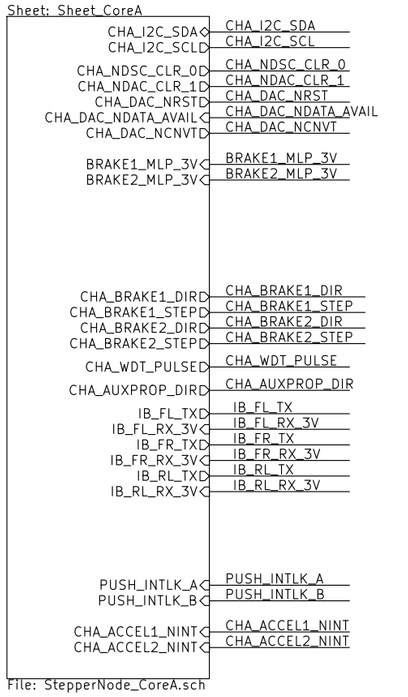
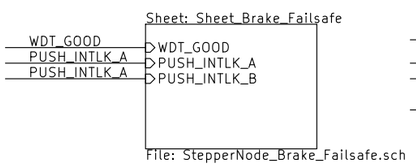
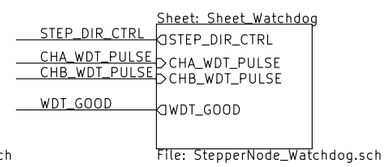
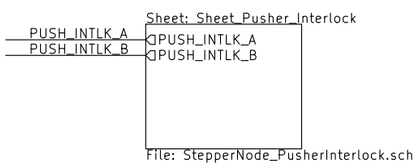
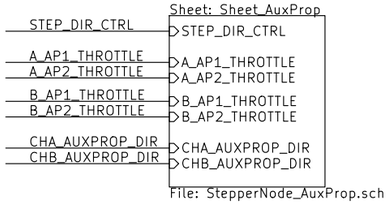
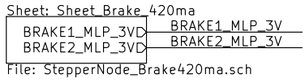


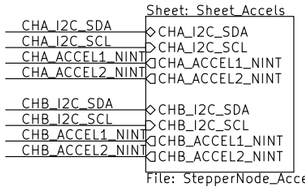


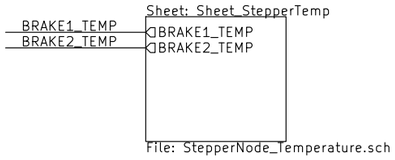


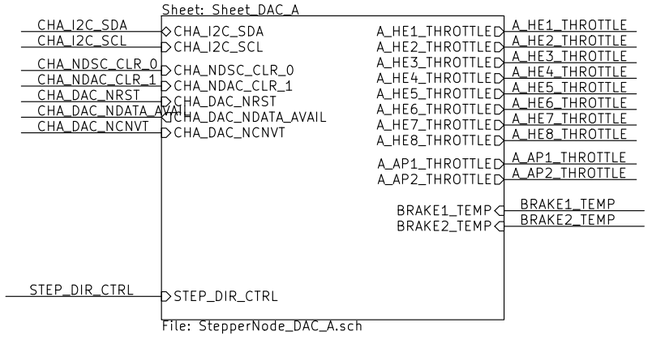


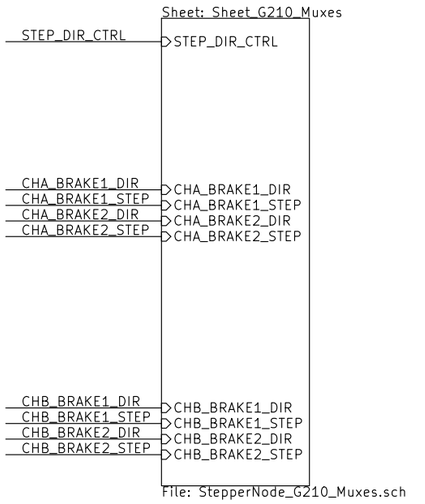


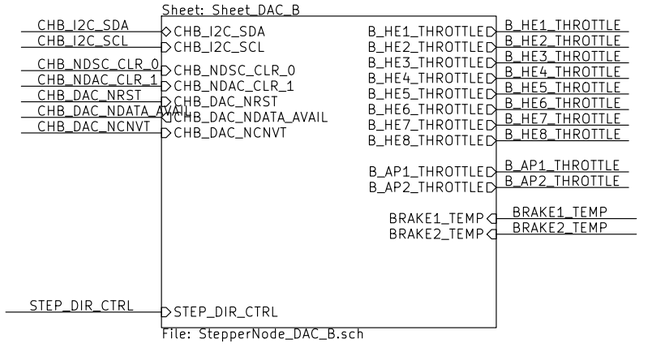


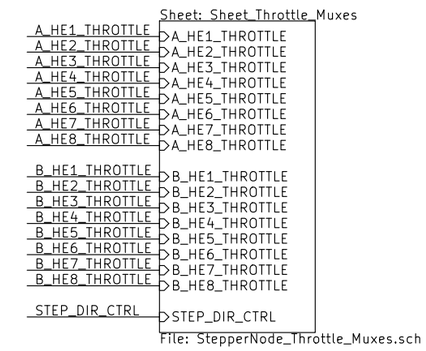


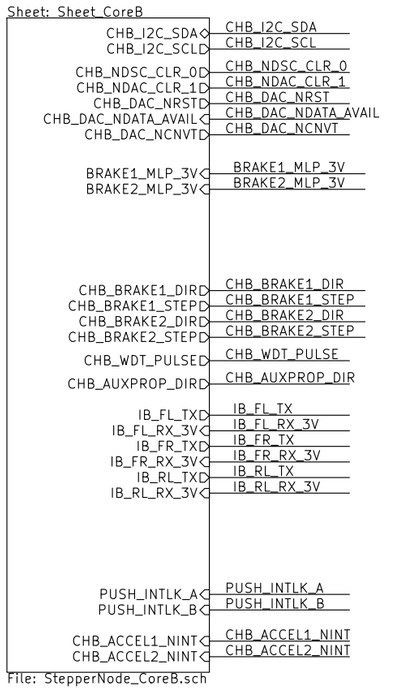


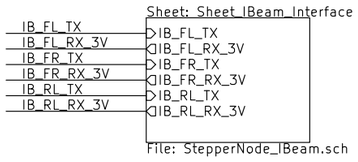












MAJOR CHALLENGES:
1. Power Muxes from a redundant source
2. Prevent parasitic powering of a failed nodes DC bus

rLoop – Stepper Node
Top Overview

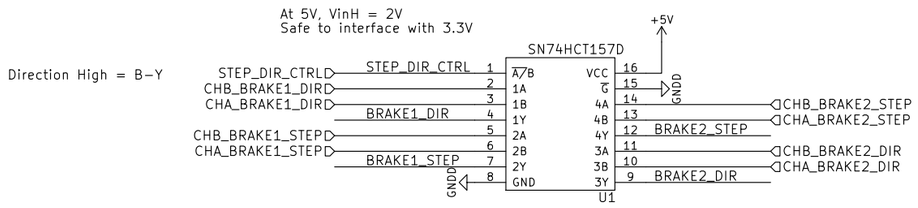
Original Author: SafetyLok

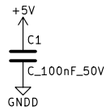
Sheet: /
File: rloopStepperNode.sch

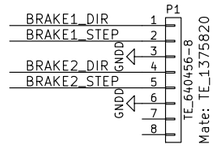
Title: Top Level

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 1/15

The purpose of this block is to route 6 Step and 6 Direction signals from each of the two teensys and also buffer those signals.







Left and Right Brake Controllers

Twisted pair wiring
Grounded at this end only

rLoop – Stepper Node
G210x Multiplexer Interface

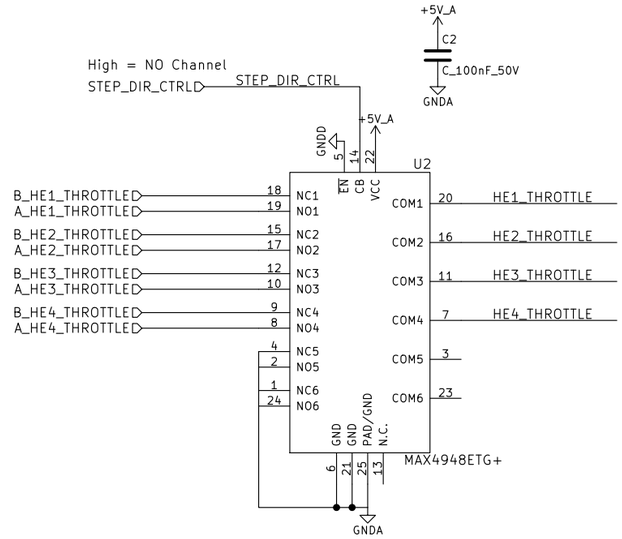
Original Author: SafetyLok

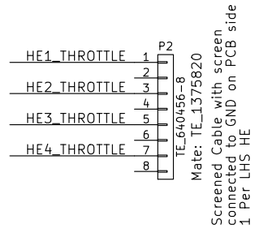
Sheet: /Sheet_G210_Muxes/
File: StepperNode_G210_Muxes.sch

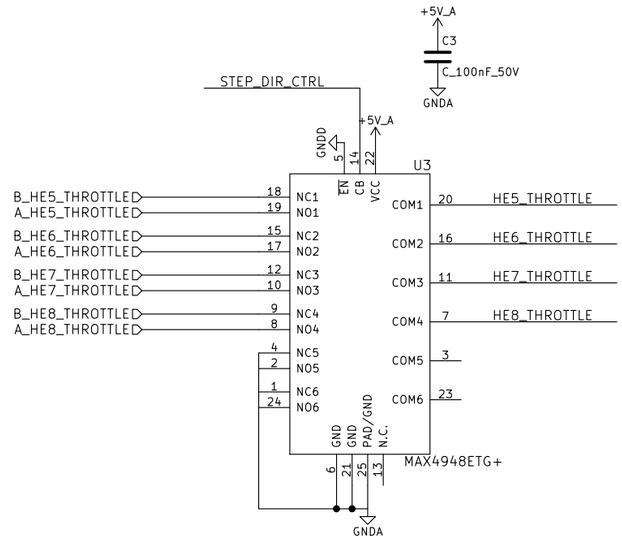
Title: G210 Multiplexers

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 2/15

Notes on HE throttle interface:
1. We need to maintain electrical isolation (GND/SIG)
2. We need to supply +12V (Fused) for the electronics to run
3. We need RS485 comms
4. Fwd/Rev? How? – Swap Phase A and C or set motor features to 0x01







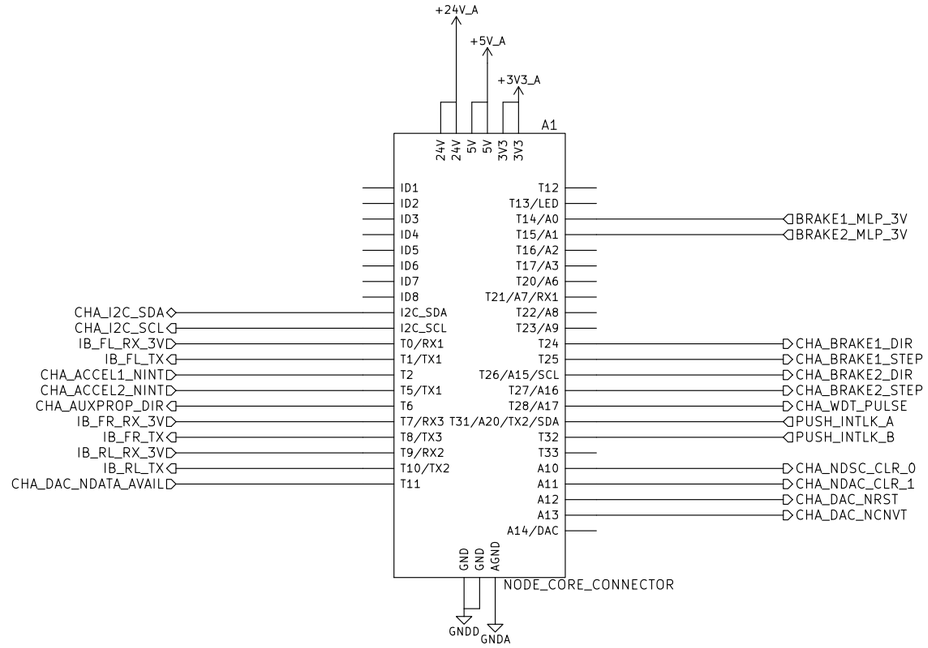
rLoop – Stepper Node
Throttle Analog Multiplexers

Original Author: SafetyLok

Sheet: /Sheet_Throttle_Muxes/
File: StepperNode_Throttle_Muxes.sch

Title: Throttle Multiplexers

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 3/15



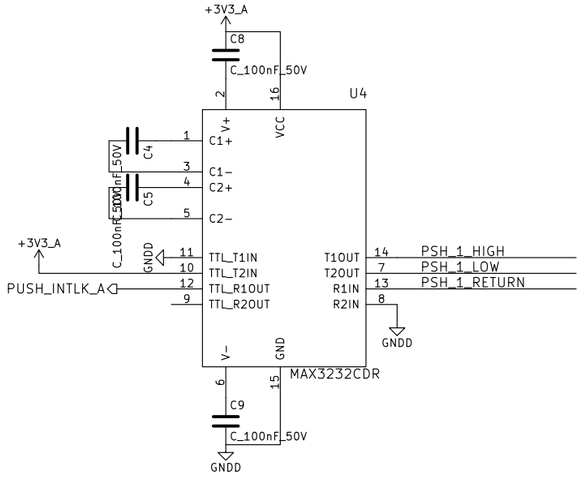
rLoop – Stepper Node
Core Interface – Channel A

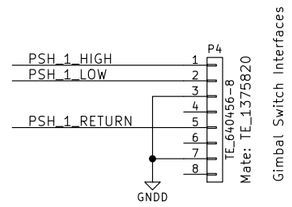
Original Author: SafetyLok

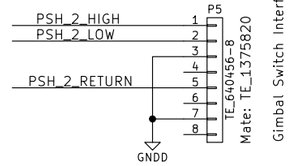
Sheet: /Sheet_CoreA/
File: StepperNode_CoreA.sch

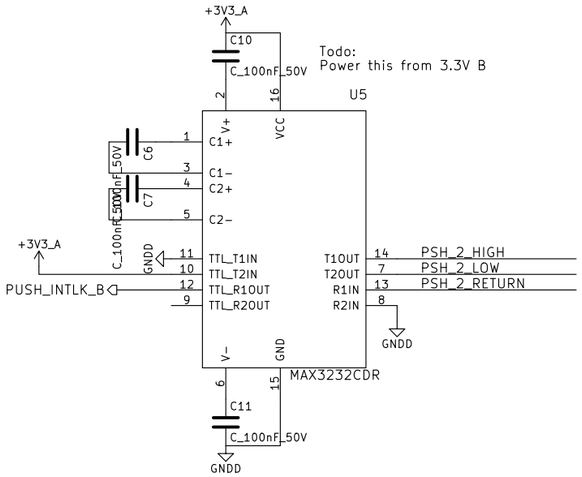
Title: Stepper Node – Core A

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 4/15









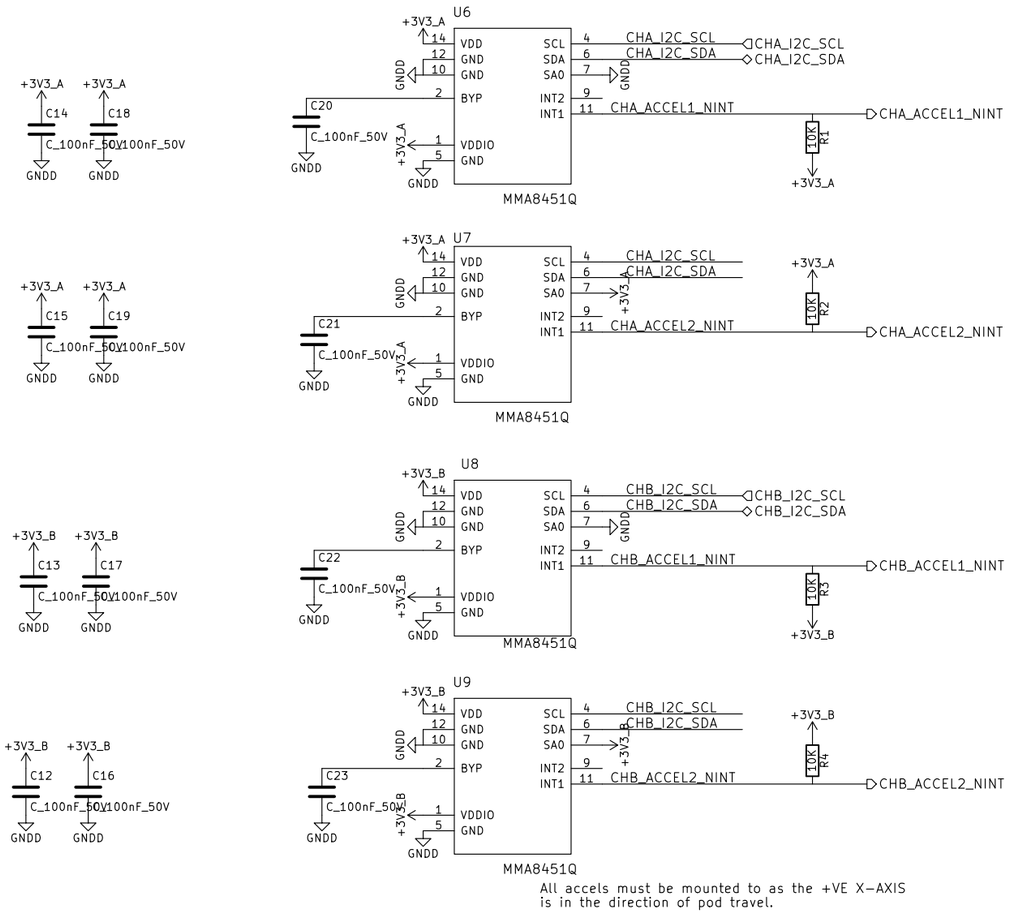
rLoop – Stepper Node
Pusher Interlock Interface

Original Author: SafetyLok

Sheet: /Sheet_Pusher_Interlock/
File: StepperNode_PusherInterlock.sch

Title: Pusher Interface Interlock

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 5/15



All accels must be mounted to as the +VE X-AXIS
is in the direction of pod travel.

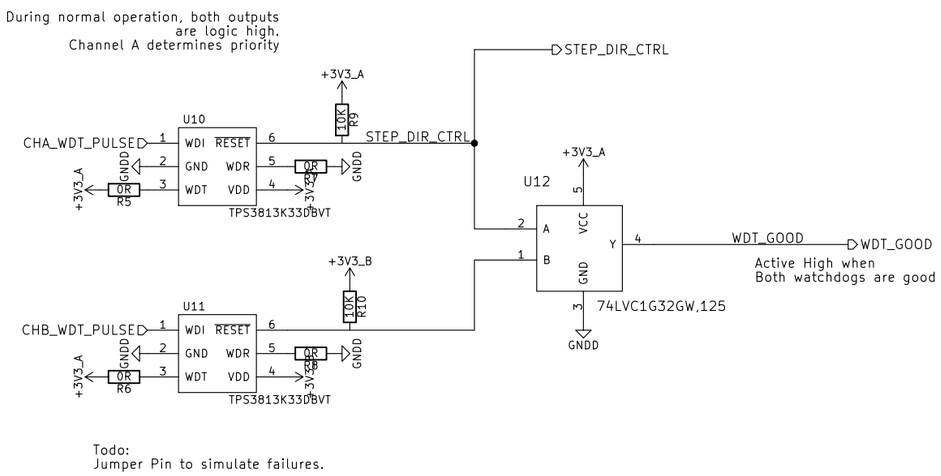
rLoop - Stepper Node
Accelerometers

Original Author: SafetyLok

Sheet: /Sheet_Accels/
File: StepperNode_Accels.sch

Title: Accelerometers

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 6/15



Todo:
Jumper Pin to simulate failures.

DESIGN REVIEW NOTES:
1. STEP_DIR_CTRL should go low if channel A fails, giving channel B priority
2. STEP_DIR_CTRL is pulled up, so the only way it can go low is if the TPS3813 is powered
3. All devices here need redundant supplies
4. Need to provide isolation in case of parasitic power from a failed node.

rLoop – Stepper Node
Mux Priority Watchdog System

Original Author: SafetyLok

Sheet: /Sheet_Watchdog/
File: StepperNode_Watchdog.sch

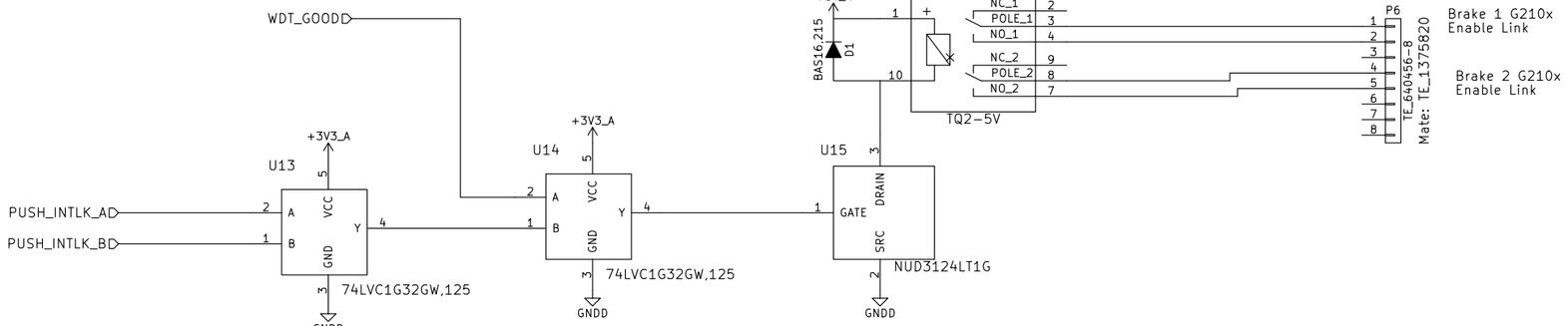
Title: Watchdog

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 7/15

The purpose of this function is to ensure that if the WDT_GOOD signal
goes low the drive controllers do not drop out if the interlock is enabled.

Todo:
Power RLY from redundant source.

G210x Active when
Relay Energized



Output is high when either
Interlock is on

If WDT or any Interlock is active then
The drive controllers always remain active.
In this mode a WDT fault can't cause loss of drive motors.

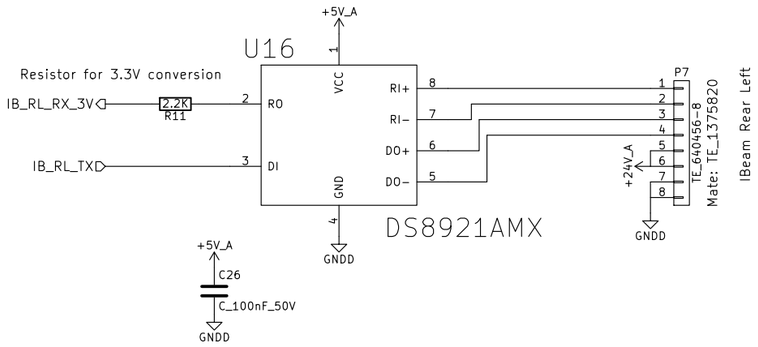
rLoop – Stepper Node
Failsafe Brake Interface

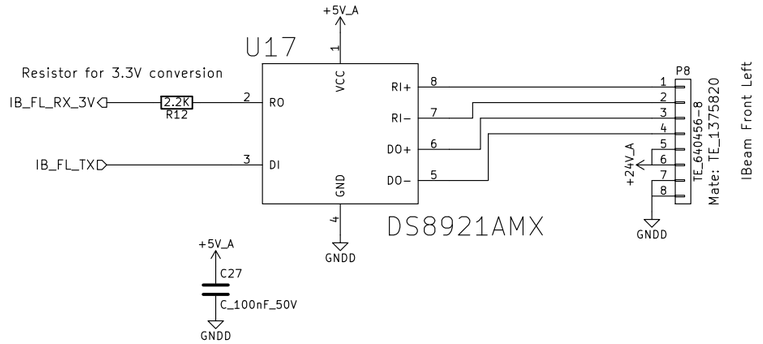
Original Author: SafetyLok

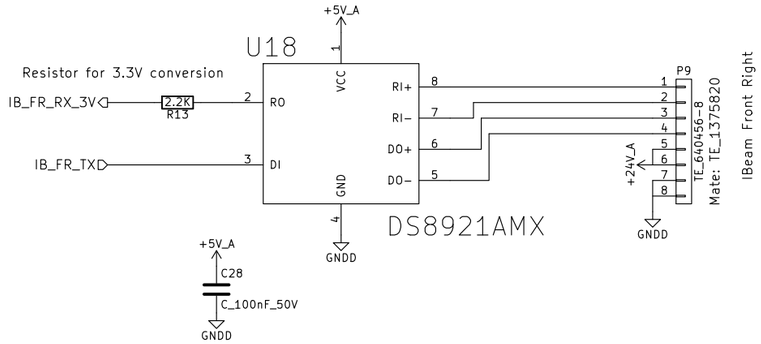
Sheet: /Sheet_Brake_Failsafe/
File: StepperNode_Brake_Failsafe.sch

Title: Brake Failsafe Control

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 8/15







rLoop – Stepper Node
I Beam Sensors

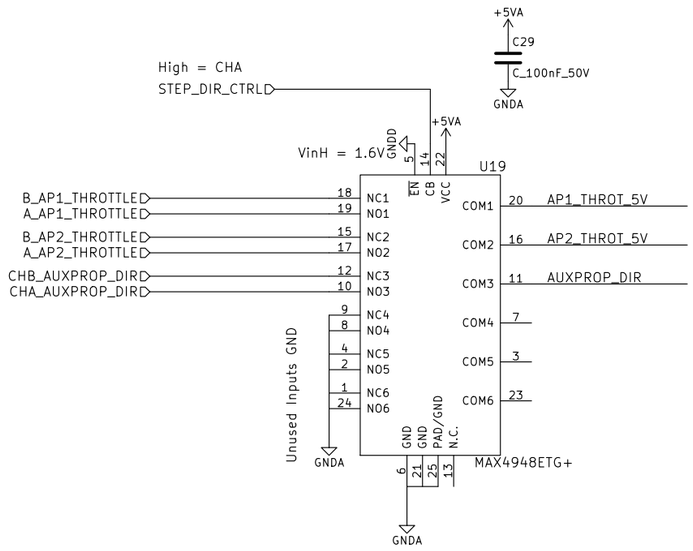
Original Author: SafetyLok

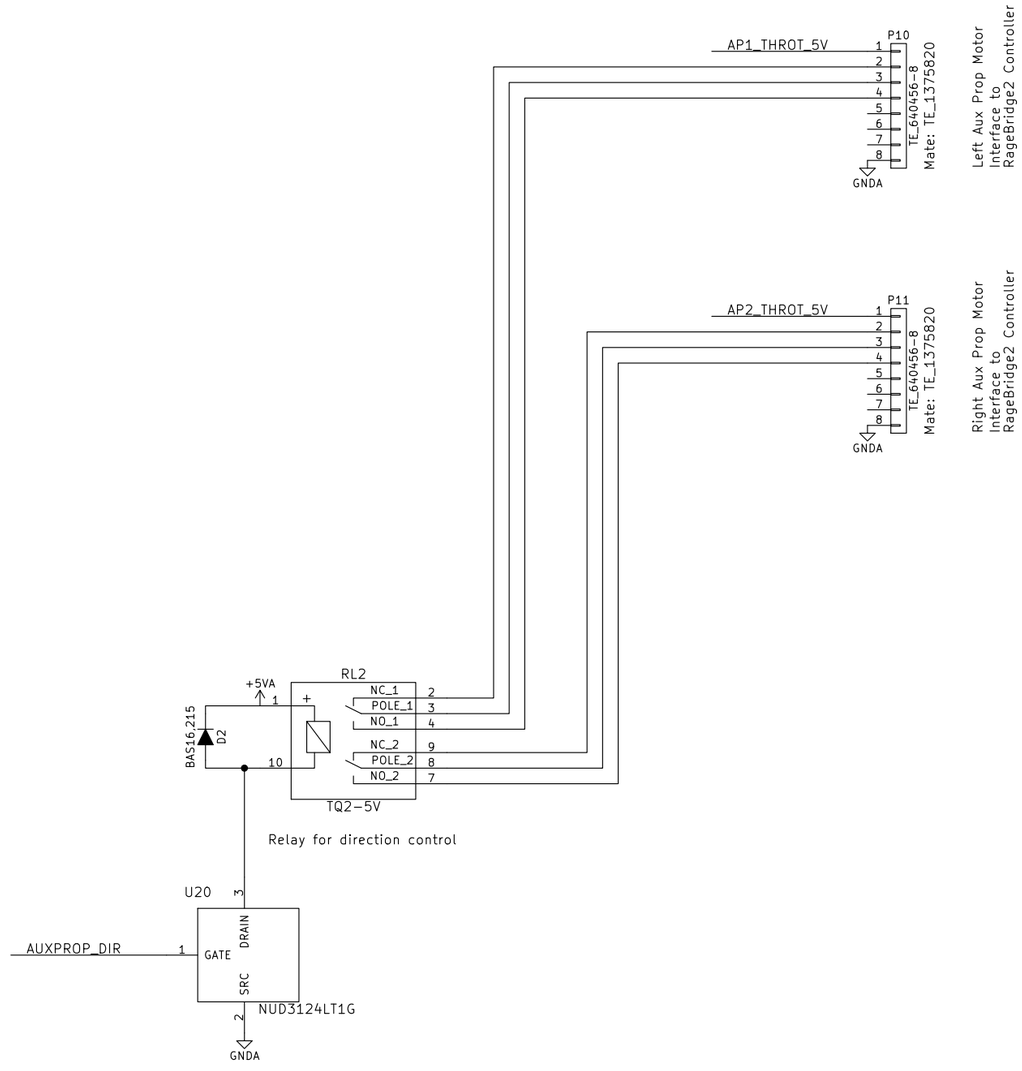
Sheet: /Sheet_IBeam_Interface/
File: StepperNode_IBeam.sch

Title: I Beam Laterial (Yaw) Sensors

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 9/15

TODO: CHECK ELECTRICAL ISOLATION OF RAGEBRIDGE CONTROLLER





rLoop – Stepper Node
Aux Prop Interface

Original Author: SafetyLok

Sheet: /Sheet_AuxProp/
File: StepperNode_AuxProp.sch

Title: Aux Propulsion Interface

Size: A3	Date:	**Rev: 1**
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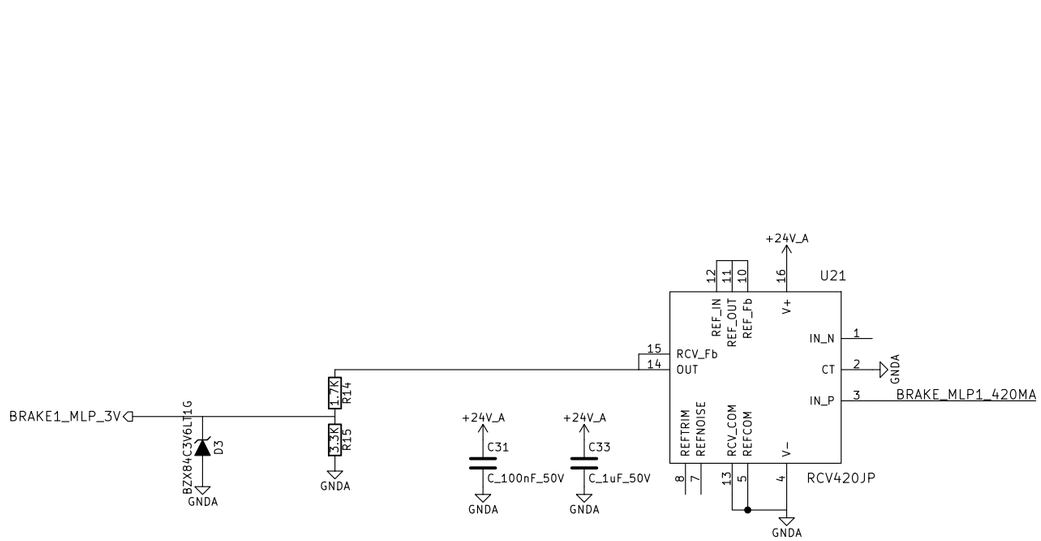
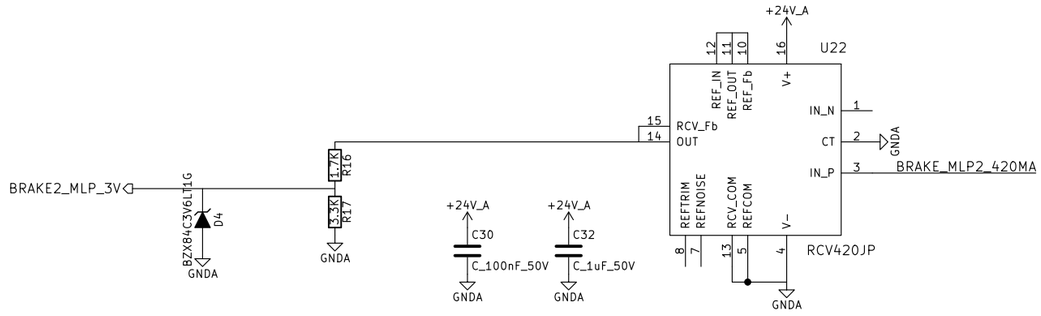
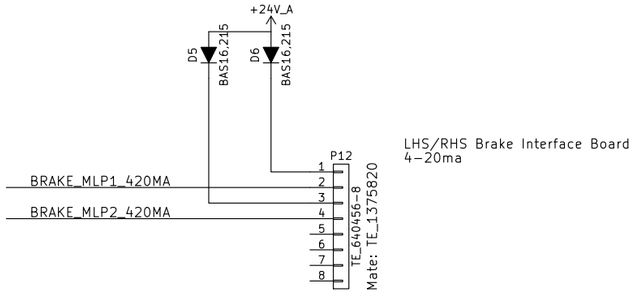






LHS/RHS Brake Interface Board
4–20ma

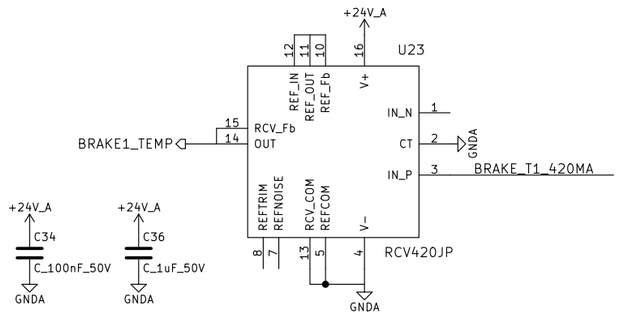
rLoop – Stepper Node
Brake MLP 4–20 Interface

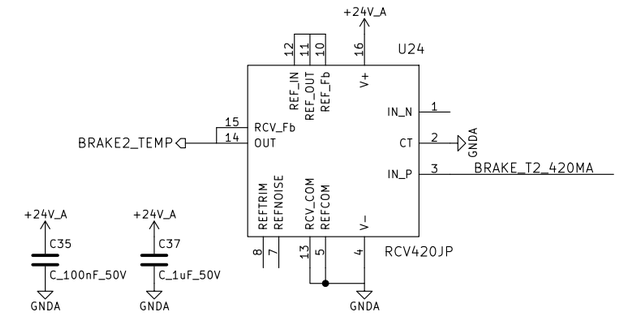
Original Author: SafetyLok

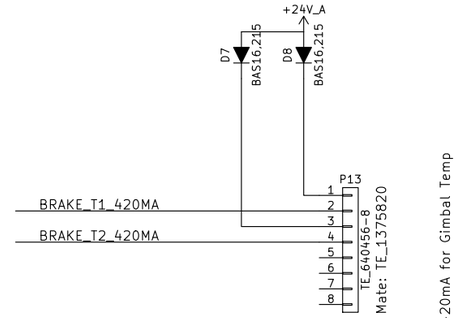
Sheet: /Sheet_Brake_420ma/
File: StepperNode_Brake420ma.sch

Title: Brake – 420ma Interface

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 11/15







4-20mA for Gimbal Temp

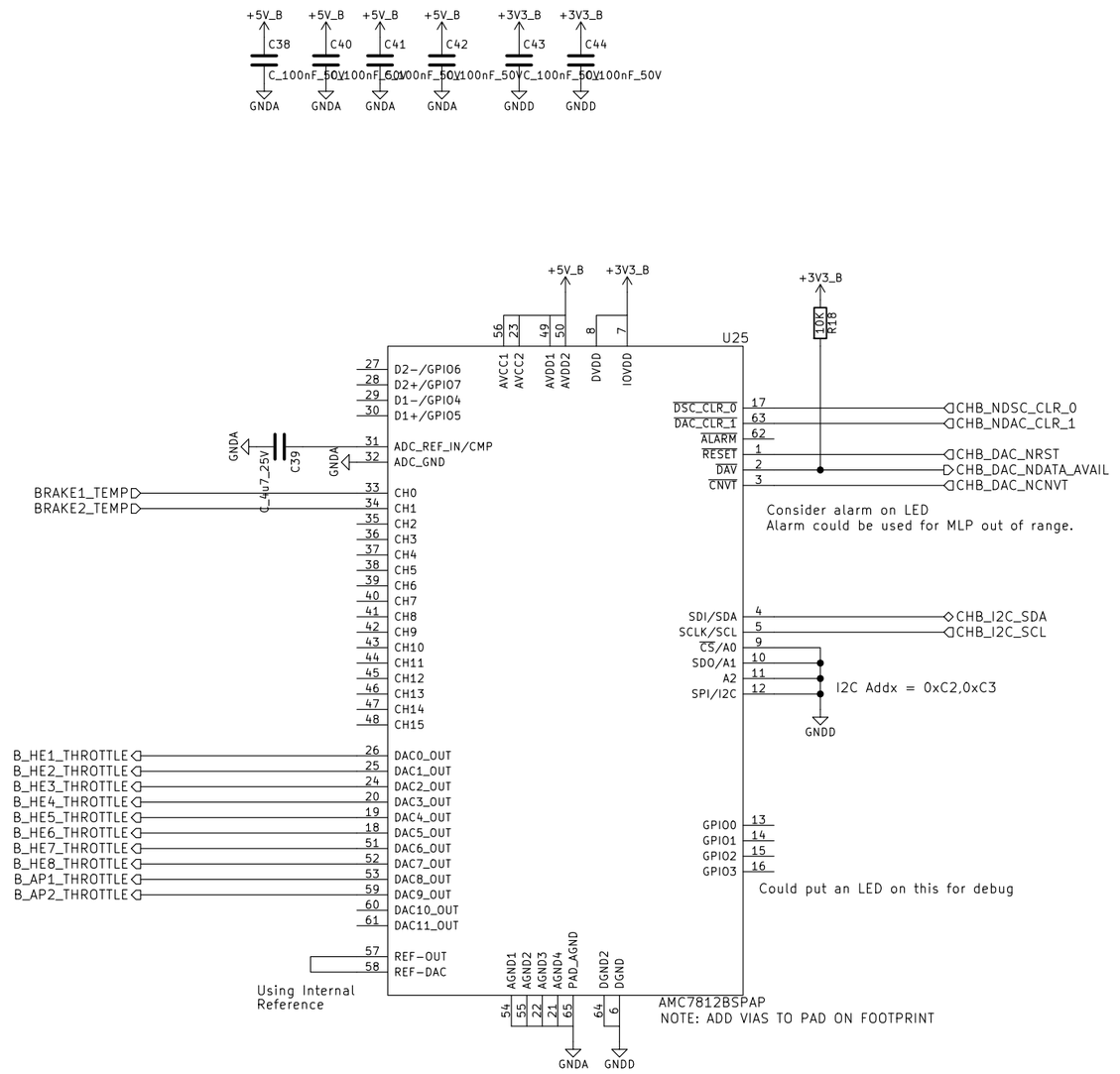
rLoop - Stepper Node
4-20mA Temp Sensor IF

Original Author: SafetyLok

Sheet: /Sheet_StepperTemp/
File: StepperNode_Temperature.sch

Title: Stepper Motor Temperature Interface

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 12/15



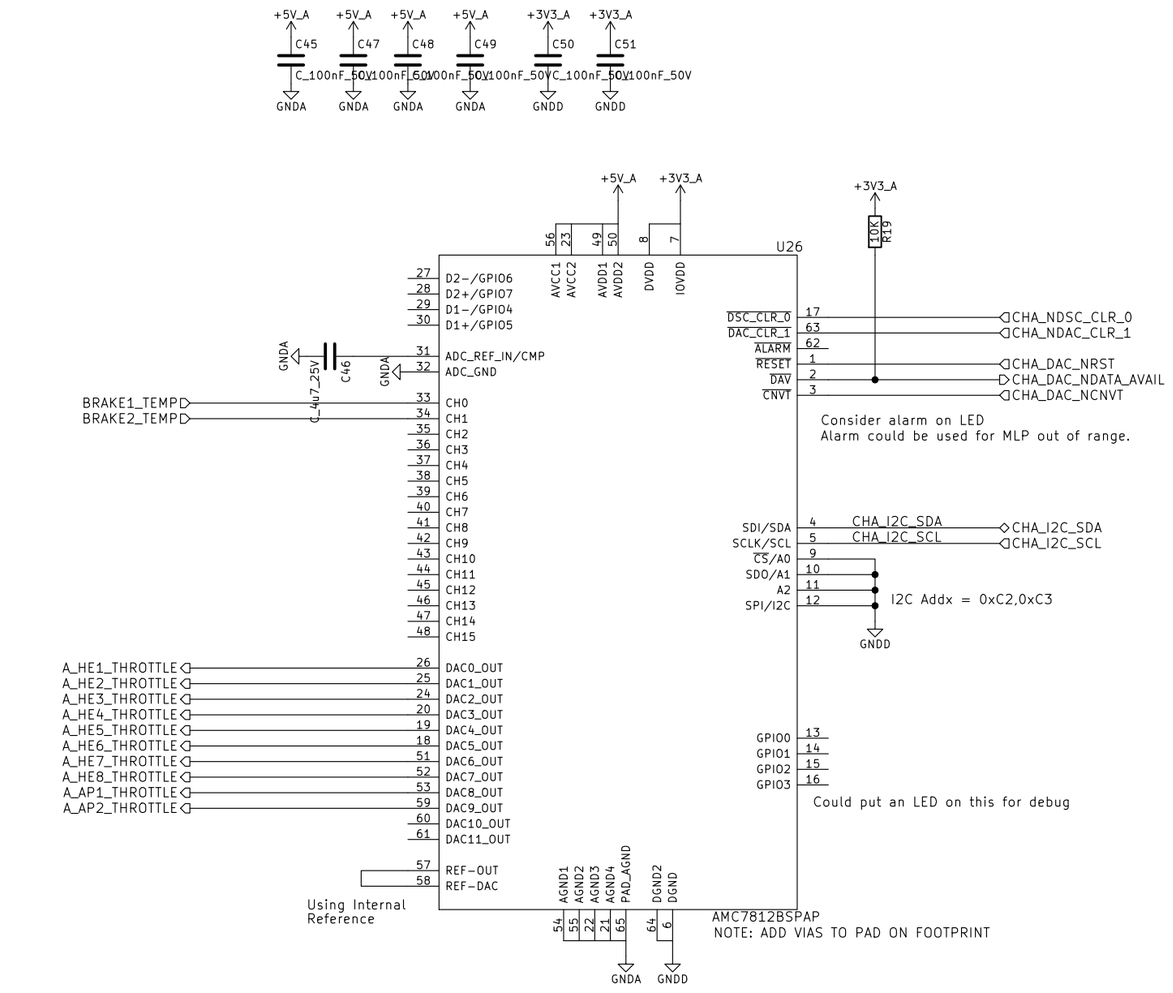
rLoop – Stepper Node
DAC Channel B

Original Author: SafetyLok

Sheet: /Sheet_DAC_B/
File: StepperNode_DAC_B.sch

Title: DAC Channel B

Size: A3	Date:	**Rev: 1**
KiCad E.D.A. kicad 4.0.2-stable		Id: 13/15



rLoop – Stepper Node
DAC Channel A

Original Author: SafetyLok

Sheet: /Sheet_DAC_A/
File: StepperNode_DAC_A.sch

Title: DAC Channel A

Size: A3	Date:	**Rev: 1**
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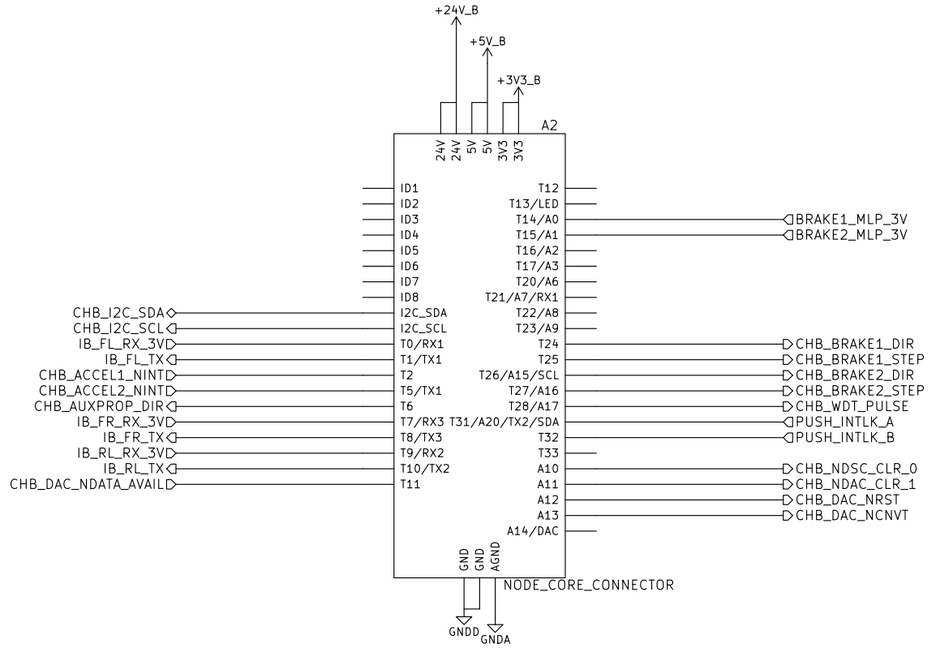

rLoop – Stepper Node
Core Interface – Channel B

Original Author: SafetyLok

Sheet: /Sheet_CoreB/
File: StepperNode_CoreB.sch

Title: Core Interface – Channel B

Size: A3	Date:	**Rev: 1**
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