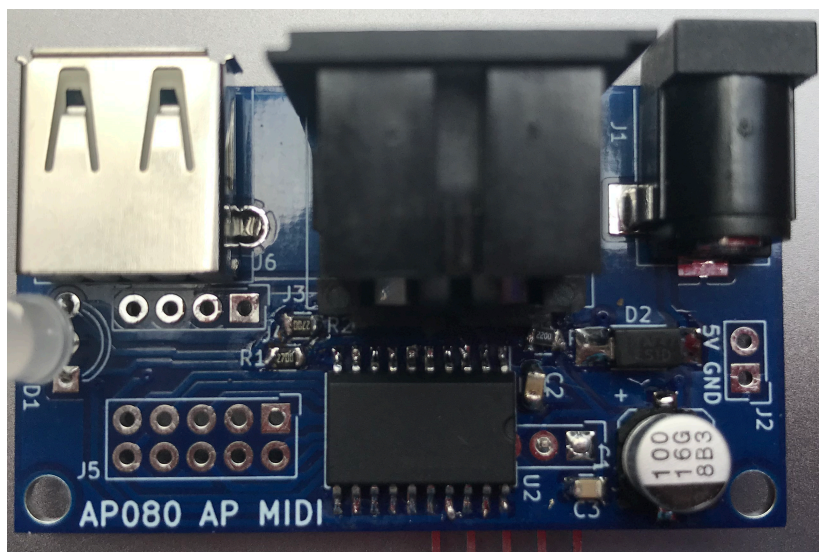
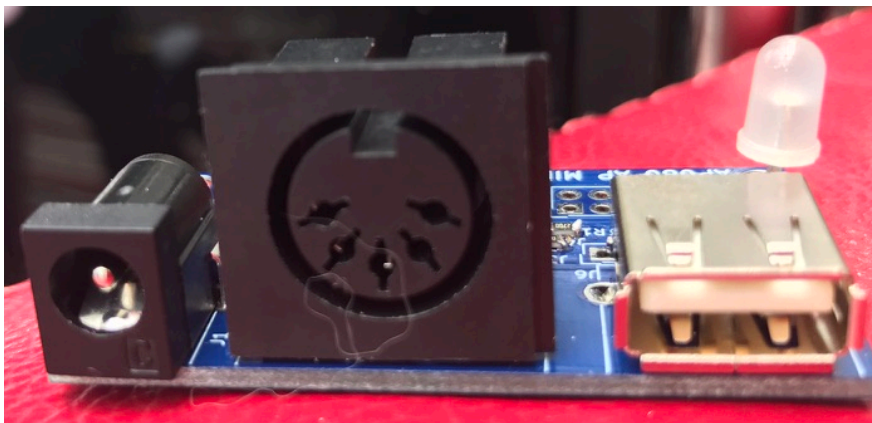


# AP080 MIDI Switch Controller

## Hardware & Firmware Description

prepared by Simon Taylor



NOTE - these instructions are not intended as direct user instructions, but are engineering notes forming a specification and operation description. The client will need to write their own user instructions, most likely using this as a basis.

## Table of Contents

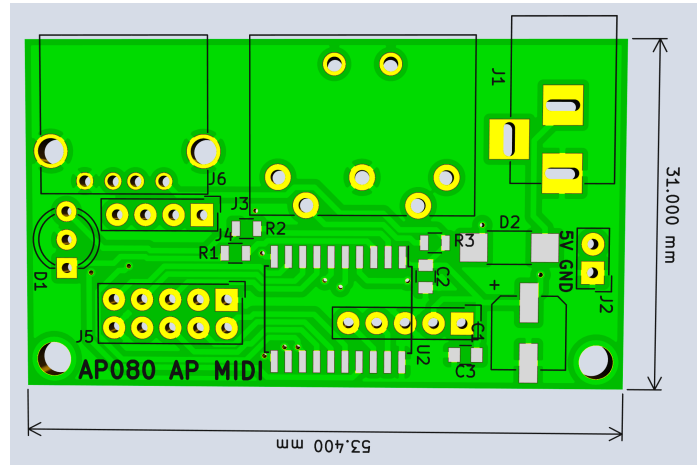
<b>Board Description</b>	<b>3</b>
Connections	3
Switch Connection Pins	3
J5	3
J3	3
Board Dimensions	3
Current board issues	3
<b>Connections</b>	<b>4</b>
Power	4
USB-A connector	4
MIDI out	4
Switch Inputs	4
<b>Firmware Operation</b>	<b>4</b>
LED Operation	4
Akai MPX-8	5
Yamaha Reface YC	6
Change Default Mode	6
Current firmware issues	7

NOTE - these instructions are not intended as direct user instructions, but are engineering notes forming a specification and operation description. The client will need to write their own user instructions, most likely using this as a basis.

## Board Description

The MIDI controller allows for up to twelve switches to be connected to the device and output MIDI trigger signals in accordance with the operation of those switches.

Primarily intended as a foot controller to trigger samplers such as the Akai MPX-8 (as used for testing).



### Connections

Power Input	-	J1	-	9V to 12V DC, 2.1mm barrel jack connector (+ve on outer, compatible with standard pedal power supplies)
Power	-	J2	-	Uncommitted power header, with +5V output (removed on Rev 172 board)
MIDI Output	-	J3	-	5 pin 180° DIN socket
USB Output	-	J4	-	+5V Power to power external device (not fitted on Yamaha Reface YC option)
Switch inputs	-	J5 / J6	-	12 switch inputs (short to GND for activation)
Programming	-	J7	-	Microchip programming header
LED	-	D1	-	Bi-colour LED for user feedback (red / cathode / green)

### Switch Connection Pins

#### J5

Pin 1	-	GND
Pin 2	-	SW1
Pin 3	-	SW2
Pin 4	-	SW3
Pin 5	-	SW4
Pin 6	-	SW5
Pin 7	-	SW6
Pin 8	-	SW7
Pin 9	-	SW8
Pin 10	-	+5V

#### J3

Pin 1	-	SW9
Pin 2	-	SW10
Pin 3	-	SW11
Pin 4	-	SW12

### Board Dimensions

53.4mm x 31mm. Mounting holes are 3mm diameter, 26mm from connector edge of board, at 48.6mm centres

### Current board issues

- 1 - J3 anchor pins are on wrong footprint, need wider spacing. [Fixed Rev 172 board](#)
- 2 - J6 / J4 legend position is confusing. [Fixed Rev 172 board](#)
- 3 - Move R3 legend from diode pad. [Fixed Rev 172 board](#)

NOTE - these instructions are not intended as direct user instructions, but are engineering notes forming a specification and operation description. The client will need to write their own user instructions, most likely using this as a basis.

## Connections

### Power

Power is provided by an external 9V DC power supply on a 2.1mm barrel connector. The type as used for guitar pedals is ideal with the negative on the centre connection and positive on the outer. A supply with a rating of at least 500mA is recommended.

### USB-A connector

This provides a USB power out connection only. up to 500mA at 5V is provided on this connector (dependent upon the capability of the external 9V power supply used). DO NOT apply power to this connector.

### MIDI out

The MIDI out connector transmits messages to external devices as described in the details described later in this document.

### Switch Inputs

Inputs are on J5 & J3 as shown below. Switches must be connected between GND and the relevant input. Use

J5 pin		J3 pin	
1	GND	1	SW9
2	SW1	2	SW10
3	SW2	3	SW11
4	SW3	4	SW12
5	SW4		
6	SW5		
7	SW6		
8	SW7		
9	SW8		
10	+5V		

normally off momentary switches (NO).

## Firmware Operation

Firmware is supplied for operation with devices selected by customer at time of order. It is not configurable to another device unless it is returned to Ambient Power.

### LED Operation

Amber - 1S after power-up.

Green - Ready.

Red - 1S after a switch operation.

NOTE - these instructions are not intended as direct user instructions, but are engineering notes forming a specification and operation description. The client will need to write their own user instructions, most likely using this as a basis.

**Akai MPX-8**

Current firmware supports switch inputs on SW1 through SW12. When a switch is activated, it outputs the following MIDI signals, transmitted at 31250bps.

MIDI Channel	-	0x99	(153d)
MIDI Note (SW1)-		0x24	(36d)
MIDI Velocity	-	0x4b	(75d)

Switches 2 through 12 return note values 0x25 (37d) through 0x2f (47d) respectively.

Note activations are sent, ideal for sampler triggers. No note off commands are sent.

## Yamaha Reface YC

Inputs SW1 to SW2 operate functions to control the rotary operation, all on MIDI channel 1.

Mode 1	
Switch	Function
SW1	Move up OFF - STOP - SLOW - FAST
SW2	Move down FAST - SLOW - STOP - OFF

Mode 2	
Switch	Function
SW1	Toggle between OFF & STOP
SW2	Toggle between SLOW & FAST

The green LED illuminates for 1S after power-up.

The red LED illuminates for 1S after a switch operation.

### Change Default Mode

To select the operation of the unit, press BOTH SW1 & SW2 simultaneously at power-up. The LED will flash red once to confirm Mode 1 (factory default), or twice for Mode 2. If you wish to change the modes, hold down SW1 for Mode 1, or SW2 for Mode 2 until the LED flashes again. The selected mode is now the default on power up.

**Current firmware issues**

None