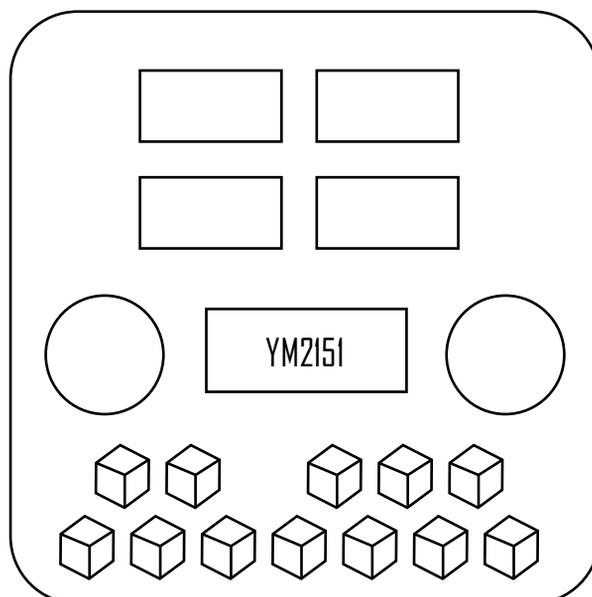
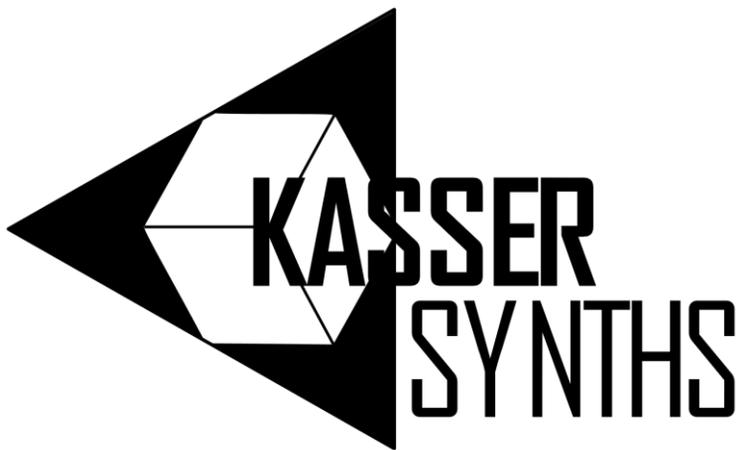


dafm synth
arcade ym2151

user manual

firmware v 1.98





introduction

thank you for purchasing the DAFM synth arcade YM2151 synthesizer. this FM multitimbral synthesizer allows you to create unique sounds using the Yamaha chips that were used in almost all the arcade machines during the 80s and 90s.

this manual will help you to get started with the DAFM synth arcade YM2151, including information about how to control the synth through an external MIDI controller. it will cover the basic features of the synthesizer, including how to navigate the menu, use the rotary encoders, and modify the ADSR envelopes, frequencies, and LFOs.

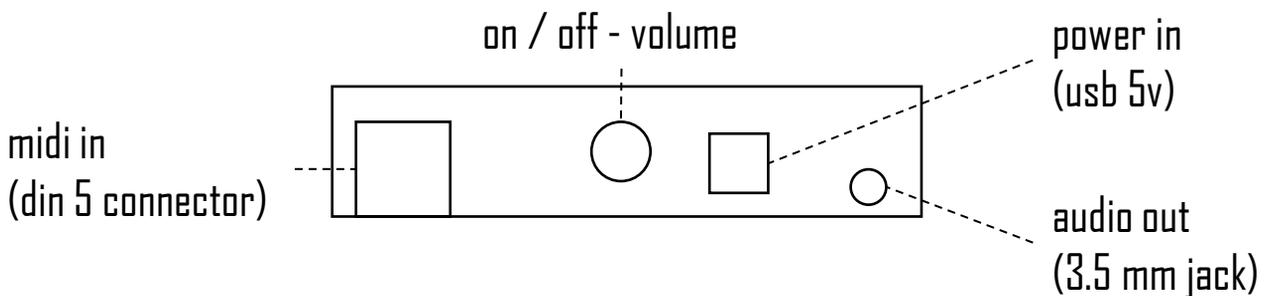
now it's time to dive in and explore the capabilities of your DAFM synth arcade YM2151! experiment with the various patches and presets, modify the settings to create your own unique sounds, and see what kind of music you can create using the iconic sound of the arcade cabinets. we challenge you to push the limits of this powerful FM multitimbral synthesizer and unleash your creativity to make something truly unique and amazing!



get started

to get started with your DAFM synth arcade YM2151, you'll need to connect it to your power source and audio output. Use the USB Type B cable (5V) to power the synthesizer, and connect the stereo sound output to a 3.5 mm audio jack.

if you want to control the synth through an external MIDI controller, connect the MIDI input to your keyboard, sequencer, or other MIDI instrument. once you've made these connections, you're ready to turn on your DAFM synth arcade YM2151 and start exploring its features!

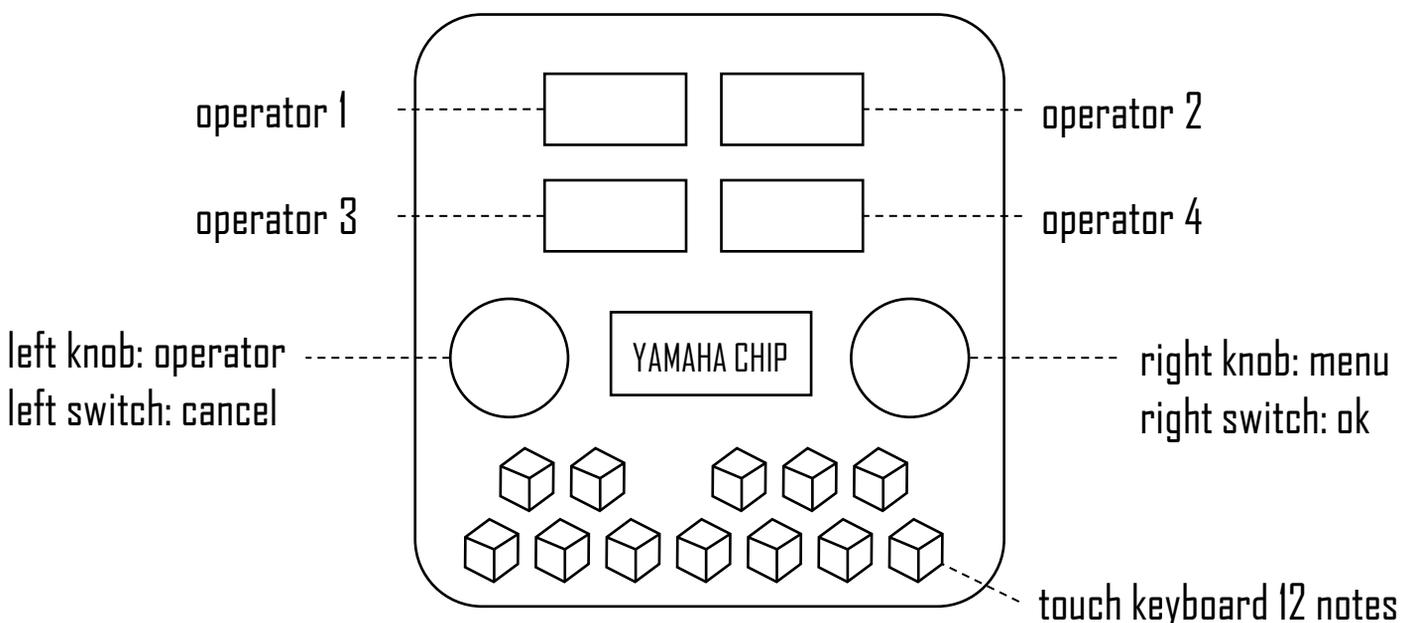


how to navigate the menus

to navigate the menus on the DAFM synth arcade YM2151, you will need to use the right knob and right switch. the right knob allows you to scroll through the different menu options, while the right switch selects the option that is currently highlighted.

the left knob is used to select the operator, while the left switch is used to cancel an action. if you hold the left knob and turn the right knob, you can change the octave. if you hold the left switch and press the right switch, you can adjust the display brightness to reduce noise at the sound output.

the touch keyboard of the DAFM synth arcade YM2151 allows you to play and experiment with different patches, making it easy to explore the full sound spectrum of the Yamaha chip.



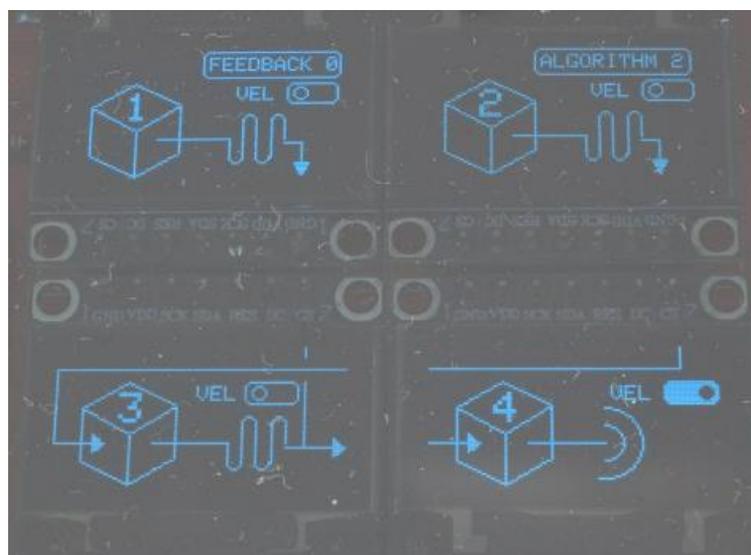
menu 1. feedback, algorithm and velocity control

menu 1 gives you access to important parameters that shape the sound of your FM synthesizer. this menu has two submenus

once you press the right switch you enter the first submenu. in this submenu 1 the left knob controls the feedback or the degree of modulation of operator 1 to itself, adding complexity and depth to your sound.

the right knob lets you choose the algorithm or how the operators interact with each other. modulators are the operators that modulate the carriers, which are the operators you can hear. choosing the right algorithm can completely transform the character of your sound.

if you select the second submenu with the right knob and press the right switch you enter the velocity control submenu. here the right knob controls the on/off switch for MIDI velocity-controlled operators. this allows you to shape the sound based on how hard you play the keys, adding expressiveness to your performance.



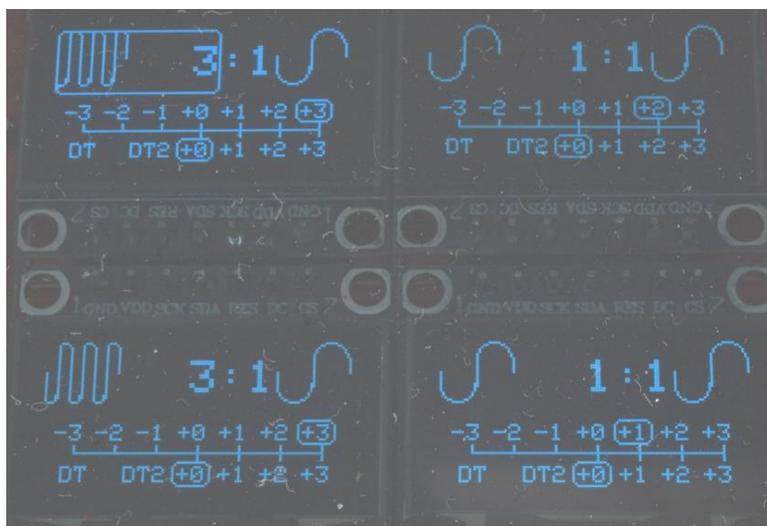
menu 2. frequency ratio

in FM synthesis, the frequency ratio determines the relationship between the carrier and modulator frequencies. changing the frequency ratio can create unique and interesting sounds. there are two submenus

once selected the first submenu with the right switch, the right knob controls the operator's frequency multiplier. this determines the pitch of the operator and how it will interact with the other operators in the synth.

if the second submenu is selected the left knob controls the fine detune whereas the right knob controls the coarse detune of the selected frequency multiplier. this allows you to coarse and fine-tune the pitch of the operator for even more precise control over your sound.

remember that different frequency ratios between the carrier and its modulator will produce different overtones, giving you a wide range of sounds to experiment with.



menu 3. envelope ADSR

welcome to menu 3 where we'll explore the **ADSR** envelope in FM synthesis. the envelope is like a roadmap for the sound, determining how it evolves over time. here's a breakdown of the different parameters:

attack: determines how quickly the sound reaches maximum volume when a key is pressed. **decay:** determines how quickly the sound drops from maximum volume to the sustain level. **sustain:** determines the volume level that the sound will sustain at while a key is held down. **release:** determines how quickly the sound fades out after a key is released. additionally, we have the **total level** parameter, which sets the overall volume of the operator. finally, the **rate or key scaling** is the degree to which the envelope becomes narrower as the frequency becomes higher.

submenu 1: you can control **attack rate** with left knob and **total level** with right knob

submenu 2: control **decay rate** with left knob and **secondary total level a.k.a. sustain** with right knob

submenu 3: control **secondary decay rate** with left knob and **release rate** with right knob

submenu 4: control the **rate or key scaling** with the right knob

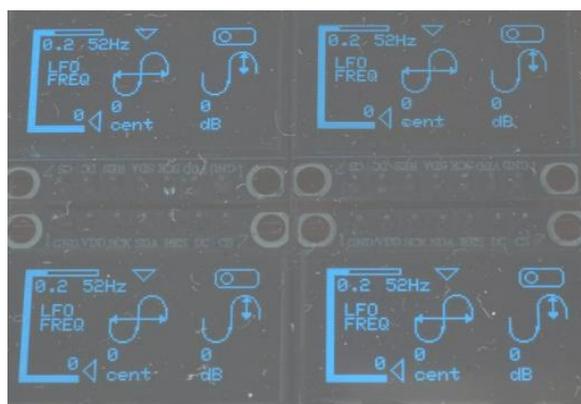


menu 4. low frequency oscillator LFO

the low-frequency oscillator (LFO) in FM synthesis generates a wave that oscillates at a frequency below the audible range. this wave can be applied to control the frequency in cents or the amplitude of the operators in dB. menu 4 and 5 allow you to control the LFO parameters of the DAFM synth arcade YM2151. you have to configure both menus to get the LFO effect

with the left knob of 4.1, you control the LFO frequency globally for all four operators at once. the frequency modulation sensitivity in cents can be adjusted with the right knob of 4.1. this affects the depth of modulation applied to the operators' frequency by the LFO.

the left knob of 4.2 turns on or off the amplitude modulation for each individual operator. the right knob adjusts the global sensitivity in dB for all operators. with amplitude modulation, the LFO affects the amplitude or loudness of the operator's signal instead of the frequency. by experimenting with the LFO settings, in summary by adjusting the amplitude modulation sensitivity in menu 4, you can achieve tremolo, while adjusting the frequency modulation sensitivity can give you vibrato.



menu 5. low frequency oscillator LFO

now let's configure the second menu of LFOs. here's how you can control it using the DAFM synth arcade YM2151:

approach to menu 5 by using the right knob until you reach it. once there use the left knob to select the LFO submenu you want to modify and press right switch to modify it.

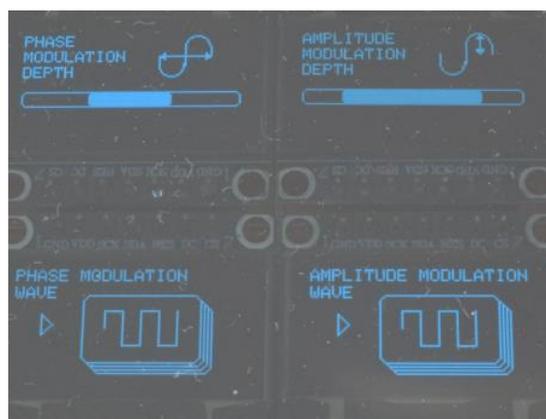
submenus:

5.1 - phase modulation depth: use the right knob to control the depth of phase modulation. this will affect how the operator wave's phase is modulated by the LFO.

5.2 - amplitude modulation depth: use the right knob to control the depth of amplitude modulation. this will affect how the operator wave's volume is modulated by the LFO.

5.3 - phase and amplitude modulation waveform: use the right knob to select the waveform for the phase and amplitude modulation. you can choose from various options such as sine, triangle, square, or random to create different effects.

experiment with these parameters to create unique and interesting sounds with the LFO. remember that the effects of the LFO can be subtle or extreme depending on the values you choose, so don't be afraid to play around with them.



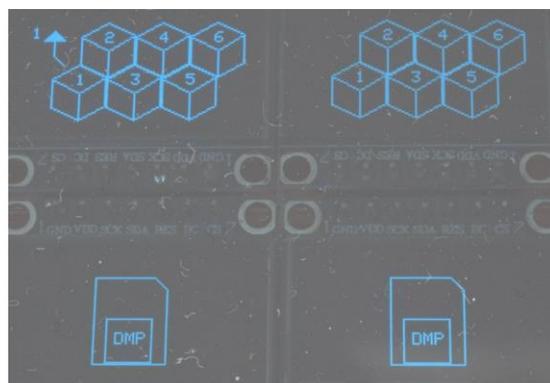
menu 6. fm patches and midi channels

the first submenu allows you to load a preset to the DAFM synth so that you can play with it and tweak its parameters. There are two types of presets: unfilled circles represent the presets saved in each of the 8 MIDI channels that can be controlled through MIDI. If you load any of these presets, the MIDI channel can be controlled externally, but you can tweak the parameters locally. If you load the bank 0 presets (filled circles), you will select from a curated selection of presets coming directly from the arcade videogames. these are exactly the same presets that were used in the videogames. check the last page of the manual to get the correspondence between the numbers, the presets and the videogames.

once you load or modify a preset, you can save it in the MIDI channel that you want using **the second submenu**. with this action, you can play the channel with the preset that you saved using the MIDI external controller.

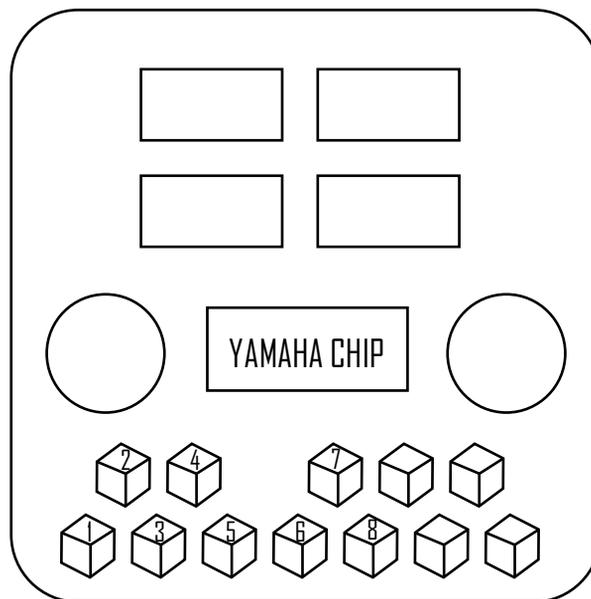
the third submenu allows you to load 8 presets from an SD card to the 8 MIDI channels. SD cards are easy to get, so you can prepare several SD cards with different sets of 8 presets to load on the fly. Remember to use the correct naming in the presets (patch0x.dmp where x goes from 1 to 8).

in **the fourth submenu**, the DAFM synth makes a copy of all the presets saved currently in the 8 MIDI channels to an SD card. They are copied at once using the naming patch0x.DMP (x from 1 to 8). remember to rename them to patch0x.dmp to load them correctly on Deflemask software.



menu 6. fm patches and midi channels.

the DAFM synth offers convenient shortcuts for quickly loading and saving presets to the six available MIDI channels. to load a preset, simply press and hold the left switch and touch the corresponding key on the keyboard (1 to 8) for the MIDI channel you want to load the preset to. to save a preset, press and hold the right switch and touch the corresponding key on the keyboard (1 to 8) for the MIDI channel you want to save the preset to. this way, you can easily switch between different presets without having to navigate through menus or use external controllers.



external midi controller

the DAFM synth has two banks of presets - bank 0 and bank 1. You can load presets from either of these banks to one of the eight MIDI channels of the synth using MIDI instructions. if you select bank 0 by sending the value 0 to the CC parameter 0 (Bank Select MSB), you can load any of the presets from the bank 0 to the MIDI channel you select by sending MIDI program change messages with the corresponding number (check the list in the last page). It's important to note that bank 0 corresponds to the list of curated presets coming directly from video games.

alternatively, you can use bank 1 to load up to 128 presets that you have saved in your SD card. to do this, you need to save *.dmp files to the root of the SD card and name them as instrxxx.dmp, where xxx ranges from 000 to 127. once you've inserted the SD card into the DAFM synth, send the value 1 to the CC parameter 0 (Bank Select MSB) to change the bank to 1. then, use a MIDI Program Change message to load that instrument preset to the related MIDI channel, with a value from 0 to 127 to select the corresponding preset.

in summary, the DAFM synth has two banks of presets, and you can load them to one of the eight MIDI channels using MIDI instructions. bank 0 contains the curated presets from video games, while bank 1 can be used to load your own custom presets from an SD card.



troubleshooting

Power issues: If the DAFM synth doesn't turn on or seems to have no power, check that the power supply is properly plugged in and that the power switch is in the "on" position. If the issue persists, try using a different power supply or contacting technical support.

Sound issues: If the DAFM synth isn't producing sound or the sound is distorted, first check that the audio cables are properly connected to the synth's output and to the speakers or mixer. If the issue persists, try adjusting the volume and tone controls. If there's still no sound, check that the synth is set to the correct MIDI channel and that the corresponding MIDI device is sending signals to that channel.

Parameter issues: If some of the synth's parameters don't seem to be working properly or the sound is not what you expect, make sure that you're using the correct settings and that you're not exceeding the synth's limits. Check the manual for information on the available menus, knobs, and switches, and try experimenting with different combinations until you achieve the desired result.

Preset issues: If you're having trouble loading or saving presets, make sure that you're following the correct procedures and that you're using the right file names and formats. Check the manual for information on how to navigate the preset menus and how to use MIDI commands to load and save presets. If the issue persists, try using a different SD card or contacting technical support.

MIDI issues: If you're having trouble controlling the DAFM synth with an external MIDI device or if you're not getting any response from the synth, check that the MIDI connections are properly set up and that the MIDI channels and parameters are correctly configured. Check the manual for information on the available MIDI options and how to use them.

Other issues: If you're experiencing other issues with the DAFM synth, such as unexpected behavior or malfunctioning components, try resetting the synth to its default settings or contacting technical support for further assistance. Remember to provide as much information as possible about the issue and any steps you've already taken to troubleshoot.





further information

thank you for choosing the DAFM synth, a powerful FM synthesizer that can be used to create a wide variety of sounds, from classic video game music to modern electronic music. we hope that this manual has helped you to understand the various features and functions of the DAFM synth, and that you are now able to use it to its full potential.

if you have any questions or issues with the DAFM synth, please refer to the troubleshooting section of this manual. If you are still experiencing problems, please don't hesitate to contact us for further assistance.

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we are constantly working to improve and update the DAFM synth, and we welcome your feedback and suggestions for future updates. please visit our website or social media pages for the latest news and updates on the DAFM synth.

THANKS for joining the **DAFM synth WAVE**



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arcade ym2151

midi CC implementation chart

global control

parameter	cc	data range
lfo frequency	1	8
phase modulation depth	28	64
amplitude modulation depth	29	64
lfo waveform	30	4
noise enable (ch 8)	78	2
noise frequency (ch 8)	79	32

channel voice control

parameter	cc	data range
pitch bend amount	81	12
fm algorithm	14	8
fm feedback	15	8
stereo configuration	77	4
amplitude modulation sensitivity	76	4
frequency modulation sensitivity	75	8



midi CC implementation chart

operator control

parameter	cc	data range
total level op1	16	128
total level op2	17	128
total level op3	18	128
total level op4	19	128
freq multiplier op1	20	16
freq multiplier op2	21	16
freq multiplier op3	22	16
freq multiplier op4	23	16
detune (fine) op1	24	7
detune (fine) op2	25	7
detune (fine) op3	26	7
detune (fine) op4	27	7
detune 2 (coarse) op1	82	4
detune 2 (coarse) op2	83	4
detune 2 (coarse) op3	84	4
detune 2 (coarse) op4	85	4

operator control

parameter	cc	data range
attack rate op1	43	32
attack rate op2	44	32
attack rate op3	45	32
attack rate op4	46	32
decay rate op1	47	32
decay rate op2	48	32
decay rate op3	49	32
decay rate op4	50	32
secondary decay rate op1	51	16
secondary decay rate op2	52	16
secondary decay rate op3	53	16
secondary decay rate op4	54	16
secondary total level op1	55	16
secondary total level op2	56	16
secondary total level op3	57	16
secondary total level op4	58	16



midi CC implementation chart

operator control

parameter	cc	data range
release rate op1	59	16
release rate op2	60	16
release rate op3	61	16
release rate op4	62	16
amplitude modulation on/off op1	70	2
amplitude modulation on/off op2	71	2
amplitude modulation on/off op3	72	2
amplitude modulation on/off op4	73	2

operator control

parameter	cc	data range
rate or key scaling op1	39	4
rate or key scaling op2	40	4
rate or key scaling op3	41	4
rate or key scaling op4	42	4



bank 0 presets

midi bank 0 presets

videogame	preset	videogame	preset
street fighter 2	0: bright piano (ken) 1: lead (ryu) 2: eorgan (guile) 3: horn (guile) 4: epiano (credit) 5: lead (title)	golden axe	42: synthbass (deathadder) 43: drum 1 (wilderness) 44: synthbass 2 (deathadder) 45: drum 2 46: drum 3 (wilderness)
space harrier	6: epiano (theme) 7: epiano 2 8: bass	altered beast	47: drum 1 (round 1) 48: drum 2 49: drum 3 50: epiano 51: kalimba 52: bass 53: metal 54: klang
afterburner 2	9: ebass (final take off) 10: wood percussion (afterburner) 11: distorted bass (redout)	marble madness	55: pad (level1) 56: kalimba 57: percussion (level2) 58: string 1 59: bass 60: string 2
ghouls'n ghosts	12: eorgan (credit) 13: organ (stage 1) 14: percussion 15: mistery piano	forgotten worlds	61: epiano (round 1) 62: horn
final fight	16: bass (opening) 17: synth lead 18: organ 19: bass (round 1) 20: horn 21: synth guitar	fantasy zone 2	63: drum 1 (10years) 64: drum 2 65: synth 66: percussion 1 (cholacorai) 67: percussion 2 68: drum 3 (gumbatight) 69: eguitar
outrun	22: synth (magical shower) 23: synth (passing breeze) 24: epiano 25: epiano 2 26: epiano 3 (splash wave) 27: ekalimba (splash wave) 28: epiano 4 29: epiano 5	ninja spirit	70: pad 1 (round 1) 71: pad 2 72: pad 3
r-type	30: eguitar 1 (start 1st stage) 31: eguitar 2 32: string	midi channels	73 (1): bass (street fighter 2 - ryu) 74 (2): bass (outrun - magical shower) 75 (3): epiano (outrun - last wave) 76 (4): lead synth (afterburner 2 - afterburner) 77 (5): drone (final fight- round 1) 78 (6): percussion (ghouls'n ghosts - stage 1) 79 (7): tom (spaceharrier - theme) 80 (8): snare (spaceharrier - theme)
shinobi	33: epiano 1 (bgm) 34: epiano 2 35: synth		
double dragon	36: eguitar (industrial area) 37: horn 38: drum 1 39: drum 2 40: drum 3 41: bass (opening)		

