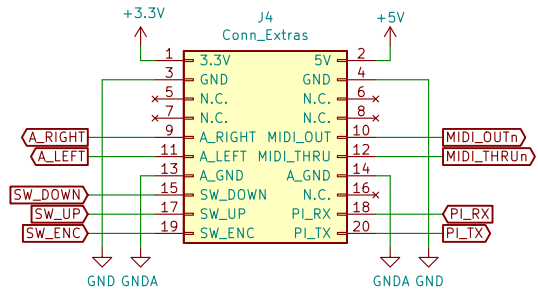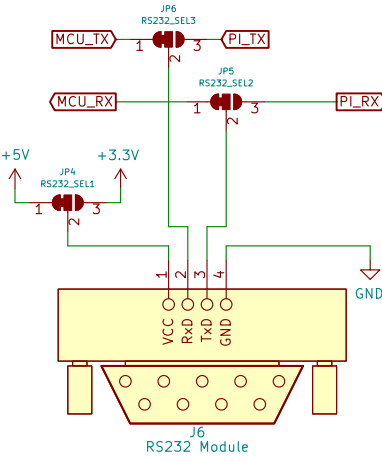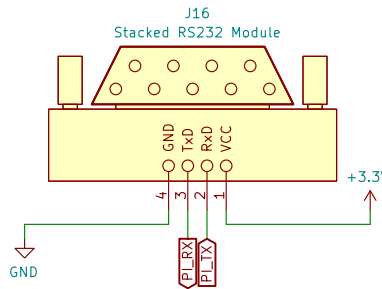**Extras connector**

When the extras board is used along with the BulkyMIDI-32, this connector takes care of all signals to and from the main module. The board is powered from this connector as well; for that reason the barrel connection should not be installed unless you intend to use it this way.
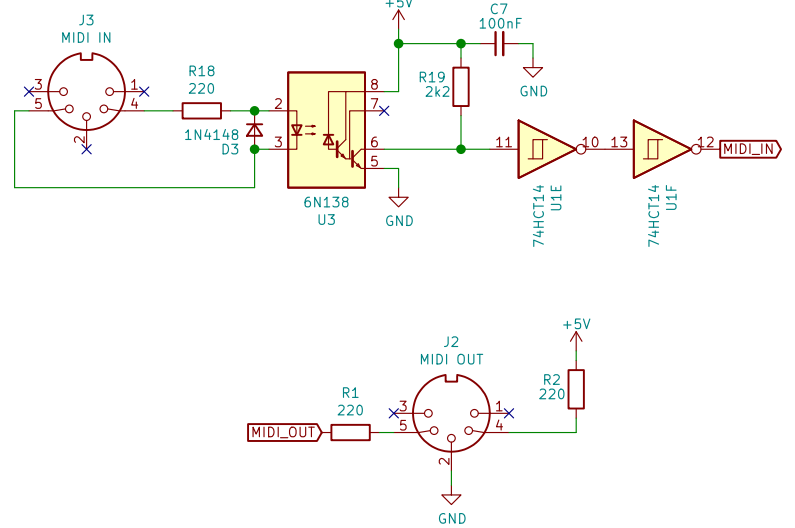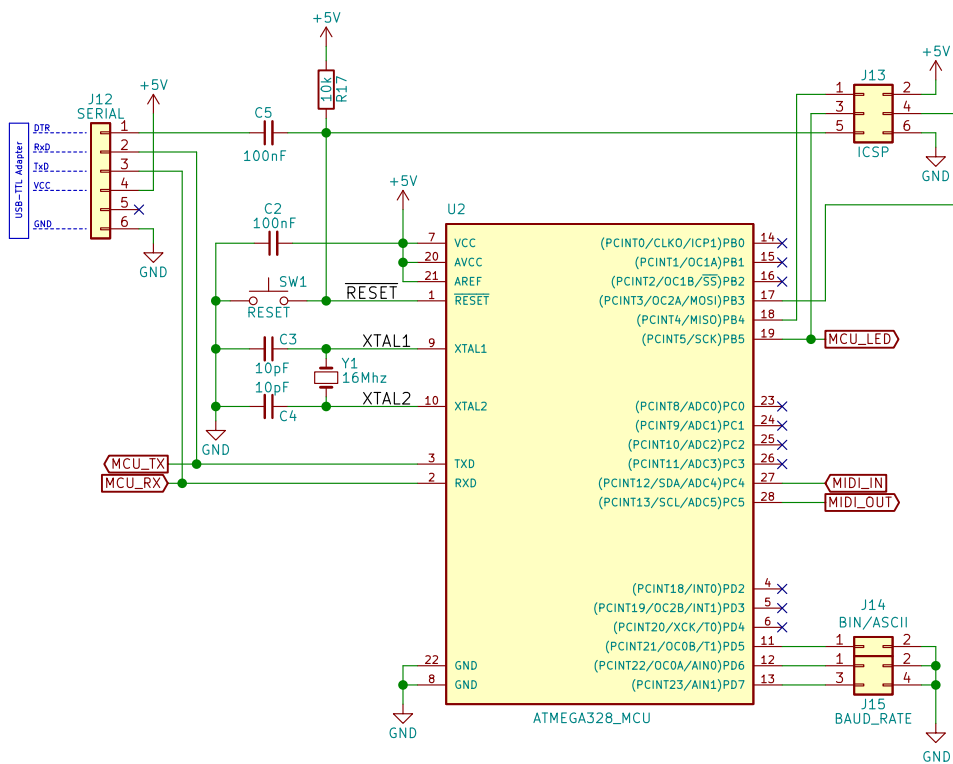
J4 Conn_Extras

+3.3V   +5V

1	3.3V	5V	2
3	GND	GND	4
5	N.C.	N.C.	6
7	N.C.	N.C.	8
9	A_RIGHT	MIDI_OUT	10
11	A_LEFT	MIDI_THRU	12
13	A_GND	A_GND	14
15	SW_DOWN	N.C.	16
17	SW_UP	PI_RX	18
19	SW_ENC	PI_TX	20

A_RIGHT, A_LEFT, SW_DOWN, SW_UP, SW_ENC
MIDI_OUTn, MIDI_THRUn, PI_RX, PI_TX
GND GNDA   GNDA GND

RS-232 Modules (1 or 2 stacked)

A set of two RS232 modules can be stacked upside down, the second one on top is usually just connected to the Raspberry Pi. The primary module can either be linked to the MCU for baud rate convertersion by linking 1-2 across JP4-JP6, 2-3 is instead used when we just want the adapter without any conversion.

J16 Stacked RS232 Module
GND TxD RxD VCC
+3.3V
PI_RX PI_TX
GND

JP6 RS232_SEL3
MCU_TX — PI_TX
JP5 RS232_SEL2
MCU_RX — PI_RX
+5V JP4 RS232_SEL1 +3.3V

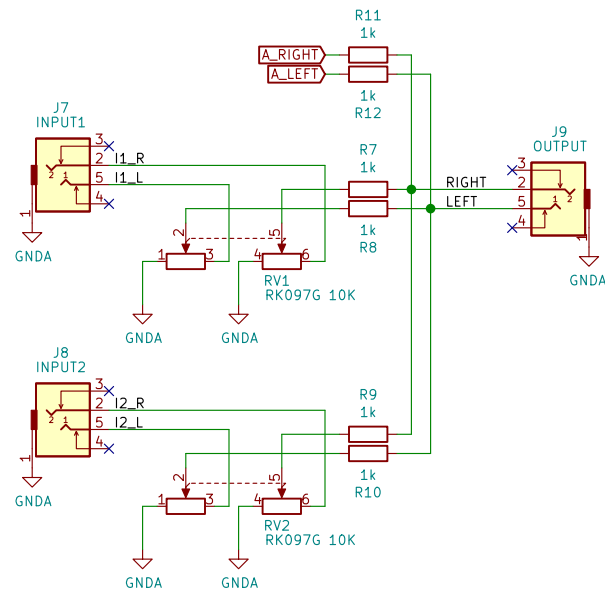J6 RS232 Module
VCC RxD TxD GND
GND

RS-232 Baud rate converter

1 or 2 RS-232 modules may be installed on the board, this section uses an Atmega328 MCU in order to convert the incoming serial data to the baud rate used by the MIDI protocol (31500 baud). A regular PC serial port can use different baud rates, but the closest is 38400 baud rate and that is still too far out of spec. Note that the MT32-PI itself is able to handle these non-standard baud rates via a configuration option, this is more intended for real MIDI devices.
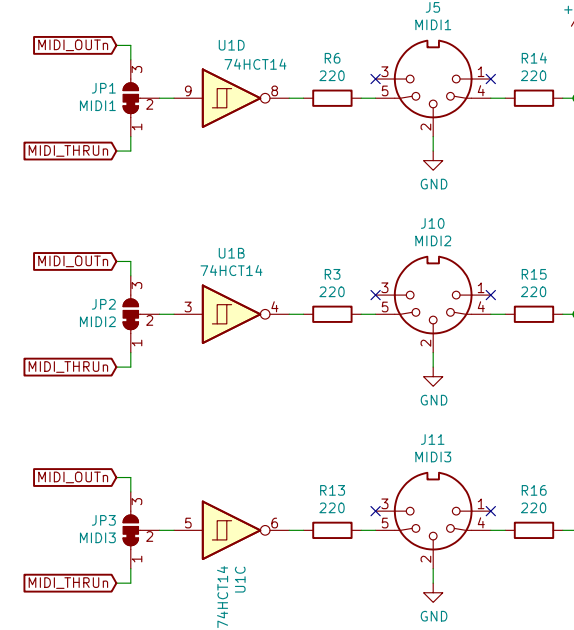
+5V

J12 SERIAL
DTR, RxD, TxD, VCC, GND
USB-TTL Adapter
GND

C5 100nF
R17 10k

C2 100nF
SW1 RESET
RESET
C3 10pF
C4 10pF
Y1 16Mhz
GND

MCU_TX   TXD 3
MCU_RX   RXD 2

U2 ATMEGA328_MCU
VCC, AVCC, AREF, RESET
XTAL1, XTAL2
7, 20, 21, 1
9, 10

(PCINT0/CLKO/ICP1)PB0 14
(PCINT1/OC1A)PB1 15
(PCINT2/OC1B/SS)PB2 16
(PCINT3/OC2A/MOSI)PB3 17
(PCINT4/MISO)PB4 18
(PCINT5/SCK)PB5 19

(PCINT8/ADC0)PC0 23
(PCINT9/ADC1)PC1 24
(PCINT10/ADC2)PC2 25
(PCINT11/ADC3)PC3 26
(PCINT12/SDA/ADC4)PC4 27
(PCINT13/SCL/ADC5)PC5 28

(PCINT18/INT0)PD2 4
(PCINT19/OC2B/INT1)PD3 5
(PCINT20/XCK/T0)PD4 6
(PCINT21/OC0B/T1)PD5 11
(PCINT22/OC0A/AIN0)PD6 12
(PCINT23/AIN1)PD7 13

GND 22
GND 8
GND

MCU_LED
MIDI_IN, MIDI_OUT

J13 ICSP
+5V
1 3 5
2 4 6
GND

J14 BIN/ASCII
J15 BAUD_RATE
1 2
3 4
GND

Status LEDs

Board status, the ACTIVITY follows data sent to the MT32-PI. The resistor value might be a bit high for classic 5mm LEDs, so you may need to lower it when using those (for modern frosted LEDs it should be a comfortable value).

+5V R4 1k D1 POWER
U1A 74HCT14
R5 2k2 D2 MIDI DATA
MIDI_THRUn 1 2
R20 2k2 D4 ACTIVITY
MCU_LED
GND
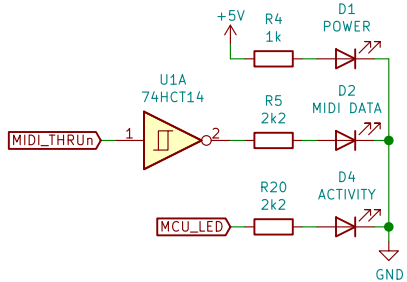
Control scheme ("simple_encoder")

4-pin connector for connecting up a rotary encoder, but because I couldn't find a pre-made module that would fit this is included as a separate PCB. This would have been easier if the real right-angle encoders weren't so expensive.

ENC1 Rotary Encoder
DAT 1 — SW_UP
CLK 2 — SW_DOWN
GND 3
BTN 4 — SW_ENC
GND
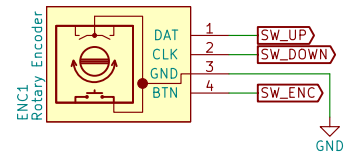
Power section

The power section has been duplicated for the main MT32-PI module, you only need the barrel jack when extras is used without MT32-PI.

DC_5V
J1 DC IN
+5V +5V
C6 470uF
C1 100nF
U1G 74HCT14
VCC 14
GND 7
GND   GND

Passive audio mixer

The audio inputs can be routed via the extras connector from the main module, alternatively you can manually route it externally to INPUT1/INPUT2. The two inputs will passively be mixed into the output sound, note that the level will be slightly lower on the output as compared to directly from the DAC.
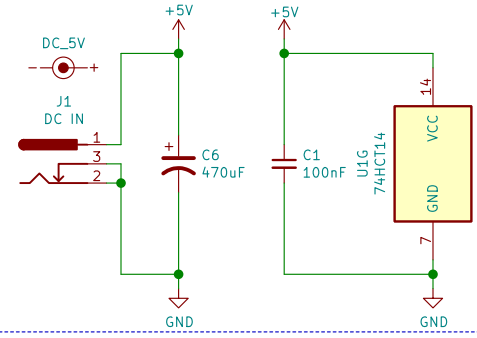
R11 1k
A_RIGHT
A_LEFT
R12 1k

J7 INPUT1
I1_R, I1_L
GNDA

R7 1k
R8 1k
RV1 RK097G 10K
GNDA GNDA

J9 OUTPUT
RIGHT
LEFT
GNDA

R9 1k
R10 1k

J8 INPUT2
I2_R, I2_L
GNDA

RV2 RK097G 10K
GNDA GNDA

Extra MIDI ports

MIDI_OUTn
U1D 74HCT14
JP1 MIDI1
MIDI_THRUn
R6 220
J5 MIDI1
R14 220
+5V
GND

MIDI_OUTn
U1B 74HCT14
JP2 MIDI2
MIDI_THRUn
R3 220
J10 MIDI2
R15 220
GND

MIDI_OUTn
U1C 74HCT14
JP3 MIDI3
MIDI_THRUn
R13 220
J11 MIDI3
R16 220
GND

J3 MIDI IN
+5V
C7 100nF
GND
R18 220
1N4148 D3
R19 2k2
6N138 U3
74HCT14 U1E 10
74HCT14 U1F 12 MIDI_IN
GND

J2 MIDI OUT
+5V
R1 220
MIDI_OUT
R2 220
GND

Basically a bunch of features that I wasn't able to fit onto the main PCB.