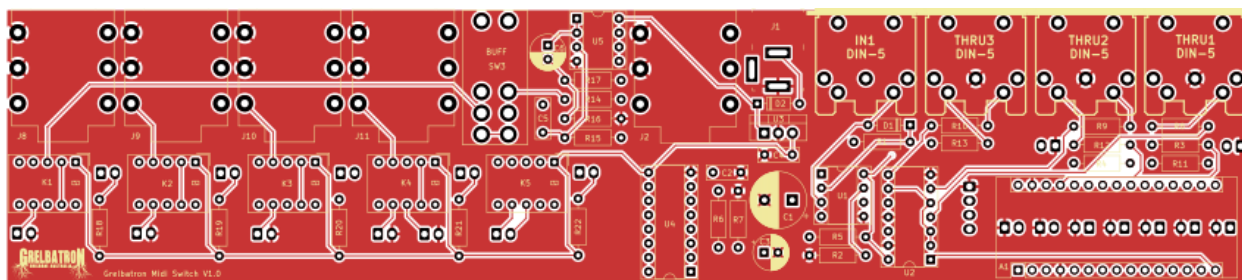# MidiEvil | Build Doc

MidiEvil is a dirt simple midi-controlled loop and amp switch. It's been designed to be easy to configure and can be used with or without a midi controller.

Features

- Switchable Input Buffer (Based on a Klon TL072)
- 4 True Bypass Loops using good quality NEC Signal Relays (Switches 1 – 4)
- 1 Normally Open Latching Relay (Switch 5)
- 2 Footswitch Modes (Direct or Program)
- Program Mode allows you to recall 10 presets across 2 banks
- Direct Mode allows for control over each loop and amp switch
- User assignable CC Numbers to each Switch
- Controller values from 0-63 will switch off the output, values from 64-127 will switch it on
- Can store up to 128 presets (not that you'll need that many)
- Ability to enable and disable CC switch control and PC recall functionality if required
- 1 Midi in Connector (5 Pin Din)
- 3 Midi Through Connectors to connect other devices (5 Pin Din)

About MidiEvil Development

I personally wanted to have a midi-controlled loop switch on my own board and thought this would be a nice challenge to design. Careful consideration was given to the component placement on the PCB to separate the digital and analogue sections as to not induce any noise into the analogue circuitry. There is a single shared ground plane.

There's a bunch of great midi Arduino project online that had code already written, I found one for an 8 Channel Loop Switch with no footswitches, it served as a good starting point for the code. For the most part it's running the core of this project, with some additional functions.

https://www.jimkim.de/

You can either program this device yourself or you can flash the Nano with my firmware updater.exe available here:

https://linktr.ee/grelbatron

One of the challenges of projects like this is cutting a square hole. I've got around this by having a custom piece of acrylic cut and etched, giving me an awesome finish and an easy way to mount the OLED screen.

The bill of materials is straight out of Kicad. I've left the footprint details and component description to help better decipher the schematic. Keep note of area's where the component name and footprint are different. Like the Relay LED's as an example, they are described as diodes but the footprint is a 2.54mm JST connector for the offboard wiring to the LED's.

With all that said I'm available through socials or email if you need anything. Happy Building!

Enclosure and Boxing

Drill template is supplied but I would double check everything before drilling. This PCB is designed to comfortably fit in a 1032L enclosure.

Bill Of Materials

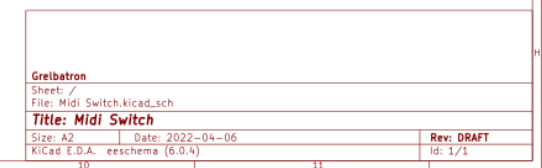Pretty much everything is available from Tayda, with a few exceptions.

- The NEC EA2 Relays
- Arduino Nano
- Arduino SSD1306
- TL072
- 6N138/6N139
- 74LS14

Below the BOM is some Tayda Part Descriptions and SKU's for what I order.

Ref	Qnty	Value	Cmp name	Footprint	Description
A1	1	Nano	Arduino Nano	Module:Arduino_Nano	Arduino Nano
Brd1	1	OLED	SSD1306	Connector_Molex:Molex_KK-254_AE-6410-04A_1x04_P2.54mm_Vertical	SSD1306 OLED
C1	1	470uF	C_Polarized_Small_US	Capacitor_THT:CP_Radial_D10.0mm_P5.00mm	Polarized capacitor, small US symbol
C2 C4 C5	3	100nF	C	Capacitor_THT:C_Rect_L7.2mm_W2.5mm_P5.00mm_FKS2_FKP2_MKS2_MKP2	Unpolarized capacitor
C3 C6	2	47uF	C_Polarized_Small_US	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor, small US symbol
D1	1	1N4148	1N4148	Diode_THT:D_DO-35_SOD27_P7.62mm_Horizontal	100V 0.15A standard switching diode, DO-35
D2	1	1N5817	1N4148	Diode_THT:D_DO-35_SOD27_P7.62mm_Horizontal	100V 0.15A standard switching diode, DO-35
D3	1	Edit	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
D4	1	Midi	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
D5	1	LED1	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
D6	1	LED2	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
D7	1	LED3	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
D8	1	LED4	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
D9	1	LED5	LED	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Light emitting diode
IN1	1	DIN-5	DIN-5_1	w_conn_av:din-5	5-pin DIN connector
J1	1	PWR	Barrel_Jack_Switch	digikey-footprints:Barrel_Jack_5.5mmODx2.1mmID_PJ-202A	DC Barrel Jack with an internal switch
J2	1	IN	AudioJack3	Connector_Audio:Jack_6.35mm_Neutrik_NMJ6HCD2_Horizontal	Audio Jack, 3 Poles (Stereo / TRS)
J3	1	RTN1	CONN_02PTH2	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections
J4	1	RTN2	CONN_02PTH2	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections
J5	1	RTN3	CONN_02PTH2	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections
J6	1	RTN4	CONN_02PTH2	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections
J7	1	OUT	CONN_02PTH2	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections
J8	1	SND1	AudioJack3	Connector_Audio:Jack_6.35mm_Neutrik_NMJ6HCD2_Horizontal	Audio Jack, 3 Poles (Stereo / TRS)
J9	1	SND2	AudioJack3	Connector_Audio:Jack_6.35mm_Neutrik_NMJ6HCD2_Horizontal	Audio Jack, 3 Poles (Stereo / TRS)
J10	1	SND3	AudioJack3	Connector_Audio:Jack_6.35mm_Neutrik_NMJ6HCD2_Horizontal	Audio Jack, 3 Poles (Stereo / TRS)
J11	1	SND4	AudioJack3	Connector_Audio:Jack_6.35mm_Neutrik_NMJ6HCD2_Horizontal	Audio Jack, 3 Poles (Stereo / TRS)

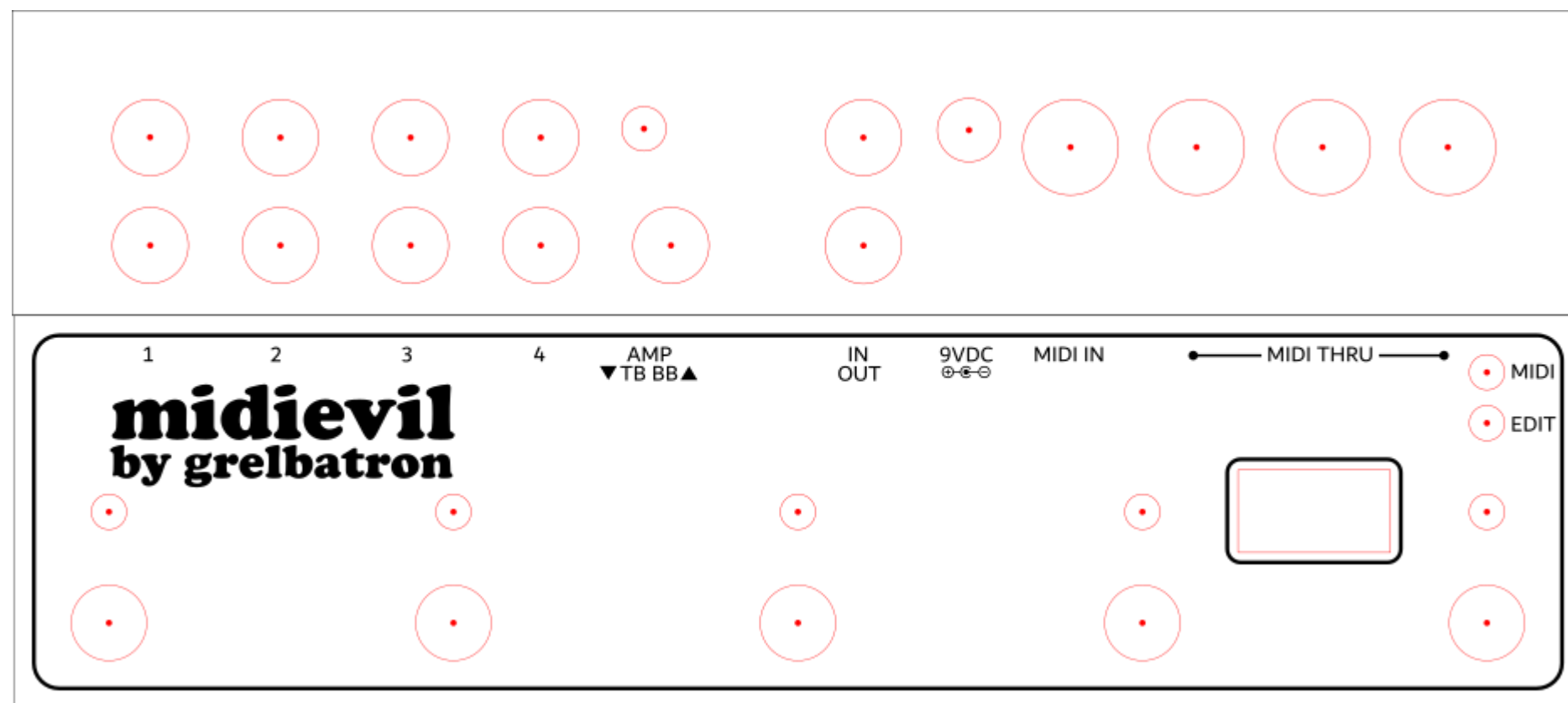|					
J12	1	AMPSW	CONN_02PTH2	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Multi connection point. Often used as Generic Header-pin footprint for 0.1 inch spaced/style header connections
K1	1	RLY1	EC2-4.5NU	w_conn_av:Relay_DPDT_NEC-EA2	General purpose signal relay, Kemet EC2 Series, DPDT (2 Form C), non-latching, through hole, 60W/125VA, 220VDC/250VAC, 2A, 4.5V DC coil
K2	1	RLY2	EC2-4.5NU	w_conn_av:Relay_DPDT_NEC-EA2	General purpose signal relay, Kemet EC2 Series, DPDT (2 Form C), non-latching, through hole, 60W/125VA, 220VDC/250VAC, 2A, 4.5V DC coil
K3	1	RLY3	EC2-4.5NU	w_conn_av:Relay_DPDT_NEC-EA2	General purpose signal relay, Kemet EC2 Series, DPDT (2 Form C), non-latching, through hole, 60W/125VA, 220VDC/250VAC, 2A, 4.5V DC coil
K4	1	RLY4	EC2-4.5NU	w_conn_av:Relay_DPDT_NEC-EA2	General purpose signal relay, Kemet EC2 Series, DPDT (2 Form C), non-latching, through hole, 60W/125VA, 220VDC/250VAC, 2A, 4.5V DC coil
K5	1	RLY5	EC2-4.5NU	w_conn_av:Relay_DPDT_NEC-EA2	General purpose signal relay, Kemet EC2 Series, DPDT (2 Form C), non-latching, through hole, 60W/125VA, 220VDC/250VAC, 2A, 4.5V DC coil
R1 R8 R9 R10 R11 R12 R13	7	220r	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
R2	1	1k	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
R3 R4 R5 R18 R19 R20 R21 R22	8	470r	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
R6 R7 R16	3	100K	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
R14	1	10K	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
R15	1	1M	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
R17	1	560R	R	Resistor_THT:R_Axial_DIN0207_L6.3mm_D2.5mm_P10.16mm_Horizontal	Resistor
SW1	1	BTN1	SW_Push	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Push button switch, generic, two pins
SW2	1	BTN2	SW_Push	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Push button switch, generic, two pins
SW3	1	BUFF	SW_DPDT_x2	w_conn_av:Angled 3PDT PCB Mount	Switch, dual pole double throw, separate symbols
SW4	1	FS1	SW_SPST	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Single Pole Single Throw (SPST) switch
SW5	1	FS2	SW_SPST	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Single Pole Single Throw (SPST) switch
SW6	1	FS3	SW_SPST	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Single Pole Single Throw (SPST) switch
SW7	1	FS4	SW_SPST	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Single Pole Single Throw (SPST) switch
SW8	1	FS5	SW_SPST	Connector_Molex:Molex_KK-254_AE-6410-02A_1x02_P2.54mm_Vertical	Single Pole Single Throw (SPST) switch
THRU1 THRU2 THRU3	3	DIN-5	DIN-5_1	w_conn_av:din-5	5-pin DIN connector
U1	1	6N138	6N138	Package_DIP:DIP-8_W7.62mm_Socket	Low Input Current high Gain Split Darlington Optocouplers, -0.5V to 7V VDD, DIP-8
U2	1	74LS14	74LS14	Package_DIP:DIP-14_W7.62mm_Socket	Hex inverter schmitt trigger
U3	1	L7805	L7805	Package_TO_SOT_THT:TO-220-3_Vertical	Positive 1.5A 35V Linear Regulator, Fixed Output 5V, TO-220/TO-263/TO-252
U4	1	ULN2003	ULN2003	Package_DIP:DIP-16_W7.62mm_Socket	High Voltage, High Current Darlington Transistor Arrays, SOIC16/SOIC16W/DIP16/TSSOP16
U5	1	TL072	TL072	Package_DIP:DIP-8_W7.62mm_Socket	Dual Low-Noise JFET-Input Operational Amplifiers, DIP-8/SOIC-8

Tayda Part Description	SKU
Pin MIDI Connector Female Right Angle	A-1010
1032L Style Aluminum Diecast Enclosure	A-5853
SPST Momentary Soft Touch Push Button Stomp Foots / Pedal Switch	A-1091
6.35mm 1/4" Stereo Insulated Unswitched Socket Jack PCB Pin	A-5079
6.35mm 1/4" Stereo Phone Jack	A-1121
PUSH BUTTON SWITCH MOMENTARY Black Color SPST 3A 250VAC	A-4720
DC Power Jack 2.1mm Barrel-Type PCB Mount	A-4118
Green Nut Plastic For 6.35MM Phone Jack	A-6193
Red Nut Plastic For 6.35MM Phone Jack	A-6192
LM7805 L7805 7805 Voltage Regulator IC 5V 1.5A	A-179
16 Pin Machine Tooled IC Socket	A-1319
14 Pin Machine Tooled IC Socket	A-1317
8 Pin Machine Tooled IC Socket	A-857
5mm LED Lampshade Protector Clear Plastic Clip	A-4302
LED 5mm Pink Water Clear Super Bright	A-4732
LED 5mm Yellow Water Clear Ultra Bright	A-1583
LED 5mm Green Water Clear Super Bright	A-057
LED 5mm Orange Water Clear Super Bright	A-4733
100nF 0.1uF 100V 5% Polyester Film Box Type Capacitor WIMA MKS2	A-1569
47uF 25V 105C Aluminum Electrolytic Capacitor 5x11mm PANASONIC	A-4144
470uF 35V 105C Aluminum Electrolytic Capacitor 10x16mm PANASONIC	A-6386
40 Pin 2.54mm DIP SIP IC Sockets Adaptor Solder Type	A-1605
1N5817 Diode Schottky 1A 20V	A-159
1N4148 Switching Signal Diode	A-157
Mini Relay DPDT A-4.5W-K 4.5VDC 10PIN 2Poles 1A	A-1169
Wafer Connector 2.54mm 2 Pins	A-804
Wafer Connector 2.54mm 4 Pins	A-806
Housing Connector 2.54mm 2 Pins	A-826
Housing Connector 2.54mm 4 Pins	A-828
Crimp Terminal Connector 2.54mm	A-837
2 Pins JST XH-2.54 Female connector with Wire Cable AWG26 Length 30cm	A-4610
2 Pins JST XH-2.54 Male connector Straight 180°	A-4608
6.35mm 1/4" Mono Right Angle Metal Plug	A-4574

Drill Template

Not shown on the drill template are the two configuration buttons and the USB access port.

Troubleshooting

There are many online groups, forums and websites to assist with troubleshooting, please see below some examples. Please feel free to make contact via socials or email if you need, we're always happy to help.

Reddit DIY Pedals Sub

https://www.reddit.com/r/diypedals/

Facebook Group "Guitar Pedal Builders

https://www.facebook.com/groups/190439971066228/

Electro Smash

https://www.electrosmash.com/

Direct Email

 grelbatron@gmail.com

Follow me on Instagram

GRELBATRON