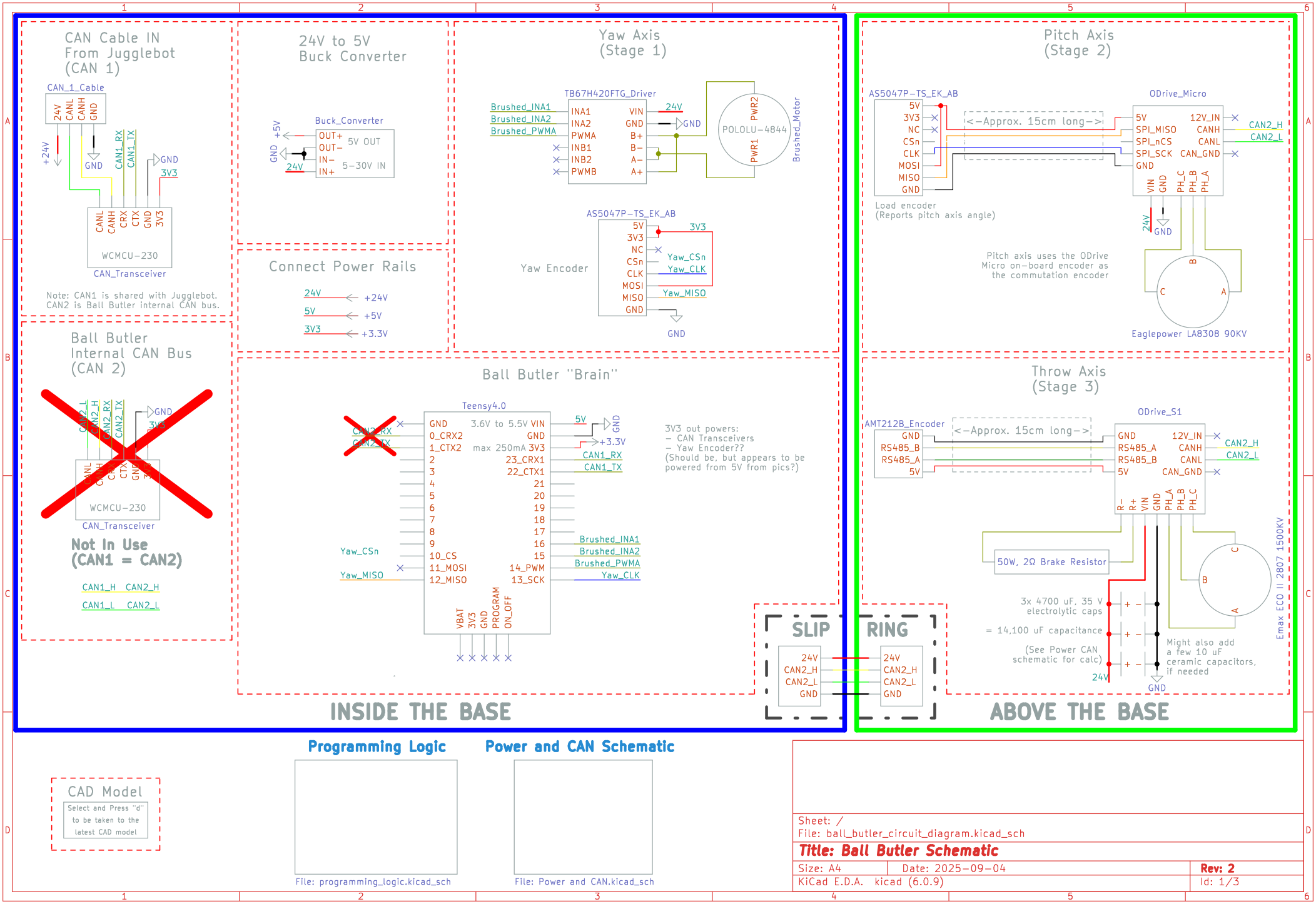

CAN Cable IN
From Jugglebot
(CAN 1)
CAN_1_Cable
24V
CANL
CANH
GND
+24V
GND
CAN1_RX
CAN1_TX
GND
3V3
CANL
CANH
CRX
CTX
GND
3V3
WCMCU-230
CAN_Transceiver
Note: CAN1 is shared with Jugglebot.
CAN2 is Ball Butler internal CAN bus.
24V to 5V
Buck Converter
Buck_Converter
OUT+
OUT-
5V OUT
IN-
IN+
5-30V IN
GND
+5V
24V
Connect Power Rails
24V
+24V
5V
+5V
3V3
+3.3V
Yaw Axis
(Stage 1)
TB67H420FTG_Driver
Brushed_INA1
Brushed_INA2
Brushed_PWMA
INA1
INA2
PWMA
INB1
INB2
PWMB
VIN
GND
B+
B-
A-
A+
24V
GND
PWR2
POLOLU-4844
PWR1
Brushed_Motor
AS5047P-TS_EK_AB
Yaw Encoder
5V
3V3
NC
CSn
CLK
MOSI
MISO
GND
3V3
Yaw_CSn
Yaw_CLK
Yaw_MISO
GND
Pitch Axis
(Stage 2)
AS5047P-TS_EK_AB
5V
3V3
NC
CSn
CLK
MOSI
MISO
GND
<-Approx. 15cm long->
ODrive_Micro
5V
SPI_MISO
SPI_nCS
SPI_SCK
GND
12V_IN
CANH
CANL
CAN_GND
CAN2_H
CAN2_L
VIN
GND
PH_C
PH_B
PH_A
24V
GND
Load encoder
(Reports pitch axis angle)
Pitch axis uses the ODrive
Micro on-board encoder as
the commutation encoder
B
C
A
Eaglepower LA8308 90KV
Ball Butler
Internal CAN Bus
(CAN 2)
CAN2_L
CAN2_H
CAN2_RX
CAN2_TX
GND
3V3
CANL
CANH
CRX
CTX
GND
3V3
WCMCU-230
CAN_Transceiver
Not In Use
(CAN1 = CAN2)
CAN1_H
CAN2_H
CAN1_L
CAN2_L
Ball Butler "Brain"
Teensy4.0
GND
0_CRX2
1_CTX2
2
3
4
5
6
7
8
9
10_CS
11_MOSI
12_MISO
3.6V to 5.5V VIN
GND
max 250mA 3V3
23_CRX1
22_CTX1
21
20
19
18
17
16
15
14_PWM
13_SCK
5V
GND
+3.3V
CAN1_RX
CAN1_TX
Brushed_INA1
Brushed_INA2
Brushed_PWMA
Yaw_CLK
VBAT
3V3
GND
PROGRAM
ON_OFF
Yaw_CSn
Yaw_MISO
3V3 out powers:
- CAN Transceivers
- Yaw Encoder??
(Should be, but appears to be
powered from 5V from pics?)
Throw Axis
(Stage 3)
AMT212B_Encoder
GND
RS485_B
RS485_A
5V
<-Approx. 15cm long->
ODrive_S1
GND
RS485_A
RS485_B
5V
12V_IN
CANH
CANL
CAN_GND
CAN2_H
CAN2_L
R-
R+
VIN
GND
PH_A
PH_B
PH_C
50W, 2Ω Brake Resistor
3x 4700 uF, 35 V
electrolytic caps
= 14,100 uF capacitance
(See Power CAN
schematic for calc)
24V
GND
Might also add
a few 10 uF
ceramic capacitors,
if needed
Emax ECO II 2807 1500KV
C
B
A
SLIP
RING
24V
CAN2_H
CAN2_L
GND
INSIDE THE BASE
ABOVE THE BASE
Programming Logic
File: programming_logic.kicad_sch
Power and CAN Schematic
File: Power and CAN.kicad_sch
CAD Model
Select and Press "d"
to be taken to the
latest CAD model
Sheet: /
File: ball_butler_circuit_diagram.kicad_sch
Title: Ball Butler Schematic
Size: A4
Date: 2025-09-04
Rev: 2
KiCad E.D.A. kicad (6.0.9)
Id: 1/3

CAN1 Frames

Throw Command
(To Ball Butler)

Frame Start	<---- Arbitration ----> (bits)											CAN Stuff	<--- Data ---> (bytes)								CAN Stuff	Frame End
	10	9	8	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0		
	Command ID												t		v_t		–	α	φ			

Command ID = 0X7D0

Yaw angle: (0–360°) – φ
1 byte gives: 360/2^8 = 1.4° resolution (N)
2 bytes gives: 360/2^16 = 0.0055° res. (Y)

Pitch angle: (0-90°) – α
1 byte gives: 90/2^8 = 0.35° resolution (Y)

Throw Speed: – v_t
2 bytes (@ 0.1 mm/s per LSB)

Throw Time: – t
2 bytes (@ 1 ms per LSB)

Call and Response
(Relaying initial yaw angle)

Frame Start	<---- Arbitration ----> (bits)											CAN Stuff	<--- Data ---> (bytes)								CAN Stuff	Frame End
	10	9	8	7	6	5	4	3	2	1	0		7	6	5	4	3	2	1	0		
	Command ID							–				X	–		–		–		φ			

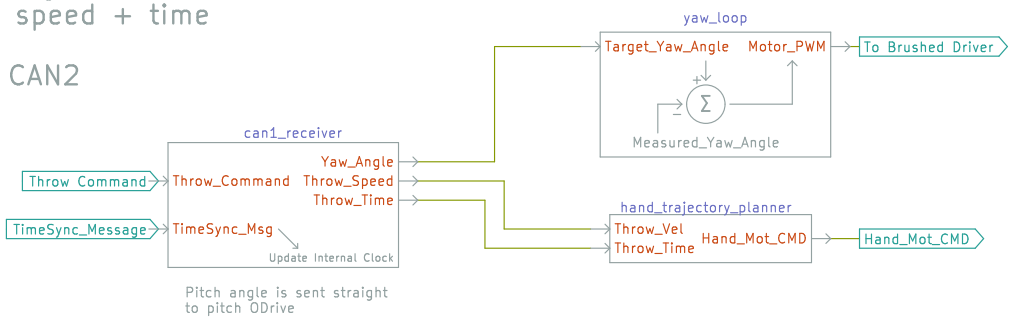
Command ID = 0X7D1

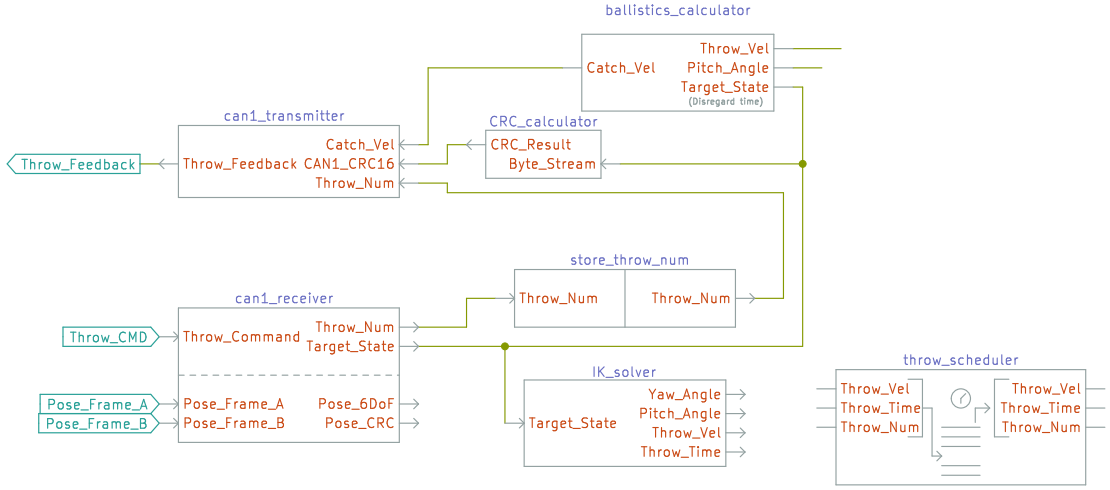
Call (from JB):
X = 0
φ = –

Response (from BB):
X = 1
φ = yaw angle (0.0055° res.)

UPDATE
Jugglebot as main brain.
Tells Ball Butler:
– Yaw angle
– Pitch angle
– Throw speed + time

CAN1 = CAN2

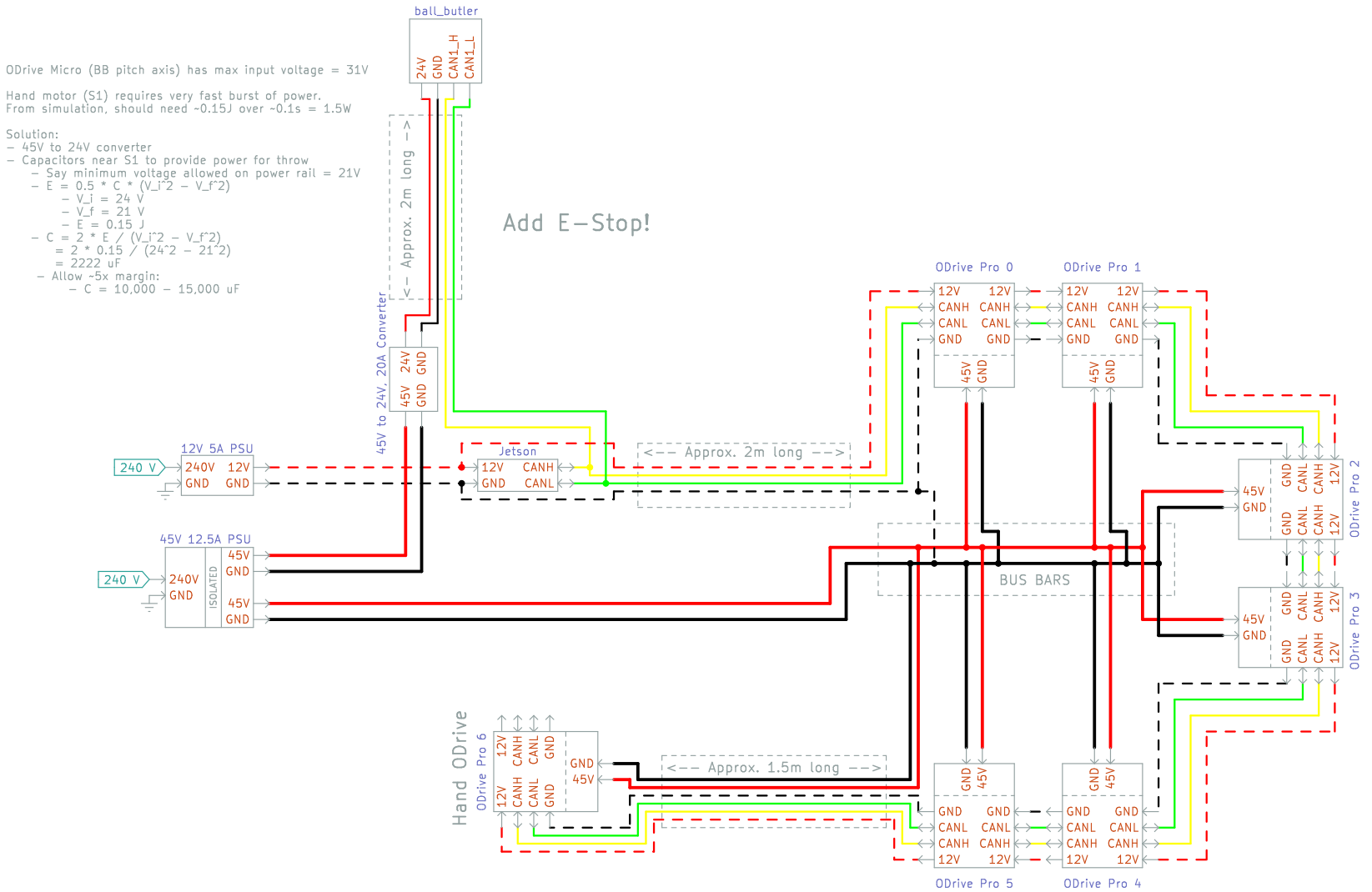




Sheet: /Programming Logic/
File: programming_logic.kicad_sch

Title: Programming Logic

Size: A4	Date: 2025-09-08	**Rev: 3**
KiCad E.D.A. kicad (6.0.9)		Id: 2/3



Sheet: /Power and CAN Schematic/
File: Power and CAN.kicad_sch

Title: Power CAN Wiring

Size: A4	Date: 2025–09–04	**Rev: 2**
KiCad E.D.A. kicad (6.0.9)		Id: 3/3