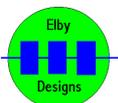




**MIDI Interceptor  
16-channel MIDI-SCANNER-TRIGGER Module  
User Guide V1.2**

February 23rd 2016



# MIDI Interceptor MIDI-Scanner-Trigger Module

MIDI Interceptor is a module that provides:-

1. 16-channel Trigger Input scanner
2. 16-channel Output Trigger driver
3. MIDI Note to Output Trigger conversion

The combination of these main functions allows the MIDI Interceptor to be 'inserted' in to the control chain of a drum machine and allows the equipments voices to be controlled by both the equipments on internal controller and an external MIDI controller.

The Output Triggers are all velocity controlled and so will respond to the Velocity byte in the associated MIDI Note message. By default MIDI Interceptor converts all Instrument Trigger Input detections in to a fixed Velocity value output of 100 unless the ACCENT input is detected in which case the output is set to a value defined by the ACCENT trimpot.

Channel #16 is permanently assigned to ACCENT control leaving the remaining 15 channels available for assignment to any MIDI Note and instrument.

The period of the trigger-on time can be adjusted using the onboard trimpot (P101) from approximately 2mS to approximately 30mS. The polarity of the triggers can also be set by an onboard jumper to either positive-going or negative-going logic. This setting is implicitly assigned to both the Trigger Input scanner and the Output Trigger driver.

MIDI Interceptor has 16 LED's which indicate the status of each of the output triggers and are also used during LEARN mode to assist the user whilst programming the board by indicating which TRIGGER output is being programmed..

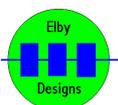
## ACCENT Control

When under MIDI control, the ACCENT output is controlled by either a MIDI Velocity value for any of the Instrument Trigger outputs being greater than 100, or on receiving a Note-ON or Note-OFF message for TRIGGER #16.

When triggered by a MIDI Velocity value of greater than 100, the ACCENT output has the same pulse period as the Instrument Triggers and so will turn ON and OFF in parallel with the Instrument Trigger that initiated the ACCENT.

When triggered by a TRIGGER #16 MIDI message, the ACCENT output is turned ON in response to a Note-ON message and turned OFF in response to a Note-OFF message. This mode allows the ACCENT output to be held ON for a controlled period of time.

If the ACCENT control has been turned 'ON' by a #16 command, then the ACCENT output voltage is defined by the ACCENT trimpot. If the ACCENT has been 'triggered' by an Instrument Trigger Velocity being greater than 100, then the ACCENT output voltage is that set by the Velocity value.



# MIDI Interceptor MIDI-Scanner-Trigger Module

## LEARN Mode

The current default MIDI Note address for each of the Output Triggers is shown in Table 1. The 'LEARN' mode lets you assign different notes and channels to each trigger output.

To use the 'LEARN' mode, you simply hold down the LEARN button (S101) until all the LED's come on. Then the LED for the first channel to be set will flash once every second, indicating that it is waiting for a note to be assigned to trigger it. Once received it will then wait for the associated NOTE OFF command before triggering its output, and then moving on to the next channel. Repeat for all 16 triggers, if you don't want to reprogram all the outputs then simply wait, the unit will timeout after roughly 4 seconds, saving any changes to trigger notes in FLASH memory.

## Adjustments

NB: the trigger output voltages measured will depend on the setting of DIPSWITCH #1. The values in square brackets [ ] are for the inverted mode.

There are 3 adjustments that can be set as follows:-

### 1. TRIGGER Output Voltage Low

Adjust P702 until the TRIGGER OFF output level is at the desired level which is, typically, 0V [10V].

### 2. TRIGGER Output Voltage High

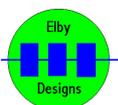
Generate and hold a NOTE ON relative to one of the TRIGGER outputs. Adjust P701 until that TRIGGER output level is at the desired level which is, typically, 10V [0V].

### 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-16-Interceptor 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 width to its minimum value. Generate triggers on all outputs and observe if any fail to generate a reliable signal. Increase the pulse width until all outputs generate reliable instrument triggers.

P101 is used to adjust this setting. Typically the pulse-width is around 4mS-10mS.



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# MIDI Interceptor MIDI-Scanner-Trigger Module

## Using LEARN Mode

Using LEARN Mode itself is pretty straight forward but there are some preparatory decisions that need to be made first.

In Table 1 (at the end of this document) you should start by listing the individual instrument voices for your 'machine' under the 'Drum Machine Instrument' column.

Then under the MIDI Instrument column you should select the desired MIDI Instrument that will be assigned to this voice. Generally you would use the General MIDI (GM) Percussion definitions. So if, for example, your machine has a 'Bass Drum' voice then you could select 'Acoustic Bass Drum' or 'Bass Drum 1' as the assigned MIDI Instrument. Enter the chosen instruments MIDI Note # under the MIDI Note column.

Repeat for all the voices in your machine. If you don't have 15 voices then simply enter the voices you have and leave the rest blank.

When you have entered all of the assignments you should finally select or reallocate the Trigger numbers if desired. It is important that the Trigger numbers start at '1' and proceed sequentially up to the last instrument voice you have, do not skip over Trigger numbers.

You will most likely be using the same MIDI Channel for all the voices but you do have the option of selecting different channels for each voice - be aware that you only have around 4 seconds between programming each Trigger during LEARN Mode and so you must be able to generate all MIDI Notes on the associated MIDI Channels within this time constraint.

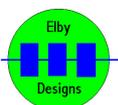
Enter the desired MIDI Channel under the MIDI Channel column. This will normally be either Channel 10 (MIDI Channel #9) or Channel 1 (MIDI Channel #0).

Trigger #16 is a special trigger used for ACCENT control. You do not have to program this Trigger as MIDI Interceptor will operate the ACCENT in response to the Velocity value in the received MIDI messages.

Assigning a MIDI Note to this Trigger will let you control the ACCENT and override the Velocity value control. When activated by a MIDI Velocity value greater than 100, the ACCENT output will only remain active for the period defined by the PULSE WIDTH setting.

When activated by a Trigger #16 MIDI Note, the ACCENT output is set according to the Note ON/Note OFF message received i.e. the ACCENT will be ON while the Trigger #16 Note is being held on and then will turn OFF when that note is released. This allows you to hold the ACCENT level active over a period of time. We would recommend assigning an unused MIDI Percussion Instrument to this Trigger.

With this table completed you are ready to use the LEARN Mode. As per the earlier instructions, activate the LEARN Mode by holding S101 closed for a second or two. MIDI Interrupt will cycle the LEDs to indicate it has entered LEARN Mode and then flash the first



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## MIDI Interceptor MIDI-Scanner-Trigger Module

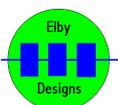
Trigger Channel. Send a MIDI message consisting of the MIDI Note and MIDI Channel as listed in your table against Trigger #1. MIDI Interceptor will set the LED for the first trigger to ON and start flashing the next LED. Repeat this process until you have programmed all the assignments for the voices of your machine. If you do not have 15 voices then simply wait after your last entry, MIDI Interceptor will timeout and then save all the programmed data.

### Setting PULSE WIDTH

The PULSE WIDTH setting needs to be set properly for the machine being controlled. This setting determines the width of the TRIGGER outputs when fired in response to trigger signals from the internal controller.

As mentioned above, this setting should be made to achieve consistent and reliable triggering of all voices. This setting should really be made with the aid of an oscilloscope so that you can determine a reasonably accurate setting. Using a scope also allows you to observe the trigger signals being generated by the internal controller and you should initially aim to replicate this at the TRIGGER outputs. Once set, you can experiment with reducing the pulse width to see if it can be optimised. A shorter pulse width setting will allow for faster 'runs' of sequential triggers to a voice (assuming that the voice circuit will respond properly to this faster sequence).

This PULSE WIDTH setting is also used by MIDI Interceptor for MIDI trigger events, however MIDI Interceptor applies slightly different logic in this case. At maximum velocity the TRIGGER output pulse width will be about the same as that set by PULSE WIDTH. AS the velocity value is reduced, the pulse width is proportionally reduced so that at lower velocities not only is the amplitude of the trigger pulse smaller, but the width.



# MIDI Interceptor MIDI-Scanner-Trigger Module

## Installation

The following notes should be read when installing the MIDI Interceptor.

### Machine Preparation:-

Before installing the MIDI Interceptor it will be necessary to make a modification to the machine in to which the MIDI-16-Interceptor is to be installed.

The basic assumption is that the machine comprises 2 main sections:-

- 1) The 'controller' section which generates the timing information and pattern generation, and
- 2) The 'voice' section which generates the actual sound outputs.



Figure 1

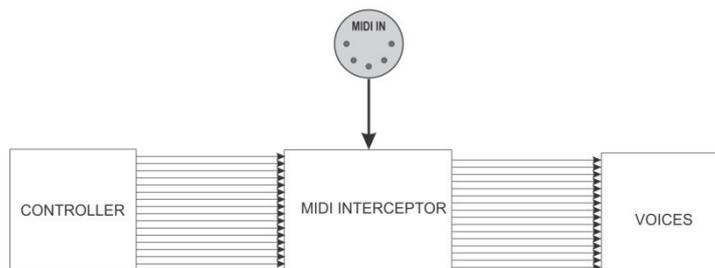


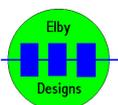
Figure 2

The 'connection' between these 2 sections could be termed as the 'trigger interface' and would be where the 'trigger outputs' signals from the controller feed in to the individual sound generator circuits. MIDI Interceptor requires these 'trigger outputs' to swing either side of half the power rail i.e. from less than 2.5V to greater than 2.5V. A jumper setting on MIDI Interceptor (JP601) allows the polarity of these outputs to be set.

LK101 should also be set too instruct the MIDI-Interceptor as to the 'direction' of its trigger outputs. Refer to Table 1

JP601	LK101	
1-2	Open	Negative Trigger Pulses
2-3	Closed	Positive Trigger Pulses

The 'trigger interface' will need to be cut (intercepted) and fed to the MIDI Interceptor. The connection to the 'controller' side of the machine should be connected to J601 and J602 while J201 and J202 of the MIDI Interceptor should connect to the 'voice' section.



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# MIDI Interceptor MIDI-Scanner-Trigger Module

## **Power:**

MIDI Interceptor requires a +12V to +15VDC supply which should, ideally, be derived from the machines own supply. MIDI Interceptor requires less than 100mA so should not present a load problem to the machines power supply.

If an external supply is to be used then you must provide a connection from the 0V of the MIDI Interceptor to a 0V tap in the machine.

## **TRIGGER Outputs:**

Up to 15 velocity adjustable TRIGGER Outputs are provided through connectors J201 and J202. The outputs are referenced to 0V so you only need to connect a single wire for each output to the associated 'voice' trigger input in the machine.

## **TRIGGER Inputs:**

Up to 16 TRIGGER Inputs are provided through connectors J601 and J602. These inputs are referenced to 0V so you only need to connect a single wire for each input to a 'trigger output'.

## **LED Status Indicators:**

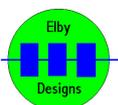
As an option you can connect an array of LEDs to display the trigger status of each connected trigger. If required then the outputs of connectors J501 and J502 should be connected to the ANODE of each LED while the LED CATHODEs are all connected to 0V.

A MIDI status LED is also available at D102 and can be used to indicate the receipt of a valid MIDI message.

## **ACCENT:**

Channel #16 is reserved for the ACCENT control leaving the remaining i/o points (#1 to #15) for general trigger control.

While Instrument TRIGGER Outputs #1 to #15 are pulsed outputs (pulse width defined by P101) TRIGGER Output #16 is either a 'gated' output that responds to the ON/OFF status of the TRIGGER #16, or a pulsed output in response to a Velocity value greater than 100 on any of the Instrument TRIGGER inputs..



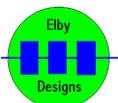
# MIDI Interceptor MIDI-Scanner-Trigger Module

## MIDI NOTE Assignment:

The default MIDI Note assignment for the 15 TRIGGER Outputs is shown below:-

Open High Conga	63
Mute High Conga	62
Low Conga	64
Cowbell	56
Crash Cymbal 1	49
High Tom 1	50
Open Hi-Hat	46
Low Tom 1	43
Closed Hi-Hat	42
Snare Drum 1	38
Bass Drum 1	36
High Wood Block	76
Vibra Slap	58
Claves	75
Side Stick	37

MIDI Interceptor initially also expects all MIDI messages to be on Channel 10



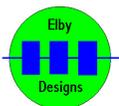
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## MIDI Interceptor MIDI-Scanner-Trigger Module

Drum Machine Instrument	MIDI Instrument	MIDI Note	Trigger #	Trigger Channel
			1	
			2	
			3	
			4	
			5	
			6	
			7	
			8	
			9	
			10	
			11	
			12	
			13	
			14	
			15	
			16	

Table 1: MIDI Assignments



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