PreampController r2 – mounting instructions

Thanks for buying this Preampcontroller kit! Now the fun of mounting starts. Make sure you read the complete instructions before you start mounting. Complete assembly can be done by an experienced hobbyist in about one hour. This circuit was designed to be used in a preamplifier project. More information can be found on the project page:

http://www.djuke.nl/en/projects/10-pre-amplifiers/34-preamplifierv2

List of components

The kit consists of the following components (but you can of course adapt it to your needs).

SMD components

Qty	Value	Device	Parts
2	100n	C-1206	C5, C6
2	22p	C-1206	C1, C2
2		LED-1206	POWER(green), STANDBY(yellow)
5	BSS138	nFET	Q2, Q3, Q4, Q5, Q6
1	0R	R-1206	R20 (only for display with reset)
12	10k	R-1206	R4, R5, R7, R8, R12, R13, R14, R15, R16, R17, R18, R19
5	1k	R-1206	R1, R2, R3, R10, R11
1	22k	R-1206	R9
1	PIC18F4620	TQFP-44	IC1

Through-hole components

Qty	Value	Device	Parts
3	47uF	C-elec-2.5-6	C3, C4, C7
1	2-pin	Con-kk	POWER-RELAY
1	3-pin	Con-kk	IR
2	4-pin	Con-kk	ENC, UART
1	5-pin	Con-kk	DAC
1	PIC-ICSP-MINI	Con-ICSP-MINI	ICSP
1	1x4	Con-pinheader	JP2 (not included)
1	1x6	Con-pinheader	JP3 (not included)
1	1x8	Con-pinheader	JP1 (not included)
1	AK500/2	Con-ptr	SUPPLY
2	ML10	Con-ribbon	BUTTONS, VOLUME
1	ML16	Con-ribbon	DISPLAY
2	ML6	Con-ribbon	INPUT, POWER-CTRL
1	10Mhz	Crystal	Q1
1	22R	R-0207	R22 (only for display with backlight, adjust for desired current)
1	10k	R-potmeter	R21 (only for LCD contrast setting)

Tools

Required:
- ✔ Soldering iron, flux and solder (0.5mm)
- ✔ Multi-meter (voltage and resistance)
- ✔ Side-cutting pliers, tweezers

Recommended:
- ✔ Adjustable power supply
- ✔ Oscilloscope
- ✔

Mounting

Note that this kit contains (small) SMD components, which have been premounted for convenience. Also some through-hole components are pre-mounted to program the microcontroller and do basic tests.

The easiest way of mounting is by starting with the components with the lowest height and build up the PCB in steps, where components of the same height are fitted and soldered in each step. So, solder the through-hole components in this order: resistors, diodes, small connectors, electrolytic capacitor, relay, large connectors.

Always double check all components before you solder them (especially the ones that are polarity dependent, electrolytic capacitors, etc), as it is difficult to remove them after soldering, much more time consuming and may break components or PCB.

Hints:

- For displays without a backlight, a 14-pin ribbon connector can be used (instead of 16-pin)
- Can be used in combination with many standard 2x20 LCD/OLED/VFD character displays. Please refer to the schematic which components to use/omit for each particular display.

Interfacing

This circuit is the heart of a preamplifier or DAC, it connects to many other boards and components:

- StereoInputSelection using the INPUT connector
- CS3318VolumeControl using the VOLUME connector
- Power button and standby/power LEDs using the POWER-CTRL connector
- Other buttons (menu/left/right/select) using the BUTTONS connector
- Character display using the DISPLAY connector
- Infrared receiver on the IR connector
- Encoder on the ENC connector
- CS4398DAC using the DAC connector
- USB-serial converter or RaspberryPi using the UART connector

Testing

Double-check all soldering connections to make sure no shorts are present.

- Connect a 5V power source to the SUPPLY connector
- The Standby LED should light up
- A startup message will appear for a few seconds on the display (if connected)
- A startup message will appear on the UART connection (see next section)

Terminal connection

The UART connection can be used to control the preamp from an external source (like a Raspberry Pi). Also it is very useful for troubleshooting. The UART connection has an integrated level conversion, which needs 3V3 on the UART connector. Connection settings: baudrate 115k2, 8N1.

The microcontroller contains a bootloader and the software can be updated from the UART connector. Please refer to the Preamplifier software page for detailed instructions:

http://www.djuke.nl/en/support/15-preamplifier/36-preamplifierv2software

Schematic and top silkscreen
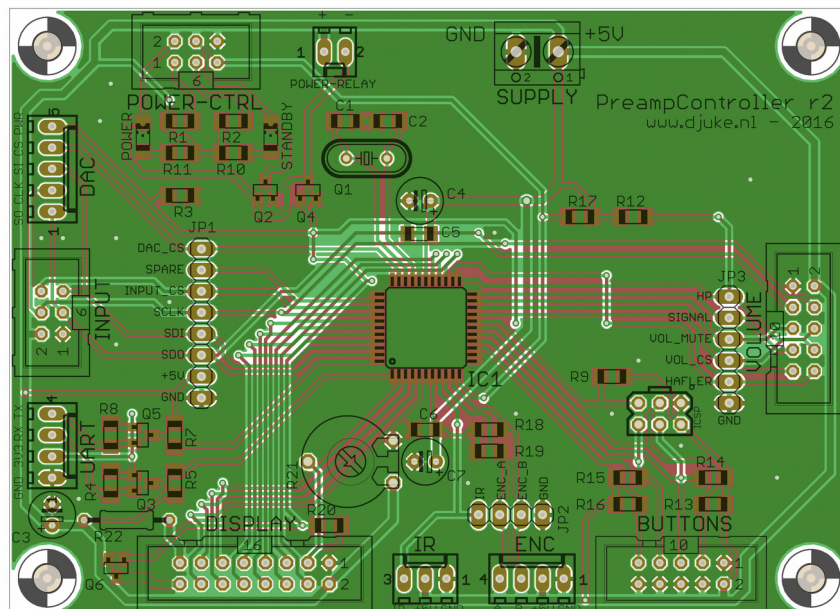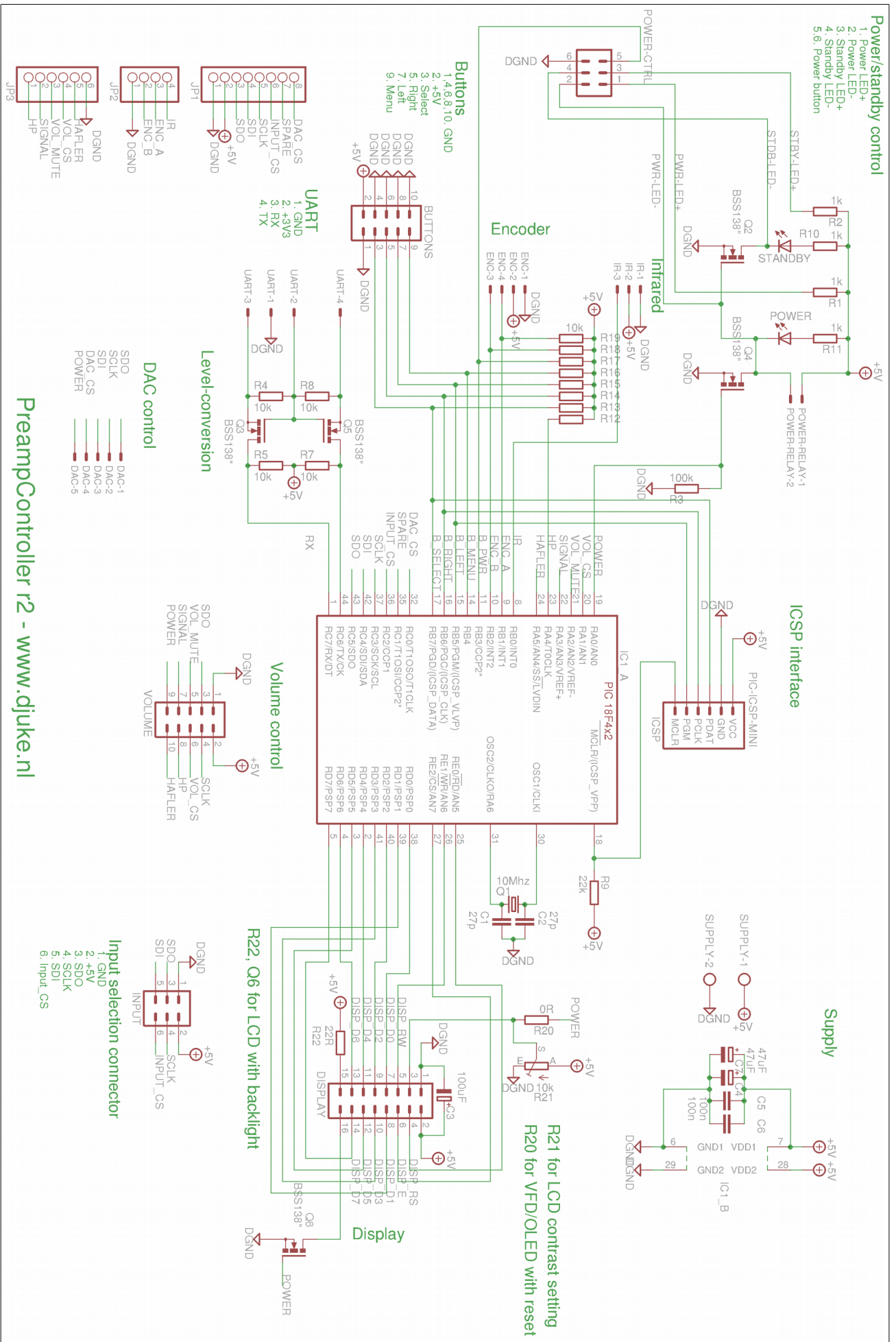
PreampController r2 - www.djuke.nl

Power/standby control
1. Power LED+
2. Power LED-
3. Standby LED+
4. Standby LED-
5,6. Power button

POWER-CTRL

DGND

STBY-LED+
STDB-LED-
PWR-LED-
PWR-LED+

Q2 BSS138"
R2 1k
R10 1k
STANDBY
R1 1k
POWER
Q4 BSS138"
R11 1k
+5V
DGND

POWER-RELAY-1
POWER-RELAY-2

R3 100k
DGND

ICSP interface
ICSP
PIC-ICSP-MINI
VCC
GND
PDAT
PCLK
PGM
MCLR
+5V
DGND

Buttons
1,4,6,8,10. GND
3. Select
5. Right
7. Left
9. Menu
BUTTONS
DGND
+5V

Encoder
ENC-1
ENC-2
ENC-3
ENC-4
DGND
+5V

Intrared
IR-1
IR-2
IR-3
+5V
DGND

R19 R18 R17 R16 R15 R14 R13 R12 10k

UART
1. GND
2. +3V3
3. RX
4. TX
UART-1 UART-2 UART-3 UART-4
DGND

Level-conversion
R4 10k R8 10k
Q3 BSS138" Q5 BSS138"
R5 10k R7 10k
+5V

DAC control
SDO
SCLK
SDI
DAC_CS
POWER
DAC-1 DAC-2 DAC-3 DAC-4 DAC-5

JP3 DGND SIGNAL VOL_MUTE VOL_CS INPUT_CS SPARE DAC_CS
JP2 IR ENC_A ENC_B DGND
JP1 +5V SDO SDI SCLK HAFLER HP +5V DGND

IC1 A
PIC 18F4x2
MCLR/((ICSP_VPP)

DAC_CS 32
SPARE
INPUT_CS 36
SDO
SDI
SCLK
B_SELECT 17
B_RIGHT 16
B_LEFT 15
B_MENU
B_PWR 11
ENC_A 10
ENC_B
IR 8
HAFLER 24
HP 23
SIGNAL
VOL_MUTE 21
VOL_CS 20
POWER 19

RA0/AN0
RA1/AN1
RA2/AN2/VREF-
RA3/AN3/VREF+
RA4/T0CKI
RA5/AN4/SS/LVDIN
RB0/INT0
RB1/INT1
RB2/INT2
RB3/CCP2*
RB4
RB5/PGM/((ICSP_VLVP)
RB6/PGC/((ICSP_CLK)
RB7/PGD/((ICSP_DATA)
RC0/T1OSO/T1CKI
RC1/T1OSI//CCP2*
RC2/CCP1
RC3/SCK/SCL
RC4/SDI/SDA
RC5/SDO
RC6/TX/CK
RC7/RX/DT
RD0/PSP0
RD1/PSP1
RD2/PSP2
RD3/PSP3
RD4/PSP4
RD5/PSP5
RD6/PSP6
RD7/PSP7
RE0/RD/AN5
RE1/WR/AN6
RE2/CS/AN7
OSC2/CLKO/RA6
OSC1/CLKI

Q1 10Mhz
C1 27p C2 27p
DGND
R9 22k
+5V

Volume control
SDO
VOL_MUTE
SIGNAL
POWER
VOLUME
DGND
SCLK
VOL_CS
HP
HAFLER
+5V

Input selection connector
1. GND
2. +5V
3. SDO
4. SCLK
5. SDI
6. Input_CS
INPUT
SDI SDO SCLK INPUT_CS
DGND
+5V

R22, Q6 for LCD with backlight
R22 22R
R20 0R POWER
DISPLAY
DISP_RW
DISP_D2 DISP_D0
DISP_D6 DISP_D4
DISP_RS DISP_E
DISP_D3 DISP_D1
DISP_D7 DISP_D5
C3 100uF
+5V
DGND

Display
Q6 BSS138"
POWER
DGND

R21 for LCD contrast setting
R20 for VFD/OLED with reset
R21 10k
DGND
+5V

Supply
SUPPLY-2
SUPPLY-1
DGND
+5V
C5 47uF C6 47uF
C5 100n C6 100n
IC1_B
GND1 VDD1
GND2 VDD2
6 7
29 28
+5V
+5V
DGND