

# MOJO

CRUMAR<sup>®</sup>

# 61



**MOJO 61**  
**USER'S MANUAL**  
*Firmware version 1.0*

[www.Crumar.it](http://www.Crumar.it)



*Congratulations! You are now the lucky owner of a Crumar Mojo 61, one of the finest digital keyboards of the modern era. The Mojo 61 is a high quality instrument that was entirely conceived, developed and built in Italy with premium quality parts. This instrument is the result of years of research in sound design, quality electronics and has been assembled with first class craftsmanship. We wish you many years of enjoyment and good music with your new Mojo 61, and, if we may give you a small piece of advice... you guessed it... please read this manual in its entirety and keep it in a safe place for future reference! Have fun!*

*The Crumar Gang.*

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## **SAFETY INFORMATION**

- Do not open the instrument. Please don't! The instrument can be opened and repaired only by qualified personnel, who, much likely, isn't you. Unauthorized opening voids the warranty.
- Do not expose the instrument to rain or moisture, it gets ugly.
- Do not expose the instrument to direct sunlight. Who wants a tanned keyboard?
- Be careful not to infiltrate powders and liquids inside the instrument. Nor on the outside.
- If liquids get inside the unit, remove the power immediately to prevent the risk of electric shock and contact a service center as soon as possible. Don't use a hair dryer, it's a bad idea.
- Do not clean using abrasive cleaners as they may damage the surface and erase some of the beautiful prints.
- Please keep all packaging in case you need to transport the instrument to a service center, even though we hope this will never happen.
- The supplied power adapter can be used in any Country that has a mains voltage between 100 Vac and 240 Vac. Please use only the supplied PSU.
- Do not touch the AC adapter with wet hands.

## **WARRANTY**

- Crumar Mojo 61 is subject to 12 months manufacturer's warranty.
- Warranty extensions are at the discretion of the retailer.
- Damages caused by misuse, improper maintenance or transportation are not covered by this warranty.
- During the warranty period, the customer is entitled to repair or replacement of any parts considered defective at no charge.
- The possible replacement of the entire product is at the manufacturer's discretion.

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## CONVENTIONS USED IN THIS MANUAL

Every time a button, an LED or any other control is referenced, it is done by the number that has been associated to it in the drawings found in chapters 3 to 8. When you're invited to "press & hold" a button, it is intended that the button should be kept depressed for at least 2 seconds.

You will find that some concepts might be repeated more than once, this happens because there could be a mention in a chapter, and a detailed explication in a later chapter. "Repetita iuvant". It's latin for "repetition is useful".

We recommend you to read this manual with the instrument in front of you, so you can put what you read into practice and have an instant feedback of the notions here explained. Also because reading the manual alone without accessing the instrument is no much fun, right?

### VB3-II virtual tonewheel organ



This is the exact same software that powers the Crumar Mojo and presents the same parameter set. VB3-II is the result of 12 years of study, research, experimentation and development of the simulation of a vintage Hammond B3 organ. It is the evolution of the GSi VB3 1.4 which is still available as a plugin for digital audio workstations. In the last 5 or 6 years it has been considered the best simulation of a tonewheel organ by some of the most acclaimed jazz and rock organists and organ techs. The Crumar Mojo has been a best-seller in the "Clone Organ" market during 2013 and 2014 and now the new Mojo 61 offers you the possibility to take advantage of one of the best clone organs ever without compromises.

### Pipe Organ



A pipe organ is not something you see every day, there are thousands of different pipe organs that differ by the number of stops, the number of manuals, the number and the type of pipes, their size, their position, etc. but we wanted to keep it simple and offer a pipe organ that would be easy to understand and inspiring to play, so we chose to offer a Baroque-style organ based on a single manual and 9 stops plus 3 couplers and the classic "tremulant" effect.

This synth engine works as an hybrid synthesizer, uses additive synthesis and physical modeling, there are no samples involved. The expression pedal responds naturally and varies the amount of air that passes through the pipes. There is a total of 776 virtual pipes.

### Combo Organs



The Mojo 61 features two simulations of very famous Italian transistor organs of the seventies, the VOX Continental and the Farfisa Compact DeLuxe. Each of these organs is simulated in every detail, reproducing the essence and the exact color of that gritty organ sound that was the cornerstone of rock bands like the Doors, the Pink Floyd and similar. The polyphony is full (all 61 notes at the same time) and all controls behave exactly like in the original instrument. One note: since both these organs were originally based on 49-note keyboards, we chose to bring the pedalboard tones to the first octave. The pedalboard tone has no settings.

## Tines Electric Piano



There's no keyboardist without a good Rhodes electric piano sound. And the Mojo 61 offers what can be considered the best fusion between sound fidelity and playability. This synth engine is based on more than 10 years of experience on the physical modeling simulation of a Rhodes electric piano, everything in the "body" of each single note from the attack transient to the very last decay is purely simulated. Some minor elements are added from selected sampled sources, but the most important part of the sound is pure synthesis. Every element of the mechanical piano is virtually reconstructed in the Mojo 61, from the hammer, the hammer-tips, the tines, the tonebars, the pick-ups, the dampers, the output filter straight to the output jack, and they all behave exactly like in the real thing. Each of the 88 notes is simulated individually, and each note is a generator on its own, thus offering the full polyphony, no note stealing and a very natural and true to the original behavior. Plus, this new simulation features a very realistic sympathetic resonance that involves the whole "harp" that can vibrate and resonate every time a key is struck. It is really hard to tell the Mojo simulation from a real Rhodes piano, the level of realism and the number of details is very high.

## Reed Electric Piano



Similarly to the previous instrument, the simulation of a Wurlitzer 200A electric piano is totally based on physical modeling with only a minor addition of sampled material. Same technique as before, every part of the mechanical piano is virtually reproduced in order to obtain the maximum level of realism and playability, including the sympathetic resonance. This piano has 64 notes and all of them can play at the same time.

## 2. THE EFFECTS

### **Tremolo / Auto-panner / Ring modulator**

Mojo 61 offers electric pianos and organs, so how could we miss such an important effect in the chain? It is a must in mono mode when combined with the Reed EP, sounds great in square stereo with the Tines EP.

### **Stereo Phaser**

This is a 4-stage stereo phaser (two individual phasers slightly shifted), and offers parameters such as LFO speed and depth. Sounds great on the electric piano sounds.

### **Stereo Chorus**

We've been listening to a selection of chorus effects for keyboards and guitars, ranging from the early analog BBD choruses up to the modern digital ones, but one that works really great on a vast variety of sounds is the two-voice BBD-based stereo chorus that Roland included in the RD-1000 and in many others of their instruments of the eighties. This is a simulation of that very chorus and sounds really great with the electric pianos.

### **Amp Simulator**

And here comes the boutique amp collection. This processor simulates five among the most used guitar and bass amps of all times: the Fender Twin, the Marshall JCM-800, the Vox AC30, the Roland Jazz Chorus and the Fender BassMan. Each amp features a 3-way equalizer and an adjustable overdrive.

### **Rotary Effect Simulator**

There's no VB3-II without a great rotary effect. This is the exact same rotary effect featured in the Crumar Mojo, offering the same control set and the same sound.

### **Digital Reverb**

This is a great sounding digital reverb that brings light and air to your sound. Sounds soft, smooth and deep, precise and alive, airy and so much realistic that's a real joy to have some in the mix.

### **Equalizer**

This section contains a very basic 3-band equalizer. Use it to shape your sound for a perfect match with your amplification system.

### 3. THE COMMAND PANEL – part 1

In this chapter we get familiar with the command panel of the Mojo 61; for a better readability, the panel has been split into three parts. Numbers are used to reference to each control later in this manual.

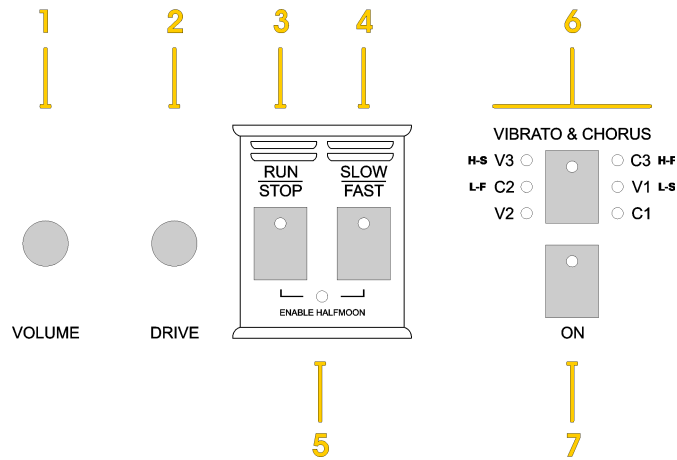


Fig. 1 - Command Panel part 1

1. Volume knob. Plain and simple.
2. Drive knob, adjusts the overdrive level when the Rotary Speaker effect is active on VB3 and when a Static Amp is active on Combo organs or Electric Pianos.
3. RUN/STOP: press to stop the rotation of the Rotary Speaker effect, the corresponding LED will turn on; press again to re-start the rotation, the LED will go off.
4. SLOW/FAST: press to switch between the two speeds of the Rotary Speaker effect. The corresponding LED animates accordingly. Please note that the LED animation is not synchronized with the sound, it's only there for reference (and also because it's cool). When the STOP speed is engaged, the LED animation halts. Depressing this button while in STOP mode will switch the speed and the LED will start animating again, even though there will be no effect on the sound until the STOP is disengaged using button n. 3.
5. This LED indicates that the support for the optional "Half-Moon" switch has been enabled, in this case buttons 3 and 4 are unresponsive. To enable and disable the "Half-Moon" support, press buttons 3 and 4 together.
6. Press this button to switch cyclically between the Vibrato/Chorus options. When playing VB3, there are 6 options (C1, C2, C3, V1, V2, V3); when playing the Combo organ "Compact DeLuxe", only 4 options are available (labeled with smaller characters, explained later).
7. This button enables/disables the Vibrato/Chorus effect on the selected manual.



## 4. THE COMMAND PANEL – part 2

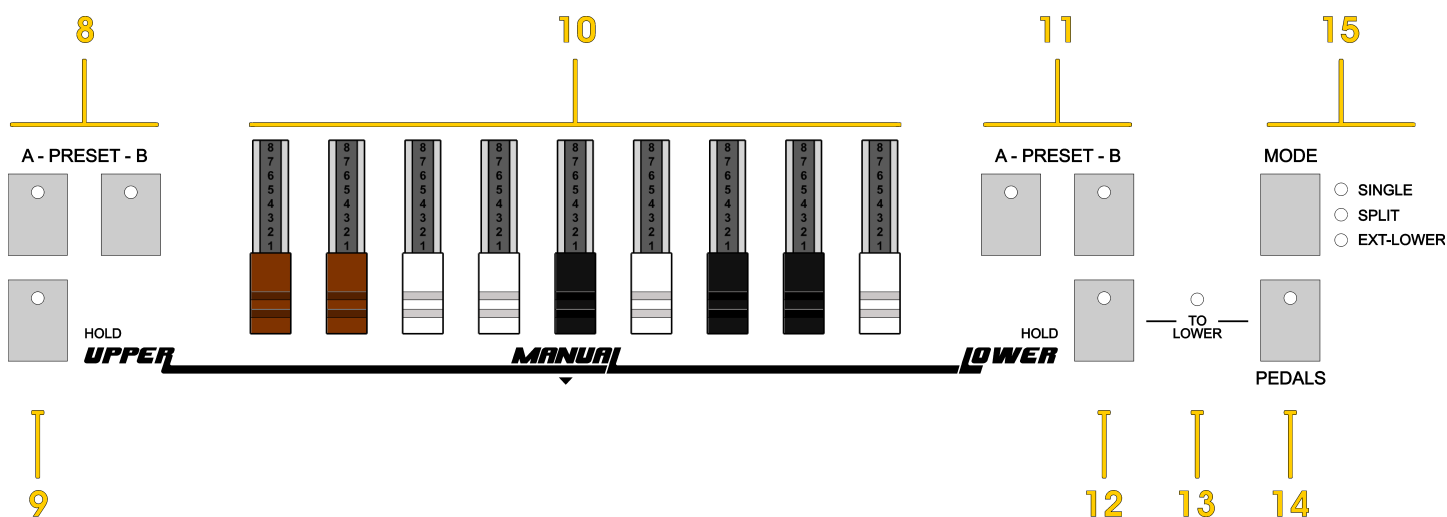


Fig. 2 - Command Panel part 2

8. Presets for the upper manual.
9. Upper manual selector / Upper HOLD function.
10. The funniest part of a drawbar organ: the drawbars.
11. Presets for the lower manual.
12. Lower manual selector / Lower HOLD function.
13. This LED indicates the status of the "Pedal-to-lower" function that can be enabled and disabled by pressing button n. 14 and then button n. 12.
14. Pedalboard selector.
15. MODE selector. Press to switch between SINGLE and SPLIT, press and hold to activate the EXT-LOWER mode.

## 5. THE COMMAND PANEL – part 3

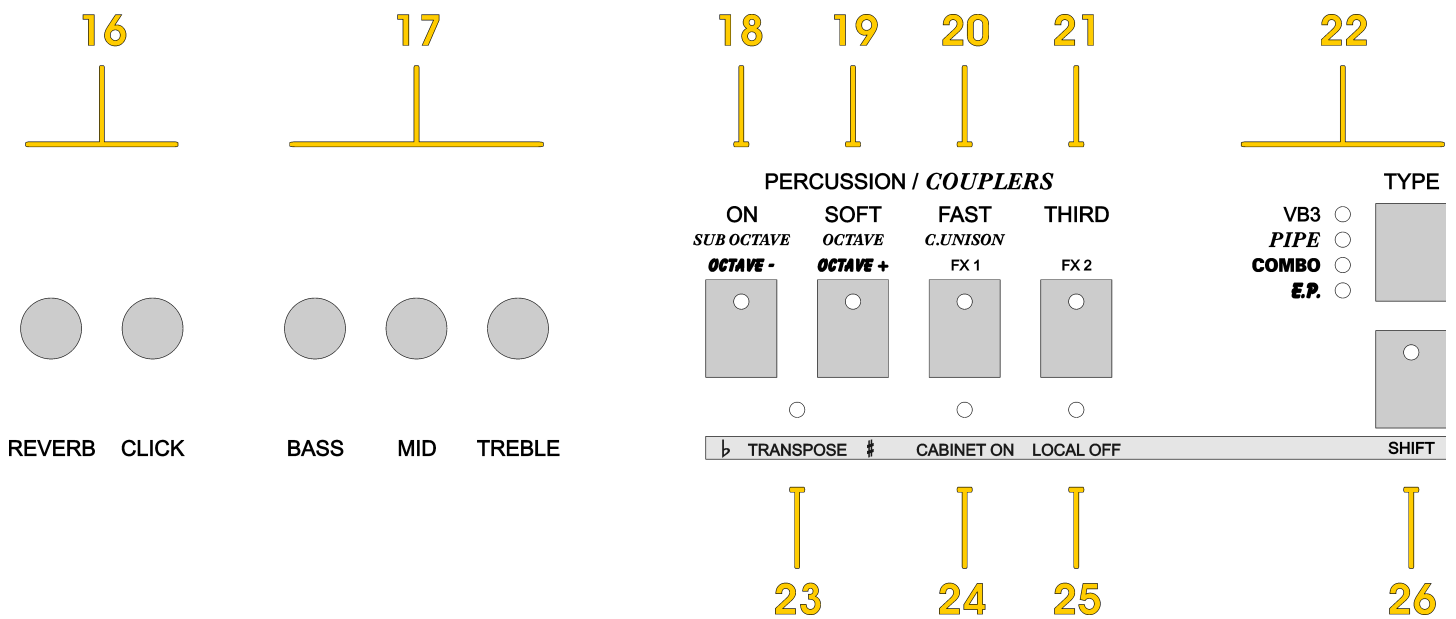


Fig. 3 - Command Panel part 3

16. Knobs for adjusting the Reverb level and the amount of key-click of VB3.
17. Equalizer section, works on top of everything.
18. Multi-function button n. 1.
19. Multi-function button n. 2.
20. Multi-function button n. 3.
21. Multi-function button n. 4.
22. Instrument type selection, where the real fun begins. Press this button to cycle between the four basic sounds (VB3, Pipe organ, Combo organ, Electric piano). The selection of which Combo organ and which E.P. to play can be done from the Editor app and via button shortcuts.
23. If you have a “perfect pitch” but hear something strange happening, keep an eye at this LED. This indicates whether the transposition has been enabled.
24. This LED indicates the status of the Rotary Speaker effect or the Static amps.
25. If you keep playing and no sound comes out of the instrument, don't panic! Keep an eye at this LED. This indicates whether the LOCAL-OFF function has been enabled. Normally, this LED should be off.
26. The SHIFT button... many buttons may have multiple functions thanks to this one button.

## 6. THE REAR PANEL

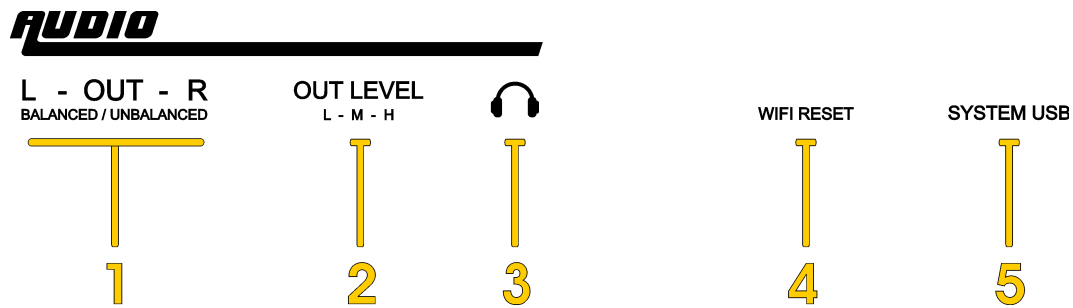


Fig. 4 - Back panel part 1.

1. Analog, line level, balanced, stereo audio output. Use your jack cords to connect the Mojo 61 to your amplification system. If you have balanced cables, use them.
2. Output level selection. The optimal choice is to leave this selector in the middle position (+4 dB); if you're connecting it to a home "consumer type" hi-fi system, use the "L" position (-10 dB); want more power? Use the "H" position.
3. Headphone output, max load = 32 ohm (check with your headphone specs). Best performance with studio grade 55 ohm headphones.
4. If you forgot your Wi-Fi password for accessing the Editor web-app, use a small screwdriver or a sharp pencil to push the button that hides behind this hole, then power-cycle the instrument (i.e.: turn off, wait a few seconds, turn on again).
5. System USB 2.0 Type "A" port, used for firmware updates and other goodies...

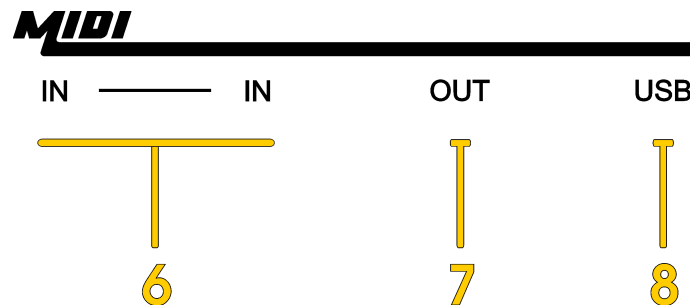


Fig. 5 - Back panel part 2.

6. These are two MIDI inputs internally merged together. If you want to connect an external keyboard to control your Mojo 61, just pick one of the two, they're identical. There are two because you might also want to connect a pedalboard, so you don't need an external MIDI Merger unit.
7. Your Mojo 61 can also be used to control other MIDI equipment, this is the usual MIDI output socket.
8. Class-compliant USB-MIDI IN/OUT port, can be used to connect the Mojo 61 to your computer without using an external MIDI interface.

## 7. CONNECTING CONTROL ACCESSORIES

There are three additional Jack sockets on the back of the Mojo 61 that are used to connect pedals or the “half-moon” 3-way switch.

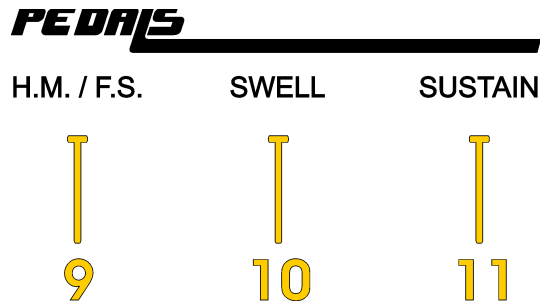


Fig. 6 - Pedal inputs.

9. Half-Moon or Foot Switch input socket. Here you can connect our dual foot switch or our half-moon switch; the latter can only be attached to the optional lower manual keyboard, and is activated by pushing the buttons n. 3 and n. 4 together; normally, this socket accepts the dual foot switch that works concurrently with the panel buttons dedicated to the Rotary Speaker speed buttons.
10. Connect a 10-K ohm expression pedal to this jack; our Crumar long-throw pedal is the perfect choice, but other 3<sup>rd</sup> party pedals might be compatible as well.
11. Connect a traditional sustain pedal to this jack; the polarity is automatically detected when the instrument is powered on, so make sure that the pedal is already connected before powering on.

### ABOUT THE SUSTAIN PEDAL

The sustain pedal is normally used when the Electric Piano sound is active and functions as a normal piano sustain pedal. However, when VB3 is active and the Rotary Speaker effect is on, the sustain pedal can be used to switch between SLOW and FAST speeds; when the speed is set to STOP by using button n. 3, the sustain pedal can be used to deactivate the rotary brake and return to the previous speed.

## 8. HOW TO TURN THE MOJO 61 ON AND START WOWING THE CROWD

You should have been given an external PSU (Power Supply Unit), one end goes to the power outlet, the other end goes to the power socket on the back of your Mojo, labeled with number 12.

Then, push the button n. 13, after a second you will see all the lights illuminating the control panel, and after 8 more seconds the instrument is ready to be played.

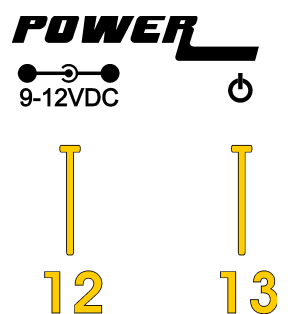


Fig. 7 – Power section.

## 9. ALL ABOUT VB3

VB3 is the first instrument that can be selected by pushing the button n. 22 labeled TYPE, and it's probably the main reason why you've bought the Mojo 61! It is the simulation of the tonewheel organ and is the main sound engine of your Crumar Mojo 61. Just like the original organ, it consists of three manuals, the upper, the lower and the pedalboard, even though we have only one physical keyboard and one set of 9 drawbars. Nevertheless, Mojo 61 offers some smart solutions to make it fun and easy to play without suffering the compromise too much.

First, select which MODE you wish to play by using button n. 15. It is very important, because the MODE establishes which manual the keyboard plays and which manual the drawbars must control.

Second, select which manual you're going to play and/or to control, by using the buttons n. 9 for the upper manual, button n. 12 for the lower manual, button n. 14 for the pedalboard.

Now an example is given in order to explain how different modes work. Let's assume that the upper manual is selected.

- MODE = SINGLE: the keyboard plays the upper manual and the drawbars control the upper manual registration;
- MODE = SPLIT: the keyboard is split in two parts, the left part plays the lower manual, the right part plays the upper manual; the drawbars control the upper manual (which, in this example, is selected); if we select the lower manual, the keyboard remains split but the drawbars will now control the lower manual;
- MODE = EXT. LOWER: the keyboard always controls the upper manual, the drawbars will control the manual that is currently selected. This is because the lower manual is expected to be played from an external MIDI keyboard.



*The playable extension of the VB3 organ is 61 notes, from C (note 36) to C (note 96). Applying the transposition would not affect the playable extension, thus resulting in having mute notes at one of the extremes of the keyboard.*

### **CHORUS / VIBRATO**

VB3 supports the 6 selections of Chorus or Vibrato, just like the original tonewheel organs, and separate activation on the upper manual and/or the lower manual (that also includes the pedalboard) by using only one button. When the upper manual is selected, button n. 7 and its LED relate to the upper manual; when the lower manual or the pedalboard is selected, button n. 7 works on the lower manual. Of course the status (on or off) is remembered.

## DRAWBARS

We assume you already know what drawbars are and how they affect the sound of a tonewheel organ. If you don't, we invite you to search the web and read one of millions documents that explain how tonewheel organs work. Our sole intention, in this chapter, is to explain that the 9 drawbars can work for both the upper manual and the lower manual, and the first 3 work for the pedalboard.

	1	2	3	4	5	6	7	8	9
<b>VB3</b>	16'	5-1/3'	8'	4'	2-2/3'	2'	1-3/5'	1-1/3'	1'
<b>PIPE</b>	Bourdon 16'	Fagotto 16'	Principal 8'	Flute 8'	Trumpet 8'	Oboe 8'	Flute 4'	Piccolo 2'	Mixture
<b>COMBO F</b>	Bass 16'	Strings 16'	Flute 8'	Oboe 8'	Trumpet 8'	Strings 8'	Flute 4'	Strings 4'	2-2/3'
<b>COMBO V</b>	16'	8'	4'	IV	Sinus	Master			
<b>TW-BASS</b>	16'	8'	RELEASE						

Fig. 8 - Drawbar function table.

Have a look at figure 8. The row labeled "VB3" indicates the pitch of each drawbar; the row labeled "TW-BASS" indicates that the first drawbar adjusts the 16' of the pedalboard, the second drawbar adjusts the 8' and the third drawbar adjusts the release time (simulation of the "string bass" function). Of course, in order to have drawbars adjusting the pedalboard, you have to select the pedalboard by pushing button n. 14. *Don't forget, first make sure which manual you have selected, then move the drawbars.*



*Despite the printed digits from 1 to 8 and the 15 "clicks" that you feel when moving the drawbars, they actually send 128 MIDI values from 0 to 127. Drawbars are just like normal slider pots, only with the shape and the look of organ drawbars.*

## DRAWBAR PRESETS

Each manual (upper and lower) supports two "drawbar presets"; upper manual uses buttons 8A and 8B, lower manual uses buttons 11A and 11B. They work just like the reversed color keys of a console tonewheel organ, exactly the same way. They only store the values of the drawbars. When a preset is activated, moving the drawbars won't make any change to the sound; when a preset is activated on the upper manual, the percussion is disabled; to re-enable the drawbars, just re-select the manual you wish to control.

To save a preset: select the manual, set the drawbars in the desired position, press and hold the preset button you wish to save. You'll see the LED quickly blinking only once, indicating the end of the process.

## THE HOLD FUNCTION

Probably you've noticed that, next to the labels "Upper" and "Lower", there's a smaller label that reads "HOLD". This is a special function that, when activated, momentarily disconnects the drawbars from the sound, allowing you to adjust the drawbars without affecting the sound, and get instantly to the new registration, as if it were a stored preset, the exact moment you deactivate the HOLD function.

Example: select the upper manual, set the drawbars the way you like and play a chord; now press the upper manual selection button again (button n. 9), you'll notice that the corresponding LED starts flashing; now move the drawbars to a new registration while still keeping the chord playing... hear, nothing changes to the sound; now push the HOLD button again, *et voilà!* New registration is now playing.

This is pretty much what organists use to do with console organs that have two drawbar sets per each manual.

## PEDALS TO LOWER

To activate or deactivate this function, first press and hold the pedalboard selection button n. 14 and then press lower selection button n. 12. The yellow LED n. 13 stays on if this function is enabled.

This function makes it possible to play the pedalboard tones along with the lower manual, one stacked on top of the other, with the difference that the lower manual will play across the whole keyboard, while the pedalboard will only play across the lower 25 notes.

## PERCUSSION

It's a short, percussive sound that's added on top of the drawbar sound with the aim to reinforce the attack transient, adds something special to the organ sound.

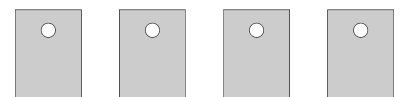
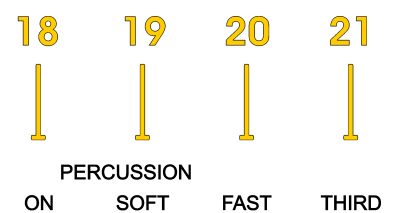


Fig. 9 - The percussion buttons.

- Button n. 18: Turns the percussion on or off. Please note that the percussion only works on the upper manual and, when activated, disables the sound of the last drawbar. Why? It's just how the original tonewheel organ works.
- Button n. 19: if activated, the percussion volume is "soft"; otherwise it's louder.
- Button n. 20: selects the percussion decay time, a short (fast) decay when it's on, or a longer (slow) decay when it's off.
- Button n. 21: selects the harmonic used for the percussion sound, the third harmonic (drawbar n. 5) when it's on, second harmonic (drawbar n. 4) when off.

## 10. PLAYING THE PIPE ORGAN

Press the TYPE button n. 22 to shift to the next sound, the Pipe Organ. This is a one manual organ with 9 stops, 3 couplers and the tremulant motor. *One important thing: remember to increase the Reverb level a bit when playing this sound!*

<b>PIPE</b>	Bourdon 16'	Fagotto 16'	Principal 8'	Flute 8'	Trumpet 8'	Oboe 8'	Flute 4'	Piccolo 2'	Mixture
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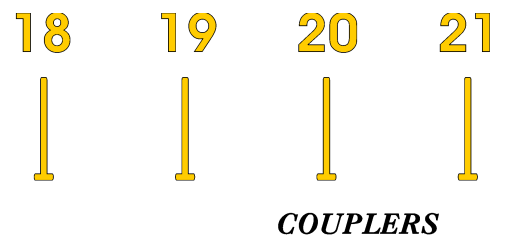
Fig. 10 - Pipe organ stops.

The drawbars, in this case, will function as on/off switches, just like the “stops” of a real pipe organ that can be pushed in (off) or pulled out (on). The middle position is the threshold, and the on/off transition is smooth. Every stop corresponds to a series of different pipes, some pipes are reused on certain note ranges. Pipes are organized differently across the stereo field, most generally the lower pitches are most audible on the left channel, and the high pitches are located more towards the right channel.

The Pipe Organ also supports presets A and B as well as the HOLD function, just like VB3. Please refer to the previous chapter.

### COUPLERS

The same buttons that were previously used for the percussion sound with VB3 are now used for the so-called “couplers”, which is a special mechanism of a pipe organ that allows a single note to play on multiple octaves.



Let's make an example: play the center C-note, now push button n. 18, this will activate the “SUB OCTAVE” coupler and you'll hear the lower C adding to the sound; now push button n. 19 that will activate the “OCTAVE” coupler, so that the higher C will also add to the sound; lastly, button n. 20 enables the “CANCEL UNISON” which will cancel the center note, i.e. the note that you are actually playing, leaving only the lower C and the higher C.

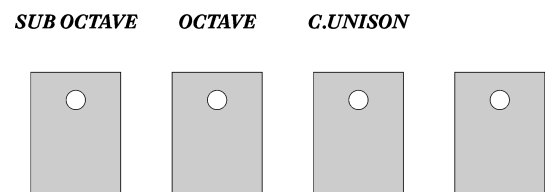


Fig. 11 - Pipe organ couplers.



*If the “CANCEL UNISON” coupler is enabled and the other two are disabled, you won't hear any sound. Actually, if you listen closely, you'll hear an airy attack sound like air that blows through the key and doesn't reach the pipes. Hey, it's physical modeling, after all!*

### TREMULANT MOTOR

This is an effect that can be activated using button n. 7. In pipe organs it's like a rotating vent that produces a sort of tremolo effect by alternating the air flow through the pipes.



## 11. FUN WITH COMBO ORGANS

Back in the seventies many bands that could not afford an electro-magnetic tonewheel organ used to buy smaller and less expensive transistor organs, mostly made in Italy. Two of the most famous models are perfectly imitated by your Mojo 61. Use the TYPE button n. 22 to activate the Combo organ sound. Deciding which Combo organ is activated from the Type button is done via the Editor web-app or a button shortcut explained later in this manual.

### DRAWBARS

<b>COMBO F</b>	Bass 16'	Strings 16'	Flute 8'	Oboe 8'	Trumpet 8'	Strings 8'	Flute 4'	Strings 4'	2-2/3'
<b>COMBO V</b>	16'	8'	4'	IV	Sinus	Master			

Fig. 12 - Drawbars functions when playing Combo organs.

The row labeled "Combo F" refers to the "Compact DeLuxe" type. In this case, the drawbars will act as on/off switches having the middle position as the threshold.

The row labeled "Combo V" refers to the "Continental" type. Here the drawbars act as normal drawbars with one exception: the first 4 drawbars are the registers, the next two adjust the volume of the two waveforms, the last three remain unused. If either the 5<sup>th</sup> or the 6<sup>th</sup> drawbars are not pulled out, there will be no sound.

### VIBRATO

The "Combo F" has 4 different vibrato types that can be selected using button n. 6 and can be turned on or off using button n. 7. The four selections are labeled as seen in fig. 13 and are:

- Light Slow
- Light Fast
- Heavy Slow
- Heavy Fast

The "Combo V" has no type selection, just the on-off switch.

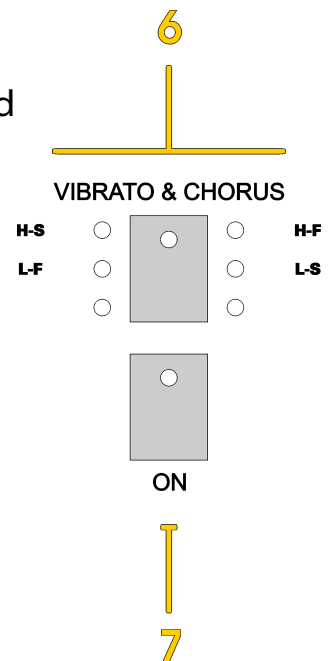


Fig. 13 - Vibrato selection for Combo Organs

## 12. ELECTRIC PIANO DELIGHT

Push the TYPE button n. 22 to activate the piano and start playing a little bit before going on with the reading of this manual. Take your time, we can wait...

You will agree with us that playing the electric pianos of the Mojo 61 is a delightful experience. These are not the usual samples that you've always found in all digital keyboards since the early 80's, instead, this is a real-time synthesizer that instantly reconstructs the sound of the electric piano while you play it, and you'll feel that it is alive, it breathes, reacts to your playing, and behaves just like the real thing.

There are a few things that you can test to prove that we are right. First, the dynamic response. How many velocity layers do you find in sampled instruments? Three? Five? Twelve? Here the dynamic is practically infinite. Here you will hardly hear twice the same attacks.

The polyphony. How many voices can the so-called ROMplers play? 64? 128? 256? Have you ever wondered why you'd need more voices than the keys you can actually play? The electric pianos in the Mojo 61 don't need to allocate extra voices because they behave just like the real thing, there's one moving element per key, so 88 playing keys = 88 voices (or 64 for the reed piano).

If you haven't connected a sustain pedal to your Mojo 61 we invite you do to so now. Now put your foot on the sustain pedal and keep it depressed, then play a *ribattuto* (keep playing the same note). You will notice some timbral changes due to the fact that an element is vibrating (a tine or a reed) and the hammer continues to put it into vibration, but sometimes the hammer happens to accelerate the vibration, other times it happens to dampen it. Also the attack sound changes every time, because you're virtually stimulating something that is already moving.

Resonances. An electric piano, just like an acoustic piano, has an harp and a soundboard where metallic elements are put into vibration and, in turn, transmit their vibration to the other elements. This is called "sympathetic" resonance. Try this: play a note in the treble register (for example the last D), now push the sustain pedal and keep playing that note. You will notice that all other tines (or reeds) are put into vibration.

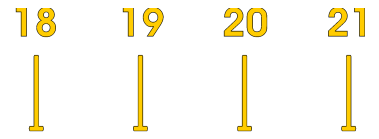
There is more, but we are confident that now you get the picture. Now back to the boring technical stuff. Won't you miss the effects?

Switching between the "Tine" and the "Reed" piano is done from the Editor web-app but can also be done using a button shortcut explained later in this manual.

### 13. APPLYING EFFECTS TO COMBO ORGANS AND ELECTRIC PIANOS

The Multi-function buttons numbered 18, 19, 20 and 21 can be used for accessing the effects and other useful functions.

When playing a Combo Organ you can switch FX1 and FX2 by using respectively buttons n. 20 and n. 21. Choosing which effect is associated to FX1 or to FX2 is done from the Editor web-app but can also be done using a button shortcut explained later.



When playing an electric piano, the octave can be shifted down or up by using respectively button n. 18 or n. 19. These buttons are exclusive, the octave can be either down or up. To reset the octave simply depress the active button again.

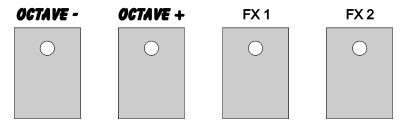


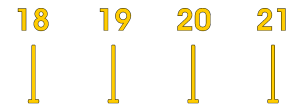
Fig. 14 - Multi-function buttons for Combo Organs and Electric Pianos



*The status of the effects is always remembered, so if – for example – FX1 was active on the Combo Organs and FX2 was active with Electric Pianos, every time you switch back and forth between the instruments, the effects will turn on or off exactly as you left them the last time.*

### 14. THE SHIFT BUTTON AND THE ALTERNATE FUNCTIONS

By pushing the SHIFT button n. 26 along with buttons 18, 19, 20 and 21 it is possible to access to other functions:



- SHIFT + button n. 18: transpose down by one semitone. It is possible to get down to -12 semitones.
- SHIFT + button n. 19: transpose up by one semitone. The higher limit is +12 semitones.

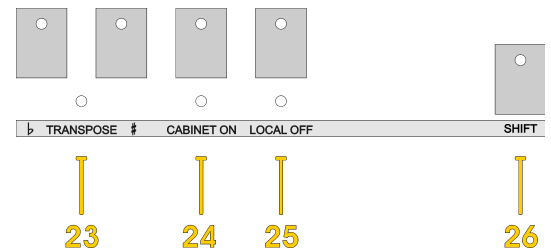


Fig. 15 - SHIFT functions

*Note: When the transposition is active, the yellow LED n. 23 is on.*

- SHIFT + button n. 20: turns on or off the “Cabinet” simulation which, in case of VB3, refers to the Rotary Speaker simulator, and in case of Combo Organs or Electric Pianos, refers to the Static Amp simulator. When the Cabinet simulation is on, it is possible to adjust the overdrive amount using knob n. 2.
- SHIFT + button n. 21: this toggles the “Local Off” function that disconnects the keyboard from the internal sound generator and activates the alternative Tx Midi Channel as explained later in this manual.

## 15. CONNECTING TO THE WEB-APP EDITOR

Any modern mobile device (tablets and smartphones) or any modern computer (desktop or laptop) can be used to access the Editor web-app. The execution speed of the Editor depends on the CPU power of your device. When the Mojo 61 is on, use your device's network options to start scanning for existing Wi-Fi networks. The Mojo 61 should cast an SSID that starts with "Mojo-xxxxxxx" where the "x" are replaced by an hexadecimal serial number that is unique per each unit. Complete the connection using the following password: 00000000 (eight times zero). The password can be changed later from the home screen of the Editor app and can be restored to its default value at any time by following the procedure described at page 10, point 4.

Once connected, open your favorite browser (Chrome, Safari, Firefox, Edge, etc.) and type the URL "Mojo/" (the final slash is important, some browsers might not recognize this as a URL) or type the IP number **192.168.1.1**

The Editor home page should load into your browser like a normal web site. This can be viewed either in portrait or landscape mode, the page should redraw itself accordingly.

The Editor consists of an home page, three editing pages for the sound parameters (VB3, Pianos and Effects), one further page for editing the Midi CC Map, and the button "Save All" highlighted in red.



## 16. USING THE WEB-APP EDITOR

The Mojo 61 Editor is a Web-App, an interactive web site that can be used to adjust all sound parameters and other functions. Parameters are generally presented under the form of horizontal sliders for more convenience when using the app from a touch device. However, the app can also be used with the mouse from a conventional computer.

An **in-line help** can be recalled by clicking/tapping on the question mark icon on the top right corner, or on the parameter names in the editing pages.

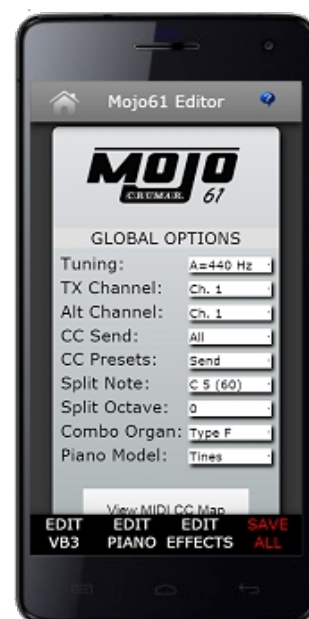


### THE HOME PAGE

Here is where you can set all global options and functions.

#### GLOBAL OPTIONS

- **TUNING:** This accepts a range from A=430 Hz to A=450 Hz, with 440 Hz being the default value. Every time this setting is changed, a reboot is required in order for the new change to take effect.
- **TX Channel:** the MIDI channel used for sending messages to the output ports. Considering that VB3 uses 3 channels, if this is set to 1, the upper part will send on ch. 1, lower on ch. 2 and the pedalboard will send on ch. 3. The channel will be folded back if it exceeds 16, so if you set this to channel 15, you'll have upper on 15, lower on 16 and pedalboard on channel 1.
- **Alt. Channel:** this is the *alternative* Channel that can be used only when the instrument is set in Local-off mode.
- **CC Send:** decide whether to send all Continuous Controller messages, only those used by the pedals, or none of them (thus only note messages will be sent).
- **CC Presets:** decide whether the CC messages related to the drawbars must be sent or not when a drawbar preset is recalled.
- **Split note:** set the lowest note of the right part of the keyboard when the Split mode is used.
- **Split octave:** can shift the octave of the left part (lower manual) of the keyboard when using the Split mode.
- **Combo Organ:** decide which Combo Organ you wish to use.
- **Piano Mode:** decide which Electric Piano model you wish to use.



#### VIEW MIDI CC MAP

This will open the MIDI CC Map page. See the paragraph "MIDI MAP" later in this manual.

## WI-FI PASSWORD

The default password for connecting to the Mojo 61 is "00000000", it can be changed to any word of a max. length of 8 characters. It's preferable to use only letters and numbers and avoid special characters. Setting a custom password prevents others to connect to the Mojo 61 while we are performing on the stage. However, the Wi-Fi radio in the Mojo 61 is powered enough to serve a connection in a range of max. 5 – 10 meters (30 feet) - even though this distance may vary according to possible interferences - and accepts only one connection at a time, so there's no risk that two people are commanding the Mojo 61 at the same time.

## PAGE: EDIT VB3

This page shows all parameters related to the VB3 engine and the Rotary Speaker effect. Every time you scroll a fader left or right, you can read the current value on top of it.

## PAGE: EDIT PIANO

This page shows all parameters related to the two electric piano simulations.

## PAGE: EDIT EFFECTS

This page shows the parameters related to the effects that can be used with the Combo Organs and the Electric Pianos. Effects are organized in colored boxes.

## PAGE: MIDI MAP

The MIDI Map page can be reached from the button in the home page or by clicking/tapping on the MIDI CC assigned to each parameter. It is possible to assign any of the 127 CC numbers to any parameter, and more than one parameter can be assigned to the same CC, if necessary, but this means that when that specific CC number is received, all parameters assigned to it will change accordingly.

## BUTTON: SAVE ALL

Click or tap this button in order to make all changes permanent.



*No further informations are given in this manual about the sound parameters accessible from the editor because they are explained in detail in the in-line help. If you have any doubts while editing your sound, click or tap the name of the parameter you wish to know more about and a pop up window will appear with the informations you need.*

## 17. SHORTCUTS

Some of the functions that are normally accessed from the Editor web-app can also be accessed using key-combinations on the command panel. Here's a summary:

- Switch between Combo Organ “F” and “V”: press SHIFT + the TYPE button n. 22 while playing the Combo Organ.
- Switch between Electric Piano “Tine” and “Reed”: press SHIFT + the TYPE button n. 22 while playing the Electric Piano.
- Switch between Square, Triangle and Mono Tremolo: press & hold the multi-function button n. 20 labeled “FX1”, the effect turns off for a short while then turns on again with the new setting.
- Switch between Phaser and Chorus: press & hold the multi-function button n. 21 labeled “FX2”, the effect turns off for a short while then turns on again with the new setting.
- Set the split point: press SHIFT + MODE button n. 15, the Split LED starts blinking, now play the desired split note on the keyboard (you won't hear any sound), the LED restores its previous position and the split point is now set and saved.
- Reset the transposition: press SHIFT + press & hold either button n. 18 or n. 19, the transpose LED n. 23 should turn off and the transpose amount is now zeroed.

## 18. THE USB PORTS

The Mojo 61 includes a Type-A “host” USB 2.0 port. This is mainly used for updating the software in case a new release is available.

But the most interesting use for this port is to connect a “Class-compliant USB-MIDI device”, i.e. one of the many MIDI devices that don't need special drivers when they are connected to a computer. The Mojo 61 will recognize USB-MIDI devices and will use them along with any other MIDI equipment connected to either one or both the classic MIDI inputs located on the rear panel. This way you can connect up to 3 MIDI devices to the Mojo 61, for example a keyboard, a pedalboard and a control surface.

Please avoid connecting unsupported devices to this port.

An additional Type-B USB 2.0 port is present at the back side of the Mojo 61 that provides Class-compliant USB-MIDI IN/OUT connection to your computer. Use this port to connect the Mojo 61 to your computer software. No drivers are needed.

## 19. MIDI FUNCTIONS AND IMPLEMENTATION CHART

Mojo 61 has a very functional and complete MIDI implementation. It can send and receive messages related to each single control and each single parameter; all physical controls located on the control panel have fixed MIDI CC assignments, while all sound parameters accessible from the Editor web-app can be freely assigned by the user. Every time a CC value is received, if it affects something that should be visible on the panel via LEDs, these turn on or off accordingly.

MIDI implementation chart v. 2.0			
Manufacturer: Crumar	Model: Mojo 61	Version: 1.0	Date: April 2016
		Transmit/Export	Recognize/Import    Remarks
<b>1. Basic information</b>			
MIDI channels		3	3
Note numbers		61	127 First C=note 36 – Transposed by -24/+24 semitones
Program change	No	Yes	Values 0 to 5
Bank select response? (Yes/No)	No		
If yes, list banks utilized in remarks column			
Modes supported:	Mode 1: Omni-On, Poly (Yes/No) Mode 2: Omni-On, Mono (Yes/No) Mode 3: Omni-Off, Poly (Yes/No) Mode 4: Omni-Off, Mono (Yes/No) Multi Mode (Yes/No)		
Note-On Velocity (Yes/No)	Yes		
Note-Off Velocity (Yes/No)	Yes		
Channel Aftertouch (Yes/No)	No		
Poly (Key) Aftertouch (Yes/No)	No		
Pitch Bend (Yes/No)	No		
Active Sensing (Yes/No)	No		
System Reset (Yes/No)	No		
Tune Request (Yes/No)	No		
Universal System Exclusive:	Sample Dump Standard (Yes/No)	No	
	Device Inquiry (Yes/No)	No	
	File Dump (Yes/No)	No	
	MIDI Tuning (Yes/No)	No	
	Master Volume (Yes/No)	No	
	Master Balance (Yes/No)	No	
	Notation Information (Yes/No)	No	
	Turn GM1 System On (Yes/No)	No	
	Turn GM2 System On (Yes/No)	No	
	Turn GM System Off (Yes/No)	No	
	DLS-1 (Yes/No)	No	
	File Reference (Yes/No)	No	
	Controller Destination (Yes/No)	No	
	Key-based Instrument Ctrl (Yes/No)	No	
	Master Fine/Coarse Tune (Yes/No)	No	
	Other Universal System Exclusive	No	
Manufacturer or Non-Commercial System Exclusive	Yes	Yes	
NRPNs (Yes/No)	No		
RPN 00 (Pitch Bend Sensitivity) (Yes/No)	No		
RPN 01 (Channel Fine Tune) (Yes/No)	No		
RPN 02 (Channel Coarse Tune) (Yes/No)	No		
RPN 03 (Tuning Program Select) (Yes/No)	No		
RPN 04 (Tuning Bank Select) (Yes/No)	No		
RPN 05 (Modulation Depth Range) (Yes/No)	No		
<b>2. MIDI Timing and Synchronization</b>			
MIDI Clock (Yes/No)	No		
Song Position Pointer (Yes/No)	No		
Song Select (Yes/No)	No		
Start (Yes/No)	No		
Continue (Yes/No)	No		
Stop (Yes/No)	No		
MIDI Time Code (Yes/No)	No		
MIDI Machine Control (Yes/No)	No		
MIDI Show Control (Yes/No)	No		
If yes, MSC Level supporte			
<b>3. Extensions Compatibility</b>			
General MIDI compatible? (Level(s)/No)	No		
Is GM default power-up mode? (Level/No)	No		
DLS compatible? (Levels(s)/No)	No		
(DLS File Type(s)/No)	No		
Standard MIDI Files (Type(s)/No)	No		
XMF Files (Type(s)/No)	No		
SP-MIDI compatible? (Yes/No)	No		



## 20. MIDI MAP

PARAMETER NAME	C.C. NUMBER	REMARKS
Volume	7	
Drive	76	
Reverb	91	
Key-click	75	
Bass	8	
Middle	9	
Treble	10	
Drawbar Upper n.1	12	For all organs
Drawbar Upper n.2	13	For all organs
Drawbar Upper n.3	14	For all organs
Drawbar Upper n.4	15	For all organs
Drawbar Upper n.5	16	For all organs
Drawbar Upper n.6	17	For all organs
Drawbar Upper n.7	18	For all organs
Drawbar Upper n.8	19	For all organs
Drawbar Upper n.9	20	For all organs
Drawbar Lower n.1	21	Only VB3
Drawbar Lower n.2	22	Only VB3
Drawbar Lower n.3	23	Only VB3
Drawbar Lower n.4	24	Only VB3
Drawbar Lower n.5	25	Only VB3
Drawbar Lower n.6	26	Only VB3
Drawbar Lower n.7	27	Only VB3
Drawbar Lower n.8	28	Only VB3
Drawbar Lower n.9	29	Only VB3
Drawbar Pedals n.1	33	Only VB3
Drawbar Pedals n.2	35	Only VB3
Vibrato Type	73	Values: VB3 = 0, 25, 50, 76, 101, 127; Combo F = 0, 42, 84, 127
Vibrato Upper Switch	31	For all organs
Vibrato Lower Switch	30	Only VB3
Percussion On	66	Also Pipe Organ Sub-Octave
Percussion Soft	70	Also Pipe Organ Octave
Percussion Fast	71	Also Pipe Organ Cancel Unison
Percussion Third	72	
Pedals-to-lower	55	
Pedalboard release time	56	
Rotary Effect Switch	85	
Rotary Effect Slow/Fast	1	Values: 0 = slow, 127 = fast
Rotary Effect Run/Stop	68	Also sends CC#1 value 64 when speed = stop
FX1 Switch	92	
FX2 Switch	93	
Static Amp Simulator Switch	88	

## **KEYBOARD VELOCITY**

Mojo 61 can send notes with or without velocity according to the instrument selected with the Type button n. 22. If VB3 or Combo Organ is selected, notes are sent with a fixed velocity value of 127 but the first key contact is used (fast key triggering). If Pipe Organ or EP is selected, velocity is sent. Key-off velocity is always sent. Any transposition or octave shifting applied to the internal sound generator is also applied to the transmitted note messages.

## **PEDALS**

The sustain pedal sends CC #64 with values 0 or 127 only when the EP is selected. The expression (Swell) pedal sends CC #11.

## **OTHER**

The instrument type selection can be remotely done by sending Program Change events with the following values: 0 = VB3, 1 = Pipe Organ, 2 = Combo "F", 3 = Combo "V", 4 = Tine Piano, 5 = Reed Piano.

## **21. SPECIFICATIONS**

Technical specifications:

- power rating: 9 ~ 12 Volts
- output level: selectable -10 dBu, +4 dBu, High Gain (~ +10 dBu)
- headphone output max load: 32 ohm
- dimensions: 92,3 cm X 35 cm X 12 cm / 36,3" x 13,7" x 4,7"
- weight: 11,5 Kg / 25,35 lbs

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