout board for the Talon SRX motor controller used with FIRST FRC robots. We did this for the following reasons:

- The flying leads provided on the Talon created awkward wiring layouts.
- Making use of the breakout port on the Talon for limit switches or encoders required use of a ribbon cable, which also contributed to awkward wiring layouts.

The breakout board we developed has the following features:

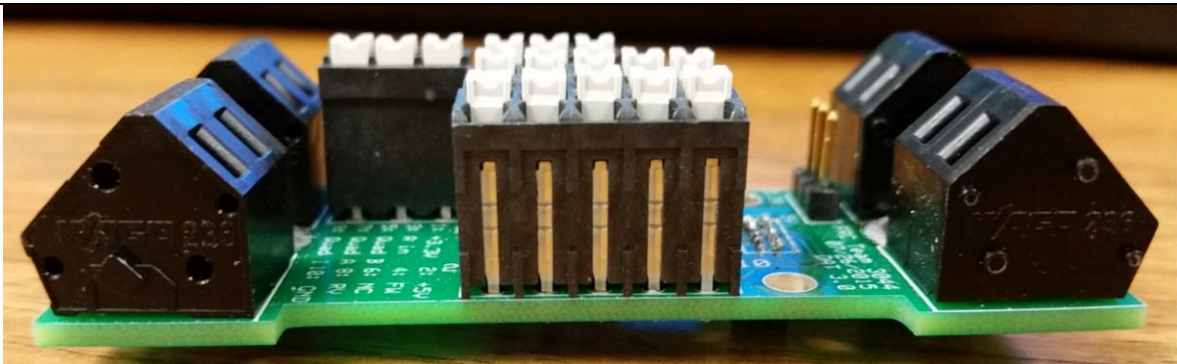
- All of the power leads are brought to a PCB that mounts to the top of the Talon SRX. The power leads mount to the PCB through Wago connectors that are similar to the Wago connectors on the Power Distribution Board.
- The ten pins of the breakout connector are brought out to Weidmuller connectors that are spring loaded connectors that require no crimp connections.
- The CAN leads are brought up to two Weidmuller connectors that serve as entry and exit points for the CAN bus.
- Nuts with 8-32 threads are incorporated into the printed circuit board to assist with mounting the Talon. The nuts align with the mounting screw holes in the Talon.
- 10k pull-up resistors are provided for use with open collector resolvers. The resistors can be pulled up to either 3.3V or 5V through use of a jumper. Resolvers with logic level outputs can be used by omitting the jumper.
- The PCB is isolated from the Talon SRX body with a separator made of Nomex aramid paper cut to the shape of the PCB. Holes are cut for the nuts and the breakout connector that engages the Talon.

The schematic and PCB layout files are available in compressed form. The PCBs need to be ordered through ExpressPCB (<http://www.expresspcb.com/>).

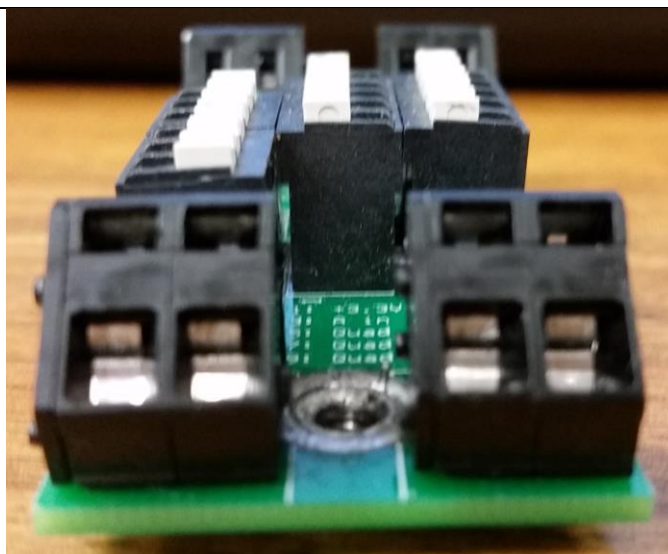
The following pages provide:

- A bill of materials (BOM) for the breakout board.
- Pictures of the populated breakout board.
- A picture of the Talon SRX prepared for the breakout board.
- A picture of the breakout board installed on the Talon SRX.
- The recommended assembly order for the breakout board.
- The PCB traces of the breakout board.
- The schematics of the breakout board.

The BOM for the breakout board.				
Quantity	Part	Value	Manufacturer Part Number	Supplier
4	J1, J2, J3, J4	Wago 236-2	Wago 236-402	OnLineComponents.com
1	J5		Digi-Key 609-3754-ND	Digi-Key
2	J6, J7		Weidmuller 1825670000	OnLineComponents.com
2	J8, J9		Weidmuller 1825650000	OnLineComponents.com
1	J10		Digikey 609-3461-ND	Digi-Key
3	R1, R2, R3	10k	Digikey 985-1278-1-ND	Digi-Key
2	W1, W2		PEM SMTSO-832-4-ET	Hi-Tech Fasteners
1	Nomex sheet	0.010" sheet		McMaster-Carr



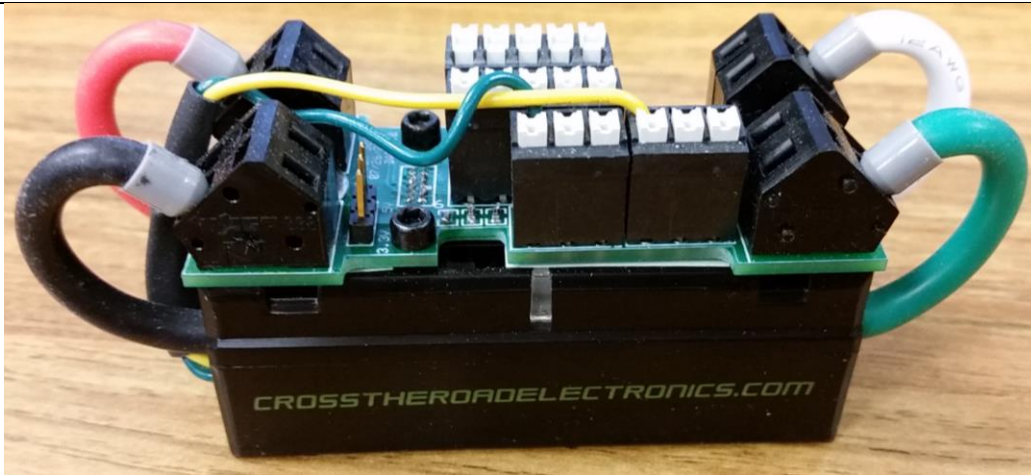
The populated breakout board.



The populated breakout board showing the Wago connectors for the power leads.



The Talon SRX prepared to accept the breakout board.



The breakout board installed on the Talon SRX.

PCB Population Notes

The PCB was populated in the following order:

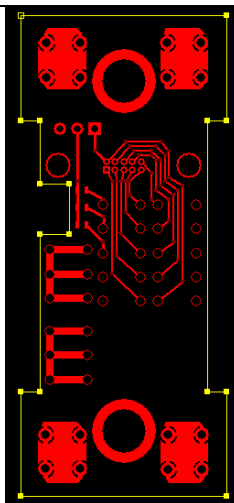
- The top SMT resistors
- The bottom PEM nuts (which should be soldered on both the top and the bottom to make sure there is good solder fill; these nuts need to handle the torque applied by the mounting screw)
- Bottom 10 pin (0.050" pitch) connector
- Top 3 pin (0.100" pitch) connector
- Top 4 pin Wago connectors
- Top Weidmuller connectors (NB: be very careful with the placement of the three connectors that span the board. If they are not placed carefully and at the same time, at least one of the connectors will likely end up askew.)

After the board is populated, the ends of all leads on the bottom of the board should be trimmed back as far as practical. All solder connections should be checked to ensure good solder connections. This is particularly important with the Wago connectors since they will be handling the highest current of all the connectors.

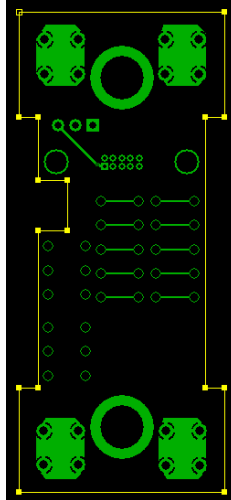
A piece of Nomex sheet was trimmed to the size of the board, then holes were made to allow the PEM nuts, the 10 pin connector, and the two small 4-40 mounting screws to pass through the sheet. The sheet was cut with regular scissors.

Each power lead was trimmed so that 50mm remained. 5mm of insulation was trimmed off of the power lead wires. Some of the exposed wire strands were trimmed so that the ferrule fit onto the wire. A ferrule was crimped onto each lead. The remaining end of the ferrule was trimmed to 7mm for insertion into the Wago connector.

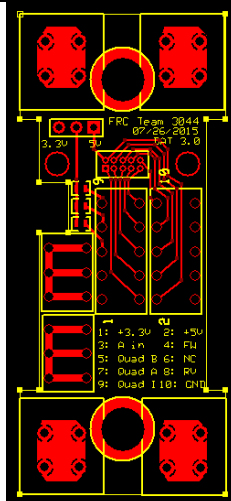
One pair of the CAN leads was cut to a length of 25mm. One of the trimmed conductors was covered with 15mm of 1/16" heat shrink tubing. A 25mm length of 3/16" heat shrink tubing was then used to capture all 4 CAN leads together. The yellow and green CAN leads were then trimmed to 90mm and brought to each of the three-pin Weidmuller connectors on the breakout board.



The layout of the top layer on the PCB.



The layout of the bottom layer on the PCB.



The silkscreen and the top layer on the PCB.

