PIRATE MIDI Mastering MIDI-Controlled Effects Pedalboard

PIRATE MIDI Mastering MIDI-Controlled Effects Pedalboard Owner's Manual

Contents

PIRATE MIDI Mastering MIDI-Controlled Effects Pedalboard

Specifications:

- **Product Name**: Tones & Technology: Mastering MIDI-Controlled Effects Pedalboards
- **Author:** Simon Glover
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Product Information

Tones & Technology: Mastering MIDI-Controlled Effects Pedalboards is a book written by Simon Glover and distributed by PIRATE MIDI. The book provides in-depth information on MIDI technology, its history, fundamentals, messages, connectivity, and practical applications in music creation, and effects pedal control. It aims to equip readers with a solid understanding of MIDI technology to enhance their pedalboard setup and performance.

Product Usage Instructions:

Chapter Overview:

Chapter 2 of the book delves into MIDI technology, covering its history, fundamentals, message structures, connectivity options, and MIDI mapping for pedal control.

Understanding MIDI Technology:

By the end of this chapter, readers will have a comprehensive understanding of MIDI technology, including communication between devices, interpreting MIDI messages, and setting up MIDI-controlled effects pedals. This knowledge will empower users to optimize their pedalboard setup with MIDI capabilities.

Exploring MIDI-Enabled Pedals:

The book also explores the benefits of MIDI-enabled pedals and provides insights into why they are advantageous for musicians. Readers will gain knowledge on how MIDI pedals enhance musical creativity and control over effects.

FAQ

- **Q: Can I share copies of the digital book with others?**
  - **A**: No, please do not share copies of this digital book without prior permission from the author. For additional copies, visit www.tonesandtechnology.com to purchase.

Acknowledgements & Dedication

Thanks to Sam for being an amazing business partner. Without your expertise and dedication, my life would be nowhere near as fun.

To my wife, Lucinda, who puts up with my constant phone-checking and message-sending for the sake of my customers – you're wonderful and I love you enormously.

To all PIRATE MIDI customers – you've pushed me to learn more than I ever thought possible. This book is dedicated to you.

Publishing Disclosure

This book is published by PIRATE MIDI who manufacture MIDI controllers and other MIDI devices.

Many of the examples in this book use PIRATE MIDI devices because those are the devices we are best acquainted with. However, most of the examples are applicable to all the best MIDI controllers, and where possible this book gives alternative options or gives generic setup advice.

To get the best out of this book, owning a PIRATE MIDI device is not necessary.

A Note From The Author

Hi, I'm Simon.

I'm a father, a traveler, and a classic geek. I'm always wanting to up-skill in some area or another! I've been building websites, creating 3d models, doing photo editing, video compositing, building electronics projects, and playing/singing music for nearly all my life and I can just never get enough.

In early 2020, I teamed up with Sam to start PIRATE MIDI after I DIY built over 100 MIDI foot controllers.

From the very beginning of the project, I realized that a thorough resource for people new to MIDI was in demand. Videos and blog posts do a great job of covering the basics, but you can't beat having it all in a book – it was just a matter of finding the time to write it!
So, if you're like me, hopefully, this book will teach you things you didn't know and lead you down rabbit holes you didn't know you wanted to explore.

Good luck and when you're stressed out, remember: it's about the music.

Understanding MIDI Technology

By the end of this chapter:

You'll have a solid grasp of MIDI technology and its inner workings. You'll understand how MIDI facilitates

communication between devices, how to interpret MIDI messages, and how to set up and configure MIDI-controlled effects pedals. Armed with this knowledge, you'll be well-prepared to harness the power of MIDI and take your pedalboard to the next level.

Chapter 2 explores MIDI (Musical Instrument Digital Interface), a communication language for electronic instruments and devices. We'll delve into its history, technical aspects like message structure and channels, and various applications in music creation and effects pedal control. You'll learn about different connection methods like USB and Bluetooth, MIDI mapping for precise pedal control, and practical examples to set up your own MIDI system.

Intro

MIDI is magical – when it works. It's not that MIDI is unreliable, but it's just old enough and just complex enough that it can twist your mind in knots if you don't know exactly what strange alien language you're playing with! When used correctly, it's a tried-and-true protocol used by professionals for forty years.

When you can press one button and you hear a symphony – there's no feeling like it. There's nothing stopping you from becoming a master of MIDI. You just need to have a solid grasp on the fundamentals
the rest is just like routing the audio signal on your pedalboard. It's logical and easy to map out when something's not right. Let's get started.

History of MIDI

In 1984, the MIDI association was formed. A group of representatives from musical instrument manufacturers cooperated on a new protocol for controlling instruments. Before this, there were many proprietary systems for achieving a similar thing. 1984 was the end of those proprietary systems. MIDI changed the game.

A few years earlier, Dave Smith from Sequential Circuits and Ikutaro Kakehashi, the president of Roland, started to collaborate on the system we now know as MIDI. On each side of the ocean, they spoke to their colleagues in the industry and collaborated to build a lightweight, fast, and reliable protocol for devices to be controlled by other devices, sync time clocks, and recall presets – all with one or two small cables.

MIDI was very popular because it was universal, and because products were ready to showcase its potential in the very frst years of its release. Roland and Sequential had multiple instruments ready to go, and the protocol worked great.

The rest of MIDI's history is a gradual expansion and improvement of its features for the last 40 years. New connectors, new digital transmission speeds, and new ways to interact with your instrument. MIDI is so great because it's a collaboration of some of the most innovative companies in digital instrument history. Putting their heads together, rather than competing, brought us one of the most powerful performance tools there is.

Modern synthesizer with integrated MIDI

Fundamentals of MIDI

MIDI is a serial-based protocol. That means a digital signal is sent along a wire with 1s and 0s making up “bits” which make up “bytes” which make up “packets.”

Because it’s a digital signal, MIDI has expanded from the original DIN5 connector to using other connectors such as TRS cables, USB cables, Ethernet cables, and even Bluetooth. It has become very fexible and diverse., But the data inside the messages doesn’t actually change between connection types.

When a MIDI message is sent, it sends a message on a particular channel, targeting a particular control or note, with a value attached that tells the control or note what to do. The sending device has no way of knowing what is physically connected to the other end of the cable though, so the message has to be correct for the receiving device to perform the intended action.

For example, if I have a Strymon BigSky reverb pedal, and I send it a “Note On” MIDI message, it will not do anything. The device that sent the message has no way of knowing that a Strymon BigSky is attached, OR that a Strymon BigSky is not programmed to respond to any “Note On” messages. Likewise, the Strymon hasn’t been programmed to know what a “Note On” is, and therefore it will ignore the MIDI message.

This means that setting up MIDI requires a deeper level of knowledge about all the parts of your MIDI rig than you might expect. You need to know which device is which, how it’s connected, the capabilities and MIDI connectors on each device, and what messages you want to send to each device. That’s why this book needed writing!

Example of a modern MIDI controlled pedalboard - Image credit: lostinreverb

Connecting Multiple MIDI Devices

MIDI is directional. One cable carries a MIDI message downstream from one device to the next, and MIDI devices are usually connected in a daisy chain. Many MIDI devices have a MIDI In and a MIDI Out jack.
By daisy chaining from the MIDI Out of one device to the MIDI In of the next, you can pass MIDI all the way from your message source, to many devices with only one cable run

MIDI Messages & General Applications

The basic components of any MIDI message are:

- Channel
- Type
- Value

Channel

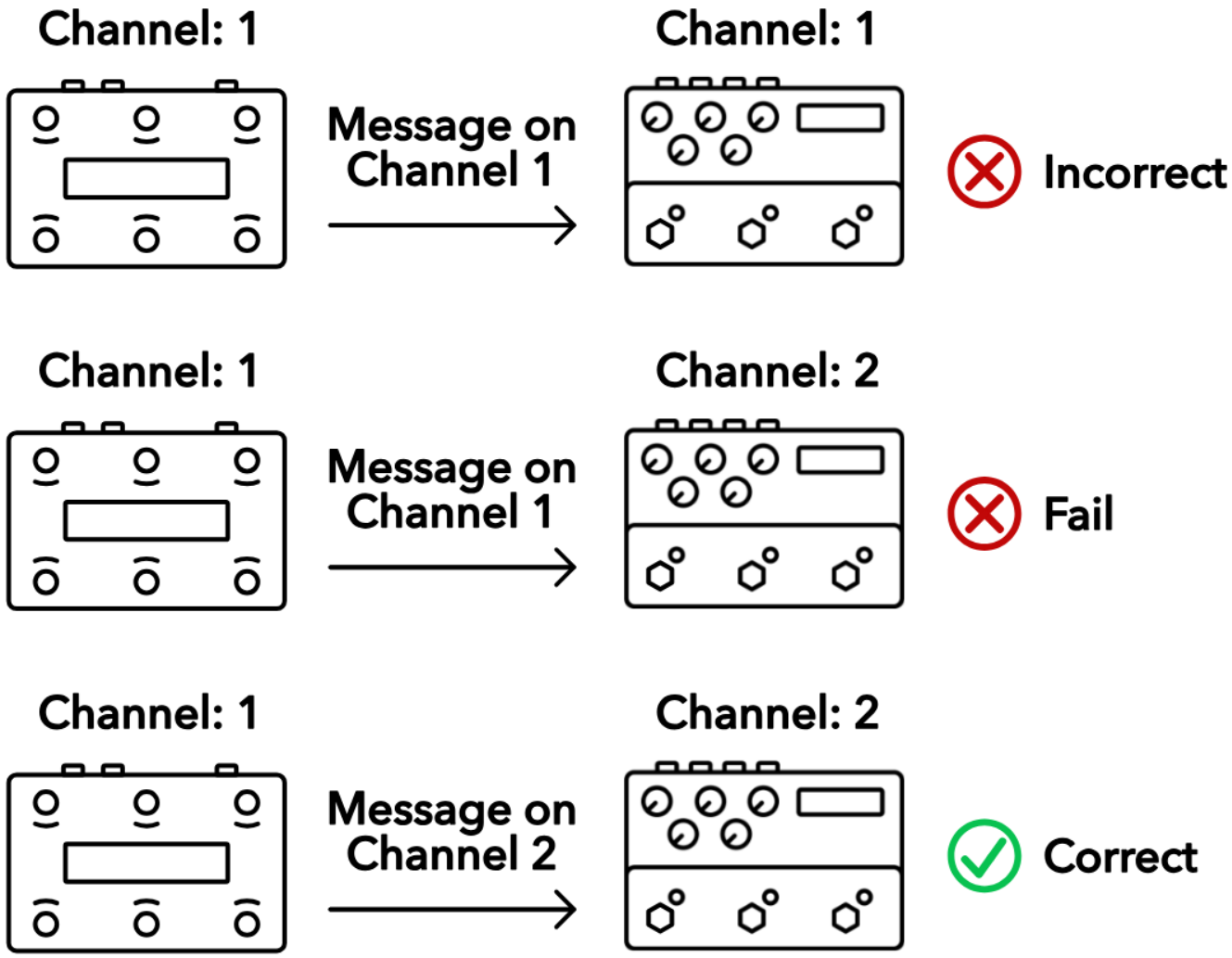
A MIDI channel may just be the most important, yet most overlooked function of a MIDI message. Channels are like an identity assumed by a MIDI device. Channels are assigned from one to sixteen (1-16)

MIDI channels are used to make devices only listen to specific messages so that you can send similar messages to a different device without other devices also reacting to that message. If a device is set to channel one, it may receive a message on channel four, but it will ignore it.

Without this feature, you would have devices possibly all reacting to the same message, even if it was only

intended for one device.

The common error here is that people assume that two devices should be set to the same channel to talk to each other. Because this is not a two-way communication, this is not the case. Channels are used to identify which device is which, not to connect devices.



Type

MIDI messages have many types – used for different functions depending on the manufacturer.
By definition of the MIDI Association, the current types of MIDI messages are as follows (ordered roughly from most common to least common)

Channel Voice Messages: ‘

- “Note On” & “Note Off” messages (usually for triggering instruments remotely via MIDI)
- PC or Program Changes (Sometimes referred to as Preset Changes)
- CC or Control Changes (Sometimes referred to as Continuous Controller)
- Pitch Bend
- Channel Pressure
- Polyphonic Key Pressure

System Messages:

- Timing Clock (Sometimes referred to as MIDI Clock – used for synchronizing tempos across devices)
- Start (for MIDI Clock)
- Stop (for MIDI Clock)
- Continue (for MIDI Clock)
- Active Sensing
- System Reset
- SysEx or System Exclusive (custom – usually proprietary – data sent via the MIDI system)

The most-used messages are Note On/Off, PC, CC, and Timing Clock. If you want to get a basic MIDI pedalboard up and running, you'll need to learn about each of these types. In later chapter chapters, we will focus almost entirely on these messages.
Each message type has a range of numbers from zero to 127. So for each type, there are 128 possible controls. (128 notes, 128 preset, 128 virtual controls, etc.)

System Messages do not have the same structure as channel voice messages. There is no value, and they often act very differently. For example, the MIDI Clock is a constant stream of messages (16 per quarter note!) which runs and maintains the tempo regardless of whether the target device is active or not. The

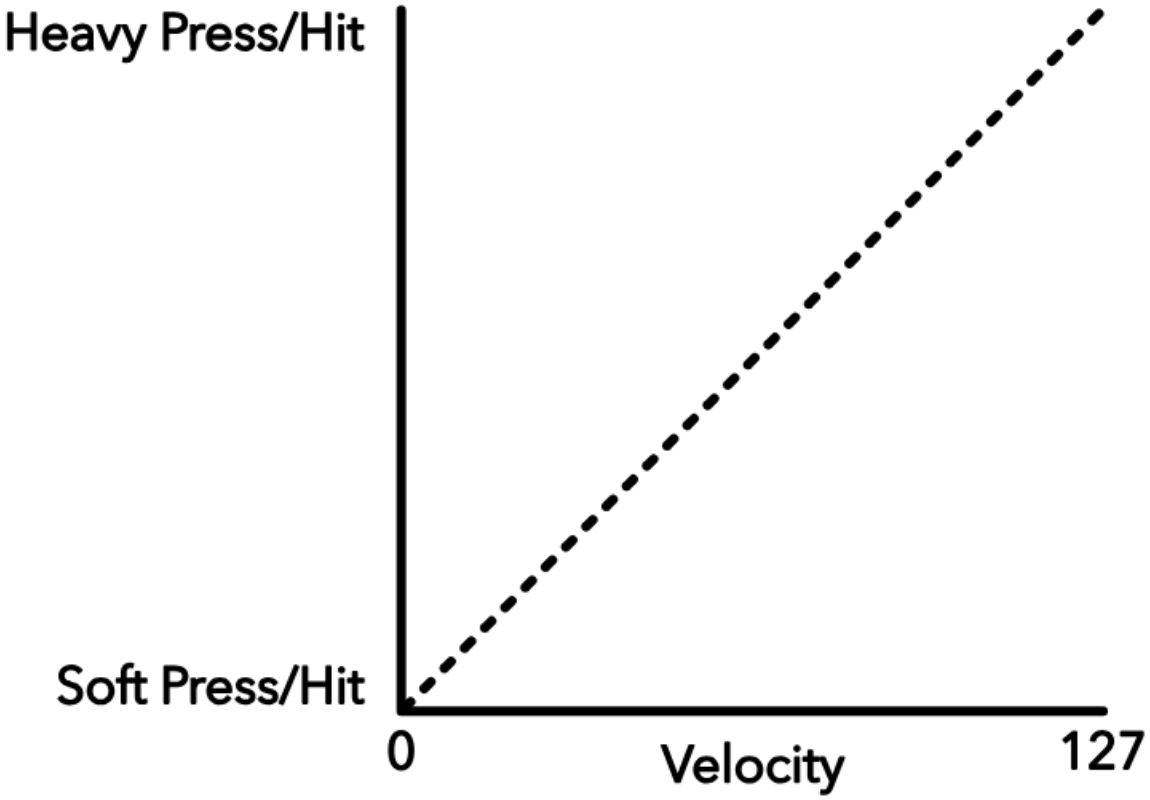
The clock's associated start/stop messages will usually be the trigger for the device to play or not, but the timing messages continue so that the devices are always synchronized and don't drift apart.

Value

The value of each message is also zero to 127. The message type determines what the value will affect.
Some messages, like PC, do not use a value. Recalling a Preset by number does not require a secondary value. However, most messages make full use of the second value. For example, a physical knob on an effects pedal might also have that control linked to a CC (control change) message. The values of 0 to 127 give us the ability to virtually "turn" that knob by sending the controller number (specific knob) and the value (specific knob position).

Most manufacturers will use the full 0-127 range for the best resolution, but some will use 0-100 for percentage-based controls, or even a more limited range if it makes sense for that control. These will be outlined in the "MIDI Implementation" section of the device's user manual.

When using MIDI notes, the value is usually called "velocity" because the value indicates the strength the note is supposed to have. In the example of triggering a drum machine via MIDI, a value/velocity of 0 would trigger the target drum sample, but 0 would mean the volume would be off. If the value was 1, the sample would be barely audible, and at 127, it would be at its loudest possible level.



If the drum machine is more complex, it might have multiple samples per drum – a few soft samples and a few loud/hard samples. If the velocity is high, it will play the appropriate loud/hard sample for that velocity range and adjust the volume to suit. A single drum (single Note message) can then have 128 different levels of dynamics available to be played.

MIDI Connectivity & Transports

MIDI's official transports (ways to move messages) include

DIN5 cables

- 2.5mm TRS cables
- 3.5mm TRS cables
- 6.35mm (1/4") TRS cables
- USB
- Ethernet
- Bluetooth

No matter which transport you are using, the messages themselves are consistent and carry exactly the same data. It's just a matter of convenience or requirements as to which transports you choose to use.
Firewire is also an official transport but is now an obsolete connector and was never used with guitar effects pedals.

MIDI TRANSPORT TYPES

Transport	Connector Options
Serial MIDI	DIN5  TRS 
USB MIDI	Type-B  Mini-B  Micro-B  Type-C 
RTP MIDI	RJ45 
BLE MIDI (Bluetooth)	Wireless 
Firewire MIDI (IEEE-1394)	6-Pin  9-Pin  Thunderbolt 2 

Extra Transport Info

TRS Connectors can be 2.5mm,3.5mm (1/8″), or 6.35mm (1/4″)

Serial Cables

DIN5 is a solid, reliable connector but it takes up a lot of space in the device and smaller devices tend to prefer a smaller connector. The cables are also becoming harder to fnd in a pinch. Big music retailers will have them, but a smaller retailer will probably have a very small range.

2.5mm and 3.5mm TRS are excellent for space-saving but are fragile if left in exposed places. 3.5mm is stronger than 2.5mm, but a good foot stomp or heavy drop is going to cause problems – likely more for the cable than the jack itself. And thankfully 3.5mm TRS cables are abundant in even tech retail stores and gas stations so there's no worry of being left stranded is a cable fails on the road. 6.35mm TRS (1/4") is solid, takes less space than a DIN5, and is a great option. Many effects pedal manufacturers have started to use 6.35mm TRS for their MIDI because they're already using TRS jacks for audio anyway. It's another cable with many options in retail stores.

If you need to adapt to/from any of the above connectors, it's entirely doable either DIY, or with cables from manufacturers and boutique online stores. Because it's just 3 wires (even on the DIN5 plug), it's simply a matter of having the right wires connected. For DIN5 to TRS, the MIDI Association released this **wiring guide**.

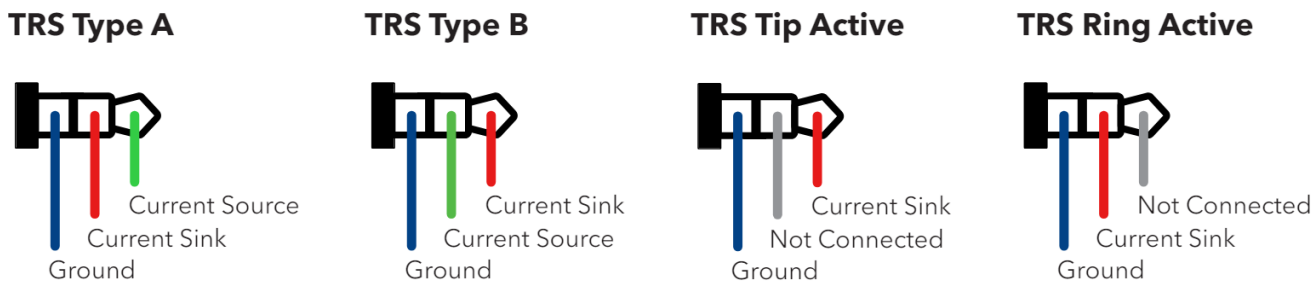
TRS Types

TRS MIDI jacks – usually in 1/4" (6.35mm) size – have different wiring configurations depending on the manufacturer of the pedal. "Type A" is the standard adopted by the MIDI Association, but unfortunately they were too late, and other manufacturers had already adopted "Type B" or even "Tip Active" and "Ring Active" wiring due

to the lack of a standard by the MIDI association when these connectors were frst being used.

These four types are used within guitar pedals and synths, but USB audio interfaces with MIDI and dedicated MIDI interfaces will always be Type A.

Below you will fnd a diagram with the different wiring for all four types of TRS MIDI connectors.



Digital Cables

USB has faster message transfer speeds and lower latency, but it's worth noting a particular limitation with USB MIDI jacks. USB itself requires a Host Device to recognize, manage, and run peripheral USB devices. This includes all USB MIDI devices.

USB MIDI Host and CME WIDI Uhost

If you have an effects pedal like the Zoom multistomp series which has no Serial MIDI connector but has a USB connector, you will not be able to connect that USB jack to the USB jack on a MIDI controller or another MIDI pedal. Unless, that is, the device specifically advertises USB Host capability (very rare and is a major feature that will be well-advertised).

Host devices that will enable MIDI for such a pedal are:

- Any computer-type device with a USB port (Phones, Tablets, Laptops, PC's
- USB MIDI Host boxes
- MIDI Controllers with advertised USB Host jacks
- MIDI Interfaces with advertised or labeled USB Host jacks

Ethernet is the other digital cable that can be used as a MIDI transport. Some MIDI interfaces (e.g. iConnectivity) have ethernet ports that are designed to work as a MIDI transport. Ethernet is great because cable runs can be very long (sometimes up to 100m). Ethernet cables are also super common at tech retailers so they're easy to replace on the road.

Wireless MIDI

Bluetooth, as you might know, is pretty terrible for audio because it has such a low bandwidth and latency that heavy compression needs to be used. Thankfully MIDI is such a data-light protocol that Bluetooth is ideal. Bluetooth MIDI devices created by the like of CME-Pro have brought wireless MIDI reliability & latency to the point where many musicians can use them in a live performance environment with great success.

Of course, Bluetooth is always susceptible to potential interference which could cause problems in a live performance environment, so it's best to test extensively before committing to using Bluetooth MIDI live. However, the convenience of freedom it gives is undeniable.

CME has a range of Bluetooth devices for MIDI Thru hubs, DIN5 dongles, TRS dongles, and even USB MIDI Host. This can significantly tidy up your rig by removing cables and having only wireless MIDI connections.

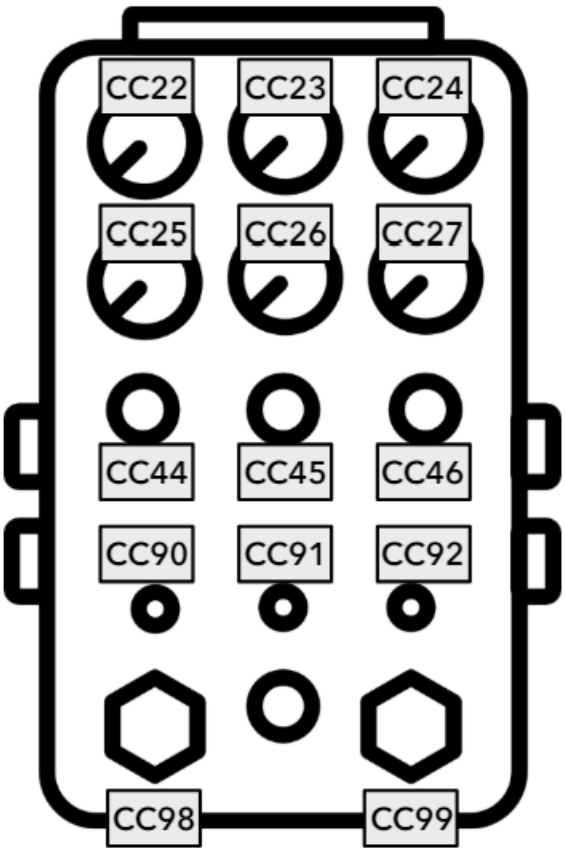
Pedals & General MIDI Mapping Structures

Since guitar effects processors started getting MIDI control in the 90s, MIDI control has been a major factor in their usability as part of a complex, flexible system. Now we'll drill down from general MIDI knowledge into specific effects pedal information.

In general, most MIDI-enabled pedals will have PC (Program Change) messages enabled to recall presets on the device. Sometimes using MIDI will unlock more preset slots than available without MIDI, and sometimes not. Some pedals will have the same 3 presets, just able to be recalled with MIDI PC messages 0-2, and some will have the full complement of 0-127 available.

In the same way, most pedals with MIDI will have a command assigned to bypass or engage the effect. Just like pressing the footswitch on the pedal itself, this message will turn the effect on and off. Then there's the knobs and switches on the pedal. If the pedal has an extended MIDI implementation, at least some if not all the knobs and switches will have a MIDI CC or MIDI Note assigned to them, and the value of that CC or Note number will set the knob or switch to a particular position. For most knobs, value 0 will be full anti-clockwise, 64 will be 12 o'clock, and 127 will be full clockwise turn.

Fictitious Example



As mentioned earlier, to find the specific MIDI commands for your device, you'll need to find the MIDI section – usually called "MIDI Implementation" at the back of the device's user manual. Some brands will have a separate PDF download with the MIDI commands listed in a table.

If a pedal has an expression jack and MIDI capability, usually this feature can also be controlled using a MIDI CC, where value 0 will be heel-down and 127 will be toe-down.

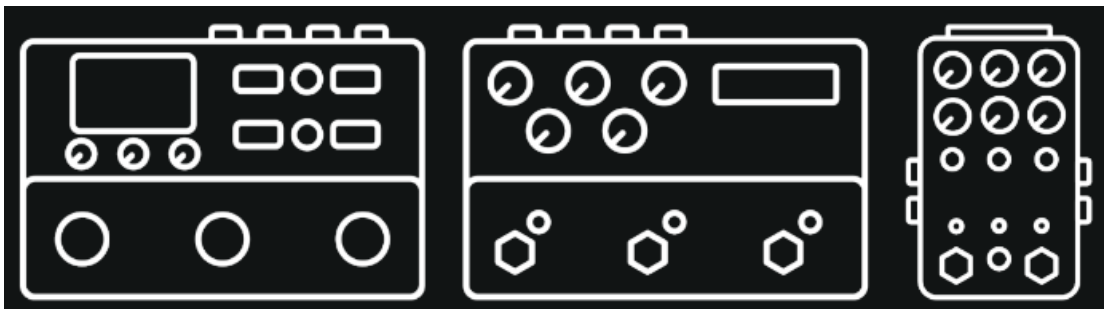
If footswitches on the pedal have different functions depending on whether the switch is pressed, held, double-tapped etc, then usually in the MIDI implementation there will be a single MIDI CC number assigned to the switch, and different values for that CC will determine which press-type is activated.

Footswitch Action Control		
Switch Off	0-5 (FS1-FS6)	0
Switch On	0-5 (FS1-FS6)	127
Toggle	0-5 (FS1-FS6)	64
Press Action	0-5 (FS1-FS6)	3
Release Action	0-5 (FS1-FS6)	4
Double Press Action	0-5 (FS1-FS6)	5
Hold Action	0-5 (FS1-FS6)	6
Hold Release Action	0-5 (FS1-FS6)	7

If you have plenty of MIDI pedals and you haven't used their MIDI features before, this may all seem a but overwhelming. In that case, start with one pedal, get to know it and its MIDI controls rather than trying to grasp every pedal at once. Manufacturers often have slightly different philosophies on how they add MIDI commands, so trying to learn multiple different pedals at once may overwhelm and confuse you very quickly.

PIRATE MIDI's MIDI devices come with full access to the Device Library, which is a hand-typed database of over 25,000 MIDI commands from the MIDI implementation section of user manuals. Rather than look up that PDF every time, you can add those messages for your devices directly to your **PIRATE MIDI controller** when editing using the web editor. It saves loads of time and instead of remembering numbers, you're looking at the actual label for what that command does.

What's so good about a MIDI pedal?



Exploring MIDI-Enabled Pedals

By the end of this chapter:

you'll have a comprehensive understanding of the variety of MIDI-enabled pedals available and how they can elevate your playing experience. You'll be equipped with the knowledge to select the right pedals for your musical style, harness their capabilities, and integrate them seamlessly into your MIDI-controlled effects pedalboard. Get ready to unlock new sonic dimensions and explore the limitless possibilities of MIDI-enabled pedals.

MIDI-enabled pedals, exploring their advantages like simultaneous control and preset recall, along with different types like modulation, delay, and reverb. We'll showcase popular models, discuss their features and sounds, and explore integration with multi-effects units and MIDI retroftting options for existing pedals. Practical tips on

incorporating MIDI pedals into your setup, including power, placement, and signal fow, will ensure optimal performance and creative potential.

What's so good about a MIDI pedal?

The reason people are jumping on board the MIDI trend is because – it's not really a trend. Not in the sense that it'll come and go. MIDI has been around for decades now, and even though it's only now becoming cheap and simple to use with a small bedroom-level pedalboard, it's been in the pedalboard industry for a long time. Its rise in popularity of late is more about ever-decreasing costs and the ease of implementation.

As we've already covered earlier in chapter 2.6, MIDI can do all sorts of different things on a guitar pedal. But it's not just about adding features for the sake of it. MIDI control means you can make multiple adjustments at once using a MIDI controller, or recall multiple..

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Tones & Technology

136 Pages

75+ Images & Diagrams

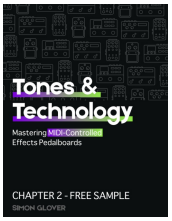
Approx 5 hour Read Time

Tones & Technology: Mastering MIDI-Controlled Effects Pedalboards

Chapter 2 – Free Sample

Written by Simon Glover

Documents / Resources

	PIRATE MIDI Mastering MIDI-Controlled Effects Pedalboard [pdf] Owner's Manual Mastering MIDI-Controlled Effects Pedalboard, MIDI-Controlled Effects Pedalboard, Controlled Effects Pedalboard, Effects Pedalboard, Pedalboard

References

- Tones & Technology - Mastering MIDI-Controlled Effects Pedalboards
- User Manual