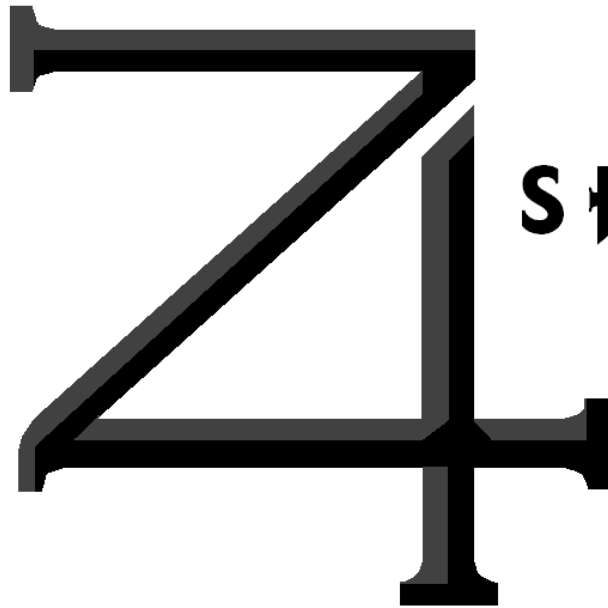




ZENDRUM
ARTICULATING
PROGRAMMER

ZAP



SERIES

OWNER'S MANUAL

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WELCOME

Thank you for purchasing your **Zendrum Articulating Programmer (ZAP)**. The **ZAP** is a hardware MIDI controller that was designed and built by drummers to allow all musicians to find new avenues of expression and creativity. The **ZAP** is specifically well-suited for smaller spaces and studio environments, but can also be mounted on a snare drum stand with an optional adapter available from **Zendrum Corp.** The purpose of the **ZAP** is to allow the user to achieve maximum dynamics, speed, and touch control with today's latest multi-sampled Virtual Studio Technology (VSTi) libraries. Until now, that super-detailed software has been muted by the actual playing surfaces. Neither keyboard keys nor gum-rubber pads can make a sound truly speak with the impact of a drum. The **Zendrum ZAP** brings a faster, more precise trigger response and the unique arrangement of five offset rows of triggers promotes some fresh new possibilities for mastering any VST instrument's depth of playing nuances.

Please take time to read this manual. We have made every effort to design a user-friendly instrument. Because it is a MIDI device, there are certain rules that will need to be understood to avoid "user-error" and frustration. **KNOW THIS** – We, the inventors, are drummers. We would rather play than program or read manuals. We'll do our best to make the instructions short and to the point, and get you up and running with the least amount of "gear fear". You can help by looking over this manual as you get started. If you're a first-time electronic musician, read **ALL** of the manual. It's not long, and we'll try to give you tips while you're learning so it will make logical sense.

We recommend reading the "**Getting Started**" section for anyone. It's to your advantage to understand the basics as you unpack your instrument and cable up for the first time. The goal is to get you safely and surely playing as soon as possible without a lot of head-scratching or guessing. Any tech support questions can be directed to:

www.zendrum.com
zendrum@mindspring.com
(404) 352-1646

Keep your sales receipt, shipping box, and manual.
For your future reference:

SERIAL NUMBER: _____
DATE OF PURCHASE: _____

WHAT'S NEW IN THE Z4

The Zendrum Z4 Series represents a **huge step forward in precision, speed, resolution, and dynamic articulation**. The Zendrum was already the perfect MIDI percussion controller for both hardware and software instruments. Now with the new Z4 upgrade, the best has just gotten even better!

The new **Dedicated Save Function** makes it much easier to try out edits before committing them. You can change several parameters of a preset then simply revert back to the previously saved version with ease. Or you can easily commit the changes to be there when you fire the Zendrum back up.

The new **MIDI Channel-Per-Trigger Feature** has vastly opened up the programming options. Now you can control multiple Virtual Studio Technology (VSTi) instruments with one preset. You can set up some triggers to play drums, some to control a soft synth, and still others to fire off audio loops in your VSTi host...all simultaneously! New **Hi-hat Pedal Control Input, Volume Pedal Control Input** and **additional trigger pad capability** maximize today's software and hardware.

Now, you can hear as well as see MIDI note number changes with the new **Audible Note Assignment Feature**, which allows you to hear note changes as you scroll through the MIDI note numbers.

The new **Automatic Calibration Feature** allows you to physically set the minimum and maximum touch of each trigger and pedal.

Most importantly, the playing "feel" has been improved. It was already the best of any MIDI controller out there, but the designers at Zendrum have managed to make it even more "live" feeling with a **state-of-the-art processor** and **advanced circuitry**. The Zendrum was already able to detect even the softest of hits, and now it picks up every single stroke and nuance of even 32nd note and 64th note finger rolls. It's like you're touching the sounds themselves! There is no other controller on the market that can equal the Zendrum's touch sensitivity and quality construction.

SAFETY INSTRUCTIONS

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. Unplug Zendrum from power source before cleaning.
4. Clean with a soft, dry cloth for fingerprints. **DO NOT USE WET CLEANERS.**
5. Do not place the Zendrum where it may fall.
6. Do not attempt to replace the 12V DC transformer without first contacting **Zendrum Technical Support.**
7. Do not allow anything to rest on the power or MIDI cords.
8. Do not attempt to open backplate without qualified assistance from **Zendrum Technical Support.**
9. Do not tamper with circuitry, wiring, or components. **Doing so will void your warranty.**

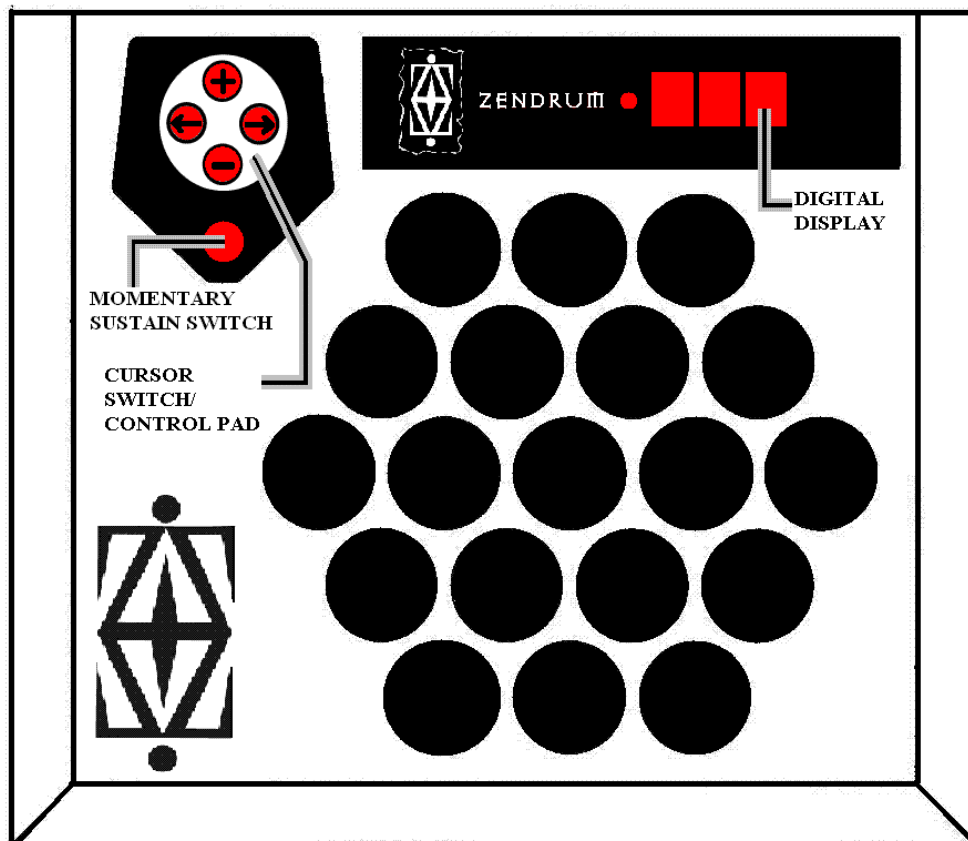
PLEASE USE COMMON SENSE! The Zendrum is an electrical device.

Zendrum Technical Support
support@zendrum.com
404-352-1646

GETTING STARTED

A BRIEF OVERVIEW OF THE ZENDRUM

The Zendrum is a MIDI (Musical Instrument Digital Interface) triggering controller designed by drummers to allow musicians to express their creativity in rhythmic and intuitive ways. However, the Zendrum can trigger ANY sound via MIDI, so it is much more than drums yet as easy to play as tapping your desk with your fingers. Unlike a keyboard, there are no moving parts to break or wear out. Anyone can enjoy it, but it is not a toy. It is a real instrument carved and handcrafted from fine woods, assembled and tested by the inventors. Each Zendrum is a work of art, manufactured with careful attention to detail and high quality.



Remember, this is a Zendrum. You CAN hit it hard, but you don't HAVE TO in order to get the maximum dynamic MIDI volume. The louder you monitor yourself through speakers or headphones, the lighter and more intricate your touch can become through practice.

BASIC PROGRAMMING FUNCTIONS

The Zendrum was designed by drummers to access the vast array of MIDI sounds. To maximize the compatibility with other manufacturers' MIDI devices, a certain number of user-definable parameters were necessary.

One of the most basic programming functions is the MIDI Channel Select. **CH** Matching the transmitting channel of the Zendrum to the receiving channel of the hardware or computer interface is what makes it possible for them to communicate with each other.

The other most basic programming function is the MIDI Note Select. **NO** Each trigger can have a MIDI note number between 0 and 127 for each of the 16 Set-up/note maps. This can be used to designate chord changes or change the playing position of drum sounds. Most hardware drum sound modules have a range of 61 MIDI notes per drum kit, any of which may be assigned to any Zendrum trigger you wish by changing that trigger's MIDI note to match. You can save any changes you make permanently using the dedicated SAVE feature.

DYNAMIC RESPONSE FEATURES

The Zendrum is the most dynamically expressive touch controller ever created. It has several functions that combine to allow the user to tailor the touch response to his or her preferences.

The Noise Floor Function **FL** allows the user to set the minimum touch required to his or her own personal hand strength and dexterity, while also setting a threshold so that accidental vibrations or loud sound will not trigger false signals.

The MIDI Volume Function **UL** allows the user to set the maximum velocity sent by the Zendrum. The combination of this parameter with the Noise Floor function sets the Zendrum's full dynamic range from soft to loud. The widest dynamics can occur when the volume is maxed at 127 and the noise floor is at zero.

The Variable Velocity Response Curve Function **rC** lets the user choose between seven different logarithmic response curves to create the best feel for his or her hardware or computer generated sounds.

SETTING UP THE ZENDRUM TO PLAY

PATCH PANEL

On the back of the **ZAP**, you will see a **patch panel** consisting of (from left to right) 2 Continuous Controller ¼ inch input jacks (1 and 2), a Foot Trigger ¼ inch input jack(3), an On/Off Switch, a locking 12 volt power supply jack, a MIDI IN jack, a MIDI OUT jack, and a Sustain Pedal ¼ inch input jack. (see below)



MIDI CABLES

You were supplied one 15' All Pins Active MIDI Cable with your **ZAP**.

POWER SUPPLY

You received a 12 volt DC power supply rated at 800 mA with a positive center pin along with your Zendrum. **Please use ONLY THIS SUPPLY to power your Zendrum.** Please contact Zendrum Technical Support for replacement information.

OTHER REQUIRED EQUIPMENT

In order to trigger sounds with the Zendrum, you must also have a hardware sound module, drum machine, keyboard, or a computer with a MIDI/USB or Firewire connection and sound card. You will also need headphones or an amplifier and speakers to hear yourself play.

POWERING UP THE ZAP

1. Connect the 15' all-pins active MIDI cable from the MIDI OUT port of the Zendrum to the MIDI IN port of your hardware sound module or computer interface.
2. Connect the 12V power supply to the 12 VDC input jack in the back of the ZAP and screw locking mechanism from power supply pin on to 12 VDC input jack to lock in place.
3. Plug the 12V power supply into your electrical outlet and you are ready to begin.

Once the Zendrum is connected and powered up, its internal processor runs a series of checks, flashes all the current settings on the digital display and comes to rest on the Program Change **Pr** function. The Zendrum is now ready to play.

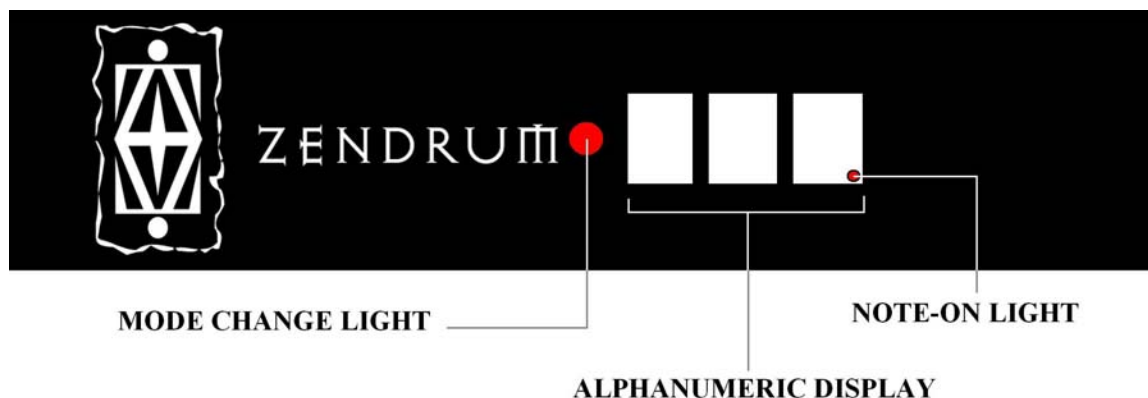
ADJUSTABLE FEET

The ZAP comes equipped with four adjustable feet on the bottom for angling the playing surface to allow you the most relaxed playing position possible. You can raise and lower the feet to make any height adjustment you want. Raise the back feet to tilt the ZAP forward, or the front feet to tilt it back.

To adjust the feet, unscrew them by hand to the desired height and playing angle. Then, using a ½ inch wrench, tighten the jam nuts against the bottom plate of the ZAP to lock in place.

DIGITAL DISPLAY, CONTROL PAD, AND SUSTAIN BUTTON

DIGITAL DISPLAY



The **Zendrum digital display** allows you to view current settings and functions, and perform custom edits. It is a three-character alphanumeric display with two extra LED indicator lights. The larger LED (**Mode Change Light**) to the left indicates Mode Changes for each function, while the smaller LED indicator (**Note-on Light**) to the right blinks whenever a MIDI message is sent. Each menu function is denoted by a two-character abbreviation (see below).

<i>UP</i>	SETUP/MEMORY BANK
<i>Pr</i>	PROGRAM CHANGE
<i>UL</i>	MAX VOLUME
<i>FL</i>	NOISE FLOOR
<i>CH</i>	MIDI CHANNEL
<i>NO</i>	MIDI NOTE
<i>dF</i>	DEFAULT CURRENT SETUP
<i>CP</i>	COPY CURRENT SETUP
<i>PL</i>	POLARITY
<i>rC</i>	RESPONSE CURVE
<i>Fd</i>	FORCE DISPLAY
<i>Ed</i>	SYSTEM EXCLUSIVE DUMP
<i>Er</i>	SYSTEM EXCLUSIVE RECEIVE
<i>bC</i>	MIDI BANK

Sd	SAVE/DISCARD
S?	SAVE?
SA	SAVE ACCEPTED
d?	DISCARD?
[1	CALIBRATE MINIMUM
[2	CALIBRATE MAXIMUM
[]	SELECT BRACKETS
F1	FACTORY INITIALIZE

CONTROL PAD/CURSOR SWITCH

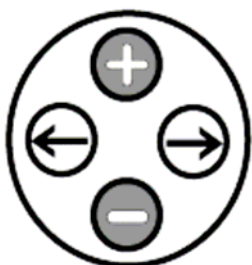
The purpose of the **control pad/cursor switch** is to allow you to edit functions. All functions of the **Zendrum** are selected and edited using the 4-button **control pad/cursor switch** and shown on the **digital display**. **You can press and hold any button to scroll quickly in any direction for fast edits. Left and right buttons display letters as the function abbreviations, + and – change/edit the numbers.**

Selecting Functions



Press either left (←) or right (→) control button to **access each specific Function page**. You can press and hold either button to scroll quickly.

Editing Functions



Press either the increment (+) or decrement (-) control button to see/change numeric value of any function. You can press and hold either button to edit numbers quickly.

Any time an edit is made, the larger LED (Mode Change Light) to the left of the digital display will begin blinking continuously to remind you to *save your edits* before you power down or they will be lost. Any edits you make are active when you change the numbers, but nothing is ever saved until you intentionally save it.

Saving Edits

Press the right (→) control button to the Save/Discard *Sd* display page.

Press (+) once to show blinking *S?*

Press (+) again to **SAVE** your changes.

Save Accepted *SA* display will flash once and then automatically return to Program Change *Pr* display. The larger LED (Mode Change Light) to the left of the digital display will stop blinking after your edits have been successfully saved.

To exit without saving, press left or right. Any edits you make are active when you change the numbers, but nothing is ever saved until you intentionally save it.

Discarding Edits

Press the right (→) control button to the Save/Discard *Sd* display page.

Press (-) once to show blinking *d?*

Press (+) to **DISCARD** your changes and revert back to previously saved edits.

The smaller LED (Note-On Light) will blink once and then automatically return to Program Change *Pr* display. The larger LED (Mode Change Light) to the left of the digital display will stop blinking after your edits have been successfully discarded.

SUSTAIN BUTTON

The **Momentary Sustain Switch** can be designated as either a **Sustain** or a **Damper**, depending on its polarity. You can change its polarity from **0 (sustain)** to **1 (damper)** using the **Polarity** *PL* function in the **Functions Menu**. It can also perform other functions as well as sustaining notes with cc #64. (See **Advanced User-Definable Calibration**)

FUNCTIONS

This section will walk you through the purpose and editing process of each function of the Zendrum.

UP SETUP/MEMORY BANK (1-16)

There are **16 memory banks** in the Zendrum called **Setups UP**. Each one of the 16 setups is comprised of **ten functions**: Program Change **Pr**, Max Volume **UL**, Noise Floor **FL**, MIDI Channel **CH**, MIDI Note **NO**, Default Current Setup **dF**, Copy Current Setup **CP**, Polarity **PL**, Response Curve **rC**, and MIDI Bank **bC**.

Access the **Setup UP** function of the Zendrum by pressing the left (←) button on the control pad once when the Zendrum is on **Program Change Pr**. Scroll through setups 1-16 by pressing (+) or (-) and choose which setup you want to use by pressing left (←) or right (→). Once you have selected a setup as the current one, you can begin editing each function in that setup by scrolling to the right to view, then using +/- to make numeric changes.

Pr PROGRAM CHANGE (0-127)

The purpose of the MIDI **Program Change Pr** function is to select an entire instrument sound or “voice” remotely from the Zendrum. For example, this could be an entire drumkit patch or a piano voice from a hardware sound module, or a performance patch from a VST instrument. The MIDI **Program Change** numerical values range from 0 to 127 and must be matched with the numerical value for the instrument voice you want to play within your hardware or software. While in **Program Change Pr**, you can select the numerical value of your program by pressing (+) or (-) and then pressing left (←) or right (→) to send the program change.

UL MAX VOLUME (0-127, DEFAULT = 127)

The purpose of the **Max Volume UL** function is to scale the maximum velocity that the triggers can send to your MIDI device. This is where you can adjust the peak levels of an entire instrument sound and “squeeze” its dynamic output. **For widest possible playing range from soft to loud leave Max Volume at 127.** When set to maximum the actual strike velocity will be sent. When set below maximum the velocity will be scaled. If the volume is set to 64 = 1/2 then a maximum strike which would normally send a value of 127 will send a value of 64 and a medium strike that would normally send a value of 64 will send a value of 32, etc. This max velocity/volume is stored in the currently selected setup **ONLY**. You must save it using the **Save/Discard Sd** function.

FL NOISE FLOOR (0-127, DEFAULT=6)

The purpose of the **Noise Floor FL** function is to establish the **minimum force** required to trigger a note while preventing vibrations or loud sound from sending unintentional notes by setting a threshold below which nothing will be sent. This function is important when considering that all software and hardware devices have limits of polyphony or simultaneous voices that they can process and respond to. Without the correct noise floor, the Zendrum's hypersensitivity could cause it to send too many simultaneous "ghost" notes and overwhelm the sound device's simultaneous voice capacity (polyphony) causing all the sounds to be clipped or chopped off. **Carefully setting this level will help to streamline the communication between the Zendrum and your other devices and allow the Zendrum Display to show ONLY the exact notes you intend to edit.** For best dynamic range leave the noise floor as low as possible, but high enough so that false triggering does not occur. One increment either way makes a noticeable and audible difference, so make changes sparingly from the default of 6 and test thoroughly before you permanently save to the currently selected **Set up UP** using the **Save/Discard Sd** function .

CH MIDI CHANNEL (1-16)

The purpose of the **MIDI Channel CH** function is to match the MIDI channel of the Zendrum with the MIDI channel of your hardware or software program. This is what allows MIDI devices to communicate with each other properly. There are 16 MIDI channels available. General MIDI specifications (see Appendix section) designate channel 10 as the drum channel, and for this reason, your Zendrum is factory preset to power up with Setup number 16 on Channel 10 to work with the vast majority of drum map programs. You can change this number to whatever you like. There is also an individual MIDI channel per trigger feature that may be stored as part of each of the 16 setups (see **MIDI-Channel Per Trigger Feature**)

While in the **MIDI Channel CH** function, **press (+) once to view your current MIDI channel.** Use (+) or (-) to select your MIDI channel, and then press left (←) or right (→) to send the change.

MIDI CHANNEL PER TRIGGER FEATURE

The purpose of the **MIDI Channel Per Trigger** feature is to designate "trigger zones", or groups of triggers, on the Zendrum to play different instruments, or "voices" at the same time using different MIDI channels. For instance, you can have a group of triggers for drums, another group for piano, and another group for guitars **all at the same time.**

While in the **MIDI Channel CH** function, **press (+) and (-) simultaneously** to show the **Select Brackets []**. Tap each trigger and use (+) or (-) to change the numeric value to the channel you wish to assign to that trigger, and then press left (←) or right (→) to send the change. Save to the currently selected **Set up UP** using the **Save/Discard Sd** function.

NO MIDI NOTE (0-127)

The purpose of the **MIDI Note NO** function is to assign individual drums or melodic notes to each trigger. The standard numeric value ranges from 0 to 127. However, the Zendrum allows for a 4-note sequential velocity switch per trigger. (see **4-Note Velocity Switch Feature**)

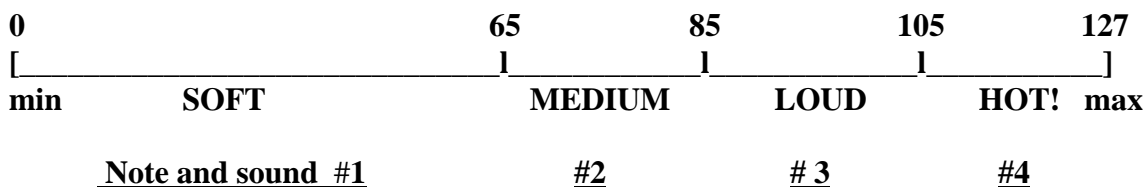
While in the **MIDI Note NO** function, press (+) or (-) to show the **Select Brackets []**. Tap the trigger you wish to change once, then use (+) or (-) to change the numeric value of that trigger. You will hear the sound that corresponds to that MIDI note number as you scroll through the numbers with the new **Audible Note Assignment** feature of the Z4.

4-NOTE VELOCITY SWITCH FEATURE

The purpose of the **4-Note Velocity Switch** feature is to allow for the most realism and articulation of each trigger when using drum libraries. It sends four sequential MIDI notes when played soft to loud to take advantage of multi-sampled articulations such as hi-hat and snare drum sounds. For instance, you can designate a different sound for soft, medium, loud, and hot on each trigger based on the realistic sound dynamics of a drum or cymbal. A snare drum trigger can start as a “brush hit” sound for soft, to a “bamboo rod” hit sound for medium, to a “middle-of-the-head hit” sound for loud, to a “rim shot” sound for hot. A hi-hat trigger can start as a foot pedal “chick” sound for soft, to a “stick tip” sound for medium, to a “stick shank” for loud, finally to a wide open “wash” sound for hot. The same principle applies to any MIDI sound where you would want to designate four sequential notes to be activated by one trigger. **As long as the 4 MIDI notes are in numerical sequence (for example 40-41-42-43) you can designate blocks of four notes to any trigger.**

To access the **4-Note Velocity Switch** feature, and while in the **MIDI Note NO** function, press (+) or (-) to show the **Select Brackets []**. Tap **ONLY** the trigger you wish to change, then use (+) or (-) to change the numeric value of that trigger. If you scroll up **PAST 127**, the large LED (**Mode Change Light**) to the left of the digital display will come on and the numbers will start over again at zero. Now you are in **4-Note Velocity Switch** mode and whichever MIDI note you stop on (**between 0 and 124**) will be the first note of the 4 sequential notes that you can assign to any trigger.

4-Note Velocity Switch Points



dF DEFAULT CURRENT SETUP

The purpose of the **Default Current Setup** **dF** function is to overwrite any edits within the currently selected setup, and revert back to the original factory presets for that setup. (see **Appendix** section)

To default, while in the **Default Current Setup** **dF** function, press and hold (+). The digital display will blink the number of the current setup. Hold (+) until the number stops blinking. You can store this edit using the **Save/Discard** **Sd** function.

CP COPY CURRENT SETUP

The purpose of the **Copy Current Setup** **CP** function is to copy the currently selected setup and clone it to another setup number 1-16. This will overwrite any information in the setup that you select as the additional location.

To copy from the current setup, press (+) or (-) to select another location for the cloned setup. Then scroll right (→) to the **Save/Discard** **Sd** function and save the change.

PL POLARITY (0-1)

The purpose of the **Polarity** **PL** function is primarily to allow you to set the **Momentary Sustain Button** to act either an **All-Notes Off Damper Switch** or a **Sustain Switch**. In other words, you can use the button to hold out (**sustain**) the melodic notes you play, or the melodic notes you play can ring out until you press the button to stop (**damper**) them. The button's default status is set to 0 for sustain.

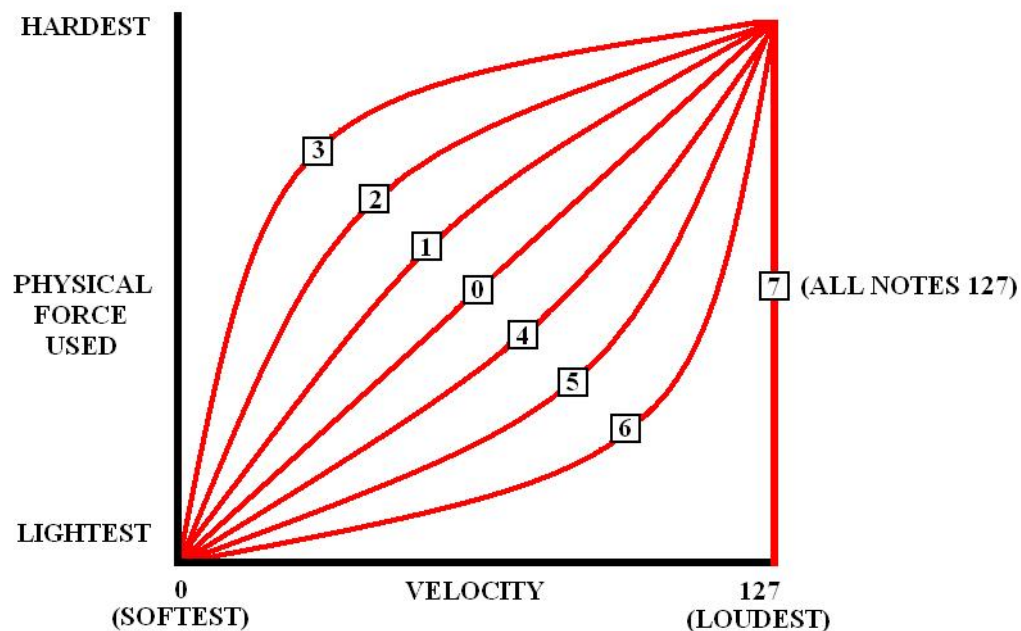
To change the **Momentary Sustain Button's** functionality from sustain to damper, while in the **Polarity** **PL** function, press (+) and **change polarity from 0 (sustain) to 1 (damper)**.

r RESPONSE CURVE (0-7)

The purpose of the **Response Curve** **r** function is allow you to tailor the touch response of the Zendrum triggers to suit your personal playing style and get the best dynamic range from your particular sound source. Each MIDI device will have a certain “feel” to its dynamics. We encourage you to experiment with all seven different variable velocity **Response Curves** to find what makes your sound source interact to your liking with the Zendrum triggers.

While in the **Response Curve** **r** function, press (+) or (-) to select a Response Curve. Then scroll right (→) to the **Save/Discard** **Sd** function and save the change. The curves are numbered 0-7 and can be described as follows:

VARIABLE VELOCITY RESPONSE CURVES



- 0** Unaffected
- 1** A little faster rise through the middle velocity range
- 2** Slightly faster to rise than 1
- 3** **Most accelerated** through the middle velocity range
- 4** **slower** rise than 0 through the middle velocity range (decelerated)
- 5** Slightly slower rise than 4
- 6** **Slowest** through the middle velocity range
- 7** All hits max at 127 (**Good for setting mixer input levels or positive control of loops**)

Fd FORCE DISPLAY

While in the **Force Display** **Fd** function, press (+) to activate the **Visual Force Display**. Tap each trigger to view the relative strength of each hit.

Ed SYSTEM EXCLUSIVE DUMP (SYSEX)

The purpose of the **System Exclusive Dump** **Ed** function is to send the entire memory of the Zendrum to another Zendrum or a computer for data backup. **This will require a SYSEX librarian program or another Zendrum to be connected via MIDI.**

Once connected, and while in the **System Exclusive Dump** **Ed** function, press (+) to tell the Zendrum to send bulk data. The display will flash until the data has been sent.

Er SYSTEM EXCLUSIVE RECEIVE (SYSEX)

The purpose of the **System Exclusive Receive** **Er** function is to receive data sent from another Zendrum or computer SYSEX librarian program. **This will require a SYSEX librarian program or another Zendrum to be connected via MIDI.**

Once connected, and while in the **System Exclusive Receive** **Er** function, press (+) to tell the Zendrum to receive incoming bulk data. The display will flash **Er** until the data has been received through the MIDI in port of the Zendrum. Then, scroll right (→) to the **Save/Discard** **Sd** function and save the data.

bC MIDI BANK (0-127)

The purpose of the **MIDI Bank** **bC** function is to allow compatibility with hardware sound modules that support more than 127 MIDI sounds. Each group of 127 sounds must be designated as “**banks**” by your hardware sound module or keyboard in order to be accessed by the Zendrum using this function. MIDI specifications allow for 127 banks, each with up to 127 sounds. **Consult the owner’s manual of your hardware sound module or keyboard for specific bank/program numbers of each sound you wish to access with the Zendrum.**

While in the **MIDI Bank** **bC** function, press (+) or (-) to select bank number from 0 to 127 that corresponds with the bank number table of your hardware. Then scroll right (→) to the **Save/Discard** **Sd** function and save the data.

FI FACTORY INITIALIZE

This feature allows you to overwrite all of your edits and revert back to the **factory presets** (see **Appendix section**) on all 16 setups at once. To access this feature, while powering up the Zendrum, hold (+) and (-) on the control pad until the digital display starts flashing **FI**. Then release the buttons and scroll right (→) to the **Save/Discard** **SD** function and save the re-initialized data.

ACCESSING EMBEDDED SERIAL NUMBER

To access embedded **Serial Number**, while in the **Program Change** **Pr** function, press and hold right (→) on the control pad until the number “41” appears flashing on the digital display. This denotes the **Zendrum Z4 processor (version 4.1)**. The next four pairs of digits that appear on the digital display are your **8-digit serial number**.

FAIL-SAFE LOCK/UNLOCK

This feature is useful for letting someone try out your Zendrum without overwriting your edits. **Fail-Safe Lock/Unlock** prevents anyone from changing your settings.

To **Lock** your Zendrum, press and hold left (←) and right (→) simultaneously until the digital display stops flashing and the large LED (**Mode Change Light**) to the left comes **on**. Now your Zendrum is **locked**.

To **Unlock** your Zendrum, press and hold left (←) and right (→) simultaneously until the digital display stops flashing and the large LED (**Mode Change Light**) to the left goes **off**. Now your Zendrum is **unlocked**.

ADVANCED USER-DEFINABLE CALIBRATION

The Z4 allows for **Variable Input Devices** such as **hi-hat and volume pedals** to send changes that can be used to modify sounds. The Zendrum must read the output voltage and polarity, then scale the value from 0-127 in MIDI to have any changes that are read control a function, so **you must first calibrate the input device** and train it to operate properly.

All physical devices are different. Every Zendrum trigger may have a slight difference in output from one to another. You can now also add extra triggers or pedals to the Z4 Zendrum that may have widely different output values, even if they are made by the same manufacturer. Your Zendrum was calibrated by David Haney in final testing for peak performance, however if you add input devices or just want to try tweaking the 'feel', calibration is the place to start. **Remember you can experiment and tweak and adjust settings and/or calibrate and then save OR discard the results using the SD function.**

To begin a calibration make sure all variable input devices such as **pedals/knobs/sliders/wheels/joysticks** are at their minimum position.

Use the **left/right** keys to move to **PL** and **then press (+) and (-) simultaneously**. The display will change to a blinking **[1]**. During this time Zendrum is learning the minimum value of each input. You may want to bang on the body (not the triggers) to **teach** Zendrum to ignore false body blows. **Do not move variable input devices during the [1] portion of calibration.**

From the blinking **[1]** display **again press (+) and (-) simultaneously**. The display will change to a blinking **[2]**. During this time Zendrum is learning the active maximum value of each trigger and connected variable device. Now is the time to beat triggers and press/turn/slide each variable device to its maximum position a few times. You don't have to hold anything as Zendrum remembers **the maximum value it reads during the [2] portion of calibration.**

From the blinking **[2]** display **again press (+) and (-) simultaneously**. Zendrum now uses the learned values to automatically determine the polarity and active range of each input. **If any input (trigger or variable) was left alone during the calibration process, its values are not changed.**

If you want to abort the calibration process (if you accidentally hit trigger pads during **[1]** or forgot to move a variable device to minimum position before **[1]** began) **you can use the left or right arrow keys to exit and nothing will be changed.**

When you like everything you've done remember to save. The saved polarity and min/max values learned during calibration will be used for all of your setups.

CC MESSAGE NUMBER

This tells the Zendrum what control change message to send from your pedal, etc. to have it act as a hi-hat, volume, expression, or any other MIDI change command that your sounds can recognize. The **CC message number** is assigned in the **MIDI Note NO** function.

To set **CC message number** for an input device, while in **MIDI Note NO** function, press (+) to show **Select Brackets []**. Move device to show current message number on the digital display. The default CC message number is either 3 or 9, which are generally unassigned numbers. You must edit this number to assign the specific task you want the input device to control. The most commonly used message number for controlling hi-hat sounds is number **4** (expression). The most commonly used message number for controlling volume is number **7** (volume). **Consult the owner's manual of your sound device for specific information regarding its accessible recognized CC Messages.**

FACTORY PRESET NOTE MAP LIST

The **factory preset** note maps are accessed within the **Setup** *UP* function. Each can be edited to your preferences. You can save these edits using the **Save/Discard** *SD* function. The Setups are factory preset to correspond to the following melodic scales and General MIDI drum maps:

1. **C Pentatonic**
2. **C Minor**
3. **Ionian Major Mode**
4. **Dorian Mode**
5. **Phrygian Mode**
6. **Mixolydian Mode**
7. **Aeolian Mode (natural minor)**
8. **Harmonic Minor**
9. **Chromatic**
10. **Whole Tone**
11. **Blues**
12. **Minor Thirds**
13. **Eastern**
14. **General MIDI Drum Map**
15. **General MIDI Drum Map**
16. **General MIDI Drum Map**

TECHNICAL SPECIFICATIONS

Body	Exotic hardwoods in oil finish
Triggers	19 velocity-sensitive, shock-mounted
Note Maps	16 user-definable set-ups
Operating System	4-way Cursor Switch Momentary Sustain Switch ON/OFF Switch
Display	3-digit, 7-segment LED
Global Parameters	MIDI Volume: 0-127 MIDI Channels: 1-16 Program Change: 0-127 Noise Floor: 0-127 System Exclusive Receive (SYSEX) System Exclusive Send (SYSEX) (Bulk Dump) Copy Set-up: 1-16 Restore Defaults: 1-16 Force Display VU Meter Variable Velocity Response Curves: 1-7 Bank Select: 0-127 Save/Discard
Trigger Parameters	MIDI Note Number: 0-127 4-way Velocity Switch: 0-124 MIDI Channel-per-trigger
MIDI	Transmits on all 16 Channels, one channel per trigger or globally (one channel per setup)
Ports	MIDI IN MIDI OUT 2 Continuous Controller Pedal IN External Foot Trigger IN Sustain Pedal IN 12 VDC Power Input
Power	12 VDC Transformer (supplied)

APPENDIX

GENERAL MIDI

General MIDI or **GM** is a standardized specification for music [synthesizers](#) that respond to MIDI messages. GM was developed by the [MIDI Manufacturers Association](#) (MMA) and the [Japan MIDI Standards Committee](#) (JMSC) and first published in 1991. The official specification is available in English from the MMA, bound together with the MIDI 1.0 specification, and in Japanese from the Association of Musical Electronic Industry (AMEI).

GM imposes several requirements beyond the more abstract [MIDI 1.0](#) specification. While MIDI 1.0 by itself provides a [protocol](#) which ensures that different instruments can interoperate at a fundamental level (e.g. that pressing keys on a MIDI keyboard will cause an attached MIDI sound module to play musical notes), GM goes further in two ways: it requires that all GM-compatible synthesizers meet a certain minimal set of features, such as being able to play at least 24 notes simultaneously ([polyphony](#)), and it attaches specific interpretations to many parameters and control messages which were left under-specified in the MIDI 1.0 spec, such as defining instrument sounds for each of the 128 possible program numbers.

GM synthesizers are required to be able to:

- Allow 24 voices to be active simultaneously (including at least 16 melodic and 8 percussive voices)
- Respond to note velocity
- Support all 16 channels simultaneously (with channel 10 reserved for percussion)
- Support polyphony (multiple simultaneous notes) on each channel

Program change events

In MIDI, the instrument sound or "program" for each of the 16 possible MIDI channels is selected with the Program Change message, which has a Program Number parameter. The following table shows which instrument sound corresponds to each of the 128 possible Program Numbers **for GM only**. Note that for purposes of computer programming, this table should start at 0 instead of 1 and thus use all of the 7-bit range (0-127) allowed by the MIDI Program Change message. It should also be noted that some MIDI keyboards display these Program Numbers as shown in the table (1-128), whereas others show the range as actually coded in the Program Change message (0-127).

MELODIC SOUNDS

Piano:

- 1 [Acoustic Grand Piano](#)
- 2 [Bright Acoustic Piano](#)
- 3 [Electric Grand Piano](#)
- 4 [Honky-tonk Piano](#)
- 5 [Electric Piano 1](#)
- 6 [Electric Piano 2](#)
- 7 [Harpsichord](#)
- 8 [Clavinet](#)

Chromatic Percussion:

- 9 [Celesta](#)
- 10 [Glockenspiel](#)
- 11 [Music Box](#)
- 12 [Vibraphone](#)
- 13 [Marimba](#)
- 14 [Xylophone](#)
- 15 [Tubular Bells](#)
- 16 [Dulcimer](#)

Organ:

- 17 [Drawbar Organ](#)
- 18 [Percussive Organ](#)
- 19 [Rock Organ](#)
- 20 [Church Organ](#)
- 21 [Reed Organ](#)

22 [Accordion](#)

- 23 [Harmonica](#)
- 24 [Tango Accordion](#)

Guitar:

- 25 [Acoustic Guitar \(nylon\)](#)
- 26 [Acoustic Guitar \(steel\)](#)
- 27 [Electric Guitar \(jazz\)](#)
- 28 [Electric Guitar \(clean\)](#)
- 29 [Electric Guitar \(muted\)](#)
- 30 [Overdriven Guitar](#)
- 31 [Distortion Guitar](#)
- 32 [Guitar harmonics](#)

Bass:

- 33 [Acoustic Bass](#)
- 34 [Electric Bass \(finger\)](#)
- 35 [Electric Bass \(pick\)](#)
- 36 [Fretless Bass](#)
- 37 [Slap Bass 1](#)
- 38 [Slap Bass 2](#)
- 39 [Synth Bass 1](#)
- 40 [Synth Bass 2](#)

Strings:

- 41 [Violin](#)
- 42 [Viola](#)
- 43 [Cello](#)
- 44 [Contrabass](#)
- 45 [Tremolo Strings](#)
- 46 [Pizzicato Strings](#)
- 47 [Orchestral Harp](#)
- 48 [Timpani](#)
- 49 [String Ensemble 1](#)
- 50 [String Ensemble 2](#)
- 51 [Synth Strings 1](#)
- 52 [Synth Strings 2](#)
- 53 [Choir Aahs](#)
- 54 [Voice Oohs](#)
- 55 [Synth Voice](#)
- 56 [Orchestra Hit](#)

Brass:

- 57 [Trumpet](#)
- 58 [Trombone](#)
- 59 [Tuba](#)
- 60 [Muted Trumpet](#)
- 61 [French Horn](#)
- 62 [Brass Section](#)
- 63 [Synth Brass 1](#)
- 64 [Synth Brass 2](#)
- 65 [Soprano Sax](#)
- 66 [Alto Sax](#)
- 67 [Tenor Sax](#)
- 68 [Baritone Sax](#)
- 69 [Oboe](#)
- 70 [English Horn](#)
- 71 [Bassoon](#)
- 72 [Clarinet](#)

65 [Soprano Sax](#)

- 66 [Alto Sax](#)
- 67 [Tenor Sax](#)
- 68 [Baritone Sax](#)
- 69 [Oboe](#)
- 70 [English Horn](#)
- 71 [Bassoon](#)
- 72 [Clarinet](#)

Pipe:

- 73 [Piccolo](#)
- 74 [Flute](#)
- 75 [Recorder](#)
- 76 [Pan Flute](#)
- 77 [Blown Bottle](#)
- 78 [Shakuhachi](#)
- 79 [Whistle](#)
- 80 [Ocarina](#)

Synth Lead:

- 81 [Lead 1 \(square\)](#)
- 82 [Lead 2 \(sawtooth\)](#)
- 83 [Lead 3 \(calliope\)](#)
- 84 [Lead 4 \(chiff\)](#)
- 85 [Lead 5 \(charang\)](#)
- 86 [Lead 6 \(voice\)](#)
- 87 [Lead 7 \(fifths\)](#)
- 88 [Lead 8 \(bass + lead\)](#)

Synth Pad:

- 89 [Pad 1 \(new age\)](#)
- 90 [Pad 2 \(warm\)](#)
- 91 [Pad 3 \(polysynth\)](#)
- 92 [Pad 4 \(choir\)](#)
- 93 [Pad 5 \(bowed\)](#)
- 94 [Pad 6 \(metallic\)](#)
- 95 [Pad 7 \(halo\)](#)
- 96 [Pad 8 \(sweep\)](#)

Synth Effects:

- 97 [FX 1 \(rain\)](#)
- 98 [FX 2 \(soundtrack\)](#)
- 99 [FX 3 \(crystal\)](#)
- 100 [FX 4 \(atmosphere\)](#)
- 101 [FX 5 \(brightness\)](#)
- 102 [FX 6 \(goblins\)](#)
- 103 [FX 7 \(echoes\)](#)
- 104 [FX 8 \(sci-fi\)](#)

Ethnic:

- 105 [Sitar](#)
- 106 [Banjo](#)
- 107 [Shamisen](#)
- 108 [Koto](#)
- 109 [Kalimba](#)
- 110 [Bag pipe](#)
- 111 [Fiddle](#)
- 112 [Shanai](#)

Percussive:

- 113 [Tinkle Bell](#)
- 114 [Agogo](#)
- 115 [Steel Drums](#)
- 116 [Woodblock](#)
- 117 [Taiko Drum](#)
- 118 [Melodic Tom](#)
- 119 [Synth Drum](#)

Sound effects:

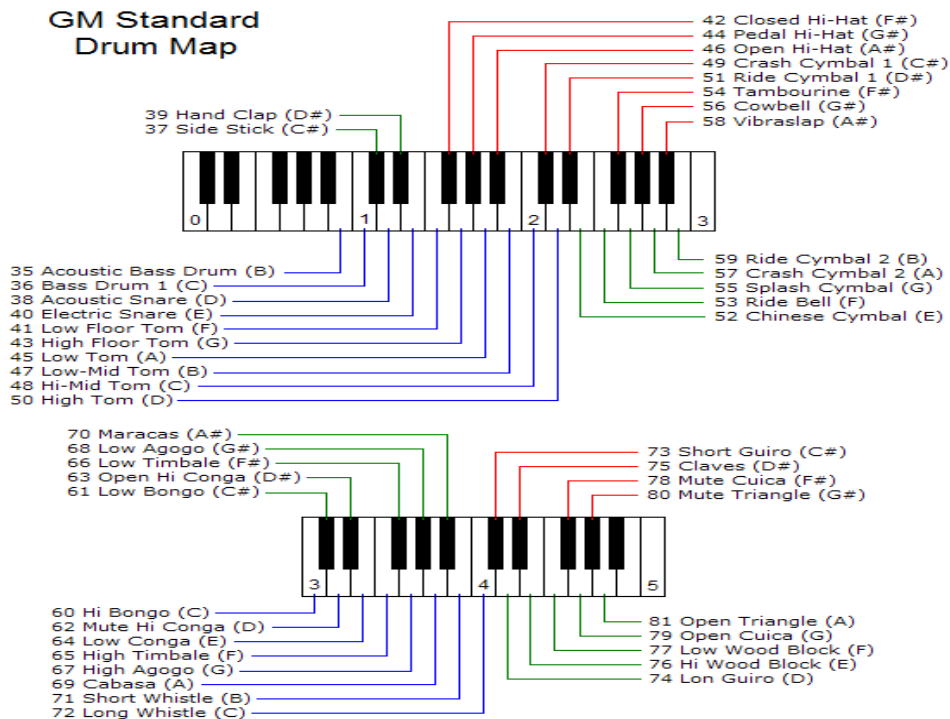
- 120 [Reverse Cymbal](#)
- 121 [Guitar Fret Noise](#)
- 122 [Breath Noise](#)
- 123 [Seashore](#)
- 124 [Bird Tweet](#)
- 125 [Telephone Ring](#)
- 126 [Helicopter](#)
- 127 [Applause](#)
- 128 [Gunshot](#)

PERCUSSION NOTES

GM Standard Drum Map

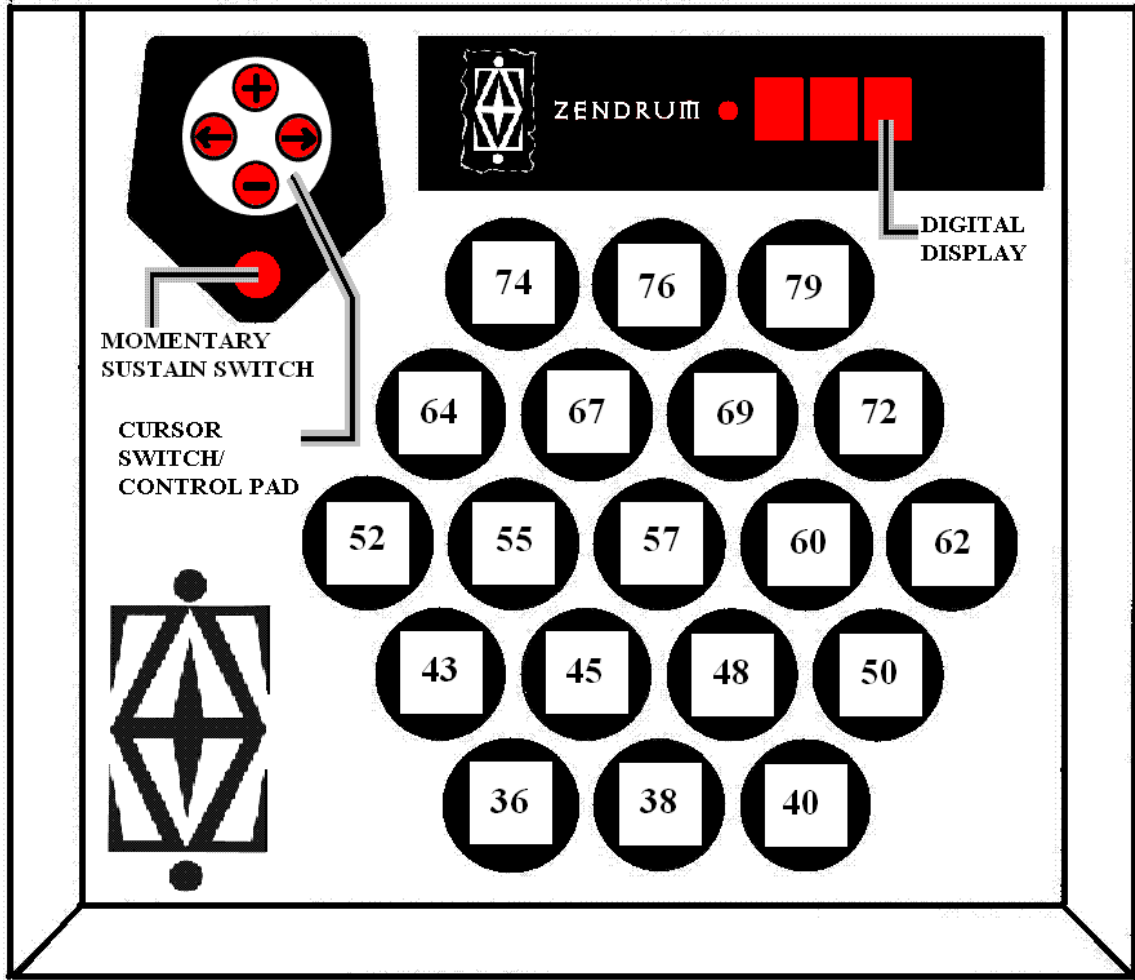
In GM, MIDI channel 10 is reserved for [percussion](#) instruments only. Notes played on channel 10 always produce percussion sounds regardless of any Program Change messages or Program Numbers that may have been sent on channel 10. Each of the 128 different possible note numbers is interpreted as a separate, different instrument, and the percussion sound's pitch is not related to the note number:

35	Bass Drum 2	59	Ride Cymbal 2
36	Bass Drum 1	60	High Bongo
37	Side Stick	61	Low Bongo
38	Snare Drum 1	62	Mute High Conga
39	Hand Clap	63	Open High Conga
40	Snare Drum 2	64	Low Conga
41	Low Tom 2	65	High Timbale
42	Closed Hi-hat	66	Low Timbale
43	Low Tom 1	67	High Agogo
44	Pedal Hi-hat	68	Low Agogo
45	Mid Tom 2	69	Cabasa
46	Open Hi-hat	70	Maracas
47	Mid Tom 1	71	Short Whistle
48	High Tom 2	72	Long Whistle
49	Crash Cymbal 1	73	Short Guiro
50	High Tom 1	74	Long Guiro
51	Ride Cymbal 1	75	Claves
52	Chinese Cymbal	76	High Wood Block
53	Ride Bell	77	Low Wood Block
54	Tambourine	78	Mute Cuica
55	Splash Cymbal	79	Open Cuica
56	Cowbell	80	Mute Triangle
57	Crash Cymbal 2	81	Open Triangle
58	Vibra Slap		



ZENDRUM MIDI IMPLEMENTATION CHART

Function	Transmitted	Recognized	Remarks	Zendrum MIDI Implementation Chart 6/15/09
Default Channel	1-16	X	Stored	O = YES X = NO
Basic channel	1-16	X	Stored	
Mode: Default Messages Altered	X X X	X X X		
Note Number: True Voice	0-127	X	Stored	
Velocity Note On Note Off	O O	X X	Note off immediately follows note on @ 10ms	Mode 1: OMNI ON. POLY Mode 2: OMNI ON. MONO Mode 3: MONO OFF. POLY Mode 4: OMNI OFF. MONO
Aftertouch Keys Channel	X X	X X		ZENDRUM CORP. REVISION 4.1
Pitch Bend	X	X		
Control Change: 64 Control Change 0-31,64-127	O	X	Sustain button CC input	
Program Change: True Number	0-127	X	Stored	
System Exclusive	O	O		
System: Song Pos. Song Sel. Common: Tune System: Clock Real Time: Commands Aux Messages: Local On/OFF All notes OFF Active Sense Reset	X X X X X X X X X X	X X X X X X X X X		
Notes:			**Sustain Polarity is selected and stored	



SETUP 1: C PENTATONIC SCALE

WARRANTY

The Zendrum is warranted “for life” (meaning David Haney’s lifetime, not yours) from defects in workmanship, provided it has not been modified or abused. The warranty is in effect as long as you are the original owner of this instrument. It is the sole judgment of Zendrum Corporation to decide what constitutes abnormal wear and tear. Tampering with circuit board or components will void your warranty and could permanently damage your instrument.

This instrument is designed by drummers to be played vigorously with the hands. It is not intended to be played with sticks, and doing so will ultimately void your warranty as well as damage the body and triggers.

Should you EVER need service or upgrades, Zendrum is a user-friendly, personal service-minded company. We personally stand behind every instrument we build, and our good reputation depends on your satisfaction. We enjoy hearing from you. We do not anticipate that you will ever experience mechanical failure, but if problems do occur, we will be happy to troubleshoot, tech support, and repair your instrument. You will be responsible for shipping charges, as well as customs, duties, taxes, etc. where applicable. Zendrum will be responsible for parts and labor only. **PLEASE DIRECT ALL QUESTIONS AND CONCERNS TO ZENDRUM TECHNICAL SUPPORT.**

TECHNICAL SUPPORT

(404) 352-1646

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