**UART Control Port**

J2
Control UART

For future interface so we
don't need to recompile code
to exercise and test motors.

GND

**STEPPER TX/UX**

Single wire RS483 style
protocol is used to set
advanced controls on
TMC2209

R1
1k

STEP_TXRX

**EXT MCU POWER**

J3

External power when USB is disconnected.
1.8-5.5 volts regulated by onboard Pico
buck/boost.

VCC
Pin_1
Pin_2
GND
Ext power

**EXT STEPPER POWER**

Stepper motors can take anywhere
between 9-24 volts. We'll just use
a barrel jack and use a pre-built
power supply.

We need to put the switch on the
front side so we need a P-Channel
Mosfet. Since it's at 12 volts we
need a N-Channel attached directly
to GPIO 22 to control the P-channel.

Include an NC 0-ohm resistor to
bypass the switch in case the design
is totally wrong.

+12V
SW3
SW_SPST
X1
3522-2
2A        2B
J5
Barrel_Jack
GND

R5
NC
R7
0
R6
57.6k

Q1
IRF9540N
Q2
MMBF170
R8
57.6k
GND
12V_ON
GND

**EXPANSION PORT**

GND
J6
Expansion Port

Throw all the unused pins to a header
so we can add in a few more components
without having to respin the board.

+3.3V

U2
Pico

Raspberry Pi Pico

GPIO0        VBUS
GPIO1        VSYS
GND          GND
GPIO2        3V3_EN
GPIO3        3V3
GPIO4        ADC_VREF
GPIO5        GPIO28_ADC2
GND          AGND
GPIO6        GPIO27_ADC1
GPIO7        GPIO26_ADC0
GPIO8        RUN
GPIO9        GPIO22
GND          GND
GPIO10       GPIO21
GPIO11       GPIO20
GPIO12       GPIO19
GPIO13       GPIO18
GND          GND
GPIO14       GPIO17
GPIO15       GPIO16
SWCLK  GND  SWDIO

+3.3V
+3.3V

GND

**SOFT REBOOT SWITCH**

SW1
Reboot
GND

GND
C2
100 uF
12V_ON

BTT_TMC2209
U1

GND    DIR
VDD    STEP
B2     CLK
B1     PDN
A2     PDN
A1     MS2
GND    MS1
VM     EN
DIAG VREF

J1
Stepper Right
12V_ON
C1
100 uF
GND

STEP_TXRX

GND

**RIGHT Z-AXIS STEPPER CONTROL**

STEP_TXRX

U3
BTT_TMC2209

EN     VM
MS1    GND
MS2    A1
PDN    A2
PDN    B1
CLK    B2
STEP   VDD
DIR    GND
VREF DIAG

Stepper Left
J4
+3.3V
GND

**LEFT Z-AXIS STEPPER CONTROL**

**ERC Flags**

+12V   PWR_FLAG   VCC   PWR_FLAG

PWR_FLAG   GND   PWR_FLAG   12V_ON

**5 Volt Buck**

+12V

U4
LM2575-5.0BU

VIN    FB
ON/OFF OUT
GND

L1
330 uH
VCC
C3
100 uF
D1
1N5819WS
C4
330 uF
GND