# MIDI-Retrofit-16 MIDI to TRIGGER Retrofit Module Construction Guide

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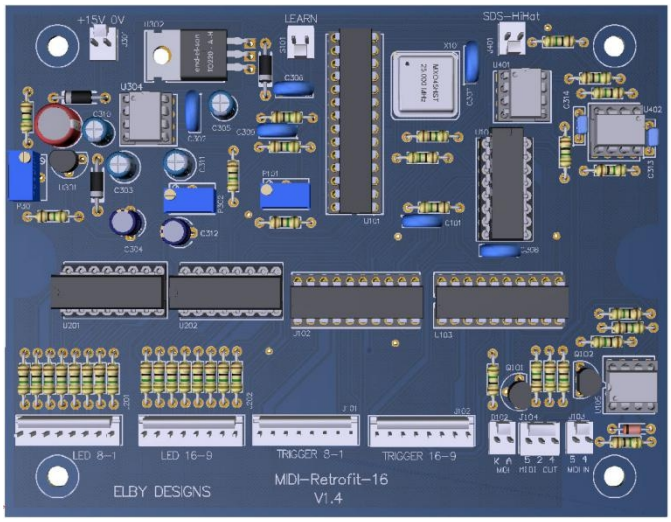
# MIDI-Retrofit-16 MIDI to Trigger Module

## Construction Notes




3D Model

Construction of the MIDI-Retrofit-16 is pretty straight forward. Please review our General Construction Notes.

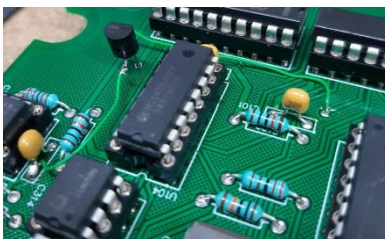
Construction should follow these simple steps:-

a) Fit all parts as per the Bill Of Materials and the PCB Component Overlay. NB: components with an x4.. number are only required when using the the unit with an SDS controller that implements a HiHat control. These parts can be omitted without impacting the main unit
b) install the board using the four mounting points
c) install all required panel components
d) connect panel components to the board using equipment wiring and the supplied crimp terminals

## PCB Error

An error in the PCB designs requires a minor modification:-

1) The footprint for C312 is wrong. The +ve leg goes to the left
2) U305, a 79L05 regulator, needs to be added as shown in the overlay. One leg is soldered directly to the via to the right of U104, the centre leg is connected by a wire link to the upper pad of C314, while the remaining leg is wired to the via above U102



**Installation Notes**

There are, basically, 3 installation options:-

1. Install MIDI-Retrofit-16 inside the equipment to be controlled
2. Mount MIDI-Retrofit-16 into a small ABS enclosure fitted with a multi-pin connector through which connection is made to the equipment to be controlled
3. Mount MIDI-Retrofit-16 inside a large enclosure complete with output jacks and panel mounted status indicators.

Option 1 - Internally mount in equipment to be controlled

- The MIDI-Retrofit-16 should have a minimum of 5mm clearance in all directions and be securely mounted to prevent movement. Power is derived from the equipments supply or an additional power source can be added.
- As a minimum you will need to mount the MIDI IN socket in a convenient location.
- The MIDI-Retrofit-16 will, most likely, only need to be programmed once so there is no need for a panel mounted LEARN switch. when needed, the unit can be opened and the 2 pins on the LEARN connector momentarily shorted to activate the LEARN mode.
- Although not essential, it is desirable to have the LEDs installed. This will greatly assist with the LEARN process and is a useful means of confirming operation of the unit. If the LEDs cannot be panel mounted then they can be direct wired in to the connector housing and mounted directly on to the LED connectors.

Option 2 - Externally mounted

1. The MIDI-Retrofit-16 footprint has been designed to fit in to a 140mmx 110mm x 35mm ABS enclosure commonly found in electronic/hobby stores.
2. There is room at the front of the assembly to fit a multi-pin D-Sub Type connector (we use a 37-pin model). This connector is used to feed the TRIGGER outputs, LED status indicator outputs, power rails and the LEARN switch.
3. A slightly larger enclosure would allow the LEDs to be mounted on the enclosure which will aid with running the LEARN mode and provide visual indication of the operation of the unit.
4. If the equipment to be controlled does not have a suitable power source for the MIDI-Retrofit-16 then a DC power connector can be mounted on the enclosure and a standard 12V-15VDC power supply used to power the unit.

*Example of an 'external connector'. Here it is shown with a loop-back plug fitted to restore normal operation of the equipment.*

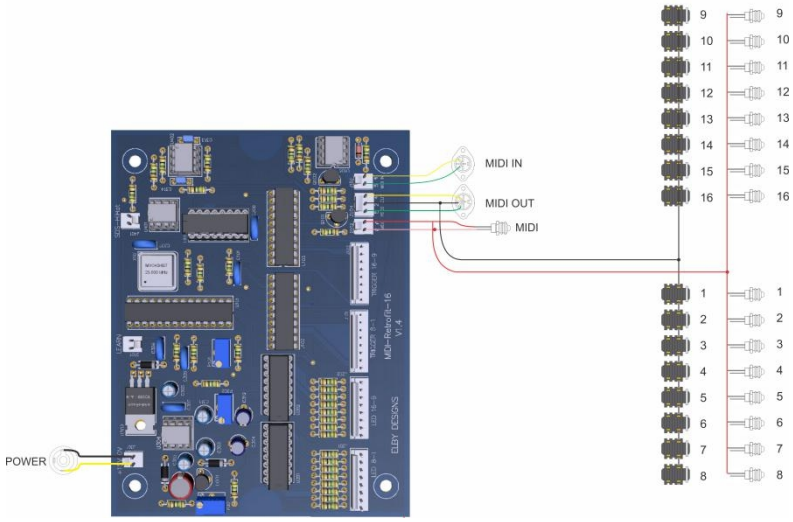
Option 3 - Stand-alone Unit

1. A suitably sized enclosure can be used to house the MIDI-Retrofit-16. Jacks would be fitted to allow individual instruments to be plugged in to the TRIGGER outputs. Typically these are 1/4" or 1/8" jacks.
2. Panel mounted LEDs would be fitted along with the LEARN switch.
3. An external power unit (12V-15VDC) would be used to power the unit


*Example of a stand-alone unit (standard MIDI2SDS(X) shown)*

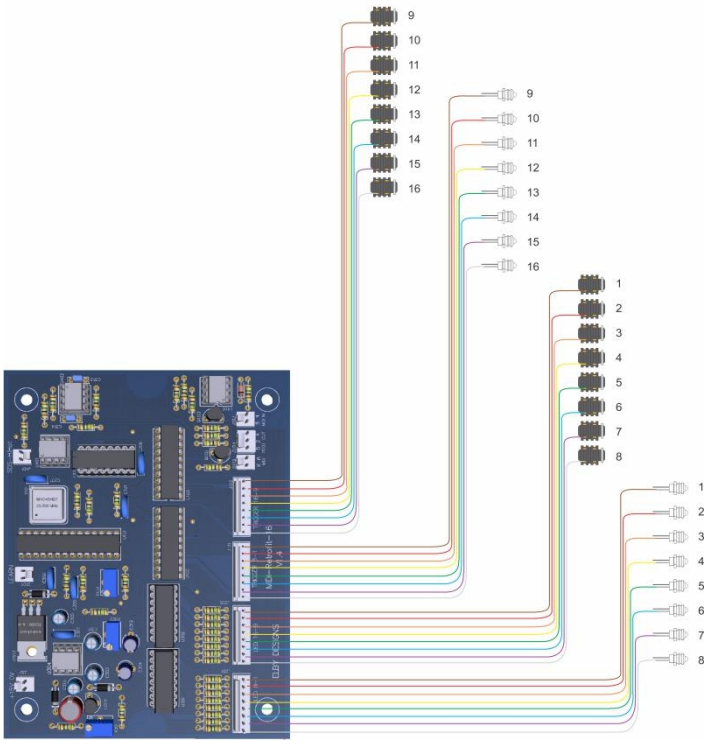
## WIRING INSTRUCTIONS

Start by wiring in the power connector and the MIDI section.




*Power and MIDI wiring – click for larger image*

Then wire up the TRIGGER outputs and the (optional) LED indicators.

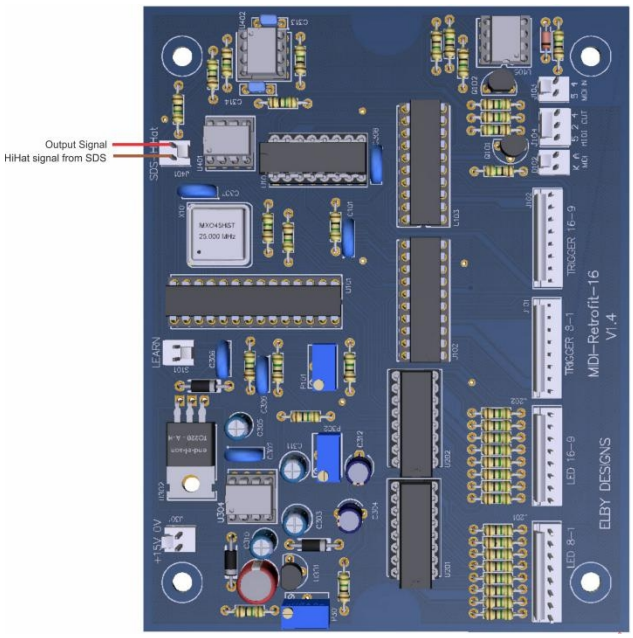



*TRIGGER and Status LED wiring – click for larger image*

**SDS Hi-Hat**

From PCB Revision 1.4 onwards the MIDI-Retrofit 16 includes an additional circuit designed to work with the SDS Hi-Hat module.

The circuit has an input from the SDS HiHat control output and, in response to MIDI 'Modulation' Control (0xB1) messages, modulates the SDS Hi-Hat signal which is then presented at the [SDS-HiHat] output.




*HiHat wiring*

## EQUIPMENT CONNECTION

- It is beyond the scope of this document to detail the actual connections that need to be made to any specific piece of equipment.
- You need to be aware of any warranty on the equipment that may be compromised by making modifications to the circuitry.
- You also need to be conversant with the electronic operation of the unit to determine the optimum insertion point for the MIDI-Retrofit-16 triggers.
- All existing trigger controls must be disabled i.e. you cannot operate the MIDI-Retrofit-16 AND the equipments own controller at the same time. Only ONE of the 'controllers' can be in circuit. If you desire to have parallel operation then you need to consider a unit such as our MIDI Interceptor. In the example under Figure 2 we have shown a 'loopback' plug fitted. This simply routes the equipments controller signals back in to the trigger inputs. Replacing this plug with the MIDI-Retrofit-16 plug disables the equipments controller lines and connects the MIDI-Retrofit-16 trigger outputs to the equipments triggers.

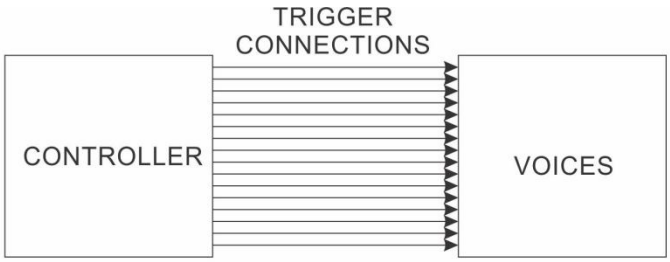



Figure 1

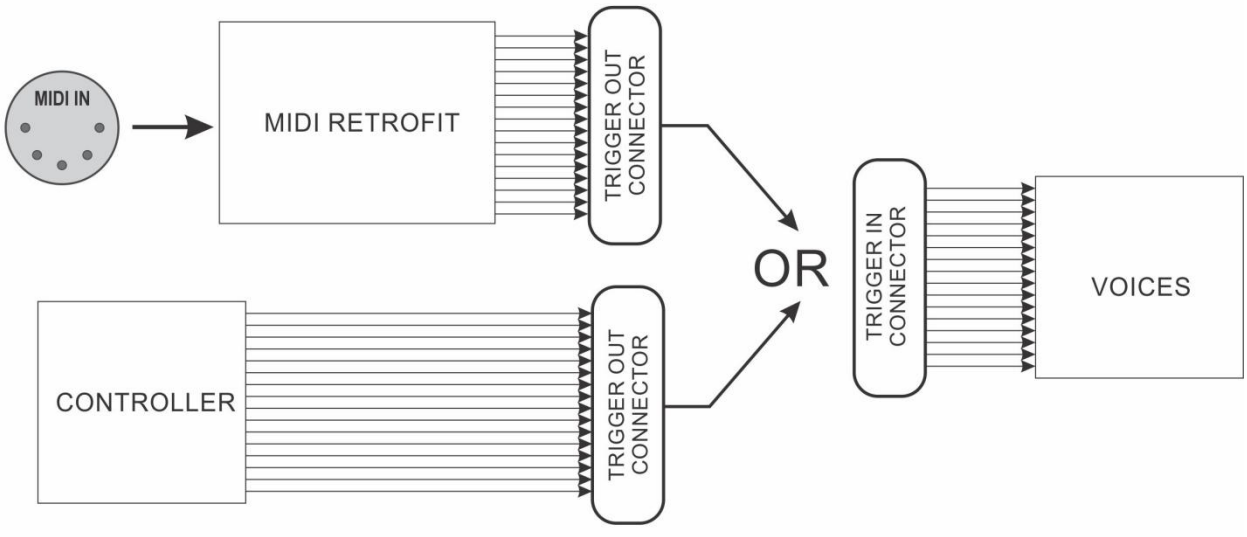



Figure 2

Block Diagram for MIDI-Retrofit 16

## COMPONENT NOTES

LEARN Switch - this should be a normally-open, momentary switch rated to a minimum of 24VDC @ 10mA. This switch is, generally, optional for options (1) & (2) as you normally only need to assign MIDI Notes to the TRIGGER outputs once. In this case the switch can be ignored and the 2 connectors pins simply shorted to activate he LEARN mode.

Status LEDS - The MIDI-Retrofit-16 includes inline resistors for the status LEDs. These are intended to run with Red LEDs from the internal 5V so will have a nominal operating current of around 8mA.Other LEDs may be substituted as required. Depending on the LEDs chosen you may need to modify the series resistor value to either increase or decrease the current drive and hence the LED brightness. If using different LEDs then you should test the unit with the existing series resistors as you may find that is it is adequate for the task.

Output Connectors - we supply 0.1" MTA headers, sockets and crimps in our kits but the board will take most 0.1" connectors. The TRIGGER outputs are voltage drive outputs so should not be connected to other 'voltage signals' such as the trigger outputs from the equipments internal controller. If required we recommend a value between 100R and 1K.

The MIDI-Retrofit16 should be powered from a clean 12V-15VDC (15VDC recommended for optimum output voltage range) rated to a minimum of 200mA.

## Setting-up the MIDI-Retrofit-16

There are 3 adjustments that can be made on the MIDI-Retrofit-16. You will need a multi-meter or equivalent to perform steps (1) and (2). Step (3) is best done with an oscilloscope.

### DIPSWITCH #1

First you should select whether you want positive-going (OFF) or negative-going (ON) trigger outputs. Your selection of the polarity will determine if the triggered state generates the lower voltage or the higher voltage. Depending on the setting of this switch steps (1) and (2) below, may have the opposite voltages as shown in square brackets [].

### DIPSWITCH #2

Set this switch to the ON position. This will force the TRIGGER output to be held ON

Apply power after you have selected these options (remember to turn DIPSWITCH #2 OFF once calibration is finished!).

### 1. TRIGGER Output Voltage Low

Adjust P302 until the TRIGGER output level is at the desired level which is, typically, 0V [10V for -Ve pulses].

### 2. TRIGGER Output Voltage High

Generate and hold a NOTE ON related to one of the TRIGGER outputs. Adjust P301 until that TRIGGER output level is at the desired level which is, typically, 10V [0V for -Ve pulses].

### 3. TRIGGER Pulse-width

This adjustment defines the pulse-width of the TRIGGER outputs. This should be set to the smallest time period possible consistent with reliable triggering and operation of the attached triggered devices. If the pulse is set too small then the triggered devices may not trigger reliably or some devices may not produce the full `sound' for which they were designed. On the other hand, increasing the pulse-width to a value well in excess of what is required to achieve a reliable trigger may affect the speed at which MIDI-Retrofit-16 can accept repetitive triggers for the same output.

If you have an oscilloscope then you can easily and quickly set the pulse width to the desired period. If you do not have an oscilloscope then you should connect the TRIGGER outputs to the equipment to be controlled and set the pulse with to its minimum value. Generate triggers on all outputs and observe if any fail to generate a reliable signal, if necessary increase the pulse width until all outputs generate reliable instrument triggers.

P101 is used to adjust this setting to between 0.5mS and 120mS.