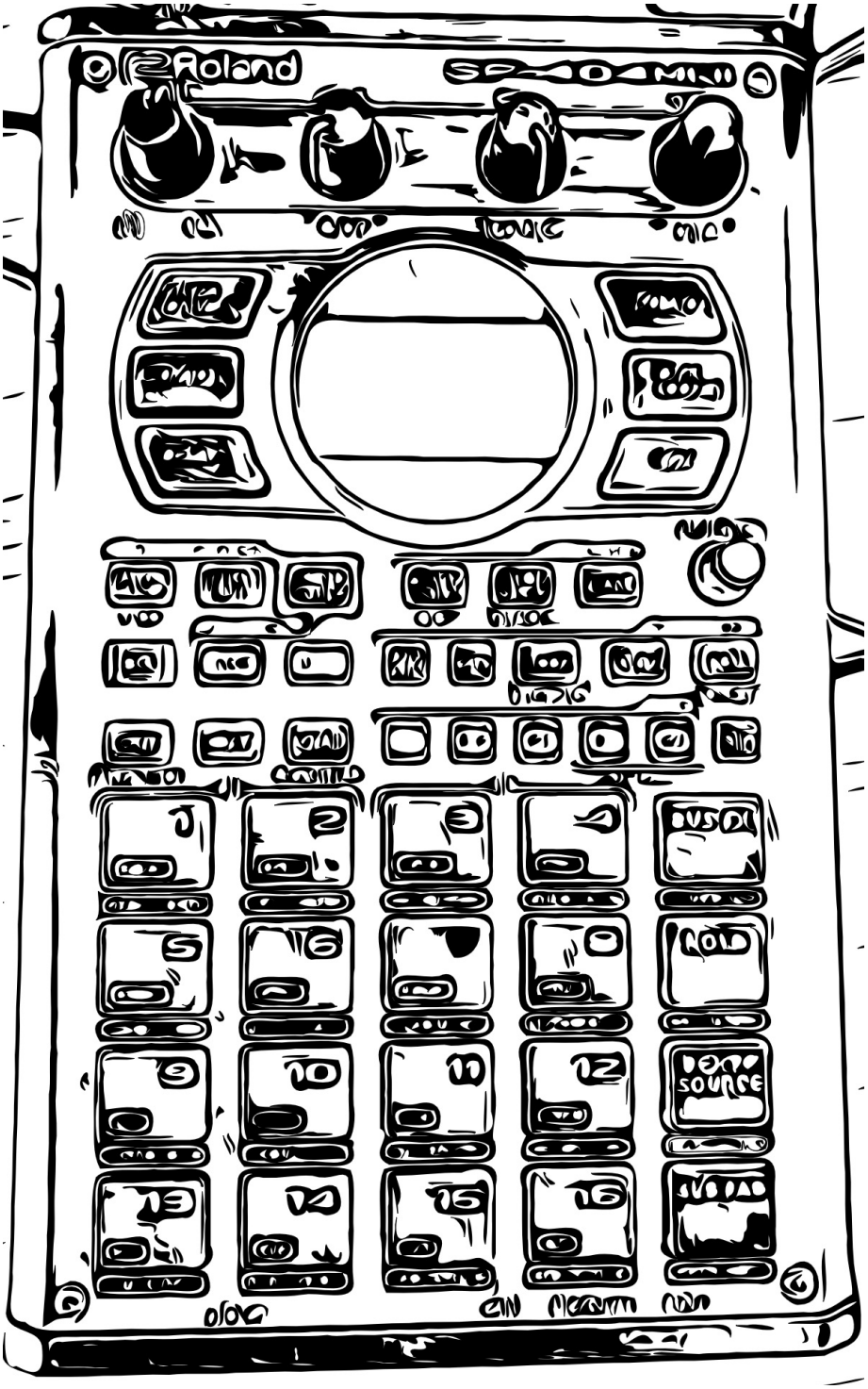
NearTao's Guide to SP-404 mk2

An Unofficial Reference for Firmware 1.13



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Guide Versions

Guide Version	Mk2 Firmware Version	Change Date	Notes
0.5	1.13	Jan 8, 2022	Finish Spec section, add some contact info, decided to put this out there as a free guide
0.4	1.13	Jan 7, 2022	Move Getting Started to the top, tweak formatting
0.3	1.13	Jan 6, 2022	Flesh out Getting Started/Conventions, and add icons, fill out Specifications section.
0.2	1.13	Jan 6, 2022	Add title page, start Overview/Getting Started
0.1	1.13	Jan 5, 2022	Initial Document Structure and Outline

Foreward

My man… he do be jiggling.

Contents

Getting Started

You've got this book in your hand, a tablet, or loaded up on your computer, and are wondering how in the world you can get around. Well, the order of sections is somewhat arbitrary, so while I tried to put it together in a way that made the most sense to me, you should absolutely feel comfortable going through it in whatever way makes the most sense for you. Skip through sections, consult what you're interested in now, and come back for the rest later.

To keep things simple, I am creating a dedicated URL on my website, starting a thread on SP-Forums, and using my discord server.

NearTao Blog: https://neartao.com
NearTao Guidebook URL: https://neartao.wordpress.com/neartaos-guide-to-the-sp404-mk2/
SP-Forums URL: https://sp-forums.com/viewtopic.php?f=24&t=27232
Discord Server URL: https://discord.gg/qMuSpuxC4n

This guy will show up from time to time to remind me I have a lot more work to do writing this book. Such as
* How to get updates
* How to notify people of changes
* Where more content will go
* And much much more…

Conventions

The SP-404 mk2 has a lot to keep track of, so I wanted to come up with some consistent conventions for giving directions to operate it. This should help improve the clarity to navigate this device, which while it isn't terribly complicated, does have a decent enough set of controls that I want to have a quick short hand for us to be able to work together. I'll provide pictures where it feels appropriate, but I don't want to over burden this book, and the editing of it going forward with lots of images.

Icons

Throughout this book I will try to remember to use standardized icons to help present important information and warnings as they make sense to note and identify.

Warning: I will use this icon to indicate a brief section as a warning or heads up. This section will contain details that may not be well documented or are not well understood. This will typically indicate something to be aware of on the mk2.

Information: I will use this icon to indicate a brief informative section. This will be something that is nice to know, but may not be essential for the operation of your SP-404 mk2.

Under Construction: this indicates that a section is still being considered, researched, or in the process of being rewritten. Don't be surprised if this information changes, moves, or is just removed.

Experiment: This is indicating that I have (or possibly intend) to run an experiment to get more details on how something works, or more specific information about the operations of the mk2.

Workflow: Indicates a short list of buttons presses or other things necessary to get a desired result

Bug: Indicates that there's something that probably isn't working quite right, not as documented, or not as expected. This is something I would expect Roland to fix on the mk2 eventually.

Controls

(VOLUME|CTRL1-3 CW|CTRL1-3 CCW) will all be referenced within parenthesis ( )
* Where CW is turn the knob clockwise
* Where CCW is turn the knob counter clockwise

/FX/ will all be referenced within forward slashes / /

|BUTTON| will all be referenced within pipes | |

{VALUE CW|VALUE CCW|ENTER} will all be referenced within curly braces { }
* Where CW is turn VALUE clockwise
* Where CCW is turn VALUE counter clockwise
* Where ENTER is push VALUE

[Pad 1-16|SUB PAD] will all be referenced within brackets [ ]
* These are velocity sensitive pads that can be effect volume based on how hard they are hit

<AUDIO OUTPUT> will all be referenced within < >
* Headphone Jacks
* L/Mono and R

>AUDIO INPUT< will all be referenced within > <
* L/Mono and R
* Mic/Guitar

Mic/Guitar & Power Switch?
Mic/Guitar Gain knob?
USB-C port?

`SUB FUNCTION` will all be referenced within back ticks ` `
* This will be used to typically denote functions accessed by hitting a pad/button twice, or pressing pads/buttons at the same time.

-> will denote pressing one pad or button followed by pressing another pad or button

+ will denote holding a pad or button while holding another pad or button

Examples

`CHROMATIC` |Shift|+[Pad 4] - Hold the Shift button and then press Pad 4 to enter Chromatic Mode

`F` |A|->|A| - Press the A Bank button twice to enter the F bank (honestly, don't do this one)

More examples like REC or… ???

Overview

I don't know about you, but I like guides. The *Hitch Hiker's Guide to the Galaxy* and *Zen and the Art of Motorcycle Maintenance* meant a lot to me growing up and I have read both books multiple times. Although I highly doubt that this book will have the level of social influence either of those books have had, I do hope that this book can help drive people to getting the most out of their Roland SP-404 mk2.

Let's also be honest, website documentation is a bummer, as it makes it nearly impossible to use in any offline manner. I tried looking around to see if anybody had been writing documentation for the mk2, and while I did find somebody tried to put together a pdf book from the Roland website manual content, it really wasn't what I was looking for. It's not easy to search, and the documentation is pretty bare bones. If you know what you're doing with an instrument and sampling in particular it's useful, but I can only imagine what people thing who haven't had any experience with either.

To rectify the situation, I have decide to write up this book with the following goals.
* Give a solid overview of what the mk2 is and is not
* Show users how to use the mk2 and point out common pitfalls and mistakes
* Provide guidance and workflows to help make mk2 users get the most out of their instrument
* Reference external information where possible for users to do their own further research

Similarly there are a few things I am not trying to do with this book.
* Replace the existing Roland manual
* Keep up with every firmware version
* Hyperlink everything
* ???

Company

Maybe add some company information?

History

*Brief history of SP series
*Famous artists/producers
*YouTube artists
*Comparison to other SPs

Specifications

Get ready, this is all of the information from the data sheet, with notes that I have sprinkled around, as well as additional information for context. There are some things I am not entirely sure about, especially for specific language that Roland has chosen to use, or how ranges for some things are managed when driven externally from the mk2. As I get more documented I'll work out some experiments, tests, or do further research and reference back into the manual, community, or anywhere else to try and nail down this information.

Sampling

Polyphony

The mk2 is specified as having a maximum polyphony of 32 voices, but doesn't state whether each voice is monophonic or stereo. (??? from what I have read/seen… need to read the manual again, or run an experiment.

Document an experiment and save off a project for readers to follow along with how we figure out if this is mono or poly.

Guess is that a voice is stereo… and 32 note stereo polyphony is pretty good.

Internal Data

Internally the mk2 appears to handle all samples at a 48kHz sample frequency at a 16-bit linear depth. It is unclear what the file format is for other metadata other than the boot screen(s) which are saved as bump map(sp?) files.

Exporting a project creates many files, but samples are saved as .SMP, and patterns are saved as .BIN. Pictures are saved as .BMP (or bump map(sp?) files), and last but not least there is a PADCONF.BIN file, that presumably contains pad settings for the project.

Could be worth digging into these file formats and seeing what can changed/ modified. Seems like a future set of experiments to run.

Sample Import Format

The mk2 natively supports importing .WAV, .AIFF, and .MP3 files. It is unclear if there are sample rate, bit depth, or other factors that are important to know when importing samples into the mk2.

Seems like some good experiments out there to try different .WAV formats, stereo vs mono (or surround sound), different bit depths and sample rates… could be cool, or might be super messy outside of “standard” values.

Using the Roland Cloud SP-404 mk2 App allows you to import WAV, AIFF, MP3, FLAC, M4A files. Maybe anything else? Could be worth researching…

Sample Export Format

The mk2 only exports files as stereo, 16-bit, 48khz .WAV files.

Warning: Plenty of older devices only support 16-bit at 44.1khz. The older devices may happily play a 48khz file, but it will be out of tune because it will be playing at a different speed than the intended 48khz that the mk2 exports.

Skip Back

The skip back features allows the mk2 to record the last 25 seconds of audio from the final output mix (??? What does Roland refer to this as) into a buffer that the user can access to go back to.

The skip back certainly makes the mk2 an interesting end of chain device as it can let you capture snippets of a performance that you may not have been intentionally recording, but if you’re fast enough and want to revisit again to try to recreate or to sample for future use. Over time I think we’ll see this as a formative mk2 feature.

Storage

Data

Internally, the mk2 can store up to 16 projects, each project is made up of 10 banks, and each bank can have both 16 samples and 16 patterns. Some basic math lets us know that internally the mk2 can store up to 2,650 samples and 2,650 patterns (16 samples/patterns * 10 banks x 16 projects).

Internal Storage

The mk2 has 16GB of internal storage. From a factory install, only 14.3GB (??? From memory, need to verify) of internal storage is available, and the lost storage is due to preloaded samples and patterns, settings data, other metadata, and drive format.

Document what the maximum amount of free internal storage is when removing factoring install data.

External Storage

The mk2 supports up to a 32GB SDHC card. While it might support the older SD card format that went up to 4GB, it definitely does not support SDXC cards or sizes over 32GB.

Unlike previous SP devices (202/303/404), the mk2 does not support streaming audio off of the SD Card. It can only be used for backups/restoring data, and importing/export projects and samples.

Maximum Sample Time

The mk2 can have a single sample that is up to 16 minutes long, documented as approximately 185MB per sample. (??? can we get an exact number/amount here?)

Pattern Sequencer

The Pattern Sequencer has a resolution of 480 parts per quarter note, which is quite good. Some devices do go to 960 parts per quarter note or possibly higher, but there was plenty of gear manufactured that only manages 96 parts per quarter note.

To increase the resolution for parts per quarter note, you can look into doubling the BPM that you record at. If you were originally going to record a piece at 100 BPM, recording at 200 BPM will effectively get you 960 parts per quarter note.

The Pattern Sequencer can record patterns of 1, 2, 4, 8, 16, 32, or 64 bars.

A technique for older gear to extend the pattern length (at the expense of parts per quarter note) is to halve your BPM, which will allow you to double the number of bars you record. By doing this you can go from 64 bars to 128 bars.

The Pattern Sequencer has a BPM range from 40 to 200.

Not entirely sure how it handles ranges outside of this from an external sync source. Worth investigating.

Finally the Pattern Sequencer supports Quantization and you can apply Strength.

Got quite a few questions here… but going to need some time to experiment, read docs, and better understand how this works.

Effects

The information on the tin states that there are 37 Multi Effects that can be used on the Bus FX or EFX (what the heck does this stand for?). There are a further 16 Input Effects, which mostly seem to overlap with the Multi-effects (will need to verify parameters, but there are 3 unique input effects at this time of Auto Pitch, Vocoder, Gt Amp Sim.

To me, this reads like the mk2 actually has 40 effects at this time. I suspect that the 3 unique Input Effects will eventually make it into the MFX section, and Roland has hinted that there are likely more MFX coming, so maybe we'll get an extra page or two in the MFX section. Only time will tell.

Interface

Pads

There are two firsts for the mk2 compared to the SP 202/303/404 product line. First and most noticeably there are now 16 pads instead of 8 (as the 202/303) or 12 (as the 404/404sx/404a). Second, the 16 Pads and Sub Pad are now velocity sensitive, which means that you'll be able to vary how loud a sample plays based on how hard you hit the pads.

Control Knobs

The mk2 has continued the 4 knob tradition since the 303, and has retained it's volume knob, and three CTRL knobs. These knobs are rotary knobs and have a clear start point and end point. This means that the knobs all have a definitive position and value based on where you have the knob set. You can somewhat adjust this behavior in your settings to allow for a more relative feel until the knob value catches up with the parameter value that you are controlling.

Value Knob

Finally the mk2 has added an endless/continuous knob that has a push toggle, to allow for relative input as well as an additional commit/enter command. This means that you can endlessly turn the knob clockwise or counter clockwise and it will adjust the specified parameter based on what the software settings the value knob is currently associated with.

My biggest concern for the mk2 currently is the rotary knob. It gets used very frequently, and is something I expect have issues in the future. If you're going to travel make sure that you don't jam the mk2 into a crowded backpack, or bring a separate custom purpose case to help protect your device.

Display

The mk2 has an OLED graphical display now, which although it is not high resolution by any means, is more than sufficient to display audio data, settings, options, and plenty of other information that makes than mk2 easier to work with than its predecessors.

External Connections

There are a number of connections for the mk2, and I'll do my best to break everything down.

Headphone Jacks

Yes you read that right, the mk2 has multiple (well okay 2) headphone jacks. It has both 1/4" and 1/8" headphone jacks, which is pretty handy for using different headphone types, and might be a good way to collaborate with other people with a single device.

Need to dig into any use cases or collaboration options. Does the mk2 amplify both signals, does one get cut off? Easy to test/check, but need to look into it. I can imagine a few interesting use cases with an iPad/mk2 hooked up together as well.

Stereo Output

Interestingly the mk2 has impedance balanced 1/4" TRS L/Mono & R jacks. This gives the mk2 some advantages to reduce the noise floor and eliminate ground loop noises when using the right cables within an impedance balanced studio environment.

The above said, I'm not sure how much this will help the average producer, as they are unlikely to be in a balanced environment, but I guess it is to say that it is a nice feature to have when you can take advantage of it.

Stereo Input

Sadly the 1/4” L/Mono & R jacks are the TS (no ring to provide impedance balance) type and appear to not be balanced.

Personally this doesn’t bother me too much, but it is a little bit strange to see balanced outputs and unbalanced inputs. It’s probably fine, but if you find running off of batteries or USB adds some noise, try using DC power.

Dual Microphone/Guitar Input

On the front there is dual microphone and guitar jack that is a 1/4” TRS. For a guitar the ring isn’t doing anything, so just use a standard TS cable to hook up your guitar and/or pedals. For microphones you’ll need a TRS cable, as this is how power is provided to the microphone.

I’m not sure what types of microphones the mk2 supports, going to need to do some research to figure this out.

MIDI Input and Output

The mk2 supports MIDI in and out, using 1/8” TRS jacks. You can buy these cables from Roland as accessories. For supported devices you should be able to connect TRS MIDI out to TRS MIDI in across devices.

Roland lists some optional (not included in the box) accessory cables that you can buy, and I’ll dig more into the specifications of them later.

BMIDI-5-35
BMIDI-1-35
BMIDI-2-35
BCC-1-3535
BCC-2-3535

There are two TRS cable formats for TRS to MIDI, make sure you get the right format documented here.

USB-C Connection

The mk2 has a USB-C port. It can be used for powering the device, sending and receiving MIDI information, and sending and receiving audio information. It has a lot of utility and I'll be writing about this extensively in sections to come.

As far as I can tell, this is class compliant audio and class compliant midi. This means that you shouldn't need any special drivers to use the mk2 with devices that support class compliant audio and midi.

Power

You can power your mk2 using several options, including the provided AC adaptor, USB-C, or with batteries.

AC Power

The mk2 takes DC power in at the terminal. The power adaptor for the mk2 is an AC (wall wart) adaptor and is specified as a 5.7 volt and 2 amp device, and is center negative. It is noted that the mk2 draws 1.1 amps of power, so the 2 amps from the power adaptor is more than sufficient to handle the power requirements of the mk2.

Older SP models were 9v, and you could swap out power supplies with other SPs or even guitar pedals. This is no longer the case, so make sure when power your mk2 that you use the provided power or something with the same specifications.

USB-C Power

The mk2 can be powered from another USB-C device or power adaptor. This can be helpful if you have a lot of USB-C devices to power or charge, and don't want to carry multiple different power adaptors around with you. One thing to note however, if you are powering over USB-C, the device or adaptor must provide 1.5 amps of power, or the mk2 will default to a different type of power. The older USB standards only provided 500ma of power, and would certainly be insufficient to power the mk2.

I'll get into it more later, but I have found you need a USB-C to USB-C cable to power the mk2 over USB. There are some issues of using USB-C to Lightning or USB-C to other USB cable types. Yes it works for information, but not power.

Battery Power

To power the mk2 off of battery power, you will need 6 Alkaline or Ni-MH batteries. There doesn't seem to be a way to tell the mk2 what type of batteries you have inserted like some other devices do. Roland specifies that for Alkaline batteries you will get approximately 2.5 hours of use and for Ni-MH batteries you will get about 3.5 hours of usage. If you use rechargeable batteries you can likely expect the amount of time you get between recharges to be lower, but you'll go through less batteries.

I just wanted to note, that it's not a great habit to get into leaving batteries in the mk2 for months or years without checking on them or replacing them. If you're not using the mk2 for extended periods of time consider taking the batteries out in case they leak so that they don't ruin your device.

Comparison

Not sure if this is interesting for folks or not… and this list could grow forever… if I get to it this section should probably move *way* down, maybe into an appendix?

Akai MPC Live/X/One
Boss SP-202
Boss SP-303
Boss SP-404
Boss SP-404(SX/A)

Data (Types of Data? Structure?)

The SP-404 mk2 has several types of concepts and data that you will want to make sure you understand while you are working with your mk2. This will help ensure that you are managing your mk2 data appropriately.

Draw a picture of Backup/Restore -> Projects -> Banks -> Samples/Patterns???

System Backup/Restore

Backing up your SP-404 mk2 will create a directory structure on your SD Card that contains all of your Settings, Projects, Banks, Samples, and Patterns in one easily referenced place.

Settings

When you enter **“UTILITY" |SHIFT|+[PAD 13]** you can get to all of your settings for how your SP-404 mk2 will operate. The UTILITY MENU allows you to make SYSTEM changes, PAD SET changes, EFX SET changes, IMPORT (and export) Projects and Samples, BACKUP, and FACTORY reset.

Turning **{VALUE}** will allow you to select which UTILITY MENU you would like to access, and pressing **{ENTER}** will allow you to enter the specific UTILITY MENU that you have selected.

By turning **(CTRL3)** you will be able to scroll through settings for GENERAL, CLICK, MIDI, GAIN, and VERSION.

These settings will effect the overall operation of your SP-404 mk2.

Does this change… project to project… saved with a backup/restore? Experiment to find out!

Projects

A project is the highest level of data that makes up the SP-404 mk2 workflow. Projects contain Banks, Samples, and Patterns within them

Banks

Banks contain Samples and Patterns, and both of these banks can be independent of the other.

Each Bank can contain 16 Samples and 16 Patterns.

Need info on **|SHIFT|+|BANK|** for Bank Volume Settings. Kind of straight forward I guess… but still.

Samples

Patterns

Sampling

Inputs

On the front of the SP-404 mk2 there is a 1/4” port/jack that can be used to (power/increase signal strength) of a guitar or a microphone. There is a switch labelled MIC/GUITAR, and a GAIN knob that can be turned to adjust the incoming signal boost.

Microphone

* Microphone
* Guitar
* L/R Inputs
* USB
* Resampling
* Skip Back

Sample Playback

* Start/End
* Pitch
* Envelope
* Chop
* Gate
* Loop
* Reverse
* Mute Groups
* Chromatic
* Fixed/Velocity
* Cue/Monitor
* Bus

Mixer

* Diagram
* Pad Volume
* Bank Volume
* Project Volume
*

Effects

* Bus/EFX Diagram
* Bus Effects
* EFX/Settings
* Input Effects
* Customization

Patterns

DJ Mode

System/Config

Import/Export
* File Structure
* Projects
* Samples

External Connection

* Midi
* Phone
* Tablet
* Cassette/Turntable/FM Radio
* Computer

Integration

* Computer
  * Reason Studio
  * Ableton Live
* Guitar
  * Electric
  * Pedals
* Microphone
  * ???
* Hardware
  * Akai MPC
  * Mixer
  * Midi Interface
* Eurorack
  * Audio
  * Midi
* iPad/iPhone
*

Customization

Face Plate

Knobs

Display

SP 404 mk2 App (roland cloud?)

Sample Packs

Appendix

Appendix ? - SP Use Cases

* SP as a buffer
* SP as a tape recorder
* SP as an effects box
* SP as a master bus

Appendix ? - Beat/Drum Patterns

Appendix ? - Workbook

* Foley Loops
*

Appendix ? - Finger Drumming

Appendix ? - Updating Firmware

Appendix ? - Experiments

Verifying Note Polyphony

Device

Rear

DC In

Power Switch

USB-C

1/8” TRS Midi In/Out

1/4” Line In R & L/Mono

1/4” Line Out R & L/Mono

Face

Volume -

CTRL 1/Cutoff

CTRL 2/Resonance

CTRL 3/Drive

Filter+Drive FX

Isolator FX

Resonator FX

DJFX Looper FX

Delay FX

MFX

Display

(Pattern Sequencer)

Pattern Select

Pattern Edit

(Sample Edit)

Start/End (Chop)

Pitch/Speed (Envelope)

Mark

(Push Enter)

Value Knob

(Sampling)

Del

Rec

Resample

(Sample Mode)
BPM Sync

Gate

Loop

Reverse

Roll (Roll Set)

Exit (Pattern Stop)

Copy

Remain (Current Pad)

(Bank)

A/F

B/G

C/H

D/I

E/J

Shift

Pad 1 (Fixed Velocity)

Pad 2 (16 Velocity)

Pad 3 (Cue)

Pad 4 (Chromatic)

Bus FX (Mute Bus)

Pad 5 (Exchange)

Pad 6 (Init Param)

Pad 7 (Pad Link)

Pad 8 (Mute Groups)

Hold (Pause)

Pad 9 (Metronome)

Pad 10 (Count-In)

Pad 11 (Tap Tempo)

Pad 12 (Gain)

Ext Source (Input Settings)

Pad 13 (Utility)

Pad 14 (Import/Export)

Pad 15 (Pad Settings)

Pad 16 (EFX Settings)

Sub Pad (Project)

|DJ Mode|

|Ch1|
Pad 1 (Bend+)

Pad 2 (BPM +)

Pad 5 (Bend-)

Pad 6 (BPM-)

Pad 9 (|<<)

Pad 10 (Sync)

Pad 13 (>/||)

Pad 14 (Cue)

|Ch2|
Pad 3 (Bend+)

Pad 4 (BPM +)

Pad 7 (Bend-)

Pad 8 (BPM-)

Pad 11 (|<<)

Pad 12 (Sync)

Pad 15 (>/||)

Pad 16 (Cue)

Front
1/4” Headphone Jack

1/8” Headphone Jack

Mic/Guitar Gain Knob

Mic/Guitar Switch

1/4” Mic/Guitar Jack

Side
SD Card Slot

Bottom
Serial Number

Battery Compartment

Definitions

Polyphony - Specifies the total number of unique sounds that be played at the same time. Traditionally each note of polyphony is a monophonic (not stereo) sound, thus meaning that a stereo sound is normally considered to be two notes of polyphony. The Sp-404 mk2 is specified as having 32 notes of polyphony

Volume

CTRL (1/2/3)

MIN/MAX

Pattern

Pattern Sequencer

Sequencer

MFX

Filter

Drive

Cutoff

Resonance

Drive

Polyphony

Index

References

Special Thanks

Acknowledgements